



OIL & GAS DEVELOPMENT COMPANY LTD

TENDER DOCUMENT

FOR

**“LAYING OF 8” DIA x 2.0 KM FLOWLINE FOR
NASHPA WELL NO 11”**

TENDER ENQUIRY NO: TE/C&ESS/PRESS/FGCP1-1006

SUMMARY OF VOLUMES OF TENDER DOCUMENTS

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- INVITATION OF BIDS
- INSTRUCTION TO BIDDERS
- BIDDING DATA
- FORM OF BID AND APPENDICES TO BID
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VOLUME – I

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INTRODUCTION & BRIEF SCOPE



INTRODUCTION & BRIEF SCOPE

Oil & Gas Development Company Limited (OGDCL) is an Exploration / Production company which is operating oil/gas fields in various parts of Islamic Republic of Pakistan. At one of the fields, OGDCL intends for "LAYING OF 8" DIA x 2.0 KM FLOWLINE FOR NASHPA WELL NO 11". This is open competitive bidding with Single Stage-One Envelope in-line with PPRA rules open for all eligible bidders.

BRIEF SCOPE OF WORK:

I. Pipeline (8" Sch 80, 2.0 KM):

- 1) The scope of work is for laying of new flowline of 8" Sch 80 x 2.0 km (approx.).
- 2) Clearing and Grubbing of ROW including ROW preparation.
- 3) Stringing along ROW.
- 4) Fabrication, Welding & Installation of flowline 8" Sch 80, Lowering in trench maintaining prescribed depth from NGL or/and as per given design package and as per instructions / satisfaction of Engineer I/C.
- 5) Surface preparation by sand blasting (SA 2.5).
- 6) Supply & Installation of HSS,
- 7) Installation of Valves, Fittings, structure etc.
- 8) Holiday detection and repairing of coating.
- 9) Civil Works including excavation, backfill, Pipeline Anchor block etc.
- 10) Testing & pre-commissioning as per design code.
- 11) Pipeline pigging & supply of pigs.
- 12) Preparation of Cold bend at per design package & site requirement.
- 13) Detail works are mentioned in BOQ.
- 14) Supply of Coated Pipe 8" sch 80, insulation joints, valves, fittings, flanges, and Factory Bends will be provided by OGDCL.

II. Exclusion:

All NDT for welding joints shall be carryout out by OGDCL through third party companies.

III. Procurement/Material Supply

In general, the contractor will be required to arrange all construction consumables (Sand, bars, cement, bricks, Anchor Bolt etc.), required to carry out Civil, mechanical, piping works. In addition to the construction consumables the contractor needs to provide following material. The discipline wise distribution of material supply is given as follows:

a. Piping

- i. Piping support (all type) material including all structural steel material on the basis of piping supports drawings.
- ii. Supply and application of primer (Compound A+B) with application kit, Supply and installation of Heat shrinkable sleeve on 8" diameter pipeline (preferably Raychem HTLP 80) and patches complete in all respect including surface preparation (as per BS



- 2.5 standard). Sleeves and primer for fixing of sleeves to be supplied by contractor as per recommendation and approval of OGDCL.
- iii. All construction consumables required to carry out piping work: (Welding electrodes, oxy/acetylene gases, fuels, grinder discs, primers & paints etc.)

b. Mechanical

All construction consumables required to carry out mechanical work. Moreover, Compressor, pumps, Pigs etc. required for testing and commissioning shall be arranged by Contractor.

c. Civil work

Contractor shall supply all materials required for the construction of civil structures, including but not limited to the following;

- i. Pipe Supports & Sleepers;
- ii. Sand, bars, cement, bricks, Anchor Bolt etc.
- iii. The contractor is responsible to provide the material required like C-Channels, Channels, Support and material.

d. TERMS AND CONDITIONS

1. All participants should carefully read TOR's attached with the Tender documents (attached herewith and must be downloaded from www.ogdcl.com) before submission of Bid. These Terms & Conditions also include the foot notes of BOQ (attached) and is considered part of the contract TORs.
2. All participants are encouraged to visit Field Party Camp and site area to discuss & understand Scope of work, standards required to be followed for job execution and completely eliminate any source of confusion before bidding.
3. Bidder must provide prior relevant experience certificates of previous completed projects along with bid documents.
4. Contractor must provide prior experience certificates of its Staff i.e. Welder, Fitters, supervisors, riggers, supervisors, QA/QC persons etc.
5. Contract period and payment terms shall be as follows:
 - a) **Contract/Completion Period:** (as per TOR):
Completion time will be within 45 Calendar days from the date of possession of Site.
 - b) **Payment Terms:**
Payment shall made as per actual work done through verified invoices by Engineer In-charge which will be issued on monthly basis as per company rules and procedure.
 - i. After issuance of LOI/LOA, CONTRACTOR shall submit 10% Performance bond in the form of Bank Guarantee issued by first class scheduled bank. The



Performance Bond Guarantee shall be valid till the Defect Liability Period which shall be released by OGDCL after completion of Defect Liability Period. Performance bond shall be submitted within 7 days after issuance of LOI/LOA.

- ii. Subsequent invoices shall be issued by the CONTRACTOR on monthly basis, on the basis of activity progress. Payment shall be made as per actual work done as per BOQ through verified invoices by Engineer In-charge which will be issued on monthly basis as per company rules and procedure. All the invoices shall be subject to retention money equal to 10% of the invoice value until the limit i.e. 5% of contract value is reached.
- iii. All the invoices shall be subject to all applicable taxes except Provincial Sales Tax.
- iv. The contract price is exclusive of all types of GST/KPST which shall be charged separately to OGDCL wherever applicable as per company policy and rules.

c) Bid Bond Security:

All bids must be accompanied by a Bid Security in the form of a Bank Draft/ Pay Order/ Deposit at Call / CDR / Bank Guarantee payable at any scheduled Bank in Islamabad for an amount of two 02% of the estimated cost of Tender to be submitted in original with Technical Bid & must be delivered in the office of in the name of "Oil & Gas Development Company Limited (OGDCL), Islamabad"

d) Mobilization Advance:

No Mobilization advanced allowed for this project.

e) Retention Money:

All the invoices shall be subject to retention money equal to 10% of the invoice value until 5% of the total contract amount is reached.

6. Contractor to comply with specifications and applicable standards and codes.
7. Price escalation/ revision of quoted rates is not allowed after award of contract and/or during execution of works or before/after project completion.
8. Rates in submitted bids to be provided as per BOQ Format.
9. After issuance of formal work order, Contractor is to provide services immediately or at a date mentioned by OGDCL.
10. The Quantities contained in the scope of work for each activity are estimated and liable to change (increase, decrease or omitted) when the work is actually executed. The payment will be made to the Contractor on the actual quantity of work performed.
11. OGDCL reserves the right to inspect, stop and advise rework for any job either during execution or after execution, if deemed necessary by the Company's representative based on inspections, quality of the job, finish of the job or if the job is not being or have been performed in line with the best engineering practices. In this regard the rework will be in Contractor's Scope without any extra claim of charges.
12. Contractor is to abide by all Safety Rules and Regulations of OGDCL. Contractor must comply to submit required HSE documents by Engineer In-charge such as JHA, JSA, etc as deemed necessary for safe execution of works.



13. Contractor will provide all kind of PPE's, safety equipment etc to its labor or workforce.
14. Inspection request to be submitted by the contractor to QA/QC inspector (appointed by OGDCL) prior to start of works or any activity related to the project.
15. Mob/De-mobilization, Equipment, machinery, tools, manpower, camping, utilities, security etc required for completion of work shall be on part of contractor.
16. Camp facility including security of personnel, utilities, equipment, and material shall be arranged by contractor.
17. Contractor will submit necessary documents including the following for invoicing at the successful completion of the job:
 - a. Commercial Invoice
 - b. Services Tax Invoice
 - c. Annexure-C
 - d. IBAN number and other Details of account on Letter Head.
 - e. Active Professional Tax Certificate of concerned excise office where operating business.
18. The Contractor should have valid NTN and GST number and have active status on FBR website.

Details are given in BOQ & Drawings.

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DRAWINGS



INVITATION FOR BIDS



INVITATION FOR BIDS

Date: _____

Bid Reference No.: _____

1. The Oil & Gas Development Company Limited (OGDCL) Islamabad the (“Employer”) intend for **“LAYING OF 8” DIA x 2.0 KM FLOWLINE FOR NASHPA WELL NO 11**”. Bidding is open for all eligible bidders.
2. The Employer invites sealed bids under **Single Stage – One Envelope** bidding procedure, from eligible firms licensed by the Pakistan Engineering Council in the appropriate C-6 & above category for the works. A foreign bidder is entitled to bid only in a joint venture with a Pakistani constructor in accordance with the relevant provisions of PEC bye-laws.
3. Bidders may download TORs and other relevant documents from our website www.ogdcl.com under tender tab. Further information may be obtained from the office of the Party Chief-Field Gathering and Construction Party-1 (PC-FGCP-1), Near Sadqal Oil Field & Shah Petroleum, Fateh Jang. Cell: 0300-5550961 Email: partychieffgcp1@ogdcl.com
4. All bids must be accompanied by a Bid Security in the form of a Bank Draft/ Pay Order/ Deposit at Call / CDR / Bank Guarantee payable at any scheduled Bank in Islamabad for an amount of **two 02%** of the estimated cost of Tender to be submitted in original with Technical Bid & must be delivered in the office of in the name of **“FGCP-I Oil & Gas Development Company Limited (OGDCL), Islamabad”**.
5. Bids will be opened at the same time and day as mentioned in Press advertisement in the presence of bidder’s representatives who choose to attend at Field Gathering and Construction Party-1, as per address mentioned above.



INSTRUCTIONS TO BIDDERS



INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 Scope of Bid

- 1.1 The Employer as defined in the Bidding Data hereinafter called “the Employer” wishes to receive bids for the construction and completion of works as described in these Bidding Documents, and summarized in the Bidding Data hereinafter referred to as the “Works”.
- 1.2 The successful bidder will be expected to complete the Works within the time specified in Appendix-A to Bid.

IB.2 Source of Funds

- 2.1 Budget is available for the said project.

IB.3 Eligible Bidders

- 3.1 This Invitation for Bids is open to all bidders meeting the following requirements:
 - a. Duly licensed by the Pakistan Engineering Council (PEC) in the category relevant to the value of the Works.
 - b. Must fulfill mandatory requirements as per Technical and Financial Evaluation Criteria as specified in tender documents.

IB.4 One Bid per Bidder

- 4.1 Each bidder shall submit only one bid either by himself, or as a partner in a joint venture. A bidder who submits or participates in more than one bid (other than alternatives pursuant to Clause IB.16) will be disqualified.

IB.5 Cost of Bidding

- 5.1 The bidders shall bear all costs associated with the preparation and submission of their respective bids and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

IB.6 Site Visit

- 6.1 The bidders are advised to visit and examine the Site of Works and its surroundings and obtain for themselves on their own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. All cost in this respect shall be at the bidder’s own expense.
- 6.2 The bidders and any of their personnel or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the bidders, their personnel and agents, will release and indemnify the Employer, his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to



property and any other loss, damage, costs and expenses incurred as a result of such inspection.

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

7.1 The Bidding Documents, in addition to invitation for bids, are those stated below and should be read in conjunction with any Addenda issued in accordance with Clause IB.9.

1. Instructions to Bidders.
2. Bidding Data.
3. General Conditions of Contract, Part-I (GCC).
4. Particular Conditions of Contract, Part-II (PCC).
5. Specifications - Technical Provisions.
6. Form of Bid & Appendices to Bid.
7. Bill of Quantities (Appendix-D to Bid).
8. Form of Bid Security.
9. Form of Contract Agreement.
10. Forms of Performance Security and Guarantee/Bond.
11. Drawings.

7.2 The bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of bid submission will be at the Bidder's own risk. Pursuant to Clause IB.26, bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.8 Clarification of Bidding Documents

8.1 Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification which he receives earlier than 7 days prior to the deadline for submission of bids.

Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying its source.

IB.9 Amendment of Bidding Documents

9.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by issuing addendum.

9.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer.

9.3 To afford prospective bidders reasonable time in which to take an addendum into



account in preparing their bids, the Employer may extend the deadline for submission of bids in accordance with Clause IB.20

- 9.4 “Any other clarification given by the employer in writing to the bidders at pre-bid stage shall be considered as an addendum and shall be part of the bid documents.”

C. PREPARATION OF BIDS

IB.10 Language of Bid

- 10.1 The bid and all correspondence and documents related to the bid exchanged by a bidder and the Employer shall be in the bid language stipulated in the Bidding Data and Particular Conditions of Contract. Supporting documents and printed literature furnished by the bidders may be in any other language provided the same are accompanied by an accurate translation of the relevant parts in the bid language, in which case, for purposes of evaluation of the bid, the translation in bid language shall prevail.

IB.11 Documents Accompanying the Bid

- 11.1 Each bidder shall:

- (a) Submit a written power of attorney authorizing the signatory of the bid to act for and on behalf of the bidder;
- (b) Update the information indicated and listed in the Bidding Data and previously submitted with the application for prequalification, and continue to meet the minimum criteria set out in the prequalification documents which as a minimum, would include the following :
 - (i) Evidence of access to financial resources along with average annual construction turnover;
 - (ii) Financial predictions for the current year and the two following years including the effect of known commitments;
 - (iii) Work commitments since prequalification;
 - (iv) Current litigation information.
 - (v) Availability of critical equipment.
- (c) Furnish a technical proposal taking into account the various Appendices to Bid specially the following:

Appendix-E to Bid	Proposed Construction Schedule
Appendix-F to Bid	Method of Performing the Work
Appendix-G to Bid	List of Major Equipment
Appendix-K to Bid	Organization Chart for Supervisory Staff

and other pertinent information such as mobilization programme etc;

- 11.2 Bids submitted by a joint venture of two (2) or more firms shall comply with the following requirements:



- (a) The bid and in case of a successful bid, the Form of Contract Agreement shall be signed so as to be legally binding on all partners;
- (b) One of the joint venture partners shall be nominated as being in charge; and this Authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners;
- (c) The partner-in-charge shall always be duly authorized to deal with the Employer regarding all matters related with and/or incidental to the execution of Works as per the terms and Conditions of Contract and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf of the joint venture;
- (d) All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a statement to this effect shall be included in the authorization mentioned under Sub-Para(b) above as well as in the Form of Bid and in the Form of Contract Agreement (in case of a successful bid); and
- (e) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid stating the conditions under which it will function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. No amendments / modifications whatsoever in the joint venture agreement shall be agreed to between the joint venture partners without prior written consent of the Employer.

11.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the Bidders' proposals to meet the technical specifications and the completion time referred to in Sub-Clause 1.2 hereof.

IB.12 Bid Prices

- 12.1 Unless stated otherwise in the Bidding Documents, the Contract shall be for the whole of the Works as described in Sub-Clause 1.1 hereof, based on the unit rates and / or prices submitted by the bidder.
- 12.2 The bidders shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by a bidder will not be paid for by the Employer when executed and shall be deemed covered by rates and prices for other items in the Bill of Quantities.
- 12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a bidder.

Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.



IB.13 Currencies of Bid and Payment

- 13.1 The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees.
- 13.2 No other currency will be acceptable

IB.14 Bid Validity

- 14.1 Bids shall remain valid for the period stipulated in the Bidding Data i.e. **60 days** after the Date of Bid Opening specified in Clause IB.23.
- 14.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period which shall in no case be more than the original bid validity period. The request and the responses thereto shall be made in writing. A bidder may refuse the request without forfeiting his Bid Security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects.

IB.15 Bid Security

- 15.1 Each bidder shall furnish, as part of his bid, a Bid Security in the amount stipulated in the Bidding Data in Pak Rupees.
- 15.2 Bid Bond / Bid Security / Earnest Money / Performance Bond / Advance Bank Guarantee in shape of Pay order / Cash Deposit Receipt / Demand Draft issued by a Pakistani Schedule Bank (listed or not listed at Pakistan Stock Exchange) or a branch of foreign bank operating in Pakistan is acceptable.

However, bid bond / Bid Security / Earnest Money / Performance Bond / Advance payment in shape of Bank Guarantee will not be acceptable with the bank whose market price per share quoted below the par value at stock Exchange.

Cross cheque / Insurance Guarantee / Swift Message will also not be not acceptable.

- 15.3 Any bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive.
- 15.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than 28 days after the expiration of the period of Bid Validity.
- 15.5 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security and signed the Contract Agreement.
- 15.6 The Bid Security may be forfeited:
 - (a) If the bidder withdraws his bid except as provided in Sub-Clause 22.1;



- (b) If the bidder does not accept the correction of his Bid Price pursuant to Sub-Clause 27.2 hereof; or
- (c) In the case of successful bidder, if he fails within the specified time limit to:
 - (i) Furnish the required Performance Security; or
 - (ii) Sign the Contract Agreement.

IB.16 Alternate Proposals by Bidder

- 16.1 Should any bidder consider that he can offer any advantages to the Employer by a modification to the designs, specifications or other conditions, he may, in addition to his bid to be submitted in strict compliance with the Bidding Documents, submit any Alternate Proposal(s) containing (a) relevant design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any other relevant details / conditions, provided always that the total sum entered on the Form of Bid shall be that which represents complete compliance with the Bidding Documents.
- 16.2 Alternate Proposal(s), if any, of the lowest evaluated responsive bidder only may be considered by the Employer as the basis for the award of Contract to such bidder.

IB.17 Pre-Bid Meeting

- 17.1 The Employer may, on his own motion or at the request of any prospective bidder(s), hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents. The date, time and venue of pre-bid meeting, if convened, is as stipulated in the Bidding Data. All prospective bidders or their authorized representatives shall be invited to attend such a pre-bid meeting.
- 17.2 The bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than 7 days before the proposed pre-bid meeting.
- 17.3 Minutes of the pre-bid meeting, including the text of the questions raised and the replies given, will be transmitted without delay to all purchasers of the Bidding Documents. Any modification of the Bidding Documents listed in Sub-Clause 7.1 hereof which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause IB.9 and not through the minutes of the pre-bid meeting.
- 17.4 Absence at the pre-bid meeting will not be a cause for disqualification of a bidder.

IB.18 Format and Signing of Bid

- 18.1 Bidders are particularly directed that the amount entered on the Form of Bid shall be for performing the Contract strictly in accordance with the Bidding Documents.
- 18.2 All appendices to Bid are to be properly completed and signed.
- 18.3 No alteration is to be made in the Form of Bid nor in the Appendices thereto except in filling up the blanks as directed. If any such alterations be made or if these instructions



be not fully complied with, the bid may be rejected.

- 18.4 Each bidder shall prepare by filling out the forms completely and without alterations one (1) original and number of copies, specified in the Bidding Data, of the documents comprising the bid as described in Clause IB.7 and clearly mark them “ORIGINAL” and “COPY” as appropriate. In the event of discrepancy between them, the original shall prevail.
- 18.5 The original and all copies of the bid shall be typed or written in indelible ink (in the case of copies, Photostats are also acceptable) and shall be signed by a person or persons duly authorized to sign on behalf of the bidder pursuant to Sub- Clause 11.1(a) hereof. All pages of the bid shall be initialed and stamped by the person or persons signing the bid.
- 18.6 The bid shall contain no alterations, omissions or additions, except to comply with instructions issued by the Employer, or as are necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.
- 18.7 Bidders shall indicate in the space provided in the Form of Bid their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their bids and the Contract is to be sent.
- 18.8 Bidders should retain a copy of the Bidding Documents as their file copy.

D. SUBMISSION OF BIDS

IB.19 Sealing and Marking of Bids

- 19.1 Each bidder shall submit his bid as under:
 - (a) ORIGINAL and each copy of the Bid shall be separately sealed and put in separate envelopes and marked as such.
 - (b) The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed / identified as given in Sub- Clause 19.2 hereof.
- 19.2 The inner and outer envelopes shall
 - (a) Be addressed to the Employer at the address provided in the Bidding Data;
 - (b) Bear the name and identification number of the contract as defined in the Bidding Data; and
 - (c) Provide a warning not to open before the time and date for bid opening, as specified in the Bidding Data.



- 19.3 In addition to the identification required in Sub- Clause 19.2 hereof, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared “late” pursuant to Clause IB.21
- 19.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

IB.20 Deadline for Submission of Bids

- 20.1 (a) Bids must be received by the Employer at the address specified no later than the time and date stipulated in the Bidding Data.
- (b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids. No claims will be entertained for refund of such expenses.
- (c) Where delivery of a bid is by mail and the bidder wishes to receive an acknowledgment of receipt of such bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed bid package.
- (d) Upon request, acknowledgment of receipt of bids will be provided to those making delivery in person or by messenger.
- 20.2 The Employer may, at his discretion, extend the deadline for submission of bids by issuing an amendment in accordance with Clause IB.9, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.21 Late Bids

- 21.1(a) Any bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 will be returned unopened to such bidder.
- (b) Delays in the mail, delays of person in transit, or delivery of a bid to the wrong office shall not be accepted as an excuse for failure to deliver a bid at the proper place and time. It shall be the bidder’s responsibility to determine the manner in which timely delivery of his bid will be accomplished either in person, by messenger or by mail.

IB.22 Modification, Substitution and Withdrawal of Bids

- 22.1 Any bidder may modify, substitute or withdraw his bid after bid submission provided that the modification, substitution or written notice of withdrawal is received by the Employer prior to the deadline for submission of bids.
- 22.2 The modification, substitution, or notice for withdrawal of any bid shall be prepared, sealed, ~~marked~~ and delivered in accordance with the provisions of Clause IB.19 with the outer and inner envelopes additionally marked “MODIFICATION”,



“SUBSTITUTION” or “WITHDRAWAL” as appropriate.

- 22.3 No bid may be modified by a bidder after the deadline for submission of bids except in accordance with Sub-Clauses 22.1 and 27.2.
- 22.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security in pursuance to Clause IB.15.

E. BID OPENING AND EVALUATION

IB.23 Bid Opening

- 23.1 The Employer will open the bids, including withdrawals, substitution and modifications made pursuant to Clause IB.22, in the presence of bidders’ representatives who choose to attend, at the time, date and location stipulated in the Bidding Data. The bidders’ representatives who are present shall sign a register evidencing their attendance.
- 23.2 Envelopes marked “MODIFICATION”, “SUBSTITUTION” or “WITHDRAWAL” shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause IB.22 shall not be opened.
- 23.3 The bidder’s name, total Bid Price and price of any Alternate Proposal(s), any discounts, bid modifications, substitution and withdrawals, the presence or absence of Bid Security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening of bids.
- 23.4 Employer shall prepare minutes of the bid opening, including the information disclosed to those present in accordance with the Sub-Clause 23.3.

IB.24 Process to be Confidential

- 24.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of bid evaluation report which shall be done at least seven (7) days prior to issue of Letter of Acceptance. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated. Any effort by a bidder to influence the Employer’s processing of bids or award decisions may result in the rejection of such bidder’s bid. Whereas any bidder feeling aggrieved may lodge a written complaint as per PPRA RULES however mere fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids

- 25.1 To assist in the examination, evaluation and comparison of bids, the Employer may, at his discretion, ask any bidder for clarification of his bid, including breakdowns of unit



rates. The request for clarification and the response shall be in writing but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause IB.28.

IB.26 Examination of Bids and Determination of Responsiveness

- 26.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid is substantially responsive to the requirements of the Bidding Documents.
- 26.2 A substantially responsive bid is one which
- i. meets the eligibility criteria;
 - ii. has been properly signed;
 - iii. is accompanied by the required Bid Security; and
 - iv. conforms to all the terms, conditions and specifications of the Bidding Documents, without material deviation or reservation.
 - v. A material deviation or reservation is one
 - a. which affect in any substantial way the scope, quality or performance of the Works;
 - b. which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the bidder's obligations under the Contract; or
 - c. adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids.
- 26.3 If a bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

IB.27 Correction of Errors

- 27.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:
- (a) Where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and
 - (b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer there is an obviously gross



misplacement of the decimal point in the unit rate, in which case the line item total as quoted will govern and the unit rate will be corrected.

- 27.2 The amount stated in the Form of Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected Bid Price, his Bid will be rejected, and the Bid Security shall be forfeited in accordance with Sub- Clause 15.6(b) hereof.

IB.28 Evaluation and Comparison of Bids

- 28.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause IB.26.
- 28.2 In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:
- (a) making any correction for errors pursuant to Clause IB.27;
 - (b) excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and
 - (c) making an appropriate adjustment for any other acceptable variation or deviation.
- 28.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.
- 28.4 If the Bid of the successful bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bill of Quantities to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause IB.32 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

F. AWARD OF CONTRACT

IB.29 Award

- 29.1 Subject to Clauses IB.30 and IB.34, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.3 and qualify pursuant to Sub-Clause IB 29.2.
- 29.2 The Employer, at any stage of the bid evaluation, having credible reasons for or



prima facie evidence of any defect in supplier's or contractor's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:

Provided that such qualification shall only be laid down after recording reasons therefore in writing. They shall form part of the records of that bid evaluation report.

Mandatory requirements and Technical Evaluation criteria is attached in bidding data, which shall be filled by employer. Accordingly contractor's technical evaluation shall be carried out.

IB.30 Employer's Right to Accept any Bid and to Reject any or all Bids

- 30.1 Notwithstanding Clause IB.29, the Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidders or any obligation except that the grounds for rejection of all bids shall upon request be communicated to any bidder who submitted a bid, without justification of grounds. Rejection of all bids shall be notified to all bidders promptly.

IB.31 Notification of Award

- 31.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in writing ("Letter of Acceptance") that his Bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the "Contract Price").
- 31.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted, however, Employer may have clarification meetings to get clarify any item in the bid evaluation report.
- 31.3 The notification of award and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the bidder till signing of the formal Contract Agreement.
- 31.4 Upon furnishing by the successful bidder of a Performance Security, the Employer will promptly notify the other bidders that their Bids have been unsuccessful and return their bid securities.

IB.32 Performance Security

- 32.1 The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Bidding Data and the Conditions of



Contract within a period of 07 days after the receipt of Letter of Acceptance.

- 32.2 Failure of the successful bidder to comply with the requirements of Sub- Clause IB.32.1 or Clauses IB.33 or IB.35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.33 Signing of Contract Agreement

- 33.1 Within days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send the successful bidder the Contract Agreement in the form provided in the Bidding Documents, incorporating all agreements between the parties.
- 33.2 The formal Agreement between the Employer and the successful bidder shall be executed within days of the receipt of the Contract Agreement by the successful bidder from the Employer.

IB.34 General Performance of the Bidders

The Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts/works. The Employer may in case of consistent poor performance of any Bidder as reported by the employers of the previously awarded contracts, interalia, reject his bid and/or refer the case to the Pakistan Engineering Council (PEC). Upon such reference, PEC in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including black listing of such Bidder and debarring him from participation in future bidding for similar works.

IB.35 Integrity Pact

The Bidder shall sign and stamp the Integrity Pact provided at Appendix-L to Bid in the Bidding Documents for all Federal Government procurement contracts exceeding Rupees ten million. Failure to provide such Integrity Pact shall make the bidder non- responsive.



BIDDING DATA



BIDDING DATA

The following specific data for the Works to be bided shall complement, amend, or supplement the provisions in the Instructions to Bidders. Wherever there is a conflict, the provisions herein shall prevail over those in the Instructions to Bidders.

Instruction to Bidders

Clause Reference

1.1 Scope of Bid:

Ref: Vol-I (BOQ)
Ref: Vol-II (Specifications)
Ref: Vol-III (Drawings)

1.1.1. Name & Address of the Employer:

The Employer is the Oil & Gas Development Company Limited.

Name and address of the Employer's Representative for the purpose of correspondence is:

PARTY CHIEF FIELD GATHERING AND CONSTRUCTION PARTY NO. 01.
NEAR SADQAL OIL FIELD & SHAH PETROLEUM FATEH JANG, PUNJAB.
Cell #0300-5550961 Email: partychieffgcpl@ogdcl.com.

1.1.2. Name of Project

"LAYING OF 8" DIA x 2.0 KM FLOWLINE FOR NASHPA WELL NO 11".

1.2 COMPLETION TIME:

The time completion as specified in Appendix-A to Bid of the whole work by the construction contractor. As OGDCL has to meet its obligations for supply of Oil & Gas owing to critical energy crises being faced by the country. The work shall be completed within period of **45 days** from possession of site issue by Engineer Incharge. The delay on part of OGDCL shall be excluded from project completion time unless verified by the Engineer In-charge on daily progress format.

1.3 GENERAL SCOPE OF WORK

- The Bidder shall visit the site and review all existing facilities / systems prior to submission of his bid to ascertain the exact quantum, nature of works.
- The scope of work of this contract consists of supply of material, labor, fabrication, transportation, installation, erection, inspection, construction, and construction supplies, temporary material(s), structures and facilities and completion testing as per specification, drawings and Bills of Quantities ("BOQs").



- The successful Bidder is required to complete the work within construction plan without disturbing existing plant working and shutdown operations. Further he shall plan the activities keeping in view the space constraints at the work site and develop the work execution procedures accordingly.
 - The Work shall be performed to the current industrial standards, practices, methods and procedures which shall meet all Contract requirements and recognized international industry quality levels, such that the facilities are safe, operable, and reliable.
 - All aspects of the Work such as, but not limited to materials, fabrication, scheduling, inspection, control systems, quality assurance, safety etc. shall be available for detailed inspection by the Employer and the 's Representative.
 - Bidder shall keep in his site offices a good quality copy of the latest of all Standards, Codes, Drawings & Documents and Norms mentioned in the Contract ready for use by 's Representatives.
 - The Bidder's obligations include, but are not limited to the following:
 - All necessary arrangements for security of personnel, materials and equipment.
 - Site office for Bidder's personnel.
 - Site storage yards and covered stores as required.
 - Temporary access ways for transportation of equipment, material and manpower as required.
 - Supply of all construction utilities like electric power, water for civil works and drinking purposes.
 - Adequate lighting arrangements for security and night works as required.
 - Supply of all equipment and material for the project.
 - Supply of all consumables.
 - Temporary firefighting equipment as required.
 - Protection of existing facilities during execution of works.
 - All arrangements for inspection and testing.
 - Restoration of roads, pavements and structures, to original condition, which were damaged during execution of works.
 - Material reconciliation upon completion of works.
-



- Preparation of marked-up as-built prints and documentation for the Project.
- Contractor shall demolish / abandon all the temporary facilities and shall clear the site upon completion of work.
- Bidder is expected to abide by all Safety Rules and Regulations Promulgated by the and relevant local authority.

2.1 Name of the Borrower/Source of Financing/Funding Agency:

OGDCL has sufficient funds.

3.1 Foreign Firm

No Foreign firm can participate in tendering unless it forms a joint venture with a Pakistan firm with at least 30% share pursuant to the prevalent PEC Bys Laws for Construction & operation of Engineering Works.

8.1 The employer will respond to any request for clarification which he receives earlier than 7 days prior to the deadline for submission of Bids.

10.1 Bid Language:

English

11. Documents accompanying the bid:

11.1 (b) (vi)

➤ **Technical bid** shall consist on the basis of minimum but not limited to:

- Compliance Sheet (Annexure – I) – Duly fill, Sign & Stamp.
- General Information (Attachment – 1)
- Mandatory documents as per requirement.

➤ **Financial Bid** shall consist on the basis of minimum but not limited to the followings:

- Bidding Form (Original) – Sign and Stamp
- BOQ (Original) – Sign and Stamp

11.2 (f) Format of Responsibility Matrix

The bidder shall also submit agreement b/w JV partners given the relationship and their responsibilities. The format for responsibility matrix is attached at **Annexure-II** and mandatory to submitted along with JV agreement with clearly define each partner responsibilities in term of lead partner, coordination, execution, supervision, management, commissioning, etc.

14.1 Period of Bid Validity:



60 days w.e.f the date of opening of the Bids.

15 Amount of Bid Security:

15.1 Bid must be accompanied by a Bid Bond of Minimum amount i.e., 02% of estimated cost as stipulated in the press advertisement in the form of Pay order or Demand Draft or Bank Guarantee or Bank Guarrantee As Earnest Money and must accompany the Technical bids.

15.2 Any bid not accompanied by acceptable required Bid Security as mentioned shall be rejected by the Employer as non-responsive

15.4 The Bid Security may be forfeited:

- (a) If the bidder withdraws his bid except as provided in Sub-Clause 22.1;
- (b) If the bidder submits forged or fake bidding documents
- (c) If the bidder does not accept the correction of his Bid Price pursuant to Sub- Clause 27.2 hereof; or
- (d) In the case of the successful bidder, if he fails within the specified time limit to:
 - (i) Furnish the required Performance Security; or
 - (ii) Sign the Contract Agreement.

17.1 Venue, time, and date of the pre-Bid meeting:

A pre-bid meeting will be convened for the purpose of clarifying issues and answering questions on any matter that may be raised at that stage. Bidders or their official representatives are advised to attend the conference which will be held in the office of PC-FGCP-I on date which will be communicated later.

18.4 Number of copies of the Bid to be completed and returned:
One (1) original and one (1) copy of Bidder Documents.

19.0 **Sealing and Marking of Bids**

Employer is following **Single Stage- One Envelop bidding process as per PPRA.** Accordingly, the bid to be submitted shall comprise of a single package containing two separate envelopes. Each envelope shall contain separately the technical (proposal) bid, if any, and financial (proposal) bid.



19.2 The outer sealed envelope shall be marked and addressed as follows:

**PARTY CHIEF FIELD GATHERING & CONSTRUCTION PARTY NO. 01 (PC-FGCP-1)
“LAYING OF 8” DIA x 2.0 KM FLOWLINE FOR NASHPA WELL NO 11”.**

DO NOT OPEN BEFORE As per Advertisement Date

The sealed envelope shall indicate the name and address of the Bidder to enable the bid to be returned unopened in case it is declared LATE.

Employer shall not be responsible for the premature opening or misplacement of any Bid not clearly marked and addressed in accordance with Instruction above.

20.1(a) Deadline for submission of bids:

“The bids can be delivered in the mentioned office on the schedule mentioned in tender notice and the same will be opened accordingly in presence of bidder’s representative.”

23.1 Venue, time, and date of Bid opening:

As per press advertisement.

28.5 The Employer reserves the right to accept or reject any variation, deviation or alternative offer.

29.3

a- MANDATORY REQUIRED FOR ACCEPTANCE OF BID

Technical evaluation will be based upon Criteria given in clause 29.3(b) herewith. All Bidder(s) and each partner of a joint venture must qualify for each of the followings which are **mandatory** otherwise bid(s) declare non-responsive without marking: -

i. Qualifying Marking Criteria:

Overall aggregate marks for qualifying will be 70%.

ii. Valid PEC License:

License required by both local and foreign bidders for **category i.e., C-6 (Upto 25 Million)** or above in the respective **field of specializations i.e., CE-08 (Oil & Gas Pipelines) & CE-10 (General Civil Engineering Works)**

If applied for renewal/up-gradation of License, bidder(s) must provide last year PEC valid License, good quality copy of Challan submitted to PEC and covering letter. Renewed/upgraded PEC License shall be provided within 05 days from the bid opening/submission date, otherwise bid declare non-responsive.

iii. Registrations:

The copy of NTN & GST and Provincial Registration by all bidders.



ANNEXURE – I

COMPLIANCE SHEET
(To be submitted along with Technical Bid)



Annexure – I

COMPLIANCE SHEET

SR#	Description	Lead Partner	JV Partner 1*	JV Partner 2*
		Comply / Not Comply		
A	MANDATORY REQUIREMENTS FOR ACCEPTANCE OF BID (Ref: Clause 29.3(a) of Bidding Data)			
1	Qualifying Marking Criteria			
2	Valid PEC License in C-6 (Upto 25 Million) Category & field of specialization CE-08 (Oil and Gas pipelines) & CE10 (General Civil Engineering Works)			
3	Registrations (NTN, GST, PST/ICT)			
B	BIDDING DOCUMENTS			
1	Covering Letter			
2	General Information (Attachment 1)			
3	Authority letter on company / JV letter head.			
4	Bid Validity - 60 Days (Ref: Clause 14 of Bidding Data)			
5	Compliance Sheet (Annexure-I)			
6	Bid Security – 02% of estimated cost as stipulated in the press advertisement. (Ref: Clause 15 of Bidding Data)			
7	Original Bid Security (Submitted along with Technical Bid)			
8	Bid Security Validity – 90 Days (Ref: Clause 15 of Bidding Data)			



9	Completion Time – 45 Days (Ref: Clause 1.2 of Bidding Data)			
10	Company Profile(s)			
11	Relevant experience (Ref: Technical Evaluation criteria)			
12	Personal Capabilities – To be deploy (Ref: Technical Evaluation criteria)			
13	Equipment capabilities – To be deploy (Ref: Technical Evaluation criteria)			
14	Financial Soundness (Ref: Technical Evaluation criteria)			
15	All relevant Work orders, Completion, Substantial, Performance certificate, etc. (As per Technical criteria)			
16	CV's of Qualified Engineer's/manpower to be deployed			
17	List of Clients with ongoing projects			
18	List of Clients with completed projects			
19	Working methodology, plan and procedure			
20	Organogram & Equipment deployment List			
21	Project Schedule / Gantt Chart			
22	Format for Daily, weekly and monthly report acceptable to Employers Engineer In charge.			
23	Affidavit as per given format (On Rs 100/- Stamp Paper)			
24	Integrity Pact as per given format (On Rs 100/- Stamp Paper)			
25	Bidding Form as per given format			
26	Original Un-priced BOQ with sign and stamp.			
27	All bidding documents will be fully sign and stamp (1 Original + 1 Copy) by authorized person / lead partner. In case of JV, must be sign & Stamp by each partner.			
28	No deviation & conditional bid shall be accepted.			
29	The Overall aggregate marks for qualifying will be 70. Marks distribution given in Annexure-III).			



30	Radiography & 3 rd Party Inspection shall be arranged by OGDCL(PE&FD Dept) as its own cost as per SCOPE of WORK, BOQ, Drawings and standard practice and qualified procedures. Contractor shall comply that any sort of information and documents required by Inspector and/or Engineer In-charge before, during and after execution of work shall be provided and any deficiency, defect, remedy identify shall be rectify at the cost of Contractor.			
31	Written approval required from Engineer Incharge before starting of any construction works.			

* Bidder(s) may add further JV partner details as per above format.

Sign & Stamp
(By Bidder's)



~~ANNEXURE — II~~

~~FORMAT OF RESPONSIBILITY MATRIX~~



ANNEXURE – III

TECHNICAL EVALUATION CRITERIA



TECHNICAL EVALUATION CRITERIA

➤ **MANDATORY REQUIREMENTS FOR ACCEPTANCE OF BID:**

1. Qualifying marking criteria 70%
2. Valid PEC License in Category C-6 (Upto 25 Million) & field of specialization CE-08 (Oil and Gas pipeline) & CE10 (General Civil Engineering Works)
3. Registrations (NTN, GST, PST/ICT)

Technical Bids Evaluation Criteria

Nashpa-11

MANDATORY REQUIREMENTS FOR ACCEPTANCE OF BID AS PER CLAUSE 29.3(a) of TOR:

1. Qualifying marking criteria
2. Valid PEC License (see note 4) in Category C-6 & above & field of specialization CE-08 & CE-10
3. Registrations (NTN/GST, FBR, PST/ICT)

GENERAL MARKING CRITERIA

No.	Evaluation Item	Description of Criteria	Max Points	Evaluation Criteria	Evaluation Comment
1	Relevant Experience	<p>Bidder has adequate relevant experience of Oil & Gas Pipeline laying (Carbon Steel Oil & Gas Transmission/Distribution) in the last 10 years. Bidder to share the detail of each project (start/end date, length of pipeline laid, size and material of construction) Each project shall carry 04 marks. For completed projects, work order and completion certificate shall carry 2 marks each. For project in hand / under progress, work order shall carry 2 marks. Contractor securing zero marks in relevant experience will be declared non-responsive.</p> <p>Executed/completed 05 Nos projects of minimum 4" dia carbon steel Oil & Gas pipeline construction laid in last 10 Years will be awarded 20 Marks.</p> <p>Executed/completed 04 Nos projects of minimum 4" dia carbon steel Oil & Gas pipeline construction laid in last 10 Years will be awarded 16 Marks.</p> <p>Executed/completed 03 Nos projects of minimum 4" dia carbon steel Oil & Gas pipeline construction laid in last 10 Years will be awarded 12 Marks.</p> <p>Less than 03 Nos of Projects executed / completed in last 10 Years will be awarded Zero (0) Marks Points will be awarded on pro rata basis whereas applicable.</p> <p>Contractor securing zero points or less than 50% Marks in relevant experience will be non-responsive.</p>	20		
				20 Points	
				16 Points	
				12 Points	
				0 Point	
2	Project Implementation Plan & Schedule	<p>The Project Implementation Plan and Execution Schedule will be evaluated as below:</p> <p>Project Implementation Plan</p> <ul style="list-style-type: none"> - Comprehensive Project Implementation Plan of all activities, including mobilization is provided. - Partial Project Implementation Plan is provided. - Project Implementation Plan not provided. <p>Project Execution Schedule</p> <ul style="list-style-type: none"> - Level 4 Project Execution Schedule is provided. - Level 3 Project Execution Schedule is provided. - Level 2 Project Execution Schedule is provided. - Project Execution Schedule not provided. 	10		
			5		
				05 points	
				2.5 points	
				0 Point	
			5		
				05 points	
				04 points	
				01 Points	
				0 Point	
3	Equipment and Machinery Owned/Rented by Contractor <i>Note: The minimum required resources are already mentioned in BOQ</i>	<p>Bidder has provided detailed information of the machinery and equipment owned by the contractor as well as the information of the equipment it will rent from market. Moreover, contractor must submit undertaking for provision of minimum machinery (mentioned in BOQ) for the project as per its requirement and instructions of Engineer In charge. It will be responsibility of contractor to arrange such machinery on as and when required basis through lease or owned resources during execution of work.</p> <ul style="list-style-type: none"> - Contractor owned/rented machinery and equipment is meeting min. requirement of the project as per BOQ and undertaking is provided. - Contractor owned/rented machinery and equipment is less than min. requirement of the project as per BOQ but has committed to arrange balance machinery & equipment from market and undertaking is provided. - Contractor owned/rented machinery and equipment is less than min. requirement of the project as per BOQ and no undertaking i.e. commitment/plan to arrange balance machinery & Equipment is provided. 	10		
				10 points	
				08 points	
				0 point	

No.	Evaluation Item	Description of Criteria	Max Points	Evaluation Criteria	Evaluation Comment	
4	Financial Status	Working Capital in last three (03) years as per audited accounts of the firm	20			
		Annual Average Turnover for last three (03) years				
		- Average annual turnover for last three years is equals to or more than 03 times the estimated cost of this project.			20 points	
		- Average annual turnover for last three years is equals to or more than 02 times the estimated cost of this project.			10 points	
		- Average annual turnover for last three years is equals to or more than the estimated cost of this project.			0 point	
		- Points will be awarded on pro rata basis where average annual turnover lies in between the given figures.				
		- If the bidder failed to provide required documents against audited accounts for last 03 years, even after seeking clarification, the bidder will be Non-Responsive irrespective of his total points in technical evaluation.				
5	HSEQ	Bidder has provided information on its QA/QC system and HSE policy	20			
		QA/ QC Management System	10			
		- Complete details of Quality Management System are provided (i.e. Project Quality Plan, QIP, Method Statements, QA/QC Forms etc.)			10 points	
		- Substantial details are provided			8 points	
		- Partial details are provided			5 points	
		-No details provided or provided detail are not in-line with Project requirement.			0 point	
		HSE	10			
		- As per HSE Bids evaluation criteria (Annexure - III-H)				
6	Manpower	Bidder's key personnel allocated on this project have sufficient experience	20			
		Project Manager 01 no. , Site Incharge 01 no.	10			
		- All main disciplines having more than 10 years relevant pipeline construction, welding, testing and commissioning works experience of Oil & Gas sector. (Must have relevant engineering degree)			10 points	
		- All main disciplines having 5 - 10 years relevant pipeline construction, welding, testing and commissioning works experience of Oil & Gas sector. (Must have relevant engineering degree)			5 points	
		- All main disciplines having less than 5 years relevant pipeline construction, welding, testing and commissioning works experience of Oil & Gas sector. (Must have relevant engineering degree)			0 points	
		Site Supervisors (Pipeline/Mechanical 01 no., Civil 01 no. , QA/QC 01 no., HSE 01 no.)	10			
		- All main disciplines having more than 10 years relevant pipeline construction, welding, testing and commissioning works experience of Oil & Gas sector. (Must have DAE in relevant field)			10 points	
		- All main disciplines having 5 - 10 years relevant pipeline construction, welding, testing and commissioning works experience of Oil & Gas sector. (Must have DAE in relevant field)			5 points	
		- All main disciplines having less than 5 years relevant pipeline construction, welding, testing and commissioning works experience of Oil & Gas sector. (Must have DAE in relevant field)			0 points	
Total Points			100			
Recommendations						

Notes

- 1 Minimum Qualifying Score (Responsiveness) - 70%
- 2 The bidding shall be as per Single Stage One Envelope Procedure. Each bid shall comprise one single envelope containing financial proposal and technical proposal.
- 3 Minimum 50% required in Financial Status and Relevant Experience category and minimum 70% required in HSE evaluation for responsiveness.
- 4 Contractor must submit Valid PEC License for execution of works in respective field of specializations. If applied for renewal/up-gradation of License, bidder(s) must provide last year PEC valid License with PEC receipt of renewal. Renewed/upgraded PEC License shall be provided before completion of work. (Contractor to furnish undertaking/affidavit to provide renewed PEC License if expired before completion of work).



HSE Bid Evaluation Sheet (Annexure - III-H)

Sr. No.	Description	Required Reference Documents	Max Points	Marking Criteria
1	Has the bidder shared the profile/CV of the HSE person to be involved in the project. If yes, is the person competent enough to monitor and control the HSE related project issues?	CV	2	Experience < 5 yrs. : 50% Experience >= 5 yrs.: 100%
2	Has the bidder certified for ISO-14001/45001 or has a detailed HSE MS and has provided affidavit of compliance with OGDCL HSE MS?	ISO 14001/45001 Certification, Organizational HSE MS/ Compliance Affidavit	2	ISO Certification: 100%; Comprehensive HSE MS: 70%; Compliance with OGDCL HSE MS: 50%
3	Has the bidder shared any Emergency response plan?	Emergency Management Plan	2	Provided: 100%; Not Provided: 0%;
4	Is the bidder willing to provide fire fighting equipment (fire extinguishers, Fire Blanket and canopies for hot works), as required by the company	Letter of compliance to provide fire fighting equipment	2	Provided: 100%; Not Provided: 0%;
5	Has the bidder submitted HSE Plan/Risk Assessments against the activities covered in the scope of work?	HSE Plan / Risk Assessments	2	Commitment to provide HSE Plan: 50%; Provision of historic HSE Plan: 70%; Provision of project specific HSE Plan/RA: 100%
			10	

Notes:

1) Passing criteria - 70%.



ATTACHMENT 1

GENERAL INFORMATION



GENERAL INFORMATION

All bidder(s) and each partner of JV shall provide the complete information as per below format. Nationality information is also to be provided for foreign bidder(s) who are forming part of the JV as required under PEC Bye-Laws.

1	<p>Name of Company / Lead Partner / Applicant: _____</p> <p>Telephone# _____ Fax# _____ Email: _____</p> <p>Permanent Office Address: _____</p> <p>Place of Incorporation/Registration: _____ Year: _____</p> <p>Pakistan Engineering Council # _____ Validity (Year): _____ Category: _____</p> <p>Field of Specialization(s): _____ Applied for Renewal / Up-gradation: <u>YES / NO</u></p> <p>Registration(s): 1. NTN# _____ 2. GST# _____</p> <p>3. Provisional Sale Tax # for each province:</p> <p>i. ICT#: _____ Registered / Un-Registered.</p> <p>ii. PUNJAB#: _____ Registered / Un-Registered.</p> <p>iii. SINDH#: _____ Registered / Un-Registered.</p> <p>iv. BALOCHISTAN#: _____ Registered / Un-Registered.</p> <p>v. KPK#: _____ Registered / Un-Registered.</p>
2	<p>Company / Lead Partner / Applicant Bank Details:</p> <p>Bank Name: _____ Branch Name: _____ Account# _____</p> <p>Address: _____ IBAN#(24 Digit): _____</p> <p>Contact Name: _____ Title / Designation: _____</p> <p>Telephone: _____ Fax: _____</p>
3	<p>Company Lead Partner / Applicant Owner Name: _____ Mobile# _____</p> <p>Email: _____ CNIC# (Attach attested copy) _____</p> <p>Director(s) Details – If any:</p> <p>1. _____ Email: _____ Mobile# _____ CNIC# (Attach attested copy) _____</p> <p>2. _____ Email: _____ Mobile# _____ CNIC# (Attach attested copy) _____</p> <p>3. _____ Email: _____ Mobile# _____ CNIC# (Attach attested copy) _____</p>



	<p>Name of JV Partner (1): _____</p> <p>Telephone# _____ Fax# _____ Email: _____</p> <p>Permanent Office Address: _____</p> <p>Place of Incorporation/Registration: _____ Year: _____</p> <p>Pakistan Engineering Council # _____ Validity (Year): _____ Category: _____</p> <p>Field of Specialization(s): _____ Applied for Renewal / Up-gradation: YES / NO</p> <p>Registration(s): 1. NTN# _____ 2. GST# _____ 3. Provisional Sale Tax # for each province:</p> <p>i. ICT#: _____ Registered / Un-Registered.</p> <p>ii. PUNJAB#: _____ Registered / Un-Registered.</p> <p>iii. SINDH#: _____ Registered / Un-Registered.</p> <p>iv. BALOCHISTAN#: _____ Registered / Un-Registered.</p> <p>v. KPK#: _____ Registered / Un-Registered.</p>
4	<p>Name of JV Partner (2): _____</p> <p>Telephone# _____ Fax# _____ Email: _____</p> <p>Permanent Office Address: _____</p> <p>Place of Incorporation/Registration: _____ Year: _____</p> <p>Pakistan Engineering Council # _____ Validity (Year): _____ Category: _____</p> <p>Field of Specialization(s): _____ Applied for Renewal / Up-gradation: YES / NO</p> <p>Registration(s): 1. NTN# _____ 2. GST# _____ 3. Provisional Sale Tax # for each province:</p> <p>i. ICT#: _____ Registered / Un-Registered.</p> <p>ii. PUNJAB#: _____ Registered / Un-Registered.</p> <p>iii. SINDH#: _____ Registered / Un-Registered.</p> <p>iv. BALOCHISTAN#: _____ Registered / Un-Registered.</p> <p>v. KPK#: _____ Registered / Un-Registered.</p>
5	<p>Authorized Person Name (On behalf of Applicant): _____ Mobile# _____</p> <p>CNIC# (Attach attested copy) _____ Designation: _____ Email: _____</p> <p style="text-align: center;"><u>(Responsibilities must be define in authority letter)</u></p>

Note: Bidder(s) may provide/attached additional information.



BIDDING FORM,
APPENDICES TO BID
AND
AFFIDAVIT



BIDDING FORM

Date.....
Tender Enquiry No.

To
Oil & Gas Development Company Limited,
OGDCL House, Plot # 3013,
Blue Area, Islamabad
Gentlemen,

Having examined the conditions of contract, scope of work and Instructions to bidders of Invitation to Bids, the receipt of which is hereby acknowledged, we the undersigned, offer to perform services (Nature of Service) to OGDCL in conformity with the scope of work and Instructions to bidders at the rates mentioned in our Bid Proposal or other such sums as may be ascertained in accordance with the said conditions.

2. We confirm that the terms and conditions given in the Tender Enquiry / Tender Documents are acceptable to us and if our Bid is accepted we shall execute a contract with OGDCL accordingly without any exceptions. We further confirm to commence service withindays of the mobilization notice issued by OGDCL.

3 We agree to validate bid unconditionally for the period of 90 days from the date of opening the same and it shall remain binding upon us and may be accepted thereof, shall constitute a binding contract between us.

4. We hereby certify that our Firm / Company / Local Agent is or has not been at any time during the past five years, involved in litigation, arbitration or any other unsettled dispute with OGDCL / JV Partners.

5. We further certify that all the contracts / orders placed on us by OGDCL / JV Partners have been executed timely and as per terms & conditions of the Contract / order without any unsettled dispute.

6. Until a formal Agreement is prepared and executed, this bid, together with your acceptance thereof, shall constitute a binding contract between us.

7. We understand that you are not bound to accept the lowest or any tender you may receive.

8. Our bid proposal do not contain any deviation or exceptions from the terms & conditions enunciated in the tender documents.

Dated this.....days of..... (year) 201--,

Name & Signature.....in the Capacity of.....

duly authorized to sign tenders for and on behalf of.....
(Name of the firm in block capital Letters)

Address.....

Telex No.....Fax No.....Phone No.....

Witness

1.
(Name) (Signature)

2.
(Name) (Signature)



BA-1
Appendix-A to Bid

SPECIAL STIPULATIONS CLAUSE

1.	Engineer's Authority to issue Variation in emergency	2.1	To convey after approval in accordance with the rules and regulations of the Employer.
2.	Minimum Amount of Performance Security and time for furnishing.	10.1	10% of total Contract Price stated in the Letter of Acceptance in the form of (a) bank guarantee or (b) Pay Order or (c) Demand Draft will be provided within 07 days after LOI issuance or as required by employer.
3.	Time for Furnishing Programme	14.1	Within 5 days from the date of receipt of Letter of Acceptance.
4.	Time for Commencement	41.1	Within 03 days from the date of receipt of Engineer's Notice to Commence.
5.	Time for Completion	43.1, 48.2	45 days-Calendar days from the date of receipt of Engineer's Notice to Commence/ possession of site.
6.	Amount of Liquidated Damages	47.1	0.1 % of the Contract Price for each day of delay in completion of the Works subject to a maximum of 10% of Contract Price stated in the Letter of Acceptance.
7.	Defects Liability Period	49.1	One (01) Year from the effective date of Taking Over Certificate (completion of works)
8.	Percentage of Retention Money	60.2	10% of the amount of Interim Payment Certificate.
9.	Limit of Retention Money	60.2	05% of Contract Price stated in the Letter of Acceptance.
10.	Minimum amount of Interim Payment Certificates (Running Bills)	60.2	Not Applicable
11.	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Employer.	60.10	As per Employer's procedure.
12.	Mobilization Advance * (Interest Free)	60.12	This Clause is deleted and no mobilization advance allowed.
13.	Price Adjustment Clause		This Clause is deleted and no escalation allowed.
14.	Bid Security		Two (02)% of estimated cost as stipulated in the press advertisement in the form of pay order or demand draft or Bank Guarantee must accompany the technical bids.



Appendix-D to Bid

BILL OF QUANTITIES



TABLE OF CONTENTS

Section No	Description	Sheet No.
1	Summary of Bid Price Schedule	6
2	BOQ Preamble	7
3	Works Pipeline/Piping BOQ	8
4	Note's	12



Location:- Nashpa-11, KPK

Completion Period: - 45 days

SUMMARY OF BID PRICE SCHEDULE

Sr No	Description	Total Cost (Without PST/ICT) Rs.
1	Mechanical Works	_____
2	Civil Works	_____
TOTAL (RS)*		

IN WORDS: PKR

*** NOTE:**

- 1- *The Quoted cost is inclusive of all Tax's, duties, levies except provincial sales tax (PST) / ICT where applicable, which shall be paid / borne by OGDCL as actual.*
- 2- *Amendment, Modification, re-production of this BOQ is not allowed, failure to comply will lead to dis-qualification*

Sign & Stamp
(Employer)

Sign & Stamp
(By Bidder)



BILL OF QUANTITIES

A. Preamble

1. The Bill of Quantities shall be read in conjunction with the Conditions of Contract, Specifications and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work executed and measured by the Contractor and verified by the Engineer and valued at the rates and prices entered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix as per the Contract.
3. The rates and prices entered in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract include all costs of Contractor's plant, labour, supervision, materials, execution, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract. Furthermore all duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to deadline for submission of Bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.
4. ~~A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor will have failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.~~
5. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works.
6. General directions and description of work and materials are not necessarily repeated nor summarised in the Bill of Quantities. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the priced Bill of Quantities.
7. Provisional sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with Sub-Clause 58.2 of Part I, General Conditions of Contract.
8. Items in the Bill of Quantities denoted Provisional, including those marked "PROVISIONAL QUANTITY", in either upper or lower case letters, shall only be executed if they are the subject of a written instruction from the Engineer. The rates set out for such items shall be used for the valuation of works so ordered by the Engineer in writing whether the quantities shown are used wholly or in part.



OIL & GAS DEVELOPMENT COMPANY LIMITED

Tie-in of Nashpa Well No. 11 with Nashpa Plant

ESTIMATE PIPELINE WORKS

SR#	ITEM DESCRIPTION	UNIT	QTY.	UNIT RATE	TOTAL	REMARKS
				Without PST	Unit Rate x Qty	
				(PKR)	(PKR)	
MECHANICAL WORKS						
1.0	PIPELINE WORKS					
	Fabrication, Internal cleaning & welding of pipeline Dia. 8" Sch. 80 Works includes but not limited to the following	RM	2000	2100	4,200,000.0	All Welding to be done in accordance with API 1104 standard Note 6 & 7
i	Receiving, Loading, transportation, unloading of pipes, bends and allied material at site					
ii	Stringing of pipeline along with ROW.					
iii	Lowering in trench with proper arrangement as per standard.					
iv	Installation of Anchor Flanges and Installation joints.					
v	Installation of factory bends as per requirement.					
vi	Fabrication, Installation and testing of Field cold bends as per site requirements.					
vii	Supply and placing of sand bags.					
viii	Holiday testing and repair of damaged coating.					
ix	20% radiography.					
x	Line locating of already layed different pipelines.					
xi	Excavation of test pits where required for identification of any underground pipeline/structure (Distance should be 25m).					
xii	All consumables and any work required for completion.					
xiii	Area must be cleared and reinstated after completion of work.					
2.0	DIA INCHES					
2.1	The estimated dia inches of gathering area and miscellaneous above ground welding.	DI	500	2400	1,200,000.0	
2.2	Installation of Anchor Flanges.	Nos	2	38400	76,800.0	
3.0	INSULATION JOINTS					
	Installation of Insulation joint includes the placing of I.J., welding. Work also includes lifting and transportation from store and unloading at work site.					
	Dia. 8" Sch. 80.	Nos	2	38400	76,800.0	
4.0	HEAT SHRINKABLE SLEEVES					
	Surface preparation (as per BS 2.5 standard), supply and application of primer (Compound A+B) with application kit, supply and installation of Heat shrinkable sleeve on 8" diameter pipeline (preferably Raychem HTLP 80) and patches complete in all respect. (Sleeves and primer for fixing of sleeves to be supplied by contractor as per recommendation and approval of OGDCL.)	Nos	225	12500	2,812,500.0	
5.0	INSTALLATION OF VALVES, FITTING, FLANGES					
	Installation of valves of all kind from size 1/2" and above complete in all respect including installation of gaskets, tightening of bolts, pressure testing and making ready for commissioning as per relevant specifications, drawings, isometrics and/or instruction given at site.	Nos	16	6400	102,400.0	
6.0	HYDROSTATIC TESTING & COMMISSIONING					



OIL & GAS DEVELOPMENT COMPANY LIMITED

Tie-in of Nashpa Well No. 11 with Nashpa Plant

ESTIMATE PIPELINE WORKS

SR#	ITEM DESCRIPTION	UNIT	QTY.	UNIT RATE	TOTAL	REMARKS
				Without PST	Unit Rate x Qty	
				(PKR)	(PKR)	
	Hydrostatic testing of pipeline as per project specification and Client requirements. Contractor shall provide all material, tools, equipment, supply of water, temporary test plugs, couplings, flanges, nuts, bolts, recorder gauge, cleaning of flushing and all necessary arrangements required for hydrostatics testing would be responsibility of contractor and should be done as per relevant specification, code and standard.	RM	2000	110	220,000.0	
7.0	PIGGING OF PIPELINE					
	Line shall be cleaned, flush and made dry by using pigs as per specification, standard practice and to the satisfaction of the Engineer In charge. Scope also includes supply of brand new pigs, pigging of pipeline and all arrangements required for completion of work.	RM	2000	150	300,000.0	
8.0	AS BUILD DRAWING					
	Preparing & updating of "As build drawings" & should be done parallel with lowering activity. Hard Copy (1 original & 2 good Quality copy) and soft copy would be submitted to Engineer In charge.	L/S	-	300000.0	300,000.0	
A1	MECH WORKS: Grand Total Inclusive of all applicable taxes exclusive PST				9,288,500.0	
	NOTES:					
1	The Quantities taken in this BOQ are estimated only for bidding purpose. Contractor is responsible to estimate the quantities as per site requirements, drawings & tender documents					
2	Contractor is responsible to add any missing / required item as per scope of works, drawings, specifications & tender documents.					
3	OGDCL reserves the right to increase / decrease the quantum of work as per instructions of Engineer I/C and site requirements. However payment will be made on actual work done.					
4	Contractor to comply with relevant codes, standards and specifications.					
5	Contractor to cooperate with Government inspector, OGDCL Staff, consultant, 3rd party inspector or other contractor appointed by OGDCL to perform their assigned duties.					
6	Approval of client should be taken by the contractor before undertaking any kind of construction and installation work.					
7	In case of water logged area, Dewatering should be done by means of Pumps and its rate should be added as per requirement by the contractor.					
8	For Water logged area Buoyancy weights should be placed on Flow line as per requirement and its rate should be added by the contractor.					
9	All crossings will be finalized as per site.					
10	During cold bending operation, angle of bend may vary according to site requirement					
11	All equipment's, machinery, tools, consumables (Includes welding rods, cutting/grinding disc, gloves, cutting gases, grinders, beveling machine, etc.), POL, cutting gases etc. required for completion of the work shall be on part of contractor.					



OIL & GAS DEVELOPMENT COMPANY LIMITED

Tie-in of Nashpa Well No. 11 with Nashpa Plant

ESTIMATE PIPELINE WORKS

SR#	ITEM DESCRIPTION	UNIT	QTY.	UNIT RATE	TOTAL	REMARKS
				Without PST	Unit Rate x Qty	
				(PKR)	(PKR)	
12	Contractor to ensure the deployment of following minimum resources as per workfront: 02 nos. fabrication teams (1 qualified experienced welders each) 01 no. Excavator 01 no. Crane mounted truck 01 no. Double-axle Trailer 01 no. 5-Ton Crane All terrain vehicles for movement of crew 02 nos. Welding Machines 01 no. Compressor 01 no. Hydrostatic test pump; and all other necessary equipment/machinery should be deployed by Contractor for timely completion of the project. The above machinery should be fit for service.					
13	Mobilization / De-Mobilization, Equipment, Machinery, Tools, Manpower, Camping, utilities, etc. required for completion of work shall be on the part of contractor.					
14	Camp facility including security of personnel, equipment and material shall be arranged by contractor, however suitable plot for camping may be provided by OGDCL subject to availability.					
15	All area must be cleared and reinstated after completion of work					
16	The Quoted cost is inclusive of all Tax's, duties, levies except provincial sales tax (PST) / ICT where applicable, which shall be paid / borne by OGDCL as actual.					
17	Inspection request to be submitted by the Contractor to QA/QC Inspector (appointed by OGDCL) prior to start of any activity related to the project.					

OIL & GAS DEVELOPMENT COMPANY LIMITED

CIVIL

TENDER BOQ

BOQ. No	Description	Unit	Quantity	Rate (Rs.) With all Applicable Taxes except KPST / ICT Sale Tax.	Amount (Rs.) With all Applicable Taxes except KPST / ICT Sale Tax.
1	<u>Excavation in Hard Rock</u> Excavation as in Hard Rock, in foundation / excavations, throw earth clear of edges of excavation within 100 M, complete as instruction of Engineer-In-Charge.	Cum	1558.44	2195.54	3,421,617.36
2	<u>Excavation in Hard Soil</u> Excavation as in Ordinary/Hard Soil, in foundation / excavations, throw earth clear of edges of excavation within 100 M, complete as instruction of Engineer-In-Charge.	Cum	2750.51	392.60	1,079,850.23
3	<u>Earth Fill in Ordinary Soil</u> Earth filling as in Ordinary, back fill in foundation, pipe trenches, shafts, wells, independent holes, under floors or around plinths etc., 1.5 M below or above Ground Level (GL), with spoil obtained from excavation in trenches/over areas within 50M including watering and compaction in 150 mm layer and dressing to required profile and shape. complete as instruction of Engineer-In-Charge.	Cum	3112.08	362.40	1,127,817.79
4	<u>PCC 1:4:8 in Foundation</u> Providing and laying of cement concrete 1:4:8 using Crushed or Broken Stone graded as specified, complete as per drawing and as instruction of Engineer-In-Charge.	Cum	2.97	10683.25	31,729.25
5	<u>Brick Work in Foundation</u> 1st Class brick work in wall 9" th. Or above laid and jointed in cement mortar 1:4 in foundation, complete as per drawing and as instruction of Engineer-In-Charge.	Cum	12.49	17665.49	220,641.97
6	<u>PCC 1:2:4 in Foundation</u> Providing and laying PCC 1:2:4 with 3000 psi compressive cylindrical strength, in foundation, complete as per drawing and as instruction of Engineer-In-Charge.	Cum	14.86	13472.22	200,197.19
7	<u>RCC 1:2:4 in Foundation</u> Providing and laying RCC 1:2:4 with 3000 psi compressive cylindrical strength, in foundation, including form work all as specified. Reinforcement measured and paid separately. complete as per drawing and as instruction of Engineer-In-Charge.	Cum	42.81	15243.45	652,572.09
8	<u>Supply and fix, Steel Reinforcement</u> Supply and fix, bars round, using deformed bars Grade-40 including cutting, bending, binding and placing reinforcement in position, complete as instruction of Engineer-In-Charge.	Kg	1712.40	228.01	390,444.32
9	<u>Plaster Work</u> Providing applying 13mm thick cement plaster in CM 1:4 on Internal and external side of walls, columns and beams surfaces, finished as specified. as per drawing or as instruction of Engineer-In-Charge.	Sqm	119.70	486.22	58,200.53

CIVIL

TENDER BOQ

BOQ. No	Description	Unit	Quantity	Rate (Rs.) With all Applicable Taxes except KPST / ICT Sale Tax.	Amount (Rs.) With all Applicable Taxes except KPST / ICT Sale Tax.
10	Implementation of HSEQ Guidelines/Measures/Protocols for High Sensitized permanent works Professionals (MBBS Doctor) for providing First Aid (15%), HSEQ Supervisor to ensure HSEQ Protocols (15%), Fire Extinguishers 02 Nos for each working place (5%), Fire Blankets 02 Nos for each working place (5%), Ambulance 01 No (40%) and other necessary equipments as advised by Engineer incharge for PPEs, i-e Coverall, Helmet, Goggle, Safety Shose, Safety Belt, Gloves etc (20%), to all deployed manpower (Skilled/Unskilled) during all ativities throughout the duration of entire project as per satisfaction of Engineer-In-Charge (Note: Payment will be made in final bill as per actual quantum of HSEQ protocol / measure followed at site by the contractor during execution of entire project.				
	HSEQ Guidelines/Measures/Protocols	Job	1.00	143661.41	143,661.41
A	CIVIL: BOQ Cost Inclusive of all Applicable Taxes Except KPST / ICT Sales Tax. (Rs.)				7,326,732.14
B	MECH: BOQ Cost Inclusive of all Applicable Taxes Except KPST / ICT Sales Tax. (Rs.)				9,288,500.00
C	Total BOQ Cost (MECH (A) + CIVIL (B)) Incl of All Taxes Except KPST / ICT Sales Tax. (Rs.)				16,615,232.14
D	Percentage _____% Above/Below (Tick One) the Estimated Cost @ C (Rs)				
E	Total BOQ Amount inclusive of Percentage above or below as quoted above (C+D) (Rs.)				
F	Rate & Amount of KPST / ICT Sale Tax On Total Amount at Sr.E (Rs.)			@ _____ %	
G	Grand Total BOQ Amount Inclusive Of All Applicable Taxes With KPST / ICT Sales Tax (E+F)(Rs.)				
Total Bid Amount in Words _____.					

Note:-

1. The rate and amount given in the BOQ are inclusive of all applicable taxes excluding PST / ICT. The rate and amount of PST / ICT Sale Tax will be mentioned separately in the above referred relevant row / column.
2. Bidder(s) must submit complete tender documents as available on website and having duly stamped and signed at the time of submission of bid otherwise OGDCL reserves the right to reject the bid.
3. Bidder(s) shall clearly mention if he is opting for reduced rate of PST / ICT and his bid shall be evaluated accordingly by adding reduced sales tax in their bid price, whereas, the bidders who opt for full rate of PST / ICT, their bids will be evaluated excluding PST / ICT. No change will be acceptable in the option of rate of PST / ICT after submission of the bid.
4. The contractor being registered with respective revenue authority is entitled to charge applicable sales tax over and above its bid price (excluding sales tax) and will be responsible for the payment of such sales tax to the respective revenue authority as per prevailing laws. OGDCL shall reimburse the amount of sales tax to the concerned contractor based on valid payment documents of respective revenue authority.
5. OGDCL shall withhold applicable income tax / PST / ICT as per prevailing withholding rules.
6. PST stands for Provincial Sales Tax, ICT stands for Islamabad Capital Territory Sales Tax and PKR stands for Pak Rupees.

Contractor signature & Official Seal.



Note # 1: General:

- 1) All consumables to be supplied by the CONTRACTOR (Includes welding rods, cutting/grinding disc, gloves, cutting gases, grinders, beveling machine, etc.) required for the execution of work as per specification and satisfaction of the OGDCL representative at site and approval of company Engineer Incharge.
- 2) Tie-in at plant shall also be responsibility of the contractor.
- 3) CONTRACTOR to verify all dimensions, ground elevations and profile before undertaking any fabrication works.
- 4) All testing equipment, arrangements & consumables shall be the CONTRACTOR'S responsibility.
- 5) Fabrication and installation of cold bends is responsibility of contractor. All cold bends to be installed as per IFC drawings and design specifications.
- 6) All areas to be cleaned and re-instated after completion of WORKS.
- 7) All material for the hydro testing including water, test plugs and consumables shall be supplied by CONTRACTOR.
- 8) The contractor shall be paid on actual work done.
- 9) Construction Contractor to comply with Specification for piping Construction & Installation, standard and codes.
- 10) Contractor to cooperate with Government inspector, OGDCL Staff, consultant, 3rd party inspector or other contractor appointed by OGDCL to perform their assigned duties.
- 11) Transportation of material from store and all other bidder's supplied items shall be in bidder's scope

Note # 2: The rates include:

- 1) Mobilization/ Demobilization of Machinery / Equipment, staff & other expenditure required for the purpose.
- 2) Overwriting / cutting are to be avoided and to be initialed if inevitable.

Note # 3: Payment Schedule:

- 1) Payment will be made on actual work done as per verifiable Running and Final Bills by the site Engineer Incharge after progressive completion of 10% of the total work.
- 2) OGDCL reserves the right to increase/ decrease the quantum of work during execution of the work. The quantities mentioned in BOQ are estimated.



BE-1

Appendix-E to Bid

PROPOSED CONSTRUCTION SCHEDULE

Pursuant to Sub-Clause 43.1 of the General Conditions of Contract, the Works shall be completed on or before the date stated in Appendix-A to Bid. The Bidder shall provide as Appendix-E to Bid, the Construction Schedule in the bar chart (CPM, PERT or any other to be specified herein) showing the sequence of work items and the period of time during which he proposes to complete each work item in such a manner that his proposed programme for completion of the whole of the Works and parts of the Works may meet Employer's completion targets in days noted below and counted from the date of receipt of Engineer's Notice to Commence (Attach sheets as required for the specified form of Construction Schedule):

<u>Description</u>	<u>Time for Completion</u>
Whole Works	45 Calendar days



BF-1

Appendix-F to Bid

METHOD OF PERFORMING THE WORK

[The Bidder is required to submit a narrative outlining the method of performing the Work. The narrative should indicate in detail and include but not be limited to:

1. Organization Chart indicating head office and field office personnel involved in management and supervision, engineering, equipment maintenance and purchasing.
2. Mobilization in Pakistan, the type of facilities including personnel accommodation, office accommodation, provision for maintenance and for storage, communications, security and other services to be used.
3. The method of executing the Works, the procedures for installation of equipment and machinery and transportation of equipment and materials to the site.]



BG-1

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

(To be used by the Bidder)

[The Bidder will provide on Sheet 2 (as below) of this Appendix a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works well within stipulated time period as per appendix-E without causing any delay and to fulfill the requirements as per BOQ (specifications). The information shall include make, type, capacity, and anticipated period of utilization for all equipment which shall be in sufficient detail to demonstrate fully that the equipment will meet all requirements of the Specifications.]

Owned Purchased or Leased	Description of Unit (Make, Model, Year)	Capacity/ HP Rating	Condition	Present Location or Source	Date of Delivery at Site	Period of Work on Project
1	2	3	4	5	6	7
a. Owned						
b. To Be Purchased						
c. To be arranged on lease / rent						



BH-1

Appendix-H to Bid

CONSTRUCTION CAMP AND HOUSING FACILITIES

The Contractor in accordance with Clause 34 of the Conditions of Contract shall provide description of his construction camp's facilities, staff housing requirements and arrangements of safety & security of its equipment and personnel.

The Contractor shall be responsible for pumps, electrical power, water and electrical distribution systems, and sewerage system including all fittings, pipes and other items necessary for servicing the Contractor's construction camp.

The Bidder shall list or explain his plans for providing these facilities for the service of the Contract as follows:

1. Site Preparation (clearing, land preparation, etc.).
2. Provision of Services.
 - a) Power (expected power load, etc.).
 - b) Water (required amount and system proposed).
 - c) Sanitation (sewage disposal system, etc.).
3. Construction of Facilities
 - a) Contractor's Office. Workshop and Work Areas (areas required and proposed layout, type of construction of buildings, etc.).
 - b) Warehouses and Storage Areas (area required, type of construction and layout).
 - c) Housing and Staff Facilities (Plans for housing for proposed staff, layout, type of construction, etc.).
4. Construction Equipment Assembly and Preparation (detailed plans for carrying out this activity).
5. Arrangements of safety & security of its equipment and personnel and Other Items Proposed (Security services, HSEQ, utilities arrangement, facilities, emergency response mechanism etc.).



BI-1

Appendix-I to Bid

LIST OF SUBCONTRACTORS

I/We intend to subcontract the following parts of the Work to subcontractors. In my/our opinion, the subcontractors named hereunder are reliable and competent to perform that part of the work for which each is listed.

Enclosed are documentation outlining experience of subcontractors, the curriculum vitae and experience of their key personnel who will be assigned to the Contract, equipment to be supplied by them, size, location and type of contracts carried out in the past.

Part of Works (Give Details)	Subcontractor (With Complete Address)
1	2



BJ-1

Appendix-J to Bid

ESTIMATED PROGRESS PAYMENTS

Payment will be made on actual work done bases.



BK-1

Appendix-K to Bid

**ORGANIZATION CHART FOR THE
SUPERVISORY STAFF AND LABOUR**



Appendix-L to Bid

LIST OF BIDDER DRAWINGS

(Bidder Drawings are Attached Separately as Volume-III)



Appendix-M to Bid

(On official letter-head of the bidder)
To be signed by the
Chief Executive of the
Bidding company or a representative duly
Authorized by board
Resolution.

INTEGRITY AND ETHICS UNDERTAKING

We hereby commit and undertake to observe the following principles during our participation in the tender process and during the contract execution:

- i. That we will not directly or through any other person of firm, officer promise or give to any of the employees of OGDCL involved in the tender process or execution of the contract any gain, pecuniary benefit of facilitation payment in order to obtain in exchange any advantages of any kind whatsoever during the tender process or during the execution of contracts.
- ii. That we have not and will not enter with other bidders into any undisclosed agreement or undertaking either formal or informal to restrict competitiveness sort to cartelise in the bidding process.
- iii. That we will ensure that the remuneration of agents (if engaged) is appropriate and for legitimate services only.
- iv. That we will not use subcontracts, purchase orders or consulting agreements as means of channeling payments to employees of OGDCL.
- v. That we will not commit any offence under the Pakistan Penal Code, Prevention of Corruption Act or National Accountability Ordinance to achieve any advantage, gain or benefit during the tender process or the execution of the contract.

We further understand and acknowledge that any violation of transgression of the above mentioned principles will attract disqualification from the tender process and may also result in permanent exclusion from future contract award process.

We also accept and undertaking to respect and uphold OGDCL,s absolute right to resort to and impose such disqualification, debarment or execution.

For and on behalf of _____

Tender No _____



A F F I D A V I T
(To be attached with Technical bid)

I, _____ S/o _____ aged _____ years
_____ working as Proprietor/Managing Partner/Director of M/s
_____ having its registered
office at _____ do hereby solemnly affirm
and declare on oath as under:

1. That I am competent to swear this affidavit being proprietor/one or the partners/
Director of M/s _____
2. That M/s _____ is a
proprietorship/partnership firm/company is participating in tender process
conducted by OGDCL.
3. That I hereby confirm and declare that none of my/our group/sister
concern/associate company is participating/ submitting this tender.
4. That I hereby confirm and declare that my/our firm/company M/s
_____ and my/our firm/group/company/ sister concern /
associate company or any of its directors have not been black listed/de-listed by any
Institutional agencies/Govt. Deptt/ Public Sector Undertaking.
5. That there is no change in the Name & Style, Constitution and Status of the firm,
after Pre-qualification.
6. That I further undertake that in case any of the facts contained above and in-our
application is round other-wise or incorrect or false at any stage, my/our
firm/company/ group/sister concerns/ associate companies shall stand debarred
from the present and future tenders of the OGDCL.

(Signature of the Proprietor/ Managing Partner/Director with Seal)

DEPONENT

Verified at _____ on _____ that the contents of paras 1 to 6 of
this affidavit are true and correct to best of my knowledge and no part of this is false and
nothing material has been concealed or falsely stated therein.

(Signature of the Proprietor/ Managing Partner/ Director with Seal)

DEPONENT

(Signature & Seal of Notary)



Form 1

Initiation of blacklisting Proceedings in furtherance of Rule 19 PPRA, 2004.

Case Reference:

Respondent Detail:

NAME

ADDRESS

NTN

CNIC

ENCIRCLE THE APPLICABLE

A) Undermines or adversely affect the operations of the company through any of the following:

a) Withdrawal of bid during the bid validity period;

b) Refusal to:

i. sign the contract;

ii. accept Purchase Order;

iii. execute work;

iv. submit Performance Security as per tender terms;

v. make supplies;

vi. fulfil contractual obligations as per contract;

vii. purchase order terms and conditions; and/or,

viii. failure to remedy underperformance as to contractual obligations.

c) Repeated non-performance.

B) Involvement in corrupt or fraudulent practices while obtaining or attempting to obtain contracts.

C). Conviction of fraud, corruption, tax evasion or criminal misappropriation by a court or competent forum.

D). Notified blacklisted/debarred/cross debarred by PPRA or any other public sector organization or international agencies.

SUPPORTING DOCUMENTS/ AFFIDAVIT

GM(LS)

GM(SCM) *JK*

Ad. all S.
her



FORMS

**BID BOND
PERFORMANCE SECURITY
GUARANTEE/BOND
CONTRACT AGREEMENT**



BID BOND

Oil & Gas Development Company Limited,
OGDCL House, Jinnah Avenue,
Blue Area, Islamabad.

Guarantee No.....
Date of issue.....
Date of expiry

Amount.....

Dear Sir,

In consideration of M/s.....
herein after called "THE BIDDER" having submitted the accompanying Bid with
reference to OGDCL tender enquiry No. ----- and in
consideration of value received from (the Bidder above), we hereby agree to
undertake as follows:-

1. To make unconditional, immediate and forthwith payment of the sum of -----
-- upon your FIRST and SIMPLE written demand without further recourse,
question, query, deferment, contestation or reference to the bidder, account party
or any other person in the event of the withdrawal of the aforesaid bid by the
BIDDER before the end of the period specified in the Bid after the opening of the
same for the validity thereof or if no such period be specified, within 210 days
after the said opening or if the Bidder, having been notified of the acceptance of
his bid by the Company during the period of bid validity:
 - i. Fails, refuses or delays to execute contract as per Tender/Contract's
terms & conditions.
OR
 - ii. Fails, refuses or delays to furnish Performance Bond and/or Advance
Bank Guarantees.
OR
 - iii. Submit forged/fake document(s) in support of their bid.
OR
 - iv. Fails to provide/ perform services as specified in TOR.
2. To accept written intimation from you as conclusive, sufficient and final
evidence of the existence of a default of non-compliance, breach or default
as aforesaid on the part of the BIDDER and to make payment immediately
and forthwith upon receipt of your FIRST and SIMPLE written intimation.
3. No grant of time or other indulgence to, or composition or arrangement
with the BIDDER in respect of the aforesaid Bid with or without notice to
us shall affect this Guarantee and our liabilities and commitments
hereunder.
4. This is an independent and direct obligations guarantee and shall be
binding on us and our successor in interest and shall be irrevocable.
5. The Guarantor Bank warrants and represents that it is fully authorized,
empowered and competent to issue this guarantee.

**Yours faithfully,
(BANKERS)**

**Bank guarantee issued from banks mentioned in clause#15.1 of invitation to bid
will be preferred**



PERFORMANCE BOND/BANK GUARANTEE

Oil & Gas Development Company Limited,
OGDCL House, Jinnah Avenue,
Blue Area, Islamabad.

Guarantee No.....
Date of issue
Date of expiry
Amount.....

Dear Sir,

Ref: Our Bank Guarantee No. _____ in the sum of _____
Account _____ Amount of Contract _____

In consideration of you having entered into contract No. _____ with _____ called Contractor and in consideration for value received from CONTRACTOR, we _____ at the request of _____ hereby agree and undertake as follows:

1. To make unconditional, immediate and forthwith payment to you as called upon of an amount (equivalent to 10% of total contract value in Pak Rupees/USD) on your written FIRST and SIMPLE demand without further recourse, question, query, deferment, contestation or reference to CONTRACTOR or any other person, in the event of default, non-performance or non-fulfillment by CONTRACTOR of his obligations liabilities, responsibilities, or in case if any forged or fake documents is found at any stage under this contract, of which you shall be the sole and absolute judge.
2. To accept written intimation from you as conclusive, sufficient and final evidence of the existence of a default or breach as aforesaid on the part of CONTRACTOR and to make payment immediately and forthwith upon receipt of your FIRST and SIMPLE written demand.
3. To keep this Guarantee in full force from the date hereof **until expiry of defect liability period as per bid documents.**
4. That no grant of time or other indulgence to, amendment in the terms of the contract by Agreement between the parties, or imposition or Agreement with contractor in respect of the performance of his obligation under and in pursuance of the said Agreement with or without notice to us, shall in any manner discharge or otherwise affect this Guarantee and our liabilities and commitments there under.
5. This is an independent and direct obligations guarantee and shall be binding on us and our successor interest and shall be irrevocable.
6. This Guarantee shall not be affected by any change in the constitution of the Guarantor Bank or the constitution of the Contractor.
7. The Guarantor Bank warrants and represents that it is fully authorized, empowered and competent to issue this guarantee.

Authorized Sign for Issuing Bank

Seal of the Bank

Bank guarantee issued from banks mentioned in clause#4.2 of invitation to bid will be preferred



CONTRACT AGREEMENT

CA-1

This agreement (Hereinafter called the “Contract”) made on ____ Day of ___, 20__ between Oil and Gas Development Company Ltd, Islamabad (Hereinafter called “The Employer”) of the one part, represented by *Mr.* _____ and *M/S* _____ (Hereinafter called “Contractor”) of the other part and represented by *Mr.* _____ of the *M/S* _____.

WHEREAS, the employer is desirous that certain Pipeline works should be executed.

Viz:- “_____.”

NOW THIS AGREEMENT WITNESSETH as follows:-

1. In this contract agreement words and expressions shall have the same meanings as are respectively assigned to them in the condition of contract hereinafter referred to.
2. The following documents specifically applicable to the said works shall be deemed to form and be ready and construed, as part of this contract agreement, and together with this agreement contract shall hereinafter be referred to as the contract documents. The order in which the documents are listed shall be indicative as to their priority in the event of (hereinafter referred to as “contract documents”):
 - i.* Contract Agreement.
 - ii.* Work Order
 - iii.* Letter of Acceptance.
 - iv.* LOI.
 - v.* Authority Letter.
 - vi.* JV Agreement with Responsibility Matrix (If any)
 - vii.* Affidavit
 - viii.* Integrity Pact
 - ix.* Form’s
 - x.* Ethic Undertaking
 - xi.* Proposed construction schedule with Gantt Chart
 - xii.* Method of Performing the work
 - xiii.* Camping arrangements
 - xiv.* Organization Chart
 - xv.* Technical Specifications
 - xvi.* All Drawings
 - xvii.* Priced BOQ
 - xviii.* Compliance Sheet.
 - xix.* Bidding data
 - xx.* Special Stipulations.
 - xxi.* Particular Condition of Contract.
 - xxii.* General Condition of Contract.
 - xxiii.* Construction programme for execution of work over total period of ____ days.



- xxiv.** Instruction to Tenders.
xxv. Invitation of tenders.

3. The laws of Pakistan shall be the governing laws for this contract. This Contract shall have precedence over all other mentioned at Article 2 herein above.
4. In consideration of the payments to be made by the Employer to the contractor as hereinafter mentioned the contractor hereby covenant with the Employer to execute, complete and maintain the works in conformity in all respect with the provisions of the contract and the contract documents within the contract period.
5. The employer hereby covenant to pay the contractor in consideration of the execution, completion and maintenance of the works the contract price at the times, and in the manner prescribed by the contract documents.
6. Payment of all running bills and final bill shall be paid within the time as required by OGDCL. No interest shall be paid to the contractor for any delay in payment at OGDCL part.
7. Contractor is required to mobilize within Fourteen (14) days from the date of issuance of the work order/ Engineers Notice to proceed.
8. The supervising officer will undertake to approve all contractors' material(s) and shop drawing submittals within Fourteen (14) days or sooner, from the date of their receipt.
9. There shall be no restriction by the Employer for the overtime working of the contractor necessary to complete the works within the required time schedule and the attendance by the Employer's representative at time outside normal working hours to monitor and inspect the works will be given freely upon reasonable notification. This assistance shall not be construed to mean permanent working and therefore permanent attendance outside the supervising officer's normal working hours.

Contract Cost Rs. _____ (Pk Rupee _____) **(In Words)** _____) *inclusive of all Tax's, duties, levies except provincial sales tax (PST) / ICT where applicable, which shall be paid / borne by OGDCL as actual.* The contractor undertakes that no claims on account of market fluctuation will be entertained during the term of the contract for any item of work included in the schedule of Quantities annexed. The contractor shall not request for escalation of rates throughout the term of contract.

CONTRACT PERIOD: - ____ **Calendar days** from date of the site possession.

10. In case of default of the contractor and/or any of its sub contractors and/or any violation of the terms and conditions of the contract and the contract documents by the contractor and/or any of its contractors the work will be done at the risk & cost of the contractor as per Engineering Practice.



11. Contractor shall provide performance Bond in the shape of a pay order/Bank Guarantee from a Scheduled bank of Pakistan @ 10% of the bid Price.
12. The performance Bond shall remain valid from date of commencement till expiry of defect liability period after completion of work.
13. Anything not mentioned/clarified herein, in such eventuality the terms and conditions of the contract documents shall apply.

IN WITNESS whereof the parties hereto have caused their respective common seals to be hereunto affixed (or have hereunto set their respective hand and seals) the day and year first above written.

For and on behalf of OGDCL

Mr. _____

Designation _____

For and on behalf of the Contractor

Mr. _____

M/S _____

In Present of Witnesses:-

1. Mr. _____

CNIC# _____

1. Mr. _____

CNIC# _____

2. Mr. _____

CNIC# _____

2. Mr. _____

CNIC# _____



PART – I
GENERAL CONDITIONS OF CONTRACT



PART – I

GENERAL CONDITIONS OF CONTRACT

Definitions and Interpretation

1.1 Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them, except where the context otherwise requires:

- (a) (i) "Employer" means Oil & Gas Development Company Limited (OGDCL), who will employ the Contractor and the legal successors in title to the Employer, but not except with the consent of the Contractor any assignee of the Employer.
- (ii) "Contractor" means the person or persons, firms, company or Joint Venture whose tender has been accepted by the Employer and includes the Contractor's personal representatives, successors and permitted assigns.
- (iii) "Subcontractor" means any person named in the Contract as a Subcontractor for a part of the Works or any person to whom a part of the Works has been subcontracted with the consent of the Engineer and the legal successors in title to such person, but not any assignee of any such person.
- (iv) "Engineer" means the person appointed by the Employer (in writing) to act as Engineer for the purposes of the Contract and named as such in Part II of these Conditions.
- (v) "Engineer's Representative" means a person appointed from time to time by the Engineer under Sub-Clause 2.2.
- (b) (i) "Contract" means these Conditions (Parts I and II), the Specification, the Drawings, the Bill of Quantities, the Tender, the Letter of Acceptance, the Contract and The performance Bond.
- (ii) "Specification" means the specification of the Works included in the Contract and any modification thereof or addition thereto made under Clause 51 or submitted by the Contractor and approved by the Engineer.
- (iii) "Drawings" means all drawings, calculations and technical information of a like nature provided by the designer / contractor under the Contract and all drawings, calculations, samples, patterns, models, operation and maintenance manuals and other technical information of a like nature submitted by the Contractor and approved in writing by the Employer.



- (iv) "Bill of Quantities" means the priced and completed bill of quantities forming part of the Tender.
- (v) "Tender" means the Contractor's priced offer to the Employer for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance.
- (vi) "Letter of Acceptance" means the formal acceptance by the Employer of the Tender.
- (vii) "Contract" means the contract (if any) referred to in Sub-Clause 9.1.
- (viii) "Appendix to Tender" means the appendix comprised in the form of Tender annexed to these Conditions.
- (c) (i) "Commencement Date" means the date upon which the Contractor receives the notice to commence issued by the Engineer pursuant to Clause 41.
- (ii) "Time for Completion" means the time for completing the execution of and passing the Tests on Completion of the Works or any Section or part thereof as stated in the Contract (or as extended under Clause 44) calculated from the Commencement Date.
- (d) (i) "Tests on Completion" means the tests specified in the Contract or otherwise agreed by the Engineer and the Contractor which are to be made by the Contractor before the Works of any Section or part thereof are taken over by the Employer.
- (ii) "Taking-Over Certificate" means a certificate issued pursuant to Clause 48.
- (e) (i) "Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract.
- (ii) "Retention Money" means the aggregate of all monies retained by the Employer pursuant to Sub-Clause 60.2(a).
- (iii) "Interim Payment Certificate" means any certificate of payment issued by the Engineer other than the Final Payment Certificate.
- (iv) "Final Payment Certificate" means the certificate of payment issued by the Engineer pursuant to Sub-Clause 60.8.



- (f) (i) "Works" means the Permanent Works and the Temporary Works or either of them as appropriate.
- (ii) "Permanent Works" means the permanent works to be executed (including Plant) and maintained in accordance with the Contract
- (iii) "Temporary Works" means all temporary works of every kind required in or about the execution and completion of the Works and the remedying of any defects therein.
- (iv) "Plant" means machinery, apparatus and the like intended to form or forming part of the Permanent Works.
- (v) "Contractor's Equipment" means all appliances and things of whatsoever nature (other than Temporary Works) required for the execution and completion of the Works and the remedying of any defects therein, but does not include Plant, materials or other things intended to form or forming part of the Permanent Works.
- (vi) "Section" means a part of the Works specifically identified in the Contract as a Section.
- (vii) "Site" means the places provided by the Employer where the Works are to be executed and any other places as may be specifically designated in the Contract as forming part of the Site.
- (g) (i) "cost" means all expenditure properly incurred or to be incurred, whether, on or off the Site, including overhead and other charges properly allocable thereto but does not include any allowance for profit.
- (ii) "day" means calendar day.
- (iii) "foreign currency" means a currency of a country other than that in which the Works are to be located.
- (iv) "writing" means any hand-written, type-written, or printed communication, including telex, cable and facsimile transmission.

1.2 **Headings and Marginal Notes**

The headings and marginal notes in these Conditions of Contract shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

1.3 **Interpretation**

Words importing persons or parties shall include firms and corporations and any organization having legal capacity.



1.4 **Singular and Plural**

Words importing the singular only also include the plural and vice versa where the context requires.

1.5 **Notices, Consents, Approvals, Certificates and Determinations**

Wherever in the Contract provision is made for the giving or issue of any notice, consent, approval, certificate or determination by any person, unless otherwise specified such notice, consent, approval, certificate or determination shall be in writing and the words "notify", "certify or "determine" shall be construed accordingly. Any such consent, approval, certificate or determination shall not unreasonably be withheld or delayed.

Engineer and Engineer's Representative

2.1 **Engineer's Duties and Authority**

- (a) The Engineer shall carry out the duties specified in the Contract.
- (b) The Engineer may exercise the authority specified in or necessarily to be implied from the Contract, provided, however, that if the Engineer is required, under the terms of his appointment by the Employer, to obtain the specific approval of the Employer before exercising any such authority, particulars of such requirements shall be set out in Part II of these Conditions. Provided further that any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Engineer.
- (c) Except as expressly stated in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.

2.2 **Engineer's Representative**

The Engineer's Representative shall be appointed by and be responsible to the Engineer and shall carry out such duties and exercise such authority as may be delegated to him by the Engineer under Sub-Clause 2.3.

2.3 **Engineer's Authority to Delegate**

The Engineer may from time to time delegate to the Engineer's Representative any of the duties and authorities vested in the Engineer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Employer and the Contractor.

Any communication given by the Engineer's Representative to the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Engineer. Provided that:



- (a) any failure of the Engineer's Representative to disapprove any work, materials or Plant shall not prejudice the authority of the Engineer to disapprove such work, materials or Plant and to give instructions for the rectification thereof; and
- (b) if the Contractor questions any communication of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary the contents of such communication.

2.4 **Appointment of Assistants**

The Engineer or the Engineer's Representative may appoint any number of persons to assist the Engineer's Representative in the carrying out of his duties under Sub-Clause 2.2. He shall notify to the Contractor the names, duties and scope of authority of such persons. Such assistants shall have no authority to issue any instructions to the Contractor save in so far as such instructions may be necessary to enable them to carry out their duties and to secure their acceptance of materials, Plant or workmanship as being in accordance with the Contract, and any instructions given by any of them for those purposes shall be deemed to have been given by the Engineer's Representative.

2.5 **Instructions in Writing**

Instructions given by the Engineer shall be in writing, provided that if for any reason the Engineer considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Engineer, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this Sub-Clause. Provided further that if the Contractor, within 7 days, confirms in writing to the Engineer any oral instruction of the Engineer and such confirmation is not contradicted in writing within 7 days by the Engineer, it shall be deemed to be an instructions of the Engineer.

The provisions of this Sub-Clause shall equally apply to instructions given by the Engineer's Representative and any assistants of the Engineer or the Engineer's Representative appointed pursuant to Sub-Clause 2.4.

2.6 **Engineer to Act Impartially**

Wherever, under the Contract, the Engineer is required to exercise his discretion by:

- (a) giving his decision, opinion or consent,
- (b) expressing his satisfaction or approval,
- (c) determining value, or
- (d) otherwise taking action which may affect the rights and obligations of the Employer or the Contractor

he shall exercise such discretion impartially and fairly within the terms of the Contract and having regard to all the circumstances. Any such decision, opinion, consent expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised as provided in Clause 67.



Assignment and Subcontracting

3.1 Assignment of Contract

The Contractor shall not, without the prior written consent of the Employer (which consent, notwithstanding the provisions of Sub-Clause 1.5, shall be at the sole discretion of the Employer), assign the Contract or any part thereof, or any benefit or interest therein or thereunder, otherwise than by:

- (a) a charge in favour of the Contractor's bankers of any monies due or to become due under the Contract, or
- (b) assignment to the Contractor's insurers (in cases where the insurers have discharged the Contractor's loss or liability) of the Contractor's right to obtain relief against any other party liable.

4.1 Subcontracting

The Contractor shall not subcontract the whole of the Works. Except where otherwise provided by the Contract, the Contractor shall not subcontract any part of the Works without the prior consent of the Engineer. Any such consent shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agent's servants or workmen.

Provided that the Contractor shall not be required to obtain such consent for:

- (a) the provision of Labour,
- (b) the purchase of materials which are in accordance with the standards specified in the Contract,
- (c) the subcontracting of any part of the Works for which the Subcontractor is named in the Contract.

4.2 Assignment of Subcontractors' Obligations

In the event of a Subcontractor having undertaken towards the Contractor in respect of the work executed, or the goods, materials, Plant or services supplied by such Subcontractor, any continuing obligation extending for a period exceeding that of the Defects Liability Period under the Contract, the Contractor shall at any time, after the expiration of such Period, assign to the Employer, at the Employer's request and cost, the benefit of such obligation for the unexpired duration thereof.



Contract Documents

5.1 Language/s and Law

There is stated in Part II of these Conditions:

- (a) the language or languages in which the Contract documents shall be drawn up, and
- (b) the country or state the law of which shall apply to the Contract and according to which the Contract shall be construed.

If the said documents are written in more than one language, the language according to which the Contract shall be construed and interpreted is also stated in Part II of these Conditions, being therein designated the "Ruling Language".

5.2 Priority of Contract Documents

The several documents forming the Contract are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer who shall thereupon issue to the Contractor instructions thereon and in such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

- (1) The Contract (if completed);
- (2) The Letter of Acceptance;
- (3) The Tender;
- (4) Part II of these Conditions;
- (5) Part I of these Conditions; and
- (6) Any other document forming part of the Contract.

6.1 Custody and Supply of Drawings and Documents

The Drawings shall remain in the sole custody of the Engineer, but two copies thereof shall be provided to the Contractor free of charge. The Contractor shall make at his own cost any further copies required by him. Unless it is strictly necessary for the purposes of the Contract, the Drawings, Specification and other documents provided by the Employer or the Engineer shall not, without the consent of the Engineer, be used or communicated to a third party by the Contractor. Upon issue of the Defects Liability Certificate, the Contractor shall return to the Engineer all Drawings, Specification and other documents provided under the Contract.

The Contractor shall supply to the Engineer four copies of all Drawings, specification and other documents submitted by the Contractor and approved by the Engineer in accordance with Clause 7, together with a reproducible copy of any material which cannot be reproduced to an equal standard by photocopying. In addition the Contractor shall supply such further copies of such Drawings, Specification and other



documents as the Engineer may request in writing for the use of the Employer, who shall pay the cost thereof.

6.2 One Copy of Drawings to be kept on Site

One copy of the Drawings, provided to or supplied by the Contractor as aforesaid, shall be kept by the Contractor on the Site and the same shall at all reasonable times be available for inspection and use by the Engineer and by any other person authorized by the Engineer in writing.

6.3 Disruption of Progress

The Contractor shall give notice to the Engineer, with a copy to the Employer, whenever planning or execution of the Works is likely to be delayed or disrupted unless any further drawing or instruction is issued by the Engineer within a reasonable time. The notice shall include details of the drawing or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

6.4 Delay and Cost of Delay of Drawings

If, by reason of any failure or inability of the Engineer to issue, within a time reasonable in all the circumstances, any drawing or instruction for which notice has been given by the Contractor in accordance with Sub-Clause 6.3, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer.

6.5 Failure by Contractor to Submit Drawings

If the failure or inability of the Engineer to issue any drawings or instructions is caused in whole or in part by the failure of the Contractor to submit Drawings, Specification or other documents which he is required to submit under the Contract, the Engineer shall take such failure by the Contractor into account when making his determination pursuant to Sub-Clause 6.4.

7.1 Supplementary Drawings and Instructions

The Engineer shall have authority to issue to the Contractor, from time to time, such supplementary Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and completion of the Works and the remedying of any defects therein. The Contractor shall carry out and be bound by the same.



7.2 **Permanent Works Designed by Contractor**

Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall submit to the Engineer, for approval:

- (a) such drawings, specifications, calculations and other information as shall be necessary to satisfy the Engineer as to the suitability and adequacy of that design, and
- (b) operation and maintenance manuals together with drawings of the Permanent Works as completed, in sufficient detail to enable the Employer to operate, maintain, dismantle, reassemble and adjust the Permanent Works incorporating that design. The Works shall not be considered to be completed for the purposes of taking over in accordance with Clause 48 until such operation and maintenance manuals together with drawings on completion have been submitted to and approved by the Engineer.

7.3 **Responsibility Unaffected by Approval**

Approval by the Engineer, in accordance with Sub-Clause 7.2, shall not relieve the Contractor of any of his responsibilities under the Contract.

General Obligations

8.1 **Contractor's General Responsibilities**

The Contractor shall always act and perform, with due care and diligence, design (to the extent provided for by the Contract), execute and complete the Works and remedy any defects therein in accordance with the provisions of the Contract. The Contractor shall provide all super-intendance, labour, material, Plant, Contractor's Equipment and all other things, whether of a temporary or permanent nature, required in and for such design, execution, completion and remedying of any defects, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the Contract.

8.2 **Site Operations and Methods of Construction**

The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations and methods of construction. Provided that the Contractor shall not be responsible (except as stated hereunder or as may be otherwise agreed) for the design or specification of Permanent Works, or for the design or specification of any Temporary Works not prepared by the Contractor. Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall be fully responsible for that part of such Works, notwithstanding any approval by the Engineer.



9.1 **Contract**

The Contractor shall, if called upon so to do, enter into and execute the Contract Agreement, to be prepared and completed at the cost of the Employer, in the form annexed to these Conditions with such modification as may be necessary.

10.1 **Performance Guarantee**

If the Contract requires the Contractor to obtain Performance Guarantee in the shape of Bank Guarantee for his proper performance of the Contract, he shall obtain and provide to the Employer, such guarantee within 14 days after the receipt of the Letter of Acceptance, in the sum stated in the Appendix to Tender. Such guarantee shall be in the form annexed to these Conditions or on the Employer Format. The institution providing such security shall be subject to the approval of the Employer. The cost of complying with the requirements of this Clause shall be borne by the Contractor, unless the Contract otherwise provides.

10.2 **Period of Validity of Performance Guarantee**

The performance guarantee shall be valid until the Contractor has executed and completed the Works and remedied any defects therein in accordance with the Contract. Such guarantee shall be returned to the Contractor after 14 days of the issuance of Final Completion Certificate by the Employer.

10.3 **Claims under Performance Guarantee**

Prior to making a claim under the performance guarantee the Employer shall in every case, notify the Contractor stating the nature of the default in respect of which the claim is to be made.

11.1 **Inspection of Site**

The Employer shall have made available to the Contractor, before the submission by the Contractor of the Tender, such data on hydrological and sub-surface conditions as have been obtained by or on behalf of the Employer from investigations undertaken relevant to the Works but the Contractor shall be responsible for his own interpretation thereof.

The Contractor shall be deemed to have inspected and examined the Site and its surroundings and information available in connection therewith and to have satisfied himself (so far as is practicable, having regard to considerations of cost and time) before submitting his Tender, as to:

- (a) the form and nature thereof, including the sub-surface conditions,
- (b) the hydrological and climatic conditions,
- (c) the extent and nature of work and materials necessary for the execution and



completion of the Works and the remedying of any defects therein, and

- (d) the means of access to the Site and the accommodation he may require, and, in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Tender.

The Contractor shall be deemed to have based his Tender on the data made available by the Employer and on his own inspection and examination, all as aforementioned.

12.1 **Sufficiency of Tender**

The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Tender and of the rates and prices stated in the Bill of Quantities, all of which shall, except insofar as it is otherwise provided in the Contract, cover all his obligations under the Contract (including those in respect of the supply of goods, materials, Plant or services or of contingencies for which there is a Provisional Sum) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein.

12.2 **Not Foreseeable Physical Obstructions or Conditions**

If, however, during the execution of the Works the Contractor encounters physical obstructions or physical conditions, other than climatic conditions on the Site, which obstructions or conditions were, in his opinion, not foreseeable by an experienced contractor, the Contractor shall forthwith give notice thereof to the Engineer, with a copy to the Employer. On receipt of such notice, the Engineer shall if in his opinion such obstructions or conditions could not have been reasonably foreseen by an experienced contractor, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of any costs which may have been incurred by the Contractor by reason of such obstructions or conditions having been encountered, which shall be added to the Contract Price,

and shall notify the Contractor accordingly, with a copy to the Employer. Such determination shall take account of any instruction which the Engineer may issue to the Contractor in connection therewith, and any proper and reasonable measures acceptable to the Engineer which the Contractor may take in the absence of specific instructions from the Engineer.

13.1 **Work to be in Accordance with Contract**

Unless it is legally or physically impossible, the Contractor shall execute and complete the Works and remedy any defects therein in strict accordance with the Contract to the satisfaction of the Engineer. The Contractor shall comply with and adhere strictly to the Engineer's instructions on any matter, whether mentioned in the



Contract or not, touching or concerning the Works. The Contractor shall take instructions only from the Engineer (or his delegate).

14.1 Programme to be Submitted

The Contractor shall, within the time stated in Part II of these Conditions after the date of the Letter of Acceptance, submit to the Engineer for his consent a programme, in such form and detail as the Engineer shall reasonably prescribe, for the execution of the Works. The Contractor shall, whenever required by the Engineer, also provide in writing for his information a general description of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works.

14.2 Revised Programme

If at any time it should appear to the Engineer that the actual progress of the Works does not conform to the programme to which consent has been given under Sub-Clause 14.1, the Contractor shall produce, at the request of the Engineer, a revised programme showing the modifications to such programme necessary to ensure completion of the Works within the Time for Completion.

14.3 Cash Flow Estimate to be submitted

The Contractor shall, within the time stated in Part II of these Conditions after the date of the Letter of Acceptance, provide to the Engineer for his information a detailed cash flow estimate, in quarterly periods, of all payments to which the Contractor will be entitled under the Contract and the Contractor shall subsequently supply revised cash flow estimates at quarterly intervals, if required to do so by the Engineer.

14.4 Contractor not Relieved of Duties or Responsibilities

The submission to and consent by the Engineer of such programme or the provision of such general descriptions or cash flow estimates shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

15.1 Contractor's Superintendence

The Contractor shall provide all necessary superintendence during the execution of the Works and as long thereafter as the Engineer may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor, or a competent and authorized representative approved of by the Engineer, which approval may at any time be withdrawn, shall give his whole time to the superintendence of the Works. Such authorized representative shall receive, on behalf of the Contractor, instructions from the Engineer.

If approval of the representative is withdrawn by the Engineer, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned, after receiving notice of such withdrawal, remove the representative from the Works and shall not thereafter employ him again on the



Works in any capacity and shall replace him by another representative approved by the Engineer.

16.1 **Contractor's Employees**

The Contractor shall provide on the Site in connection with the execution and completion of the Works and the remedying of any defects therein:

- (a) only such technical assistants as are skilled and experienced in their respective callings and such foremen and leading hands as are competent to give proper superintendence of the Works, and
- (b) such skilled, semi skilled and unskilled labour as is necessary for the proper and timely fulfilling of the Contractor's obligations under the Contract.

16.2 **Engineers at Liberty to Object**

The Engineer shall be at liberty to object to and require the Contractor to remove forthwith from the Works any person provided by the Contractor who, in the opinion of the Engineer, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose presence on Site is otherwise considered by the Engineer to be undesirable or security risk, and such person shall not be again allowed upon the Works without the consent of the Engineer. Any person so removed from the Works shall be replaced as soon as possible.

17.1 **Setting-out**

The Contractor shall be responsible for:

- (a) the accurate setting-out of the Works in relation to original points, lines and levels of reference given by the Engineer in writing,
- (b) the correctness, subject as above mentioned of the position, levels dimensions and alignment of all parts of the Works, and
- (c) the provision of all necessary instruments, appliances and labour in connection with the foregoing responsibilities.

If, at any time during the execution of the Works, any error appears in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Engineer, shall, at his own cost, rectify such error to the satisfaction of the Engineer, unless such error is based on incorrect data supplied in writing by the Engineer, in which case the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

The checking of any setting-out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the accuracy thereof and the Contractor shall carefully protect and preserve all bench-marks, sight-rails, pegs and



other things used in setting-out the Works.

18.1 **Boreholes and Exploratory Excavation**

If, at any time during the execution of the Works, the Engineer requires the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be the subject of an instruction in accordance with Clause 51, unless an item or a Provisional Sum in respect of such work is included in the Bill of Quantities.

19.1 **Safety, Security and Protection of the Environment**

The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein:

- (a) have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons,
- (b) provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others, and
- (c) take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

19.2 **Employer's Responsibilities**

If under Clause 31 the Employer shall carry out work on the Site with his own workmen he shall, in respect of such work:

- (a) have full regard to the safety of all persons entitled to be upon the Site, and
- (b) keep the Site in an orderly state appropriate to the avoidance of danger to such persons.

If under Clause 31 the Employer shall employ other contractors on the Site he shall require them to have the same regard for safety and avoidance of danger.

20.1 **Care of Works**

The Contractor shall take full responsibility for the care of the Works and materials and Plant for incorporation therein from the Commencement Date until the date of issue of the Taking-Over Certificate for the whole of the Works, when the



responsibility for the said care shall pass to the Employer. Provided that:

- (a) if the Engineer issues a Taking-Over Certificate for any Section or part of the Permanent Works the Contractor shall cease to be liable for the care of that Section or part from the date of issue of the Taking-Over Certificate, when the responsibility for the care of that Section or part shall pass to the Employer, and
- (b) the Contractor shall take full responsibility for the care of any outstanding Works and materials and Plant for incorporation therein which he undertakes to finish during the Defects Liability Period until such outstanding Works have been completed pursuant to Clause 49.

20.2 Responsibility to Rectify Loss or Damage

If any loss or damage happens to the Works, or any part thereof, or materials or Plant for incorporation therein, during the period for which the Contractor is responsible for the care thereof, from any cause whatsoever, other than the risks defined in Sub- Clause 20.4, the Contractor shall, at his own cost, rectify such loss or damage so that the Permanent Works conform in every respect with the provisions of the Contract to the satisfaction of the Engineer. The Contractor shall also be liable for any loss or damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50.

20.3 Loss or Damage Due to Employer's Risks

In the event of any such loss or damage happening from any of the risks defined in Sub-Clause 20.4, or in combination with other risks, the Contractor shall, if and to the extent required by the Engineer, rectify the loss or damage and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer. In the case of a combination or risks causing loss or damage any such determination shall take into account the proportional responsibility of the Contractor and the Employer.

20.4 Employer's Risks

The Employer's risks are:

- (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (b) Rebellion, revolution, insurrection, or military or usurped power, or civil war,
- (c) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,



- (d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
- (e) riot, commotion or disorder, unless solely restricted to employees of the Contractor or of his Subcontractor and arising from the conduct of the Works,
- (f) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract,
- (g) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible, and
- (h) any operation of the forces of nature against which an experienced contractor could not reasonably have been expected to take precautions.

21.1 **Insurance of Works and Contractor's Equipment**

The Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 20, insure:

- (a) the Works, together with materials and Plant for incorporation therein, to the full replacement cost (the term "cost" in this context shall include profit),
- (b) an additional sum of 15 per cent of such replacement cost, or as may be specified in Part II of these Conditions, to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature, and
- (c) the Contractor's Equipment and other things brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

21.2 **Scope of Cover**

The insurance in paragraphs (a) and (b) of Sub-Clause 21.1 shall be in the joint names of the Contractor and the Employer and shall cover:

- (a) the Employer and the Contractor against all loss or damage from whatsoever cause arising, other than as provided in Sub-Clause 21.4, from the start of work at the Site until the date of issue of the relevant Taking-Over Certificate in respect of the Works or any Section or part thereof as the case may be, and
- (b) the Contractor for his liability:
 - (i) during the Defects Liability Period for loss or damage arising from a cause occurring prior to the commencement of the Defects Liability Periods, and



- (ii) for loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50.

21.3 **Responsibility for Amounts not recovered**

Any amounts not insured or not recovered from the insurers shall be borne by the Employer or the Contractor in accordance with their responsibilities under Clause 20.

21.4 **Exclusions**

There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by:

- (a) war, hostilities (where war be declared or not), invasion, act of foreign enemies,
- (b) rebellion, revolution, insurrection, or military or usurped power, or civil war,
- (c) ionising, radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof, or
- (d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds.

22.1 **Damage to Persons and Property**

The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of:

- (a) death of or injury to any person, or
- (b) loss of or damage to any property (other than the Works),

which may arise out of or in consequence of the execution and completion of the Works and the remedying of any defects therein, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, subject to the exceptions defined in Sub-Clause 22.2.

22.2 **Exceptions**

The "exceptions" referred to in Sub-Clause 22.1 are:

- (a) the permanent use or occupation of land by the Works, or any part thereof,
- (b) the right of the Employer to execute the Works, or any part thereof, on, over, under, is or through any land,
- (c) damage to property which is the unavoidable result of the execution and



completion of the Works, or the remedying of any defects therein, in accordance with the Contract, and

- (d) death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Employer, his agents servants or other contractors, not being employed by the Contractor, or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or, where the injury or damage was contributed to by the Contractor, his servants or agents, such part of the said injury or damage as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the injury or damage.

22.3 Indemnity by Employer

The Employer shall indemnify the Contractor against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the exceptions defined in Sub-Clause 22.2

23.1 Third Party Insurance (including Employer's Property)

The Contractor shall, without limiting his or the Employer's obligation and responsibilities under Clause 22, insure, in the joint names of the Contractor and the Employer, against liabilities for death of or injury to any person (other than as provided in Clause 24) or loss of or damage to any property (other than the Works) arising out of the performance of the Contract, other than the exceptions defined in paragraphs (a), (b) and (c) of Sub-Clause 22.2.

23.2 Minimum Amount of Insurance

Such insurance shall be for at least the amount stated in the Appendix to Tender.

23.3 Cross Liabilities

The insurance policy shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Employer as separate insured's.

24.1 Accident or Injury to Workmen

The Employer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or any Subcontractor, other than death or injury resulting from any act or default of the Employer, his agents or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, other than those for which the Employer is liable as aforesaid, and against all claims, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto.



24.2 **Insurance Against Accidents, etc. to Workmen**

The Contractor shall insure against such liability and shall continue such insurance during the whole of the time that any persons are employed by him on the Works. Provided that, in respect of any persons employed by any Subcontractor, the Contractor's obligations to insure as aforesaid under the Sub-Clause shall be satisfied if the Subcontractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy, but the Contractor shall require such Subcontractor to produce to the Employer, when required, such policy of insurance and the receipt for the payment of the current premium.

25.1 **Evidence and Terms of Insurances**

The Contractor shall provide evidence to the Employer prior to the start of work at the Site that the insurances required under the Contract have been effected and shall, within 84 days of the Commencement Date, provide the insurance policies to the Employer. When providing such evidence and such policies to the Employer, the Contractor shall notify the Engineer of so doing. Such insurance policies shall be consistent with the general terms agreed prior to the issue of the Letter of Acceptance. The Contractor shall effect all insurances for which he is responsible with insurers

25.2 **Adequacy of Insurances**

The Contractor shall notify the insurers of changes in the nature, extent or programme for the execution of the Works and ensure the adequacy of the insurances at all times in accordance with the terms of the Contract and shall, when required, produce to the Employer the insurance policies in force and the receipts for payment of the current premiums.

25.3 **Remedy on Contractor's Failure to Insure**

If the Contractor fails to effect and keep in force any of the insurances required under the Contract, or fails to provide the policies to the Employer within the period required by Sub-Clause 25.1, then and in any such case the Employer may effect and keep in force any such insurances and pay any premium as may be necessary for that purpose and from time to time deduct the amount so paid from any monies due or to become due to the Contractor, or recover the same as a debt due from the Contractor.

25.4 **Compliance with Policy Conditions**

In the event that the Contractor or the Employer fails to comply with conditions imposed by the insurance policies effected pursuant to the Contract, each shall indemnify the other against all losses and claims arising from such failure.



26.1 **Compliance with Statutes, Regulations**

The Contractor shall conform in all respects, including by the giving of all notices and the paying of all fees, with the provisions of:

- (a) any National or State Statute, Ordinance, or other Law, or any regulation, or by-law of any local or other duly constituted authority in relation to the execution and completion of the Works and the remedying of any defects therein, and
- (b) the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works,

and the Contractor shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such provisions. Provided always that the Employer shall be responsible for obtaining any planning, zoning or other similar permission required for the Works to proceed and shall indemnify the Contractor in accordance with Sub-Clause 22.3.

27.1 **Fossils, etc.**

All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the Site shall, as between the Employer and the Contractor, be deemed to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall, immediately upon discovery thereof and before removal, acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same. If, by reason of such instructions, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer.

28.1 **Patent Rights**

The Contractor shall save harmless and indemnify the Employer from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Contractor's Equipment, materials or Plant used for or in connection with or for incorporation in the Works and from and against all damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, except where such infringement results from compliance with the design or Specification provided by the Engineer.



28.2 **Royalties**

Except where otherwise stated, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensation, if any, for getting stone, sand, gravel, clay or other materials required for the Works.

29.1 **Interference with Traffic and Adjoining Properties**

All operations necessary for the execution and completion of the Works and the remedying of any defects therein shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with:

- (a) the convenience of the public, or
- (b) the access to, use and occupation of public or private roads and footpaths to or of properties whether in the possession of the Employer or of any other person.

The Contractor shall save harmless and indemnify the Employer in respect of all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of, or in relation to, any such matters insofar as the Contractor is responsible therefore.

30.1 **Avoidance of Damage to Roads**

The Contractor shall use and adopt every reasonable means and measures to prevent private and public property or any of the roads or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of his Subcontractors and, in particular, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of materials, Plant, Contractor's Equipment or Temporary Works from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such roads and bridges.

30.2 **Transport of Contractor's Equipment or Temporary Works**

Save insofar as the Contract otherwise provides, the Contractor shall be responsible for and shall pay the cost of strengthening any bridges or altering or improving any road communicating with or on the routes to the Site to facilitate the movement of Contractor's Equipment or Temporary Works and the Contractor shall indemnify and keep indemnified the Employer against all claims for damage to any such road or bridge caused by such movement, including such claims as may be made directly against the Employer, and shall negotiate and pay all claims arising solely out of such damage.

30.3 **Transport of Materials or Plant**

If, notwithstanding Sub-Clause 30.1, any damage occurs to any bridge or road communicating with or on the routes to the Site arising from the transport of materials



or Plant, the Contractor shall notify the Engineer with a copy to the Employer, as soon as he becomes aware of such damage or as soon as he receives any claim from the authority entitled to make such claim. Where under any law or regulation the hauler of such materials or Plant is required to indemnify the road authority against damage the Employer shall not be liable for any costs, charges or expenses in respect thereof or in relation thereto. In other cases the Employer shall negotiate the settlement of and pay all sums due in respect of such claim and shall indemnify the Contractor in respect thereof and in respect of all claims, proceedings damages, costs, charges and expenses in relation thereto. Provided that if and so far as any such claim or part thereof is, in the opinion of the Engineer, due to any failure on the part of the Contractor to observe and perform his obligations under Sub-Clause 30.1, then the amount determined by the Engineer, after due consultation with the Employer and the Contractor, to be due to such failure shall be recoverable from the Contractor by the Employer and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Provided also that the Employer shall notify the Contractor whenever a settlement is to be negotiated and, where any amount may be due from the Contractor, the Employer shall consult with the Contractor before such settlement is agreed.

30.4 Waterborne Traffic

Where the nature of the Works is such as to require the use by the Contractor of waterborne transport the foregoing provisions of this Clause shall be construed as though "road" included a lock, dock, sea wall or other structure related to a waterway and "vehicle" included craft, and shall have effect accordingly.

31.1 Opportunities for Other Contractors

The Contractor shall, in accordance with the requirements of the Engineer, afford all reasonable opportunities for carrying out their work to:

- (a) any other contractors employed by the Employer and their workmen,
- (b) the workmen of the Employer, and
- (c) the workmen of any duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works.

31.2 Facilities for Other Contractors

If, however, pursuant to Sub-Clause 31.1 the Contractor shall, on the written request of the Engineer:

- (a) make available to any other contractor, or to the Employer or any such authority, any roads or ways for the maintenance of which the Contractor is responsible,



(b) permit the use, by any such, of Temporary Works or Contractor's Equipment on the Site, or

(c) provide any other service of whatsoever nature for any such,

the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

32.1 **Contractor to Keep Site Clear**

During the execution of the Works the Contractor shall keep the Site reasonably free from all unnecessary obstruction and shall store or dispose of any Contractor's Equipment and surplus materials and clear away and remove from the Site any wreckage, rubbish or Temporary Works no longer required.

33.1 **Clearance of Site on Completion**

Upon the issue of any Taking-Over Certificate the Contractor shall clear away and remove from that part of the Site to which such Taking-Over Certificate relates all Contractor's Equipment, surplus materials, rubbish and Temporary Works of every kind, and leave such part of the Site and Works clean and in a workmanlike condition to the satisfaction of the Engineer. Provided that the Contractor shall be entitled to retain on Site, until the end of the Defects Liability Period, such materials, Contractor's Equipment and Temporary Works as are required by him for the purpose of fulfilling his obligations during the Defects Liability Period.

Labour

34.1 **Engagement of Staffs and Labour**

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

35.1 **Returns of Labour and Contractor's Equipment**

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Contractor's Equipment as the Engineer may require.

Materials, Plant and Workmanship

36.1 **Quality of Materials, Plant and Workmanship**

All materials, Plant and workmanship shall be:

(a) of the respective kinds described in the Contract and in accordance with the



Engineer's instructions, and

(b) subjected from time to time to such tests as the Engineer may require at the place of manufacture, fabrication or preparation, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places.

The Contractor shall provide such assistance, labour, electricity, fuels, stores, apparatus and instruments as are normally required for examining, measuring and testing any materials or Plant and shall supply samples of materials, before incorporation in the Works, for testing as may be selected and required by the Engineer.

36.2 **Cost of Samples**

All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Contract.

36.3 **Cost of Tests**

The cost of making any test shall be borne by the Contractor if such test

is: (a) clearly intended by or provided for in the Contract, or

(b) particularised in the Contract (in cases only for a test under load or of a test to ascertain whether the design of any finished or partially finished work is appropriate for the purposes which it was intended to fulfill) in sufficient detail to enable the Contractor to price or allow for the same in his Tender.

36.4 **Cost of Tests not Provided for**

If any test required by the Engineer which

is: (a) not intended by or provided for,

(b) (in the cases above mentioned) not so particularized, or

(c) (through so intended or provided for) required by the Engineer to be carried out at any place other than the Site or the place of manufacture, fabrication or preparation of the materials or Plant tested,

shows the materials, Plant or workmanship not to be in accordance with the provisions of the Contract to the satisfaction of the Engineer, then the cost of such test shall be borne by the Contractor, but in any other case Sub-Clause 36.5 shall apply.

36.5 **Engineer's Determination where Tests not provided for**

Where, pursuant to Sub-Clause 36.4, this Sub-Clause applies the Engineer shall, after due consultation with the Employer and the Contractor, determine:



(a) any extension of time of which the Contractor is entitled under Clause 44, and

(b) the amount of such costs, which shall be added to the Contract Price,

and shall notify the Contractor accordingly, with a copy to the Employer.

37.1 **Inspection of Operations**

The Engineer, and any person authorized by him, shall at all reasonable times have access to the Site and to all workshops and places where materials or Plant are being manufactured, fabricated or prepared for the Works and the Contractor shall afford every facility for and every assistance in obtaining the right to such access.

37.2 **Inspection and Testing**

The Engineer shall be entitled, during manufacture, fabrication or preparation to inspect and test the materials and Plant to be supplied under the Contract. If materials or Plant are being manufactured, fabricated or prepared in workshops or places other than those of the Contractor, the Contractor shall obtain permission for the Engineer to carry out such inspection and testing in those workshops or places.

Such inspection or testing shall not release the Contractor from any obligation under the Contract.

37.3 **Dates for Inspection and Testing**

The Contractor shall agree with the Engineer on the time and place for the inspection or testing of any materials or Plant as provided in the Contract. The Engineer shall give the Contractor not less than 24 hours notice of his intention to carry out the inspection or to attend the tests. If the Engineer, or his duly authorised representative, does not attend on the date agreed, the Contractor may, unless otherwise instructed by the Engineer, proceed with the tests, which shall be deemed to have been made in the presence of the Engineer. The Contractor shall forthwith forward to the Engineer duly certified copies of the tests readings. If the Engineer has not attended the tests, he shall accept the said readings as accurate

If, at the time and place agreed in accordance with Sub-Clause 37.3, the materials or Plant are not ready for inspection or testing or if, as a result of the inspection or testing referred to in this Clause, the Engineer determines that the materials or Plant are defective or otherwise not in accordance with the Contract, he may reject the materials or Plant and shall notify the Contractor thereof immediately.

The notice shall state the Engineer's objections with reasons. The Contractor shall then promptly make good the defect or ensure that rejected materials or Plant comply with the Contract. If the Engineer so requests, the tests of rejected materials or Plant shall be made or repeated under the same terms and conditions. All costs incurred by the Employer by the repetition of the test shall after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the



Contractor by the Employer and may be deducted from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

37.5 Independent Inspection

The Engineer may delegate inspection and testing of materials or Plant to an independent inspector. Any such delegation shall be effected in accordance with Sub-Clause 2.4 and for this purpose such independent inspector shall be considered as an assistant of the Engineer. Notice of such appointment (not being less than 14 days) shall be given by the Engineer to the Contractor.

38.1 Examination of Work before Covering up

No part of the works shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any such part of the Works which is about to be covered up or put out of view and to examine foundations before any part of the Works is placed thereon. The Contractor shall give notice to the Engineer whenever any such part of the Works or foundations is or are ready or about to be ready for examination and the Engineer shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such part of the Works or of examining such foundations.

38.2 Uncovering and Making Openings

The Contractor shall uncover any part of the Works or make openings in or through the same as the Engineer may from time to time instruct and shall reinstate and make good such part. If any such part has been covered up or put out of view after compliance with the requirement of Sub-Clause 38.1 and is found to be executed in accordance with the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount the Contractor's costs in respect of such of uncovering, making openings in or through, reinstating and making good the same, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer. In any other case all costs shall be borne by the Contractor.

39.1 Removal of Improper Work, Materials or Plant

The Engineer shall have authority to issue instructions from time to time, for:

- (a) the removal from the Site, within such time or times as may be specified in the instruction, of any materials or Plant which, in the opinion of the Engineer, are not in accordance with the Contract,
- (b) the substitution of proper and suitable materials or Plant, and
- (c) the removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefore, of any work which, in respect of



- (i) materials, Plant or workmanship, or
- (ii) design by the Contractor or for which he is responsible,

is not, in the opinion of the Engineer, in accordance with the Contract.

39.2 **Default of Contractor in Compliance**

In case of default on the part of Contractor in carrying out such instruction within the time specified therein or, if none, within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and all costs consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

Suspension

40.1 **Suspension of Work**

The Contractor shall, on the instructions of the Engineer, suspend the progress of the Works or any part thereof for such time and in such manner as the Engineer may consider necessary and shall, during such suspension, properly protect and secure the Works or such part thereof so far as is necessary in the opinion of the Engineer. Unless such suspension is:

- (a) otherwise provided for in the Contract,
- (b) necessary by reason of some default of or breach of contract by the Contractor or for which he is responsible,
- (c) necessary by reason of climatic conditions of the Site, or
- (d) necessary for the proper execution of the Works or for the safety of the Works or any part thereof (save to the extent that such necessity arises from any act or default by the Engineer or the Employer or from any of the risks defined in Sub-Clause 20.4), Sub-Clause 40.2 shall apply.

40.2 **Engineer's Determination following Suspension**

Where, pursuant to Sub-Clause 40.1, this Sub-Clause applies the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount, which shall be added to the Contract Price, in respect of the cost incurred by the Contractor by reason of such suspension,



and shall notify the Contractor accordingly, with a copy to the Employer.

40.3 **Suspension lasting more than 84 Days**

If the progress of the Works or any part thereof is suspended on the written instructions of the Engineer and if permission to resume work is not given by the Engineer within a period for 84 days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of Sub-Clause 40.1, the Contractor may give notice to the Engineer requiring permission, within 28 days from the receipt thereof, to proceed with the Works or that part thereof in regard to which progress is suspended. If, within the said time, such permission is not granted, the Contractor may, but is not bound to, elect to treat the suspension, where it affects part only of the Works, as an omission of such part under Clause 51 by giving a further notice to the Engineer to that effect, or, where it affects the whole of the Works, treat the suspension as an event of default by the Employer and terminates his employment under the Contract in accordance with the provisions of Sub-Clause 69.1, whereupon the provisions of Sub-Clause 69.2 and 69.3 shall apply.

Commencement and Delays

41.1 **Commencement of Works**

The Contractor shall commence the Works as soon as is reasonably possible after the receipt by him of notice to this effect from the Engineer, which notice shall be issued within the time stated in the Appendix to Tender after the date of the Letter of Acceptance. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

42.1 **Possession of Site and Access Thereto**

Save insofar as the Contract may prescribe:

- (a) the extent of portions of the Site of which the Contractor is to be given possession from time to time,
- (b) the order in which such portions shall be made available to the Contractor, and, subject to any requirement in the Contract as to the order in which the Works shall be executed, the Employer will, with the Engineer's notice to commence the Works, give to the Contractor possession of
- (c) so much of the Site, and
- (d) such access as, in accordance with the Contract, is to be provided by the Employer as may be required to enable the Contractor to commence and proceed with the execution of the Works in accordance with the programme referred to in Clause 14, if any, and otherwise in accordance with such reasonable proposals as the Contractor shall, by notice to the Engineer with a copy to the Employer, make. The Employer will, from time to time as the Works proceed, give to the Contractor possession of such further portions of the Site as may be required to enable the



Contractor to proceed with the execution of the Works with due dispatch in accordance with such programme or proposals, as the case may be.

42.2 **Failure to Give Possession**

If the Contractor suffers delay and/or incurs costs from failure on the part of the Employer to give possession in accordance with the terms of Sub-Clause 42.1, the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
 - (b) the amount of such costs, which shall be added to the Contract Price,
- and shall notify the Contractor accordingly, with a copy to the Employer.

42.3 **Rights of Way and Facilities**

The Contractor shall bear all costs and charges for special or temporary way leaves required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional facilities outside the Site required by him for the purposes of the Works.

43.1 **Time for Completion**

The whole of the Works and, if applicable, any Section required to be completed within a particular time as stated in the Appendix to Tender, shall be completed, in accordance with the provisions of Clause 48, within the time stated in the Appendix to Tender for the whole of the Works or the Section (as the case may be), calculated from the Commencement Date, or such extended time as may be allowed under Clause 44.

44.1 **Extension of Time for Completion**

In the event of:

- (a) the amount or nature of extra or additional work,
- (b) any cause of delay referred to in these Conditions,
- (c) exceptionally adverse climatic conditions,
- (d) any delay, impediment or prevention by the Employer, or
- (e) other special circumstances which may occur, other than through a default of or breach of contract by the Contractor or for which he is responsible,

being such as fairly to entitle the Contractor to an extension of the Time for Completion of the Works, or any Section or part thereof, the Engineer may, after



due consultation with the Employer and the Contractor, consider the amount of such extension or otherwise and shall notify the Contractor accordingly, with a copy to the Employer.

44.2 Contractor to Provide Notification and Detailed Particulars

Provided that the Engineer is not bound to make any consideration unless the Contractor has

(a) within 14 days after such event has first arisen notified the Engineer with a copy to the Employer, and

(b) within 14 days or such other reasonable time as may be agreed by the Engineer, after such notification submitted to the Engineer detailed particulars of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

44.3 Interim Determination of Extension

Provided also that where an event has a continuing effect such that it is not practicable for the Contractor to submit detailed particulars within the period of 14 days referred to in Sub-Clause 44.2(b), he shall nevertheless be entitled to an extension of time provided that he has submitted to the Engineer interim particulars at intervals of not more than 14 days and final particulars within 14 days of the end of the effects resulting from the event. On receipt of such interim particulars, the Engineer shall, without undue delay, make an interim determination of extension of time and, on receipt of the final particulars, the Engineer shall review all the circumstances and shall determine an overall extension of time in regard to the event. In both such cases the Engineer shall make his determination after due consultation with the Employer and the Contractor and shall notify the Contractor of the determination, with a copy to the Employer. No final review shall result in a decrease of any extension of time already determined by the Engineer.

45.1 Restriction on Working Hours

Subject to any provision to the contrary contained in the Contract, none of the Works shall, save as hereinafter provided, be carried on during the night or on locally recognized days of rest without the consent of the Engineer, except when work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer. Provided that the provisions of this Clause shall not be applicable in the case of any work which it is customary to carry out by multiple shifts.

46.1 Rate of Progress

If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Engineer, too slow to comply with the Time for Completion, the Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary,



subject to the consent of the Engineer, to expedite progress so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognized days of rest, he shall be entitled to seek the consent of the Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this Clause, involve the Employer in additional supervision costs, such cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

47.1 Liquidated Damages for Delay

If the Contractor fails to comply with the Time for Completion in accordance with Clause 48, for the whole of the Works or, if applicable, any Section within the relevant time prescribed by Clause 43, then the Contractor shall pay to the Employer the relevant sum stated in the Appendix to Tender as liquidated damages for such default and not as a penalty (which sum shall be the only monies due from the Contractor for such default) for every day or part of a day which shall elapse between the relevant Time for Completion and the date stated in a Taking-Over Certificate of the whole of the Works or the relevant Section, subject to the applicable limit stated in the Appendix to Tender. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

47.2 Reduction of Liquidated Damages

If, before the Time for Completion of the whole of the Works or, if applicable, any Section, a Taking-Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over Certificate, and in the absence of Alternative provisions in the Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

48.1 Taking-Over Certificate

When the whole of the Works have been substantially completed and have satisfactorily passed any Tests on Completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer with a copy to the Employer, accompanied by a written undertaking to finish with due expedition any outstanding work during the Defects Liability Period. Such notice and undertaking



shall be deemed to be a request by the Contractor for the Engineer to issue a Taking-Over Certificate in respect of the Works. The Engineer shall within 21 days of the date of delivery of such notice, either issue to the Contractor, with a copy to the Employer, a Taking-Over Certificate, stating the date on which, in his opinion, the Works were substantially completed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the work which, in the Engineer's opinion, is required to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of the Works specified therein. The Contractor shall be entitled to receive such Taking-Over Certificate within 21 days of completion, to the satisfaction of the Engineer, of the Works so specified and remedying any defects so notified.

48.2 Taking Over of Sections or Parts

Similarly, in accordance with the procedure set out in Sub-Clause 48.1, the Contractor may request and the Engineer shall issue a Taking-Over Certificate in respect of:

- (a) any Section in respect of which a separate Time for Completion is provided in the Appendix to Tender,
- (b) any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer and, otherwise than as provided for in the Contract, occupied or used by the Employer, or
- (c) any part of the Permanent Works which the Employer has elected to occupy or use prior to completion (where such prior occupation or use is not provided for in the Contract or has not been agreed by the Contractor as a temporary measure).

48.3 Substantial Completion of Parts

If any part of the Permanent Works has been substantially completed and has satisfactorily passed any Tests on Completion prescribed by the Contractor, the Engineer may issue a Taking-Over Certificate in respect of that part of the Permanent Works before completion of the whole of the Works and, upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete with due expedition any outstanding work in that part of the Permanent Works during the Defects Liability Period.

48.4 Surfaces Requiring Reinstatement

Provided that a Taking-Over Certificate given in respect of any Section or part of the Permanent Works before completion of the whole of the Works shall not be deemed to certify completion of any ground or surfaces requiring reinstatement, unless such Taking-Over Certificate shall expressly so state.



Defects Liability

49.1 Defects Liability Period

In these Conditions the expression "Defects Liability Period" shall mean the defects liability period named in the Appendix to Tender, calculated from:

- (a) the date of completion of the Works certified by the Engineer in accordance with Clause 48, or
- (b) in the event of more than one certificate having issued by the Engineer under Clause 48, the respective dates so certified,

and in relation to the Defects Liability Period the expression "the Works" shall be construed accordingly.

49.2 Completion of Outstanding Work and Remedying Defects

To the intent that the Works shall, at or as soon as practicable after the expiration of the Defects Liability Period, be delivered to the Employer in the condition required by the Contract, fair wear and tear excepted, to the satisfaction of the Engineer, the Contractor shall:

- (a) complete the work, if any, outstanding on the date stated in the Taking-Over Certificate as soon as practicable after such date, and
- (b) execute all such work of amendment, reconstruction, and remedying defects, shrinkages or other faults as the Engineer may, during the Defects Liability Period or within 14 days after its expiration, as a result of an inspection made by or on behalf of the Engineer prior to its expiration, instruct the Contractor to execute.

49.3 Cost of Remedying Defects

All work referred to in Sub-Clause 49.2(b) shall be executed by the Contractor at his own cost if the necessity thereof is, in the opinion of the Engineer, due to:

- (a) the use of materials, Plant or workmanship not in accordance with the Contract,
- (b) where the Contractor is responsible for the design of part of the Permanent Works, any fault in such design, or
- (c) the neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract.

If, in the opinion of the Engineer, such necessity is due to any other cause, he shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.



49.4 **Contractor's Failure to Carry Out Instructions**

In case of default on the part of the Contractor in carrying out such instruction within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and if such work is work which, in the opinion of the Engineer, the Contractor was liable to do at his own cost under the Contract, then all cost consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

50.1 **Contractor to Search**

If any defect, shrinkage or other fault in the Works appears at any time prior to the end of the Defects Liability Period, the Engineer may instruct the Contractor, with a copy to the Employer, to search under the directions of the Engineer for the cause thereof. Unless such defect, shrinkage or other fault is one for which the Contractor is liable under the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount in respect of the costs of such search incurred by the Contractor, which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer. If such defect, shrinkage or other fault is one for which the Contractor is liable, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case remedy such defect, shrinkage or other fault at his own cost in accordance with the provisions of Clause 49.

Alterations, Additions and Omissions

51.1 **Variations**

The Engineer shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:

- (a) increase or decrease the quantity of any work included in the Contract,
- (b) omit any such work (but not if the omitted work is to be carried out by the Employer or by another contractor),
- (c) change the character or quality or kind of any such work,
- (d) change the levels, lines, position and dimensions of any part of the Works,
- (e) execute additional work of any kind necessary for the completion of the Works,
or
- (f) change any specified sequence or timing of construction of any part of the Works.

No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 52. Provided that where the issue of an instruction to vary the Works is necessitated by some default of



or breach of contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.

51.2 **Instructions for Variations**

The Contractor shall not make any such variation without an instruction of the Engineer. Provided that no instruction shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

52.1 **Valuation of Variations**

All variations referred to in Clause 51 and any additions to the Contract Price which are required to be determined in accordance with Clause 52 (for the purposes of this Clause referred to as "varied work"), shall be valued at the rates and prices set out in the Contract if, in the opinion of the Engineer, the same shall be applicable. If the Contract does not contain any rates or prices applicable to the varied work, the rates and prices in the Contract shall be used as the basis for valuation so far as may be reasonable, failing which, after due consultation by the Engineer with the Employer and the Contractor, suitable rates or prices shall be agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such rates or prices as are, in his opinion, appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with Clause 60.

52.2 **Power of Engineer to Fix Rates**

Provided that if the nature or amount of any varied work relative to the nature or amount of the whole of the Works or to any part thereof, is such that, in the opinion of the Engineer, the rate or price contained in the Contract for any item of the Works is, by reason of such varied work, rendered inappropriate or inapplicable, then, after due consultation by the Engineer with the Employer and the Contractor, a suitable rate or price shall be agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such other rate or price as is, in his opinion, appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with Clause 60.

Provided also that no varied work instructed to be done by the Engineer pursuant to Clause 51 shall be valued under Sub-Clause 52.1 or under this Sub-Clause unless, within 14 days of the date of such instruction and, other than in the case of omitted work, before the commencement of the varied work, notice shall have been given either:

- (a) by the Contractor to the Engineer of his intention to claim extra payment or a varied rate or price, or



(b) by the Engineer to the Contractor of his intention to vary a rate or price.

52.3 Variations Exceeding 15 per cent

If, on the issue of the Taking-Over Certificate for the whole of the Works, it is found that as a result of:

- (a) all varied work valued under Sub-Clauses 52.1 and 52.2, and
- (b) all adjustments upon measurement of the estimated quantities set out in the Bill of Quantities, excluding Provisional Sums, day works and adjustment of price made under Clause 70.

but not from any other cause, there have been additions to or deductions from the Contract Price which taken together are in excess of 15 per cent of the "Effective Contract Price" (which for the purposes of this Sub-Clause shall mean the Contract Price, excluding Provisional Sums and allowance for day works, if any) then and in such event (subject to any action already taken under any other Sub-Clause of this Clause), after due consultation by the Engineer with the Employer and the Contractor, there shall be added to or deducted from the Contract Price such further sums as may be agreed between the Contractor and the Engineer or, failing agreement, determined by the Engineer having regard to the Contractor's Site and general overhead costs of the Contract. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer. Such sum shall be based only on the amount by which such additions or deductions shall be in excess of 15 per cent of the Effective Contract Price.

52.4 Day work

The Engineer may, if in his opinion it is necessary or desirable, issue an instruction that any varied work shall be executed on a day work basis. The Contractor shall then be paid for such varied work under the terms set out in the day work schedule included in the Contract and at the rates and prices affixed thereto by him in the Tender.

The Contractor shall furnish to the Engineer such receipts or other vouchers as may be necessary to provide the amounts paid and, before ordering material, shall submit to the Engineer quotations for the same for his approval.

In respect of such of the Works executed on a day work basis, the Contractor shall during the continuance of such work, deliver each day to the Engineer an exact list in duplicate of the names, occupation and time of all workmen employed on such work and a statement, also in duplicate, showing the description and quantity of all materials and Contractor's Equipment used thereon or therefore other than Contractor's Equipment which is included in the percentage addition in accordance with such day work schedule. One copy of each list and statement will, if correct, or when agreed, be signed by the Engineer and returned to the Contractor.



At the end of each month the Contractor shall deliver to the Engineer a priced statement of the labour, materials and Contractor's Equipment, except as aforesaid, used and the Contractor shall not be entitled to any payment unless such lists and statements have been fully and punctually rendered. Provided always that if the Engineer considers that for any reason the sending of such lists or statements by the Contractor, in accordance with the foregoing provision, was impracticable he shall nevertheless be entitled to authorize payment for such work, either as day work, on being satisfied as to the time employed and the labour, materials and Contractor's Equipment used on such work, or at such value therefore as shall, in his opinion, be fair and reasonable.

Procedure for Claims

53.1 Notice of Claims

Notwithstanding any other provision of the Contract, if the Contractor intends to claim any additional payment pursuant to any Clause of these Conditions or otherwise, he shall give notice along with supporting documents of his intention to the Engineer with a copy to the Employer, within 28 days after the event giving rise to the claim has first arisen.

53.2 Contemporary Records

Upon the happening of the event referred to in Sub-Clause 53.1, the Contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make. Without necessarily admitting the Employer's liability, the Engineer shall, on receipt of a notice under Sub-Clause 53.1, inspect such contemporary records and may instruct the Contractor to keep any further contemporary records as are reasonable and may be material to the claim of which notice has been given. The Contractor shall permit the Engineer to inspect all records kept pursuant to this Sub-Clause and shall supply him with copies thereof as and when the Engineer so instructs.

53.3 Substantiation of Claims

Within 28 days, or such other reasonable time as may be agreed by the Engineer, of giving notice under Sub-Clause 53.1, the Contractor shall send to the Engineer an account giving detailed particulars of the amount claimed and the grounds upon which the claim is based. Where the event giving rise to the claim has a continuing effect, such account shall be considered to be an interim account and the Contractor shall, at such intervals as the Engineer may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Engineer, the Contractor shall send a final account within 28 days of the end of the effects resulting from the event. The Contractor shall, if required by the Engineer so to do, copy to the Employer all accounts sent to the Engineer pursuant to this Sub-Clause.



53.4 **Failure to Comply**

If the Contractor fails to comply with any of the provisions of this Clause in respect of any claim which he seeks to make, his entitlement to payment in respect thereof shall not exceed such amount as the Engineer or any arbitrator or arbitrators appointed pursuant to Sub-Clause 67.3 assessing the claim considers to be verified by contemporary records (whether or not such records were brought to the Engineer's notice as required under Sub-Clause 53.2 and 53.3).

53.5 **Payment of Claims**

The Contractor shall be entitled to have included in any interim payment certified by the Engineer pursuant to Clause 60 such amount in respect of any claim as the Engineer, after due consultation with the Employer and the Contractor, may consider due to the Contractor provided that the Contractor has supplied sufficient particulars to enable the Engineer to determine the amount due. If such particulars are insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment in respect of such part of the claim as such particulars may substantiate to the satisfaction of the Engineer. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.

Contractor's Equipment, Temporary Works and Materials

54.1 **Contractor's Equipment, Temporary Works and Materials; Exclusive Use for the Works**

All Contractor's Equipment, Temporary Works and materials provided by the Contractor shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the Site to another, without the consent of the Engineer. Provided that consent shall not be required for vehicles engaged in transporting any staff, labour, Contractor's Equipment, Temporary Works, Plant or materials to or from the Site.

54.2 **Employer not Liable for Damage**

The Employer shall not at any time be liable, save as mentioned in Clauses 20 and 65, for the loss of or damage to any of the said Contractor's Equipment, Workforce, Temporary Works or Materials.

54.3 **Customs Clearance**

The Employer will use his best endeavors in assisting the Contractor, where required, in obtaining clearance through the Customs of Contractor's equipment, materials and other things required for the Works.



54.4 **Re-export of Contractor's Equipment**

In respect of any Contractor's Equipment which the Contractor has imported for the purposes of the Works, the Employer will use his best endeavors to assist the Contractor, where required, in procuring any necessary Government consent to the re-export of such Contractor's Equipment by the Contractor upon the removal thereof pursuant to the terms of Contract.

54.5 **Conditions of Hire of Contractor's Equipment**

With a view to securing, in the event of termination under Clause 63, the continued availability, for the purpose of executing the Works, of any hired Contractor's Equipment, the Contractor shall not bring on to the Site any hired Contractor's Equipment unless there is an agreement for hire thereof (which agreement shall be deemed not to include an agreement for hire purchase) which contains a provision that the owner thereof will, on request in writing made by the Employer within 7 days after the date on which any termination has become effective, and on the Employer undertaking to pay all hire charges in respect thereof from such date, hire such Contractor's Equipment to the Employer on the same terms in all respect as the same was hired to the Contractor save that the Employer shall be entitled to permit the use thereof by any other contractor employed by him for the purpose of execution and completing the Works and remedying any defects therein, under the terms of the said Clause 63.

54.6 **Costs for the Purpose of Clause 63**

In the event of the Employer entering into any agreement for the hire of Contractor's Equipment pursuant to Sub-Clause 54.5, all sums properly paid by the Employer under the provision of any such agreement and all costs incurred by him (including stamp duties) in entering into such agreement shall be deemed, for the purpose of Clause 63, to be part of the cost of executing and completing the Works and the remedying of any defects therein.

54.7 **Incorporation of Clause in Subcontracts**

The Contractor shall, where entering into any subcontract for the execution of any part of the Works, incorporate in such subcontract (by reference or otherwise) the provisions of this Clause in relation to Contractor's Equipment, Temporary Works or materials brought on to the Site by the Subcontractor.

54.8 **Approval of Materials not implied**

The operation of this Clause shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by the Engineer.



Measurement

55.1 Quantities

The quantities set out in the Bill of Quantities are the estimated quantities for the Works, and they are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfillment of his obligations under the Contract.

56.1 Works to be measured

The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value of the Works in accordance with the Contract and the Contractor shall be paid that value in accordance with Clause 60. The Engineer shall, when he requires any part of the Works to be measured, give reasonable notice to the Contractor's authorized agent, who shall:

- (a) forthwith attend or send a qualified representative to assist the Engineer in making such measurement, and
- (b) supply all particulars required by the Engineer.

Should the Contractor not attend, or neglect or omit to send such representative, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of such part of the Works. For the purpose of measuring such Permanent Works as are to be measured by records and drawings, the Engineer shall prepare records and drawings as the work proceeds and the Contractor, as and when called upon to do so in writing, shall, within 14 days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If the Contractor does not attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor, within 14 days of such examination, lodges with the Engineer notice of the respects in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Engineer shall review the records and drawings and either confirm or vary them.

57.1 Method of Measurement

The Works shall be measured net, notwithstanding any general or local custom, except where otherwise provided for in the Contract.



57.2 **Breakdown of Lump Sum Items**

For the purposes of statements submitted in accordance with Sub-Clause 60.1, the Contractor shall submit to the Engineer, within 28 days after the receipt of the Letter of Acceptance, a breakdown for each of the lump sum items contained in the Tender. Such breakdowns shall be subject to the approval of the Engineer.

Provisional Sums

58.1 **Definition of "Provisional Sum"**

"Provisional Sum" means a sum included in the Contract and so designated in the Bill of Quantities for the execution of any part of the Works or for the supply of goods, materials, Plant or services, or for contingencies, which sum may be used, in whole or in part, or not at all, on the instructions of the Engineer. The Contractor shall be entitled to only such amounts in respect of the work, supply or contingencies to which such Provisional Sums relate as the Engineer shall determine in accordance with this Clause. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.

58.2 **Use of Provisional Sums**

In respect of every Provisional Sum the Engineer shall have authority to issue instructions for the execution of work or for the supply of goods, material, Plant or services by:

- (a) the Contractor, in which case the Contractor shall be entitled to an amount equal to the value thereof determined in accordance with Clause 52, and
- (b) a nominated Subcontractor, as hereinafter defined, in which case the sum to be paid to the Contractor therefore shall be determined and paid in accordance with Sub-Clause 59.4.

58.3 **Production of Vouchers**

The Contractor shall produce to the Engineer all quotations, invoices, vouchers and accounts or receipts in connection with expenditure in respect of Provisional Sums, except where work is valued in accordance with rates or prices set out in the Tender.



Nominated Subcontractors

59.1 Definition of "Nominated Subcontractors"

All specialists, merchants, tradesmen and others executing any work or supplying any goods, materials, Plant or services for which Provisional Sums are included in the Contract, who may have been or be nominated or selected or approved by the Employer or the Engineer, and all persons to whom by virtue of the provisions of the Contract the Contractor is required to subcontract shall, in the execution of such work or the supply of such goods, materials, Plant or services, be deemed to be subcontractors to the Contractor and are referred to in this Contract as "nominated Subcontractors".

59.2 Nominated Subcontractors; Objection to Nomination

The Contractor shall not be required by the Employer or the Engineer, or be deemed to be under any obligation, to employ any nominated Subcontractor against whom the Contractor may raise reasonable objection or who declines to enter into subcontract with the Contractor containing provisions:

- (a) that in respect of the work, goods, materials, Plant or services the subject of the subcontract, the nominated Subcontractor will undertake towards the Contractor such obligations and liabilities as will enable the Contractor to discharge his own obligations and liabilities towards the Employer under the terms of the Contract and will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities, and
- (b) that the nominated Subcontractor will save harmless and indemnify the Contractor from and against any negligence by the nominated Subcontractor, his agents, workmen and servants and from and against any misuse by him or them of any Temporary Works provided by the Contractor for the purposes of the Contract and from all claims as aforesaid.

59.3 Design Requirements to be expressly stated

If in connection with any Provisional Sum the services to be provided include any matter of design or specification of any part of the Permanent Works or of any Plant to be incorporated therein, such requirement shall be expressly stated in the Contract and shall be included in any nominated Subcontract. The nominated Subcontract shall specify that the nominated Subcontractor providing such services will save harmless and indemnify



the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities.

59.4 **Payments to Nominated Subcontractors**

For all work executed or goods, materials, Plant or services supplied by any nominated Subcontractor, the Contractor shall be entitled to:

- (a) the actual price paid or due to be paid by the Contractor, on the instructions of the Engineer, and in accordance with the subcontract;
- (b) in respect of labour supplied by the Contractor, the sum, if any, entered in the Bill of Quantities or, if instructed by the Engineer pursuant to paragraph (a) of Sub-Clause 58.2, as may be determined in accordance with Clause 52; and
- (c) in respect of all other charges and profit, a sum being a percentage rate of the actual price paid or due to be paid calculated, where provision has been made in the Bill of Quantities for a rate to be set against the relevant Provisional Sum, at the rate inserted by the Contractor against that item or, where no such provision has been made, at the rate inserted by the Contractor in the Appendix to Tender and repeated where provision for such is made in a special item provided in the Bill of Quantities for such purpose.

59.5 **Certification of Payments to Nominated Subcontractors**

Before issuing, under Clause 60 any certificate, which includes any payment in respect of work done or goods, materials, Plant or services supplied by any nominated Subcontractor, the Engineer shall be entitled to demand from the Contractor reasonable proof that all payments, less retentions, included in previous certificates in respect of the work or goods, materials, Plant or services of such nominated Subcontractor have been paid or discharged by the Contractor. If the Contractor fails to supply such proof then, unless the Contractor:

- (a) Satisfies the Engineer in writing that he has reasonable cause for withholding or refusing to make such payment, and
- (b) produces to the Engineer reasonable proof that he has so informed such nominated Subcontractor in writing,

the Employer shall be entitled to pay to such nominated Subcontractor direct, upon the certificate of the Engineer, all payments, less retention, provided for in the nominated Subcontract, which the



Contractor has failed to make to such nominated Subcontractor and to deduct by way of set-off the amount so paid by the Employer from any sums due or to become due from the Employer to the Contractor.

Provided that, where the Engineer has certified and the Employer has paid direct as aforesaid, the Engineer shall in issuing any further certificate in favour of the Contractor, deduct from the amount thereof the amount so paid, direct as aforesaid, but shall not withhold or delay the issue of the certificate itself when due to be issued under the terms of the Contract.

Certificates and Payment

60.1 Monthly Statements

The Contractor shall submit to the Engineer after the end of each month six copies, each signed by the Contractor's representative approved by the Engineer in accordance with the Sub-Clause 15.1, of a statement, in such form as the Engineer may from time to time prescribe, showing the amounts to which the Contractor considers himself to be entitled up to the end of the month in respect of:

- (a) the value of the Permanent Works executed,
- (b) any other items in the Bill of Quantities including those for Contractor's Equipment, Temporary Works, day works and the like,
- (c) the percentage of the invoice value of listed materials, all as stated in the Appendix to Tender, and Plant delivered by the Contractor on the Site for incorporation in the Permanent Works but not incorporated in such Works,
- (d) Adjustments under Clause 70, and
- (e) any other sum to which the Contractor may be entitled under the Contract or otherwise.

60.2 Monthly Payments

The Engineer shall, within 28 days of receiving such statement, certify to the Employer the amount of payment to the Contractor which he considers due and payable in respect thereof, subject:

- (a) firstly, to the retention of the account calculated by applying the Percentage of Retention stated in the Appendix to Tender, to the amount to which the Contractor is entitled under paragraph



(a), (b), (c) and (e) of Sub-Clause 60.1 until the amount so retained reaches the Limit of Retention Money stated in the Appendix to Tender, and

- (b) secondly, to the deduction, other than pursuant to Clause 47, of any sums which may have become due and payable by the Contractor to the Employer.

Provided that the Engineer shall not be bound to certify any payment under this Sub-Clause if the net amount thereof, after all retentions and deductions, would be less than the Minimum Amount of Interim Payment Certificates stated in the Appendix to Tender.

Notwithstanding the terms of this Clause or any other Clause of the Contract no amount will be certified by the Engineer for payment until the performance security, if required under the Contract, has been provided by the Contractor and approved by the Employer.

60.3 **Payment of Retention Money**

- (a) Upon the issue of the Taking-Over Certificate with respect to the whole of the Works, one half of the Retention Money, or upon the issue of a Taking-Over Certificate with respect to a Section or part of the Permanent Works only such proportion thereof as the Engineer determines having regard to the relative value of such Section or part of the Permanent Works, shall be certified by the Engineer for payment to the Contractor.
- (b) Upon the expiration of the Defects Liability Period for the Works the other half of the Retention Money shall be certified by the Engineer for payment to the Contractor. Provided that, in the event of different Defects Liability Periods having become applicable to different Sections or part of the Permanent Works pursuant to Clause 48, the expression "expiration of the Defects Liability Period" shall, for the purposes of this Sub-Clause, be deemed to mean the expiration of the latest of such periods. Provided also that if at such time, there shall remain to be executed by the Contractor any work instructed, pursuant to Clause 49 and 50, in respect of the Works, the Engineer shall be entitled to withhold certification until completion of such work of so much of the balance of the Retention Money as shall, in the opinion of the Engineer, represent the cost of the work remaining to be executed.

60.4 **Correction of Certificates**

The Engineer may by any Interim Payment Certificate make any correction or modification in any previous certificate which shall have been issued by him and shall have authority, if any work is not being



carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate.

60.5 **Statement at Completion**

Not later than 84 days after the issue of the Taking-Over Certificate in respect of the whole of the Works, the Contractor shall submit to the Engineer a Statement at Completion with supporting documents showing in detail, in the form approved by the Engineer:

- (a) the final value of all work done in accordance with the Contract up to the date stated in such Taking-Over Certificate,
- (b) any further sums which the Contractor considers to be due, and
- (c) an estimate of amounts which the Contractor considers will become due to him under the Contract.

The estimated amounts shall be shown separately in such Statement at Completion. The Engineer shall verify payment in accordance with Sub-Clause 60.2.

60.6 **Final Statement**

Not later than 56 days after the issue of the Defects Liability Certificate pursuant to Sub-Clause 62.1, the Contractor shall submit to the Engineer for consideration a draft final statement with supporting documents showing in detail, in the form approved by the Engineer:

- (a) the value of all work done in accordance with the Contract, and
- (b) any further sums which the Contractor considers to be due to him under the Contract.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed (for the purposes of these Conditions referred to as the "Final Statement").

If, following discussions between the Engineer and the Contractor and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer an Interim Payment Certificate for those parts of the draft final statement, if any, which are not in dispute. The dispute may then be settled



in accordance with Clause 67.

60.7 Discharge

Upon submission of the Final Statement, the Contractor shall give to the Employer, with a copy to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after payment due under the Final Payment Certificate issued pursuant to Sub-Clause 60.8 has been made and the performance security referred to in Sub-Clause 10.1, if any, has been returned to the Contractor.

60.8 Final Payment Certificate

Within 28 days after receipt of the Final Statement, and the written discharge, the Engineer shall issue to the Employer (with a copy to the Contractor) a Final Payment Certificate stating:

- (a) the amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and
- (b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled other than under Clause 47, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.

60.9 Cessation of Employer's Liability

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or execution of the Works, unless the Contractor shall have included a claim in respect thereof in his Final Statement and (except in respect of matters or things arising after the issue of the Taking-Over Certificate in respect of the whole of the Works) in the Statement at Completion referred to in Sub-Clause 60.5.

60.10 Time for Payment

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 47, be paid by the Employer to the Contractor within 28 days after such Interim Payment Certificate has been delivered to the Employer, or, in the case of the Final Payment Certificate referred to in Sub-Clause 60.8, within 56 days, after such Final Payment Certificate has been delivered to the Employer. In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor interest at the rate stated in the Appendix to



Tender upon all sums unpaid from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to the Contractor's entitlement under Clause 69 or otherwise.

61.1 Approval only by Defects Liability Certificate

Only the Defects Liability Certificate, referred to in Clause 62, shall be deemed to constitute approval of the Works.

62.1 Defects Liability Certificate

The Contract shall not be considered as completed until a Defects Liability Certificate shall have been signed by the Engineer and delivered to the Employer, with a copy to the Contractor, stating the date on which the Contractor shall have completed his obligations to execute and complete the Works and remedy any defects therein to the Engineer's satisfaction.

The Defects Liability Certificate shall be given by the Engineer within 28 days after the expiration of the Defects Liability Period, or, if different defects liability periods shall become applicable to different Sections or parts of the Permanent Works, the expiration of the latest such period, or as soon thereafter as any works instructed, pursuant to Clause 49 and 50, have been completed to the satisfaction of the Engineer. Provided that the issue of the Defects Liability Certificate shall not be a condition precedent to payment to the Contractor of the second portion of the Retention Money in accordance with the conditions set out in Sub-Clause 60.3.

62.2 Unfulfilled Obligations

Notwithstanding the issue of the Defects Liability Certificate the Contractor and the Employer shall remain liable for the fulfillment of any obligation incurred under the provisions of the Contract prior to the issue of the Defects Liability Certificate which remains unperformed at the time of such Defects Liability Certificate is issued and, for the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties to the Contract.

Remedies

63.1 Default of Contractor

If the Contractor is deemed by law unable to pay his debts as they fall due, or enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or becomes insolvent, or makes an arrangement with, or assignment in favour of, his creditors, or agrees to carry out the Contract under a committee of inspection of his creditors, or if a receiver, administrator, trustee or liquidator is appointed over any substantial part of his assets, or if, under any law or regulation relating to



reorganization, arrangement or readjustment of debts, proceedings are commenced against the Contractor or resolutions passed in connection with dissolution or liquidation or if any steps are taken to enforce any security interest over a substantial part of the assets of the Contractor, or if any act is done or event occurs with respect to the Contractor or his assets which, under any applicable law has a substantially similar effect to any of the foregoing acts or events, or if the Contractor has contravened Sub-Clause 3.1, or has an execution levied on his goods, or Contract, if the Engineer certifies to the Employer, with a copy to the Contractor, that, in his opinion, the Contractor:

- (a) has repudiated the Contract, or
- (b) without reasonable excuse has failed
- (i) to commence the Works in accordance with Sub-Clause 41.1,
 - (ii) to proceed with the Works, or any Section thereof, within 28 days after receiving notice pursuant to Sub-Clause 46.1,
- (c) has failed to comply with a notice issued pursuant to Sub-Clause 37.4 or an instruction issued pursuant to Sub-Clause 39.1 within 28 days after having received it
- (d) despite previous warning from the Engineer, in writing, is otherwise persistently or flagrantly neglecting to comply with any of his obligations under the Contract, or
- (e) has contravened Sub-Clause 4.1,

then the Employer may, after giving 14 days' notice to the Contractor, enter upon the Site and the Works and terminate the employment of the Contractor without thereby releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and authorities conferred on the Employer or the Engineer by the Contract, and may himself complete the Works or may employ any other contractor to complete the Works. The Employer or such other contractor may use for such completion so much of the Contractor's Equipment, Temporary Works and materials as he or they may think proper.

63.2 Valuation at Date of Termination

The Engineer shall, as soon as may be practicable after any such entry and termination by the Employer, fix and determine expert, or by or after reference to the parties or after such investigation or enquiries as he may think fit to make or institute, and shall certify:

- (a) what amount (if any) had, at the time of such entry and termination, been reasonably earned by or would reasonably accrue



to the Contractor in respect of work then actually done by him under the Contract, and

- (b) the value of any of the said unused or partially used materials, any Contractor's Equipment and any Temporary Works.

63.3 Payment after Termination

If the Employer terminates the Contractor's employment under this Clause, he shall not be liable to pay to the Contractor any further amount (including damages) in respect of the Contract until the expiration of the Defects Liability Period and thereafter until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum (if any) as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount exceeds the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.

63.4 Assignment of Benefit of Agreement

Unless prohibited by law, the Contractor shall, if so instructed by the Engineer within 14 days of such entry and termination referred to in Sub-Clause 63.1, assign to the Employer the benefit of any agreement for the supply of any goods or materials or services and/or for the execution of any work for the purposes of the Contract, which the Contractor may have entered into.

64.1 Urgent Remedial Work

If, by reason of any accident, or failure, or other event occurring to, in, or in connection with the Works, or any part thereof, either during the execution of the Works, or during the Defects Liability Period, any remedial or other work is, in the opinion of the Engineer, urgently necessary for the safety of the Works and the Contractor is unable or unwilling at once to do such work, the Employer shall be entitled to employ and pay other persons to carry out such work as the Engineer may consider necessary. If the work or repair so done by the Employer is work which, in the opinion of the Engineer, the Contractor was liable to do at his own cost under the Contract, then all costs consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted



by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Provided that the Engineer shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof.

Special Risks

65.1 No Liability for Special Risks

Subject to due care and precaution and due diligence by the Contractor, the Contractor shall be under no liability whatsoever in consequence of any of the special risks referred to in Sub-Clause 65.2, whether by way of indemnity or otherwise, for or in respect of:

- (a) destruction of or damage to the Works, save to work condemned under the provisions of Clause 39 prior to the occurrence of any of the said special risks,
- (b) destruction of or damage to property, whether of the Employer or third parties, or
- (c) injury or loss of life.

65.2 Special Risks

The Special Risks are:

- (a) the risks defined under paragraphs (a), (c), (d) and (e) of Sub-Clause 20.4, and
- (b) the risks defined under paragraph (b) of Sub-Clause 20.4 insofar as these relate to the country in which the Works are to be executed.

65.3 Damage to Works by Special Risks

If the Works or any materials or Plant on or near or in transit to the Site, or any of the Contractor's Equipment, sustain destruction or damage by reason of any of the said special risks, the Contractor shall be entitled to payment in accordance with the Contract for any Permanent Works duly executed and for any materials or Plant so destroyed or damaged and, so far as may be required by the Engineer or as may be necessary for the completion of the Works, to payment for:

- (a) rectifying any such destruction or damage to the Works, and
- (b) replacing or rectifying such materials or Contractor's Equipment,

and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 (which shall in the case of the cost of replacement of Contractor's Equipment include the fair market value



thereof as determined by the Engineer) and shall notify the Contractor accordingly, with a copy to the Employer.

65.4 Projectile, Missile

Destruction, damage, injury or loss of life caused by the explosion or impact, whenever and wherever occurring, of any mine, bomb, shell, grenade, or other projectile, missile, munitions, or explosive of war, shall be deemed to be a consequence of the said special risks.

65.5 Increased Costs arising from Special Risks

Save to the extent that the Contractor is entitled to payment under any other provision of the Contract, the Employer shall repay to the Contractor any costs of the execution of the Work (other than such as may be attributable to the cost of reconstructing work condemned under the provisions of Clause 39 prior to the occurrence of any special risk) which are howsoever attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks, subject however to the provisions in this Clause hereinafter contained in regard to outbreak of war, but the Contractor shall, as soon as any such cost comes to his knowledge, forthwith notify the Engineer thereof. The Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of the Contractor's costs in respect thereof which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer.

65.6 Outbreak of War

If, during the currency of the Contract, there is an outbreak of war, whether war is declared or not, which, whether financially or otherwise, materially affects the execution of the Works, the Contractor shall, unless and until the Contract is terminated under the provisions of this Clause, continue to use his best endeavour to complete the execution of the Works. Provided that the Employer shall be entitled, at any time after such outbreak of war, to terminate the Contract by giving notice to the Contractor and, upon such notice being given, the Contract shall, except as to the rights of the parties under this clause and Clause 67, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

65.7 Removal of Contractor's Equipment on Termination

If the Contract is terminated under the provisions of Sub-Clause 65.6, the Contractor shall, with all reasonable dispatch, remove from the Site all Contractor's Equipment and shall give similar facilities to his Subcontractors to do so.

65.8 Payment if Contract Terminated



If the Contract is terminated as aforesaid, the Contractor shall be paid by the Employer, insofar as such amounts or items have not already been covered by payments on account made to the Contractor, for all work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:

- (a) the amounts payable in respect of any preliminary items referred to in the Bill of Quantities, so far as the work or service comprised therein has been carried out or performed, and a proper portion of any such items which have been partially carried out or performed;
- (b) the cost of materials, Plant or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery, such materials, Plant or goods becoming the property of the Employer upon such payments being made by him;
- (c) a sum being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works insofar as such expenditure has not been covered by any other payments referred to in this Sub-Clause;
- (d) any additional sum payable under the provisions of Sub-Clauses 65.3 and 65.5;
- (e) such proportion of the cost as may be reasonable, taking into account payments made or to be made for work executed, of removal of Contractor's Equipment under Sub-Clause 65.7 and, if required by the Contractor, return thereof to the Contractor's main plant yard in his country of registration or to other destination, at no greater cost; and
- (f) the reasonable cost of repatriation of all the Contractor's staff and workmen employed on or in connection with the Works at the time of such termination.

Provided that against any payment due from the Employer under this Sub-Clause, the Employer shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of Contractor's Equipment, materials and Plant and any other sums which, at the date of termination, were recoverable by the Employer from the Contractor under the terms of Contract. Any sums payable under this Sub-Clause shall, after due consultation with the Employer and the Contractor, be determined by the Engineer who shall notify the Contractor accordingly, with a copy to the Employer.



Release from Performance

66.1 Payment in Event of Release from Performance

If any circumstance outside the control of both parties arises after the issue of the Letter of Acceptance which renders it impossible or unlawful for either party to fulfill his or their contractual obligations, or under the law governing the Contract the parties are released from further performance, then the parties shall be discharged from the Contract, except as to their rights under this Clause and Clause 67 and without prejudice to the rights of either party in respect of any antecedent breach of the Contract, and the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as that which would have been payable under Clause 65 if the Contract had been terminated under the provisions of Clause 65.

Settlement of Disputes

67.1 Employer's Decision

If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Engineer, the matter in dispute shall, in the first place, be referred not later than 30 days in writing to the MD/CEO of the Employer or his nominee, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. Not later than 30 days after the day on which he received such reference the MD/CEO or his nominee shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Works with all due diligence and the Contractor and the Employer shall give effect forthwith to every such decision of the MD/CEO or his nominee unless and until the same shall be revised, as hereinafter provided, in an amicable settlement or an arbitral award.

If either the Employer or the Contractor be dissatisfied with any decision of the MD/CEO or his nominee, or if the MD/CEO or his nominee fails to give notice of his decision on or before the 30 days on which he received the reference, then either the Employer or the Contractor may, on or before the 30th day after the day on which he received notice of such decision, or on or before the 30th day after the day



on which the said period of 30th days expired, as the case may be, give notice to the other party, with a copy for information to the Engineer & Employer, of his intention to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 67.4, no arbitration in respect thereof may be commenced unless such notice is given.

If the MD/CEO or his nominee as the case may be has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notice of intention to commence arbitration as to such dispute has been given by either the Employer or the Contractor on or before the 30th day after the day on which the parties received notice as to such decision, the said decision shall become final and binding upon the Employer and the Contractor.

67.2 Amicable Settlement

Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 67.1, the parties shall attempt to settle such dispute amicably before the commencement of arbitration. Provided that, unless the parties otherwise agree, arbitration may be commenced on or after 30th day after the day on which notice of intention to commence arbitration of such dispute was given, even if no attempt at amicable settlement thereof has been made.

67.3 Arbitration

Any dispute in respect of which:

- (a) the decision, if any, of the MD/CEO or his nominee has not become final and binding pursuant to Sub-Clause 67.1, and
- (b) amicable settlement has not been reached within the period stated in Sub-Clause 67.2,

shall be finally settled, unless otherwise specified in the Contract, under the Arbitration Act, 1940. The said arbitrator/s shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the MD/CEO or his nominee related to the dispute.

Neither party shall be limited in the proceedings before such arbitrator/s to the evidence or arguments put before the MD/CEO or his nominee for the purpose of obtaining his said decision pursuant to Sub-Clause 67.1. No such decision shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator/s on any matter whatsoever relevant to the dispute.



Arbitration may be commenced prior to or after completion of the Works, provided that the obligations of the Employer, the Engineer and the Contractor shall not be altered by reason of the arbitration being conducted during the progress of the Works.

67.4 **Final and Binding Decision**

Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 67.1 and the related decision shall become final and binding.

Notice

68.1 **Notices to Contractor**

All certificates, notices or instructions to be given to the Contractor by the Employer or the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the Contractor's principal place of business or such other address as the Contractor shall nominate for that purpose.

68.2 **Notice to Employer and Engineer**

Any notice to be given to the Employer or to the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the respective addresses nominated for that purpose in Part II of these Conditions.

68.3 **Change of Address**

Either party may change a nominated address to another address in the country where the Works are being executed by prior notice to the other party, with a copy to the Engineer, and the Engineer may do so by prior notice to both parties.

Default of Employer

69.1 **Default of Employer**

In the event of the Employer:

- (a) failing to pay to the Contractor the amount due under any certificate of the Engineer within 28 days after the expiry of the time stated in Sub-Clause 60.10 Within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract,
- (b) interfering with or obstructing or refusing any required approval



to the issue of any such certificate,

- (c) becoming bankrupt or, being a company, going into liquidation, other than for the purpose of a scheme of reconstruction or amalgamation, or
- (d) giving notice to the Contractor that for economic reasons it is impossible for him to continue to meet his contractual obligations, the Contractor shall be entitled to terminate his employment under the Contract by giving notice to the Employer, with a copy to the Engineer. Such termination shall take effect 14 days after the giving of the notice.

69.2 Removal of Contractor's Equipment

Upon the expiry of the 14 days' notice referred to in Sub-Clause 69.1, the Contractor shall, notwithstanding the provisions of Sub-Clause 54.1, with all reasonable dispatch, remove from the Site all Contractor's Equipment brought by him thereon.

69.3 Payment on Termination

In the event of such termination the Employer shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of Clause 65.

69.4 Contractor's Entitlement to Suspend Work

Without prejudice to the Contractor's entitlement to interest under Sub-Clause 60.10 and to terminate under Sub-Clause 69.1, the Contractor may, if the Employer fails to pay the Contractor the amount due under any certificate of the Engineer within 28 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract, after giving 28 days' prior notice to the Employer, with a copy to the Engineer, suspend work or reduce the rate of work.

If the Contractor suspends work or reduces the rate of work in accordance with the provisions of this Sub-Clause and thereby suffers delay or incurs costs the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of such costs, which shall be added to the Contract Price, and

shall notify the Contractor accordingly, with a copy to the Employer.

69.5 Resumption of Work



Where the Contractor suspends work or reduces the rate of work, having given notice in accordance with Sub-Clause 69.4, and the Employer subsequently pays the amount due, including interest pursuant to Sub-Clause 60.10, the Contractor's entitlement under Sub-Clause 69.1 shall, if notice of termination has not been given, lapse and the Contractor shall resume normal working as soon as is reasonably possible.

Changes in Cost and Legislation

70.1 Increase or Decrease of Cost (Clause-70 is deleted entirely).

There shall be added to or deducted from the Contract Price such sums in respect of rise or fall in the cost of labour and/or materials or any other matters affecting the cost of the execution of the Works as may be determined in accordance with part II of these Conditions.

70.2 Subsequent Legislation

If, after the date 28 days prior to the latest date for submission of tenders for the Contract there occur in the country in which the Works are being or are to be executed changes to any National or State Statute, Ordinance, Decree or other Law or any regulation or bye-law of any local or other duly constituted authority, or the introduction of any such State Statute, Ordinance, Decree, Law, regulation or bye-law which causes additional or reduced cost to the Contractor, other than under Sub-Clause 70.1, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

Currency and Rates of Exchange

71.1 Currency Restrictions

If, after the date 28 days prior to the latest date for submission of tenders for the Contract, the Government or authorized agency of the Government of the country in which the Works are being or are to be executed imposes currency restrictions and/or transfer of currency restrictions in relation to the currency or currencies in which the Contract Price is to be paid, the Employer shall reimburse any loss or damage to the Contractor arising therefrom, without prejudice to the right of the Contractor to exercise any other rights or remedies to which he is entitled in such event.



72.1 **Rates of Exchange**

Where the Contract provides for payment in whole or in part to be made to the Contractor in foreign currency or currencies, such payment shall not be subject to variations in the rate or rates of exchange between such specified foreign currency or currencies and the currency of the country in which the Works are to be executed.

72.2 **Currency Proportions**

Where the Employer has required the Tender to be expressed in a single currency but with payment to be made in more than one currency and the Contractor has stated the proportions or amounts of other currency or currencies in which he requires payment to be made, the rate or rates of exchange applicable for calculating the payment of such proportions or amounts shall, unless otherwise stated in Part II of these Conditions, be those prevailing, as determined by the Central Bank of the country in which the Works are to be executed, on the date 28 days prior to the latest date for the submission of tenders for the Contract, as has been notified to the Contractor by the Employer prior to the submission of tenders or as provided for in the Tender.

72.3 **Currencies of Payment for Provisional Sums**

Where the Contract provides for payment in more than one currency, the proportions or amounts to be paid in foreign currencies in respect of Provisional Sums shall be determined in accordance with the principles set forth in Sub-Clauses 72.1 and 72.2 as and when these sums are utilised in whole or in part in accordance with the provisions of Clauses 58 and 59.



PART – II
PARTICULAR CONDITIONS OF CONTRACT



PART II
PARTICULAR CONDITIONS OF CONTRACT
(Mandatory Provisions not to be Amended / Substituted except as instructed by PEC)

1.1 Definitions

- (a) (i) The Employer is Oil & Gas Development Company Limited (OGDCL), Islamabad, its legal successors and assignees.
- (a) (iv) The Engineer is the person / consultant appointed, from time to time, by the Employer or any other competent person appointed by the Employer, and notified to the Contractor, to act in replacement of the Engineer. Provided always that except in cases of professional misconduct, the outgoing Engineers is to formulate his certifications/recommendations in relation to all outstanding matters, disputes and claims relating to the execution of the Works during his tenure.

The following paragraph is added:

- (a)(vi) "Bidder or Tendered" means any person or persons, company, corporation, firm or joint venture submitting a Bid or Tender.
- (b)(v) The following is added at the end of the paragraph:

The word "Tender" is synonymous with "Bid" and the word "Tender Documents" with "Bidding Documents".

The following paragraph is added:

- (b)(ix) "Programme" means the programme to be submitted by the Contractor in accordance with Sub-Clause 14.1 and any approved revisions thereto.
- (e)(i) The text is deleted and substituted with the following:

"Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works subject to such additions thereto or deductions there from as may be made and remedying of any defects therein in accordance with the provisions of the Contract.

2.1 Engineer's Duties and Authority

With reference to Sub-Clause 2.1(b), the following provisions shall also apply;



The Engineer shall obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses:

- i. Consenting to the sub-letting of any part of the Works under Sub-Clause 4.1 “Subcontracting”.
- ii. Certifying additional cost determined under Sub-Clause 12.2 “Not Foreseeable Physical Obstructions or Conditions”.
- iii. Any action under Clause 10 “Performance Security” and Clauses 21,23,24 25 “Insurance” of sorts.
- iv. Any action under Clause 40 “Suspension”.
- v. Any action under Clause 44 “Extension of Time for Completion”.
- vi. Any action under Clause 47 “Liquidated Damages for Delay”
- vii. Issuance of “Taking Over Certificate” under Clause 48.
- viii. Issuing a Variation Order under Clause 51,except:
 - a. in an emergency* situation, as stated here below, or
 - b. if such variation would increase the Contract Price by less than the amount stated in the Appendix-A to Bid
- ix. Fixing rates or prices under Clause 52.
- x. Extra payment as a result of Contractor’s claims under Clause 53.
- xi. Release of Retention Money to the Contractor under Sub-Clause 60.3 “Payment of Retention Money”.
- xii. Issuance of “Final Payment Certificate” under Sub-Clause 60.8.
- xiii. Issuance of “Defect Liability Certificate” under Sub-Clause 62.1.
- xiv. Any change in the ratios of Contract currency proportions and payments thereof under Clause 72 “Currency and Rate of Exchange”.

(Note: Employer may further vary according to need of the project)



* (If in the opinion of the Engineer an emergency occurs affecting the safety of life or of the Works or of adjoining property, the Engineer may, without relieving the Contractor of any of his duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.)

2.2 Engineer's Representative

The following paragraph is added:

The Employer shall ensure that the Engineer's Representative is a professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976)

The following Sub-Clauses 2.7 and 2.8 are added:

2.7 Engineer Not Liable

Approval, reviews and inspection by the Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of materials, plant and equipment for construction of the Works and their parts in accordance with the Contract and neither the Engineer's authority to act nor any decision made by him in good faith as provided for under the Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any portion of the Works.

2.8 Replacement of the Engineer

“If the Employer intends to replace the Engineer, the Employer shall, not less than 14 days before the intended date of replacement, give notice to the Contractor, of the name, address and relevant experience of the intended replacement Engineer. The Employer shall not replace the Engineer with a person against whom the Contractor raises reasonable objection by notice to the Employer, with supporting particulars.”



5.1 Language(s) and Law

- (a) The Contract Documents shall be drawn up in the English language.
- (b) The Contract shall be subject to the Laws of Islamic Republic of Pakistan.

5.2 Priority of Contract Documents

In case of discrepancies between drawings, those of larger scale shall govern unless they are superseded by a drawing of later date regardless of scale. All Drawings and Specifications shall be interpreted in conformity with the Contract and these Conditions. Addendum, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

The following Sub-Clauses 6.6 and 6.7 are added:

6.6 Shop Drawings

The Contractor shall submit to the Engineer for review 3 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.

Review and approval by the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory and that the Engineer's review or approval shall not relieve the Contractor of any of his responsibilities under the Contract.



6.7 As-Built Drawings

At the completion of the Works under the Contract, the Contractor shall furnish to the Engineer 6 copies and one reproducible of all drawings amended to conform with the Works as built. The price of such Drawings shall be deemed to be included in the Contract Price.

10.1 Performance Security

The text is deleted and substituted with the following:

Contractor shall furnish to the Employer within days as mentioned in Appendix -A after receipt of Letter of Acceptance a Performance Security 10% of contract price, at the option of the bidder, in the shape of Bank Draft/Call Deposit/Pay Order or Bank Guarantee with the validity as specified in Contract Data. Bank Guarantee as performance security must be submitted in accordance with the format provided in tender documents. Performance security in the shape of Bank Guarantee will not be acceptable with the banks whose market price per share is quoted below the Par Value at Stock Exchange Crossed Cheque /Insurance Guarantee /Swift Message will not be acceptable. The Cost of complying with requirement of this sub Clause shall be borne by contractor.

The cost of complying with requirements of this Sub-Clause shall be borne by the Contractor

The following Sub-Clause 10.4 is added:

10.2 Period of Validity of Performance Guarantee

The Performance guarantee shall be returned to the Contractor after defect liability period.

10.4 Performance Security Binding on Variations and Changes

The Performance Security shall be binding irrespective of changes in the quantities or variations in the Works or extensions in Time for Completion of the Works which are granted or agreed upon under the provisions of the Contract.

14.1 Programme to be submitted

The programme shall be submitted within 07 days from the date of receipt of Letter of Acceptance, which shall be in the form of:

- i) a Bar Chart identifying the critical activities.
- ii) a CPM identifying the critical path/activities.

(Employer to select appropriate one)



14.3 Cash Flow Estimate to be Submitted

The detailed Cash Flow Estimate shall be submitted within 21 days from the date of receipt of Letter of Acceptance

The following Sub-Clause 14.5 is added:

14.5 Detailed Programme and Monthly Progress Report

- a) For purposes of Sub-Clause 14.1, the Contractor shall submit to the Engineer detailed programme for the following:
- (1) Execution of Works;
 - (2) Labour Employment;
 - (3) Local Material Procurement; (4) Material Imports, if any; and
 - (5) Other details as required by the Engineer.
- (b) During the period of the Contract, the Contractor shall submit to the Engineer not later than the 8th day of the following month, 10 copies each of Monthly Progress Reports covering:
- (1) A Construction Schedule indicating the monthly progress in percentage;
 - (2) Description of all work carried out since the last report;
 - (3) Description of the work planned for the next 56 days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
 - (4) Monthly summary of daily job record;
 - (5) Photographs to illustrate progress ;and
 - (6) Information about problems and difficulties encountered, if any, and proposals to overcome the same.
- (c) During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Engineer as and when requested. The daily record shall include particulars of weather conditions, number of men working, deliveries of materials, quantity, location and assignment of Contractor's equipment.

The following Sub-Clauses 15.2 and 15.3 are added:

15.2 Language Ability of Contractor's Representative

The Contractor's authorized representative shall be fluent in the English language. Alternately an interpreter with ability of English language shall be provided by the Contractor on full time basis.



15.3 Contractor's Representative

The Contractor's authorized representative and his other professional engineers working at Site shall register themselves with the Pakistan Engineering Council.

The Contractor's authorized representative at Site shall be authorized to exercise adequate administrative and financial powers on behalf of the Contractor so as to achieve completion of the Works as per the Contract.

The following Sub-Clauses 16.3 and 16.4 are added:

16.3 Language Ability of Superintending Staff of Contractor

A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language. If the Contractor's superintending staffs are not fluent in English language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

16.4 Employment of Local Personnel

The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour from sources within Pakistan.

The following Sub-Clauses 19.3 and 19.4 are added:

19.3 Safety Precautions

In order to provide for the safety, security, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorize or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose.

The Contractor shall make, maintain and submit reports to the Engineer concerning safety, health, security and welfare of persons and damage to property, as the Engineer may from time to time prescribe.



19.4 Lighting Work at Night

In the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night-work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer's Representative.

20.4 Employer's Risks

The Employer's risks are:

Notwithstanding anything contained (in GCC 20.4), the Employer shall not be responsible, compensate or bear any kind of risk/liability whatsoever in nature.

21.1 Insurance of Works and Contractor's Equipment

Insurance will be the liability of the Contractor in any of the case.

21.3 Responsibility for Amounts not Recovered

The text is deleted and substituted with the following:

Any amount not insured or not recovered from the insurers shall be borne by the Contractor in accordance with their responsibility.

21.4 Exclusions

The text is deleted and substituted with the following:

There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by the risks listed under Sub-Clause 20.4 paras (a) to (h).

The following Sub-Clause 25.5 is added.

21.5 Taxes

Any taxes, duties, fees, levies and other relevant charges, present or future, assessed or payable outside Pakistan by the Contractor and/or by the expatriate personnel deputed by Contractor in connection with the services performed under the contract shall be the exclusive responsibility of the Contractor.

Any taxes, duties, fees, levies and other relevant charges, present or future,



assessed or payable in Pakistan by the Contractor and/or by the expatriate personnel deputed by the Contractor in connection with the services performed under the contract shall be the exclusive responsibility of the Contractor.

The Contractor shall be responsible and pay all taxes on its income outside and in particular on its income in Pakistan under the Contract and under the laws of Pakistan. Employer shall have the right, as provided under the laws of Pakistan to meet its obligations and in particular to deduct from the payment due to the Contractor, income tax at source at the rates prevailing from time to time, from the invoiced amounts, or such reduced rates fixed by the taxation authorities for the Contractor on production of documentary evidence by the Contractor and pay such amount to appropriate authorities.

The Contractor shall also be responsible for any income taxes levied on the Contractor's expatriate personnel, under the laws of Pakistan and for all social security issuances and other contributions for the Contractor's expatriate personnel regardless of whether such contributions are levied on employer or employee or both in Pakistan.

The Contractor shall keep Employer duly informed about the steps taken by the Contractor in order to meet its obligations under the contract and provide the necessary documents to Employer in this connection.

The Contractor shall indemnify Employer against any claim, which might occur due to non-compliance by the Contractor of any legal obligation regarding the taxes, duties, fees, levies, or other charges, including taxes on income in Pakistan and any other payments to the Government or Governmental agencies.

22.2 Exceptions

The sub clause 22.2(d) is deleted.

22.3 Indemnity by the Employer

The clause is deleted in its entirety.

23.1 Third Party Insurance (Including Employer's Property)

The clause will be read as follows:

The Contractor shall, without limiting his or the Employer's obligation and responsibilities under Clause 22, insure, in the joint names of the Contractor and the Employer, against liabilities for death of or injury to any person.



25.1 Evidence and Terms of Insurances

Number of days in the text of this clause shall be read as 30 days instead of 84 days.

25.3 Remedy on Contractor Failure to Insure

Delete the text and substitute with the following

The Contractor shall effect and keep in force all insurances required under the contract. The Employer shall not effect any kind of insurance on behalf of this project.

25.4 Compliance with Policy Conditions

Delete the text and substitute with the following:

“In the event that the Contractor fails to comply with conditions imposed by the insurance policies effected pursuant to the contract, the Contractor shall indemnify the other against all losses and claims arising from such failure.”

25.5 Insurance Company

The Contractor shall be obliged to place all insurances relating to the Contract (including, but not limited to, the insurances referred to in Clauses 21, 23 and 24) with either National Insurance Company of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.

Costs of such insurances shall be borne by the Contractor. The following Sub-Clause 31.3 is added:

31.3 Co-operation with other Contractors

During the execution of the Works, the Contractor shall co-operate fully with other contractors working for the Employer at and in the vicinity of the Site and also shall provide adequate precautionary facilities not to make himself a nuisance to local residents and other contractors.

The following Sub-Clauses 34.2 to 34.12 are added:

34.2 Rates of Wages and Conditions of Labour

The Contractor shall pay rates of wages and observe conditions of labour not less favorable than those established for the trade or industry where the work is carried out. In the absence of any rates of wages or conditions of labour so established, the Contractor shall pay rates of wages and observe conditions of



labour which are not less favorable than the general level of wages and conditions observed by other employers whose general circumstances in the trade or in industry in which the Contractor is engaged are similar.

34.3 Employment of Persons in the Service of Others

The Contractor shall not recruit his staff and labour from amongst the persons in the services of the Employer or the Engineer; except with the prior written consent of the Employer or the Engineer, as the case may be.

34.4 Housing for Labour

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labour, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, these facilities shall be handed over to the Employer or if the Employer so desires, the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Engineer.

34.5 Health, Safety and Security

Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety and security of his staff and labour at all times throughout the period of the Contract. The Contractor shall further ensure that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements.

34.6 Epidemics

In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government, or the local medical or sanitary authorities, for purpose of dealing with and overcoming the same.

34.7 Supply of Water

The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site, to the satisfaction of the Engineer or his representative, adequate supply of drinking and other water for the use of his staff and labour.



34.8 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents, staff or labour.

34.9 Arms and Ammunition

The Contractor shall not give, or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

34.10 Festivals and Religious Customs

The Contractor shall in all dealings with his staff and labour have due regard to all recognized festivals, days of rest and religious and other customs.

34.11 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst staff and labour and for the preservation of peace and protection of persons and property in the neighborhood of the Works against the same.

34.12 Compliance by Subcontractors

The Contractor shall be responsible for compliance by his Subcontractors of the provisions of this Clause.

The following Sub-Clauses 35.2 and 35.3 are added:

35.2 Records of Safety, Security and Health

The Contractor shall maintain such records and make such reports concerning safety, security, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.

35.3 Reporting of Accidents

The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest



available means.

The following Sub-Clause 36.6 is added:

36.6 Use of Pakistani Materials and Services

The Contractor shall , so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services, available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.

41.1 Commencement of Works

The text is deleted and substituted with the following:

The Contractor shall commence the Works on Site within the period named in Appendix-A to Bid from the date of receipt by him from the Engineer of a written Notice to Commence. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

The following Sub-Clause 47.3 is added:

47.3 Bonus for Early Completion of Works

No bonus is admissible for this project.

48.2 Taking Over of Sections or Parts

For the purposes of para (a) of this Sub-Clause, separate Times for Completion shall be provided in the Appendix-A to Bid “Special Stipulations”. See attached samples for “Final Acceptance Certificate” (Attachment-I) and “Provisional Acceptance Certificate” (Attachment-II).

49.5 Extensions of Defects Liability Period

The provisions of this Sub-Clause shall apply to all replacements or renewals of plant and equipment carried out by the Contractor to remedy defects and damage as if the replacements and renewals had been taken over on the date they were completed. The Defects Liability Period for the Works shall be extended by a period equal to the period during which the Works cannot be used by reason of a defect or damage. If only a part of the Works is affected the Defects Liability Period shall be extended only for that part. In neither case shall the Defects Liability Period extend beyond two (2) years from the date of taking over.



51.2 Instructions for Variations

At the end of the first sentence, after the word “Engineer”, the words “in writing” are added.

52.1 Valuation of Variations

In the tenth line, after the words “Engineer shall” the following is added:
within a period not exceeding one-eighth of the completion time subject to a minimum of 56 days from the date of disagreement whichever is later.

53.4 Failure to Comply

This Sub-Clause is deleted in its entirety.

54.3 Customs Clearance

(Employer may vary this Sub-Clause)

54.5 Conditions of Hire of Contractor’s Equipment

The following paragraph is added:

The Contractor shall, upon request by the Engineer at any time in relation to any item of hired Contractor’s Equipment, forthwith notify the Engineer in writing the name and address of the Owner of the equipment and shall certify that the agreement for the hire thereof contains a provision in accordance with the requirements set forth above.

The following Sub-Clauses 59.4 & 59.5 are added:

59.4 Payments to Nominated Subcontractors

The Contractor shall pay to the nominated Subcontractor the amounts which the Engineer certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with Clause 58 [Provisional Sums], except as stated in Sub-Clause 59.5 [Certification of Payments].

59.5 Certification of Payments & Nominated Subcontractors

Before issuing a Payment Certificate which includes an amount payable to a nominated Subcontractor, the Engineer may request the Contractor to supply reasonable evidence that the nominated Subcontractor has received all amounts due in accordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor:



- a) Submits reasonable evidence to the Engineer, or
- b)
 - i) satisfies the Engineer in writing that the Contractor is reasonably entitled to withhold or refuse to pay these amounts, and
 - ii) Submits to the Engineer reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement,

then the Employer may (at his sole discretion) pay direct to the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in subparagraphs (a) or (b) above. The Contractor shall then repay, to the Employer, the amount which the nominated Subcontractor was directly paid by the Employer.

60.1 Monthly Statements

In the first line after the word "shall", the following is added:

"on the basis of the joint measurement of work done under Clause 56.1,"

In Para (c) the words "the Appendix to Tender" are deleted and substituted with the words "Sub-Clause 60.11 (a)(6) hereof".
(in case Clause 60.11 is applicable)

60.2 Monthly Payments

In the first line, "28" is substituted by "14".

The following Sub-Clause 60.11 is added:

60.11 Secured Advance on Materials

- a) The Contractor shall be entitled to receive from the Employer Secured Advance against an indemnity bond acceptable to the Employer of such sum as the Engineer may consider proper in respect of non-perishable materials brought at the Site but not yet incorporated in the Permanent Works provided that:
 - (1) The materials are in accordance with the Specifications for the Permanent Works;
 - (2) Such materials have been delivered to the Site and are properly stored and protected against loss or damage or deterioration to the



satisfaction of the Engineer but at the risk and cost of the Contractor;

- (3) The Contractor's records of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer, and such records shall be available for inspection by the Engineer;
 - (4) The Contractor shall submit with his monthly statement the estimated value of the materials on Site together with such documents as may be required by the Engineer for the purpose of valuation of materials and providing evidence of ownership and payment therefore;
 - (5) Ownership of such materials shall be deemed to vest in the Employer and these materials shall not be removed from the Site or otherwise disposed of without written permission of the Employer; and
 - (6) The sum payable for such materials on Site shall not exceed 75 % of the (i) landed cost of imported materials, or (ii) ex-factory / ex-warehouse price of locally manufactured or produced materials, or (iii) market price of other materials.
- (b) The recovery of Secured Advance paid to the Contractor under the above provisions shall be effected from the monthly payments on actual consumption basis.

60.12 Financial Assistance to Contractor

This clause is deleted and No Escalation is allowed.

63.1 Default of Contractor

The following para is added at the end of the Sub-Clause:

Provided further that in addition to the action taken by the Employer against the Contractor under this Clause, the Employer may also refer the case of default of the Contractor to Pakistan Engineering Council for punitive action under the Construction and Operation of Engineering Works Bye-Laws 1987, as amended from time to time.

65.2 Special Risks

The text is deleted and substituted with the following:



The Special Risks are the risks defined under Sub-Clause 20.4 sub paragraphs (a) to (h).

67.3 Arbitration

In the sixth to eight lines, the words “shall be finally settled appointed under such Rules” are deleted and substituted with the following:

shall be finally settled under the provisions of the Arbitration Act, 1940 as amended or any statutory modification or re-enactment thereof for the time being in force.

The following paragraph is added:

The place of arbitration shall be Islamabad, Pakistan.

68.1 Notice to Contractor

The following paragraph is added:

For the purposes of this Sub-Clause, the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract.

68.2 Notice to Employer and Engineer

For the purposes of this Sub-Clause, the respective address are:

a) The Employer:
OIL & GAS DEVELOPMENT COMPANY LIMITED, ISLAMABAD

b) The Engineer:
The person appointed from time to time by the Employer.

70.1 Increase or Decrease of Cost

Sub-Clause 70.1 is deleted in its entirety

73.1 Payment of Income Tax

The Contractor, Subcontractors and their employees shall be responsible for payment of all their income tax, super tax and other taxes on income arising out of the Contract and the rates and prices stated in the Contract shall be deemed to cover all such taxes.



73.2 Customs Duty & Taxes

(Employer may incorporate provisions where applicable)

74.1 Integrity Pact

If the Contractor or any of his Subcontractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Appendix-L to his Bid, then the Employer shall be entitled to:

- (a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;
- (b) terminate the Contract; and
- (c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 63.1 to 63.4 and the payment under Sub-Clause 63.3 shall be made after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause.

75.1 Termination of Contract for Employer's Convenience

The Employer shall be entitled to terminate the Contract at any time for the Employer's convenience after giving 30 days prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor:

- (a) shall proceed as provided in Sub-Clause 65.7 hereof; and
- (b) shall be paid by the Employer as provided in Sub-Clause 65.8 hereof.

76.1 Liability of Contractor

The Contractor or his Subcontractors or assigns shall follow strictly, all relevant labour laws including the Workmen's Compensation Act and the Employer shall be fully indemnified for all claims, damages etc. arising out of any dispute between the Contractor, his Subcontractors or assigns and the labour employed by them.



77.1 Joint and Several Liability

If the Contractor is a joint venture of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfillment of the terms of the Contract and shall designate one of such persons to act as leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

78.1 Details to be Confidential

The Contractor shall treat the details of the Contract as private and confidential, save in so far as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the prior consent in writing of the Employer or the Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract, the same shall be referred to the decision of the Engineer whose award shall be final.

79.1. Final Bill shall be processed as under :-

1. On the request of the contractor Completion certificate will be issued by the Engineer-in-Charge.
2. Final measurement shall be made during a joint visit of the Engineer-in-charge and contractor. The contractor shall be required to accept the measurement.
3. The measurement shall be recorded on Measurement Book by the Engineer-in-Charge and duly accepted by the contractor.
4. Any item not included in BOQ shall be paid on the MES rates with applicable premium.

79.2. Rebate / Discount on Contract Price

Rebate / Discount if any shall clearly be mentioned on financial bid format, if mentioned elsewhere, the same shall not be entertained.

80. BID SECURITY

In case the bidder fails to fulfill agreed Tender/contract terms & Condition by submitting Forged documents and based on forged documents he is declared Lowest Evaluated Responsive Bidder and these documents are noticed during execution of work , the bidder shall be liable to pay liquidated damages as per Terms and mechanism agreed in the tender . Whereany loss or damaged suffered by OGDCL due to any of aforementioned act of the bidder is more than the liquidated damages, the company will be entitled to mitigate /recover the losses through encashment of Bank Guarantee /Bid securities / Earnest money or Forfeiture of security furnished by bidder in other procuremnet cases.



81. TAXES

The contractor shall quote rates inclusive of all taxes including withholding tax, GST, provincial sale tax and other taxes as applicable till the day of bid submission. Any tax or any change in the rate of existing taxes made applicable after bid submission by Government shall be excluded from the quoted rates and will be paid to contractor on submission of deposit receipt of Government Exchequer. All taxes including provincial sale tax shall be mentioned separately at the end of Bill of Quantities.

82. BLACK LISTING OF SUPPLIERS:-

Blacklisting means; temporarily or permanently, barring an entity or a person against whom proceedings have been initiated including but not limited to bidder, contractor, supplier, agent, consultant, company, partnership, company or firm; hereinafter referred to as, Respondent from participating in any future procurement (goods & services) proceedings conducted by OGDCL. The Respondent(s) individually or collectively as a consortium may stand blacklisted if found to have been involved in any or all of the following acts:

- A. Undermines or adversely affects the operations of the company through wilful failure by:
 - a. Withdrawing a bid during the bid validity period;
- B. Failure or refusal to:
 - a. sign the contract;
 - b. accept Purchase Order / Service Order Terms;
 - c. execute work;
 - d. submit Bank Guarantee as per tender terms;
 - e. make supplies as per specification agreed;
 - f. fulfill contractual obligations as per contract;
 - g. meet purchase order / service order terms and conditions; and/or,
 - h. to remedy underperformance as per contractual obligations.
 - i. Or any other non-compliance of obligations vital for the execution / compliance of the contract.
- C. Repeated non-performance.
- D. Indulgences in corrupt or fraudulent practices while obtaining or attempting to obtain contracts in the company.
- E. Convicted of fraud, corruption, tax evasion or criminal misappropriation by a court of competent forum.
- F. Notified blacklisted/debarred/cross debarred by any public sector organization or international agency. (Note: At the time of submission of bid a contractor shall submit an Affidavit Form 4 that he or his principal is not declared



blacklisted / debarred / cross debarred by any public sector organization or international agency.)

G. Furnished information that was false and materially inaccurate or submitted forged or fake documents

83. CONFISCATION OF BANK GUARANTEE / PAY ORDER / DEMAND DRAFT ETC.:-

The bank guarantee / bid bond (earnest money) / performance bond / Advance Bank Guarantees etc. of the bidder/vendor will be confiscated if they:

- i. Withdraw their bid during bid validity.
OR
- ii. Fails to provide performance and/or advance bank guarantees.
OR
- iii. Submit forged document in support of their bid.
OR
- iv. Fails to execute contract as per terms of contract.
OR
- v. Fails to supply the short/wrong shipped items.
OR
- vi. Any other reason warranting the confiscation of the guarantee.



Extension in Bid Bond and Performance Bond / Bank Guarantee

Bid Bond: Extension in Bid Bond (if required) must be submitted in original 15 days before the expiry date otherwise OGDCL may proceed for encashment.

Performance Bond/Bank Guarantee: Extension in Performance Bond (if required) must be submitted in original 15 days before the expiry date otherwise OGDCL may proceed for encashment



OIL & GAS DEVELOPMENT COMPANY LTD

VOLUME – II

GUIDELINES FOR EXECUTION OF
WORKS

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1.0 INTRODUCTION

Oil & Gas Development Co. Ltd. (OGDCL), hereinafter referred as Company, is interested in hiring the services of construction contractors for the development of production well.

All associated Engineering and Survey works already stands conducted and now project is in the advance stage of implementation. The intent of this document is to outline the general scope of services required from perspective Bidders. The more precise specifications related to pipeline works (if any) is provided with drawings and design package.

2.0 PROJECT OBJECTIVE

The objective of this Project is to develop the field by laying of pipeline for **NASHPA Well no 11.**

3.0 DEFINATION

Company / Owner: Oil & Gas Development Co. Ltd. (OGDCL).

Contractor: "Contractor" means the person or persons, firm or Proprietor whose proposal has been accepted by the Company for construction, commissioning, performance testing and includes the Contractor's representative(s), successors and permitted assignees.

Vendor/Supplier: The organization, firm or agency order for the supply of equipment and or material has been placed.



4.0 SCOPE OF WORK (GENERAL)

Contractor's scope of work shall include all activities necessary for construction, installation/erection, testing and completion of all works associated as per scope. The scope of work defined herein shall be read in conjunction with all technical documents (BOQ, specifications, drawings, etc.) included in this tender document.

Construction, Installation and Erection of all supplied materials and site supervision, management, planning and control of the whole project from contract award to final acceptance by the company by ensuring security, safety and compliance with HSE requirement shall be the responsibility of the Contractor.

Contractor shall receive all material from OGDCL yard at designated field and make all necessary arrangement for its safe transportation to project site. Contractor shall borne all levies, taxes as applicable during the transportation of material under scope of the Contractor to the project site.

Contractor shall use the above mentioned technical requirements as minimum. Compliance with the requirements of the tender document does not relieve the Contractor of his responsibility for construction of entire flow line meeting all the statutory requirements, codes & standards, safe industry practices, rated operating and service conditions & as per instruction and approvals from Engineer Incharge

Contractor shall furnish all construction materials, tools and consumable supplies required for the project and shall make the complete installation of works covered in Scope of Work.

The project when turned over to Company shall be in a commissioned condition with successful and tested performance. It shall be Contractor's responsibility to see that all works is completed in accordance with the Specifications, drawings relevant codes and standards.

It is not the intent of this SOW to include every individual scope, specification and component that would be needed for the project. Contractor shall be responsible to include all such scope, specification and component for the project in order to meet the overall requirement of the SOW. Any item not identified due to any error, mistake, omission, deficiency and lack of accuracy but is required in the scope shall be



deemed to be included and contractor shall perform and assume full responsibility at no cost to OGDCL.

To achieve the maximum quality work and full satisfaction, it is mandatory requirement that all works must be carried out under supervision of Contractor's Engineers with Site supervisor & skill labor of adequate experience. The Contractor shall be responsible for liaison and coordination with Company and Suppliers. Liaising with certifying Local Authorities to obtain the permissions and licenses for executing the work and preparation of all the necessary documentation shall be in the Contractor's Scope of Work.

The Contractor shall provide all management, planning, control, QA/QC, services, vehicles, ordinary and special tools, test equipment's, transport, labor, and supervision and all other necessary arrangements regarding the execution of the specified work and arrangements for the security of its personnel.

The Contractor shall furnish construction and consumable supplies required for the project and shall make the complete construction and installation of the Project covered in this Scope of Work.

The Contractor shall provide a temporary camp for his own personnel. The Contractor shall also establish a warehouse where he will store/place all equipment and material. The Contractor shall maintain scores record of all equipment and material and handover such records to Company after completion of the Project to facilitate reconciliation of consumed/installed and left over equipment/material.

The Contractor shall also establish all necessary workshops /fabrication shops for execution of project construction activities. Mobilization & Demobilization of all equipment, camps, stockyard, workshops, fabrication shops, etc. and cleaning / restoring these areas, shall also be the responsibility of the Contractor. The Contractor shall carryout the necessary temporary works, and construct, install and mechanically complete all the works and submit all documentation as required by this Document. This also includes furnishing temporary electrical supplies, lighting, water, etc. required for construction purposes.



The construction, installation and mechanical completion activities shall take full account of other work being carried out. During construction works the Contractor shall ensure, together with his own personnel and equipment, the safety of the existing equipment and material at site.

The Contractor shall abide by the Company's safety policies/procedures and shall ensure that his work in any way shall not affect normal operation of existing facility / pipeline. The Contractor shall clearly identify the areas of works inside in operation and shall make all arrangements required for safe execution of construction related activities. The Contractor shall also be responsible for obtaining all hot or cold permits or any other permits as deemed necessary by the Company on day-to-day basis.

The Contractor shall make all necessary work plans/procedures as required by the Company's Engineer Incharge and shall submit the same for approval prior to execution. The Contractor shall ensure completion of all works within the agreed time schedule with due diligence and shall make all necessary arrangements.

All work shall be carried out by Contractor under the best and latest approved practices in the oil and gas industry. Health, Safety and Environment requirements and provisions shall be in accordance with the requirements of the Contract and shall fully comply with Company's policies/procedures.

Contractor shall also comply with the QA/QC, Safety, Planning and Scheduling requirements of the Contract throughout the execution of the Project. Unit / Area wise description / scope are given in the succeeding sections.

The contractor shall be responsible for the timely submission to the local or other authorities of such details of his proposals for the works as will be necessary to the comply with all relevant legislation and obtain all permission and approvals stipulated. The applications shall be made by the contractor, as agent of the OGDCL and allowance for all costs related to thereto, including any local or other authority charges, shall be deemed to be included in the contract price.

In addition, approval shall be obtained by the contractor from the local authority regarding safe means of escape and fire prevention measures before relevant construction work proceeds.



Providing detailed manpower and construction plant loading charts. Providing schedule and progress reporting in accordance with the requirements of the Contract. Providing and implementing a quality assurance plan and developing and implementing quality control procedures.

Maintaining all temporary facilities required for the Works. Contractor is responsible to provide temporary access road to Site for use during construction period. Maintaining construction records such as QA/QC inspection records, test certificates, for final submission to OGDCL.

Protection of all adjacent properties, Pipelines and environment against damage due to construction and erection activities. Protection of materials and (partially) erected facilities/Pipeline against damage or deterioration due to construction activities or by meteorological conditions. Preparing and performing good housekeeping practices and procedures at all areas, including but not limited to the following:

- Prevention of undue waste build-up;
- Keeping areas tidy;
- Keeping roads clean and emergency exit clear;
- Containing dust-producing activities.

Verification of the existing facilities/Pipeline at the proposed and other locations associated with the Project. Contractor is responsible to protect the existing above ground and underground services and if the need arises.



5.0 SCOPE

- 1.1 This specification defines the minimum requirements for the various activities to be carried out by Contractor for the construction of Pipeline.
- 1.2 The various activities covered in this specification, SOW, BOQ, etc during pipeline construction.
- 1.3 Contractor shall submit detailed work procedures including drawings, calculations as required equipments, Machinery, Engineer, Supervisors, Skilled, unskilled manpower deployment details for the all pipeline activities, to Employers Engineer Incharge for approval. Entire work shall be carried out as per approved procedures and to the satisfaction of Employer Engineer Incharge.
- 1.4 Contractor shall mobilize required resources like man power / equipment's necessary consumables tools materials for temporary use and other facilities to complete the construction as per specifications & requirements of Employer / other authorities along the ROW at no extra cost to Employer.

6.0 REFERENCE CODES, STANDARDS AND SPECIFICATIONS

- 2.1 Reference has been made in this specification to the latest codes, standards and specifications
 - i) ASME B31.8 - Gas Transmission and Distribution piping systems
 - ii) ASME B31.4 - Pipeline transportation systems for liquid hydrocarbons and other liquids.
 - iii) API 1104 - Standard for Welding Pipelines and related facilities
 - iv) API 1105 - Bulletin on construction practices for oil and products pipelines
 - v) Part 192 - Transportation of natural and other gas by pipeline
Title 49 (U.S Department of Transportation – Pipeline safety standards)
 - vi) Part 195 - Transportation of liquids by pipeline (U.S department of Transportation – Pipeline safety standards)



7.0 HANDLING, HAULING, STRINGING AND STORING OF MATERIALS

7.1 GENERAL

Contractor shall be fully responsible for all materials and their identification until such time that the pipes and other materials are installed in permanent installation. Contractor shall be fully responsible for arranging and paying for stacking/storage areas for the pipeline materials, however, method of stacking/storage shall be approved by Employer.

7.2 LINE PIPES

The Contractor shall load, unload, transport and stockpile the bare/coated pipes using approved suitable means and in a manner to avoid damage to the pipe and coating. Contractor shall submit to Employer a complete procedure indicating the manner and arrangement used for handling, transportation and stacking of bare/coated pipes for Employer approval prior to commencement of handling operations.

Stacks shall consist of limited number of layers so that the pressure exercised by the pipes' own weight does not cause damage to the coating. Contractor shall submit the staking height calculations as per API RP 5L1 to Employer for approval. Stacks of different diameter, wall thickness and damaged, rejected pipe shall be separately segregated and identified properly. The pipes shall be stacked at a slope so that driving rain does not collect inside the pipe.

The ends of pipes during handling and stacking shall be protected with bevel protectors. Supports shall be provided for at least 10% of the pipeline length. These supports shall be lined with rubber protection. The second layer and subsequent layers shall be separated from each other by material such as straw in plastic covers or mineral wool strips or equivalent.

Materials excluding line pipes shall be stored in sheltered storages.



7.3 STRINGING OF PIPE

Pipes shall be unloaded from the stringing trucks/trailers and lowered to the ground by means of boom tractor or swinging crane or other suitable equipment using lifting devices. Dragging or sliding of pipe shall not be permitted. Special precaution shall be taken during stringing of corrosion coated pipe as per the special requirements of previous para. Stringing of pipe shall only be carried out in daylight and after clearing and grading operations have been completed. Pipe shall not be strung on the Right-of-use in rocky areas where blasting may be required, until all blasting is complete and the area cleared of all debris. Contractor shall submit to Employer for approval a complete procedure for stringing of line pipes.

Pipes shall be supported either by wooden skids or by a suitable material filled in the empty cement bags at a height of at least 500 mm above terrain level.

7.4 REPAIR OF DAMAGED PIPES

After the pipe has been strung on the Right-of-Way it shall be inspected by the Contractor and the Employer and all defective pipes and pipe ends shall be repaired. Defective pipe shall be repaired or rejected as the Employer may direct as per the requirements of specification.

7.5 IDENTIFICATION

For all pipes, numbers and lengths shall be identified and recorded properly. Before a pipe end is cut, the painted pipe number and cold die stamped pipe number shall be transferred by Contractor in presence of Employer to either side of the joint which is to be made by cutting.

8.0 BENDING

Contractor shall preferably provide for changes of vertical and horizontal alignment by making elastic bends. Contractor may provide cold field bends, at its option for change of direction and change of slope. Cold field bends shall be used for bends up to 18°. For bends more than 18° hot induction bends shall be used. Employer at its option may authorize hot bends for installation at points where in Employer's judgment the use of such bends is unavoidable.



Over bends shall be made in such a manner that the centre of the bend clears the high points of the trench bottom. Sag bends shall fit the bottom of the trench and side bends shall conform and leave specified clearance to the outside wall of the trench.

8.1 COLD FIELD BENDS

8.1.1 The minimum radius of cold field bends shall be 40 D where D is outside diameter of the pipe.

Contractor shall use a bending machine and mandrel and employ recognized and accepted methods of bending of coated pipe in accordance with good pipeline construction practice. However, bending machines shall be capable of making bends without wrinkles, buckles, stretching and with no damage to the coating.

8.1.2 Contractor shall, before the start of the work, submit and demonstrate to Employer a bending procedure, which shall conform to the recommendations of the bending machine manufacturer. The procedure shall include amongst other steps – lengths, maximum degree per pull and method and accuracy of measurement during pulling of the bend. This procedure and the equipment used shall be subject to Employer's approval.

8.1.3 For welded pipes, longitudinal seam shall be suitably placed as per approved procedure so that the weld seam shall not be overstressed. Care shall be taken to ensure that after positioning and welding the bend the seam shall be in upper quarter 335° to 45° of the pipeline (pipeline top shall be considered as Zero position).

8.1.4 The ends of each bend length shall be straight and not involved anyway in the bending. The length of the straight section shall permit easy joining. In no event shall the end of the bend be closer than 2m from the end of a pipe.

8.1.5 The ovality used on each pipe by bending shall be less than 2.5% of the nominal diameter at any point. Ovality is defined as the reduction or increase in the internal diameter of the pipe compared with the nominal internal diameter. A check shall be performed on all bends in the presence of Employer by passing a gauging pig / buckle detector consisting of two discs with a diameter equal to 97.5% of the nominal internal diameter of the pipe connected rigidly together at a distance equal to 300mm.



8.1.6 Cold bend pipes on site shall have the corrosion coating carefully checked with the aid of a holiday detector for cracks in the coating down to the pipe wall. It must also be checked whether the coating has disbonded from the pipe wall during bending by beating with a wooden mallet along the outer radius. Any defects or disbonding of the coating caused during bending shall be repaired at the Contractor's expense in accordance with Employer approved procedures.

8.2 MITER AND UNSATISFACTORY BENDS

All bends showing buckling, wrinkles, cracks or other visible defects or which are in any way in disagreement, in whole or in part, with this specification shall be rejected.

No miter bends shall be permitted in the construction of the pipeline. Cutting of factory made bends and cold field bends for any purpose are not permitted.

9.0 LINING UP

Each length of pipe shall be thoroughly examined internally and externally to make sure that it is free from visual defects, damage, severe corrosion (sea water pitting), dirt, animals or any other foreign objects. Each length of the pipe shall be adequately swabbed, either by use of canvas belt disc of proper diameter or by other methods approved by the Employer. Damaged/ corroded pipes shall be kept separate. Each length of pipe shall be pulled through just before being welded. Contractor on shall submit a detail procedure for Lineup of line pipe to Employer for approval.

9.1 PIPE DEFECTS AND REPAIRS

9.1.1 Acceptability of defects in the pipe detected during inspection at the work site shall be determined in accordance with the project specification for Welded Linepipe or approved procedures or Code ASME B31.8/B31.4 whichever is more stringent.

9.1.2 Repair on line pipe shall be executed as specified in project specification for Welded Line pipe and specification for 3Layer Polyethylene Coating or Code ASME B31.4 whichever is more stringent.

Repair of damaged pipe ends by hammering and/or heating is not allowed. Contractor shall submit detailed procedure for pipe defects and repairs to Employer for approval



9.2 SKID SPACING

9.2.1 A strip of soft material shall be placed in between skid and pipe to protect the external coating of pipe from any damage.

9.2.2 The pipes shall be maintained at the minimum height of 500mm above ground and spacing between skids shall be 6.0 mtrs maximum.

9.3 NIGHT CAPS/TEMPORARY CAPS

After each day's work or when work is interrupted, the open ends of the welded strings of pipes shall be capped with a securely closed metal cap as approved by Employer.

10.0 WELDING OF PIPELINE

Refer the project specification for pipeline welding (2664-SP-001)

11.0 FIELD JOINT COATING

Refer the project specification for Field Joint Coating of pipeline (2664-SP-005)

12.0 LAYING

12.1 LOWERING IN TRENCH

12.1.1 Lowering shall follow as early as possible, after the completion of the field joint coating of the pipeline. In the case of parallel pipelines, laying shall be carried out by means of successive operations, if possible without interruption. Contractor shall submit a detail procedure for lowering of pipeline to Employer for approval.

Contractor shall submit the pipe book with necessary data / backup, for the section to be lowered at least 2 days before the schedule of lowering to the Employer to have a complete check after signing by Contractor's Quality Team.

12.1.2 Before lowering in, a complete check by a full circle holiday detector for pipe coating and for field joint coating shall be carried out and all damages repaired as agreed by Employer at Contractor's cost. All the points on the pipeline where the coating has been in contact with either skids or with lifting equipment shall be properly checked. Where water is present in the trench, no laying shall be permitted until the ditch has been drained.



12.1.3 The pipeline shall be lifted and laid using, for all movements, necessary, suitable equipment of non-abrasive material having adequate width for the fragility of the coating. Care shall be exercised while removing the slings from around the coated pipe after it has been lowered into the trench. Any damage caused to the coating shall be promptly repaired. Lowering in utilizing standard pipe cradles shall be permitted if Contractor demonstrates that pipe coating is not damaged. No sling shall be put around field joint coating.

Roller cradles with proper outer lining can be used after approval of Employer in place of sling belts.

12.1.4 The portion of the pipeline between trench and bank shall be supported by as many side booms as required and approved by Employer for holding the line in gentle S-curve maintaining minimum elastic bend radius as specified in approved procedure. Lowering in and back filling shall preferably be carried out at the highest ambient temperature.

12.1.5 Over-head sections

- a) The following works shall be completed before proceeding with the assembly and laying of overhead pipelines:
 - Construction of the pipe support structures or of mounts on supports.
 - Paints and/or coating of the pipe work, as indicated in the engineering specification.
- b) The erection of the supports shall be carried out taking care that the elevation and alignment is in accordance with the drawings.

In the case of metal work supports, pre-fabrication and/or assembly shall take into account the maximum allowed free span and the supports shall not interfere with the pipeline welds.

- c) In case roller supports are used, the rollers shall be lubricated, and then checked for smooth rotation and, in case of seizure, the defect shall be repaired or roller shall be replaced. In the case of overhead section where the pipeline is slanting, the alignment of the end supports shall be made after placing the pipeline in position. Before installation of the pipe section, all the rollers shall be perfectly centered acting on the seat of the support plates.



The above alignment operations shall be carried out before connecting the overhead section with the ends of the buried section.

- d) Lifting, moving and laying of the pipeline shall be carried out in accordance with the provisions of this specification.

An insulation sheet shall be installed to isolate the pipe from the support or support from the earth.

The sheet shall be hard polyethylene at least 8mm thick.

It shall extend at least to 25 mm outside the saddles or clamps.

- e) Moving supports, if any shall be centered on their support and allow for a movement of at least 300mm in both directions.
- f) A comprehensive report / method statement on the laying operation to be used shall be submitted to the Employer well in advance for approval. The report as a minimum shall include, but not limited to the following:
- Method of installation by lifting (as a preferred method).
 - Pulling method and related calculations, whenever lifting method cannot be used.
 - Pulling device and its characteristics.
 - Method of anchoring the pulling device
 - Characteristics of the pulling rope
 - Braking device, if any.
 - Pipeline assembly system.

13.0 PIPELINE TIE-IN

13.1 The unconnected sections of the pipeline at various locations have to be tied in after the sections are coated, lowered and backfilled. The sections to be connected shall have at the ends, sections of over lapping, uncovered pipe of sufficient length to absorb, without including excessive stresses in the steel, small displacements necessary for perfect alignment and connection of the ends.

13.2 If a pup end cannot be avoided for tie-in, the minimum length that shall be added is 2.5meters and two or more such pups shall not be welded together. All cut-off lengths greater than 2.5 meters shall be moved ahead in order to be welded into the pipeline at a suitable location. Tie-in with two or more pups may be used provided



that they each have minimum length of 2.5meter and are separated by an entire length of pipe. In no case more than three

13.3 welds shall be permitted on a 10 meter length of pipeline.

14.0 CROSSINGS

Pipe line sections at all major crossings (IF ANY) like State and National Highways, Railways, major canals and lined canal / distributaries shall be laid by boring with casing pipe complying with all other statutory requirements. All other crossings shall be executed by open cut method unless otherwise specified in the Contract or specified by statutory authorities.

Refer the project specifications for Pipeline Crossing Roads, Rail Roads and Minor Water Ways.

15.0 INSTALLATION OF INSULATING JOINTS

15.1 Insulating joints shall be installed at the locations shown in the drawings. Contractor shall obtain approval from the Employer before installation of the insulating joints.

15.2 Handling and installation of the insulating joints shall be carried out with all precautions required to avoid damage and excessive stresses and that the original pup length is not reduced.

15.3 The insulating joints and the welded joints shall be protected by external coating as per the relevant specifications issued for the purpose.

15.4 Before welding insulating joints in to pipeline, it shall be megger testes to check the integrity of insulation.

16.0 WORKING SPREAD LIMITATIONS

Contractor shall, in general, observe the following maximum distances between the working mainline spread.

Between Row grading, clearing and backfilling	:	25Kms.
Between Backfilling and final clean up	:	5Kms.

17.0 CLEAN-UP & RESTORATION OF RIGHT-OF-WAY



- 17.1 After all required tests have been concluded satisfactorily Contractor shall clean up the site as laid down in the specifications issued for the purpose. The site finish shall be graded in accordance with the approved drawings.
- 17.2 Contractor shall restore the ROW and all sites used for the construction of pipelines, water crossings and other structures in accordance with Employer instructions and deliver them to the satisfaction of Employer.

18.0 INSPECTION OF SITE

CONTRACTOR shall be deemed to have inspected and examined the SITE and to have full and complete knowledge of the conditions of the site and its surroundings on its own responsibility and satisfied itself before submission of BID PROPOSAL and to have taken into account any information in connection therewith, which may have been provided by or on behalf of COMPANY.

The CONTRACTOR and any of its personnel or agents will be granted permission by the COMPANY for site visit, upon the express condition that the CONTRACTOR, its personnel or agents will relieve and indemnify the Company from and against all liability in respect thereof including personal injury (whether fatal or otherwise), and any other loss, damage, costs and expenses, including kidnapping, murder of CONTRACTOR's personnel, or any disease etc.

Due to visa requirement in Pakistan, CONTRACTOR should initiate / complete all requirements/ formalities for obtaining Visa of their nominated personnel (if applicable) for site visit at the earliest.

COMPANY shall not accept any claim from CONTRACTOR by reason of any error, insufficiency or omission due to COMPANY'S information.

COMPANY must receive requests for site visit at least ten (10) calendar days before the BID CLOSING DATE. All personnel (including local as well foreign expats) security clearance / NOC (applicable for foreign expats) and arrangements shall be solely on Bidder's account.

19.0 MOBILIZATION / DEMOBILIZATION



Upon completion of project CONTRACTOR shall remove all equipment and material within the CONSTRUCTION facilities to CONTRACTOR's own temporary facilities then back to or directly bring it back to the designated place/field/plant of OGDCL. This work shall include but not limited to:

- CONTRACTOR shall be responsible to develop all temporary facilities including site office, workshop, crane, heavy machineries, storage place, camp accommodation, utilities etc.
- CONTRACTOR shall be responsible to pave a road in order to transport equipment, parts and everything which they intend to use for Project purpose.
- Upon completion of work, CONTRACTOR shall be responsible for dismantling and removal of all temporary facilities (Site Office, Workshop, Stores, Camp accommodation etc.) and utility systems;
- Removal of all balance construction equipment, machinery, tools, cranes, scaffolding etc. from site;
- Removal of all surplus equipment and materials and hand over to OGDCL wherever applicable;
- Reinstatement of the areas of temporary facilities to a clean and tidy condition to the satisfaction of OGDCL;
- Re-export of construction equipment, machinery, cranes etc., if temporarily imported for sole purpose of construction of the Project under this Contract, in conformance and compliance to the applicable government laws, regulations and procedures;
- CONTRACTOR to keep the required facilities at Worksite during Warranty Maintenance period;
- To return to OGDCL surplus/ left over materials supplied by OGDCL (if any).

CONTRACTOR is required to keep and maintain required personnel, equipment and facilities namely site office and its facilities and accommodations etc. for OGDCL representatives and CONTRACTOR to perform the punch list clearing and Warranty work at SITE during Warranty Period.

20.0 QUALITY ASSURANCE AND QUALITY CONTROL

General

Contractor shall be responsible to plane, establish, implement and maintain a Quality system for the fabrication, installation; pre-commissioning, commission and



performance testing of the Wellhead Flow line as per ISO 9001 and requirements of project specification for Quality Assurances.

Contractor shall submit a copy of CONTRACTOR'S policy statement on their corporate quality manual and procedures, as a part of their bid, for review by OGDCL.

Contractor shall be responsible for all Quality Assurance and Quality Control functions and shall at all times provide adequate, competent and qualified supervision and inspection personnel, approved by OGDCL, to ensure that the quality of work is met and timely inspected.

Contractor shall supply all the relevant quality assurance requirements to its Subcontractors, suppliers etc. involved in the Project for compliance and shall be responsible for Overall Project Assurance and Quality Control.

Quality Control

Quality control activities for the Project shall include the following, as minimum:

- Development of inspection and test plans (ITPs) , procedures, schedules and reports for Procurement/Construction;
- Review, approval and monitoring of Vendor / Subcontractors inspection and test plans;
- QA/QC requirements for Subcontracts / Vendors:
- QA/QC requirements for all site related activities (Field QA/QC plan);
- Design control:
- Quality control of procurement procedures;
- Document Control:
- Safety & Environment Control;
- Verification of all test certificates for compliance with OGDCL requirements.

To achieve the above objective, dedicated QC personnel are required for the work.

Quality Assurance Manual

The contents of Contractor's Quality Assurances Manual Shall Cover

- Civil / Structure Construction;
- Pipeline laying



- Piping fabrication / Manifolds;
- Valves, Check vales, Safety Valves; (if any)
- Pipes and fittings;
- Handling and lifting

21.0 INSPECTION, TESTING AND PRE-COMMISSIONING

Checking and Inspection

Mechanical Completion Inspection

The Contractor shall use the relevant drawings and documents to check that all pipe work, supports and connections are mechanically complete. Mechanical completion inspection shall include the checking of all connections to ensure that they have been made off in the correct manner and have been tightened in readiness for pressure testing.

Checking & Inspection after Installation

Checking and inspection after installation shall include the following:

- Visual inspection of installations shall be carried out to make sure that all connections and fixing are tight, all wiring, tubing, fittings are correct to the drawings and labels are correctly engraved.
- All defects or faults shall be corrected by the Contractor.
- Any faults in work performed by the Contractor shall be corrected by the Contractor at their own expenses.

Any faults in material or equipment or line segment furnished by others which are the result of careless, incompetent or improper handling or installation by the Contractor shall be corrected or replaced promptly by the Contractor at their own expenses.

Test Records

The Contractor shall keep records of the tests and upon completion, a test certificate for every installation, recording all results, shall be handed to the OGDCL / Engineering Consultant.

Provide Commissioning Support

Contractor shall provide all kinds of commissioning supports for instrumentation installation works (if applicable).



Third Party Inspection

The required inspection shall be performed by qualified Third Party Inspection Agency engaged & employed by duly approved by OGDCL.

22.0 MECHANICAL COMPLETION

Contractor shall provide experienced and qualified personnel to perform pre-commissioning activities and achieve Mechanical Completion.

Contractor shall note that Commissioning of the entire systems and or facility identified in the Contract shall not commence until Mechanical Completion of the systems has been achieved and a Mechanical Completion Certificate has been issued by OGDCL.

Contractor shall provide all necessary pre-commissioning equipment, tools, instruments and fluids such as fresh, clean, inhibited water, chemicals, temporary power, compressed air, nitrogen, lube oils, fuel, etc. Contractor shall also provide all necessary pre-commissioning spare parts.

Contractor shall execute all scheduling, planning and progress reporting including planning meetings. Contractor shall comply with the pre-commissioning requirements as defined hereinafter, in accordance with the specifications. Contractor shall provide all test equipment & site radios required for loop testing. Mechanical Completion shall be a systematic and progressive activity leading to issuance of a Mechanical Completion Certificate from OGDCL.

23.0 MECHANICAL COMPLETION CERTIFICATE

The Mechanical Completion date is considered as the date of the last pre-Commissioning satisfactory test and approval of the Mechanical Completion Certificate by OGDCL for the last portion or system of the Works.

Upon completion of all the pre-commissioning requirements related to each individual system (portion of the Works) and such system is ready for commissioning and to receive hydrocarbon, CONTRACTOR shall apply for a Mechanical Completion Certificate for this system and submit to OGDCL with the pre-commissioning results.

Subsequently, OGDCL representative shall carryout inspection of the subject system.



24.0 PRE – COMMISSIONING ACTIVITIES

Pipe Hydro Test

Contractor shall prepare and submit the Hydro test and flushing procedure, for OGDCL review and approval. The procedures shall highlight the system portion/parts that must be isolated during the tests. The procedure shall highlight the valve and instruments or any unit that must be isolated during the test;

Contractor shall adhere to the Hydro test and Flushing Procedure prior to closing up the piping systems. Contractor shall ensure that no foreign materials are left in the pipes and which could not be flushed out during flushing;

Contractor is responsible to supply water for hydro test and leak test purpose. Hydro test water shall be analyzed for chemical composition for suitability of usage; It is Contractor's duty to carry out any weld repairs; every repair shall undergo another hydraulic test under the same previous conditions;

Contractor shall utilize calibrated instruments. The satisfactory measurement readings shall be followed by the signature of OGDCL's Representative;

Contractor shall submit a programme for any testing works for OGDCL's approval not later than two (2) weeks prior to commencement of testing;

All pipe works are to be pressure tested in accordance with the procedures and specifications and the following requirements shall be fully complied with:

Contractor shall be responsible for properly preparing Works for pressure testing; During the whole period of testing the Works, Contractor shall provide and install in accordance with the specifications and drawings, calibrated and accurate tests gauges and recorders and all other necessary materials and equipment required to perform pressure testing;

All welded joints may be painted with primer only in order to prevent initial corrosion until the completion of non-destructive and pressure testing before full coating is allowed;

After completion of hydrostatic test, a reinstatement test for each system shall be conducted at a test pressure 95% of the lowest rated relief valve setting in the system. When no relief valves are present, the system shall be reinstated at 110% of the system operating pressure.



Contractor shall prepare and submit the reinstatement procedure to OGDCL for review and approval 2 weeks in advance of any reinstatement works; Instrument air leak test shall be carried out by Contractor to all hydraulic signal lines. Leak test shall be done by using a bubble tester. The maximum allowable leakage rate shall not exceed 7 bubbles per minute. This test shall be witnessed and verified by Contractor quality control inspector and OGDCL Representative;

Upon completion of hydrostatic pressure testing, Contractor shall drain and dry to the satisfaction of OGDCL, the piping by suitable method approved by OGDCL;

Contractor shall remove all temporary facilities installed by Contractor once testing is completed to the satisfaction of OGDCL. Tests shall be witnessed by OGDCL and records of all tests shall be furnished to OGDCL within forty eight (48) hours of the test. Completion of final flushing of piping shall be after the reinstatement testing and acceptance by OGDCL. All pipe works shall be adequately flushed using a high pressure and high volume flow of fresh and clean water upon completion of installation. Flushing shall be carried out with all valves fully open. Contractor shall ensure that adequate fresh and clean water be made available to perform the above works. It is Contractor's responsibility to dispose of all cleaning water.

30.0 COMMISSIONING

Contractor shall be responsible to supply the feedstock at the new system boundary limits as required to perform the commissioning and Performance Tests.

Contractor shall execute all activities required for commissioning and start-up of the new facilities including necessary utilities supply.

At least three (3) weeks prior to the Commissioning and Performance Test, a Safety and Commissioning Start up Audit shall be conducted and attended by the Contractor, OGDCL Project Team and Production Team. Contractor is responsible to complete the activities identified as critical during the audit before proceeding with Commissioning and Performance Test.

Contractor shall note that Commissioning shall generally include the following activities and such activities are to be completed prior to Performance Test of the FACILITY: Operational testing of the equipment (at maximum operating pressure) as required. Operational and functional testing of instrumentation, control, and safety



systems, CONTRACTOR shall prepare a Pre-commissioning and Commissioning Procedure document.

COMMISSIONING RESPONSIBILITY

Provision of a team of suitably experienced and qualified personnel including management, supervision, labor, and the necessary assistance by SUBCONTRACTOR's /VENDOR's commissioning specialists, for commissioning as per approved plans, schedules and procedures, including the appointment of a Commissioning Manager; Preparation of interface and commissioning co-ordination procedures together with supporting documentation including "Highlighted and Red Line Mark-up" drawings. CONTRACTOR shall prepare and submit Commissioning Manual to OGDCL for approval, six (6) weeks in advance;

Preparation of safety audits and recording of all approved safety audit items to ensure the required safety;

Provision of all commissioning spare parts and consumables and ensuring their availability at Worksite at least four (4) weeks prior to commissioning of facility;

Provision of consumables including nitrogen, helium, water; Diesel, lube oil, grease, other consumables, etc for COMMISSIONING activity;

Provision of consumables including nitrogen, helium, water; Diesel, lube oil, grease, other consumables (if applicable), etc for first fill-up during start-up after COMMISSIONING.

Development of all required software items including programming /interfacing with existing operational controls;

Maintenance of all documentation and records of Commissioning Activities on microcomputer including execution and documentation of performance tests of commissioning systems;

Maintenance of records of all design changes for updating the operating manuals;

Provision of mechanical, electrical and instrumentation test and measuring equipment and special tools and accessories necessary to carry out calibration, testing, trouble shooting and repair to ensure timely completion of commissioning activities;



Preparation and issue of the Commissioning dossier of the individual systems;

Identification of commissioning activities including definition of piping, electrical and instrumentation test systems, definition of commissioning systems and definition of performance test program;

Provision of sufficient portable walkie-talkies sets for use during commissioning;

Ensuring adequate and timely operator involvement in the preparation of the commissioning activities, and close liaison and co-ordination with OGDCL's Operations, Maintenance and Safety;

Provision of a detailed commissioning plan, procedures, schedules and reports which shall be submitted to OGDCL for approval. Ensuring documented recording and reporting;

Submission of operating and maintenance manuals and Performance Test Procedures for OGDCL approval, six (6) weeks prior to Performance Test; Provision of spades /gaskets /bolts for tie-in works, as necessary; Obtaining and complying with the necessary permits and approvals.

26.0 CONSTRUCTION COMPLETION

Contractor shall prepare a construction completion procedure as part of the construction plan as developed under the execution plan.

The construction completion procedure shall include checklist forms, document flow, schedule, certification scheme and status monitoring method for attaining Construction Completion. Separate checklists for different systems and for different disciplines of engineering will be required.

All documents, checklist forms and procedures required for Construction Completion shall be compiled in a construction punch list, which itself forms a part of the documentation which has to be submitted and approved prior to the achievement of Construction Completion. All quality control data to support this documentation shall be filed in a separate quality control dossier for each Subsystem.

HSEQ

Requirements & Guidelines

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Appendix 1: Summary HSEQ Register of Legal & Other Requirements

Appendix 2: OGDCL HSEQ Policy

HSEQ Requirements & Guidelines

1. INTRODUCTION

This document is being issued with the Contract Document for **“LAYING OF 8” DIA x 2.0 KM FLOWLINE FOR NASHPA WELL NO 11”**. It sets out the requirements for Health, Safety and Environment (HSEQ) that the contractor and its subcontractors must follow during the entire project.

1.1 Scope and Objectives

The document is intended as a guideline for the contractor and spells out the minimum HSEQ standards of the company, for the contractor to follow during the entire duration of project. The document however does not absolve the Contractor and its subcontractors from their own HSEQ responsibilities and is not universal in nature.

2. POLICY AND RESPONSIBILITIES

2.1 HSEQ Policy

Contractor and its subcontractor will acknowledge Company's strong commitment to HSEQ and affirm that they have written health, safety and environmental policies, which are of a standard comparable to that of company. These policies will be signed and actively supported and endorsed by contractor management.

Contractor will further affirm that its policies are widely disseminated and understood among employees and sub-Contractors. These policies should be in English and such other local languages as required.

2.2 Responsibilities

- Contractor is responsible to communicate all HSEQ requirements asked by the company to its field management and supervision according to their areas of responsibilities.
- The Contractor is responsible, through his organization, for applying the HSEQ measures required to carry out work assigned to him accidents / incident or events which jeopardize the HSEQ of the personnel and of the installation.
- Contractor is responsible for correct selection of personnel to assign to the jobs and shall determine, the need for, and provide, training of the personnel whose activities influence HSEQ.
- Contractor shall possess all the equipment needed to carry out the work (appropriate for the work environment) as well as all the clothing, safety devices and personal and collective protection devices required.
- Contractor shall plan all actions, controls and inspections aimed at ensuring HSEQ requirements are observed, applying the measures defined in his own HSEQ Manual.
- Contractor shall provide experienced HSEQ Supervisor and Doctor/Medic at the site.
- Contractor shall provide project organization chart, specifying also the names and relevant professional profiles of the key positions.
- Contractor will also submit CV's and job description of its personnel for handling HSEQ matters i.e. Project Manager, Site Incharge (s), HSEQ Supervisor and medic.

HSEQ Requirements & Guidelines

3. PERSONNEL

3.1 Recruitment

Contractor shall ensure that all roles and responsibilities with respect to HSEQ management are detailed in the contractors HSEQ Project specific management plan. Roles to be addressed in the plan include the following

- Project Manager
- HSEQ Team/Supervisor
- Rigging supervisor
- Side boom Operator if the operation includes side boom
- Horizontal directional drill operator (HDD)
- Welders qualification
- Radiographer
- Drivers
- Crane Operator

a) Medical Screening

It is contractor's responsibility to ensure that all contractors and subcontractors personnel's are healthy and medically fit for their respective assignments

For certain tasks, contractor may be asked to provide reasonable evidence to satisfy OGDCL of their medical fitness. If necessary, and if so requested by OGDCL, contractor shall arrange for contractors nominated medical officer to approve the employment on Medical grounds, of contractors and subcontractors personnel's.

3.2 Operators / Drivers Selection

Selection procedures should cover:

- Age, Health and working experience in hilly areas
- Language (understanding written and verbal instructions)
- Operator / driver skills, Operator / Driving record and appropriate licenses
- Attitude to substance abuse
- Level of general education
- Previous training and qualifications on same type of equipment / vehicle
- Understanding of safe operation of equipment (excavator, loader, dumper, jack hammer, grader).
- Work safety issues

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All operator / drivers must have valid driving / operating / licenses according to the category of equipment / vehicles and fully trained and competent to operate particular equipment / vehicle.

3.3 HSEQ Induction

Contractor shall ensure that all arrivals to Company's work site receive a briefing upon arrival at the work site. The induction should cover the emergency response and evacuation, escape routes and mustering, communication methods, medical and first aid facilities, traveling, environment, and other HSEQ aspects etc.

Note that all contractor personnel entering the operations area shall undergo OGDCL Operations provided induction.

As such, the contractor shall prepare and deliver a OGDCL approved project induction package (visitor and full induction) that incorporate items including but not limited to the following

- OGDCL HSEQ Policies and standards
- Contractor ERP
- Project HSEQ minimum requirements
- PPE Requirements
- JSA/TRA process
- Incident reporting
- Health and hygiene
- Drug and alcohol policy
- Permit Requirements
- Tool box talks

3.4 Training & Awareness

Contractor is responsible for maintaining HSEQ awareness of all personnel including arranging safety talks for traveling in hilly areas with / without loads, road conditions and community sensitive areas.

Contractor staff must have the basic knowledge about risk associated with Pipeline and Civil work, spillage handling, firefighting and other emergency related issues.

3.5 Occupational Health & Hygiene

- Contractor shall ensure that its personnel shall maintain standards of health & hygiene during the execution of the Contract.
- Contractor will make arrangements for essential medical support at site.
- Contractor will designate a vehicle for evacuation of injured / ill persons from site to nearby hospitals.
- Contractor will appoint a full time Doctor/Medic at site and made available all necessary medicines at site.

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- The contractor shall ensure that water to be used at the camp for potable purpose, is filtered and treated.
- Sufficient latrine and washing facilities shall be provided for all employees, and shall be hygienically maintained and inspected on daily basis.

4. HSEQ LEGAL AND OTHER REQUIREMENTS

Contractor's is required to comply with all relevant National, Provincial and local Laws while working with OGDCL.

4.1 Reference Laws & Provisions*

a) Occupational safety laws

- The Mines Act, 1923
- The Regulation of Mines and Oilfields and Mineral Development (Government Control) Act 1948, Pakistan Petroleum (production) Rules, 1949 and Pakistan Petroleum(Exploration and Production) Rules, 1986, Safety in Drilling and Production Rules 1974.
- West Pakistan Shops and Establishment Ordinance 1969 & Rule 1969

b) Environmental protection laws and other relevant legislation i.e. PEPA 1997, NEQS

* refer appendix 1

4.2 Termination & Suspension

Any infringements by Contractor's manpower identified by Company of its HSEQ regulations and standards shall be investigated jointly by Company and Contractor and remedial action mutually agreed upon and implemented by the Contractor. If Contractor does not implement remedial action within agreed terms, Company has the right to stop the contract forthwith.

4.3 Alcohol & Narcotics

Contractor manpower is required to comply with Contractors Drug and Alcohol program. Based on that program it shall be ensured that personnel do not, at any time, while traveling to or from, or at the work, have in their possession or under influence of any

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Contraband or alcoholic liquor, drug or other intoxicating substances.
Company reserves a right to subject all personnel deployed in the services of the Company to drug test at any time without prior notice.

5. RISK MANAGEMENT & HAZARDS IDENTIFICATION

- Contractor shall make an initial assessment of the HSEQ risks involved in the execution of the works. The focus of the assessment shall be to evaluate the inherent hazards in conducting the work and the potential adverse consequence of an accident to the workforce, the public and the environment, company assets and reputation.
- Contractor shall take appropriate measures to prevent incidents from occurring and to minimize the consequence of an event should it occur.
- Contractor shall conduct HSEQ inspections and audits to ensure that such preventive measures are carried out. Contractor shall promptly conform to all recommendations made pursuant to the said inspections and audits.

6. CONTRACTOR'S CAMP

Contractor shall be responsible for providing quality living and food to his employees on site. All facilities within the Contractor's camp shall conform to an acceptable standard of cleanliness and hygiene. These facilities shall include but are not limited to temporary accommodation, kitchen, mess, toilet and bath. Contractor shall ensure that the flow from toilets shall be drained into a covered septic tank which shall have an outlet in a soak pit. Flow from kitchen and baths shall be drained into the soak pit directly.

The fuel storage tank constructed by Contractor in his camp shall be lined with an impermeable membrane liner to hold the oil within the tank in case of any accidental oil spill or leakage. A brick masonry or concrete pad shall be constructed adjacent to the fuel storage tank to avoid any soil contamination during fuel loading, of E-loading and re-fueling of vehicles at the camp.

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7. EQUIPMENT/ VEHICLES REQUIREMENTS

- Vehicles and equipment (earth moving machinery i.e. excavators, loaders, Side booms , HDD , Jack hammers, cranes etc.; welding, cutting, grinding machines) should meet international safety standards.
- Be *inspected by an experienced mechanic* who will issue fitness certificate on behalf of contractor.
- Be re-examined by mechanic in case of any accident /damage /modification.
- Driver seats should have proper seat belts.
- Have rear-mounted reversing alarm, audible from 8 meters, automatically operates when reverse gear is selected.
- Have fire extinguishers, with minimum capacity of 5kg multipurpose dry-powder and first aid kit fitted in the cabin
- Have an indicator/gauge showing brake pressure.
- Have two spare wheels and equipment to safely change a wheel.
- Have storage box for tools and auxiliary lashing equipment. If the storage box is on the top of a headboard, there shall be rungs fitted for access to the box.

8. EQUIPMENT / VEHICLES MAINTENANCE

Operators / Drivers should be seen as professionals and be expected to take full responsibility for safety and the safety status of the equipment / vehicle. Linking operators / Drivers to such kind of specific equipment / vehicles can enhance their sense of responsibility.

Contractor shall carry out its equipment / vehicle regular maintenance in its designated area including change of lube oils and filters.

No maintenance shall be carried out without drip trays on the ground to collect any drips or small.

9. TRAVELING RULES

The following general rules should be observed for all traveling:

- Speed limits (where defined) shall strictly be followed.
- Speed should be reduced while moving near residential areas to avoid any disturbance to local community.
- While moving in concession boundaries contractor will follow speed limits defined by Location management. Contractor will also ensure that local community is not disturbed due to movement of its vehicles.

10. INTERFACE WITH THE COMPANY

The Contractor shall, within the context of these activities, identify one competent person tasked to interface with Company's representative for HSEQ related matters.

The persons shall hold sufficient authority to manage the entire contract and to organize the work, taking care that all information for and from the Company is transmitted correctly.

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11. PERSONAL PROTECTIVE EQUIPMENT

The Contractor will be responsible for ensuring that all personnel entering in site, plant or operation areas and working areas where they are exposed to risk of injury or disease shall use suitable protective clothing and equipment.

Such clothing and equipment shall include but not be limited to depending on nature of job and hazards to which one is exposed to:

- Overalls
- Safety helmets
- Safety boots
- Gum Shoes (for concrete work/Slippery surfaces)
- Eye protection
- Ear defenders
- Gloves

The contractor shall be responsible to provide the mandatory PPE to its employees / subcontractors while working for Company in its Field Areas. The contractor shall ensure that its employees have received appropriate training on the use and maintenance of safety and personal protective equipment prior to its use.

12. SAFETY EQUIPMENT AND FIRE PROTECTION

Contractor shall at its own expense provide necessary first aid equipment, sufficient fire extinguishers, and other safety equipment and shall maintain this equipment in a professional manner as dedicated by legal and industry standards. In addition, contractor shall keep up-to-date records of manufacture, testing and maintenance of all said equipment.

First Aid boxes shall be allocated to each unit or independent sub-unit of the operation, and shall be of a size and composition suitable for the number of persons involved.

Ready access by all persons on site to all fire extinguishing and safety equipment must be maintained at all times. Locations of such equipment must be clearly marked. All persons shall have the basic knowledge of how to operate the equipment, and the procedures to be followed in the event of fire.

Contractor shall provide safe storage for flammable substances in safe locations. The storage area shall be remote from frequently manned areas. Any oil grade with a low flash point (for example petroleum) shall not be used for cleaning purposes.

Contractor shall maintain good housekeeping and remove all unnecessary inflammable and other surplus material from the site or facility. Sufficient waste bins shall be provided on the work site.

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Contractor shall provide safety signs for the project facilities.

13. EARTH MOVING EQUIPMENT

The following minimum standards will apply to all earth moving equipment to be used by contractor during the project.

Seat belts shall be provided on all equipment. Seat belts not to be provided for equipment, which is designated only for stand up operations.

Roll Over protective structure (ROPS) Seat belts need not be provided for equipment, which have roll over protection structure or adequate canopy protection.

Brakes. All earth moving equipment shall have a service braking system capable of stopping and holding the equipment fully loaded.

Horn All bi-directional machines, such as rollers, compactors, front end loaders, bulldozer, excavator and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. The horn shall be maintained in operative condition.

Reverse Alarm. No contractor shall permit earth moving or compacting equipment which has an obstructed view to the rear to be used in reverse gear unless the equipment has in operation a reverse signal alarm distinguishable from the surrounding noise level or an employee signals that it is safe to do. Also rear view panoramic type mirrors is a requirements.

Scissor Points. Scissor points on all front-end loaders, which constitute a hazard to the operator during normal operation, shall be guarded.

Rated Capacity: Cranes shall have rated capacity clearly posted on them so that it is clearly visible to the operator. When the manufacturer provides auxiliary removable counterweights, corresponding alternate rated capacities also shall be clearly shown on the vehicle. These ratings shall not be exceeded.

Driving / Operator License: All drivers and operators of heavy equipment must have valid license, as per the state requirements. Company representative shall hold the authority to reject the operator / driver of any equipment / vehicle who does not possess valid legal authority.

Driving Test: Company retain the authority to conduct a driving test and issue a driving permit, which are fulfilling Company driving policy standards.

Unauthorized personnel & helpers shall not be permitted to ride any equipment.

Preventive Maintenance Program: For the prolong work schedule, where a particular equipment is in operation for a period of more than one week, contractor has to prepare and implement preventive maintenance program.

General Condition: The general condition of all equipment shall be visibly good. Equipment with leaking oil, ruptured boots and seals are not considered fit-for-purpose. The worn up body, fenders, parts, horn are considered flaws which must be repaired and maintained before using at Company sites.

Drip trays: No maintenance shall be carried out without drip trays on the ground to collect any drips and small spillage.

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14. RIGGING / LOAD LIFTING EQUIPMENT

- Cranes/Side booms should be certified for 3rd party and operator should valid license for operating crane. Unauthorized persons and helpers are not allowed to operate crane. Crane operator shall be assisted by competent rigger during loading and offloading.
- All rigging equipment shall be marked with their respective SWL (Safe Working Load).
- All slings should be load tested and color coded (certified OK).
- All wire ropes shall be used under their stated SWL.
- Natural and synthetic fiber ropes should be inspected regularly especially before use.
- Shackle and hooks shall be used under specified SWL.

15. ELECTRICAL / POWER EQUIPMENT

- Electrical and power generation equipment shall be in good condition and safe to operate. Defective equipment shall not be used.
- Contactor will ensure proper inspection of electrical and power equipment on regular basis.
- Electrical hand-held equipment shall be appropriately connected to an external supply with ELCB's.
- Contractor should ensure that all portable equipment is disconnected from the power supply when not in use.
- Contractor should ensure all the Earthing/Grounding requirements before the start of activity
- All flexible cables shall be of industrial grade, in good and safe working condition. Taped joints in cables shall not be permitted and plugs will always be used in power sockets. The cables shall be protected against mechanical damage

16. SCAFFOLDING / SHUTTERING

- Scaffolding should be of good quality all connection tied securely.
- Company will not allow any scaffolding pipe which is painted / bended.
- Scaffolding should only be carried out by scaffolders with adequate experience of such jobs.
- Scaffolding should be inspected by Contractor scaffolding inspector & properly tagged (saying it is approved for usage etc.) before starting the work.
- Wooden shuttering to be used where possible.
- In case of steel shuttering special care shall be taken while transporting, placing and removing them as these are falling hazards and one should take extreme care while

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removing them.

- While installing and removing shuttering proper access to provided and safety harness/belts should be worn all the time where there is potential of fall hazard.
- Green tags to be used for Safe access
- Red Tags to be used during erection of Scaffolding
- OSHA guide lines should be followed for Erecting Scaffoldings structures
- Earthing of scaffolding structure should be done where applicable.

17. EXCAVATION

- Follow the OSHA guidelines for excavation.
- Identify the soil characteristics at the work site, and use this information to provide a safe work place for construction laborers.
- Use prescribed methods of wall retention, piling, and cribbing, sloping, shoring, trench boxing and sheeting to maintain trench and excavation walls.
- For each trenching or excavation situation, employ the proper sloping, shoring and bracing structures and measures designed specifically for the particular situation.
- Trench failures often occur in multiples, starting with a movement of soil material near the bottom of the trench wall. After the failure of the base, the support of the wall will quickly erode and the wall will collapse. The collapsing soil is extremely heavy and can weigh one and a half tons per cubic yard, producing a tremendous crushing force.
- Proper design, construction and placement of support structures will allow employees to work in a safe environment.
- Authority to take prompt corrective measures to eliminate existing and predictable hazards and to stop work when required.
- Surface crossing of trenches should be discouraged
- For Access to and exit from the trench ladders should be used with caution.
- Where necessary, the trench will be de-watered prior to lowering of the pipe and back filling.
- The trench will be excavated using Excavator/ Jack Hammer at site and shall meet the requirements of the specification.
- Deep Excavation that may require shoring if the ground conditions are unstable.
- No persons may have access to trench over 1.5 meters in depth unless batters or shoring are in place.

19. CEMENT AND CONCRETE WORK

The jobsite should be adequately marked to warn people construction activities. Fences, barricades, and warning signs can be used to restrict people access. And the work area should be kept clean and uncluttered to minimize hazards to workers. Remember: safety is the job of everyone onsite.

19.1 Head and Eyes Protection

Construction equipment and tools represent constant potential hazards to busy construction personnel. That's why hard hats are required on construction projects. It is therefore recommended that some sort of head protection, such as a hard hat or safety hat, be worn when working any construction job, large or small.

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Proper eye protection is essential when working with cement or concrete. Eyes are particularly vulnerable to blowing dust, splattering concrete, and other foreign objects. On some jobs it may be advisable to wear full-cover goggles or safety glasses with side shields. Remember that sight is precious. Protect the head and eyes by using proper safety equipment and remaining alert.

While using cement mixer for concreting area under the boom shall be barricaded and concrete man should wear rubber shoes and face shield while concreting using concrete coil

19.2 Back Protection

All materials used to make concrete-portland cement, coarse aggregate, sand, and water-can be quite heavy even in small quantities. When lifting heavy materials, your back should be straight, legs bent, and the weight between your legs as close to the body as possible. Do not twist at the waist while lifting or carrying these items Rather than straining your back with a heavy load, get help. Remember to use your head, not your back.

Let mechanical equipment work to your advantage by placing concrete as close as possible to its final position. After the concrete is deposited in the desired area by chute, pump, or wheelbarrow, it should be pushed-not lifted-into final position with a shovel. A short-handled, square-end shovel is an effective tool for spreading concrete, but special concrete rakes or come-along also can be used. Excessive horizontal movement of the concrete not only requires extra effort, but may also lead to segregation of the concrete ingredients. Pull the concrete mixer with help tractor/vehicle and manual shifting in no allowed.

Avoid actions that cause dust to become airborne. Local or general ventilation can control exposures below applicable exposure limits; respirators may be used in poorly ventilated areas, where exposure limits are exceeded, or when dust causes discomfort or irritation. Avoid prolonged exposure to dust.

20. WELDING WORK

20.1 Electrical Arc Welding

- Welding procedure shall be developed by contractor.
- Both alternating and direct current welding are acceptable.
- Welding protection screens and mandatory PPE shall be used.
- Fire protection and firefighting equipment shall be available in close proximity of welding work.
- Electrode holders with a completely insulated head shall always be used, and un-insulated cable plugs shall not be permitted.
- All cables shall be in good condition without mechanical damage. Joints are not permitted. All cables shall be kept out of water and coiled when not in use.
- All welding machines should comply with HSEQ electrical requirements i.e. ELCBS should be installed on each welding rectifier.
- Desiccator shall be provided and electrical tested to remove moisture from the electrode to Prevent eye irritations.

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20.2 Gas Welding / Cuttings

- Necessary PPE shall be used.
- Fire protection / fire blanket and firefighting equipment shall be available in close proximity of welding work.
- All flash back arrestor and check valve shall be installed between the cylinder and fuel-Gas hose immediately after the pressure regulator and also on the oxygen line. All flash back arrestor should be certified.
- Hoses shall be inspected frequently for leaks, wear and loose connections. Leak shall be Repaired immediately by cutting out the defective part of the hose and inserting a tube with two hose clamps. Taping of worn hoses is not permitted.

21. RADIOGRAPHIC TREATMENT

21.1 Safety Precautions

- Adequate precautions shall be taken to protect testing personnel and any other persons in the vicinity, when radiography equipment is being used. Statutory regulations enforced by Pakistan Atomic Energy Commission shall be observed
- Personnel who perform radiographic testing shall have recognized qualification, such as SNT-TC-IA Level I/II or PAEC Level I/II
- The following areas shall be classified as restricted areas
- Storage place of radioactive materials to be allocated
- Any area where radiation exists at levels such that the body could receive a dose in excess of 300 micro-sievert per hour (30 Millirems per hour) per week

The following shall be considered as off limit;

- Any area where radiation exists such that the body could receive a dose excess of 500 micro sievert per hour (50 millirems per hour)
- Area with in min.15 meters from the source of radiation (operating x-ray or radioactive source)
- Unauthorized persons shall not be allowed to enter the restricted area and off-limit areas.
- During examination proper shielding should be used to prevent escape of radiation into the environment.
- To prevent the entry of unauthorized persons, the following shall be provided for the restricted and off limit areas/ places.
- Warning signs, labels and posters showing the existing radiation hazards and that no entry allowed.
- Barricade or rope off with radiation signs and flashing/ Beacon lights.

21.2 Testing Timings

- Radiographic activities should be carried out at lunch times or during night so that no persons shall be present in the safe working area.

HSEQ Requirements & Guidelines

21.3 Storage

- Radioactive materials shall be stored separately from other materials or equipment. The storage facility of radioactive material container shall be so constructed as to be free from the hazards of flood, fire, cavein and other adverse conditions. The storage shall be lockable and shall be fenced with a lockable gate.
- Radiography supervisor shall measure and record the dose of radiation every day at the boundary of restricted area where the radioactive materials are stored ,the dose shall not exceed 300 microsievevt(30 millions per week)
- Radioactive wastes shall not be disposed off in the open environment and in water.

21.4 Transportation

- Radioactive materials shall be transported by two or more men under the direct supervision of a radiography supervisor.
- Sign showing that radioactive material is being transported shall be displayed.

22. HOLIDAY TESTING AND LOWERING

- Contractor shall utilize proper SPY holiday detector for checking the pipe coating and the weld joint coating. The Side booms/Crane will pick up the pipe strings and lower in the pipe into the trench utilizing the CRC Evans Lowering in cradles. While the pipe is on the ground and being held by the side-boom the holiday checking will take place and by walking the apparatus (detector) alongside the pipe string by the holiday check crew. Any repairs located will be carried out prior to pipe being lowered. At the same time the side-booms will lower the pipe in to the trench.
- Height of the pipe and spacing of the machine will be monitored continuously to prevent pipe slack rolling and buckling.
- During the above activity no person shall approach under the pipe and inside the trench.

23. ROAD CANAL AND SURFACE OBSTACLE CROSSING (thrust Boring)

- Lifting and rigging Standards shall be followed for lowering thrust bore into the deep excavation.
- All the excavations for thrust boring shall be hard barricaded and signage shall be installed.
- Inspected sling / shackles shall be used for lowering of pipes into the angur boring machine.
- Excavator shall maintain safe working distance from the live pipe line and layout plan shall be considered prior to start the activity.

24. TRENCH BACKFILLING

- Contractor shall utilize the excavated spoil for the Trench Backfilling.
- Area shall be barricaded.
- Equipment used for backfilling shall be checked.
- Trench shall be backfilled as soon as work is complete to avoid personnel's/ community children's to fall into the trench

25. HYDRO TESTING DEWATERING AND DRAWING

- Ensure that all workers have been informed when the Hydro testing will be conducted properly lit and barricaded by a barrier.
- It is advised that the testing to be conducted at night or break time hours to minimized the SIMOPS or personnel interface
- Ensure sufficient man power will be designated as watchman to ensure nobody will enter the Hydro testing zone

HSEQ Requirements & Guidelines

- Ensure that the Relief valve was install
- Ensure that all workers have been informed when the water releasing will be conducted properly lit and barricaded by a barrier

27. HAZARDOUS CHEMICALS

All chemicals or other dangerous substances to be used in the contract are required to be suitably packaged which will include clear identification of the substance concerned and prominent hazard warning signs. Each delivery shall contain the appropriate Materials Safety Data Sheets (MSDS) which shall also be attached to all invoices or other documentation. This is to ensure appropriate recording and dissemination to all concerned. The information contained in the Materials Safety Data Sheets (MSDS) must include at least:

- a. Chemical identification and data.
- b. Fire and explosion (Flash point temperature, flammable limit range, auto ignition temperature).
- c. Health aspects (nature of hazards, TLV-STEL, TLV-TWA).
- d. Emergency procedures (firefighting agent, spillage, personnel exposure, and first- aid).
- e. Environmental (emissions to atmosphere, spillage, neutralizer procedure).
- f. Transportation procedure.
- g. Personnel protective equipment to be worn.
- h. Storage requirements.

28. HOUSEKEEPING

Contractor shall ensure that good housekeeping is maintained in camp / worksite continuously throughout the duration of the Work with due regard being paid to tidiness and disposal of scrap material, access ways and emergency exits being kept clear. In particular, all unnecessary inflammable and other surplus material shall be removed daily from the site or facility. Sufficient waste bins shall be provided on the Work site.

29. COMMUNICATION SYSTEM

Contractor shall ensure that its crew / personnel have adequate means of communication to enable them to contact Base Camp/Radio Room and/or other agencies in the region for help in case of emergency situation, such as telephones, radios, etc.

30. ENVIRONMENT AL GUIDELINES

Contractor shall pay consideration to the environment by acting to preserve air, fuel, and animal and plant life from the contrary effects of the travelling activities and to minimize any nuisance, which may arise from the transportation.

The following guidelines shall be applied for the environmental protection:

- Contractor shall avoid any damage to the environment
- Contractor shall report any fuel / oil spillage to the Company and carry out remediation /

HSEQ Requirements & Guidelines

reclamation of the contaminated soil while working for the Company (Construction, Operation and restoration).

- Contractor, in conducting the work, shall best endeavor to prevent or limit pollution within the levels permitted by applicable laws.
- Contractor should ensure measure for resources conservation wastage of energy, fuel, Diesel, paper etc.
- The Contractor will be responsible for maintaining good housekeeping including the control and disposal of domestic and general waste, hazardous materials and all other effluents and emissions in accordance with the Company requirements.
- Contractor shall follow existing roads & tracks and will not develop any new track or passage.
- Contactor shall be responsible for all compensations incase of damage and / or contamination to local community assets caused by contractor operations.

31. COMMUNITY GUIDELINES

Contractors all personnel working with the Company should respect local cultures and traditions while traveling through different locations / towns / villages etc.

Their operations should avoid causing any damage to the local environment, water-ways (flowing or dry), foot-paths, roads, animal life, standing crops / trees etc. If any accidental or incidental damage is caused then such damage shall be immediately repaired and any disturbance should be amicably and reasonably compensated, with the approval of and in consultation with Company.

32. HSEQ REPORTING

- Contractor shall report all accidents and incidents immediately to the Company and implement corrective measures that arise from the accident investigation.

33. EMERGENCY RESPONSE AND MEDICAL EVACUATION

- Contractor shall submit an emergency response plan to the Company for review and approval including ways of communications.

34. INFORM ATION / DOCCUMENTS REQUIREMENTS

a) Standard Documents

- Details Contractor's dedicated personnel who will hold sufficient authority to manage the entire Contract and to organize the work.
- Type of equipment / vehicles to be used by contractor for this Service and their fitness certificate if already available.
- Contractor's journey / travel management plan.
- Contractor HSEQ Plan
- Contractor's Emergency Response Plan
- Risk Assessment
- Any other additional information the Contractor deems useful in this respect.

b) Requirements on Contract Award

- Adequate experience / trainings evidences of staff.
- Contractor's equipment / vehicles Fitness certificate from contractor experienced mechanic.
- Emergency Response Plan.
- Risk Assessment

HSEQ Requirements & Guidelines

c) **Requirements during Execution of Work**

- Contractor will be expected to implement all agreed HSEQ requirement provided by the Company.
- Contractor's will follow all Company's procedures (related to their nature of job) and field instructions issued by time to time.
- All accident / incident reports (if occurred during contractor's operation)
- Monthly HSEQ performance reports on format provided by Company.

HSEQ Requirements & Guidelines

Appendix 1: Summary HSEQ Register of Legal & Other Requirements

Instrument	Promulgation Date	Enforcing Authority	Scope and Applicability
Pakistan Environmental Protection Act, 1997 (Act XXXIV of 1997)*	Dec. 1997	Ministry of Environment, GoP Pakistan Environmental Protection Council (PEPC) Federal and Provincial EPA	An umbrella and basic environmental law which provide for establishment of: <ul style="list-style-type: none"> ▪ High powered PEPC headed by the Chief Executive of Pakistan ▪ Federal and provincial EPAs ▪ Environmental quality standards ▪ Environmental Tribunals to deal with cases of violation <p>This law applies uniformly to both public and private sector organizations and provides for penalties for non compliance or violations and has the overriding effect to other legislation.</p>
National Environmental Quality Standards (NEQS)	Aug. 2000.	Federal EPA Provincial EPAs	Applies to all wastewater streams discharging into inland waters, sewage treatment system and sea. Applies to all gaseous emissions (at stack). Applies to vehicular emissions and noise NEQS provides max allowable limits to discharges.
NEQS (Self Monitoring and Reporting by Industry) Rules, 2001	April 2001	Pakistan EPA Provincial EPAs	The rules group industries in 3 categories. E&P (production) lies in Cat-1 and E&P (exploration) in Cat-2. Cat-1 industries will report their air and water emissions on monthly, where as Cat -2 on quarterly basis to EPA. These rules require to monitor and report on selected parameters in air and water (production facilities) on monthly basis and (exploration operations) on quarterly basis Industries have to subscribe a software (Self Monitoring and Reporting Tool "SMART") to report environmental performance.
Pakistan EPA Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2000	June 2000	Pakistan EPA Provincial EPAs	These regulations categorize projects requiring EIA or IEE. OGDCL falls in the category requiring only IEE before initiating a new project. Regulations authorize EPA officials to inspect projects at any time.
Industrial Pollution Charge (Calculation and Collection) Rules 2001	July 2001	Pakistan EPA Provincial EPAs	Provides a framework for calculating, reporting and payment of pollution charge exceeding NEQS parameters. Rate of Pollution Charge increases for non compliance.

HSEQ Requirements & Guidelines

...Table 1, Continued

Instrument	Promulgation Date	Enforcing Authority	Scope and Applicability
Environmental Samples Rules 2001	March 2001	Pakistan EPA Provincial EPAs	Regulates procedure for collecting, packing and dispatching for environmental test of sample from industrial units. Authorized personnel may enter any place, inspect and examine any machinery.
Environmental Laboratories Certification Regulations, 2000	May 2000	Pakistan EPA Provincial EPAs	Provides criteria and application / renewal process for the certification of environmental laboratories
NWFP Wildlife (Protection, Preservation, conservation and Management) Act 1975	1975	NWFP Wildlife Department (SWD)	This is a provincial piece of legislation which provide framework for the preservation, conservation and management of wildlife in NWFP.
Guidelines for Operational Safety, Health and Environmental Management (Petroleum Explorations and Production Sector)	Dec 1996	Director General Petroleum Concessions (DGPC)	<p>These Guidelines [issued by the industry Regulator (DGPC)] have been prepared on the basis of various pieces of legislations relating to operational health, safety and environmental management in E&P companies' operations.</p> <p>These Guidelines cover:</p> <ul style="list-style-type: none"> ▪ Safety and Training Programs ▪ Emergency Response ▪ Accident reporting and mitigation follow up ▪ Operational procedures and Training ▪ Hazardous Material Storage and Handling ▪ Guidelines for environmental management ▪ Emission from Flaring, venting and their monitoring programs ▪ Spill prevention, containment and clean up (SPCC) plans ▪ Waste Management
Oil and Gas (Safety in Drilling and Production) Regulations, 1974	Jan. 1976.	Chief Inspector of Mines.	<p>These Regulations have been promulgated by the Federal Govt. pursuant to Chapter V II (Section 29) of the Mines Act 1923. This provides elaborative guidelines, primarily, for safety in drilling and production operations. Among others, these regulations cover:</p> <ul style="list-style-type: none"> ▪ Management & Supervision of fields ▪ Blowouts prevention ▪ Pipe storage & racking ▪ Air or Gas drilling ▪ Dimension of flare stack ▪ Sour gas flaring ▪ Emergency Responses Plan (ERP) duly approved by CIM

HSEQ Requirements & Guidelines

...Table 1, Continued

Instrument	Promulgation Date	Enforcing Authority	Scope and Applicability
The Mines Act 1923		Chief Inspector of Mines.	<ul style="list-style-type: none"> ▪ Suitable BA sets be available at field locations ▪ Flare pits / stacks how to be located ▪ Remote means of flare ignition or re-ignition ▪ Flare stack shall be at least 9 m high from surrounding topography. ▪ A full chapter on fire fighting (Chapter 27) etc. <p>Medical appliances: Accidents reporting Work / rest cycles / Hours of work Extra wages for over time:</p> <ul style="list-style-type: none"> ▪ Child Labor ▪ Register of employees
Explosive Act 1884		Explosive Department	<ul style="list-style-type: none"> • Explosive transportation • Handling and use
The Forest Act 1927		Forest Department (Federal)	<ul style="list-style-type: none"> • Forest preservation, conservation and management • Consolidate the law relating to forests, the transit of forest produce and the duty leviable on timber and other forest-produce
NWFP Forest Ordinance 2002		Forest Department (NWFP)	<ul style="list-style-type: none"> • This is a provincial piece of legislation which provide framework for the preservation, conservation and management of Forests in NWFP



OIL & GAS DEVELOPMENT COMPANY LIMITED

0904570 – NASHPA 11 PIPELINE CONSTRUCTION PACKAGE (PIPELINE PACKAGE)

CONSULTANTS:

APRIL, 2023



Petrochemical Engineering Consultants

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REV	DESCRIPTION	ORIG	REVIEW	PEC APPROVAL	DATE	CLIENT APPROVAL	DATE
0	Interdisciplinary Check	AHK	SAR	Adeel	April 17, 2023		
1	Issued for review	AHK	SAR	Adeel	April 18, 2023		



CONTENTS

TABLE OF CONTENTS

SECTION NO.	DESCRIPTION
1.0	DOCUMENT LIST
2.0	DRAWINGS
3.0	I. PIPELINE ALIGNMENT DRAWINGS
4.0	II. DETAIL DRAWINGS
5.0	SPECIFICATIONS



DRAWING LIST



OIL & GAS DEVELOPMENT COMPANY LIMITED
NASHPA 11 PIPELINE CONSTRUCTION PACKAGE



DOC. NO. :0904570-LT-001

REV. : A

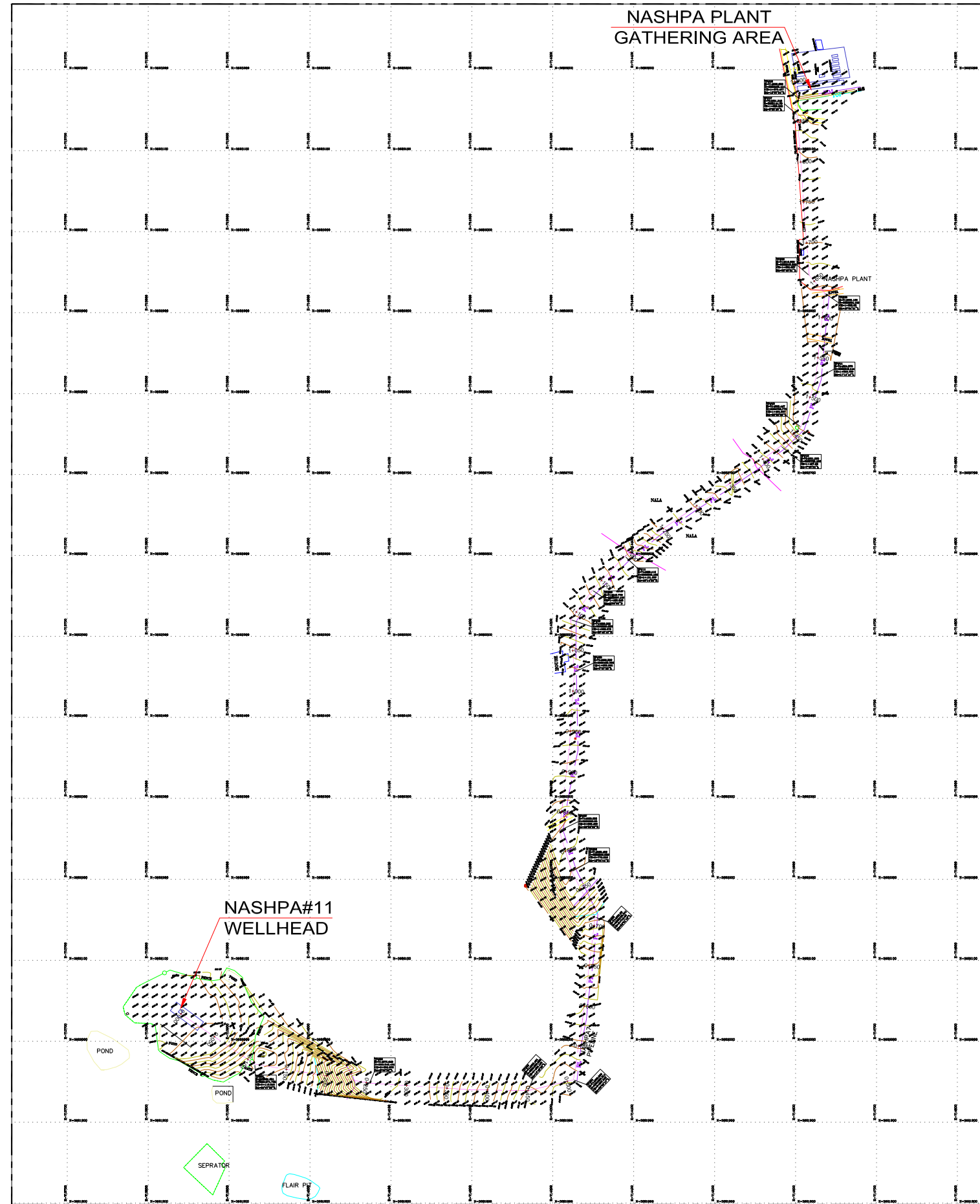
PREP. : MM

Document List

S.NO	DESCRIPTION	DRAWING NO.	REVISION	REMARKS
1.1 PIPELINE ALIGNMENT				
1.1.1	PIPELINE ALIGNMENT DRAWING (0+000 TO 0+750)	0904570-PL-01	1	ISSUED FOR REVIEW
1.1.2	PIPELINE ALIGNMENT DRAWING (0+750 TO 1+500)	0904570-PL-02	1	ISSUED FOR REVIEW
1.1.3	PIPELINE ALIGNMENT DRAWING (1+500 TO 1+682.850)	0904570-PL-03	1	ISSUED FOR REVIEW
1.2 DETAIL DRAWINGS				
1.2.1	Dia 8" COLD BEND DETAIL DRAWING	0904570-DT-001	1	ISSUED FOR REVIEW
1.2.2	Dia 8" PIPELINE RISER AT GATHERING FACILITY	0904570-DT-002	1	ISSUED FOR REVIEW
1.2.3	Dia 8" PIPELINE RISER AT CHABARO WELLHEAD	0904570-DT-003	1	ISSUED FOR REVIEW
1.2.4	TYPICAL MARKER DETAIL	0904570-DT-004	1	ISSUED FOR REVIEW
1.2.5	TYPICAL ROAD CROSSING	0904570-DT-005	1	ISSUED FOR REVIEW
1.2.6	TYPICAL DITCH DIMENSION	0904570-DT-006	1	ISSUED FOR REVIEW
1.2.7	TYPICAL WATER COURSE	0904570-DT-007	1	ISSUED FOR REVIEW
1.2.8	TYPICAL R.O.W DIMENSIONS FOR PIPELINE	0904570-DT-008	1	ISSUED FOR REVIEW
1.2.9	TYPICAL PIPE SUPPORT DETAIL	0904570-DT-009	1	ISSUED FOR REVIEW
1.3 SPECIFICATIONS:				
1.3.1	FIELD COATING SPECIFICATIONS	MEC-GSP-1001	A	FINAL ISSUE
1.3.2	PIPELINE COATING SPECIFICATIONS	MEC-GSP-1002	A	FINAL ISSUE
1.3.3	WELDING SPECIFICATIONS	MEC-GSP-1003	A	FINAL ISSUE
1.3.4	INSULATING JOINT SPECIFICATIONS	MEC-GSP-1004	A	FINAL ISSUE
1.3.5	HYDROSTATIC TESTING SPECIFICATIONS	MEC-GSP-1005	A	FINAL ISSUE
1.3.6	FACTORY BEND SPECIFICATIONS	MEC-GSP-1006	A	FINAL ISSUE
1.3.7	PIPELINE CONSTRUCTION SPECIFICATIONS	MEC-GSP-1010	A	FINAL ISSUE



PIPELINE ALIGNMENT DRAWINGS

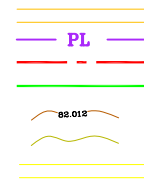


ABBREVIATIONS :

TP = TURNING POINT
 TS = TRAVERSE STATION
 CH = CHARGE
 E = EASTING
 N = NORTHING
 DA = DEFLECTION ANGLE

LEGEND :

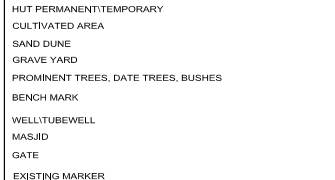
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 EXISTING PIPELINE
 PROPOSED PIPELINE
 GROUND PROFILE
 MAJOR CONTOUR
 MINOR CONTOUR
 ROAD



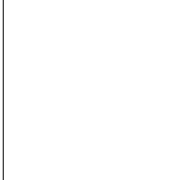
FENCING
 SPOTHEIGHT
 TOP
 HIGH TENSION LINE
 WATER COURSE
 ELECTRIC POLE
 TOE
 WATERLOG AREA
 CP




211.125
 TOP
 HTL
 E
 TOE
 WLA
 X



BUILDING PUCKAKUTCHA
 HUT PERMANENT/TEMPORARY
 CULTIVATED AREA
 SAND DUNE
 GRAVE YARD
 PROMINENT TREES, DATE TREES, BUSHES
 BENCH MARK
 WELL/TUBEWELL
 MASJID
 GATE
 EXISTING MARKER



REV	DATE	DESCRIPTION OF REVISION	DRAWN	CKD.	APPR.
1	31-MAR-2023	ISSUED FOR REVIEW	SS	SAR	
0	30-MAR-2023	INTERDISCIPLINARY CHECKS	SS	SAR	

CLIENT
 OIL & GAS DEVELOPMENT COMPANY LTD

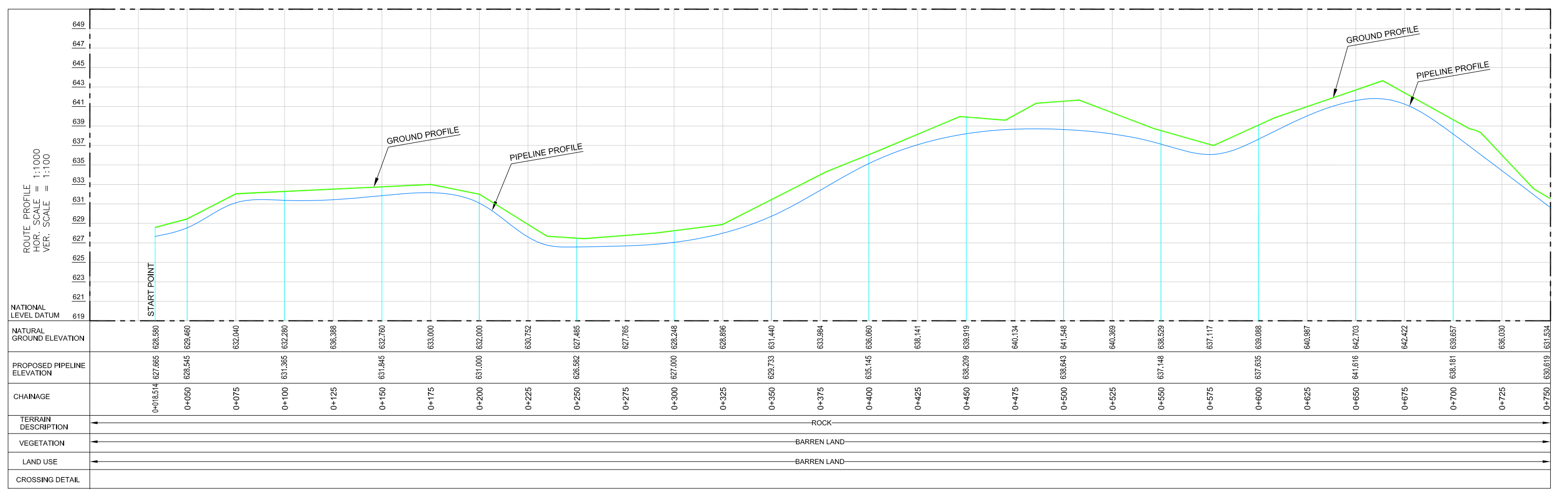
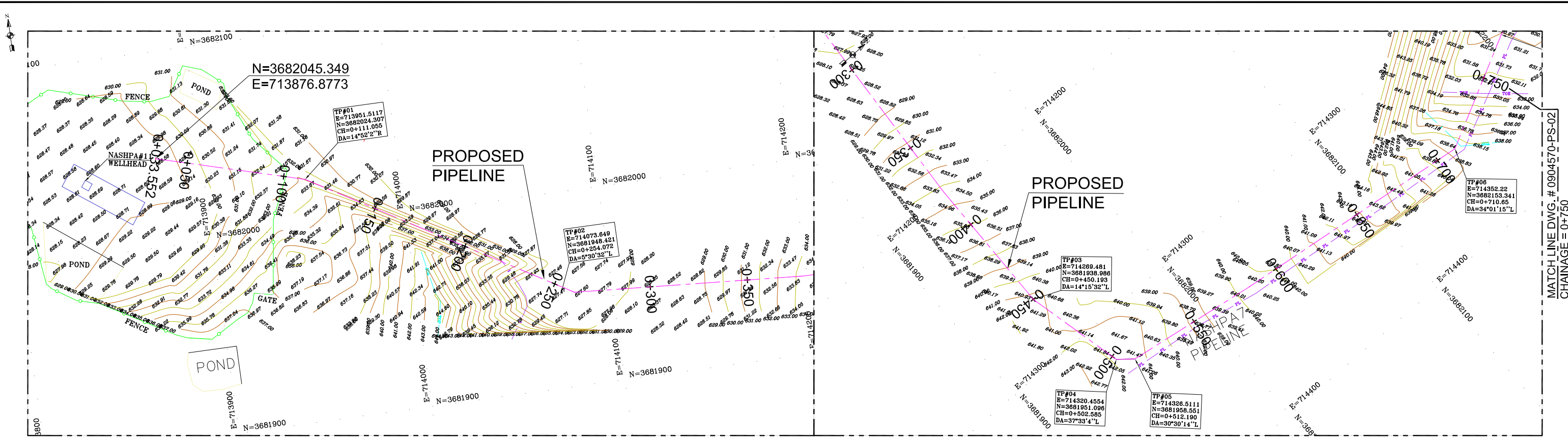
PROJECT: NASHPA 11 PIPELINE CONSTRUCTION PACKAGE

TITLE: KEY PLAN

DRAWING NO. 0904570-KPL-01 JOB NO.0904570

SHEET: 01 OF 01 SHEET SIZE - A3

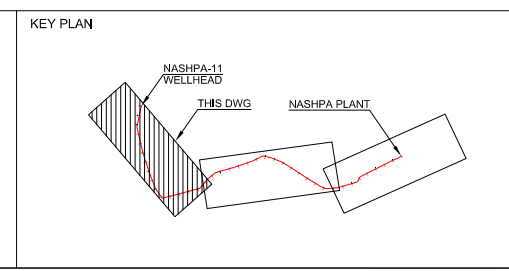
PC PETROCHEMICAL ENGINEERING CONSULTANTS
 C-2, BLOCK NO. 17, GULSHAN-E-HADIS, NEAR NATIONAL STADIUM, KARACHI-75300, PAKISTAN.
 TEL: +92 (21) 34527790, 34561088, FAX: +92 21 34561089, E-MAIL: contact@pec.com.pk web site: www.pec.com.pk



LEGEND:		ABBREVIATIONS:	
LINE PIPE	8 INCH DIA. SCH. 80, CS, API 5L GR.X42	AT	RADIO ANTENNA
LINE PIPE INSULATION	THREE LAYER POLYETHYLENE COATED	BP	BOUNDARY MARKER
SPECIFICATION / CLASS	-	CTM	CATHODIC MARKER
FLANGE RATING	CLASS 900#, RTJ	EP	ELECTRICITY POLE
SERVICE LIMIT	-25 TO 180F	FL	FLARE
HYDRO TEST PRESSURE	1300 PSIG.	KM	KILOMETER MARKER
SOIL COVER MIN.	0.915m	LP	LAMP POST
		LPM	LAND PARCEL MARKER
		MS	MAST
		NV	NAVIGATION BEACON
		PM	PIPELINE MARKER
		PY	ELECTRICITY Pylon
		RL	RUNWAY LIGHTS
		RM	RAILWAY MARKERS
		SG	SIGNAL
		SH	SEISMIC SHOT HOLE
		SN	SIGN POST
		ST	SETTING OUT MARKER
		TP	TELEPHONE POLE
		WT	WATER STAND PIPE

NOTES:

- ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE STATED.
- ALL DIMENSIONS, ELEVATIONS AND ORIENTATIONS TO BE VERIFIED BY THE CONTRACTOR BEFORE UNDERTAKING ANY KIND OF FABRICATION, CONSTRUCTION AND INSTALLATION WORK AT SITE.
- PIPELINE MARKERS SHALL BE INSTALLED AT EVERY 500m IN POPULATED AND INDUSTRIAL AREAS PIPELINE MARKERS SHALL BE INSTALLED EVERY 250m.
- RISER COORDINATES AT WELLHEAD & AT PLANT GATHERING AREA HAVE NOT BEEN FIXED YET OWING TO THE UNDEVELOPED WELL SITE & NON OCCURRENCE OF FENCE IN THE DESIGN PHASE.



REV	DATE	DESCRIPTION OF REVISION	DRAWN	CHKD.	APPR.
0	14-APRIL-2023	ISSUED FOR REVIEW	AHK	SAR	
1	13-APRIL-2023	INTERDISCIPLINARY CHECKS	AHK	SAR	

CLIENT: OIL & GAS DEVELOPMENT COMPANY LTD

PETROCHEMICAL ENGINEERING CONSULTANTS
 C-5, BLOCK NO. 17, GULSHAN-E-QUEEN, NEAR NATIONAL STADIUM, KARACHI-75300, PAKISTAN
 TEL: +92 (21) 34827785, 34891088, FAX: +92 21 34861088, E-MAIL: contact@pec.com.pk web site: www.pec.com.pk

PROJECT: NASHPA 11 PIPELINE CONSTRUCTION PACKAGE

TITLE: PIPELINE SURVEY (0+000 TO 0+750)

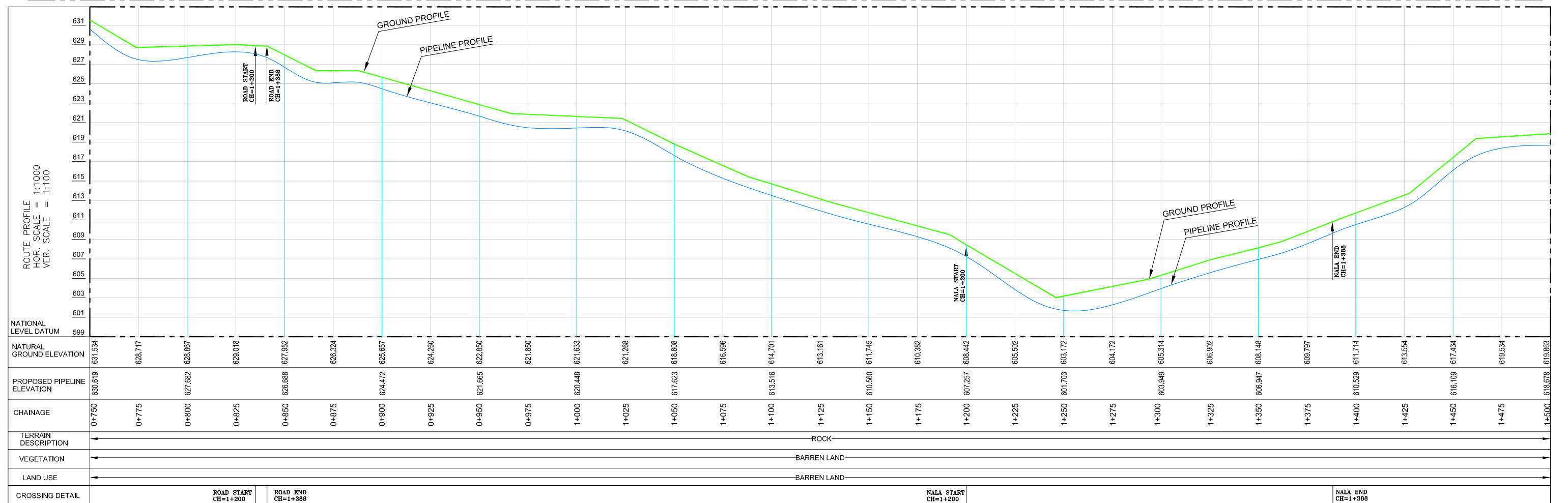
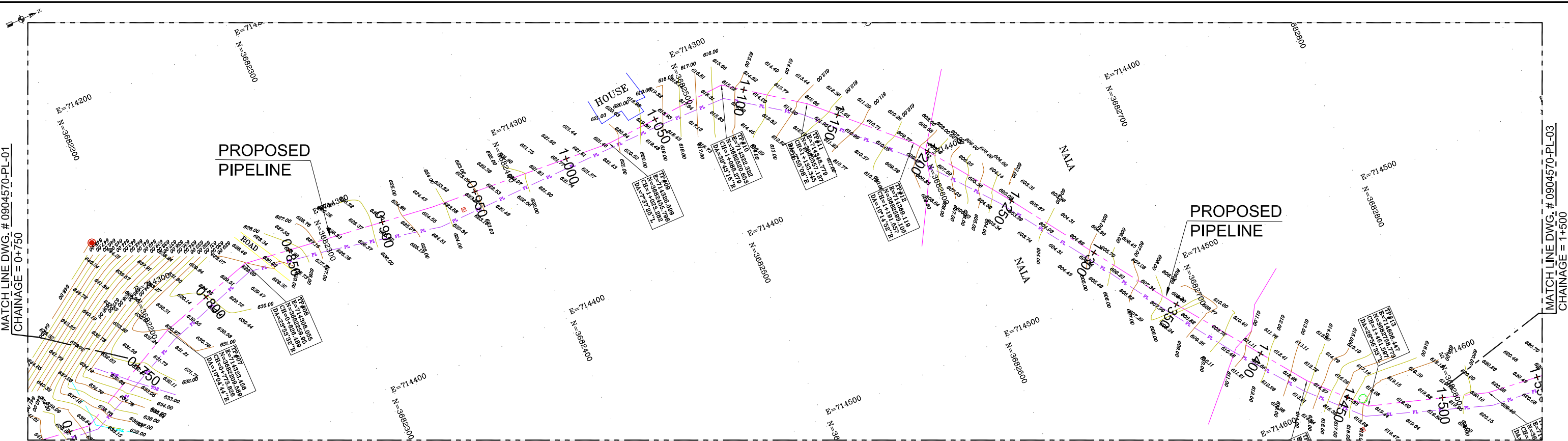
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CHAINAGE = 0+750

MATCH LINE DWG. # 0904570-PL-01
CHAINAGE = 0+750

MATCH LINE DWG. # 0904570-PL-03
CHAINAGE = 1+500



LINE PIPE	8 INCH DIA. SCH. 80, CS, API 5L GR.X42
LINE PIPE INSULATION	THREE LAYER POLYETHYLENE COATED
SPECIFICATION / CLASS	-
FLANGE RATING	CLASS 900#, RTJ
SERVICE LIMIT	-25 TO 180°F
HYDRO TEST PRESSURE	1300 PSIG.
SOIL COVER MIN.	0.915m

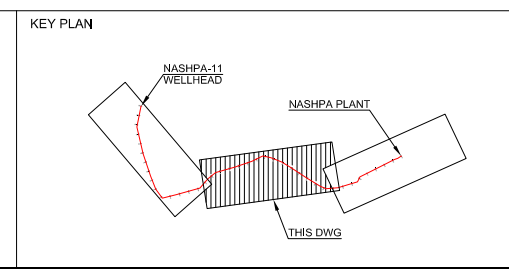
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RIVER / CANAL / DITCH	---
SURFACED ROAD	---
UNSURFACED ROAD	---
TRACK / PLATFORM	---
FIELD BOUNDARY	---
EMBANKMENT	---
WALL	---
FENCE	---
HEDGE	---
GAS & CONDENSATE PIPELINE	---
PIPELINE-OIL	---
PIPELINE-GAS	---
ACCESS ROAD CENTER	---
ELECTRIC LINE	---
EXISTING PIPELINE	---
NATURAL GROUND ELEVATION	---
TREE (NON FRUIT)	---

WATER LINE	TOE	TOP
RAILWAY TRACK	---	---
MAJOR CONTOUR	---	---
MINOR CONTOUR	---	---
CUTTING AREA	---	---
FILLING AREA	---	---

ABBREVIATIONS:	
AT RADIO ANTENNA	SN SIGN POST
BP BOUNDARY MARKER	ST SETTING OUT MARKER
CTM CATHODIC MARKER	TP TELEPHONE POLE
EP ELECTRICITY POLE	WT WATER STAND PIPE
FL FLARE	
KM KILOMETER MARKER	
LP LAMP POST	
LPM LAND PARCEL MARKER	
MS MAST	
NV NAVIGATION BEACON	
PM PIPELINE MARKER	
PE ELECTRICITY Pylon	
RL RUNWAY LIGHTS	
RM RAILWAY MARKERS	
SG SIGNAL	
SH SEISMIC SHOT HOLE	

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0	13-APRIL-2023	INTERDISCIPLINARY CHECKS	AWK	SAR	

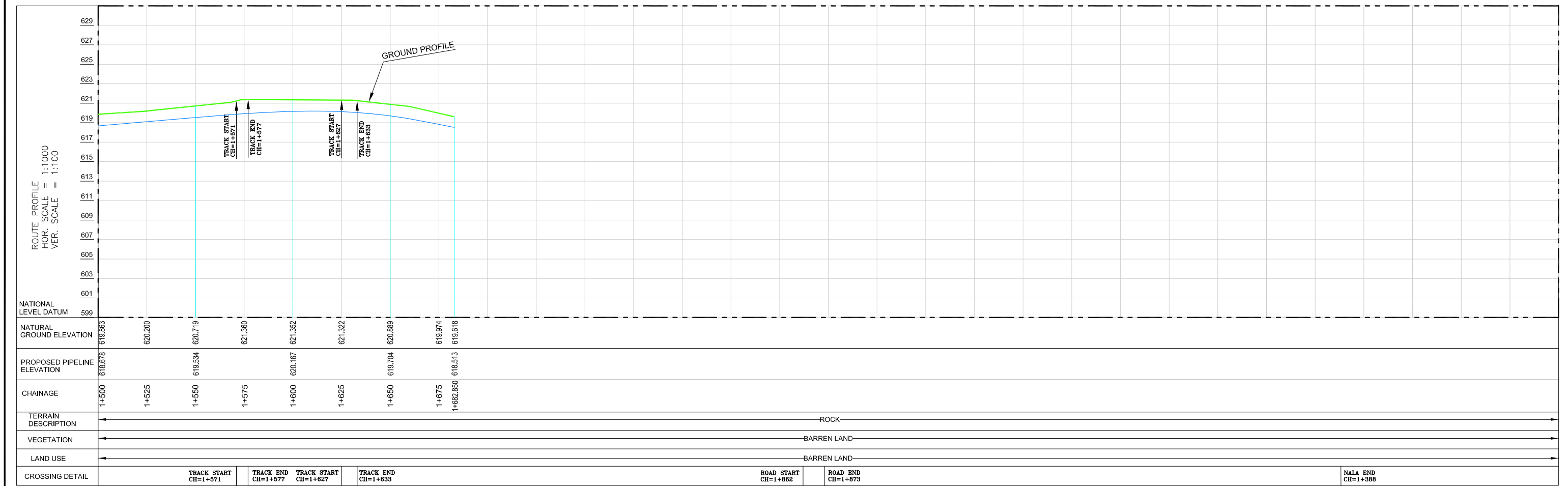
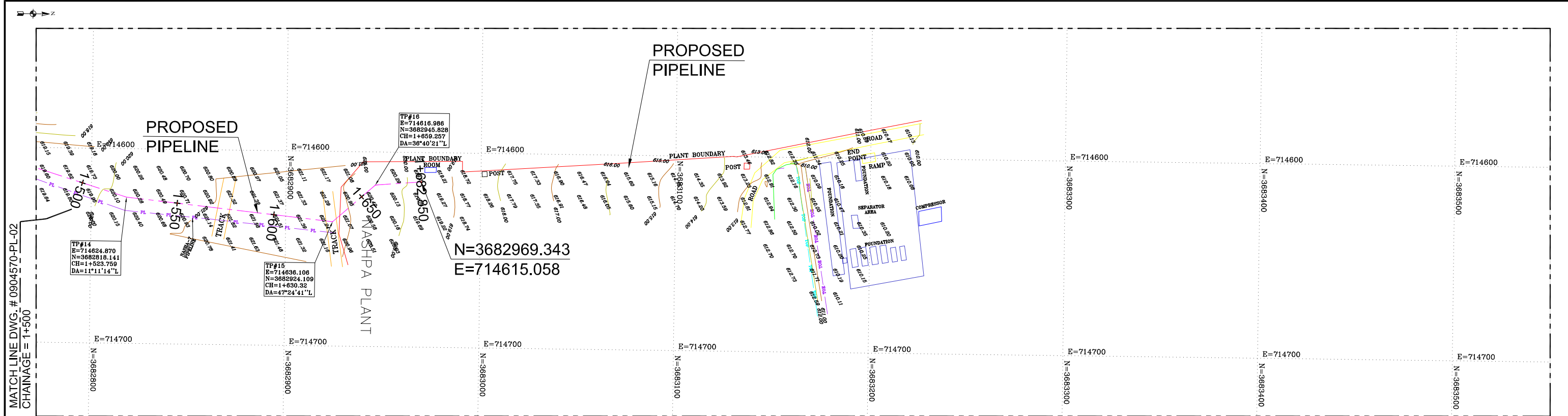
CLIENT: OIL & GAS DEVELOPMENT COMPANY LTD

PROJECT: NASHPA 11 PIPELINE CONSTRUCTION PACKAGE

TITLE: PIPELINE SURVEY (0+750 TO 1+500)

DRAWING NO. 0904570-PL-02 | JOB NO. 0904570

SHEET: 01 OF 03 | SHEET SIZE - A3 | HOR. SCALE: 1:1000 - VER. 1:100

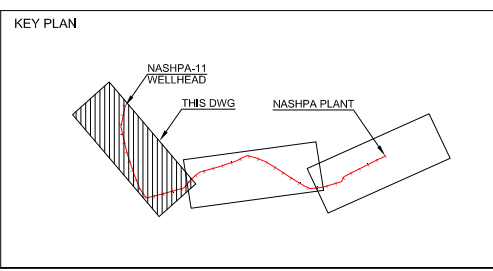


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LINE PIPE INSULATION	THREE LAYER POLYETHYLENE COATED
SPECIFICATION / CLASS	-
FLANGE RATING	CLASS 900#, RTJ
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SOIL COVER MIN.	0.915m

LEGEND:	
RIVER / CANAL / DITCH	---
SURFACED ROAD	---
UNSURFACED ROAD	---
TRACK / PLATFORM	---
FIELD BOUNDARY	---
EMBANKMENT	---
WALL	---
FENCE	---
HEDGE	---
GAS & CONDENSATE PIPELINE	---
PIPELINE-OIL	---
PIPELINE-GAS	---
ACCESS ROAD CENTER	---
ELECTRIC LINE	---
EXISTING PIPELINE	---
NATURAL GROUND ELEVATION	---
TREE (NON FRUIT)	---

WATER LINE	---
TOP	---
RAILWAY TRACK	---
MAJOR CONTOUR	---
MINOR CONTOUR	---
CUTTING AREA	---
FILLING AREA	---
ABBREVIATIONS:	
SECONDARY SURVEY STATION (GPS)	---
TP TURNING POINT	---

ABBREVIATIONS:	
AT RADIO ANTENNA	SN SIGN POST
BP BOUNDARY MARKER	ST SETTING OUT MARKER
CTM CATHODIC MARKER	TP TELEPHONE POLE
EP ELECTRICITY POLE	WT WATER STAND PIPE
FL FLARE	
KM KILOMETER MARKER	
LP LAMP POST	
LPM LAND PARCEL MARKER	
MS MAST	
NV NAVIGATION BEACON	
PM PIPELINE MARKER	
PY ELECTRICITY PYLON	
RL RUNWAY LIGHTS	
RM RAILWAY MARKERS	
SG SIGNAL	
SH SEISMIC SHOT HOLE	

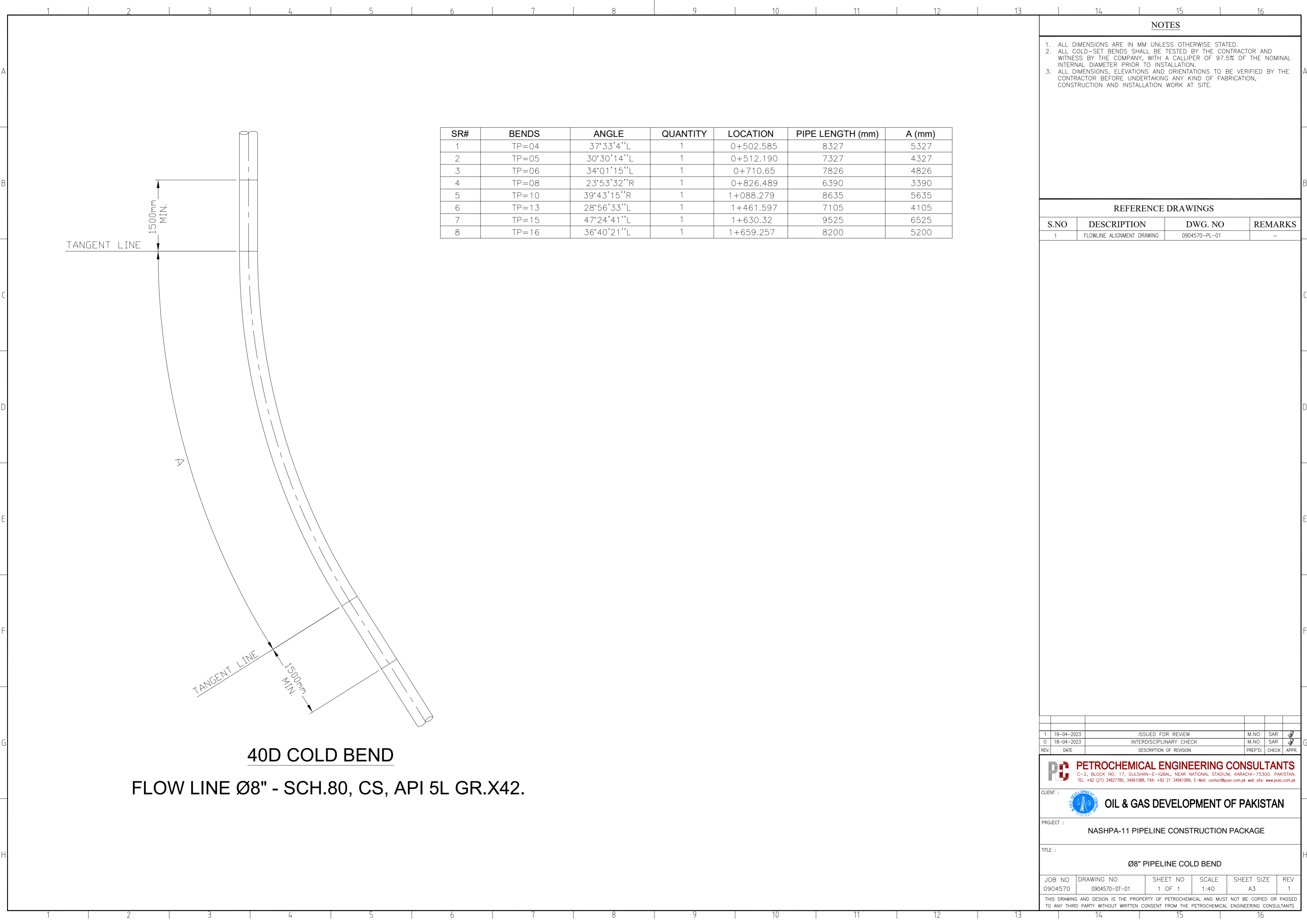


NOTES:
1. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE STATED.
2. ALL DIMENSIONS, ELEVATIONS AND ORIENTATIONS TO BE VERIFIED BY THE CONTRACTOR BEFORE UNDERTAKING ANY KIND OF FABRICATION, CONSTRUCTION AND INSTALLATION WORK AT SITE.
3. PIPELINE MARKERS SHALL BE INSTALLED AT EVERY 500m IN POPULATED AND INDUSTRIAL AREAS PIPELINE MARKERS SHALL BE INSTALLED EVERY 250m.
4. RISER COORDINATES AT WELLHEAD & AT PLANT GATHERING AREA HAVE NOT BEEN FIXED YET OWING TO THE UNDEVELOPED WELL SITE & NON OCCURRENCE OF FENCE IN THE DESIGN PHASE.

CLIENT	OIL & GAS DEVELOPMENT COMPANY LTD
PROJECT:	NASHPA 11 PIPELINE CONSTRUCTION PACKAGE
TITLE:	PIPELINE SURVEY (1+500 TO 1+882.850)
DRAWING NO.	0904570-PL-03
JOB NO.	0904570
SHEET:	01 OF 03
SHEET SIZE:	A3
HOR. SCALE:	1:1000 -VER. 1:100



DETAIL DRAWING



SR#	BENDS	ANGLE	QUANTITY	LOCATION	PIPE LENGTH (mm)	A (mm)
1	TP=04	37°33'4''L	1	0+502.585	8327	5327
2	TP=05	30°30'14''L	1	0+512.190	7327	4327
3	TP=06	34°01'15''L	1	0+710.65	7826	4826
4	TP=08	23°53'32''R	1	0+826.489	6390	3390
5	TP=10	39°43'15''R	1	1+088.279	8635	5635
6	TP=13	28°56'33''L	1	1+461.597	7105	4105
7	TP=15	47°24'41''L	1	1+630.32	9525	6525
8	TP=16	36°40'21''L	1	1+659.257	8200	5200

40D COLD BEND
FLOW LINE Ø8" - SCH.80, CS, API 5L GR.X42.

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED.
2. ALL COLD-SET BENDS SHALL BE TESTED BY THE CONTRACTOR AND WITNESS BY THE COMPANY, WITH A CALLIPER OF 97.5% OF THE NOMINAL INTERNAL DIAMETER PRIOR TO INSTALLATION.
3. ALL DIMENSIONS, ELEVATIONS AND ORIENTATIONS TO BE VERIFIED BY THE CONTRACTOR BEFORE UNDERTAKING ANY KIND OF FABRICATION, CONSTRUCTION AND INSTALLATION WORK AT SITE.

REFERENCE DRAWINGS

S.NO	DESCRIPTION	DWG. NO	REMARKS
1	FLOWLINE ALIGNMENT DRAWING	0904570-PL-01	-

REV.	DATE	DESCRIPTION OF REVISION	PREP'D:	CHECK	APPR.
1	19-04-2023	ISSUED FOR REVIEW	M.NO	SAR	<input checked="" type="checkbox"/>
0	18-04-2023	INTERDISCIPLINARY CHECK	M.NO	SAR	<input checked="" type="checkbox"/>

PC PETROCHEMICAL ENGINEERING CONSULTANTS
 C-2, BLOCK NO. 17, GULSHAN-E-IOBAL, NEAR NATIONAL STADIUM, KARACHI-75300, PAKISTAN.
 TEL: +92 (21) 34827780, 34961088, FAX: +92 21 34961089, E-Mail: contact@pcec.com.pk web site: www.pcec.com.pk

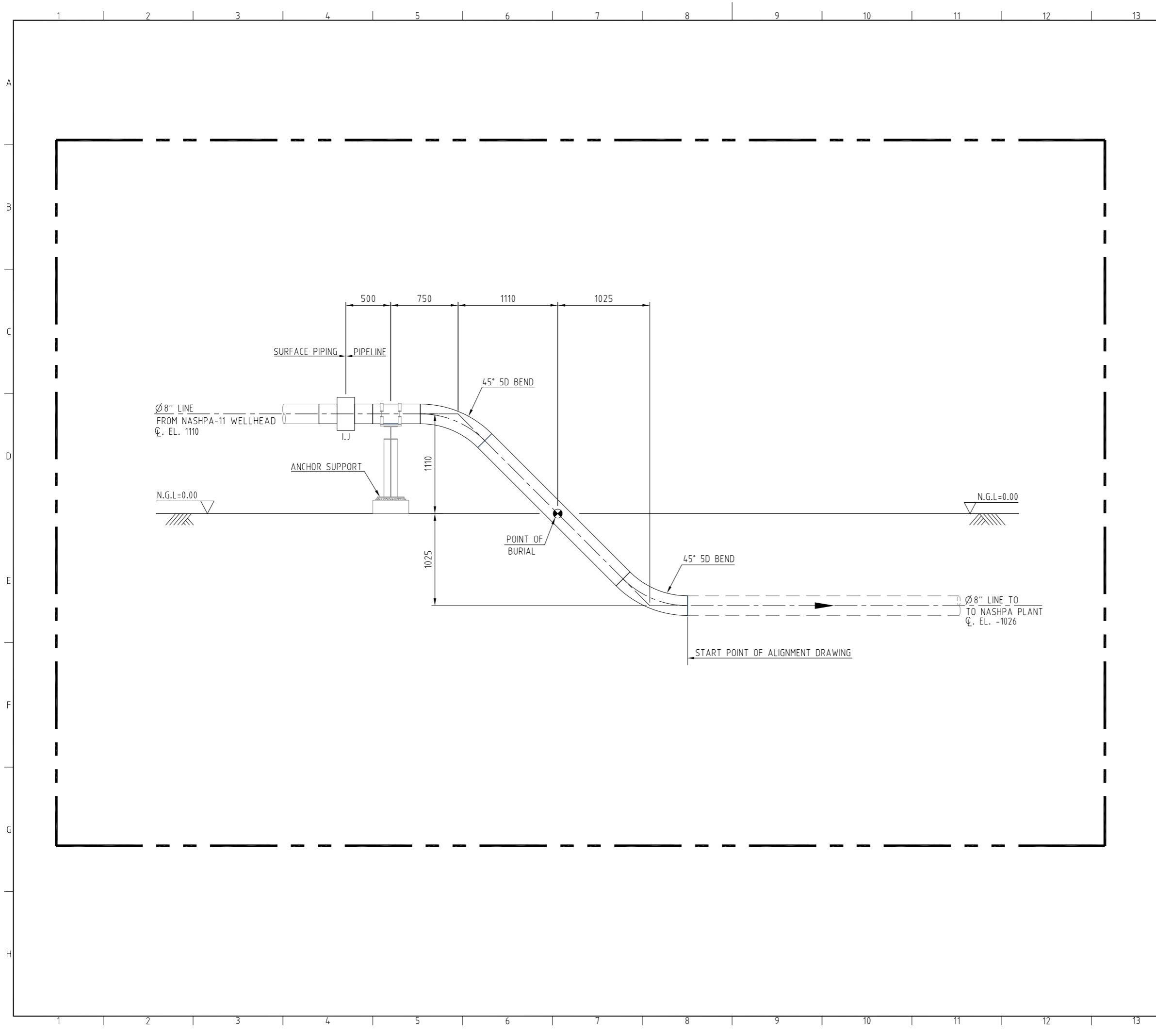
CLIENT :  **OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

TITLE : **Ø8" PIPELINE COLD BEND**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-01	1 OF 1	1:40	A3	1

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NOTES

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2. ALL DIMENSIONS, ELEVATIONS AND ORIENTATIONS TO BE VERIFIED BY THE CONTRACTOR BEFORE UNDERTAKING ANY KIND OF FABRICATION, CONSTRUCTION AND INSTALLATION WORK AT SITE.
3. TWO NOS. 45°, 5D COLD BEND ARE USED AT EACH RISER.

REFERENCE DRAWINGS

S.NO	DESCRIPTION	DWG. NO	REMARKS
1	FLOWLINE ALIGNMENT DRAWING	0904570-PL-01	-

REV.	DATE	DESCRIPTION OF REVISION	PREP'D	CHECK	APPR.
1	19-04-2023	ISSUED FOR REVIEW	M.NO	SAR	
0	18-04-2023	INTERDISCIPLINARY CHECK	M.NO	SAR	

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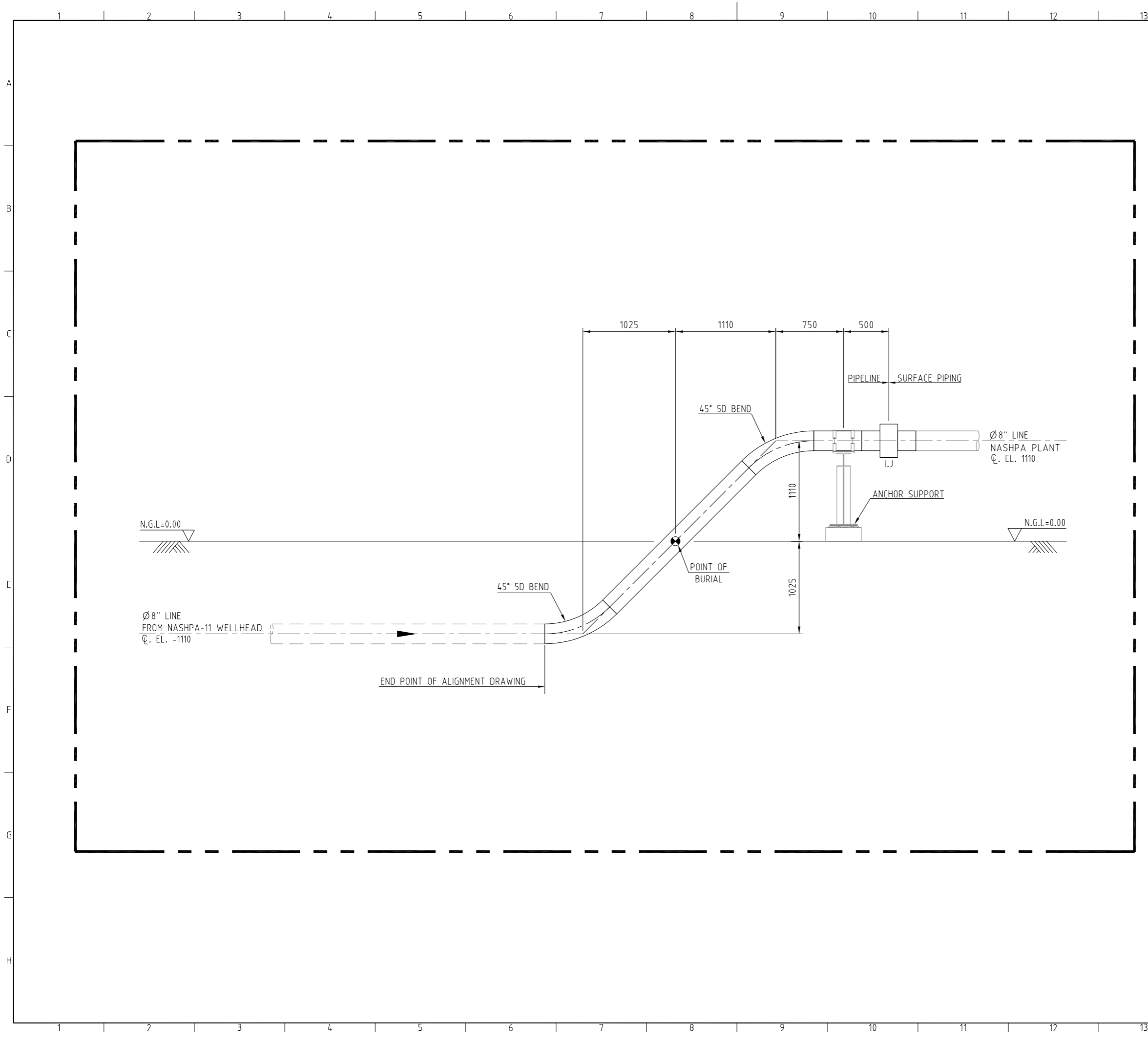
CLIENT : **OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

TITLE : **Ø8" FLOWLINE RISER AT NASHPA-11 WELLHEAD**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-02	1 OF 1	1:40	A3	1

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NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED.
2. ALL DIMENSIONS, ELEVATIONS AND ORIENTATIONS TO BE VERIFIED BY THE CONTRACTOR BEFORE UNDERTAKING ANY KIND OF FABRICATION, CONSTRUCTION AND INSTALLATION WORK AT SITE.
3. TWO NOS. 45° 5D BEND ARE USED AT EACH RISER.

REFERENCE DRAWINGS

S.NO	DESCRIPTION	DWG. NO	REMARKS
1	FLOWLINE ALIGNMENT DRAWING	0904570-PL-03	-

REV.	DATE	DESCRIPTION OF REVISION	M.NO	SAR	APPR.
1	19-04-2023	ISSUED FOR REVIEW			
0	18-04-2023	INTERDISCIPLINARY CHECK			

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 TEL: +92 (21) 34827780, 34961088, FAX: +92 21 34961089, E-Mail: contact@pcec.com.pk web site: www.pcec.com.pk

CLIENT : **OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

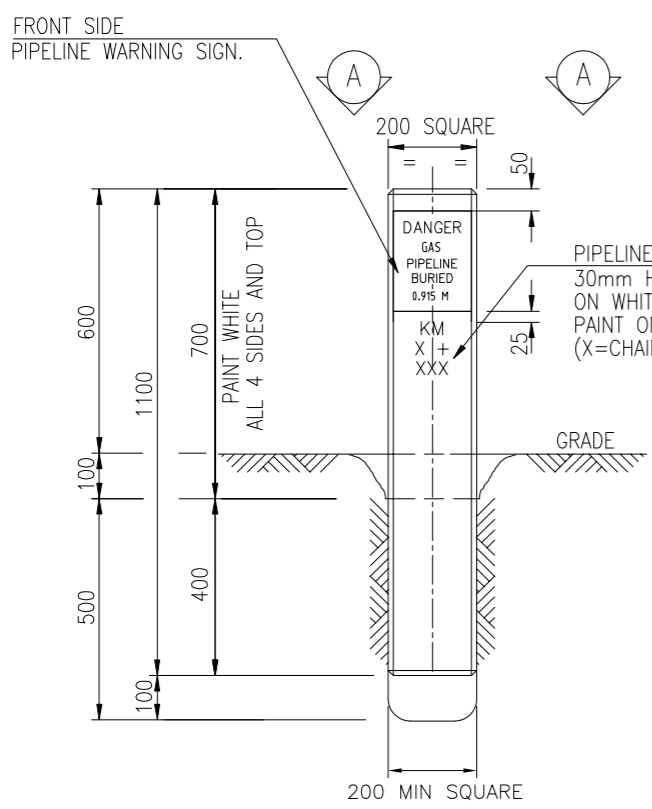
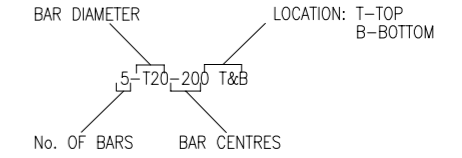
TITLE : **Ø8" FLOWLINE RISER AT NASHPA PLANT**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-03	1 OF 1	1:40	A3	1

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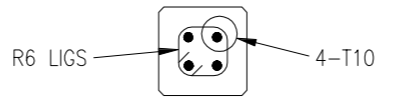
NOTES

- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS.
- ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH PROJECT SPECIFICATION.
- ALL CONCRETE SHALL BE GRADE C35 MINIMUM.
- MINIMUM REINFORCEMENT COVER FOR CONCRETE IS 45mm.
- PIPELINE MARKERS SHALL BE INSTALLED IN LOCATIONS AS DETERMINED BY THE CONTRACTOR.
- EXACT LOCATION OF PIPELINE MARKERS SHALL BE DETERMINED ON SITE.
- PIPELINE MARKERS SHALL BE INSTALLED AT EVERY 500.0m. IN POPULATED AND INDUSTRIAL AREAS, PIPELINE MARKERS SHALL BE INSTALLED EVERY 250.0m.
- CONCRETE PIPELINE MARKERS SHALL BE INSTALLED DIRECTLY ABOVE THE PIPELINE AT ALL TRACK, WATERCOURSE AND SERVICE CROSSINGS.
- AT ALL LOCATIONS OTHER THAN IN NOTE- 8, PIPELINE MARKERS SHALL BE PLACED 500mm TO THE LEFT OF THE PIPELINE WHEN LOOKING IN THE DIRECTION OF THE FLOW.
- LETTERING INTERCHARACTER SPACING SHALL BE 0.75 TO 1.0 X LETTER HEIGHT UNLESS NOTED OTHERWISE.
- PAINT TYPE TO BE APPROVED BY COMPANY PRIOR TO USE. PAINT SHALL BE UV RESISTANT AND SUITABLE FOR UNPROTECTED OUTDOOR LOCATIONS.
- PIPELINE MARKERS SHALL BE INSTALLED AT INTERVAL OF 500M, UPSTREAM AND DOWNSTREAM OF EACH CROSSING AND AT TURNING POINT.
- POST WEIGHT (EXCL FOOTING) APPROX 110kg EACH.
- REINFORCEMENT NOTATION.

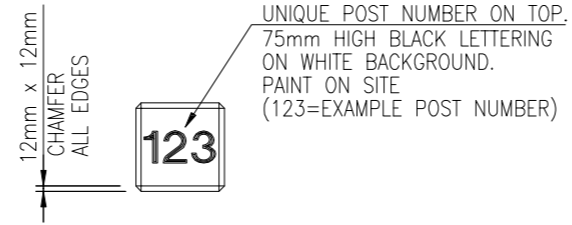


ELEVATION - FRONT SIDE
MARKER POST
 LOOKING IN DIRECTION OF PIPELINE FLOW

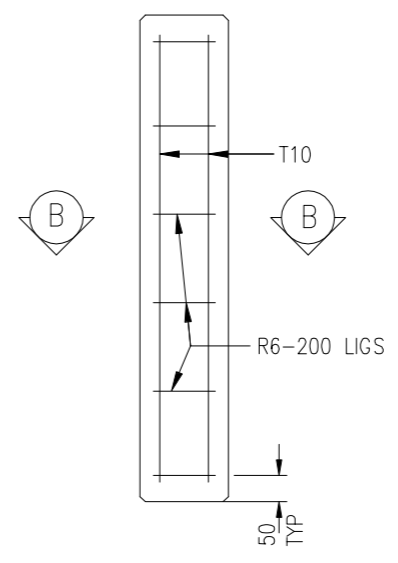
PIPELINE CHAINAGE IN METRES.
 30mm HIGH BLACK LETTERING
 ON WHITE BACKGROUND.
 PAINT ON SITE
 (X=CHAINAGE)



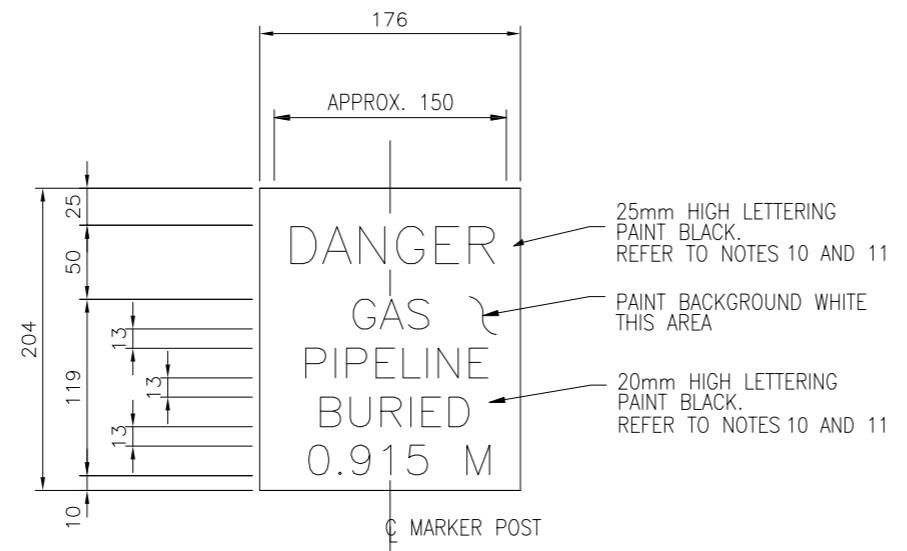
SECTION B-B



SECTION A-A



**REINFORCEMENT
 MARKER POST**



TYPICAL GAS PIPELINE SIGN

REV.	DATE	DESCRIPTION OF REVISION	PREP'D:	CHECK	APPR.
1	19-04-2023	ISSUED FOR REVIEW	M.NO	SAR	
0	18-04-2023	INTERDISCIPLINARY CHECK	M.NO	SAR	

PG PETROCHEMICAL ENGINEERING CONSULTANTS
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 TEL: +92 (21) 34827780, 34961088, FAX: +92 21 34961089, E-Mail: contact@pcec.com.pk web site: www.pcec.com.pk

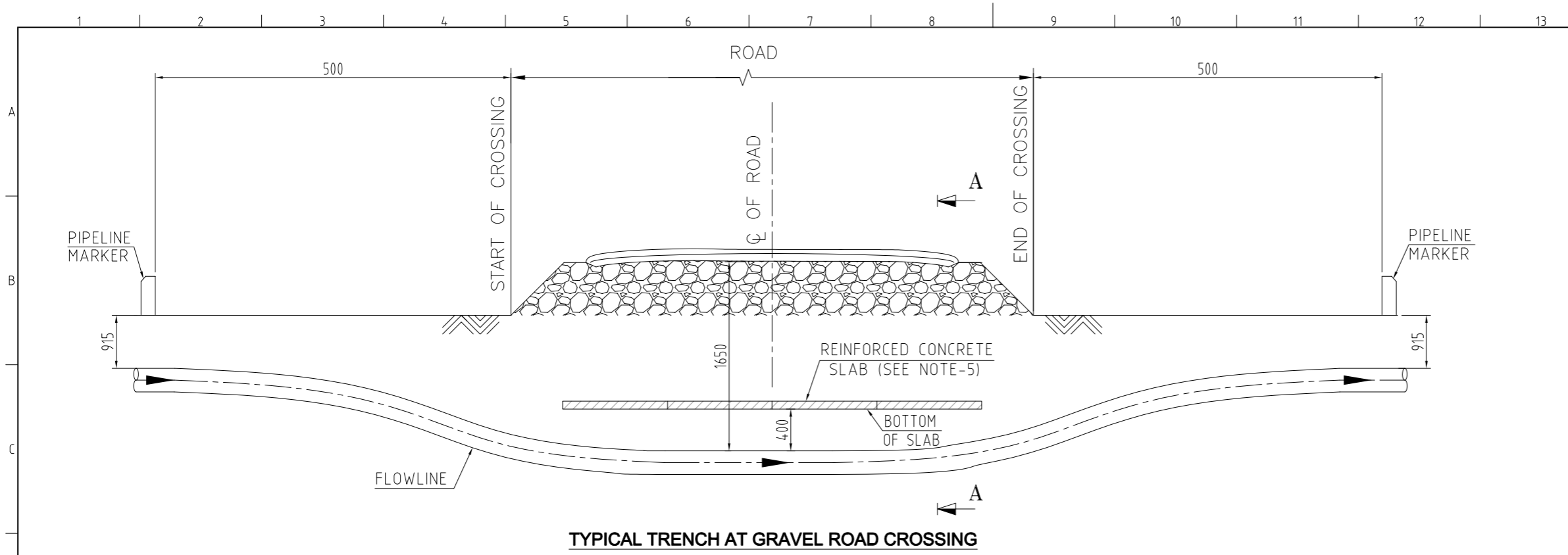
CLIENT : **OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

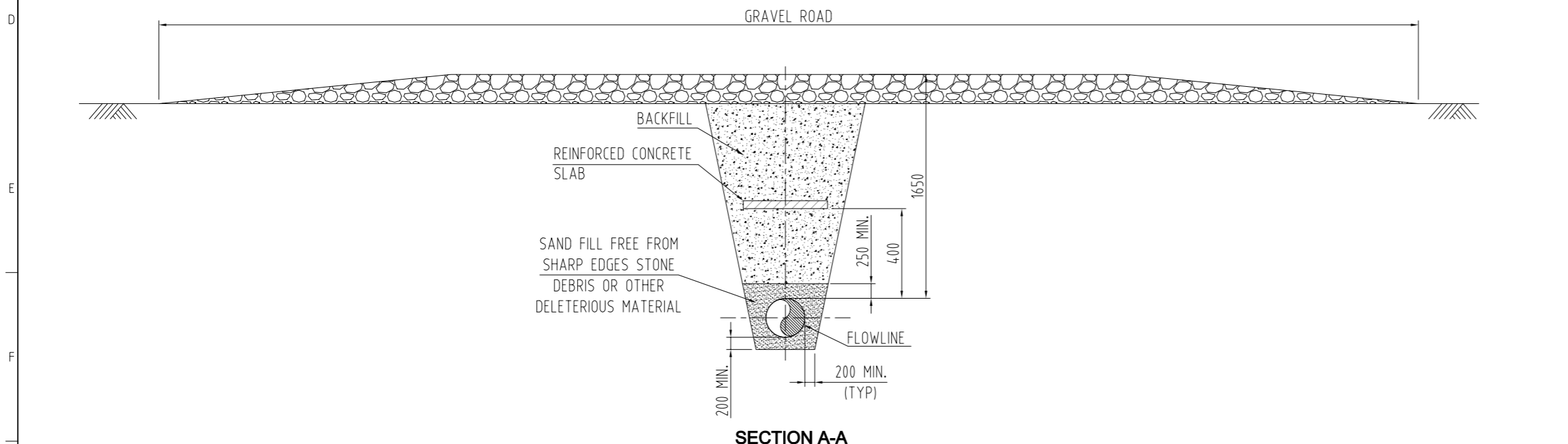
TITLE : **TYPICAL DETAIL KM POSTS & SIGNAL INSTALLATION**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-04	1 OF 1	1:40	A3	1

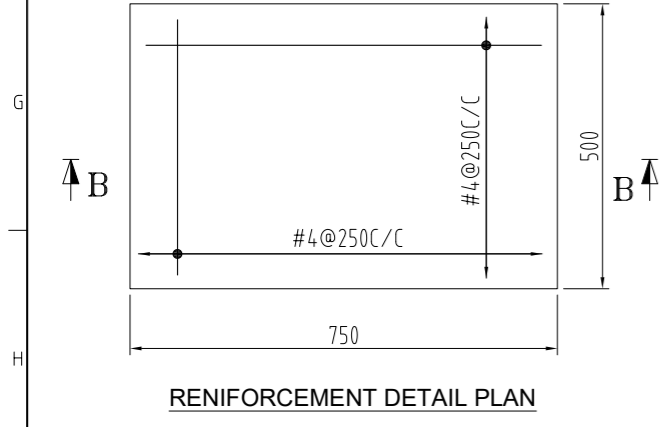
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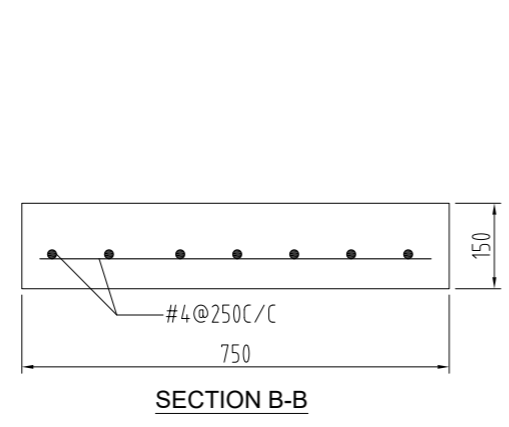
TYPICAL TRENCH AT GRAVEL ROAD CROSSING



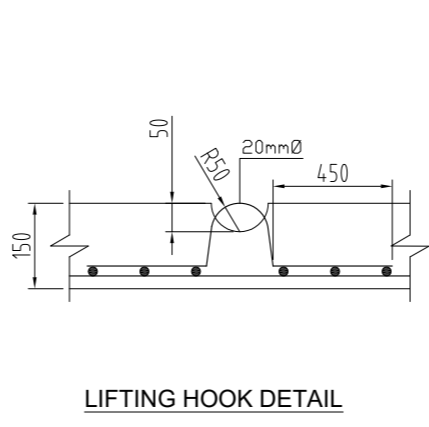
SECTION A-A



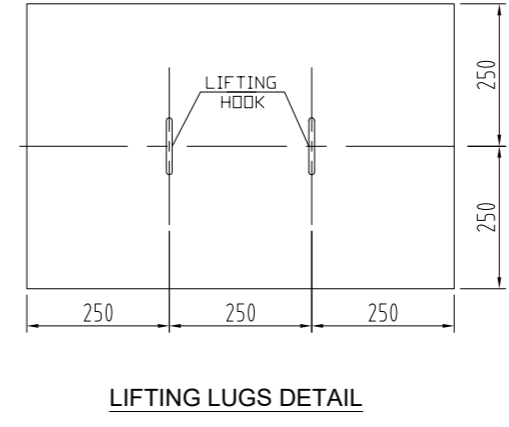
REINFORCEMENT DETAIL PLAN



SECTION B-B



LIFTING HOOK DETAIL



LIFTING LUGS DETAIL

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED.
2. ALL DIMENSIONS, ELEVATIONS AND ORIENTATIONS TO BE VERIFIED BY THE CONTRACTOR BEFORE UNDERTAKING ANY KIND OF FABRICATION, CONSTRUCTION AND INSTALLATION WORK AT SITE.
3. TRENCH SHALL BE EXCAVATED WITH SIDE SLOPES STANDING STABLE.
4. ROAD CUTTING AREA SHALL BE RESTORED.
5. QUANTITY OF SLABS MUST BE DETERMINED BY THE CONTRACTOR BASED ON THE WIDTH OF THE CROSSING.

REV.	DATE	DESCRIPTION OF REVISION	M.NO	SAR	PREP'D	CHECK	APPR.
1	19-04-2023	ISSUED FOR REVIEW					
0	18-04-2023	INTERDISCIPLINARY CHECK					

PC PETROCHEMICAL ENGINEERING CONSULTANTS
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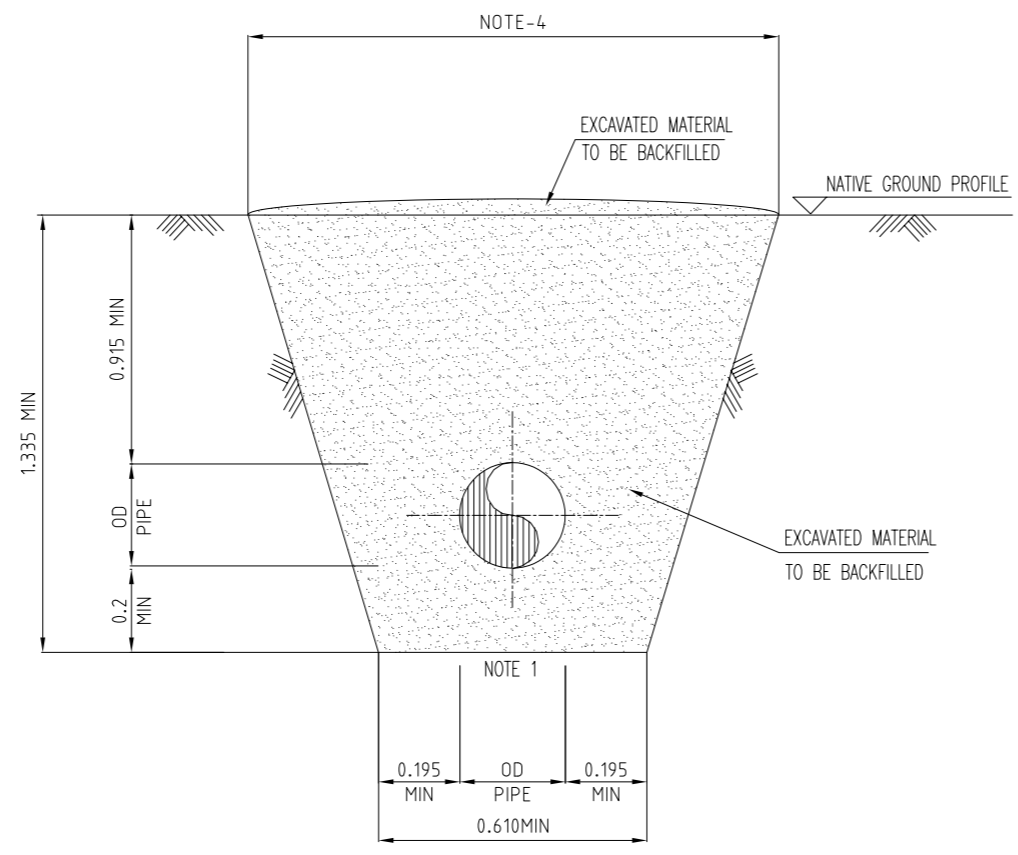
CLIENT : **OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

TITLE : **TYPICAL ROAD CROSSING DETAIL**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-05	1 OF 1	1:40	A3	1

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STANDARD DETAIL 8" PIPELINE

NOTES

1. BOTTOM OF DITCH SHALL BE UNIFORMLY GRADED & FREE FROM LOOSE ROCKS OR COBBLES/GRAVELS OR OTHER OBJECTS THAT MAY DAMAGE THE PIPE COATING & THE PIPE ITSELF.
2. THE TRENCH SLOPE VALUE IS TYPICALLY SHOWN THE ACTUAL TRENCH SLOPE VALUE WILL BW DETERMINED FROM LOCAL SITE CONDITIONS & BE ADEQUATE TO MAINTAIN TRENCH WALL STABILITY.
3. ALL DIMENSIONS ARE IN METERS.
4. ANGLE OF TRENCH MAY VARIES AS PER SOIL CONDITION..

REV.	DATE	DESCRIPTION OF REVISION	PREP'D	CHECK	APPR.
1	19-04-2023	ISSUED FOR REVIEW	M.NO	SAR	
0	18-04-2023	INTERDISCIPLINARY CHECK	M.NO	SAR	

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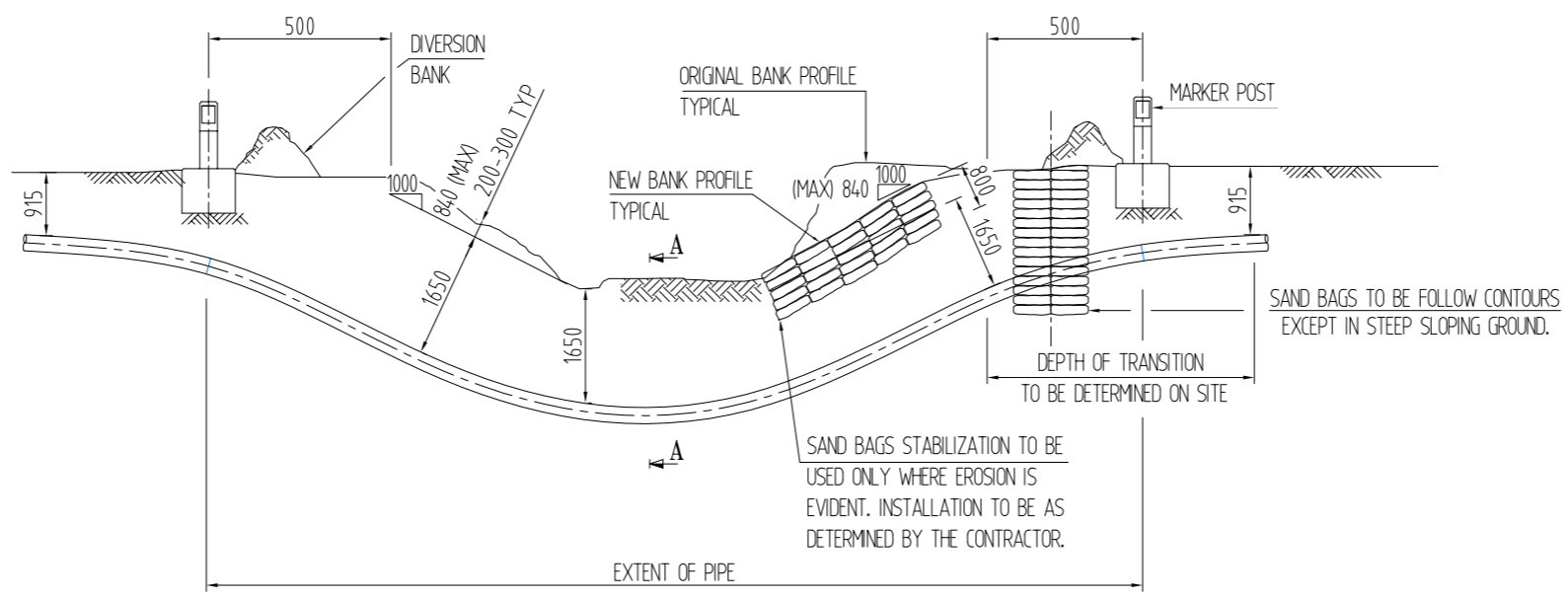
CLIENT :  **OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

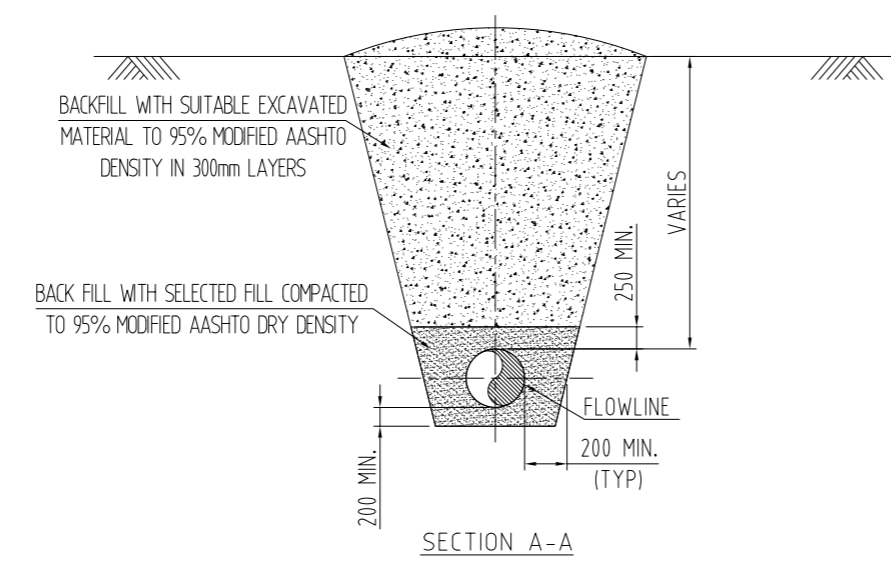
TITLE : **TYPICAL DITCH DIMENSION**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-06	1 OF 1	1:40	A3	1

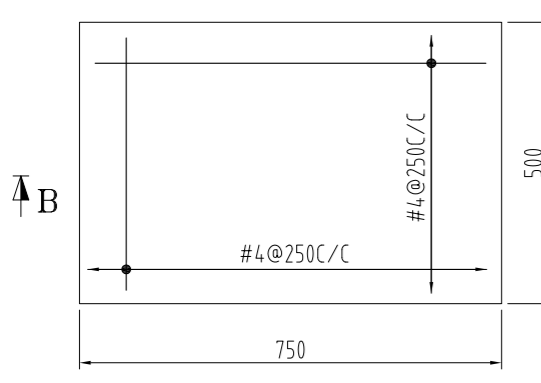
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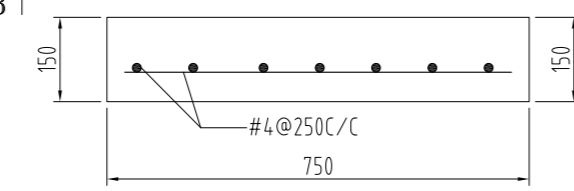
TYPICAL WATER COURSE CROSSING FOR PIPELINE
INSTALLATION VIA OPEN CUT TRENCH.



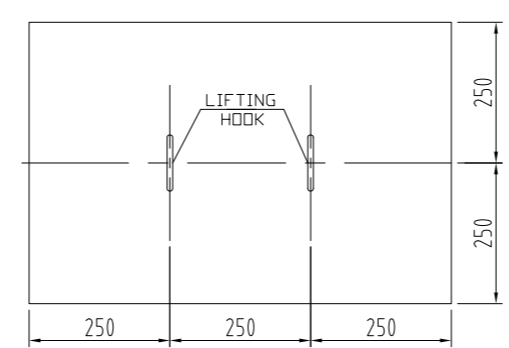
SECTION A-A



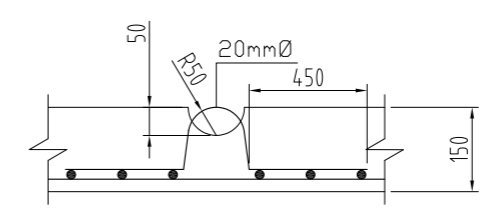
REINFORCEMENT DETAIL PLAN



SECTION B-B



LIFTING LUGS DETAIL



LIFTING HOOK DETAIL

NOTES

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2. ALL DIMENSIONS, ELEVATIONS AND ORIENTATIONS TO BE VERIFIED BY THE CONTRACTOR BEFORE UNDERTAKING ANY KIND OF FABRICATION, CONSTRUCTION AND INSTALLATION WORK AT SITE.
3. FABRICATION, INSTALLATION AND WELDING OF STEEL PIPE SHALL BE IN ACCORDANCE WITH ASME B31.8 AND API 1104.
4. ALL PIPE USED UNDER THE CROSSING SHALL BE HYDRO TESTED PRIOR TO PLACEMENT IN THE TRENCH.
5. BANKS SHALL BE RESTORED BY GRADING AND REVEGETATING ALL DISTURBED GROUND.
6. DIMENSION OF SAND BAG: 0.5 x 0.7 METER

REV.	DATE	DESCRIPTION OF REVISION	M.NO	SAR	PREP'D	CHECK	APPR.
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0	18-04-2023	INTERDISCIPLINARY CHECK					

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TEL: +92 (21) 34827780, 34961088, FAX: +92 21 34961089, E-Mail: contact@pcec.com.pk web site: www.pcec.com.pk

CLIENT : **OIL & GAS DEVELOPMENT OF PAKISTAN**

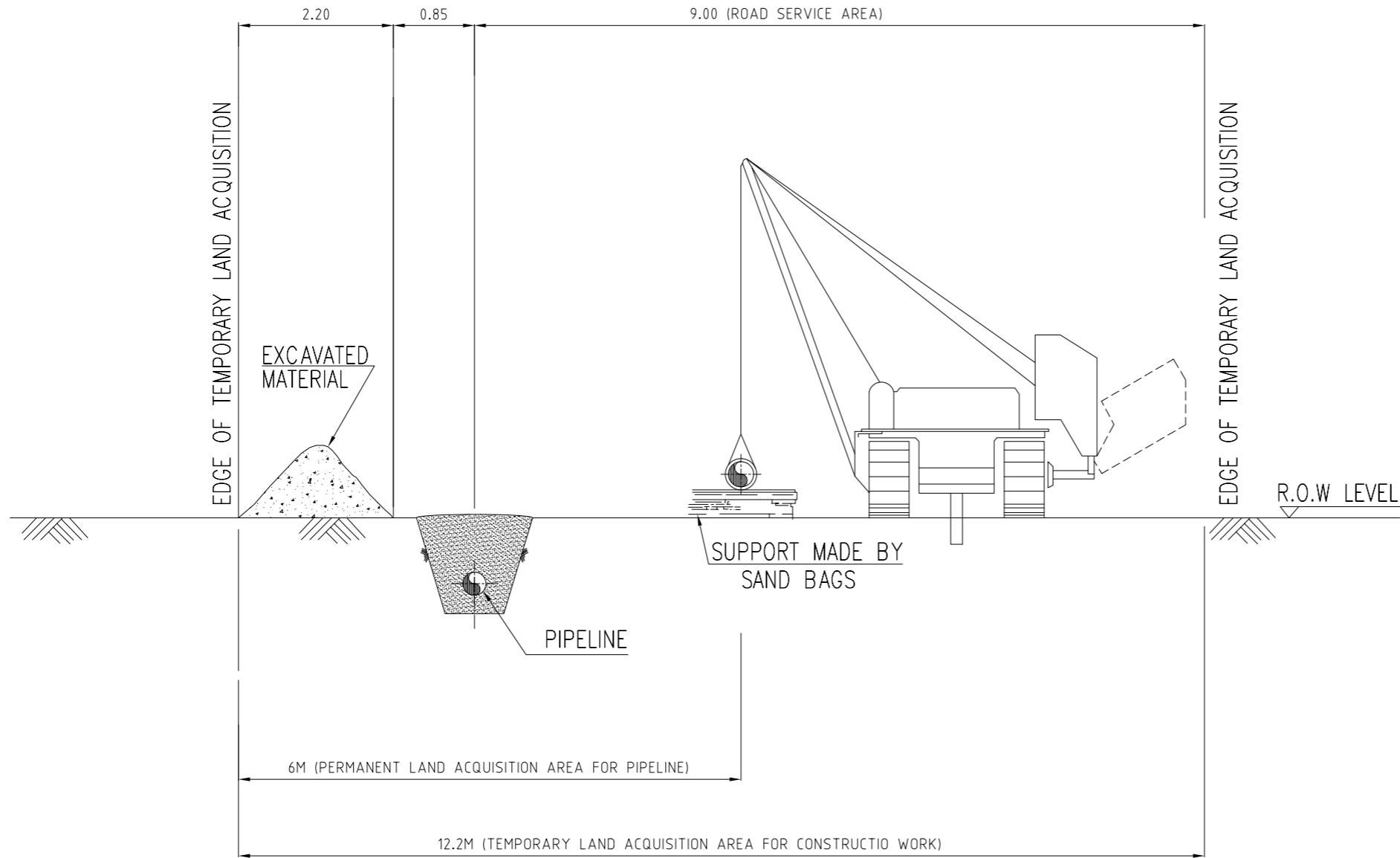
PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

TITLE : **TYPICAL WATER COURSE CROSSING DETAIL**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-07	1 OF 1	1:40	A3	1

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STANDARD R.O.W FOR 8" PIPELINE



NOTES

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE STATED.

REV.	DATE	DESCRIPTION OF REVISION	PREP'D.	CHECK	APPR.
1	19-04-2023	ISSUED FOR REVIEW	M.NO	SAR	
0	18-04-2023	INTERDISCIPLINARY CHECK	M.NO	SAR	

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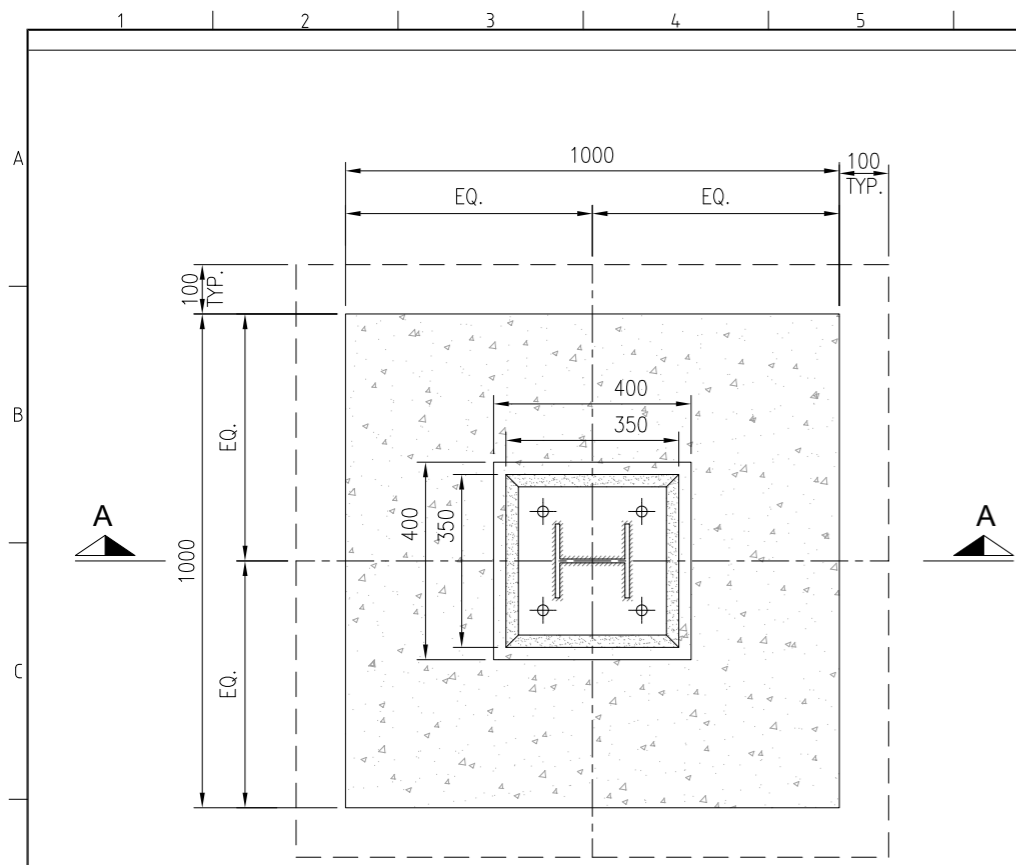
CLIENT :  **OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

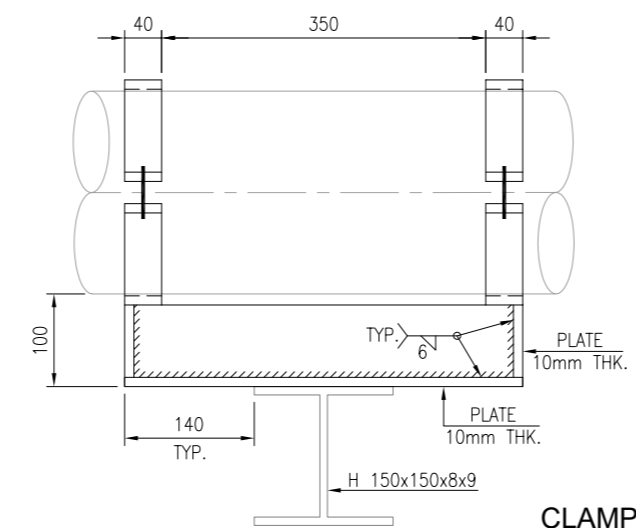
TITLE : **R.O.W DIMENSIONS FOR PIPELINE**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
0904570	0904570-DT-08	1 OF 1	1:40	A3	1

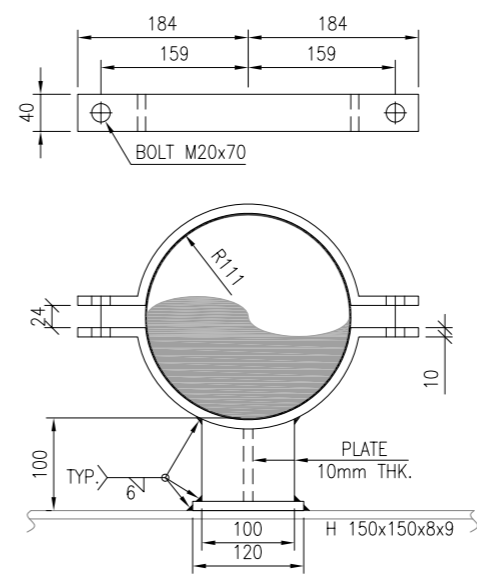
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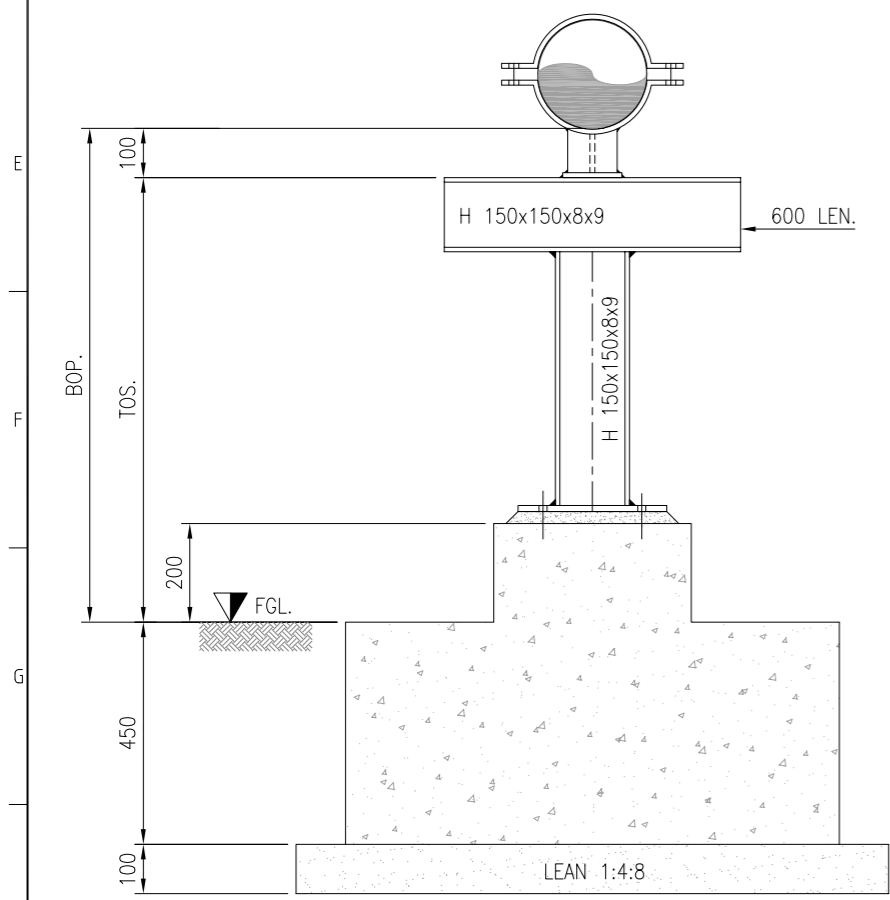
PLAN



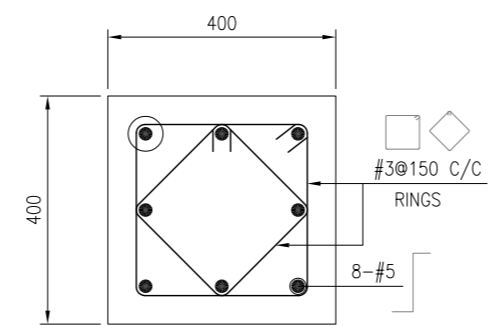
CLAMP DETAIL



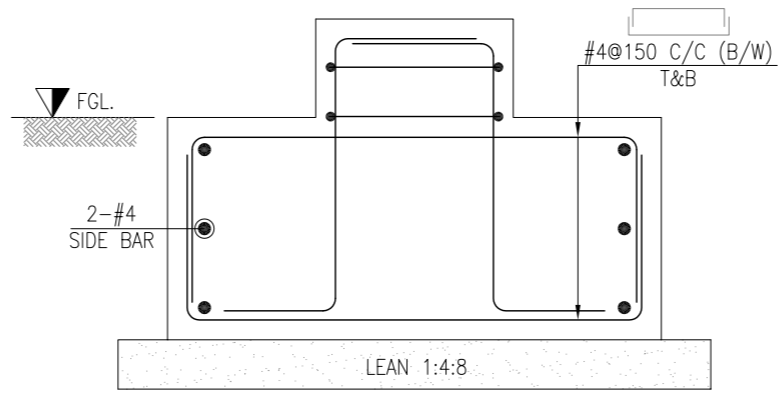
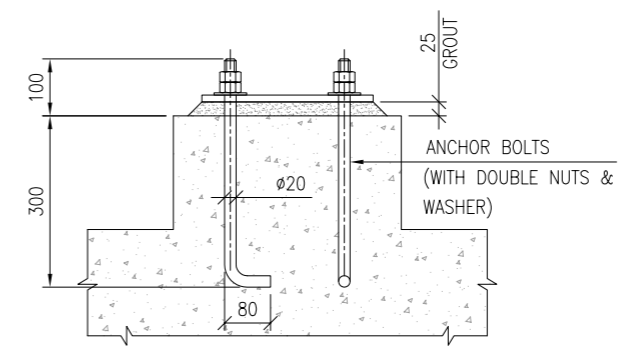
ANCHOR BOLT DETAIL



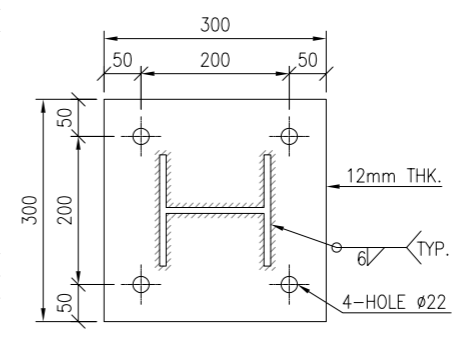
SECTION A-A



SECTION B-B



REINFORCEMENT SECTION A-A



BASE PLATE PLAN

NOTES

1. ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METER UNLESS OTHERWISE NOTED.
2. CONTRACTOR WILL VERIFY ALL THE DIMENSIONS BEFORE EXECUTION OF WORK.
3. 50mm CLEAR COVERS TO BE USED FOR REINFORCEMENT BARS
4. SULPHATE RESISTANT CEMENT SHOULD BE USED AND, REINFORCED CONCRETE SHOULD HAVE A 28 DAY CYLINDRICAL STRENGTH OF 3000 PSI.
5. BLINDING CONCRETE SHOULD BE AT LEAST 1:4:8 HAVING CYL. STRENGTH OF 1000 PSI.
6. DEFORMED BARS HAVING YIELD STRENGTH OF 60,000 PSI CONFORMING TO ASTM A-615 TO BE USED.
7. MATERIAL FOR EMBEDDED PLATE SHALL BE ASTM A-36.
8. MATERIAL FOR ANCHOR BOLTS SHALL BE ASTM-A-307 GR.B FOR CAST IN PLACE BOLTS.
9. FOR T.O.S SEE PIPELINE RISER DETAIL DRAWING.

REV.	DATE	DESCRIPTION OF REVISION	PREP'D	CHECK	APPR.
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CLIENT : **OGDCL OIL & GAS DEVELOPMENT OF PAKISTAN**

PROJECT : **NASHPA-11 PIPELINE CONSTRUCTION PACKAGE**

TITLE : **PLAN, SECTION & DETAIL FOR CLAMP SUPPORT Ø8" PIPELINE**

JOB NO	DRAWING NO	SHEET NO	SCALE	SHEET SIZE	REV
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SPECIFICATION



STANDARD SPECIFICATION FOR FIELD COATING

SPEC NUMBER : MEC-GSP-1001

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TABLE – 1: PERFORMANCE REQUIREMENTS OF HEAT SHRINKABLE SLEEVE SYSTEM FOR MAXIMUM CONTINUOUS PIPELINE OPERATING TEMPERATURE OF 175 °F

1.0 GENERAL

1.1 Scope

This Specification defines the minimum requirements for the materials and application of Heat Shrinkable Sleeves to be applied around the girth weld areas, bends on line pipe, and part of the coated pipe where coating has been damaged over 300mm or 100 sq.cm.

- 1.1.1 This specification covers the requirements for a wraparound heat shrinkable corrosion protection sleeve system for pipeline weld joints, bare steel field bends, and part of the coated pipe where coating has been damaged over 300mm or 100 sq.cm and defines the material characteristics, functional properties, qualification tests and quality control programs to be achieved by the product. At weld joints, sleeves are to be applied on pipes pre-coated with 3-Layer Polyethylene Coating.

The heat shrink sleeve system shall consist of a first layer of solvent free 100% solids epoxy primer, a second layer of copolymer adhesive, and a third layer of extruded radiation crosslinked heat shrinkable polyethylene for operating temperatures up to 175 °F and shall conform to special type coating 'S' as per DIN 30670.

- 1.1.2 The type and grade of heat shrinkable sleeve shall be suitable for use up to an operating temperature of 175 °F in wet conditions (as verified by hot water immersion testing) and shall be fully compatible with the factory applied pipeline coatings of 3-Layer Polyethylene Coating type 'S' as per DIN 30670

- 1.1.3 This specification also defines the pre-production qualification tests to be carried out on the field joint coating materials.

1.2 Definitions

For this specification the following definitions shall apply:

OWNER : "COMPANY" or "OWNER" means the person or persons, firm or Proprietor, who has hired PEC for delivering engineering services.

CONSULTANT: Petrochemical Engineering Consultants.

CONTRACTOR: Party which carries out all or part of the detailed engineering, procurement, construction, commissioning or management of the PROJECT.

SUB CONTRACTOR / : The Contractor / Supplier engaged by Contractor

VENDOR

1.3 Errors or Omissions

- 1.3.1 The review and comment by the Owner of any contractor's or its manufacturer's drawings, procedures or documents shall only indicate acceptance of general requirements and shall not relieve the Contractor of its obligations to comply with the requirements of this specification and other related parts of the contract documents.
- 1.3.2 Any errors or omissions noted by the Contractor in this Specification shall be immediately brought to the attention of the Owner.

1.4 Deviations

All deviations to this Specification, other specifications or attachments shall be brought to the knowledge of the owner in the bid. All deviations made during the procurement, design, manufacturing, testing and inspection shall be with written approval of the owner prior to execution of the work. Such deviations shall be shown in the documentation prepared by the contractor.

1.5 Conflicting Requirements

In the event of conflict, inconsistency or ambiguity between the contract scope of work, this Specification, National Codes & Standards referenced in this Specification or any other documents, the Contractor shall refer to the Owner whose decision shall prevail.

1.6 Reporting Procedure

- 1.6.1 A reporting and documentation system shall be agreed between the owner and the contractor for the status of procurement, design, manufacturing, inspection, testing and shipment of the equipment/material to be supplied under this specification. Contractor's manufacturer shall provide reports and summaries for production performance and testing operations in conformance with a manufacturing schedule approved by Owner.
- 1.6.2 Daily, weekly monthly and run summaries of all major aspects of the production process shall be provided as reports to the Owner.

1.7 Quality System

- 1.7.1 Contractor shall maintain an effective program for quality assurance and quality control, planned and developed in conjunction with all manufacturing, storage and application functions necessary to meet the requirements of the Contract.

The requirements shall be met by the establishment and implementation of procedures and a Quality Plan, which shall ensure that acceptable services are presented to the Owner. The

Quality Plan shall demonstrate both recognition of the quality requirements of the Contract and an organized approach to satisfy these requirements.

The Quality Plan shall ensure that quality requirements are determined prior to commencement of the work and subsequently satisfied throughout all phases of application.

- 1.7.2 Contractor's/Manufacturer's quality systems and quality control procedures shall be in accordance with ISO 9000/9001/9002 as appropriate.

1.8 Design Requirements

- 1.8.1 The design requirements for the 3-Layer PE Coating of Line Pipe (Fusion Bonded Epoxy, Intermediate adhesive layer and outer PE coating).
- 1.8.2 The properties and testing of the material shall conform fully in the details contained within the above referenced specification.

2.0 CODES, STANDARDS & SPECIFICATIONS

The latest editions of the following specifications, National or Industry Codes and Standards shall, to the extent specified herein, form a part of this Specification.

The materials, application, inspection and testing, where relevant, shall meet the requirements of the latest editions of these codes and Standards:

ASME B31.8	Gas Transmission and Distribution Piping System
ASME B31.4	Pipeline Transportation Systems for Liquids and Slurries
API 5L	Specification for Line Pipe
SSPC-SP 10	Near White Metal Blasting
SSPC-AB 1	Specification for Mineral and Slag Abrasives
NACE RP0287-95	Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape
NACE MR0175	Petroleum and natural gas industries — Materials for use in H ₂ S-containing environments in oil and gas production
SIS-05-5900	Pictorial Surface Preparation Standards for Painting Steel Surfaces
ASTM D-638	Standard Method of Test for Tensile Properties of Plastic
ASTM D 1002	Standard Methods of Test for Strength Properties of Adhesive in Shear by Tension Loading (Metal-to-Metal)
ASTM D2671	Standard Methods of Testing Heat-Shrinkable Tubing for Electrical Use.
ASTM D4541	Method for Pull-off strength of coatings using portable adhesion tester
ASTM D1002	Test Method for strength properties of Adhesive in Shear by Tension loading (Metal to Metal)
ASTM D2249	Test Method for Rubber Property (Durometer-hardness)
ASTM D149	Dielectric Breakdown Test.
ASTM G-10	Standard Test Method for Bend ability of Pipeline Coatings.

ASTM G-14	Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test).
ASTM G-17	Standard Test Method for Penetration Resistance of Pipeline Coating (falling Weight Test).
ASTM G-42	Standard Methods for Cathodic Disbonding of Pipelines Coatings Subjected to Elevated or Cyclic Temperatures.
ASTM D870	Test Method for Hot Water Immersion.
TP-206	Soil Stress Creep Resistance
DIN 30670	Polyethylene Coating for Steel Pipes & Fittings.
ISO 9000/9001/9002	Quality Systems.

3.0 CONTRACTOR'S RESPONSIBILITIES

3.1 The Contractor's responsibilities shall include, but not be limited to:

- 3.1.1 Procuring all consumables including the Owner approved material for field coating of girth weld areas on the coated line pipe.
- 3.1.2 Inspecting materials to ensure all specification requirements have been met.
- 3.1.3 Making good any defects or damage prior to final acceptance by the Owner.
- 3.1.4 At all times actively guarding against injury to personnel. All Work shall be performed in strict compliance with all applicable safety regulations and codes.

4.0 PROCEDURE QUALIFICATION REQUIREMENTS

4.1 Preliminary Information

- 4.1.1 As part of the bid submission, Contractor shall also include performance data for all proposed materials to which this Specification relates.

4.2 Procedure Details

- 4.2.1 Prior to commencement of field joint coating, Contractor shall submit to the Owner a detailed procedure for qualification and approval.

This shall include, but not be limited to the following:

- Complete details of the coating materials including quality control and Manufacturer's data, certification and safety sheets. Also details of materials for repair of damaged materials.
- Inspection and testing including typical reports, instrument and equipment types, together with methods of calibration and operation.
- Repair techniques and materials to be used.
- Sample of recording and reporting formats including laboratory reports and certificates.

4.2.2 Qualification testing of the field joint corrosion coating shall include the following :

- Thickness
- Impact resistance
- Adhesion

4.2.3 Procedures, approved by the Owner, upon completion of qualification trials shall be implemented for the work.

4.2.4 Deviations from the approved procedures shall not be permitted without the written approval of the Owner.

5.0 MATERIALS

5.1 Corrosion Coating Properties

Sleeve Properties

5.1.1 The corrosion coating shall be a wrap-around heat shrinkable sleeve, black in color and shall be suitable for an operating temperature of 175 °F in wet conditions as defined for coating type 'S' as per DIN 30670.

5.1.1.1 Epoxy and Sleeve Thickness (for 175 °F)

The first layer of the Heat Shrink sleeve shall be a 100% solids isocyanate-free novalac type two component epoxy of a minimum dry-film thickness of 350 microns when applied on the steel surface. The epoxy layer shall be the main anti-corrosion barrier and shall be capable of corrosion protecting the steel surface on a standalone basis.

The heat shrink sleeve shall provide mechanical protection to the epoxy layer and shall seal onto the epoxy layer and the adjacent line coating. It shall have the following minimum thickness:

Backing:	1.35mm (after full free recovery)
Backing + Adhesive:	2.5mm as supplied
	3.0mm (after full free recovery)

5.1.1.2 Sleeve Width

The sleeves on the weld joint shall be wide enough so as to overlap onto the mainline coating by a minimum of 50mm on each side of the weld joint once installed.

The sleeves on field bends may be wider and shall overlap onto each other by a minimum of 50mm.

5.1.1.3 Performance Requirements

The epoxy and sleeves when installed, shall, as a minimum meet the requirements of as defined for coating type 'S' as per DIN 30670. Bidder shall submit with his bid, detailed characteristics of the Heat Shrink sleeves and epoxy to be supplied.

- 5.1.2 Contractor shall ensure that all material proposed for field joint coating have been tested and have met the requirements as agreed with Owner for physical, chemical and electrical properties.
- 5.1.3 Contractor shall ensure that test certificates are provided for all accepted materials, detailing the information as required in this Specification.
- 5.1.4 The self-adhesive layer of the coating adopted shall be homogeneous, free from flaws, defects, pinholes, bubbles, cracks and inclusions.
- 5.1.5 The corrosion coat shall be resistant to bacterial attack and shall not deteriorate during the design life of the pipeline.

5.2 Identification & storage of Coating Materials

- 5.2.1. Contractor shall ensure that all materials are supplied in sealed, damage-free, clearly marked containers or pallets giving the following information:
- Contractor's/Manufacturer's name
 - The grade/type of products contained.
 - The batch number of the products

- The date and place of manufacture of the products
- Safety instructions
- Expiry date for use.

Contractor shall include any other pertinent data that is considered necessary.

5.2.2 The coating materials shall be handled and stored in accordance with Manufacturer's instructions or as directed by an authorized representative of the coating Contractor.

6.0 COATING APPLICATION

Installation of shrinkable sleeves must be done according to regulations and usual safety precautions.

6.1 Joint Coating Applicator Qualification:

Contractor/Owner shall prequalify each member of the joint coating application crew. Each member of the application crew shall apply coating to a minimum of three joints in the presence of the Owner who will certify the applicator as acceptable for carrying out the coating application. Any joint coating or mainline coating repair applied by a team or team member that has not been qualified shall be completely removed and re-applied by a qualified team

The coating application sequence should be as follows:

- The exposed steel area and adjacent pipe coating shall be cleaned of all dust dirt, moisture, salts, grease or other contaminants, if necessary using a non-contaminant solvent, Xylene or equal.
- Weld area shall be thoroughly abraded with a sand or grit blaster to a near white metal finish, SIS SA 2½ to yield an anchor pattern of 50-100 microns. Blasting material shall be approved by Owner prior to its use at site. No blasting shall be carried out if Relative Humidity is above 80% or if the temperature of line is less than 3 °C above dew point. The line coating adjacent to the weld area shall also be sweep blasted and should be beveled to less than a 30° angle. The exposed steel and coated areas should be wiped clean of all foreign materials. Any sand /grit used shall be washed free of any salt contaminants and shall be sieved to give the required anchor pattern. Industrial grade garnet may also be used as an alternative to sand, to ensure a contamination free steel surface. Sand blasting material shall be approved by the Owner prior to its use at site

- Immediately after blasting and as soon as possible (within max. ½ hour of blasting), joint area shall be pre-heated to the Manufacturer’s recommended minimum temperature. A pyrometer shall be used to ensure that correct temperature is reached on steel and the line coating. As a minimum, Pre-heating of the steel surface 5 deg.F above dew point is required.
- The two component epoxy shall be mixed together thoroughly in the ratio recommended by the Manufacturer and brush, pad, roller or airless spray applied to the bare steel surface to yield a Dry Film Thickness of minimum 350 microns. Runs, sags, or other application defects shall be removed and coating reapplied.
- The heat shrink sleeve shall be wrapped loosely around the pipe, centering it over the epoxied weld area and evenly overlapping the adjacent pipe coating by 50 mm or more.
- Using a torch approved by the Owner, the flame length shall be adjusted to approximately 20" (500 mm) to produce a yellow flame at the end. Using the yellow portion of the flame, the closure shall be heated evenly until the pattern of the fabric reinforcement is visible. The closure shall then be put down with gloved hand and any wrinkles shall be smoothed by gently working them outward from the center of the closure.
- A small hand roller shall be run over the closure to push out any trapped air.
- Using torch approved by the Owner, heating shall start at the center of the sleeve and move circumferentially around the pipe, using a constant paintbrush motion.
- Heating shall be continued toward one end of the sleeve, followed by the other, starting at the shrunk down weld bead area and continue to the other end of the sleeve.
- During shrink-down, adhesive flow shall be occasionally checked with finger. Wrinkles should disappear automatically.
- When the sleeve has been shrunk onto the joint area and is still hot and soft, a small hand roller may be run over the sleeve to push out any trapped air. Particular attention shall be paid to the weld and cutback area. If necessary, areas may be reheated to roll out air. Sleeve shall be fully recovered when all of the following have occurred:
 - The sleeve has fully conformed to the pipe and adjacent coating.

- There are no cold spots or dimples on the sleeve surface.
- Weld bead profile can be seen through the sleeve.
- After sleeve is cooled, adhesive flow shall be evident on both edges.

The Contractor shall demonstrate at site, the recovered thickness of the sleeves using an ultrasonic thickness gauge.

7.0 INSPECTION, TESTING, AND REPAIR PROCEDURE

7.1 General

7.1.1 Owner shall have the right to inspect at all times, any tools, instruments, materials or equipment used or to be used in the manufacturing/application process.

7.1.2 Owner shall have the right to condemn any or all tools, instruments, materials, equipment or work that does not conform to this Specification.

7.1.3 Any condemned material not conforming to this Specification shall be rectified by the Contractor at no expense to the Owner. Any condemned tools, instruments, materials or equipment shall be replaced or rectified.

7.2 Test and Inspection Requirements

Factory Inspection and Testing:

This shall be in accordance with the applicable standards and shall include the following as a minimum:

- Peel Strength to steel at 75 deg.F and 140 deg.F
- Lap Shear Strength at 140 deg.F
- Impact Resistance at 75 deg.F
- Hardness Shore D at 75 deg.F

7.2.1 Field Installation Inspection and Testing Procedure:

Owner inspectors at site shall spot check the application procedure without any limitation. Any non-compliance with the agreed procedure shall constitute reason for rejection of heat shrink sleeves and their replacement by Contractor at no cost to Owner.

Once installed the Heat Shrink Sleeve shall be subjected to the following checks:

a) Small Damages Extending up to 1.0 cm²

Small damages to 3LPE or sleeve should be repaired using PE melt sticks; with epoxy primer if bare metal is visible.

b). Damages Extending up to 300 mm or 100 cm²

Polyethylene repair patches precoated with hotmelt adhesive, should be used in conjunction with a hotmelt filler adhesive and epoxy primer (if bare steel visible) as per Manufacturer's recommendations. Repair patches when installed should overlap the damaged area by minimum 50 mm all round.

c). Damages Extending Over 300mm or 100cm²

Full encirclement heat shrink sleeves with epoxy primer

8.0 DOCUMENTATION

8.1 Report Documentation

On compliance of the Work, Contractor shall deliver to Owner a comprehensive bound original document record, with completion of additional copies as specified in the Purchase Order, containing, but not limited to, the following information:

- a) Manufacturer's documentation for the field joint material, together with any technical queries and subsequent concessions.
- b) Contractor's/Manufacturer's quality assurance and quality control procedures approved by Owner.
- c) Manufacturer's batch certificates for all coating materials.
- d) Manufacturer's technical data sheets for the heat shrinkable sleeves.
- e) Pre-qualification test reports.

8.2. Final Acceptance

The final acceptance of coatings by Owner shall be dependent upon the satisfactory compliance to all specification requirements, together with completion of all documentation.

9.0 WARRANTY

The Contractor shall warrant that if the heat shrink sleeve coating is found defective or not meeting the required performance the contractor shall repair or replace the defective coating. The warrantee shall be valid for 24 months from the acceptance date of the pipeline facility.

TABLE – 1

Performance requirements of Heat Shrink Sleeve System for maximum continuous pipeline operating temperature of 175 °F

S.NO.	PERFORMANCE PARAMETER	TEST METHOD	REQUIRED RESULT
1	Lap Shear Strength of adhesive at 140°F	ASTM D-1002	25 Psi min.
2	Peel Strength- Adhesive to Steel at 75°F	ASTM D-1000	15 Psi min.
3	Toughness of backing at 75°F (2% secant modulus) 0.4 in/minute	ASTM D-882	30,000 Psi min.
4	Impact Resistance of installed sleeve at 75°F	ASTM G-14	50 in-lb min.
5	Hardness of backing, Shore D at 75°F	ASTM D-2240	50 min.
6	Soil Stress Creep Resistance of installed sleeve at 140°F	TP-206	0.10 inch max. after 24 hours
7	Cathodic Disbondment at 140°F	ASTM G-42	15 mm radius max. after 30 days
8	Hot Water Immersion at 140°F	ASTM D-870	After 120 days, no blisters or delamination. No water under sleeves.
9	Moisture Vapor Transmission at 100°F, 90% RH	ASTM E-398	0.10 gm/24 hr/100 sq. in. max.
10	Dielectric Breakdown at 75°F	ASTM D-149	30 Kv, min.
11	Adhesive Ring and Ball Softening Point	ASTM E-28	190°F min.
12	Holiday Detection of Installed sleeve		Pass at 15 kV
13	Tensile Strength of Backing	ASTM D-638	2200 Psi min.
14	Elongation of Backing to Break	ASTM D-638	400% min.
15	Penetration Resistance of installed sleeve at 140°F	ASTM G-17	No Holiday with 10,000 volt detector
16	Low Temperature Flexibility of sleeve (1" mandrel)	ASTM D-2671C	-25°C
17	Volume Resistivity of Backing	ASTM D-257	1.0×10^{14} ohm-cm min
18	Water Absorption of Cured epoxy at 75°F	ASTM D-570	0.15 % max
19	Pull of adhesion strength of cured epoxy - at 75°F - after 24 hours 200°F water immersion	ASTM D-4541 CSA-Z245-20-M92	2,000 Psi min. Rating 3 min.
20	Cathodic Disbondment of Cured epoxy on pipe at 200°F after 28 days	ASTM G-42	15mm max.



STANDARD SPECIFICATION FOR PIPELINE COATING

SPEC NUMBER : MEC-GSP-1002

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1.0 INTRODUCTION

1.1 SCOPE

This Specification defines the minimum requirements for the factory application of three-layer fusion bonded epoxy (FBE)-polyethylene and three-layer fusion bonded epoxy (FBE) polypropylene coatings to pipes of various nominal outside diameters.

The pipe may have been previously internally coated. 'Internal coating' refers to thin film epoxy coatings applied at 50 to 100 micron (2 to 4 mil) thickness mainly to the internals of gas pipelines to assist internal flow characteristics and improve the efficiency of pipeline commissioning.

This Specification also defines the tests for both pre-qualification and production that are to be carried out on the two types of three-layer coating systems.

1.2 DEFINITIONS

Following definitions apply throughout this document

For this specification the following definitions shall apply:

OWNER : "COMPANY" or "OWNER" means the person or persons, firm or Proprietor, who has hired PEC for delivering engineering services.

CONSULTANT: Petrochemical Engineering Consultants.

CONTRACTOR: Party which carries out all or part of the detailed engineering, procurement, construction, commissioning or management of the PROJECT.

SUB CONTRACTOR /: The Contractor / Supplier engaged by Contractor

VENDOR

1.3 ERROR AND OMISSIONS

Review and comment by the COMPANY of any CONTRACTOR / SUPPLIER drawings, procedures or documents shall only indicate acceptance of general requirements and shall not relieve the CONTRACTOR / SUPPLIER of its obligations to comply with the requirements of this specification and other related parts of the Contract Documents. Any errors or omissions noted by the CONTRACTOR / SUPPLIER in this Specification shall be immediately brought to the attention of COMPANY.

1.4 DEVIATIONS

All deviations to this Specification, other related specifications or attachments shall be brought to the knowledge of the COMPANY in the bid. All deviations made during the procurement, design, manufacturing, testing and inspection of the Works shall be with written approval of the COMPANY prior to execution of work. Such deviations shall be shown in the documentation prepared by the COMPANY.

1.5 REPORTING PROCEDURE

A reporting and documentation system shall be agreed between the COMPANY and the CONTRACTOR / SUPPLIER for the status of procurement, design, manufacturing, inspection, testing and shipment of the equipment/material to be supplied under this specification. CONTRACTOR/SUPPLIER's manufacturer shall provide reports and summaries for production performance and testing operations in conformance with a manufacturing schedule approved by COMPANY.

Weekly, monthly and run summaries of all major aspects of the production process shall be provided as reports to the COMPANY.

1.6 UNIT RESPONSIBILITY

The CONTRACTOR / SUPPLIER shall be responsible for the complete design, manufacture supply, fabrication, installation/erection, inspection and testing of the equipment/ material, including full compliance with all applicable design codes, and standards, including those listed in Section 4.0 of this document and with the requirements of the independent certifying authority, where applicable.

2.0 SITE ENVIRONMENTAL CONDITION

Below are the site environmental conditions

DESCRIPTION	DATA	UNIT
Average ambient temperature (min.)	40	°F
Average ambient temperature (max.)	122	°F
Relative Humidity	25 ~ 80	%
Maximum Wind Velocity	100	Miles/hr
Wind Direction	North East (Predominantly)	-
Seismic Zone	Zone 2A	-
Ground Acceleration	0.2g	m/sec ²

3.0 SYMBOLS AND ABBRIVIATIONS

For the purpose of this specification, the following symbols and abbreviations apply:

DSC	Differential Scanning Calorimetry
FBE	Fusion Bonded Epoxy
ITP	Inspection & Testing Plan
PQT	Pre-Qualification Trial
PE	PolyEthylene
PP	PolyPropylene

4.0 CODES, STANDARDS & SPECIFICATIONS

The following documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

API RP 5L1	Recommended Practice for Railroad Transportation of Line Pipe.
API RP 5LW	Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels.
API SPEC 5L	Specification for Line Pipe.
ASTM G14	Test for Impact Resistance of Pipeline Coatings (falling weight test).
ASTM D42	Method for Indicating Oil or Water in Compressed Air.
AFNOR NF A49-710	Steel tubes. External coating with three polyethylene based coating. Application through extrusion.
AFNOR NF A49-711	Steel tubes. External coating with three polypropylene layers coating. Application by extrusion.
CSA Z245.21	External Polyethylene Coating for Steel Line Pipe
DIN 30670	Polyethylene Coatings for Steel Pipes and Fittings
DIN 30678	Polypropylene Coatings for Steel Pipes
ISO 178	Plastics-determination of flural properties.
ISO 306/A	Plastics-theroplastic materials. Determination of vicat softening temperature.

ISO 527-2	Plastics - Determination of tensile properties Part 2: Test conditions for moulding and extrusion plastics
ISO 868	Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness).
ISO 1133	Plastics - Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.
ISO 1183/A	Plastics methods for determining the density of non-cellular plastics.
ISO 3146	Plastics - Determination of melting behaviour (Melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods.
ISO 6964	Determination of Carbon Black content by Calcination and Pyrolysis - Test Method and Basic Specification.
ISO 8501	Preparation of steel substrates before application of paints and related products.
ISO 8501-1	Visual assessment of surface cleanliness Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings Supplement Representative photographic examples of the change of appearance imparted to steel when blast-cleaned with different.
ISO 8502	Preparation of steel substrates before application of paints and related products-Tests for the assessment of surface cleanliness Part 3: Assessment of dust on steel surfaces prepared for painting. (Pressure sensitive tape method). Part 9: Field method for the conductimetric determination of water-soluble salts.
ISO 8503	Preparation of steel substrates before application of paints and related products-surface roughness characteristics of blast-cleaned steel substrates Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces Part 2: Method of Grading of Surface Profile of Abrasive Blast-Cleaned Steel-Comparator Procedure Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile - Stylus instrument procedure Part 5: Replica tape method for the determination of surface profile
ISO 9001	Quality management systems - Requirements.
ISO 11124	Preparation of steel substrates before application of paints and related products - Specifications for metallic blast cleaning abrasives Part 1: General introduction and classification Part 2: Chilled iron grit Part 3: High-carbon cast-steel shot and grit Part 4: Low-carbon cast-steel shot

ISO 11420	Method for the assessment of the degree of carbon black dispersion in polyolefin pipes, fittings and compounds
NACE RP0394	Application, Performance and Quality Control of Plant- Applied Fusion Bonded Epoxy External Pipe Coating.
NACE RP0490	Holiday Detection of Fusion Bonded Epoxy External Pipeline Coatings of 10 to 30 mls (0.25 to 0.70 mm).
SSPC SP1	Solvent Cleaning.
TRANSCO/CW6	Specification for the External Protection of Steel Line Pipe and Fittings Using Resin and Associated Coating Systems Part 1 Requirements for Coating Material and Methods of Test.

4.1 ORDER OF PRECEDENCE

The following is the order of precedence of the specifications:

1st	Pakistan national, regional or local laws, regulations and codes. If applicable
2nd	This specification including all datasheets as being part of the contract
3rd	Technical proposals as being part of the contract
4th	API/ASTM codes and standards
5th	Other international codes and standards

Any conflict generated not solved by the order of precedence shall be referred to the Company in writing for clarification and resolution. The Supplier shall not carry out any specific work before the clarification, discussion and decision.

In the event of any conflict of data or requirements in any of the above documents, it is the Supplier's responsibility to resolve these conflicts before proceeding with design, manufacture or purchase. In any case, the most stringent requirement shall prevail. However, the Company interpretation shall be final.

5.0 QUALITY ASSURANCE

- The coating operation shall be governed by a documented Quality System, which ensures that the requirements of the specification are met in every respect.
- The Quality System shall be based upon recognized quality standards of which ISO 9001 is a suitable example. Quality Assurance systems to other equivalent standards may be used if approved by the purchaser.
- A Quality Assurance Group shall have been established, which shall be responsible for reviewing the Quality System and ensuring that it is implemented.
- Application and test procedures, which comprise of the Quality System and the ITP shall be submitted to the purchaser for agreement.
- The Quality System shall include control of material and equipment manufacturer and sub-contractors and shall ensure that the requirements of this Specification are satisfied by the

- manufacturer and sub-contractors operating quality systems in their own organizations.
- f. A Quality Plan and ITP for the activities necessary to satisfy the requirements of the specification shall be prepared and issued to the purchaser for agreement before commencement of work.
 - 1. The Quality Plan and ITP shall include any sub-contracted work and the sub-contractor's Quality Plans shall be submitted.
 - 2. The Quality Plan shall be sufficiently detailed to indicate sequentially, and for each discipline, the requisite quality control, inspection, testing, and certification activities with reference to the relevant procedures and the acceptance standards.
 - g. The Quality System and associated procedures may, with due notice, be subject to formal audits by the purchaser. The application of quality control will be monitored by the purchaser's inspectors, who will witness and accept on behalf of the purchaser the inspection, testing, and associated work required by the specification.
 - h. The provision of inspection services reporting directly to the purchaser shall in no way relieve the responsibility to ensure that the full scope of work is carried out entirely in accordance with the specification and the agreed Quality Plan and ITP.

6.0 COATING SELECTION

This Specification covers details both FBE-PP and FBE-PE three-layer coatings. The choice of which type of coating to be used shall depend on the nature of the pipeline project.

- a. For pipeline product temperatures at or below 80°C (175°F), a three-layer FBE-PE system using medium-density or high-density PE may be utilized.

It should be noted that a number of proven FBE-PP field joint coating systems exist which are comparable to and fully compatible with FBE-PP line pipe coating. These FBE-PP field joint coatings eliminate field joint-line pipe coating interface issues between different generic coating types that need to be addressed when specifying three-layer FBE-PE coatings. No similar proven field joint coating systems exist for three layers FBE-PE. Therefore, it is often advantageous to specify a three-layer FBE-PP line pipe coating even though the maximum operating temperature does not exceed 80°C (175°F).

An FBE-PP pipeline coating system may also be preferred because of the superior mechanical properties compared to three-layer FBE-PE at the same operating temperatures.

- b. For three layer FBE-PP coated pipe, the maximum operating temperature shall be 110-125°C (230-257°F). The maximum operating temperature will be determined by the specific FBE coating used and the Purchaser will verify that the FBE selected is appropriate for the specific maximum temperature to be encountered in service.

7.0 PROCEDURE QUALIFICATION

7.1 GENERAL

- a. Procedures proposed for factory application and repair of three-layer fusion bonded epoxy-polyethylene or fusion bonded epoxy-polypropylene coating shall be submitted to the purchaser for approval.
 1. Procedures shall include a range of nominal outside pipe diameters.
 2. Procedures shall comply with clause 7.2

Before the start of production coating, proposed procedures for coating of the line pipe, as specified in clause 7.3, shall be qualified.

7.2 COATING PRECEDURE

The coating procedures shall incorporate full details of the following:

- a. Raw materials to be used including current data sheets providing values for the basic properties of each (see clause 8).
- b. Raw material test methods.
- c. Preliminary pipe inspection.
- d. Pipe cleaning/dirt and grease removal.
- e. Blast cleaning abrasives and technique.
- f. Testing for soluble salts.
- g. Abrasive blast cleaning quality, standard, and surface profile.
- h. Method of dust removal.
- i. Chemical pre-treatment methods.
- j. Pipe preheat method and pipe temperature at the point of coating; method of measurement of pipe/substrate temperature.
- k. Manufacturer and grade of FBE powder, its gel time, cure time, T_g , and application method.
- l. Adhesive material and application method.
- m. Polyethylene or polypropylene material and application method.
- n. Coating inspection procedures, testing methods, and acceptance criteria.
- o. Coating repair procedures.
- p. Pipe handling and identification.
- q. Quality control procedures, quality plan, and ITP.

7.3 COATING PRECEDURE APPROVAL TEST / PRE QUALIFICATION TRIAL (PQT)

- a. Before commencement of coating procedure approval tests, the supplier shall have obtained approval of the coating procedures (see clause 7.2) including the test methods and acceptance criteria which shall be as described in Annexes A and B.
- b. The purchaser shall be given a minimum of seven (7) working days' notice to witness procedures and tests. Coating procedure approval tests/ prequalification will be witnessed by the purchaser.

- c. Ten pipes shall be prepared and coated in accordance with the approved coating procedure.
 - 1. Five pipes shall be coated with chemical pretreatment(s) (see clause 11) and five pipes shall be coated without chemical pre-treatment. Coating line pipe with and without chemical pre-treatment enables the effectiveness of the chemical treatment to be confirmed.
 - 2. One of the pipes coated without chemical pre-treatment shall be coated one-third with FBE, one-third with FBE and PE or PP adhesive, and one-third with the full PE or PP system. Partially coating one of the pipes enables the thickness of each individual layer to be established accurately.
 - 3. The other four pipes that are not chemically pretreated shall receive the three-layer PE or PP coating system for the full length of the pipe.
- d. Tests shall be carried out on the raw materials used and on the final coatings on pipes in accordance with clauses 8 and 13 and Annexes A and B for formal approval of the coating procedure specification. Proposed coating repair procedures shall also be qualified during the coating procedure approval tests.
- e. Within four (4) days of completion of the coating procedure approval tests, a written test report shall submit to the purchaser. The written test report shall include a full set of records covering the properties of the raw materials and the final coating.

7.4 EPOXY POWDER RECYCLE SYSTEM

- a. During pre-qualification, samples of reclaimed powder shall be removed from the reclamation system.
 - 1. These samples of reclaimed powder shall be subject to a detailed 30 x illuminated magnification examination, thermal analysis, and moisture content tests.
 - 2. Properties of the reclaimed powder shall be within the ranges specified by the manufacturer for the virgin epoxy powder. Should this not be the case then the use of reclaimed powder shall not be permitted.
- b. If the use of reclaimed FBE powder is permitted by the purchaser, the percentage of reclaimed powder in the mixture shall be in accordance with clause 12.4
- c. Recycling of fusion bonded epoxy powder shall not be permitted if the polyethylene or polypropylene adhesive is applied by powder spray. There is a danger that cross contamination of the fusion bonded epoxy and the polypropylene adhesive occurs to the detriment of the coating system.

8.0 COATING MATERIAL

8.1 ACCEPTABLE MATERIALS

Before factory production coating is permitted, the coating system and application process shall be defined and qualified in accordance with the coating procedure qualification specified in clause 7.

8.2 FBE POWDER

Current data sheets from the manufacturer shall be submitted to the purchaser.

- a. The manufacturer's production test records shall be obtained for the following data:
 1. Sieve analysis.
 2. Gel and cure times.
 3. Density.
 4. Moisture content.
 5. Thermal analysis, including glass transition temperature.
 6. Infrared scan.
 7. Storage stability.
- b. As a minimum, thermal analysis and moisture content tests shall be carried out on each batch of each FBE powder used to check compliance with the manufacturer's data.
- c. The proposal for the specific FBE powder shall be accompanied by test data demonstrating its satisfactory performance in a 3-layer FBE-PE or FBE-PP line pipe coating system, as appropriate, at the maximum operating temperature, (see also clause 5.e and Annex A).

8.3 ADHESIVE

- a. Current data sheets for the PE or PP adhesive he intends to use from the proposed manufacturer shall be submitted to the purchaser.
- b. For both PE and PP, the adhesive shall be obtained from the same manufacturer as the top coat.
- c. The manufacturer's production test records shall be obtained for the following data:
 1. Shelf life.
 2. Density.
 3. Melt flow index.
 4. Tensile strength.
 5. Elongation.
- d. Every batch of adhesive used shall be tested in respect of items 2 and 3 above only, to check their compliance with the manufacturer's data.
- e. The proposal for the PE and PP adhesive shall be accompanied by test data demonstrating equivalent performance in three-layer FBE-PE or FBE-PP line pipe coating systems, as appropriate, (see Annex A).

8.4 POLYETHYLENE OR POLYPROPYLENE OUTER COATING

- a. The outer PE coating shall be a medium to high density polyethylene generally complying with Table 3 of CSA Z245.21. In addition, the outer coating shall conform to the Table 1

Table 1 - Carbon black requirements

Carbon black content	2.0 to 2.6%	ISO 6964 (latest)
Carbon black dispersion	' 3.0	ISO 11420 (latest)

- b. The outer PP layer shall generally comply with Table 2.

Table 2 - Property requirements

Property	Value	Standard
Density	0.9 g/cm ³ (0.5 oz/in ³)	ISO 1183/A
Melt Flow Index	0.8 g (0.03 oz)/10 min	ISO 1133
Modulus of Elasticity	1 000 MPa (145 000 psi)	ISO 178
Tensile Strength	> 25 Mpa (3 600 psi)	ISO 527-2
Elongation at Break	> 400%	ISO 527-2
Melting Point	> 160°C (320°F)	ISO 3146
Vicat Softening Point	> 140°C (284°F)	ISO 306/A
Shore Hardness	> 60	ISO 868

- c. Current technical and health & safety data sheets from the proposed manufacturer of the PE and PP outer layer for the proposed material shall be submitted to the purchaser.
- d. The manufacturer's production test records shall be obtained for the following data:
1. Shore hardness.
 2. Tensile strength.
 3. Elongation.
 4. Density.
 5. Melt flow rate.
 6. Moisture content.
 7. Carbon black content (polyethylene only).
 8. Carbon black dispersion (polyethylene only).
 9. Oxidation induction time.
- e. The manufacturer's production test records shall be obtained for items 4 to 8 for every batch of polyethylene and polypropylene used. Every batch of polyethylene and polypropylene used shall be tested in respect of items 4 and 5 above, as a minimum, to check their compliance with the manufacturer's data.
- f. The proposal for the PE and PP outer layer material shall be accompanied by test data demonstrating the performance of the material in a 3-layer PE and PP pipe coating system, as appropriate (see Annex A).

8.5 IDENTIFICATION OF COATING MATERIALS

Materials supplied in conjunction with the line pipe coating operations shall be in sealed, damage

free, marked containers giving the following information:

- a. Manufacturers' name.
- b. The name and grade.
- c. The batch number.
- d. Date and place of manufacture.
- e. Expiry date for use.

8.6 STORAGE OF COATING MATERIALS

- a. Coating materials supplied shall be stored in accordance with the manufacturer's recommendations at all times, to prevent contamination, damage, and deterioration in quality before use.
- b. Materials shall be used in the order in which they are delivered and before their expiry date for use.
- c. Materials not fulfilling these requirements shall not be used.

9.0 FREE-ISSUED MATERIALS

9.1 PRILIMINARY INSPECTION

- a. A receipt inspection of free-issued materials shall be carried out against the purchaser's documentation. Any shortages, defects, anomalies, or discrepancies shall be reported to the purchaser no later than 48 hours from the time of receipt of the material.
- b. Identification markings on each pipe, whether internal or external, shall be committed to permanent record before surface preparation begins and shall be replaced after the coating process is complete.
- c. A procedure for compliance with these requirements shall be provided for approval by the purchaser before the commencement of any work on the purchaser's behalf, see clause 7.2.

9.2 PROTECTION OF WELD END PREPRATIONS

- a. Weld end preparations shall be protected from mechanical damage and contamination by the coating during handling, storage, surface preparation, and the coating processes by a method agreed with the purchaser. The method shall be demonstrated in the PQT.
- b. The methods used shall also ensure that no damage occurs to either the internal surface (if this has been applied) or the internal surface of the pipe. If an internal coating has been applied, some minor scuffing of the internal coating may be permitted over the first 200 mm (8 in), but there shall be no damage to the coating beyond this limit.

10.0 SURFACE PREPARATION

10.1 GENERAL

The method(s) of surface cleaning and surface preparation in the factory shall be proposed and demonstrated as part of the coating procedure qualification (see clause 7) and shall comply with clauses 10.2 to 10.3 j inclusive.

During storage and shipment of the pipe to the coating mill, superficial surface corrosion may occur. The pipes may also be contaminated by soluble salts or other deposits on the exterior and interior surface (see clause 10.4.h) and surface cleaning in accordance with clause 10.2 may be required to achieve the specified degree of cleanliness.

10.2 SURFACE CLEANING

- a. Surface cleaning' is defined as the additional process necessary to remove salts or other forms of contamination, such as dust and grease, before abrasive blast cleaning.
- b. The extent of any surface cleaning shall be agreed with the purchaser before any work commences.
- c. Surface cleaning of the steel surfaces shall include the removal of contaminants such as oils, grease, dirt, and solid pollution in accordance with SSPC SP1. The steel surface shall be dry before abrasive blast cleaning.

10.3 ABRASIVE BLAST CLEANING

- a. Steel surfaces shall be prepared by dry abrasive blast cleaning to remove mill scale, rust, corrosion products, oxides, and other foreign matter. Abrasive blast cleaning shall be to ISO 8501-1, Grade Sa 2½ quality, as a minimum.
- b. The selection of the abrasives for blast cleaning of low alloy or carbon steel surfaces shall be in accordance with ISO 11124-1.
- c. For 13Cr and stainless steel surfaces, the abrasive shall be chopped stainless steel wire or grit, or a mixture of stainless steel chopped wire or grit and stainless steel shot. Alternative good quality non-metallic abrasives, for example aluminum oxide, may be used, providing they are capable of meeting the requirements of 10.3.a, 10.3.d, and 10.4.c in an efficient manner.

Stainless steel surfaces have a tendency to work harden during abrasive blasting and good quality abrasives are required to achieve the required surface profile.

- d. The size and mix of abrasive shall be such as to give a dense angular surface profile or anchor pattern of between 50 and 100 microns (2 to 4 mils) in amplitude at all times.
- e. Surface profile measurements shall be in accordance with ISO 8503 Parts 1 or 2 or 4 or 5.
- f. During abrasive blast cleaning:
 1. The metallic abrasive shall be continually sieved to remove 'fines' and 'contaminants' and the quality shall be checked, including for soluble salts, at a frequency agreed with the purchaser.
 2. Tests for oil contamination in the compressed air supplies to the equipment shall be carried

out periodically in accordance with ASTM D4285.

3. The abrasive(s) used shall be regularly 'topped up' in order to provide the correct profile and cleanliness.
- g. The equipment used for abrasive blast cleaning shall meet the work requirement and shall be free from oil and water contamination to ensure that the cleaning process is not impaired. Traps, separators, and filters shall be checked for condensed water and oil at the start of each shift and emptied and cleaned regularly.
Experience shows that optimum surface preparation quality is best achieved by using two abrasive blast cleaning units in order to obtain the correct surface profile and cleanliness.
- h. Surface preparation shall only be conducted when the air temperature is above 10°C (50°F), the relative humidity is less than 85%, and the steel surface temperature is at least 5°C (9°F) above the dew point.
- i. In any event, pipe shall be pre-heated to 65-85°C (149-185°F) to remove moisture from the steel surface. The method of heating shall not result in contamination of the steel surface.
- j. The steel and air temperatures and the relative humidity shall be monitored and recorded at the beginning of each shift and at a minimum frequency of every four hours thereafter during abrasive blast cleaning.

10.4 FINAL CLEANING AND INSPECTION

- a. The steel surface shall be inspected immediately after abrasive blast cleaning. Surface imperfections such as slivers, scabs, etc. made visible by blast cleaning, and which are detrimental to the coating process, shall be marked up for further attention.
- b. Spent abrasives shall be completely removed from the blast cleaned surface and the pipe internals by one or more of the following: air lance, vacuum cleaner, clean, stiff bristle brush, etc.
- c. Surface contamination shall be assessed in accordance with ISO 8502-3. Surface cleanliness rating shall be 2 or better.
- d. Marked defects shall be brought to the attention of the purchaser who will advise on the necessary action. No surface defects shall be ground or repaired without approval from the purchaser.
- e. Grinding or repairs shall not reduce the pipe wall thickness in the areas thus treated below the requirements of the purchaser's line pipe specification. If such areas exceed 75 mm (3 in) in diameter or there are more than four such areas on any one pipe, the areas shall be re-blast cleaned to meet clauses 10.3.a-10.3.d.
- f. Any component found to have defects which exceed the levels permitted in the line pipe specification shall be set aside for examination by the purchaser and no subsequent action shall be taken without agreement with the purchaser.
- g. The time interval between completion of blast cleaning and coating of the cleaned surface shall be kept to a minimum.
 1. In any event, oxidation, tarnishing, or contamination of the blast cleaned surface shall not be

allowed.

2. If the time interval exceeds 4 hours the pipe surfaces shall be re-blast cleaned irrespective of the apparent condition.
- h. Pipe handling between abrasive blast cleaning and pipe coating shall minimize damage to the surface profile achieved during abrasive blast cleaning. Any pipe affected by damage to the surface profile exceeding 250 cm² (39 in²) in total area or by contamination of the steel surface shall be rejected and the pipe shall be re-abrasive blast cleaned before surface coating.
- i. Purchaser-approved salt meter shall be used to carry out salt tests on the pipe in accordance with ISO 8502-9 to determine if further surface cleaning is required.
 1. If two abrasive blasting cabinets are used, salt tests shall be carried out after the first cabinet and before the pipe enters the second cabinet.
 2. If a single blast cabinet is used, salt tests shall be carried out after abrasive blast cleaning. In each case, one test shall be carried out at each end and one at the centre of the pipe.
- j. The acceptance criteria shall be a maximum of 2 µg/cm² (0,5 µoz/in²).
- k. Initially, the frequency of the soluble salt tests shall be the first pipe and then one pipe in 20 of production. If, over a period of time, acceptable values are consistently achieved, the frequency of salt test measurements may be reduced to twice per shift, subject to the purchaser's approval.
- l. The salt meter shall be calibrated in accordance with the equipment manufacturer's recommendations.

11.0 CHEMICAL PRE-TREATMENT

11.1 GENERAL

- a. Following abrasive blast cleaning the pipe surface may be pre-treated with a proprietary chemical solution. Chemical treatment serves two purposes. It rinses off residual dust and other contamination and produces a more stable surface. In both cases the end result is improved coating adhesion.
- b. The chemical pre-treatment shall be applied in accordance with the chemical manufacturer's instructions and in a manner which ensures 100% uniform coverage of the pipe surface without introducing any surface contamination.

11.2 PHASPHORIC ACID TREATMENT AND WATER WASHING

- a. Following abrasive blast cleaning operations, A propriety brand of a 10% solution (or as otherwise proven in the PQT) of phosphoric acid, e.g., Oakite 31 or 33, shall be used to remove soluble salts and other soluble contaminants. This process shall be followed immediately by washing with de-ionized water. (Alternative concentrations may be used subject to verification during the PQT). This process shall be followed immediately by washing with de-ionized water.
- b. The pipe surface temperature immediately before the phosphoric acid treatment shall be in the range 45 to 65°C (113 to 149°F).

- c. If two abrasive blast cleaning machines are utilized, the phosphoric acid pre-treatment shall be carried out between the two blast cleaning operations. If only a single abrasive blast cleaning unit is used, phosphoric acid treatment shall take place after blast cleaning.
- d. The pH of the pipe surface shall be determined both before and after the fresh water rinse at a minimum frequency of once per hour. The measured pH shall be as follows:
 1. Before the fresh water rinse: 1 to 2.
 2. Following the fresh water rinse: 6 to 7.
- e. Data sheets and supporting documentation for the proprietary phosphoric acid system to be used shall be provided. The documentation shall verify that the chemical is suitable for the treatment of line pipe before the application of the specific fusion bonded epoxy powder being applied and the final coating will meet fully the requirements of this Specification.

11.3 CHROMATE SOLUTION

Following completion of the abrasive blast cleaning process the pipe surface may be chemically pre-treated with a 10% strength (or as established in the PQT) proprietary chromate solution.

- a. The pipe steel temperature, before application of the chromate solution, shall be between 45 and 65°C (113 and 149°F).
- b. Data sheets and supporting documentation for the chemical to be used shall be provided. The documentation shall verify that the chemical is suitable for the treatment of line pipe before the application of the specific fusion bonded epoxy powder being applied and the final coating will meet the requirements of this Specification.

11.4 VERIFICATION OF CHEMICAL TREATMENT SOLUTION CONCENTRATION

Any chemical pre-treatment solution shall be checked to ensure it remains:

- a. Within the concentration range recommended by the chemical manufacturer for the pipe coating process. Concentration shall be checked at the makeup of each fresh solution and once per shift thereafter, using a method approved by the chemical manufacturer.
- b. Free from contamination at all times.

12.0 COATING APPLICATION

12.1 GENERAL

The coating process in the factory shall comply with the coating procedure established in the coating procedure qualification tests (see clause 7) and the requirements specified in clauses 12.2 to 12.6 inclusive.

12.2 PREHEATING OF PIPE

- a. Immediately before coating application, the pipe shall be heated to a temperature within

the limits specified by the manufacturer for the particular pipe size. In any event, the pipe temperature shall not exceed 260°C (500°F).

- b. The method of heating shall not result in discoloration or contamination of the pipe surface.
- c. If the temperature moves outside the recommended limits, the coating process shall stop until the fault is rectified.
- d. During coating application, the steel surface temperature shall be monitored and recorded continuously. The means of temperature control, both at the heat source and the monitoring location, shall be proposed for approval by the purchaser.

12.3 FBW POWDER APPLICATION

- a. Before coating with fusion bonded epoxy powder, the powder application system shall be thoroughly cleaned to remove any powder remaining from a previous line pipe coating application.
- b. The fusion bonded epoxy powder coating shall be applied to a minimum thickness of 250 µm (10 mils) and to a maximum thickness of 400 µm (16 mils) by electrostatic spray.
A minimum FBE coating thickness of 250 µm (10 mils) maximizes the gel time of the FBE providing optimum conditions for adhesion of the adhesive layer and overall coating integrity. It also ensures sufficient FBE thickness exists at the coating cutback to enable the FBE surface to be prepared without being completely removed, see clause 12.6.e.
- c. The FBE coating shall be applied to within 65-90 mm (2 ½-3 ½ in) of the pipe ends unless otherwise advised by the purchaser.

The specific length of coating cutback is determined by the fusion welding process to be used at the pipeline butt welds and the likelihood of the coating suffering heat damage during pipeline construction.

12.4 RECYCLED FBE POWDER

Reclaimed FBE powder may be used if:

- a. The polyolefin adhesive is applied by extrusion and not in powder form. With the polyolefin in powder form there is a high risk of contamination of the reclaimed FBE.
- b. The reclaim system is successfully qualified during prequalification (see clause 7.4).
- c. The quality of the reclaimed powder is routinely checked during production, at a minimum frequency of once per 500 pipes coated, and consistently meets the requirements stated in clause 7.4.
- d. Only epoxy powder recovered automatically by the fully enclosed recovery system during coating application is re-used.
- e. The quantity of reclaimed powder in the mixture does not exceed 15%.
- f. The adhesive is applied by extrusion.

12.5 ADHESIVE LAYER APPLICATION

- a. The PE or PP adhesive layer shall be applied immediately after the FBE and within the time period using a method recommended by the manufacturer. The proposed time interval (maximum and minimum) between FBE and adhesive applications at the proposed pipe temperature range and line speed shall be stated.
- b. The adhesive shall be applied to a thickness of between 200 and 400 μm (8 and 16 mils).

12.6 POLYETHYLENE OR POLYPROPYLENE OUTER LAYER APPLICATION

- a. The PE or PP outer layer shall be applied by either the cross-head or side extrusion technique.
- b. The PE or PP shall be applied over the adhesive within the time limits established during pre-production testing (see clause 7.) and within the temperature range recommended by the manufacturer.
- c. The coating shall be water-cooled to below 80°C (175°F) before handling.
- d. The PE or PP shall be applied to a minimum thickness of 2.00 mm (0.08 in) to give a minimum total coating thickness of 2.45 mm (0.10 in).
2.00 mm (0.08 in) is considered the minimum thickness required to resist mechanical damage during transit and construction.
- e. The PE or PP shall be applied to within 100 and 150 mm +/- 10 mm (4 and 6 in +/-0.4 in) of the pipe ends unless otherwise advised by the purchaser.
 1. The ends of the coating shall be beveled at 30 degrees.
 2. A minimum of 25 mm (1 in) of FBE coating shall be visible beyond the end of the polyethylene following the beveling operation.
The requirement for an FBE toe of minimum length 50 mm (2 in) is to provide a stepped interface and greater coating integrity at the factory coating-field joint coating interface. With polyethylene, this is particularly important as the field joint coatings commonly used with polyethylene (liquid applied, heat shrink sleeves and cold applied tape wraps) do not adhere well to polyethylene.
- f. Immediately after the coating has fully hardened, the pipe identification marks, etc. shall be re-applied to the coated pipe using a method approved by the purchaser and which is compatible with the coating.
 1. Additional identification shall be made in order to trace the coating and test batches.
 2. Such markings shall be within 2 m (6.6 ft) of the pipe end.

13.0 INSPECTION AND TESTING

13.1 GENERAL

- a. All stages of the preparation and coating operations in the factory shall be subjected to continuous inspection:
 1. The results of inspections and tests recorded and reported to the purchaser.

2. The format of the inspection and test results shall be agreed with the purchaser before commencement of production coating.
3. The inspection and testing shall include, as a minimum, the requirements listed in Annexes A and B.

While it is important that the manufacturer provides his own inspection, the primary responsibility for ensuring the tests and inspections required by this Specification are carried out lies with the supplier.
- b. Before use, equipment used for inspection and testing shall be calibrated in accordance with the equipment manufacturer's recommendations.
- c. Inspection on every pipe during production shall include, but not be limited to, the following:
 1. Level of surface contamination, including general detritus, oil, grease, soluble salts.
 2. Standard of abrasive blast cleaning (visual).
 3. Appearance of the pipe after chemical pre-treatment (phosphoric acid or chromate).
 4. Temperature of pipe immediately before coating.
 5. Appearance and colour of coating (FBE, adhesive layer, and full system).
 6. Total coating thickness.
 7. Holiday detection.
- d. The measurements of surface profile, salt contamination, and dust contamination shall be carried out on one pipe, once every hour during production.
- e. Testing of the applied coatings to prove compliance with the requirements of this Specification shall include the tests specified in clauses 13.2 to 13.10 and shall be carried out during pre-qualification and production at the frequencies shown in Annex B.
 1. If problems develop or significant changes occur, i.e. a change in batch of materials (FBE, adhesive, or PE or PP) or the production parameters, or a plant shutdown, etc., adhesion, DSC, foaming/air entrapment tests shall be carried out on the first production pipe of each diameter and wall thickness coated after the occurrence of this event.
 2. If the test results are satisfactory, the test frequency shall then revert to that shown in Annex B.
- f. Cured pipe coating shall comply with clauses 13.2 to 13.10 inclusive and Annex A.
- g. The purchaser shall have the right to reject any factory-applied coating that does not conform to the requirements of this Specification.

13.2 COATING INSPECTION BY THE SUPPLIER

- a. Competent and certificated coating inspection personnel shall be employed by the Supplier in sufficient numbers to ensure that coating related activities, including testing, are adequately inspected for conformance to the coating specifications and procedures.
- b. Coating Inspectors shall have a sound knowledge of surface preparation and coating processes and possess the knowledge and skills to carry out the tasks stated in the approved Quality Plan, including the following:

1. Routine inspections and checks on site and/or at manufacturer' or subcontractors' premises in a systematic and timely manner.
2. Production and maintenance of accurate records and reports.
- c. Coating Inspectors shall hold current certification in accordance with one of the following standards, as a minimum:
 1. UK Institute of Corrosion-Coating Inspector Level 2.
 2. UK Institute of Corrosion-Pipeline Coating Inspector Level 2.
 3. BGAS-CSWIP (Argyll-Ruane, UK) - Coating Inspector Grade 2.
 4. NACE-Coating Inspector Level 2.
- d. Alternative Coating Inspector certification shall be subject to approval of COMPANY.
- e. During the work carried out on behalf of COMPANY, the Coating Inspector(s) shall have direct access to senior management out with the coating production management organization.

13.3 VISUAL INSPECTION OF CURED COATINGS

- a. Visual inspection of the cured fusion bonded epoxy coating shall be carried out to ensure the coating color and appearance are uniform and the coating is free from:
 1. Blistering and other imperfections.
 2. Entrained foreign matter.
- b. The adhesive film shall be examined for uniformity, continuity, and absence of entrained foreign matter.
- c. The fully coated pipe shall be completely visually inspected for surface defects likely to affect the integrity of the coating.
 1. The coating shall be blemish-free, with no dust or other particulate inclusions.
 2. No more than 1% of the outside surface shall have holes caused from air entrapment when viewed under 30 X illuminated magnification.
- d. A "blemish" that has no detrimental effect may be acceptable if it meets the other criteria of being smooth, bonded, and without the inclusion of foreign matter.

13.4 COATING THICKNESS MEASUREMENT

- a. During the pre-qualification, the thickness of the FBE, the adhesive, and the polyethylene layers shall be separately determined at a minimum of six equidistant locations in each case for conformance with the specification requirements.
- b. Following start up or a break in production, the overall coating thickness shall be checked for compliance with clause 12.6.d in at least ten (10) equidistant locations spread over the total surface of each line pipe for the first 10 pipes, and on every twentieth pipe coated thereafter.
- c. The coating thickness on intermediate pipes shall be measured at a minimum of four representative locations.
- d. The results of measurements shall be recorded.
- e. Coatings with thicknesses outside the specified limits shall be stripped and re-processed in

accordance with this specification, unless otherwise agreed with the purchaser.

- f. The thickness measuring gauge shall be of a type acceptable to the purchaser, as used in the PQT, and calibrated hourly for the specified thickness range.

13.5 HOLIDAY DETECTION

- a. 100% of the finished three-layer coating shall be checked for holidays using a high voltage holiday detector.
- b. The detector shall maintain intimate contact with the coating at all times.
- c. The detector may be either constant or pulsed voltage type, but in the case of the former, the holiday detection shall be carried out on a dry coating.
- d. The operating voltage between the detector electrode and the pipe shall be checked at least twice per working shift and shall be maintained at a minimum of 20 kilovolts (or 5 kV per 1 mm (0,04 in) thickness).
- e. The correct travel speed for the holiday detector shall be determined by consistent detection of an artificial pinhole made in a good coating sample and/or by reference to NACE RP0188, at the purchaser's discretion.
- f. The number of holidays shall not exceed two on any one pipe (see also clause 14.f).

13.6 CURE TEST BY DIFFERENTIAL SCANNING CALORIMETRY (DCS)

- a. During pre-qualification, and at the start of every shift, the degree of cure of the applied FBE shall be determined by differential scanning calorimetry.
- b. A detailed procedure for the determination of the degree of cure of the FBE layer shall be proposed for the purchaser's approval.
- c. A sample of the applied FBE coating shall be removed from the coated pipe with a sharp knife or a sharp cold chisel and hammer. Only furled coating flakes free from steel particles shall be removed.
- d. Results of the cure test shall be recorded with time/date, pipe number, sequence number, batch number of powder, and location of the sample from pipe.
- e. Acceptance shall be based upon the difference between Tg2 and Tg1, being delta Tg. The acceptable value for delta Tg shall be between -2°C and +3°C (28°F and 37°F).

13.7 ADHESION TEST

- a. During pre-qualification, and at the start of every shift, the adhesion of the FBE shall be separately determined by the "St. Andrews Cross" method that is, by cutting two straight lines through the FBE with a sharp knife.
 - 1. The lines shall intersect at a 30/150 degree angle.
 - 2. The FBE coating shall resist disbondment from the steel when attempts are made to lift the coating from the 30 degree angle with a sharp knife.
- b. The adhesion of the three-layer coating system shall be determined in accordance with

one of the methods described in DIN 30670, AFNOR NF A49-710, or CSA Z245.21 for PE coatings and AFNOR NF A49-711 or DIN 30678 for PP coatings.

1. The test shall be performed at a temperature of $50^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($122^{\circ}\text{F} \pm 9^{\circ}\text{F}$) for PE and $90^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($194^{\circ}\text{F} \pm 9^{\circ}\text{F}$) for PP. When the pipe temperature is outside of these limits, the test shall be stopped.
2. The peeling rate shall not exceed 10 mm/min (0.4 in/min).
3. For PE, the minimum adhesion strength at 50°C (122°F) shall be 60 N/cm (34 lb/in) width of strip peeled.
4. For PP, the minimum adhesion strength at 90°C (194°F) shall be 80 N/cm (46 lb/in) width of peel.
5. The adhesion failure mode shall be recorded.
6. Any failure should occur at the adhesive/PE or adhesive/PP interface or adhesive/FBE interface.
7. If failure occurs at the FBE/Steel interface, this is considered a total failure of the system.

13.8 PENETRATION/ IDENTATION TEST

Three samples shall be cut from a test specimen of coated pipe and tested for resistance to indentation.

- a. For PE, this test shall be in accordance with the method stated in DIN 30670 except that the test shall be performed at a temperature of 80°C (175°F).
- b. For PP, the test shall be in accordance with DIN 30678, except that the test temperature shall be 90°C (194°F).
- c. Maximum penetration depth exhibited after testing for 24 hours shall be 0.30 mm (0.012 in) for both PE coated and PP coated pipe.

13.9 IMPACT RESISTANCE

PE and PP coated pipe shall be impact tested in accordance with the procedures and acceptance requirements specified in DIN 30670 and 30678, respectively. The tests shall be performed at ambient temperature.

13.10 AIR ENTRAPMENT

Samples of the finished coating shall be removed from the pipe, sectioned, and examined under a 40 X magnification microscope.

- a. The PE or PP and adhesive layers shall have no more than 10% of the observed area taken up with air entrapment (porosity or bubbles).
- b. Air entrapment shall not occupy more than 10% of the thickness in each case.
- c. Bubbles shall not link together to provide a moisture path through to the FBE layer.

13.11 FLEXIBILITY TEST

- a. The flexibility test shall be carried out using the 'bending' test method as described in Transco/CW6.
1. The 'bending' method shall use samples 50 mm (2 in) wide by 356 mm (14 in) long, cold cut from the coated pipe in the circumferential direction.
 2. These shall be bent over an appropriately sized mandrel at a test temperature of 0°C (32°F). The mandrel diameter (mm [in]) is given by:

$$\frac{1}{\frac{(0.02)}{t} + \frac{1}{(D_o-t)}} - t$$

Where,

Do = Outside diameter of the line pipe (mm [in])

t = Nominal pipe wall thickness (mm [in])

- b. The arc length of the mandrel shall be 225 mm (9 in) ± 5 mm (0.2 in).
- c. After bending, the coating shall not exhibit visible signs of cracks, disbondment, or pinholes and shall pass a holiday detection test as specified in 13.5. Limit of strain shall be 2% at 0°C (32°F). Details of the actual test method shall be agreed with the purchaser before the coating procedure approval tests (see clause 7.3).

13.12 CATHODIC DISBONDMENT TEST

- a. Cathodic disbondment testing shall be performed at a potential of -1.5 volts versus a standard calomel reference electrode in 3% sodium chloride solution.
 1. 28 days at 23°C (73°F). (Pre-qualification only)
 2. 48 hours at 65°C (149°F). (Pre-qualification and production)
- b. A coated test panel complete with the pre-drilled holiday shall be maintained at a potential of -1,5 volts with respect to a standard calomel reference electrode at the prescribed temperature for the defined period.
- c. The tests method shall conform to that described in clause 12.3.3.4, Item c, of CSA Z245.21, except that the diameter of the pre-drilled holiday shall be 6 mm (1/4 in).
- d. After cathodic disbondment testing, the extent of disbondment shall be determined by making radial cuts in the coating approximately 30 degrees apart.
 1. Using the point of a sharp knife, attempts shall be made to lift the coating at the edge of the coating holiday.
 2. The maximum extent of radial disbondment around the full circumference of the holiday is determined by physical measurement using a ruler.
 3. The maximum disbondment measured from the edge of the holiday shall be 7 mm (0.3 in).

13.13 HOT WATER IMMERSION RESISTANCE

- a. This procedure shall be used to assess the comparative resistance of three-layer polyolefin coatings applied to a bare steel substrate, to loss of adhesion due to hot water immersion.
- b. 150 mm (6 in) pipe rings shall be cold cut from the pipe. If the pipe diameter is too large, 100 mm x 100 mm (4 in x 4 in) panels cold cut from the pipe may be utilised. Cold cutting shall not 'rip' the coating at the cut edge.
- c. The coated pipe samples or rings shall be tested for holidays with the holiday detector set at the required voltage for the coating system, see clause 13.5. No holidays shall be present in the test samples.
- d. The quality of the coating adhesion on samples shall be examined to ensure that the coating system is firmly adherent to the substrate, particularly along the cut edges. The cut edges shall not receive any edge protection.
- e. Duplicate samples shall be tested at both procedure qualification and during production. The samples shall be full immersed in tap (potable) water.

Three Layer FBE-PE	65 ± 3 °C (149 °F ± 5 °F)
Three Layer FBE-PP	80 ± 3 °C (176 °F ± 5 °F)

- f. For procedure qualification, the samples shall be removed and examined after 24 hours and then, 28 days. During production testing, they shall be examined after 24 hours only. The samples shall be allowed to cool to ambient temperature before examination.
- g. A visual assessment of test samples shall be undertaken along the substrate-coating interface at the cut edges. Any loss of adhesion of the coating to the substrate, and/or any loss of adhesion between the layers, shall be recorded.
- h. The coating shall exhibit no disbondment or delamination from the cut edges of the sample on completion of the test.

13.14 DESTRUCTIVE TESTS

- a. For the destructive tests, i.e. cathodic disbondment, water soak, penetration, flexibility, etc., a sufficient length of pipe shall be cold cut from the production pipe and then sectioned into the required number of test pieces.
- b. The coating on the cut end of the pipe length shall be cut back to comply with clauses 12.3.c and 12.6.e.

13.15 PRODUCTION COATING TEST FAILURE

- a. If a production-coated pipe fails to meet the acceptance criteria for a specified test, the pipe length shall be rejected unless a concession is granted by the purchaser.
- b. Each coated pipe immediately preceding and following the failed pipe in the same production run shall then be tested in accordance with column three (Pre-qualification) of Annex B. If both pipes pass all of the tests, the remainder of the pipe joints in that production interval shall be

deemed satisfactory.

- c. If either pipe fails to meet the specification requirements, a test schedule shall be provided for the purchaser's approval.
 1. The objective of this test schedule shall be to determine which pipes coated since the last acceptable test pipe also meet the specification requirements and to isolate those which do not.
 2. Coated pipes not meeting the specification requirements shall be stripped and reprocessed in accordance with this Specification at no cost to the purchaser.

14.0 COATING REPAIRS

- a. Any defect resulting in exposure of the fusion bonded epoxy and/or the steel substrate shall be cause for the complete removal of the coating and the pipe being reprocessed.
- b. If the PE or PP is damaged, but the FBE coating is not exposed, detailed coating repair procedures shall be submitted for approval by purchaser. These shall detail minimum/ maximum areas for which each type of repair is applicable. Manufacturer's data sheets and test data for materials used shall be incorporated in the procedure.
- c. Repairs shall provide a finished coating equal in effectiveness to that of the parent coating.
- d. Each repaired area shall be holiday tested in accordance with clause 13.4.f.
- e. Shrink sleeves or patches are not considered an acceptable repair.
- f. In addition to the requirements of clause f, the number of coated pipes requiring coating repairs shall not exceed 5% of the total number of pipes coated. If this figure is exceeded:
 1. The coating process shall be stopped.
 2. The reason for the excessive number of holidays shall be investigated.
 3. The problem shall be rectified.

15.0 HANDLING, STORAGE, STACKING AND SHIPPING

15.1 GENERAL

- a. Pipe handling, storage, and transportation procedures shall generally be in accordance with API Spec 5L, API RP 5L1, and API RP 5LW as applicable.
- b. Procedures for handling, storage, stacking, and shipping of uncoated and coated line pipe shall be submitted to the purchaser for approval. This shall include protection for individual line pipe during handling.
- c. Each pipe shall be fitted with a minimum of three rubber spacers, each at least 6 mm (1/4 in) thick, before stacking to prevent direct contact between adjacent pipes. Alternatively, a minimum of 3 loops of 12 mm (1/2 in) diameter polypropylene rope may be used for the same purpose.
- d. Any coated item that has deteriorated or become damaged due to handling or storage shall be

stripped and re-coated in accordance with this Specification, at no cost to the purchaser.

15.2 HANDLING AND STORAGE

- a. Pipes shall be handled in a manner that prevents damage to the external coatings, pipe walls, and beveled ends and bevel protectors.
 1. Strapping and padding shall be provided when loading for transfer to any location.
 2. Pipe shall be raised or lowered to or from the stockpile, ground, barge, railcar, or truck using methods and equipment approved by the purchaser.
- b. On load out, the pipe ends and bevels shall meet the requirements of the purchaser's pipe manufacturing specification.
- c. Bare pipe shall be stacked on a minimum of two loose-graded sand windrows at least 15 cm (6 in) deep, each not less than 2 m (6.6 ft) wide, approximately 7 m (23 ft) apart and shall not be separated by bearers.
- d. Bare and coated pipe shall be carefully lifted and lowered to minimize the risk of impact damage and stacked in such a way that water and mud cannot accumulate inside the pipe or against the external surface. Aluminum end hooks shall be used to lift bare pipe.
- e. The maximum height of stacked components shall be subject to the approval of the purchaser. The originally agreed stacking height shall be reduced if damage to the component or its coating is observed due to stacking.
- f. Storage of coated components by the supplier shall be on soft-faced racks with each component separated.
- g. Bevel protectors and end caps, received with the pipe and removed before coating, shall be replaced following coating application.

15.3 TRANSPORTATION/ SHIPPING

- a. Before loading, rail cars, trucks, lighters, ships, or other conveyances shall be cleaned of debris or any item or substance that might damage the components and coating.
- b. Suitable timber and other dunnage shall be used to protect the components and coating against damage in transit.
- c. Loading onto or into railcars, trucks, lighters, ships, or other conveyances shall be conducted in accordance with a procedure approved by the purchaser.
- d. On-deck overseas shipment shall not be allowed without prior written approval of the purchaser.

**Annex A
(Normative)**

APPLIED COATING PROPERTIES

Property	Test Description		Spec. clause	Acceptable Values	
	PE	PP		PE	PP
Visual Appearance	100% with naked eye/Sample under X 30 magnification		13.2	Free of blemishes and particulate matter. No more than 1% porosity in outer surface.	
Coating Thickness	Physical Measurement		13.4	FBE: 250-400 μm (10-16 mils)	
				Adh: 200-400 μm (8-16 mils)	
				Outer Coating: 2.0 mm (0.08 in) min	
Holiday Detection	High Voltage Holiday Detector 5 kV per mm of coating thickness		13.5	No Holidays	
Thermal Analysis (FBE only)	Differential scanning calorimeter		13.6	Tg2 - Tg1 shall be between -4°C to +3°C (25°F to 37°F) to ensure coating is fully cured.	
Adhesion a) FBE	a) Cut a 30°/150° cross through coating down to Steel surface using a sharp knife.		13.7	a) The coating to be firmly adherent in the 30° angle, i.e. refusal of coating to peel	
b) Full Coating	b) DIN 30670, AFNOR NF A49710/A49-711, CSA Z245.21			b) 60 N/cm @ 50°C (34 lb/in @ 122°F)	80 N/cm @ 90°C (46lb/in @ 194°F)
Penetration/Indentation	DIN 30670/DIN 30678, 2.5kg (5.5lb) on 1.8 mm (0.07 in) diameter pin for 24 hours		13.8	0.3 mm (0.01 in) Max @ 80°C (175°F)	0.3 mm (0.01 in) Max @ 90°C (194°F)
Impact Resistance	DIN 30670/DIN 30678, using 25mm(1 in) diameter ball indenter		13.9	30 locations without penetration or loss of adhesion of coating	
Air Entrapment	Samples of coating removed from pipe and sectioned. Sections examined under X 40 magnification		13.1	No more than 10% of sectioned area taken up by air entrapment. No more than 10% of thickness occupied by air. No link up of air voids.	
Flexibility	Mandrel Bend Test		13.11	2% Strain at 0°C (32°F). No cracking disbondment or holidays.	
Cathodic Disbondment	Clause 12.8 of CSA Z245.21, - 1.5volts v Calomel, 6 mm (1/4in), a diameter holiday 48 hrs @ 65 \pm 3°C (149 \pm 5°F) 28 days @ 23 \pm 3°C (73 \pm 5°F)		13.12	Maximum disbondment 5 mm (0,2 in) increase in radius	
Hot Water Immersion	Coated pipe sample immersed for a) 24 hours & b) 28 days in tap water		13.13	No disbondment or delamination of the coating layers	
	65°C(149°F)	80°C(176°F)			

**Annex B
(Normative)
FREQUENCY OF TESTING**

Test Description	Spec. clause	Frequency of Testing	
		Pre-qualification	Production
FBE Powder (a) Therm. Analysis (b) Moisture Content	8.2.a	Every Batch	Every Batch
PE or PP Adhesive (a) Density (b) Melt Flow Index	8.3.d	Every Batch	Every Batch
PE or PP Outer Coating (a) Density (b) Melt Flow Index	8.4.e	Every Batch	Every Batch
Environmental Conditions	10.3.h	Every Batch	Every Batch
Surface Preparation Standard	10.3.a	100% Every pipe	100% Every pipe
Surface Profile	10.3.d	Every Pipe	Beginning of every shift and every 4 hours thereafter
Surface Cleanliness	10.2	Every Pipe	1 Per Hour
Salt Contamination	10.4.i	Every Pipe	1 Per Hour
Chemical Pretreatment(s)/ Solution Concentration	11	Every Pipe	1 Per Hour
pH of Pipe Surface (Phosphoric Acid Pretreatment Only)	11.2.d	Once Per Shift	Visual-100% Every Pipe/Batch Change/Once Per Shift
Coating Application Temperature	12.2	Every Pipe, both before and after fresh water rinse.	Once per hour, both before and after fresh water rinse
Recycled Epoxy Powder (if used)	12.4	Every Pipe	Every Pipe
Coating Appearance	13.2	Every Pipe	One pipe per 500 coated
Coating Thickness	13.4	Every Pipe	Every Pipe
Holiday Detection (Full System Only)	13.5	Every Pipe (each layer)	Every Pipe
Cure by DSC (FBE only)	13.6	Every Pipe	Every Pipe
Adhesion Testing (FBE + Full System)	13.7	Every Pipe	One Pipe per 500 coated
Penetration (Full System Only)	13.8	Every Pipe (FBE + Full System)	One Pipe Per Shift (Full System Only)
Impact (Full System Only)	13.9	Every Pipe	One Per 500 Pipes
Cathodic Disbondment Testing (Full System Only) a) 48 hours @ 65 ±3°C (149°F ±5°F)	13.12	Every Pipe	One Pipe Per Shift
b) 28 days @ 23 ±3°C (73°F ±5°F)		Every pipe	---

Hot Water Immersion	13.13	Every Pipe (24 hours & 28 days)	One Per 500 pipes (24 hours only)
Air Entrapment	13.10	Every Pipe	One per 500 pipes
Flexibility (Full Coating System)	13.11	Every Pipe	One Pipe Per Shift

SPECIFICATION FOR WELDING OF PIPELINE

Document No. : MEC-GSP-1003



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Specification For Welding Of Pipeline

Doc. No. :
MEC-GSP-1003

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Specification For Welding Of Pipeline

Doc. No. :
MEC-GSP-1003

1.0 SCOPE

This specification defines the minimum requirements for welding of carbon steel pipeline systems and related facilities.

2.0 DEFINITIONS

For this specification the following definitions shall apply:

OWNER : “COMPANY” or “OWNER” means the person or persons, firm or Proprietor, who has hired PEC for delivering engineering services.

OWNER’S ENGINEER : Petrochemical Engineering Consultants

CONTRACTOR : Party which carries out all or part of the detailed engineering, procurement, construction, commissioning or management of the PROJECT.

SUB CONTRACTOR / VENDOR : The Contractor / Supplier engaged by Contractor

SHALL/MUST/IS TO BE : A mandatory requirement

SHOULD : A non-mandatory requirement, advisory or Recommendation

3.0 REFERENCE CODE AND STANDARDS

The following latest codes and standards shall be applicable for this specification:

- i. ASME B31.8 : Gas Transmission and Distribution Piping Systems.
- ii. API 1104 : Standard for welding of Pipelines and Related Facilities
- iii. ASME Sec. II C : Specification for welding Electrodes and Filler Materials
- iv. ASME Sec. V : Non Destructive examination
- v. ASME Sec. VIII Div.1: Boiler and Pressure Vessel Code: Pressure Vessels

- vi. ASME Sec. IX : Boiler and Pressure Vessel Code: Welding and Brazing Qualification
- vii. ASTM E23 : Notched Bar Impact Testing of Metallic Testing
- viii. ASTM E92 : Test Method for Vickers Hardness of Metallic Materials
- ix. ASTM E709 : Practice for magnetic Particle Examination
- x. ASTM A370 : Standard Test Methods and Definitions for Mechanical Testing of Steel Production
- xi. ASNT-SNT-TC-1A : American Society for Non-destructive Testing

4.0 WELDING PROCESS AND CONSUMABLES

4.1 Welding of various materials under this specification shall be carried out using Shielded Metal Arc Welding process (SMAW) with the approval of the OWNER. Any other process of welding shall require prior approval from the OWNER.

4.2 WELDING CONSUMABLES

4.2.1 The welding electrodes/filler wires supplied by the Contractor shall conform to the class specified in the approved welding procedure specification. The materials shall be of the make approved by the OWNER.

4.2.2 The Contractor shall submit batch test certificates from the electrode manufacturers giving details of physical and chemical tests carried out by them for each batch of electrodes to be used.

Electrode Qualification test records shall be submitted as per relevant code requirements in respect of the electrodes tested by the Contractor for obtaining the approval of the OWNER. The following details should include in qualification test records. All weld tensile test, base material used, pre-heat and post weld heat treatment details, visual examination results, radiographic examination results, tensile test results (incl. UTS, and elongation), impact test values, chemical analysis

report, fillet weld test results, other tests like transverse tensile tests and guide bend test results.

4.2.3 The electrode shall suitable for the welding process recommended and base metal used. Physical properties of the welds produced by an electrode recommended for the welding of a particular base metal shall not be lower than the minimum values specified for the base metal unless otherwise specified in approved Welding procedure Specification. The choice of electrode shall be made after conducting the required tests on the electrodes as per relevant standards and shall be the sole prerogative of the OWNER.

4.2.4 All electrodes shall be purchased in sealed, containers and stored properly to prevent deterioration. Electrodes shall be kept in oven, if required, at all conditions as per manufacturer recommended temperature.

Each packet / box of electrode shall contain Material Safety Data sheet conforming to Hazard Communication standard 29CFR, 1910, 1200 latest version.

Different grades of electrodes shall be stored separately.

The electrodes used shall be free 'from rust, oil, grease, earth and other foreign matter which affect the quality of welding.

4.2.5 The composition and purity of shielding gas when required by the welding processes other than shielded metal arc welding, when permitted by the OWNER shall be subject to the approval of the OWNER.

5.0 WELDING PROCEDURE SPECIFICATION

5.1 Contractor shall submit the welding procedure specification indicating the proposed welding process to OWNER for approval.

5.2 A combination of different welding processes or a combination of electrodes of different classes/makes could be employed for a particular joint only after duly qualifying the welding procedures to be adopted and obtaining the approval of the OWNER.

Welding procedure qualification shall be carried out in accordance with the relevant requirements of API 1104 and other applicable codes and other job requirements by the Contractor. The Contractor shall submit the welding procedure specifications as per the Formats given in API 1104 within one month after commencement of services indicating details of welding consumables, welding process, welding position, welders, destructive testing positions, pre-heating requirements, current, voltage, types of electrode, no. of passes, dia. of electrode, etc.

- 5.3 OWNER/ Owners Engineer will review, check and approve the welding procedure submitted and shall release the procedure for procedure qualification tests. The procedure qualification test shall be carried out by the Contractor under field conditions at his own expense. A complete set of test results shall be submitted to the OWNER for approval immediately after completing the procedure qualification test and atleast 2 weeks before the commencement of actual work. All tests shall be carried out as per provisions of this specification.

6.0 QUALIFICATION OF WELDERS & PERFORMANCE

- 6.1 Welders shall be qualified in accordance with the API 1104 and other applicable specifications by the Contractor at his expense. The butt weld test pieces of the welder qualification tests shall meet the radiographic test requirements of this specification and the destructive test requirements as per code. The OWNER shall witness the test and certify the qualification of each welder separately. Only those welders who have been approved by the OWNER shall be employed for welding. Contractor shall submit the welder qualification test reports and obtain express approval, before commencement of the work. It shall be the responsibility of Contractor to carry out qualification tests of welders.
- 6.2 The welders shall always have in their possession the identification card and shall produce it on demand by the OWNER. It shall be the responsibility of the Contractor to provide the identity cards after it has been duly certified by the OWNER. No welder shall be permitted to work without the possession of identity card.

- 6.3 OWNER will review the daily weld defect report and undertake the final interpretation. Subsequently OWNER shall instruct contractor of remedial action following the criteria given below.

Weld Defects	Action
1 to 2 Weld defects in 50 welds	Defects Recorded
3 Weld defects in 50 welds	Contractor advised
4 Weld defects in 50 welds	Second notice to Contractor
5 Weld defects in 50 welds	Welder removed from the project

7.0 ALIGNMENT

Temporary attachments of any kind shall not be welded to the pipe. Welds joining the sections of the pipeline, valve installation or similar welds classified as tie-in welds shall be made in the trench. Otherwise the alignment and welding shall be made alongside the ditch with the pipe supported on skids and pack pads or other suitable means approved by OWNER, at least 500mm above the ground unless approved by the OWNER in specific cases.

For welded pipes, weld seams of adjoining pipes shall be staggered such that a minimum distance of 300 mm to be maintained along the circumference and both longitudinal welds shall be at top 90° of the pipeline except in bends. A longitudinal joint shall pass an appurtenance of a structural element at a minimum distance of 50mm.

For pipe of same nominal wall thickness the off-set shall not exceed 1.6 mm. The off set may be checked from outside using dial gauges. Any branch connection sleeve, etc. shall be minimum 150mm from any other weld. The welds for fittings shall be so located that the toe of the weld shall not come within 50mm of any other weld. Cold dressing is permissible only in cases of slight misalignment and may only be carried out with a bronze headed hammer. Hot dressing shall not be permitted.

When welding pipes of different wall thickness, end connection shall be as per ASME B31.8. If required transition piece shall be used. This shall have a minimum of 1:4 taper. The welds shall be subject to both ultrasonic and radiographic inspection.

The root gap shall be accurately checked and shall conform to the qualified welding procedure. For mainline, the use of internal Line-up Clamps is mandatory for pipe diameters 10" and above. However, in some case (tie-in welds, flanges, fittings, small section etc.) where it is impossible to use internal Clamps, an external line-up clamp may be used.

The internal line-up clamp shall not be released before the entire root and hot pass has been completed.

When an external line-up clamp is used, all spaces between bars or minimum 60% of the root pass shall be welded before the clamp is released and the pipe remaining adequately supported on each side of the joint. Segments thus welded shall be equally spaced around the circumference of the pipe. Slag, etc. shall be cleaned off and the ends of the segments shall be prepared by grinding, so as to ensure continuity of the weld bead.

8.0 JOINT PREPARATION

Before welding, all rust and foreign matter shall be removed from the beveled ends by power operated tools at inside and outside edges for a minimum distance of 25mm from the edge of the weld bevel. If any of the ends of the pipe joints are damaged to the extent that, in the opinion of OWNER, satisfactory weld spacing cannot be obtained and local repair by grinding cannot be successfully done, the damaged ends shall be cut and beveled to the satisfaction of the OWNER, with an approved beveling machine.

Manual cutting and weld repairs of bevels is not allowed. Should laminations, split ends or inherent manufacturing defects in the pipe be discovered, the lengths of pipe containing such defects shall be removed from the line to the satisfaction of OWNER. On pipes which have been cut back, a zone extending 25mm back from the new field bevel, shall be dye penetration tested to the requirement of the line pipe specification

to ensure freedom from laminations. The new bevel shall be 100% visual and 100% dye penetrate /MPI tested A report shall be written for all testing.

The parts / joints being welded and the welding personnel shall be adequately protected from rain and strong winds. In the absence of such a protection no welding shall be carried out. All completed welding work shall be protected from bad weather conditions.

9.0 PRODUCTION WELDING

9.1 WELDING PASSES

- a) Root pass is a critical welding activity, which shall be carefully carried out by the Contractor as per approved WPS. Root pass shall be made with electrodes/filler wires recommended in the qualified WPS. The size of the electrodes used shall be as per the approved welding procedure. Preheating should be carried out by suitable heating method.
- b) Position or roll welding may be permitted. Separate procedures shall be submitted and qualified for up hill, down hill, vertical down and roll welding. Down hill welding shall be used when internal clamp is used. The vertical up method of welding shall be used for the root pass of the tie-ins, special crossings, fittings and special parts, fillet welds, repairs and when an external line up clamp is used. The down hill welding may be used for root run welding of tie-ins and special crossings when (a) the edges are machined or have equivalent preparation (b) line up clamps are used and the fit up is geometrically and mechanically similar to one of the ordinary line welding without misalignment or unevenness.
- c) Weld projection inside the pipe shall not exceed 2mm
- d) Any deviations desired from the recommended welding technique and electrodes indicated in the WPS shall be adopted only after obtaining express approval of the OWNER.
- e) Welding shall be continuous and uninterrupted during root pass. On completion of each run, craters, welding irregularities, slag etc., shall be removed by grinding and

chisel. While the welding is in progress care shall be taken to avoid any kind of movement of the components, shocks, vibration and stresses to prevent occurrence of weld cracks.

9.2 JOINT COMPLETION

In case of joint welding, the first pass shall be carried out by a minimum of two welders, working simultaneously and so placed as to cause minimum distortion of the pipe. The number of welders and the allowable welding sequences shall be as those laid down in the qualified welding procedure specification. Once the deposit of the first pass has been started, it must be completed as rapidly as possible, reducing interruptions to the minimum. The welding and wire speed shall be approximately same as that established in the qualified welding procedure specification.

The interruption between completion of the first pass and starting the second pass shall be as stated in the procedure specification, normally not exceeding four minutes.

The time lapse between second and third pass shall be as stated in the procedure specification, normally not exceeding five minutes. Welding can be suspended, so allowing the joint to cool down, provided that the thickness of the weld metal deposited is atleast 50% of the pipe thickness. Upon restarting, preheating to at least 100°C shall be carried out. Subsequent passes up to weld completion shall be protected to avoid rapid cooling, if meteorological conditions so dictate. Cleaning between passes shall be done carefully so as to reduce the possibility of inclusions.

Electrode starting and finishing points shall be staggered from pass to pass. Arc-strikes outside the bevel on the pipe surface are not permitted. Arc -strike or arc-burn on the pipe surface outside the weld, which are caused accidentally by electrical arcs between the electrode, electrode holder, welding cable or welding cable round and the pipe shall be removed by grinding in accordance with a procedure approved by OWNER and the repair checked by ultrasonic, radiographic, magnetic particle or dye penetrate tests which the OWNER feels necessary. The pipe wall thickness after grinding shall not be less than the minimum thickness limit permitted for the pipe.

Repair of arc strikes by welding is prohibited. The completed weld shall be carefully brushed and cleaned and shall appear free from spatters, scales, etc.

10.0 HEAT TREATMENT

10.1 PREHEATING

- a) Preheating requirement for this project shall be minimum 100°C.
- b) Preheating shall be performed using resistance or suitable heating method.
- c) Preheating shall extend uniformly to atleast three times the thickness of the joint, but not less than 50mm, on both sides of the weld. Preheating temperature shall be maintained over the whole length of the joint during welding temperature indicating crayons or other temperature indicating devices shall be provided by the Contractor to check the temperature.
- d) Maximum interpass temperature shall be 250° C

10.2 POSTWELD HEAT TREATMENT

- a) The Heat treatment of welded joints shall be carried out as per the requirements laid down in ASME B31.8 and other special requirements mentioned in approved WPS.
- b) Post weld heat treatment shall be done or by using an electric resistance or induction heating equipment, as decided by the OWNER.
- c) While carrying out local post weld heat treatment, technique of application of heat must ensure uniform temperature attainment at all points of the portion being heat treated. Care shall be taken to ensure that width of heated band over which specified post weld heat treatment temperature is attained is at least as that specified in the relevant applicable standards/codes.
- d) Throughout the cycle of heat treatment, the portion outside the heat band shall be suitably wrapped under insulation so as to avoid any harmful temperature gradient at

the exposed surface of pipe. For this purpose temperature at the exposed surface of the pipe shall not be allowed to exceed 400°C.

- e) Contractor shall submit detailed procedure for post-weld heat treatment specifying the temperature measurement, minimum no. of thermocouple to be used, details of the equipment to be used, method of execution etc. for approval.
- f) Automatic temperature recorders which have been suitably calibrated shall be employed. The calibration chart of each recorder shall be submitted to the OWNER prior to starting the heat treatment operation and its approval shall be obtained.
- g) Immediately on completion of the heat treatment, the post weld heat treatment charts/records along with the hardness test results on the weld joints (whenever required as per the welding specification chart) shall be submitted to OWNER for approval.
- h) Proper identification of weld joint shall be maintained and same shall appear on the corresponding post weld heat treatment charts and in corresponding radiography films.
- i) Hardness of the heat affected zone as well as of the weld metal, after heat treatment shall be measured using a suitable hardness tester by Vickers or Brinnel and shall not exceed the maximum hardness specified in the specification. The weld joint shall be subjected to reheat treatment, when hardness measured exceeds the specified limit, by the Contractor at his own expense.

11.0 INSPECTION & TESTING

11.1 WELDING PROCEDURE QUALIFICATION

For welding procedure qualification tests, standard tests as specified in the API 1104 shall be carried out in all cases. In addition to these tests, other tests like radiography, macro/micro examination, hardness tests, dye penetrate examination, Charpy V-notch etc. shall be carried out on specimens as per this specification at Contractor's expenses. It shall be the responsibility of the Contractor to carry out all

the tests required to the satisfaction of the OWNER. The destructive testing of welded joints shall be as per Annexure-1.

11.2 VISUAL INSPECTION OF THE WELD JOINT

Inspection of all welds shall be carried out as per the latest editions of the applicable codes and specifications. All finished welds shall be visually inspected for alignment, excessive reinforcement, concavity of welds, shrinkage, cracks, under-cuts, dimensions of the weld, surface porosity and other surface defects. Undercutting adjacent to the completed weld shall not exceed the limits specified in the applicable standard/code.

11.3 NON DESTRUCTIVE EXAMINATION

The non-destructive examination shall mainly consist of Radiographic examination and Ultrasonic Testing of the weld as detailed in Annexure-2. Radiographic examination of all girth welds with 100% coverage of the weld shall be the requirement. All welds shall meet the criteria as set forth in API 1104 and as modified in this specification below:

Cracks	Cracks of any type, size and shape including crater cracks are not acceptable
Incomplete root penetration	Not acceptable
Lack of fusion at the root	Not acceptable
Burn through	Un-repaired burn through are not acceptable
Excess weld penetration (Internal)	> 2mm Not acceptable
Excess weld reinforcement (External)	> 3mm Not acceptable

Any weld which as a result of radiographic and/or ultrasonic examination in the opinion of OWNER exhibits imperfections greater than the limits stated in API-1104 latest edition or as superseded in this specification as stated above shall be considered defective and shall be marked with an identification paint marker.

The Contractor shall make all the arrangements for the radiographic examination of work covered by the specification at his expense.

The OWNER will review all the radiographs of welds and inform the Contractor regarding unacceptable welds. The decision of the OWNER shall be final and binding in this regard.

Ultrasonic inspection / the other method as approved by OWNER is required in the following cases as per Annexure-2 of this Specification.

- a) When in the opinion of OWNER, ultrasonic inspection is required to confirm or clarify defects indicated by radiography.
- b) When there is 20mm or more are cut from the pipe end, the ends shall be dye penetration inspected for an additional length of 20mm to assure no lamination exist.
- c) When welds are repaired.

In addition, ultrasonic inspection may be required for certain critical welding of the pipeline (i.e. tie-ins, welding of valves, flanges) randomly selected at OWNER discretion. All fillet and groove welds other than those which are not radiographically examined shall be examined by Dye Penetration or Magnetic Particle inspection techniques.

All non-destructive test systems used for inspecting welds must be approved by the OWNER.

Suitable records shall be maintained by the Contractor as desired by the OWNER on the day to day work done on welding radiography and ultrasonic testing if any. The Contractor shall present the- records to the on day to day basis and whenever demanded for approval.

11.4 DESTRUCTIVE TESTING

0.2% of total number of welds completed shall be subjected destructive testing the welds selected by OWNER as per Annexure – 1.

In addition, welds already cut out for defects for any reason may also be subjected to destructive testing. If the results are unsatisfactory, two penalty joint shall be destructive tested. If any of these fails the joints welded by welder/wilders shall stand rejected and welder/welders shall be removed from the project or requalified.

Welding operations shall be suspended and may not be restarted until the causes have been identified and the Contractor has adopted measures which guarantee acceptable results. If it is necessary in the OWNER opinion the procedure shall be re-qualified. The weld joint represented by unsatisfactory welds shall stand rejected unless investigation prove otherwise.

12.0 REPAIRS OF WELDS

- 12.1 With the prior permission of OWNER welds which do not comply with the standards of acceptability shall be repaired or the joint cut out and re-welded.

A separate welding procedure specification sheet shall be formulated and qualified by Contractor for repair welds simulating the proposed repair to be carried out. Separate procedures are required to be qualified for (a) through thickness repair (b) partial thickness repair. Welders shall be qualified in advance for repairs. The root pass, for repairs opening the root, shall be replaced by the vertical uphill technique. The procedure shall be proven by satisfactory procedure tests to API-1104 including the special requirements of the specification, and shall also be subjected to metallographic examination, hardness surveys and Charpy tests to determine the effects of repair welding on the associated structure.

Root sealing or single pass repair deposit shall not be allowed. Internal root defects shall be ground thoroughly and welded with a minimum of two passes. However, while grinding for repairs, care shall be taken to ensure that no grinding marks are made on the pipe surface anywhere prior to this repair OWNER approval shall be obtained.

The repair weld shall be subjected, as a minimum requirement to the same testing and inspection requirements as the original weld. The entire joint shall be re-radiographed. A 100% ultrasonic inspection shall be done at the repaired area externally. Any repaired area that is wide, irregular or rough shall be rejected and a full cut out shall be done.

Welds not meeting the specification after one repair shall be cut out depending upon the extent of repair. A report of all repairs shall be maintained by Contractor. All

repairs shall be carried out the day after initial radiography or earlier. A full report of all repairs made shall be submitted every day to the OWNER.

12.2 LIMITATIONS ON REPAIRS

Only one attempt at repair of any region is permitted. Repairs are limited to a maximum 30% of the weld length. For internal repairs or external repairs which open the weld root, only 20% of the weld length may be repaired. Repairs opening the root must only be carried out in the presence of OWNER. The minimum length of a repaired area shall be 100mm as measured over the-recapped length. Welds containing cracks shall be cut out and rebeveled to make a joint with prior approval of OWNER.

ANNEXURE – 1

1.0 DESTRUCTIVE TESTING OF BUTT WELDED JOINTS

1.1 PREPARATION

After the visual and the non-destructive inspection, the test weld shall be subjected to mechanical test.

After satisfactory completion of all visual and non-destructive testing the procedure test weld shall be set aside for a period not less than 24 hour No further work on the test weld and no cutting of test specimens from the weld shall be performed until a period of at least 24 hours has expired.

Weld specimens shall be taken from the positions as per approved WPS. In addition to API 1104 tests, the following tests of minimum numbers to be carried out as tabulated below.

**Type and Number of Test Specimens for Procedure Qualification
Test and Production Welds**

Pipe size, out side diameter-inches	Number of Specimens		
	Macro	Hardness	Impact
Wall thickness- under ½ inch			
Under 2.375	0	0	0
2.375 to 4 ½	0	0	0
Over 4 ½ less than 12 ¾	2	2	12
12 ¾ and over	2	2	24



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Wall thickness-over ½ inch			
4- ½ and smaller	0	0	0
Over 4½ less than 12 ¾	2	2	12
12 ¾ and over	2	2	24

Macro and hardness shall be carried out, generally at the top and bottom of the joint suitably as per approved WPS.

The test shall be carried out at laboratories approved by the OWNER. The specimens shall be prepared in accordance with the relevant standards / code requirements.

1.2 TENSILE STRENGTH

Specimens shall be taken from the position as per approved WPS.

The test shall be carried out in accordance with API 1104.

Acceptance Criteria shall be as per API 1104.

1.3 NICK-BREAK TEST

Specimens for nick-break test with notches thus worked can break in the base metal, instead of in the fusion zone; therefore an alternative test piece may be used after authorization by the OWNER with a notch cut in the reinforcement of outside weld bead to a maximum depth of 1.5mm, measured from the surface of the weld bead.

Acceptance Criteria shall be as per API 1104.

1.4 MACROSCOPIC EXAMINATION

Specimens shall be taken from the positions as indicated in the approved WPS and shall be prepared in accordance with ASTM E2 and E3.

The width of the macro-section has to be at least three times the width of the weld. The section is to be prepared by grinding and polishing and etched to clearly reveal the weld metal and heat effected zone.

Specimens shall be carefully examined under the microscope, with a magnification of at least 25 (25:1).

OWNER reserve the right to ask for a micrograph with 5 times (5:1) magnification or any other magnifications as required for Documentation purposes.

Under macroscopic examination, the welded joints shall show good penetration and fusion, without any defect exceeding the limits stated in the evaluation criteria of the nick break test.

1.5 HARDNESS TEST

The prepared macro-section is to be used for hardness testing using the Vickers method with 10 Kg load Indentations are to be made along traverses each approximately 1 mm below the surface at both side of the weld.

In the weld metal a minimum of 6 indentations equally spaced along the traverses are to be made. The HAZ indentations are to be made along the traverses for approximately 0.5mm each into unaffected material, and starting as close to the fusion line as possible.

One indentation at each side of the weld along each traverse has to be made on the parent metal. The indentations are to be made in the adjacent region as well as on the opposite side of the macro section along the specified traverses.

The test shall be carried out in accordance ASTM E92.

Hardness value shall not exceed 290HV 10. In case of a single reading slightly (+40HV10) higher than the specified limit, further indentations shall be made to check if the high value was an isolated case.

All the hardness values contained from the heat effected zone shall not exceed 40 HV with respect to the average hardness of the values obtained for the base metal. If

these additional tests give a hardness within the specification limit the slightly higher value may be accepted.

1.6 CHARPY-V-NOTCH IMPACT TEST

Specimens shall be taken from the position as per approved WPS. The test specimens will be prepared in accordance with ISO R 148.

Three test specimens shall be taken from each sample and they shall be cut and worked so that their length is transversal and perpendicular to the weld bead with the notch position. The notch shall be perpendicular to the roller surface. The test specimen width shall depend upon the pipe wall nominal thickness as following:

Nominal wall thickness in mm	Test specimen width in mm
Over 12	10

The test shall be carried out as indicated in ISO R 148 "Beam impact test V- notch".

Test pieces shall be immersed in a thermostatic bath and maintained at the test temperature for at least 15 minutes. They shall then be placed in the testing machine and broken within 5 seconds of their removal from the batch.

The acceptable values of the impact energy shall be as follows:

Test specimen size (mm)	Average of three specimens (Note 2) Joules (Minimum)	Any single value (Note 1) Joules (Minimum)
10.0	40	37

Note:

1. These values are specified for resistance to brittle fracture only. Where additional requirements are specified by OWNER, the same shall be followed.
2. Only one value is permitted to be lower than average value up to the value specified.

1.7 BEND TEST REQUIREMENTS



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The Bend test Specimens shall be made and tested as per the requirements of API 1104.

The acceptance criteria shall be as per API 1104.

ANNEXURE-2

1.0 ULTRASONIC INSPECTION

Ultrasonic inspection is required to be performed on the pipeline field welds as per conditions listed in this specification. This section concerns manual ultrasonic inspection. However ultrasonic inspection by automatic equipment shall be used only with OWNER approval.

1.1 EQUIPMENT AND OPERATORS

The operators shall be qualified by the OWNER. All operators shall be qualified as per ASNT-SNT-TC-1A minimum level II.

The OWNER have the option of checking the ability of personnel employed for ultrasonic testing by means of qualification tests.

1.2 SPECIFICATION FOR ULTRASONIC TESTING PROCEDURE QUALIFICATION

Before work begins, the Contractor shall present a specification describing the proposed U.T. procedure qualification and calibration methodology.

This specification shall state, as an indication only but not limited to the following information:

- Type of U.T. equipment used
- Details for calibration
- Type and dimensions of transducers
- Frequency range
- Coupling medium
- Inspection technique
- Record details
- Reference to the welding procedure where it is intended to adopt the specification.
- Temperature range of the joints to be inspected.

The ultrasonic inspection procedure shall be approved by the OWNER. This specification test consists in testing (under normal operating conditions) some Contractor welds made according to the same production procedure, where there are typical defects the test intends to detect.

1.3 TEST PROCEDURE

Circumferential welds shall be inspected from both sides using angled probes.

If, during the test, echoes of doubtful origin appear, it shall be necessary to inspect a convenient area on the pipe surface, close to the weld, with a straight beam transducer in order to check whether any manufacturing defects are present which could have interfered with the ultrasonic beam.

The equipment shall include but not be limited to the following

- Ultrasonic equipment and coupling medium
- Sample sections for calibration of instruments
- Equipment for cleaning of surface to be examined
- Rules calibrated in centimeters for exact location of the position of defects.

1.4 REFERENCE PIECES

The efficiency of the equipment used, the effective refraction angle of the probe, and the beam output point, shall be checked using a V1 and V2 sample block, IIW type or the calibration block ASTM E-428.

1.5 AMPLIFICATION DURING PRODUCTION TESTING

The amplification during production testing shall be obtained by adding 2-6 dB (according to the surface condition of the pipe and its cleanness) to the reference amplification.

1.6 QUALIFICATION OF ULTRASONIC TESTING OPERATORS

Before the inspection begins or during the same inspection, the OWNER may require a qualification test for the ultrasonic equipment operators.

1.7 EVALUATION OF INDICATIONS GIVEN BY ULTRASONIC TESTS

Each time that echoes from the weld bead appear during production testing, the instrument amplification shall be altered to coincide with the reference amplifications and the probe shall be moved until maximum response is obtained, paying attention all the time to the probe-tube coupling.

If, under these conditions, the height of the defect echo is equal to or greater than that of the reference echo, the defect shall be evaluated according to the specification of NDT as mentioned. If the defect has also been detected by the radiographic and/or visual examination, the dimensions shall be judged according to the type of examination which detects the greater defect. Returns which are less than 50% of the reference echo, will not be considered. If returns are above 50% but lower than 100% of the reference echo, and if the operator has good reasons to suspect that the returns are caused by unfavorably oriented cracks, he shall inform the OWNER. Moreover, when there is a defect to be repaired, such defect shall be removed for a length corresponding to the one where no more return echo is given.

1.8 OTHER EQUIPMENT

The use of rules calibrated in centimeters, attached if possible to the probe, for the precise location of the position of welding defects, is recommended. Defect location is effected by measuring the projection distance between the probe output and the reflecting surface.

The operators carrying out the tests shall have, besides the probing instrument, tools for cleaning the pipe surface (files, brushes, etc.) as well as the coupling liquid or paste appropriate for the temperature of the section to be examined.

2.0 RADIOGRAPHIC TESTING

2.1 Proposed Radiographic examination procedure shall be submitted by the Contractor to OWNER for approval.

- 2.2 The procedure of radiographic examination shall be qualified to the entire satisfaction of OWNER prior to use. It shall include but not be limited to the following requirements.
- i) Lead foil intensifying screens, at the rear of the film shall be used for all exposures.
 - ii) Type 2 and 3 films as per ASTM E-94 shall be used.
 - iii) A densitometer shall be used to determine film density. The transmitted film density shall be 2.0 and 3.5 throughout the weld. The unexposed base density of the film shall not exceed 0.30.
 - iv) Radiographic identification system and documentation for radiographic interpretation reports and their recording system.
- 2.3 The Contractor shall qualify each procedure in the presence of the OWNER prior to use.
- 2.4 All the girth welds of mainline shall be subjected to 100% radiographic examination.
- 2.5 When the radiation source and the film are both on the outside of the weld and located diametrically opposite each other, the maximum acceptable length of film for each exposure shall not exceed the values given in API 1104. The minimum film overlap, in such cases, shall be 40mm. The ellipse exposure technique may be used on nominal pipe sizes of 2 inch and smaller provided that the source to film distance used is a minimum of 12 inch.
- 2.6 Copies of each acceptable radiographic procedure and of radiographic qualification records shall be supplied to OWNER. Set of the qualifying radiographs on the job shall be kept by the Contractor's authorized representative to be used as-a standard for the quality of production radiographs during the job. The other sets shall be retained by OWNER for its permanent record.
- 2.7 Copies of the exposure charts relating to material thickness, kilo voltage, source of film distance and exposure time shall also be made available to OWNER by the Contractor.

2.8 The Contractor shall provide all the necessary facilities at site, such as a dark room with controlled temperature, film viewer etc. to enable the OWNER to examine the radiographs.

2.9 The Contractor, if found necessary, may modify the procedure of radiographic examination suiting to the local conditions prevailing. This shall, however, be subject to the approval of the OWNER. OWNER shall have free access to all the Contractor's work facilities in the field.

2.10 Any approval granted by the OWNER shall not relieve the Contractor of his responsibilities and guarantees.

2.11 RADIATION SOURCE

Radiographic examination shall be carried out using X-radiations. Radiographic examination by Gamma rays may be allowed, at the discretion of the OWNER in case of inaccessible joints.

2.12 LEVEL OF QUALITY

The quality level of Radiographic sensitivity required for radiographic inspection shall be 2%.

2.13 PENTAMETERS

The image quality indicator (abbreviation: IQI) shall be used for the qualification of the welding procedure and during normal line production. Radiographic sensitivity shall be measured with the wire image quality indicator (Penetrameter). The penetrameter shall be selected according to DIN54109 or IS01027. The placement of the penetrameter shall be as per approved procedures.

The sensitivity limit may be considered to have been reached when the outline of the IQI, its identification number and the wire of the required diameter show up clearly on the radiograph.

The OWNER may authorize use of types of IQI other than those planned, provided that they conform with recognised standards and only if the Contractor is able to

demonstrate that the minimum sensitivity level required is obtained. For this demonstration, a test shall be carried out comparing the IQI specified and the Contractor's. to show up the identification number and other details of the proposed IQI, which must be visible in the test radiograph.

2.14 FILM IDENTIFICATION MARKERS

All films shall be clearly identified by lead numbers, letters, and/or markers. The image of the markers shall appear on the films, without interfering with the interpretation. These markers positions shall also be marked on the part to be radiographed and shall be maintained during radiography.

2.15 PROTECTION AND CARE OF FILM

All unexposed films shall be protected and stored properly as per the requirements of API 1104 standard and ASTM E.94.

The exposed and unexposed film shall be protected from heat, light, and dust and moisture.

Sufficient shielding shall be supplied to prevent exposure of film to damaging radiation prior to and following the use of the film for radiographic exposure.

2.16 RE- RADIOGRAPHY

The weld joints shall be re-radiographs in case of unsatisfactory quality of the radiographs, at the expense of the Contractor.

All the repaired weld joints shall be re-radio graphed at no extra cost to the OWNER in the same manner as that followed for the original welds. In addition, -the repaired weld areas shall be identified with the original identification number plus the letter R to indicate the repair.

When evaluating repair film, radiographers shall compare each section (exposure) of the weld with the original film to assure repair was correctly marked and original defect removed.

The OWNER will review prior to any repair of welds, all the radiographs of welds which contain, according to the Contractor's interpretation unacceptable defects. The final disposition of all unacceptable welds shall be decided by the OWNER.

2.17 QUALIFICATION OF RADIOGRAPHERS

Pipeline radiographers shall be qualified in accordance with the requirement of API 1104 and to the full satisfaction of OWNER.

Certification of all the radiographers shall be furnished by the Contractor to the OWNER before a radiographer will be permitted to perform production radiography.

The certificate record shall include:

- Name of Radiographer and qualification level
- Name of Certifying institute
- Certification Number, date and validity
- Identification of personal radiation monitoring device / dose meter / monitoring badge

Radiographer should carry with him the copy of instructions for operating and emergency procedure, rules and notifications in industrial radiography operation and details of radiograph source he is carrying / using.

The radiographers shall be required to qualify with each radiographic procedure they use, prior to performing the work assigned to him in accordance with the specification.

2.18 PRESERVATION OF RADIOGRAPHS

The radiographs shall be processed to allow storage of films without any discoloration for at least three years. All the radiographs shall be presented in suitable folders for preservation alongwith necessary documentation.

All radiographs shall become property of the OWNER.

2.19 EQUIPMENT AND ACCESSORIES

Contractor shall make necessary arrangements at his own expense, for providing the radiographic equipment, radiographic films and all the accessories for carrying out the radiographic examination for satisfactory and timely completion of the job.

2.20 RADIATION PROTECTION

Contractor shall be responsible for the protection and personnel monitoring of every man with or near radiation sources.

The protection and monitoring shall comply with local regulations. Contractor shall be responsible for complying with all rules and regulation set fourth by Atomic Energy Commission or any other Government `agencies in this regard and OWNER shall not be responsible. OWNER shall be kept indemnified at all times by the Contractor.

2.21 SAFETY INSTRUCTIONS

The safety provisions shall be brought to the notice of all concerned by display on a notice board at prominent place at the work spot. The person responsible for the "safety" shall be named by the Contractor.

SPECIFICATION FOR INSULATING JOINT

Document No. : MEC-GSP-1004



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1.0 GENERAL

- 1.1 This specification covers the minimum requirements for design, manufacturing, testing, inspection, supply and documentation for Monolithic Insulating joints for the Project.
- 1.2 Monolithic insulating joints to be supplied and to be installed at Pipeline Risers as mentioned in bill of quantities.

1.3 Operating Conditions

- Pipeline Design pressure: 1000 Psig
- Pressure-Temperature Rating 600#
- Composition of the pipeline product: Natural Gas
- Temperature of the pipeline product 60 °C.
- Ambient Conditions: Max. 55°C.
Min. 0°C
- Insulating joints shall be installed outdoors, above ground

1.4 Insulating joints shall be supplied with epoxy based primer coating to a minimum DFT of 1 mm. Suitable end covers shall be installed for the protection of bevels and to avoid ingress of material during shipment and handling at site.

1.5 The Contractor shall be responsible for ensuring that the materials utilized are suited for the design life of 20 years.

1.6 OWNER may also appoint its own inspector for the witnessing/inspection.

1.7 Definitions

For this specification the following definitions shall apply:

OWNER	: “COMPANY” or “OWNER” means the person or persons, firm or Proprietor, who has hired PEC for delivering engineering services.
OWNER’S ENGINEER	: Petrochemical Engineering Consultants
CONTRACTOR	: Party which carries out all or part of the detailed engineering, procurement, construction, commissioning or management of the PROJECT.
SUB CONTRACTOR / VENDOR	: The Contractor / Supplier engaged by Contractor
SHALL/MUST/IS TO BE	: A mandatory requirement
SHOULD	: A non-mandatory requirement, advisory or Recommendation

1.8 Errors or Omissions

1.8.1 The review and comment by the OWNER of any Contractor’s or its manufacturer’s drawings, procedures or documents shall only indicate acceptance of general requirements and shall not relieve the Contractor of its obligations to comply with the requirements of this specification and other related parts of the contract documents.

1.8.2 Any errors or omissions noted by the Contractor in this Specification shall be immediately brought to the attention of the OWNER.

1.9 Deviations

All deviations to this Specification, other specifications or attachments shall be brought to the knowledge of the OWNER in the bid. All deviations made during the procurement, design, manufacturing, testing and inspection shall be with written approval of the OWNER prior to execution of the work. Such deviations shall be shown in the documentation prepared by the contractor.

1.10 **Conflicting Requirements**

In the event of conflict, inconsistency or ambiguity between the contract scope of work, this Specification, National Codes & Standards referenced in this Specification or any other documents, the Contractor shall refer to the OWNER whose decision shall prevail.

1.11 **Reporting Procedure**

1.11.1 A reporting and documentation system shall be agreed between the OWNER and the contractor for the status of procurement, design, manufacturing, inspection, testing and shipment of the equipment/material to be supplied under this specification. Contractor's manufacturer shall provide reports and summaries for production performance and testing operations in conformance with a manufacturing schedule approved by OWNER.

2.0 CODES, STANDARDS AND SPECIFICATIONS

The materials and equipment supplied and work performed under this Specification shall conform to the latest edition of the industry Codes and Standards, references recommended practices and project specification listed below:

- a) ASME B16.9 Wrought Steel Butt Welding Fitting
- b) ASME Section IX Welding & Brazing Qualification
- c) ASME B31.3 Chemical Plant & Petroleum Refinery Piping
- d) API 5L Specification for Line Pipe
- e) ANSI B31.8 Gas Transmission and Distribution Piping System
- f) MSS-SP-75 Specification for High Test Wrought Welding Fittings

3.0 CHARACTERISTICS

3.1 Insulating Joints

Insulating joints, shall be flangeless which cannot be dismantled, after their assembly in the factory. They are assembled only in factory, steel parts are separated by rigid insulating rings and sealing gaskets with good mechanical and dielectric properties.

The insulating joint shall be used to provide electrical isolation of one piping system from another. The insulating joint shall be electrically discontinuous from one end to the other.

The insulating joint shall be suitable for aboveground or underground installation. It is to provide extended leak-free service, with no deterioration of its electrical insulation properties.

The insulating joint shall match the chemical and mechanical properties of the line pipe materials.

The insulating joint shall retain its electrical and mechanical properties after the butt-welding of each end is complete.

Once an insulating joint is fully assembled at the factory, disassembly of the unit shall not be allowed.

The insulating joint shall have an electrical resistance of greater than 5 Megaohms at 1000 V dc in dry air.

The insulating joint shall exhibit a dielectric strength such that there is no current leakage when 2500 Vac is applied across the joint for one minute and with no damage to insulating material.

3.2 The insulating joints shall have welded sleeves at each end, the length of which shall at least, be equal to the external diameter of the pipe. The dimensions of the beveled edges shall conform to the requirements of ANSI B 16.25 latest edition.

3.3 Ovalization of the pipes constituting the sleeves shall not exceed $\pm 0.5\%$.

4.0 MATERIALS

4.1 All materials used in the manufacture of the insulating joints must be satisfactory for use with Natural Gas or specified in BOQ and datasheet:

4.2 Chemical and mechanical properties

The insulating joint shall match the mechanical and chemical properties of the line pipe. Fitting material in accordance with MSS SP-75 is preferred. The grade shall match the grade of the pipe specified.

5.0 TESTS AND INSPECTION

5.1 All welding on the unit shall be performed using qualified Welding Procedure Specifications with supporting Procedure Qualification Records and welders qualified in accordance with ASME Section IX. All welds shall be 100 percent radiographically tested. The radiographic technique, interpretation and acceptance shall be in accordance with MSS SP-75. Where it is impractical to utilize radiography, weld testing shall be performed by the liquid penetrant or magnetic particle methods. Indication of cracks and areas of incomplete penetration of fusion of any size shall be unacceptable.

5.2 Acceptance of Insulating Materials

As a minimum requirement the following tests shall be performed by the Manufacturer and test certificate certified by a third party inspector acceptable to Purchaser shall be submitted to Purchaser:

- a) Tensile test on specimen of materials used
- b) Compression test using a 10 mm square stamp
- c) Measurement of low voltage resistance
- d) Test of transverse dielectric strength on plate of 3 mm thickness (or more)
- e) Measurement of water absorption percentage
- f) Check on thickness of joints, washers, sleeves.

In addition, measurement of the transverse resistance of the sample may be requested before and immediately after the water absorption test. The difference between the two specific resistance readings must not exceed 100 mega ohms cm^2/cm .

5.3 Acceptance of Insulating Joints Assemblies

The following tests and inspection must be carried out on each insulating joints assembled in the workshop:

- Visual inspection
- Radiographic, ultrasonic and liquid penetrants or magnetic particle inspection as applicable.
- Hydrostatic test
- Dimensional check (after hydrostatic test)
- Electrical resistance (after hydrostatic test)
- Coating thickness
- Any additional tests which may be considered necessary to ascertain characteristics of the joints as a whole or its components.

5.3.1 Visual Inspection

A final visual examination shall verify that:

- the insulating joint is free of nicks, dents, arc burns or other surface irregularities
- Weld seams do not exceed 3 mm in height
- After the application of coating at ends, the bevel ends are free of coating and the applied coating is free of runs, sags or gaps.

5.3.2 Hydrostatic Test

Each insulating joint shall be tested at 60 bars. The test must be maintained 4 hours with no signs of leakage. Testing shall be done at a constant temperature. Testing will be performed using a dead weight tester that is certified for accuracy. Test pressure shall be recorded, and both the record and copies of the calibration certificate of the dead weight tester shall be included as part of the records of the hydrostatic test.

5.3.3 Dimensional Check

The insulating joint shall be checked after hydrostatic testing to ensure that the tolerances of MSS SP-75 are met for ovality, wall thickness and squareness.

5.3.4 Electrical Properties.

Measurement of the electric resistance between the two conducting parts of the insulating joints and between each threaded rod and the conducting parts of the joint.

This resistance should be more than 1 mega ohms.

Dielectric strength test on each insulating joint at a minimum voltage of 2500 volts.

6.0 TEST / INSPECTION REPORTS AND DOCUMENTATION

6.1 Supplier shall deliver to Purchaser the record and certification of all test and inspection required to be carried out on the insulating joints and its components. This shall include but not limited to the following:

- a) Drawings with sectional views showing the arrangement of all components.
- b) Bill of materials.
- c) Material certificates for each component (chemical and mechanical properties).
- d) Records of destructive and non-destructive testing.
- e) Welding procedure qualification record.
- f) Welder qualification record.
- g) Hydrotest record.
- h) Coating thickness check and inspection records.
- i) Electrical resistance test record. (Before and after hydrotest).
- j) Dielectric strength test record. . (Before and after hydrotest).
- k) Calibration records of instruments used in inspection and testing.
- l) Record of visual inspection.
- m) Guarantee Certificate.
- n) Third Party Inspection Certificate for compliance of this specification.

7.0 NAME PLATE

Nameplate information may be stenciled on the unit or an actual nameplate attached to the unit. Nameplate information shall include:

- Tag numbers
- Manufacture's name
- Serial number
- Nominal diameter
- Design wall thickness and grade of adjoining pipe
- Design pressure
- Test pressure
- Design temperature
- Purchase order number (if any)
- Date of manufacture (month/year)

SPECIFICATION FOR HYDROSTATIC TESTING

Document No. : MEC-GSP-1005



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Specification For Hydrostatic Testing Of Pipelines

Doc. No. : MEC-GSP-1005

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1.0 SCOPE

- 1.1 This specification defines the minimum technical requirements for supply, works and operations to be performed by Contractor for hydrostatic testing of cross country pipelines transporting hydrocarbons in liquid or gaseous phase.

2.0 DEFINITIONS

For this specification the following definitions shall apply:

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SHALL/MUST/IS TO BE : A mandatory requirement

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3.0 REFERENCE DOCUMENTS

- 3.1 Reference has been made in this specification to the following codes and standards:

- i) ASME B31.8 : Gas transmission and distribution piping system
- ii) ASME B31.4 : Liquid petroleum transportation piping systems
- iii) API RP1110 : Pressure testing of liquid petroleum pipelines
- iv) ASME Sect. VIII : Boiler & Pressure Vessel code Div. 1 hydrocarbon pipelines

4.0 FUNCTIONAL REQUIREMENTS

- 4.1 Hydrostatic test shall be performed on the entire length of the pipeline or section of pipeline as approved by OWNER. Hydrostatic test shall be performed in accordance with approved test diagrams for each test section. The maximum length of each test section shall not exceed 50 kms./ if Contractor wish to do final hydrotest in one go he has to propose, justify and get approval from OWNER.

Wherever pipeline is installed through casing that particular section has to be pretested. Pretesting pressure and hold period shall be as per relevant specification.

- 4.2 In addition to the above, for pipeline sections, which in OWNER's opinion, once installed would require an inordinate amount of effort for repair in case of a leak, a provisional pre-test shall be conducted in consultation with the OWNER. However, after installation, all such pretested sections shall be tested again along with the entire pipeline. Contractor shall submit the completed pipe book with all respect till to the testing stage at least one week before hydro test commencement. Contractor required to take the mechanical clearance from OWNER before proceeding for cleaning, gauging and hydrotest activities.
- 4.3 Test shall commence only after completion of all mechanical and civil works i.e., all welds have been accepted and the pipeline has been laid and backfilled according to the specifications. OWNER shall check the pipebook with all site test reports / quality reports and relevant documents and shall sign for release for hydrostatic testing format for pipeline section to be tested. Contractor shall perform all works required for testing after obtaining written approval from the OWNER.
- 4.4 Contractor shall prepare a test procedure submit for OWNER's approval at least one month prior to the scheduled commencement of tests. The procedure shall strictly comply with the requirements of this specification. The procedure shall include all temporary materials and equipment, but not limited to the following items:

- a) A diagram indicating all fittings, vents, valves, test headers, temporary connections, relevant elevations and ratings. The diagram shall also indicate injection location and intake and discharge lines.
- b) Estimated amount of test water, water sources, results of water test sample, including required concentration of corrosion inhibitors and additives, procedure for inhibitor injection and control or concentration.
- c) Cleaning, gauging, filling and flushing procedures, including a complete description of all proposed equipment and instruments (including spares), their location and set-up.
- d) The type and sequence of pigs and the pig tracking system for cleaning and removal of air pockets. Pig inspection procedures, including procedure to be followed in case the gauging pig indicates damage.
- e) Pressure testing procedure including a complete description of all proposed equipment and instruments (including spares), their location and set-up, and proposed system for observation and recording of data during the pressure test.
- f) Procedures for leveling and stabilization after filling and for pressurization and to allow for temperature stabilization..
- g) Procedure for detection and location of leaks.
- h) Procedure for dewatering the pipeline section after testing, including a complete description of all proposed equipment and instruments (including spares), their location and set-up, the type and sequence of pigs and the pig tracking system along with the pig specifications.
- i) Forms for recording the test data.
- j) Method of disposal of hydro test water if water contains additives of anti corrosion solution.

4.5 EQUIPMENT AND INSTRUMENTATION

The Contractor shall furnish all necessary equipment for performing the work as stated in cleaning, flushing, filling, leveling, stabilizing, and testing and dewatering procedures.

This shall include, but not be limited to the following equipment and instruments.

- 1) Pigs for filling, cleaning and gauging :
 - a) Cleaning pigs with nylon / polyurethane / steel brushes.
 - b) Four cup batching pigs ;
 - c) Pigs with gauge plate diameter equal to 95% of the nominal inner dia of heavy wall pipe in the pipe sections.

The Contractor shall provide sufficient number of pigs, including spares.

- 2) Fill pumps : The Contractor shall determine the type and number of fill pumps. If a single pump is used, a standby unit must be available.
- 3) Water tanks during water filling.
- 4) Variable speed positive displacement pumps equipped with a stroke counter to pressurize the line with a known stroke and capable of exceeding the maximum test pressure by atleast 20 bar.
- 5) Two positive displacement meters to measure the volume of water used for filling the line. These meters shall be provided with a calibration certificate not older than one month.
- 6) Pressure gauges of suitable pressure range (1.5 x pressure to be measured) and accuracy of $\pm 0.1\%$ of the full scale value.
- 7) Pressure recording charts.
- 8) Dead weight testers with an accuracy of 0.01 bar measuring in increments of 0.05 bar provided with a calibration certificate not older than one month.
- 9) Two temperature recorders for fill water.
- 10) Thermocouples for measuring the pipe wall temperature.

- 11) Two laboratory thermometers 0° C to 60° C range, accuracy ± 0.1 degrees to be used in thermo wells.
- 12) Portable tanks of sufficient size to provide a continuous supply of water to the pump during pressurizing.
- 13) Means to measure the volume of water necessary to drop the line pressure by 0.5 bar (container on scales or graduated cylinder).
- 14) Injection facilities to inject additive for anti-corrosion into the test medium in the required proportions.
- 15) The temporary headers shall be installed according to the testing sections fixed in the test procedure manual. Proper piping and valving arrangements shall be available to allow launching and receiving of each pig independently.
- 16) Communication equipment suitable for a continuous connection between the beginning and the end of the test section and with the inspection team along the line, in accordance with the requirements of Local Authorities.
- 17) Thermocouples for measuring the temperature of the pipe wall shall be installed on the pipeline to be tested :
 - 1 thermocouple at about 500m distance from the pumping head.
 - 1 thermocouple every 2500 m of the pipe.
 - 1 thermocouple at about 500m distance from the terminal head.These shall be witnessed, approved and the documents /report shall be certified.

In addition to above, OWNER reserves the right to demand to install more thermocouples as per site conditions.

Thermocouples shall be attached on the external surface of the pipe after removal of external coating and shall be adequately protected and OWNER's coating instruction shall be followed.

5.0 TEST DURATION AND PRESSURE

- 5.1 The duration of hydrostatic test shall be minimum 24 hours after stabilization and the test pressure shall be as indicated in approved hydrostatic test diagram.
- 5.2 Unless otherwise specified in the Contract, the minimum test pressure shall be as per ASME B31.8 and maximum test pressure shall be limited to hoop stress resulting 90% of SMYS of the lowest wall thickness of line pipe within the pipeline section to be tested.

6.0 PROCEDURES

If the difference of minimum and maximum atmospheric temperature should cause thermal instability on the pipe section directly exposed to atmospheric condition, the scraper traps and above ground pipeline shall be properly protected.

The pipeline test exclude long segments of line exposed to atmospheric condition, viz aerial lengths on piers, bridges etc. all such sections shall be tested separately.

The test medium shall confirm soft non-aggressive water. The water to be used shall be filtered, limpid, potable and free from sand or silt. Contractor shall submit laboratory test reports of water used for testing. Water shall be within PH 7 to PH 8 and shall be tested at OWNER approve institute. Contractor shall provide OWNER approved corrosion inhibitors, oxygen scavengers and bactericides to be added to the test water. The Contractor shall furnish and install all temporary piping which may be necessary to connect from source of water to its pumps and manifolds / tankages.

6.1 CLEANING AND CALIPER PIGGING

Before filling operation the Contractor shall clean the pipeline by air driven pigs to remove all mill scale rust / sand from the internal of pipe sections. The finishing touch shall be executed with pigs provided with air jet holes or nozzles to keep the internal dust in turbulence ahead of the pigs. The number of pig runs shall depend upon the cleaning results and shall be determined by the OWNER at site.

In normal case the cleaning pig shall run with adequate water volume ahead of pig so the debris shall be washed out with pig. Cleaning shall be considered accepted when the debris collected with water is 2% of water volume.

Gauging plate shall be of aluminum 12 mm thick with outside diameter as 95% of the inside diameter of the thickest section of the pipeline. Gauge plate shall have cuts of 2 mm. on the periphery in radial direction on 6 places 60° apart and shall have chamfer on one face of the plate. The Contractor shall fix the plate on pig in presence of OWNER and duly signed by them.

A gauging pig shall be launched using inhibited water in order to check possible out-of roundness along the pipeline. The results of the caliper pig run shall be analysed to evaluate the internal status of the pipeline. If required the gauging pig shall be propelled with control speed and a continuous back pressure of about 2 bar. Contractor has to decide it.

After gauging, pipeline will be flushed and water shall be filled with corrosion inhibitor by propelling min 2 pigs with water column of 100 meters.

6.2 THERMAL STABILISATION

After a check has been made to confirm if the pressure has attained at least 1 bar (g) on the highest section, the thermal stabilization can be started.

Thermal equilibrium between the pipeline and environment shall be checked through the thermocouples installed on the pipeline.

Temperature readings shall be taken at 2 hours intervals. Thermal stabilization shall be considered to have been achieved when a difference not higher than 1°C is attained between the average values of the last two readings. Thermal stabilization completion shall be approved by OWNER.

6.3 PRESSURISATION

The pressurization rate shall not be more than 2 bar/min. Pressure shall be recorded by using a dead weight tester and confirmation can be done with pressure gauge on the same header. Volume shall also be recorded with respect to pressure.

- Each 5 bar increments upto 80% of test pressure as recorded by the dead weight tester.
- Each 2 bar increment between 80% to 90% of the test pressure as recorded by the dead weight tester.
- Each 0.2 bar increments between 90% of the test pressure up to full test pressure as recorded by dead weight tester.

Air volume ratio shall be calculated as per following :

- i) Pressure to 50% of test pressure, hold pressure for 1 hour, collect water for air volume calculations.
- ii) Drop pressure to static head of test section at test head.
- iii) Pressurize 75% of test pressure, hold pressure for 1 hour, collect water for air volume calculations.
- iv) Drop pressure to static head of test section at the test head.
- v) Pressurize to test pressure.

During the pressurization to each test pressure, two tests shall be carried out for the calculation of air volume in the pipeline under test.

6.3 AIR VOLUME CALCULATION

In order to check the presence of air in the pipeline, two separate consecutive pressure lowering of 0.5 bar shall be carried out.

For calculation of air in the pipeline the second pressure lowering shall be used, and the relevant drained water shall be accurately measured (V1). This amount measured shall be compared to the theoretical amount (V2) corresponding to the pressure lowering that has been carried out, by using the procedure outlined in the specification.

If no air is present in the length under test:

$$\frac{V1}{V2} = 1$$

In order that the above ratio is acceptable, it shall not differ from 1 by more than 6% (i.e. 1.06).

If ratio is found within limits, pressurization can continue. If not, water refilling shall be carried out by another run of batching pigs.

6.4 TESTING

After the section has been pressurized and the air volume test has given acceptable results the test pressure shall be held for a minimum of 24 hours after stabilization. After temperature and pressure are stabilized, the injection pump shall be disconnected and all connections at the test heads shall be checked for leakage. The pressure recorders shall then be started with the charts in a real time orientation for continuous recording throughout the test duration.

During the testing period the following measurements shall be recorded / reported:

- _ Every one hour pressure measurements from dead weight testers.
- _ Every two hours the ambient temperature and the pipe temperature at the thermocouples.

All data shall be recorded on appropriate formats attached to the hydrostatic test procedure manual. Care shall be taken that the maximum test pressures are not exceeded.

Bleed-off water shall be accurately measured and recorded.

7.0 ACCEPTANCE

The hydrostatic test shall be considered as positive if pressure has kept a constant value throughout the test duration, except for change due to temperature effects. Such changes shall be evaluated as described below.

The pressure change value as a function of temperature change shall be algebraically added to the pressure value as read on the meters. The pressure value thus adjusted shall be compared with the test shall be considered as acceptable if the difference is less than or equal to 0.3 bar. In case of doubt the test duration shall be extended by 24 hours. If test section doesn't meet the above requirement, Contractor shall determine by search the location of leakage or failure. All leaks and failures within the pipe wall or weld seam shall be repaired by replacement of entire pipe or pipes in which leakage or failure occurs. In those cases where leaks occur in circumferential welds the method of repair shall be determined by the OWNER. Contractor shall comply with instructions of the OWNER whether to replace a section of the line pipe that includes the line leak or whether to repair the circumferential weld. The repair shall be carried out as per specifications. Where failures occur in pipeline field bends, bends shall be replaced with same degree bends. After completion of repairs, the hydrostatic test shall be repeated as a complete cycle, as per this specification.

8.0 TERMINATION

After the positive results of testing and all the data have been gathered, the tests shall be terminated upon written approval given by OWNER.

The pipeline shall be slowly depressurized at a moderate and constant rate as instructed by OWNER.

9.0 DETAILS OF THE INSTRUMENTS

9.1 WATER AMOUNT MEASUREMENT

The water volume added to the section to be tested shall be measured during the filling stage through a positive displacement meter (a turbine meter may also be used).

The amount of water that has been let into the section shall be measured during the pressurization stages through positive displacement meters or turbine meters.

9.2 PRESSURE AND TEMPERATURE MEASUREMENT

Pressure shall be measured with a dead weight tester. Pressure recorder and gauge shall be installed on line.

Pressure instrument shall have the following accuracy:

Accuracy : $\pm 0.1\%$ of the full-scale value.

The recording pressure gauge shall be checked by means of dead weight tester at the beginning, during and at the end of the hydrostatic test.

The thermocouples sensitivity shall enable temperature readings with accuracy of $\pm 0.2^\circ\text{C}$.

Thermocouple/Readout units shall be calibrated with thermometer which should have calibration certificate.

The recording thermometer shall feature the following characteristics:

Accuracy : $\pm 1\%$ of the scale range

Scale : -10° to $+ 50^\circ\text{C}$

Environmental temperature shall be recorded by thermometer which shall have:

Accuracy : $\pm 1\%$ of the scale range

Scale : 0° to $+ 60^\circ\text{C}$

10.0 CALCULATIONS

The theoretical water amount that is necessary for filling the section to be tested shall be obtained from the geometrical volume of the section considering the pipe tolerances.

The theoretical water amount that is necessary for pressurizing the section shall be calculated by means of the following formula:

$$V_p = (0.884 r_i/t + A) \times 10^{-6} \times V_t \times \Delta P \times K$$

Where:

- V_p = computed water amount required to raise by P the pressure in the section to be tested (m³).
- V_t = geometrical volume of the section (m³).
- ΔP = Pressure rise (bar)
- r_i = nominal inner radius of the pipe (mm).
- T = nominal pipe thickness (mm).
- A = isothermal compressibility value for water at the pressurization temperature in the P range (bar⁻¹) x 106.
- K = a dimensionless coefficient that is equal to a value of 1.02 for longitudinally welded pipe.

The pressure change due to a water temperature change shall be calculated through the following formula:

$$\Delta P = \frac{B}{0.884 \frac{r_i}{t} + A} \Delta T$$

Where,

- ΔP = Pressure change resulting from a temperature change (bar).
- ΔT = Algebraic difference between water temperature at the beginning of the test and water temperature as measured at the end of the test (°C).
- B = Value of the difference between the thermal expansion of water at the pressure and temperature as measured at the end of the test and that of steel (°C⁻¹) x 106.
- A = Isothermal compressibility value of water as estimated at the pressure and temperature values obtained at the end of test (bar⁻¹) x 106.
- r_i = nominal inner radius of the pipe (mm).
- t = nominal pipe thickness (mm).

11.0 TEST REPORT / DOCUMENTATION

A complete report signed by Contractor's Quality team and OWNER shall be submitted upon completion of the hydrostatic testing operations for each test section.

The report shall contain as minimum

- Cleaning, flushing, filling and testing procedure used
- Schematic layout of cleaning, filling and testing facilities
- Instruments calibration certificates
- A profile of the pipeline that shows the test sites, all instrument and injection connections
- Pipe filling logs and records
- Hydro test chemicals specification, dosage, injection records
- Pig specifications
- Pig inspection records including photographs of the damages
- Records of gauging pig survey and photographs
- Records of caliper pig survey and interpretation of results
- Pressurization and stabilization records
- Pressure and temperature recording charts with appropriate information inscribed thereon
- Dead weight tester logs and recordings
- Air volume calculations
- Pressure – temperature change calculations
- Environmental data
- Depressurization logs and records
- Records and photograph of all leaks/failure

12.0 PRECAUTIONS DURING THE TEST

In addition to all that has been expressly described in the procedures for carrying out the test, the following requirements shall also be complied with

- 12.1 During the hydro test, no other activities shall be performed on or near the pipeline being tested.
- 12.2 Signs stating “PIPE UNDER TEST – KEEP OFF” shall be placed where the test heat/scrapper traps are located. Such areas shall be suitably guarded throughout the duration of the test. In case pressurizing is done from the shore end, the entire operational area shall suitably be fenced to prevent entry of unauthorized personnel.
- 12.3 All personnel working on the hydro test spread shall be instructed on the possible dangers connected with the high pressure test operations. During the testing, operations, no unauthorized personnel shall be allowed near by the test head location. Test cabin shall be atleast 10 m away from the pipeline so that it is not affected by any pipeline failure.

SPECIFICATION
FOR
FACTORY BENDS

Document No. : MEC-GSP-1006



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1.0 GENERAL

1.1 This specification covers the minimum requirements for design, manufacturing, testing, inspection, supply and documentation for factory made large radius 5D-Pipe bends for the Project.

1.2 Definitions

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1.4 Deviations

All deviations to this Specification, other specifications or attachments shall be brought to the knowledge of the Owner in the bid. All deviations made during the procurement, design, manufacturing, testing and inspection shall be with written approval of the Owner prior to execution of the work. Such deviations shall be shown in the documentation prepared by the contractor.

1.5 Conflicting Requirements

In the event of conflict, inconsistency or ambiguity between the contract scope of work, this Specification, National Codes & Standards referenced in this Specification or any other documents, the Contractor shall refer to the Owner whose decision shall prevail.

1.6 Reporting Procedure

- 1.6.1 A reporting and documentation system shall be agreed between the Owner and the contractor for the status of procurement, design, manufacturing, inspection, testing and shipment of the equipment/material to be supplied under this specification. Contractor's manufacturer shall provide reports and summaries for production performance and testing operations in conformance with a manufacturing schedule approved by Owner.

2.0 CODES, STANDARDS AND SPECIFICATIONS

All bends shall conform to the applicable requirements of the following documents, except as specifically noted in this specification

ASME B 16.49	Factory Made wrought steel butt welded Induction Bends for Transportation and Distribution System
API SPEC. 5L	Specification for Line Pipe
ASME/ANSI B31.8	Gas Transmission and Distribution Piping System
ANSI B16.9	Factory Made wrought steel butt welded fittings
B16.25	Butt Welded Ends
MSS SP-75	Specification for high test wrought welding fittings
ISO 9000	Quality System

3.0 DESIGN DATA

The Radius of manufactured bends shall be suitable for pigging. All Factory made bends for the pipeline shall have a radius of 5D.

3.1 For 20" Dia. Pipeline (Class-II)

Pipeline Size	:	Outer Dia. 20 inch
<i>Pipe Thickness</i>	:	<i>10.31 mm*</i>
Pipe Material	:	API 5L Grade X-70
Bends Size	:	Outer Dia. 20 inch
<i>Bends Thickness</i>	:	<i>10.31 mm (Next Higher Pipe thickness)*</i>
Bends Material	:	API 5L Grade X-70

*** : Owner to update bend & pipe-thickness**

4.0 MATERIAL & PROCESS OF MANUFACTURE

4.1 General

All material shall be new, unused and suitable for the specified application.

The bends shall be obtained by hot bending of pipes selected from those destined for the Liquid Transportation Pipeline. The bends shall comprise a bent part and at each end a straight part at a tangent to the bent part.

The pipes, for the manufacturing of the bends, shall be selected in such a way that their thickness, yield strength and toughness are at least equal to that of the line pipe or higher. Characteristic of the pipe used for the manufacturing of the bends shall be correctly identified.

4.2 Mill Test Reports

The mill certificates of pipes, the chemical composition of heat and/or product, the mechanical properties of the product, shall be provided to the Owner.

4.3 Manufacturing Procedure

4.3.1 Bending

- Prior to work being performed, the Contractor shall submit, for approval, detailed manufacturing procedures.
- The pipe bends will be made by High Frequency Induction heating method. Heating shall be uniform and done in a furnace. Temperature shall be controlled. Bending by locally/applied heat is not allowed.
- The bends are to be installed on pipeline for which submerged arc welded (spiral-welded pipe) or Electric-Resistance Welded (ERW) shall be used.
- Hot bending shall be performed so as to avoid any fold, distortion and any excessive formation of scale or oxides on the internal and external surfaces of the elbows. In case these surfaces are not correct, a treatment of these surfaces

may be required in order to obtain a surface condition suitable for examination.
In case of welded line pipe, the weld shall be positioned on the upper generating line (i.e.) in the position, which corresponds to maximum deformation.

4.3.2 Final Heat Treatment

If the mechanical properties of the pipes used would be altered by the bending operation, the bends shall be heat treated after bending.

5.0 INSPECTION AND TESTING

5.1 General

- 5.1.1 All inspections and tests to be carried out at, under this specification at the Manufacturer's facility, shall be witnessed and certified.

The X-ray will be read according to the code laid down for pipes defined in the latest edition of API Standard 5L

Certified copies of shop tests, performed on the bends shall be furnished to the Owner.

- 5.1.2 Ultrasonic control shall be applied on weld (if any) as an additional check where deemed necessary.

5.2 Visual Check

All bends shall be visually inspected to ensure that they are free from surface defects.

5.3 Dimensions & Tolerances

A full dimensional testing shall be made upon each delivered bend. Pipe used for bends must be within the tolerances permitted by line pipe specification API 5L

The diametrical tolerance at the beveled ends shall meet the requirements of API Specification 5L.

Pipe ends shall meet the requirements of API Specification 5L.

5.3.1 Ovalization

A gauging pig shall be passed through each bend. The gauge shall have two parallel 6-mm thick circular plate each at least 95% of pipe nominal ID separated by a rigid bar of length twice the pipe nominal inside diameter.

The Ovalization after production of bends will be within the following tolerances:

$$D \text{ max} - D \text{ min}$$

----- < 1.2 % = Ovalization max.

Do th

In which

D max. is the pipe maximum outside diameter.

D min. is the pipe minimum outside diameter

Do th. Is the pipe theoretical outside diameter.

5.3.2 Straight Parts

The ends of the straight parts and the bevels shall conform to API specification 5L and shall have 300mm long straight length.

5.3.3 Undulations

The maximum depth of the undulations should not exceed 2% of the nominal outside diameter.

This tolerance shall be checked by passing a gauge through it, diameter of which shall be given in the order.

The outside surface should be regular and show no discontinuity.

The repairing of the undulations by locally applied heat or by hammering is not allowed.

5.3.4 Thickness of the bends

The thickness of the bends shall be measured by ultrasonic, especially the outer part of the torus. These should not reveal any abnormal thinning of the wall.

5.3.5 Curve Radius

The curve radius will be checked by measurement of the sag on a rope 2 meters in length for pipes of less than 12" and 3 meters in length for pipes of 12" and more.

The tolerance on the specified radius is $\pm 1/15$ of the radius.

5.4 Mechanical Testing

5.4.1 After the final bending, the Manufacturer shall take a transverse sample from both ends of each bend. This sample will be given a tensile test to determine the minimum yield stress, the elongation and the tensile strength.

The taking of samples, preparation, execution and result of the tests must be complied with API standard specification 5L or the requirements of the order.

5.4.2 The results of the test will be given in a certified test report, which will be signed by the Manufacturer and submitted, to the Owner.

5.4.3 A special examination will be made to check that the beveled ends have not split (dye penetration or magnetic particles).

5.4.4 Hydrostatic Tests

The bends shall be submitted to a hydrostatic test to the test pressure (1.1 x Design Pressure). All hydrostatic test pressure shall be in accordance with ASME B 31.8.

5.5 Repairs

Bends shall be free from cracks and other injurious defects. All costs associated with replacement of rejected bends or repair of beveled ends shall be to the Contractor's account.

Minor surface defects may be removed by grinding provided the minimum specified wall thickness is not infringed upon. Removal of defects shall be confirmed by magnetic particle examination.

5.6 Painting and Coating

Bends, supplied for the installation on the above ground sections of the pipeline, shall be sand blasted and primer coated suitable for Polyurethane Coating

5.7 Acceptance

Acceptance shall be pronounced by the Owner or his representatives.

The Owner and his Representatives have the right of free access at any time to all parts of the factory where the work or tests are being carried out on the bends that have been ordered.

The Contractor shall make available to the Owner's Representatives, all facilities enabling them to ensure that the requirements of the present specification and the order are being complied with.

A copy of the order for the pipes will be sent to the Owner.

Under no circumstances can the Contractor be relieved of his responsibilities by the Owner or his Representatives.

6.0 DOCUMENTS

6.1 The Contractor will submit three sets of following inspection and test certificates along with the supply.

- Final Drawings
- Calculations
- Hydrostatic tests.
- Chemical analysis.
- Mechanical properties (yield strength, ultimate tensile strength and elongation).
- Dimensional checks.

Contractor will indicate the make/origin of pipe used for large radius bends in their quotation.

6.2 The Contractor shall provide the following certificates:

- Certificates of conformity and test certificates for materials.
- Pressure test certificates.
- Records of all inspections and testing carried out at the shop.

7.0 NAME PLATE

A nameplate (of SS-316) shall be attached to each bend showing the relevant design and test data. Alternatively stenciling may be substituted for the nameplate.

8.0 HANDLING AND STORAGE

The materials and equipment shall be properly stored and protected from damage at all times.

Bends shall be coated with rust preventive (both internal and external) approved by Owner prior to storage.

All handling, loading and unloading shall be done in such a manner as to minimize mechanical damage and corrosion.

All handling shall be done with slings, padded hooks or brass-lined end hooks approved by Owner.

Fitting ends shall be protected with suitable end protectors. The type of protector shall be submitted for Owner approval.

Suitable timber shall be used to protect the bends against damage in transit.

9.0 PACKING AND SHIPPING

The Bends shall be prepared for shipment in accordance with good packing practice for shipment.

All exposed machined surfaces and delicate mechanical parts shall be protected with wood or plastic covers, to prevent mechanical damage during shipment. All machined surfaces shall be protected from corrosion by suitable anti-corrosion methods. Any coating so used shall be clean and easy to remove at job site. All equipment that may contain or may have been tested with water shall be drained and protected against corrosion during shipment.

10.0 WARRANTY

- 10.1 The equipment/material shall be warranted against design/manufacturing defects for a period of 12 month from the date of commissioning or 18 months from the date of shipment, whichever is late.
- 10.2 If any such defect is detected during this period, Vendor shall either repair or replace the defective component at his own cost.

SPECIFICATION FOR PIPELINE CONSTRUCTION

Document No. : MEC-GSP-1010



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1.0 **GENERAL**

1.1 **Scope**

This construction specification outlines the minimum basic Pipeline construction requirements for Gas Pipeline.

The Contractor will provide overall project management of the construction, installation and commissioning including document control and records.

This specification establishes the methods of construction, testing and repair, acceptable construction tolerances, construction record requirements and such details as ditch dimensions, amount of cover required, allowable change of slope and tie-in etc. Installation of anchor flanges, risers, Insulating Joints are also included in the specification.

2.0 CODES, STANDARDS & SPECIFICATIONS

- | | |
|------------------------|---|
| – API specification 5L | Specification for Line pipe, Forty Sixth Edition,
November 2018 |
| – API specification 6D | Specification for pipeline valves |
| – API Standard 1104 | Standard for welding pipelines and related facilities |
| – API RP 5LW | Recommended practice for Transportation of line pipe on Barges and Marine vessels |
| – ASME B 31.8 | Gas Transmission and Distribution Piping System |

Certain codes and regulations may have been adopted by the jurisdictional agencies over the locations where the work is to be performed. It shall be the contractor responsibility to determine whether local codes and regulation exist. In the event local codes and regulations exist contractors shall determine their scope and abide by all their provisions on its own cost.

3.0 **PIPELINE ROUTE**

Contractor shall verify survey and prepare/update drawings for the pipeline route and set survey markers and monuments in order to establish the center-line, construction limits of work and to establish the crossing points. The Contractor shall perform all required survey work including the surveying for proper grading of the trench, location and bending of pipe and installation of road/canal crossings. Contractor shall perform all surveying necessary for the installation of pipeline and preparation of as-built drawings.

3.1 **Demarcation**

The pipeline route drawings (plan/profile) show generally the alignment that is to be followed by the Contractor and pipeline corridor shall be marked accordingly on ground.

Contractor shall at his own expense carryout all necessary survey to locate underground/buried services such as electric cables, telephone line, gas line, pipeline etc. and other permanent structures in order to protect and prevent any accident or damage to other's work.

Owner shall obtain necessary right of way from the concerned Agency/Authorities. However it shall be the Contractors responsibility to liaise/coordinate with these Agencies/Authorities/Individuals in order to ensure systematic and smooth laying of pipeline to the satisfaction of the Owner as well as the Authority/Agency/ Individual concerned.

4.0 **UNLOADING, STOCKPILING, HAULING & STRINGING OF MATERIALS**

- 4.1 Contractor shall receive, load-out, transport and stockpile coated pipes at the designate delivery points, and shall reload and string with equipment of a suitable capacity using Owner approved slings, spreader bars and protected hooks. Coated pipes shall not be handled in any manner, which distorts, scratches, scars, or dents the pipe. Unloading of pipes from trucks shall be done carefully. Pipe shall never be dropped. It shall be handled and transported to prevent any damage. The pipe insulation and, concrete coating, if any, shall be protected from damage. Pipe shall be stockpiled as directed by Owner.

Pipes shall be loaded in truck in a pyramid form and tiers shall be according to ASME B31.8.

Materials other than pipes and which are susceptible to dispersing, deteriorating or suffering from damages, especially due to humidity, exposure to high thermal excursions or other adverse weather conditions shall be suitably stored and protected. In particular, material for protective coatings, heat shrinkable sleeves, rock shields fall within this class.

- 4.2 Pipe strung along the construction right-of-way shall be protected by setting the pipe on padded supports.
- 4.3 Pipe shall not be stung on the construction right-of-way in advance of trenching where blasting will be necessary in rock areas.
- 4.4 Pipe shall be strung in such a manner as to result in the least amount of interference to the normal use of the land and/or other properties crossed, and gaps shall be left at frequent intervals to permit the use to the land and the passage of farm animals equipment, or other normal traffic across the construction right-of-way.
- 4.5 All materials shall be unloaded, stored if such is required, hauled to the site of the work and assembled on the site in such a manner as to prevent damage, theft, etc.

Flammable materials such as paints, primers, volatile substances etc. shall be kept in separate storage having proper ventilation until the final use and both inside and outside of the storage all kind of preventive measures shall be taken against danger of a possible fire.

- 4.6 The Contractor shall be fully responsible for providing and paying for all storage areas.
- 4.7 The Contractor shall prevent entrance of dirt of debris into pipe during stringing.

- 4.8 The piling of coated pipes will be carried out on surfaces previously leveled and coated with a layer of sieved earth or sand having a sufficient thickness to prevent coatings from being damaged or on wood wedges or sand bags.

Carefully lower the pipe to the right of way on to sandbags. Do not roll off or drop from vehicles

- 4.9 Lifting and handling of mainline block valve, structural steel and other materials shall be accomplished without damage of any sort. Contractor shall adhere to all lifting and handling instructions lay down by the Contractor.
- 4.10 The Contractor shall be fully liable for repair or replacement materials or equipment damaged by Contractor.
- 4.11 For handling of coated pipes, equipment shall be selected carefully to avoid any damage to the coating. Pads are recommended on forklifts and a spreader bar shall be used when handling pipe with an overhead crane. These pipes shall be handled with wide belt strips and not with chain or wire.
- 4.12 If the pipe is to be stored for long periods of time, the ends should be covered from the elements to insure cleanliness and to prevent deterioration of the coating. The most common method of protection is to use a polyethylene bag securely taped over the ends of each pipe, carefully stacked in a secured area to prevent damage from other operations incidental to the job.
- 4.13 Pipes shall be suitably secured against falling down and will consist of pipes having the same diameter and thickness. Continuous pipes having different sizes, wall thickness or coating thickness shall be clearly separated.

5.0 **RIGHT-OF-WAY**

5.1 **General**

- 5.1.1 The construction right-of-way shall be cleared and graded to a smooth surface for the full width and prior to the stringing of pipe. In addition, fills and cuts may be indicated on the plan or profile drawings in order to eliminate or lighten over bends or sags in the pipeline.
- 5.1.2 For the purpose of construction temporary ROW (Construction ROW) shall be acquired by the Owner. Width of permanent Row in different section shall be as per alignment drawings. Any requirement of land in addition to this, for construction, storage, access or residential camps shall be arranged by the Contractor at its Own cost.
- 5.1.3 The Contractor shall pay for all damages resulting from operations outside the construction right-of-way.
- 5.1.4 The Contractor, at its own expense, shall verify by suitable means in advance of actual construction, the precise location and actual depth of all existing pipelines, utilities and subsurface structures that either cross or are in close proximity to the proposed pipeline. Contractor shall avoid damages to and shall be liable for all damages to all such structures.
- 5.1.5 Contractor shall restore all damaged property including but not limited to buildings, fences, hedges, roads, bridges, culverts, drainage ditches, terraces, drainage, tile, creeks, levees and rivers occupied or crossed in said construction. Any property damaged in the prosecution of the work shall be put into as good conditions as before damage occurred and upto the satisfaction of concerned local authorities and as agreed to by Owner.
- 5.1.6 In rough or steep terrain the Contractor may be required to grade access roads into the construction right-of-way for use in the moving in of materials, men and equipment. Where such roads are required the Contractor shall obtain the necessary permission from land Purchasers and tenants involved and shall furnish Purchaser with a written copy of such permission. The Contractor shall be responsible for all the damage caused by the construction and use of such roads.
- 5.1.7 Where the construction working area is shared or located on an existing pipeline ROW, extreme caution shall be used at all times to avoid damage to existing facilities.
- 5.1.8 Before any work can begin on shared ROW, the existing pipeline marked by the contractor with red flags, for clear indication. Contractor shall take extreme care not to ply the equipment over the existing pipeline.
- 5.1.9 Contractor shall cross his equipment only at the designated points over the

existing pipeline if deemed necessary. Earthen ramps shall be constructed/maintained at such crossing points till completion of the pipeline construction.

5.2 **Site Marking**

The proposed Gas Pipeline in sharing section of ROW shall be installed at a distance as shown in Pipeline Alignments drawings or as per site requirement. Contractor at its own cost shall locate the existing pipeline and determine the alignment of proposed Gas Pipeline accordingly.

The crossings with roads shall be marked and the Contractor shall warn for special operations.

If the right of way width is reduced, entrance to and exit from the narrow area are clearly marked and stakes are placed if necessary.

Every 250 m along the right of way, a stake is placed on the trench side and should be visible from the working track.

The Contractor shall maintain and possibly correct the marking during the construction operations.

5.3 **Preparation of the R.O.W.**

The Contractor, within the area made available to him by the Owner shall at his own cost perform the following:

Make all required arrangements (cleaning, leveling) permitting the delivery and transfer of pipe, moving of vehicles, all operations required for the good performance of work, traffic of vehicles belonging to any agent responsible for the supervision of work, and if necessary installation of culverts, dewatering, back-filling of ditches or reinforcing of certain portions of natural ground which could be in poor condition.

Remove or have removed all power line or telephone line poles; the Contractor shall take all necessary steps to secure, in due time, the corresponding agreement from the governmental agencies concerned.

5.4 **Cutting down of Trees**

Within the R.O.W. made available by the Owner, the Contractor shall proceed with cutting down of trees, clearing of tree stumps and large roots.

Cutting down of trees shall be performed so as to avoid damages to other trees, plantings, crops and any construction.

Clearing and Grading operation shall not be more than 5 Km ahead of

completed trench unless advised by engineer.

All cut-down trees shall remain the sole property of the Owner. Trimmed trunks shall either stacked along the R.O.W. or removed to a place specified by the Owner.

The same shall be applied for bushes and branches resulting from the clearing.

5.5 **Maintenance of ROW**

The right of way once prepared shall be kept in good condition for all traffic.

- 5.5.1 In non shared section, Contractor shall grade, raise and compact ROW to make it jeepable in cultivated/water logged area. Grading/raising of ROW in rocky area and deserts is not required.

As a general guideline, the width of Jeepable ROW shall be 10 ft with 9" raised above the NGL

6.0 **TRENCHING**

Particular care should be taken to locate all buried installation, crossings, the pipe line route in advance of grading and ditching.

The Contractor shall take center-line of the pipeline as per relevant drawings / site conditions dig and maintain the pipeline trench.

6.1 **General**

6.1.1 In locations where the trench is cut across roads, paths, walkways, etc., the Contractor shall provide temporary bridges of adequate strength and properly constructed to allow the passage of normal traffic with a minimum of inconvenience and interruption.

6.1.2 Proper warning signs shall be placed and maintained while such crossings are open, if the crossings are open at night, the Contractor shall provide and use; Warning Lights or lanterns, all as required by the agency having jurisdiction and/or Owner.

6.1.3 The Contractor shall provide at his cost necessary pumps, de-watering equipment, sheet piling, shorting well points, etc. as required to prepare trench in marshy and high water table areas. Contractor shall ensure satisfactory disposal of water pumped through the ground.

6.1.4 Where gravel, rock, and/or other hard materials are in the bottom of the trench in non traffic areas and where in Owner's opinion, such conditions will result in injury to the pipe coating, the Contractor shall pad the bottom of the trench with sand to a depth such as to give the pipe, in place, at least 150mm of clearance from the hard materials.

6.2 **Depth**

6.2.1 Minimum depth of cover shall be measured from the top of the pipe coating, to the top of the undisturbed surface of the soil. Fill material in the construction right-of-way not be considered to add to the depth of cover.

6.2.2 The Contractor shall carry out all point of the R.O.W. where a deeper cover is required by the Owner or his Representative, or indicated on drawings near roads, railways, water course crossings and in short sections of cultivated areas where special installations or surface arrangements exist or are foreseen.

If, during performance of work, the minimum cover height cannot be respected, the Contractor shall submit for the Owner's approval all necessary provisions to ensure equivalent protection.

6.3 **Width**

6.3.1 The trench shall be wide enough to allow for lowering-in without damage to the pipe, pipe coating and insulation. The trench shall be excavated so as to provide a minimum clearance of 150 mm on either sides of the pipe. Each side of the pipe measured from the outside of any coating at the horizontal centerline of the pipe when is placed in the trench.

6.3.2 The Contractor may be required to excavate deeper than shown on the Drawings, or to excavate a trench wider than required by the Specifications and Drawings, in order to properly construct the pipeline at water logged area, road, path, walkway, dike and stream crossings, and other locations of a similar type. It is understood that the Contractor recognizes such possibilities at the time of the submission of the bid and that he has included such possible costs in the bid.

6.4 **Ditches**

Ditching operations, increase in width and depth, supply of back-filling material of the ditch bottom shall be at the Contractor's expense.

When required in locations where ditch walls shall be protected by shielding, the Contractor shall perform the corresponding work at his own cost.

Ditch walls and bottom shall be free of damaging elements (stones, roots, etc.). Ditch walls shall be as vertical as possible.

Ditch shall have 150mm fine sand cushion all around pipeline.

At points where trench is know to cross other pipelines or underground systems. Excavation shall be performed manually.

The bottom of the finished trench shall be adjusted in such manner that the bottom of pipe, bent according to the design, will fit on its whole length so that the pipe will not be ovalized.

In rocky areas, the Contractor shall protect the ditch bottom with a padding of sieved sand of 200 mm thick. Pipeline should be provided with the mechanical protection being backfilled in the rocky areas of a minimum of 20-mm thickness.

When ditching is performed in an urban zone, the Contractor shall take all necessary measures in order to prevent disturbing normal activity in the neighbourhood and shall quickly restore streets, and other structures, as necessary.

6.5 **Top Soil**

Top soil shall be conserved by removing one layer of top soil to a depth of between 100 mm and 150 mm. Removed top soil shall be stockpiled in a location that will minimize any loss due to erosion or mixing with other materials. Top soil conservation shall be carried out in all areas where excavation or levelling is necessary including the trench line, graded pipeline route, temporary stock piles and camp sites.

The excavated materials shall be stored within the Row.

When required by governmental agencies concerned, the Contractor shall remove all excavate materials and convey them to locations chosen in agreement with the Owner. He shall also supply and perform the necessary back-filling.

6.6 **Crossing of Unstable Areas**

If the zones crossed by the line present any risk of settling and sliding, the Contractor shall, immediately, inform the Owner of such risk.

In steep areas of hillside before starting the work, the Contractor shall provide for suitable dams or other similar protections in order to prevent the material removed from falling down the hill. The foregoing is particularly applicable where lines of communication, houses, water courses and cultivation exist.

6.7 **Temporary Crossings**

6.7.1 Wherever it is permissible to open cut a road with an improved surface to make a road crossing, the Contractor shall remove the surface in accordance with the restrictions and requirements of the national, provincial, municipal or other agency having jurisdiction thereof.

6.7.2 Where possible the Contractor shall arrange to complete the trenching, laying and back-filling of such crossings and to remove the temporary bridging before the end of the regular work day in order to minimize the hazard to night traffic.

6.8 **Water Drainage**

The Contractor shall be responsible for the protection of the site against water of any kind and origin.

He shall be responsible, in any circumstance, for maintaining surface or deep water drainage.

He shall also be responsible for all consequences resulting from troubles he would have caused in surface or deep water drainage and for any damage or

accident likely to occur.

The Contractor shall be responsible for drainage of water of any origin for the site up to the adequate outlets. Such obligations cover the construction and maintenance of water supply connections (drain-pits, drains, etc.), the supply of power and equipment necessary for drainage, operational and supervisory personnel, the restoration of the site etc. so that ditching operations and lowering-in of pipe into the ditch be carried out under good conditions.

When the back-filled trench making a drain effect is liable to cause damages to the pipeline or to the nearby lands, the Contractor shall submit to the Owner adequate measures to prevent damages from occurring.

6.9 **Underground Drainage**

Within drained areas or areas to be drained, the pipe will be laid in order that the distance between the top of pipe and the bottom of each drain is at least 0,3 meter.

The Contractor will take similar measures for separate drain lines which have not been indicated to him and which he is likely to encounter during the performance of work. He will have to immediately inform the Owner of the existence of such drain lines.

As soon as the pipe has been laid down, the Contractor shall restore all drain lines in such a way as to obtain a draining system similar to the initial one.

Drain lines, which would have been damaged by vehicles, shall be replaced under the previous conditions.

Special measures shall also be taken in order to prevent the ditch, after back filling, from being used as drain line.

Within grounds drained by underground systems, the Contractor shall restore any cut network, using a method satisfactory to the land Purchaser and approved by the Owner.

6.10 **Blasting**

When blasting is necessary to grade the ROW, excavation of ditches or performance of any other operation required for laying the pipe, the Contractor shall inform the Owner.

Contractor shall comply with all safety regulations concerning their personnel and take any measures to ensure safety of people, cattle and properties in the site vicinity.

In all cases where blasting is used, the Owner's authorization does not cancel

nor decrease the Contractor's full responsibility for any damage to the existing installations, to the other underground and overhead facilities, to people animals and things.

Any damage caused shall be immediately repaired to full satisfaction of the Owner

The Contractor will notify, sufficiently in advance, all persons living in the neighbourhood and all parties concerned prior to starting operation, in order to protect any livestock in the vicinity. When blasting operations are to be performed close to buildings, systems or forests, the Contractor shall take all necessary measures to prevent damage to nearby structures from occurring.

In any way, the Contractor shall pick up all scraps and fragments ejected beyond this area and bear the cost of damages of any kind resulting from such blasting operation.

6.11 **Bell Holes**

When pipe tie in is to be performed in the ditch, the Contractor shall provide, at his own expense, bell holes having at least the following dimensions:

Depth:	60 (Sixty) cm below the lower part of pipe.
Length:	70 (seventy) cm in excess of the outside diameter of the pipe
Width:	90 (ninety) cm between the outside of the pipe and the bell hole wall on either side of the pipe.

7.0 **BENDING**

CONTRACTOR shall preferably provide for changes of vertical and horizontal alignment by making elastic flexing bends. CONTRACTOR may provide cold field bends ($R=40D$), at his option for change of direction and change of slope. Hot bends ($R=5D$) shall be provided only where such bends are required due to a space/level constraint. Use of hot bends shall be minimized.

Over bends shall be made in such a manner that the centre of the bends clears the high points of the trench bottom. Sag bends shall fit the bottom of the trench and side bends shall conform and leave clearance to the outside wall of the trench.

7.1 Elastic Bends

The minimum allowable radius for elastic bends in the buried pipeline or above ground pipeline is based on a maximum allowable bend stress specified in Design Codes. The elastic bend shall be continuously supported over its full length. A radius smaller than permitted in elastic bending shall require a cold bend.

7.2 Cold Field Bends

Cold field bends shall be made by a cold, smooth-stretch method approved by the OWNER, in such a manner as to preserve the cross-sectional shape of the pipe. In no case shall heat be used for the purpose of bending the pipe.

The radius of cold bends shall not be less than 30 times the pipe nominal diameter for all pipe diameters.

CONTRACTOR shall use a bending machine and mandrel and employ recognized and accepted methods of bending of coated pipe in accordance with good pipeline construction practice. Bending machine shall be of a type approved by the OWNER. Bending machines shall be capable of making bends without wrinkles, buckles, stretching and with minimum damage to the coating.

Prior to commencement of the work, CONTRACTOR shall submit and demonstrate to OWNER a bending procedure, which shall conform to the recommendations of the manufacturer of the bending machine. The procedure shall include lengths, maximum degree per pull and method and accuracy of measurement during pulling of the bend.

This procedure and the equipment used shall be subject to OWNER approval.

Pipes with longitudinal welds shall be bent in such a way that the longitudinal weld lies in a plane through the neutral axis of the bend. The pipe shall be installed positioning the longitudinal weld in the upper quadrants. If horizontal

deviations are to be achieved by joining more adjacent bends, the bending of the pipe lengths shall be made by positioning the longitudinal welds alternately 70 mm above and below the plane passing through the neutral axis, so that the bends are welded with the longitudinal welds displaced by about 150 mm and situated in the upper quadrants. In case of vertical bends formed from a number of pipe lengths, the longitudinal welds shall be positioned on the plane passing through the neutral axis of the bend to the right and left alternately.

The pads, dies and rolls of the bending equipment shall have relatively soft surfaces to avoid damage to the pipe coating. Where applicable, fully retaining bending shoes shall be used. Roller-type bending machines are preferred.

The tangent ends of each bent length shall be straight and shall not be subjected to bending. The length of the straight section shall permit easy joining. In no event shall the end of the bend be closer than 1.5 meter from the end of a pipe or within one meter of a girth weld.

The ovalization of a bent pipe shall not exceed 1.0 percent of the nominal diameter at any point. Ovalization is defined as the reduction or increase in the internal diameter of the pipe compared with the nominal internal diameter. A check shall be performed on all piggable bends in the presence of OWNER by passing a gauging plat with a diameter equal to 97.5 percent of the nominal internal diameter of the pipe connected rigidly together at a distance equal to 350 mm.

7.3 Miter and Unsatisfactory Bends

All bends showing any sign of buckling, wrinkles, cracks or other visible defects or which are in any way in disagreement, in whole or in part, with this specification shall be rejected.

No miter bends shall be permitted in the construction of the pipeline. CONTRACTOR shall cut out and remove any bend or bends which do not meet the specifications and shall replace the same with satisfactory bends at no additional cost to the OWNER. The material required for replacement shall be furnished by CONTRACTOR.

Cutting of factory made bends and cold field bends for any purpose is not permitted without OWNER approval.

8.0 CLEANING & INSPECTION OF PIPES & BEVELS

- All pipes shall be internally cleaned prior to assembling.
- The means of cleaning shall be proposed by the Contractor for approval of the Owner's Representative.
- All operations performed later on shall be conducted so as to prevent any foreign body, especially water and earth, from penetrating into the pipes.
- Any assembled section or part shall be carefully obtruded at each interruption of work, by night caps agreed upon by the Owner, so as to prevent water, dirt, animals and any foreign substance from entering the pipe.
- All Site personnel shall be fully aware to comply with the provisions and be informed that equipment, tools or suits shall not be left in the pipe, for no reason.
- If, upon removal of night caps, it appears that some foreign bodies have penetrated into the pipe, the contaminated portion shall be properly cleaned before proceeding with further assembling operation.
- Immediately, prior to proceeding with alignment each pipe end shall be carefully cleaned, using metallic brushes.
- In the event such surfaces show rust mill scales, grooves, burrs, etc. a grinding machine of flexible disk type shall be used.
- Cleaning shall be performed on the inside and outside of the pipe and at least up to ten (10) cm from the edge.
- When cleaning is performed by grinding the bevel root face shall be reconditioned using a file.
- Prior to welding, pipe diameter and thickness will be verified at each pipe end. Bevel design shall comply with type of welding.

9.0 **WELDING**

9.1 **General**

Welding and welding related requirements of the following codes and standards shall be considered part of but subject to the more stringent provision of these specifications:

- API 1104 latest edition (Standard for welding pipelines and related facilities).
- American National Standard Institute ANSI B31.8 (Latest edition).
- ASME Code - Section IX welding / brazing qualification.

9.1.1 No circumferential weld shall be located within 150 mm of the centre of a support.

9.1.2 All welds shall be marked with waterproof crayon or paint stick by the welders according to numbers assigned to them by Owner at the time they qualify. Should any welder leave, his number will be avoided and not duplicated on the project. No punch or steel stencilling will be permitted.

9.1.3 Except as otherwise required herein, all welding shall equal or exceed the requirements of the Standards for Field Welding of Pipe Lines API Standard 1104, latest edition.

9.1.4 All welding machines, line-up clamps, machines, cutting torches, and other equipment, tools, and supplies used in connection with the welding work shall be kept in good mechanical condition so as to produce sound welds.

9.1.5 All welding electrodes furnished and used by Contractor shall be of an approved type and quality suitable for pipeline welding acceptable to Owner. All welding electrodes found to be deteriorated, defective, or otherwise damaged shall be rejected and prohibited from use on the pipeline.

9.1.6 No cutting or welding on the line pipe, other than that required for making the normal circumferential joints, will be allowed without written permission from Owner.

No welding electrode or grounding shall be permitted to are the pipe except in the actual bevel being welded.

9.2 **Procedure & Qualification**

Prior to starting of production welding, a welding procedure shall be established in accordance with API Standard 1104 latest edition, for field welding of pipelines and shall be approved by Owner.

Approved pipe welding procedure shall be recorded in detail as outlined in API Standard 1104 and be adhered to during subsequent construction. The Contractor shall obtain a certificate of qualification from Owner for Welders before any welding is carried out on site.

Welding procedures which have been established approved and qualified shall not be changed. Re-qualification shall be required for any change in welding procedure already established approved and qualified. The entire welding procedure, qualification tests shall be conducted in presence of Owner. Contractor shall organize the test at a fixed plate on site to be intimated to the Owner at least one week before the date fixed for these tests.

Contractor shall, for the execution of welds, designate one or two welders to undergo the procedure qualification tests to meet the code requirement and the welders involved shall qualify for production welding on the qualification of procedure test.

The pipes welded at the time of the test shall be two job size nipples free from dirt, paint, etc. and ends bevelled with machine.

For each procedure test, four specimens shall be removed from the completed joint as per API Standard 1104 for carrying out necessary mechanical tests (destructive) all hardness surveys (if required) shall be witnessed by Owner. The procedure qualification shall be carried out at Contractor's expense.

9.3 **Welder Qualification**

The qualification test of welders shall be conducted strictly in accordance with API Standard 1104 (latest edition). Test shall be conducted in the presence of Owner. The welder(s) who have performed successful procedure qualification test is automatically qualified in that procedure.

This qualification shall in particular enable to distinguish between welders capable of executing any pass, root bead, hot pass, filler bead, capping in mainline, fabrication, tie-ins and repairs.

All the qualified welders shall be given the identification tag consisting of following information:

- Photographs
- Welder identification symbol

- Welder's name
- Contractor's name

Reports

The Contractor shall draw up a report of each qualification procedure, which shall contain the results of all inspections and tests performed on the corresponding welds. This report shall be signed by the Contractor and the Owner's representative and the Inspection Agency. These documents shall be available on Site when the welding is performed.

A form of the API 1104 type or equivalent shall be used for recording test performance conditions and results of the welding procedure qualification test.

9.4 Validity

The validity of qualification of a welder shall be maintained subject to the following conditions:

Whether the welder has worked on identical parts/procedure for total duration of at least 60 days. Whether the partial or total inspection of welds which he has performed, proved high standard of his work

In case welder leaves the site his identification shall be cancelled.

A qualified welder can be replaced by other welder whose production work is found repeatedly defective. Owner's reserves the right to disqualify such welder.

Any welder who fails the qualification tests or who has lost his qualification during the course of his work, may after a further training of a minimum of 15 days, try another qualification test.

9.5 Electrode Specification

Welding electrodes shall be sealed tin packing and only that number of times opened on each day that are likely to be consumed during the day. The electrodes/rods must be free from any trace of oxidation.

Storage of welding electrodes at the job site during construction and open electrodes overnight shall be in ovens to keep the electrode dry and in good condition.

The size of electrodes shall be established in the welding procedure.

Welding electrodes should be of acceptable makes such as LINCOLN, ESAB, PIPEWELD & PHILLIPS. Contractors would be required to obtain Owner's

approval of the selected make.

9.6 **Production Welding**

9.6.1 **General**

Weld qualification procedure shall be provided for approval to the Owner.

Production welding shall not begin until all the following qualifications have been performed and found acceptable in accordance with this specification:

- Qualification of welding procedures.
- Qualification of weld repair procedures.
- Qualification of welders and welding operators.
- Qualification of radiographic procedures.
- Qualification of mechanical testing procedure.

The welding conditions that apply to production welding shall be those used for the welding procedure qualification tests.

9.6.2 **Preheating & Interpass Temperature**

If preheating is found necessary, the required temperature shall be reached at the joint and over a distance of at least 76 mm (3") in all directions from the joint. This temperature shall be checked regularly (e.g. using temperature indicating crayons). These requirements also apply to tack welds.

The interpass temperature is normally not to exceed the maximum temperature recorded during the Welding Procedure Qualification Test, and restricted to 250 ° C max.

9.6.3 **Tack Welds**

Tack welds shall be performed in accordance with a previously approved procedure and by qualified welders. They shall be 75 to 100 mm (3 to 4") long for O.D. > 12 3/4" and minimum of 50 mm (2") or 4 times the W.T. (whichever is less) for O.D. < 12 3/4", to prevent any crack formation at the root of the finished weld.

9.6.4 **Welding Sequence**

The second pass (hot pass) shall be made within five minutes (or less) after deposit of the root pass.

Successive passes shall not begin or end at the same point; they shall be staggered by 50 mm least for O.D. > 16".

No pass shall be commenced until the preceding pass is completed.

9.6.5 **Alignment Clamp**

Use of an alignment system inside the pipeline (internal clamp) is preferred.

Internal line up clamp shall not be released until the root bead is 100% complete and pipe has been properly supported.

External line up clamp can only be removed when root bead is 50% completed in equal segments uniformly spaced around the circumference of the pipe.

9.6.6 **Cleaning**

Before welding, the surfaces to be connected shall be cleaned of any trace of mill scale, slag, rust, grease, paint etc.

Upon completion of each welding pass the weld run shall be cleaned of any trace of slag and various deposits.

After completion of the welded joint, the surfaces next to the weld shall be cleaned of any trace of slag, spatters and various deposits.

9.6.7 **Arc Strikes**

No arc strikes shall be permitted outside the bevel area. Any accidental arc strikes shall be ground out then submitted to magnetic particle or liquid penetrant inspections in accordance with ASME SE-138 or ASME SE-165 respectively.

9.6.8 **Post-weld Treatment**

No heat treatment is required on completed production welds provided hardness requirements are respected.

9.6.9 **Protection against Rough Weather**

The Contractor shall take all necessary measures for protecting the welds and welders from bad weather conditions (rain, wind, etc.) for the duration of the work. Adequate protective means and equipment shall be made available on the Site.

9.6.10 **Welding Conditions Control**

The following parameters shall be checked during welding:

- Preheating temperature (when required).
- Minimum and Maximum interpass temperatures.
- Welding current amperage and voltage.
- Travel speed.

The Contractor shall provide all measuring instruments necessary for making these checks to the satisfaction of the Inspector.

As far as possible those instruments shall be the same or same type) as those used for the procedure qualification performance.

9.7 **Identification of Welds**

After execution and before the inspection, the welded joints are numbered by the Contractor and furthermore, in the case of piping of pipeline installations, marked on the assembly drawing.

In line, each welded number shall be written again over the coating material.

Welders are requested to stamp their identification number on the first in line welds they perform and when a modification is brought in the composition of their welding crew.

Marking on pipe shall never be made by punching.

9.8 **Weld Inspection**

9.8.1 **General**

The Contractor is responsible for performing all weld inspections. He shall provide the personnel, equipment and products necessary on Site to ensure proper performance of these inspections in accordance with this specification.

The Contractor's inspection personnel and equipment shall be submitted for prior approval by the Inspector.

9.8.2 **Non-Destructive Inspections**

NDT inspector shall have certificate of NDT level II or level III from a recognized institute and have adequate experience in the NDT inspection of pipeline laying work.

a) **Visual Examination**

Weld preparations and completed welds shall be visually inspected by the Contractor and the Inspector.

Once the welding is completed, all welds shall have an uniform outside appearance and shall blend progressively and without undercut into the base metal. The adjacent surface shall be cleaned of any spatters or other deposits.

b) **Radiographic Inspection**

Radiographic inspection shall be performed in accordance with standard API 1104 (radiographic procedure specification, qualification test, etc.) taking into account the following special requirements:

- The Image Quality Indicator (IQI) shall be of the wire type as per DIN 54109 Standard or ISO Standard.
- The geometrical un sharpness shall not exceed 0.2 mm,
- The detection sensitivity shall not exceed 2% of the weld thickness.
- The image density shall be between 2.0 and 3.5.

Except otherwise specified by the Owner, all welds of pipeline and associated sections shall be submitted to 100% radiographic inspection in accordance with the previously qualified radiographic inspection procedure.

Each film shall include a weld number as well as figures or letters corresponding to the weld actual external marking.

All radiographs shall be submitted for examination and acceptance by the Inspection Agency.

The Contractor shall submit the radiographic inspection report to the Inspection Agency so that it may be approved as soon as possible.

c) Extent of Radiographic Inspection

The Contractor shall arrange radiographic inspection at his own expense.

The qualification of welding shall be checked by non-destructive methods. Non-destructive inspection shall consist of radiographic examination. Radiographic examination shall meet the requirements under "Radiographic Procedure" in API Standard 1104. Films shall be retained during the construction involved and for six months thereafter.

Lineal Method to Determine Weld Reject Rate

The Lineal method is used to indicate weld reject rate by determining the length of weld repaired out of the total length of welds radiographed in one day. A Lineal method shall be the main way to determine weld reject rate.

Application of Lineal Method to Determine Percent of Radiography

Quality of work shall be checked visually and by destructive or non-destructive method according to API 1104. Minimum 10% of each days girth weld shall be radiographed, selected at random by the Owner's Representative or his nominee.

Radiograph of crack defect weld, cut out repair, shall be 100%.

Apart from the above, 100% Radiography shall be carried out for the following:

- i) Within populated areas such as residential sub-divisions, shopping centers, and designated commercial and industrial areas.
- ii) River, lake and stream crossing within the are subject to frequent inundation; and river, lake and stream crossing on bridges.
- iii) Railway or public highway rights of way, including tunnels, bridges, and overhead railway and road crossing
- iv) Tie-in girth welds not hydrostatically tested.
- v) If the weld is rejected due to crack interpreted by radiography examination.
- vi) Any weld performed for qualification of procedure.
- vii) Any weld performed for welder qualification.
- viii) Block valve assemblies.

- ix) Insulating flanges.
- x) Anchor Flange.

Standards of acceptability for inadequate penetration and incomplete fusion, burn through, slag inclusions, porosity or gas pockets, cracks accumulation of discontinuities, and undercutting as set for the under "Standards of Acceptability - Non-destructive Testing" in API Standard 1104 shall be applicable to the determination of the size and type of defects located by visual inspection or radiography.

d) Ultrasonic Inspection

Will not be used for wall thickness below 12 mm.

e) Magnetic Particle & Liquid Penetrant Inspections

The Contractor shall perform a magnetic particle or liquid penetrant inspection at any time upon the request of the Inspector. These inspections shall be performed according to ASME SE-165 and ASME SE-138 respectively.

9.9 Weld Acceptance Criteria

The weld acceptance standards of API 1104 shall apply to the visual and non-destructive inspections (radiographic, etc.) for welding procedure qualification tests, welder qualification tests and production welds.

The Inspector on Site shall be sole judge of weld acceptability and his decision is final.

9.10 Repair & Removal of Defects

Welds which do not meet the acceptable standards of this specification shall be cut out at the Contractor's expense by removing a cylinder of pipe containing the weld, or with the prior approval of the Owner.

Cutouts and repairs shall be made by the Contractor as soon as possible.

Repairs may normally be allowed, at Owner discretion, under the following conditions:

- Where there are no cracks in the weld.
- Where the segment of weld to be repaired was not previously repaired.
- Where the weld is inspected after repairs by the method used to originally inspect the weld.

Defect removal: Weld defects shall be removed by grinding. The repair cavity shall be of sufficient size to allow adequate access for welding.

Cleaning: The requirements for cleaning of weld beads shall also apply for repairs.

Arc burns shall be removed by grinding. Grinding shall have a smooth contour. After grinding, the remaining wall thickness in the area will be verified by the Owner's representative and shall not be less than 90% of the nominal wall thickness.

If the thickness is less than that acceptable, the Contractor shall cutout a cylinder of pipe containing the arc burn and replace it.

10.0 **LOWERING IN**

- Pipe shall not be lowered into the trench when, in Owner's opinion, the temperature is such that damage to coating may result.
- All skid marks and other possible places of damage to the coating shall be checked with a holiday detector and damaged area properly repaired before the pipe is finally lowered into the trench.
- The coated pipes shall be lifted with non-abrasive nylon belts to prevent the coating damage.
- Coated pipe shall not be placed in the trench until bare field joints have been coated and cave-ins, plugs, hard clods, stones, skids, welding rods, etc., have been removed and padding has been placed. Coated pipe shall not be dragged along the ground. If coating is damaged due to mishandling it shall be repaired as per procedure recommended by coating Contractor.
- If water or mud is found in the ditch, whenever possible, proceed with pumping out of water and cleaning of the ditch before lowering-in takes place.
- In the event, it is not possible to drain water contractor shall submit to the Owner's approved, all necessary measures in order to have the pipe normally rest on the bottom of the ditch.

Air Test/Pigging

- All weld segments shall be air pigged and soap tested at 100 psig before lowering into the trench. All weld repairs shall be completed and sections be cleared radiographically before conducting the air test.

11.0 **TIE-INS**

- 11.1 The pipe shall be cut so as to permit a good line-up and weld. Unless pipe has been placed in the ditch and shaded, tie-ins shall not be made at the temperature less than 10°C. Bell hole welding shall be done in bell holes which provide adequate clearance to enable the welder to exercise normal welding skill and ability. The lap of pipe strings at tie-in shall be at least 2 meters.

The weld seams of the adjoining pipes shall offset by 30% or 76 mm (which ever is greater) if not possible, a spool piece of not less than 1.2 meters in length shall be inserted.

- 11.2 The minimum length pup which shall be used is 1 meter. All pups of 1 meter or over shall be moved ahead and welded into the pipeline daily. Pups under 1 meter shall be gathered up and delivered to the Owner's nearest storage area.

12.0 **BACK-FILLING OF THE TRENCH**

The Contractor shall backfill the trench after the pipe is in place as set forth in the following:

- 12.1 The trench shall not be back-filled until Owner has approved the fit and cover of the pipe in place in the trench and has approved starting the back-filling operation.
- 12.2 The trench shall be back-filled to 0.2 meter initially. The backfilling shall be such that initial back-filling shall be performed as soon as possible after the trench is approved for back-filling.
- 12.3 After the initial backfill has been placed in the trench to the level of the surrounding ground the Contractor shall compact the backfill by making as many passes as necessary with a rubber tired compacting device approved by Owner's Representative
- 12.4 After the initial backfill, the remaining material excavated shall be neatly crowned over the trench and lightly compacted. The crown remaining shall be large enough in Owner's opinion to prevent the formation of a depression in the soil when the backfill has settled into its permanent position.

The backfill shall be crowned to a height of not less than 0.4 m, after the settlement. Spoil that can not be used in the backfill shall be considered as surplus and shall be removed from the premises by the Contractor. Contractor shall dispose of the spoil in am manner and at locations satisfactory to Owner.

- 12.5 Where the trench has been dug through driveways walks, roads, dikes, etc. the backfill shall be thoroughly compacted by mechanically tamping the fill material into place in properly wetted layers not thicker than 150mm. the surface of such areas shall be restored to their original condition in a manner satisfactory to Owner and the responsible authorities.
- 12.6 Trenches crossing ditches shall be back-filled with the material excavated from the trench at that location except that in locations where the excavated material in Owner's opinion is not suitable for back-filling, the Contractor shall provide and use suitable material from another source. Ditches with lined or otherwise improved surfaces shall be resurfaced in a manner satisfactory to and approved by Owner and the responsible authorities.
- 12.7 Where the excavated material is rock, gravel or other hard materials which in Owner's opinion, would injure the pipe or pipe insulation the Contractor shall furnished and place sufficient sand or soft earth to give the pipe protective cover before the trench is back-filled with the hard materials. Also Rock shield is provided for the protection.

- 12.8 Rock boulders but not larger than 1 cubic foot. volume may be placed in ditch after the padding is in place; however, in cultivated areas, no rocks shall be placed in the top of the backfill which would interfere with ploughing or cultivating. All surplus rock shall be disposed of the satisfaction of Owner land Purchaser and/or tenant at no additional compensation.
- 12.9 When back-filling across irrigated fields, Contractor shall provide furrows across pipeline right-of-way as required by Owner land Purchaser or tenant to direct the flow of water into normal irrigation furrows. Extra cover is required at vertical, horizontal and composite preformed bend in some cases.

To ensure the retention of sand cover in active sand areas, the backfill must be stabilized, preferably by a 6" layer of marl or other stable material. The width of stabilization shall be ten (10) feet on each side of the pipeline.

Provide diversion ditches and/or culverts for floodwater in order to keep the pipeline from acting as a dam and channel bank.

Spot back-filling is required to tie down, and restrain the pipe in the ditch after it has been lowered in. Spot back-fills shall provide full-specified cover and shall cover all preformed bends a distance of 6 meter to each side of the centers of the bends. The maximum clear distance between spot back-fills shall be 20 meter. Spot back-fills shall cover the pipe for at least 5 meter along the pipe. Completion of back-filling shall follow spot back-filling as closely as practicable.

13.0 **SPECIAL MECHANICAL PROTECTION**

The Contractor shall apply, at his own cost, an additional mechanical protection around pipeline in case where there is a danger of damage of pipeline or pipeline coating.

These cases may be originated due to Concrete set-on weights, Pipeline laying in rocky areas and other concrete works regarding pipelines.

Mechanical protection is also used to protect the pipeline coating from accidental abrasion and from subsequent abrasion during lifetime of the pipeline.

13.1 **Characteristics**

- Mechanical protection shall be a flexible padding designed especially for the protection of the corrosion coating on pipeline.
- Mechanical protection shall be flexible to shape and cut easily. It shall remain be flexible at lower temperatures and its application shall not be effected by colder temperature.
- It shall be unaffected by wet or extreme weather conditions.
- Mechanical protection shall provide the padding required for pipe coatings without the concern of blocking out Cathodic protection or it must have zero dielectric properties.
- It shall absorb impact of uneven backfill material and protect pipe from protruding rock in trench. Also shall minimize abrasion of coating from pipe movement in ground.
- Th protection shall be lightweight and shall be available in numerous sizes for optimal match to pipe diameter.
- The protection shall be longer and wider than the set-on weight and any other concrete works.
- In any case, its thickness shall be at least 20 mm.
- The contractor shall specify the following properties of the protection along with the sample, prior to the Owner's approval:
 - a) Weight
 - b) Tensile strength
 - c) Toughness
 - d) Impact resistance
 - e) Roll width and length
 - f) Elongation

14.0 **CROSSINGS**

This section refers to all the details, regarding proposed Gas Pipeline, crossing existing roads, highways, railroad, canals, rivers, distributaries etc. The details primarily reflect the minimum requirements to ensure safe crossings of pipeline through the above-mentioned crossings. Contractor shall use such equipment and procedures that shall not cause damage to any structure or facility intercepted by or adjacent to the crossing.

The trench on either side of the tunnel/bore shall be de-watered and the inside of the tunnel shall be cleaned before the pipe is pulled or pushed into place.

The pipe shall be pulled or pushed into the tunnel/bore in such a manner that the pipe is centered in the tunnel/bore, the pipe coating is not damaged, and the rate of travel into the tunnel/bore is uniform.

Contractor is responsible for obtaining necessary permission from the relevant authorities.

14.1 **Uncased Crossings**

Carrier pipe, under metal roads, crossing rivers and any water stream shall be installed with minimum cover of 1.2 m, as measured from the top of the pipe to the top of the surface.

All uncased crossings shall be as per Pipeline Crossing/ Alignment Drawings.

14.2 **Cased Crossings**

Steel casing if required, provided at main roads, where heavy traffic is expected, and all railroad crossings. The casing pipe shall be of size dia. 24", as indicated in relevant Pipeline Crossing/ Alignment Drawings

Casing pipe under highways shall be installed with a minimum cover of 1.2 m, as measured from top of the pipe to the top of the surface.

Casing pipe under railroads shall be installed with a minimum cover of 1.8 m, as measured from top of the pipe to the top of the surface.

14.3 **Casing Pipe**

Casing Pipe shall be of the material API 5L Gr. X-46 and its wall thickness shall be of 12.95 mm for highway crossings and 17.65 mm for all railroad crossings

The casing pipe shall be free of internal obstructions, shall be as straight as practicable and shall have a uniform bedding for the entire length of the

crossing. Casing pipe shall be internally Epoxy coated, in order to protect it from atmospheric corrosion.

After the cased crossing is installed, a test shall be conducted to determine that the carrier pipe is electrically isolated from the casing pipe.

14.3.1 **Electrodes Or Filler Metal**

The quality and conditions for use of electrodes and filler metal must comply with the requirements of the weld process as defined in the welding Specifications.

14.3.2 **Installation of the Casing**

Two methods will be possible, boring machine and open cut. The Contractor shall conform to the approved construction drawings, nevertheless, it shall, prior to starting the work, submit a work proposition which shall be in accordance with the requests of the authority in charge of the crossed item.

14.3.3 **Introduction Of The Pipe Into The Casing**

The operation shall go on without creating any tension or damage on the pipe. The pipe shall be completely isolated before any back-fill.

14.4 **Casing Seals**

All casings used at crossings of roads shall be fitted with end seals at both ends to reduce the intrusion of water and fines from the surrounding.

The seal shall be formed with a flexible material that will inhibit the formation of a waterway through the casing.

14.5 Coated carrier pipe shall be independently supported and insulated from the casing throughout the cased section. Insulator shall be designed to promote minimal bearing pressure between insulator and carrier coating.

14.6 **Plastic Grating**

Plastic grating shall be laid 200mm above the pipeline as a signalling device near crossings.

Material of Plastic grating shall be such that it must not cut when unravel and resist rotting. It shall be impervious to water. Material such as Polyethylene Hardware cloth, Polyethylene screening, neoprene mesh or polyethylene fencing are the acceptable alternatives.

Plastic grating shall be furnished in rolls. Mesh shall be of diamond or circle pattern and the size of the opening is not important.

Contractor's scope shall include supply and installation of the Plastic Grating.

15.0 **CANALS, RIVERS, WATER COURSES DISTRIBUTORIES**

15.1 **Underground Crossings**

All underground crossings shall be at least 3 feet below the scar depth or as shown on the relevant drawings. The line shall be laid without any bends in the bed of crossing, and unless banks are protected by concrete mats or walls. The line should be extended well into the bank and brought up to normal grade with a gradual shape and without sags or over bends. The method of crossing could be either boring or trenching and Contractor will notify the relevant Authorities/ Owners and will obtain necessary permission in this regard. Radiographic inspection of the welds, electric holiday detection for the coating and hydrostatic testing for the line sections will be made prior to lowering or pulling the line into position. Concrete Set-On weights shall be placed on pipeline in rivers, water logged, marshy, fish farm or any other areas as required by Owner, according to relevant drawings. Mechanical protection between concrete set-on weights and pipeline shall be provided of approximately 10 mm thickness.

16.0 **UNDERGROUND PIPES, CABLES ETC.**

Crossing of all underground pipes, cables, etc. shall be contractor's responsibility. Contractor is responsible for obtaining necessary permission, if required, and coordination with relevant authorities during construction.

17.0 **SPECIAL ITEMS**

17.1 Installation of the following equipment shall be included as a special item in pipeline construction:

- Scrapper Traps (future)
- Mainline block valves and fitting.
- Insulating Flanges.

They shall be installed in accordance with the Drawings.

17.2 **Anchor flanges**

Anchor flanges shall be aligned properly and welded to the pipeline at the burial point.

18.0 **APPURTENANCES**

Appurtenances include mainlines valve foundations, enclosures for valve assemblies, abutment, markers, etc.

The Contractor shall supply the material and install the appurtenances in accordance with the drawings.

In addition the Contractor shall be required to carryout pipeline protective works in terrain liable to erosion which include but are not limited to, stone pitching, abutments, bunds, etc.

19.0 **PRESSURE TESTING, DEWATERING AND DRYING**

19.1 **General**

Contractor shall furnish all necessary equipment, materials and labour to successfully complete the hydrostatic strength and leak test and the cleaning and drying defined herein.

The hydrostatic strength and leak test and the cleaning and drying includes

- Locating and procuring acceptable water to the Owner for testing.
- Preparing pipeline profiles and test procedure for approval by the Owner.
- Filling the test section with water including addition of required chemicals.
- Performing the strength test at the specified pressure.
- Investigating for leaks or breaks, making any necessary repairs and re-testing.
- Displacing and safely disposing of test water.
- Cleaning, drying, treating and capping off the tested pipelines.
- Recording of all test data.

Contractor shall assign and designate a construction crew, with equipment, to the testing operations. The testing operations shall be conducted diligently, thoroughly and in a safe manner in accordance with accepted pipeline testing practices. Any work by Contractor or existing conditions which, in the opinion of Owner are deemed to be unsafe shall be corrected. The testing operations shall not continue until the unsafe conditions have been corrected to the satisfaction of Owner. Contractor may not receive additional compensation for time lost caused by unsafe conditions.

Contractor shall furnish a representative who shall be responsible for supervising all testing operations. Owner will witness and accept all tests.

19.2 **Standard**

Contractor shall conduct the testing operations in accordance with ASME B 31.8, Section 841.3, "Testing After Construction".

19.3 **Procedure**

At least four (4) weeks prior to the start of testing, Contractor shall submit to Owner a detailed procedure for the hydrostatic tests listing equipment, manpower and program for testing all pipelines. The Contractor must submit a profile of each pipeline indicating the elevation of the pipeline, the test pressure at the low and high points for each test section and the number of test sections required. This procedure shall include the proposed water source, water analysis, proposed chemical additives, water disposal method and water disposal locations.

Also, the procedure shall include field preparations such as placement of pumps, laying of water supply lines, connection to the water source, location and implementation of all equipment and a detailed test procedure. Contractor shall not proceed with testing until Owner has approved the test procedure.

19.4 **Materials and Equipment**

Contractor shall furnish and install all test-header pipe, valves, fittings, test instruments, water, chemicals, strainers and filters, fill and pressure pumps, meters, air compressors and all piping incidental to filling, sectionalizing, transferring and disposing water. Contractor shall also furnish adequate materials for capping off both ends of completed test sections.

Contractor shall furnish an enclosed weatherproof, properly lighted, temporary shelter of sufficient size to house the pressure recorders, calibration equipment and test personnel at the data collection site of each test section during the testing operations. Contractor shall also furnish sufficient lighting in the compressor, pump and test header areas during periods of darkness when testing operations are in progress. Calibration of all test instruments shall be performed by the Contractor and witnessed by the Owner.

The equipment furnished by the Contractor shall meet the following requirements:

- The filter shall be of a quality to remove 95 percent of all particles 40 microns in diameter and larger. The filter shall be provided with a means of cleaning either side without disconnecting the piping or interrupting the flow of testing media.

- The pumping system used for filling the test section shall be capable of filling the pipe test sections at the rates specified in this section.
- The pumping system used for pressurization of the sections shall be capable of attaining the test pressure required at a slow and steady rate of pressure increase. When the pressure in the test segment is 70 percent of the specified test pressure, the pumping rate will be reduced so that the pressure does not increase at a rate greater than approximately 15 psi per minute.
- All required test manifolds will be furnished by Contractor in accordance with these specifications. All fabrication welds and girth welds on each test manifold shall meet the standards of acceptability for non-destructive testing requirements of API Standard 1104. All manifolds used for testing shall be pre-tested by Contractor to a minimum of 105 percent SMYS of the respective pipe sizes for a minimum period of 4 hours. Contractor shall replace or repair, as directed by Owner, all welds found to be defective in manifolds fabricated by Contractor.
- A 24 hour pressure recorder having a minimum 12 inch diameter chart shall be furnished and installed and shall be of sufficient capacity to record the complete test. The pressure recorder shall have a pressure range greater than the highest test pressure required for the pipelines to be tested.
- A certified calibrated 24 hour clock-wound temperature recorder with a range of approximately 0-60 °C shall be provided and shall be installed before filling each test section.
- A high pressure deadweight gauge of 50 - 7000 psi range capable of reading to 1.0 psi intervals. A deadweight gauge of quality comparable to Chandler Engineering of Tulsa, Oklahoma or equal is required. The deadweight gauge shall have a certification of calibration not more than 6 months old.
- A flow meter of sufficient size and accurate to within 0.5 percent to measure water injected into the test sections.
- A yellow-black thermometer with a range of 0-600 °C , ½ °C increments, 300mm long with a string hole at top.
- Pressure gauges with 150mm dials and ranges of 0-1000 psi and 0-7000 psi.
- An air compressor capable of delivering an air supply to propel pigs through the various pipe sizes to be tested at a speed between 3 and 16 kilometers miles per hour.
- An adequate supply of pipeline scrapers for performing the pigging operations described herein. The following types of pipeline scrapers will be required as a minimum:

- sizing pigs
 - fill pigs
 - cleaning pigs
 - dewatering pigs
 - drying pigs
- A corrosion inhibitor pump capable of injecting corrosion inhibitor into the test water stream as the line is being filled with test water.
 - A water dewpoint analyzer with a range of approximately 0 to +10 °C which uses a probe for analysis inserted directly into the pipeline. Analyzer shall be a Panametrics Model 700 or approved equal.

All materials and equipment, especially test instruments, will be subject to Owner approval.

19.5 **Testing**

19.5.1 **Test Sections**

Contractor shall locate and identify all test sections and shall indicate the test sections, water sources and water disposal points on the appropriate alignment sheets for Contractor's approval as described in 19.3.

Contractor shall isolate the test sections by installing hydrostatic test headers and shall install the necessary piping connecting the test sections that will allow transfer of the test water from one section to the next. Where directed by Owner, the test water shall be filtered when transferring it from one section to the next.

19.5.2 **Cleaning and Sizing Pigs**

After a section of pipeline is lowered in and backfilled and just prior to pressure testing, The Contractor shall run a cleaning pig. After a successful cleaning pig run, a sizing pig shall be run. Plate size of the sizing pig shall be 90 percent of the pipeline inside diameter. The pigs may be run using compressed air or water. If water is used, it is required to precede each pig with a quantity of water equivalent to a full pipe column approximately 400m in length.

19.5.3 **Maintenance of Pigs**

The Contractor shall furnish all cleaning pigs and sizing pigs. The Contractor shall furnish extra pig cups and wire brushes for all pigs and shall utilize these to refurbish the pigs, when in Contractor's opinion, the cups or brushes become excessively worn. Sizing plates may also require replacement due to damage.

19.5.4 Acceptable Sizing Pig Runs

Contractor shall notify Owner at least two days prior to pigging operations. A Owner representative shall witness pigging operations and shall be present when Contractor inserts the sizing pig in the pipeline, removes it from opposite end of the pigged operation and any operations resulting from the pigging operation shall be recorded.

Owner representative will inspect sizing plates for damage at completion of each run; authority for acceptance/rejection of the sizing pig runs lies with the Owner representative. In case the sizing pig lodges in the line, Contractor shall cut the line, remove the obstruction, reseal the line and repeat the sizing pig operation, at no additional cost to Owner, until a successful run of the sizing pig has been completed.

Pigging operations shall be completed as soon as possible once a section of pipeline has been laid, but shall not occur until all backfill operations on that section have been completed except those which would be detrimental to accomplishing final tie-ins after the pig run.

19.5.5 Filling the Line

The Contractor shall supply the test water. The water shall be analyzed to determine its suitability for use in the testing operations. Contractor shall present recommendations as to the type of corrosion inhibitor, oxygen scavenger and bactericide to be used in the test water.

Two pigs shall be utilized for water fill of each pipeline section. A quantity of water equivalent to a full pipe column 400m in length shall be pumped ahead of a wire brush cleaning pig and ahead of a fill pig. Water fill for testing follows the fill pig.

Water fill rates shall maintain pig speeds of not less than 1 km/hr and not more than 8km/hr. Pumping shall be continuous throughout each water fill and Contractor shall construct his test headers so as to permit the sequential launching and receipt of the two fill pigs without delaying this operation. The exhausting air shall be throttled to maintain adequate 'back pressure' against the front of the pigs. When it is confirmed that both pigs have been received, maintain water flow until exhausting water is clean and free of suspended matter to the Owner satisfaction.

The intent of the above cleaning and water fill requirements is to ensure the removal of most of the rust, mill scale, sand and dust from the pipelines.

Suspended matter in the fill water shall be removed before injection into the pipeline by use of a filter of the quality as stated earlier in this section.

Before the pressuring operation commences, each valve capacity shall be tested with water by partially closing and opening each valve. Valves shall be tested in the full open position. Discs shall be removed from check valves prior to any testing operations if the testing operations require reverse flow. Contractor shall carefully replace discs after drying operations are complete.

After filling operations are completed and prior to pressure testing, backfilling must be complete on the test section except for a small distance near the test header which shall be backfilled lightly by hand. Test line connections to the recorders and deadweight gauge shall be connected and insulated. The test section shall remain at fill pressure and left for a period of approximately 48 hours for temperature stabilization after backfilling is complete.

Prior to the commencement of the test and during the temperature stabilization period a check shall be made for residual air and a pressure/volume (PV) plot prepared.

19.5.6 **Pressure Test**

After the temperature stabilization period, the pressure in the test section may be increased to the test pressure. The minimum and maximum test pressures shall be specified by Owner (and in accordance with ANSI B31.8). The test pressure must remain within the range of pressure (between minimum and maximum) during the test period of 24 hours at all points within a given test section.

Each test section shall be pressurized to the specified test pressure by maintaining a constant pumping rate and continuously observing the line pressure. After the minimum test pressure has been reached, the pump shall be stopped, disconnected and the pressure allowed to stabilize. The Contractor shall then adjust the pressure within the test segment, if necessary and begin the test period. The pressure and temperature recorders shall then be started using charts in real time orientation.

During the test period, pressures shall be recorded every quarter hour using a deadweight gauge. The deadweight gauge shall be read to the nearest psi. If a drop in pressure occurs during the test period which cannot be attributed to changes in temperature or if the pressure in the test section falls below the minimum test pressure, the test is unsuccessful and the leak must be located by the Contractor or the line pressure increased to an acceptable level. After the repairs have been made, the pressure test shall be repeated until it has been determined to be successful by the Owner.

Should the test pressure increase due to a change in the ambient temperature, the Contractor shall reduce the pressure in the test section to keep the pressure below the maximum test pressure.

A Owner representative shall witness and certify hydrostatic testing. Authority

for, acceptance/rejection of all hydrostatic test operations lies with the Owner representative.

19.5.7 **Failures**

Failures in the line disclosed by the loss of pressure not attributable to temperature changes shall be located and repaired by Contractor. If the failure is in the seam of the pipe, the entire joint in which the seam failure exists shall be removed. A minimum of one pipe diameter each side of the failure will be removed on all other failures. The piece(s) removed shall be marked for orientation with respect to the position in the pipeline and with the approximate location of the failure. Contractor shall not cut on or damage the failed edge of the pipe during removal, transit or unloading at the storage location. All portions are to be retained. The failure shall be photographed prior to and after removal from the pipeline, if possible.

Care must be taken to ensure that external coating and backfilling at repair sites is carried out in accordance with these specifications.

All welds in pipe repairs shall be 100 percent inspected by radiography. Upon completion of a pipe repair, Contractor may, at Owner discretion, be required to displace the test section volume with fill water behind a fill pig to remove all entrapped air. After repair of the failure, a retest for an additional 24 hour period is required.

Contractor shall at his expense, repair all defects found resulting from inferior workmanship or defective materials furnished by Contractor.

19.5.8 **Test Records**

The pipeline pressure and temperature for the 24 hour period shall be continuously recorded with recording instruments. The pressure recording shall serve only as information data and may not be used to determine pressure drop for pipeline leakage. Test sections will not be accepted until a 24 hour period can be recorded without pressure loss unless the loss can be attributed to temperature change. All data and charts shall be clearly marked with the following information:

- Owner name and authorized representative
- Testing Contractor's name and authorized representative
- Description of facilities tested
- Date and time of test
- Test pressure and duration

- Test medium used
- P/V Plot with residual air determination
- Test section key plan complete with line specs, length and instrument locations
- Filling record
- Explanation of any pressure discontinuities that appear on any chart
- Signature of Owner's and Testing Contractor's authorized representatives.

All permanent records shall become property of the Owner.

Fabricated assemblies and piping for tie-ins to existing pipelines shall be tested in accordance with this specification. All data and charts shall be clearly marked in the same manner the pipeline test records are marked.

19.6 **Dewatering**

After Owner's acceptance of the hydrostatic strength and leak test, the pressure shall be released until atmospheric pressure has been reached. Reduction of pressure shall be conducted in a manner to prevent severe vibration. Contractor shall then purge the water from the line by using a series of dewatering pigs propelled by compressed air. Contractor shall continue to run the pigs through the line until all free water is removed.

Contractor shall control the speed of the pigs by release of water or air from the downstream end of the pipeline. The recommended pig speed for dewatering is between 2km and 5km per hour. All free water shall be determined to be removed when no free water is received in the scraper trap after three (3) consecutive pig runs. Water should be drained from any low point drains, mainline block valve body bleeds etc. during the dewatering operation.

Contractor shall be responsible for the proper disposal of test water at locations and at a time satisfactory to Owner. Damage to the pipeline, the right-of-way or adjacent property caused by the disposal operations shall be repaired by contractor at his expense. Contractor shall abide by any Governmental or local jurisdiction regulations governing the method and location of the disposal of test water. Owner may elect to leave the test water in the pipelines until start-up and commissioning.

19.7 **Drying**

The Contractor shall supply all equipment, labour and materials to dry all pipelines. Drying shall be performed immediately following acceptance of the

dewatering operation for each pipeline to prevent any corrosion within the pipeline.

The Contractor shall prepare a procedure and schedule for pipeline drying. These shall be submitted to the Owner for approval at least thirty days prior to the scheduled start of drying.

19.8 **Treating**

On completion of pipeline drying the pipeline and station pipework will be purged with clean dry air having a dew point of -5°C . The system will be left with a positive pressure of 50kPa until gas is received.

20.0 **PAINTING**

All exposed above ground metal surfaces on piping, structure, equipment, or attached appurtenances shall be painted by the Contractor with equipment and labor supplied by the Contractor as per painting specification.

21.0 **CONCRETE**

- 21.1 S.R. cement shall be used.
- 21.2 Water used in making concrete shall be of approved drinkable quality, free of injurious amounts of oil, acid, alkali or organic matter.
- 21.3 Admixtures or setting accelerators will be added to concrete mix.
- 21.4 The proportion of aggregate shall be determined by means of screen tests and shall be approved by Owner.
- 21.5 Concrete shall meet a minimum ultimate compressive strength of 210 kg/cm² at an age of 28 days.
- 21.6 Only materials resulting in the specified ultimate compressive strength shall be accepted by Owner. All unsuitable materials shall be replaced by acceptable materials at his own expense by Contractor.
- 21.7 Concrete shall be mixed in an approved batch type mixer either at the site of the work or transit mixed. Adequate equipment and facilities shall be provided for accurate measurements and control of all materials for readily changing proportions as control of all required. The time of mixing each batch in the mixer at the site, will not be less than one minute after all materials are in the mixer. Transit mixed concrete shall be mixed and transported according to Contractor's recommendations and in no case shall water be added to the mixture. All batches shall be dumped which have not been placed within 1.5 hours after water is introduced into the mixture.
- 21.8 Concrete pouring shall be done with the help of pneumatic vibrator.
- 21.9 The Contractor shall provide at least three-test specimen of concrete 6×6×6 and shall pay the charges for obtaining certified test results from the government authorized test laboratory.

22.0 **FENCING**

The work under this section of these Specifications includes the furnishing of all supervision, labor, services, tools, and instruments required for installation of fences and gates as indicated on the Drawings and specified herein, and in accordance with the Contract Documents. Materials will be supplied by the Contractor.

23.0 **WET AREAS, SWAMPS DITCHES AND AREAS SUBJECT TO FLOODING**

- 23.1 Wet areas, swamps, ditches and areas subject to flooding are those areas where weighting or anchoring may be required to hold the pipe down. Wet areas, swamps, ditches and areas subject to flooding will be shown on the drawings when those areas are known at the time of original survey; however, additional or lesser areas may be classified as wet areas, swamps, ditches or areas subject to flooding upon further investigation or as trenches are excavated.
- 23.2 The Contractor shall do all the work necessary to install the pipelines across wet areas, swamps, ditches and areas subject to flooding.
- 23.3 If required, the pipe may be held down by one or any combination of the following methods:
- Weighting by use of continuous concrete coating;
 - Weighting by use of set on weights; or
 - Metal anchors screwed in pairs into the subsoil.
- 23.4 Pipe, insulation, and concrete weighting when submerged in water of sp. gravity of 1.15 or greater if so specified in the drawings.
- 23.5 If set-on weights are used, the pipe coating shall be protected with five wraps of asbestos felt weighting 800 grams/m² between the coating and set-on weights. The maximum center-to-center distance between set-on weights shall not exceed that shown on the drawings. Set-on weight shall be provided with suitable lifting lugs.
- 23.6 If screw anchors are used, the pipe coating shall be protected with three layers of asbestos felt weigh 800 grams/m² placed between coating and metal hold-down straps. The maximum center-to-center distance between screw anchors shall not exceed that shown on the drawings. Screw anchors shall be installed as shown on the drawings and at locations specified by Owner.

24.0 **LINE AND AERIAL MARKERS**

24.1 In general, line markers and aerial markers shall be constructed and installed as per relevant drawings at contractor's cost.

Water crossing signs will be installed on each side of all river crossings and open water areas such as swamps.

25.0 **FINAL CLEAN-UP OF THE CONSTRUCTION RIGHT-OF-WAY AND PERMANENT JEEPABLE TRACK.**

- 25.1 The Contractor shall restore the construction right-of-way as near as practical to its original condition.
- 25.2 All surplus and defective materials supplied by Owner shall be collected by the Contractor and delivered to the Owner's specified location.
- 25.3 All surplus and defective material supplied by the Contractor and all trash, refuse, and spoiled materials shall be collected and disposed of by the Contractor.
- 25.4 All loose rock exposed by the construction operations, which is scattered over the right-of-way and adjacent property shall be removed and hauled by the Contractor.
- 25.5 The permanent Jeepable track both in shared and non shared section of ROW shall be maintained and restored to Jeepable condition as specified in Section 5.1 of this specification. All water courses, depression, etc. shall be provided with proper crossings and land filling so as to make the entire Row Jeepable in one continuous stretch.

26.0 **COMMISSIONING AND START-UP**

26.1 This part of the specification defines the various responsibilities of the Contractor with the commissioning of the complete pipeline system and lists the preparatory work to be performed and the requirements to be met before the pipeline system can be commissioned.

The operations personnel of the Owner shall be involved in pipeline commissioning within the framework of the specified training program

26.2 Contractor's Responsibilities

26.2.1 The Contractor will prepare a commissioning plan for each part of the pipeline system (i.e. pipeline section, pump station, etc.) in consultation with the Owner. The Contractor will determine the work, services, equipment and personnel required for commissioning and will be responsible both for the co-ordination of commissioning and for liaison with the Owner. The Contractor shall instruct the personnel to be deployed for commissioning in the commissioning procedures to be used and shall cause such personnel to give an undertaking to comply with all safety regulations applicable to commissioning.

26.2.2 The Contractor shall provide all personnel and equipment required for the performance of all work required for commissioning in accordance with the commissioning plan. The services to be performed by the Contractor for commissioning shall include without limitation:

- Take an active part in preparing the commissioning plan in accordance with sub-section 26.2.1 above,
- supply and provide any equipment, facilities, etc. which may be required for commissioning, manage and co-ordinate commissioning work and monitor compliance with safety regulations,
- install any additional lines and facilities which may be required for commissioning including such lines and facilities which may be required for the disposal of water or for the treatment of waste products,
- supply transport equipment and mobile lifting equipment with all accessories required,
- supply and install pressure indicators and pressure recorders required for the works hereunder if required,
- operate mechanical and electrical implementation in accordance with the commissioning plan,
- provide personnel required for the works hereunder including personnel for the observation and maintenance of the pipelines and for the recording, evaluation and documentation of meter reading taken during the works hereunder,
- provide a standby crew with suitable specialists and equipment to perform any repairs or additional work which may become necessary during commissioning,
- prior to the commencement of commissioning works, the Contractor shall:
 - Install and level all mechanical equipment cold-aligned, subjected to no-load tests and load tests (if practical), and made ready for

operation. Fresh charges of lubricants, coolants and fuels shall have been installed according to manufacturer's instructions,

- ensure that all certificates required for commissioning are available,
- check which environmental and other regulations must be complied with during commissioning and obtain any necessary approvals by authorities,
- select and name persons to contact for work on the pipelines and work on the stations,
- ensure ease of access to all plans, equipment, etc.,
- ensure that adequate means of communication (telephone, radio) are available for the commissioning work,
- calculate, obtain and remove the methanol or nitrogen required as a safety batch in front of product medium, separated by scrapers in pipelines,
- train personnel for the commissioning operation, patrol the route and check the effectiveness of radio communications,
- provide all fire fighting and other safety equipment required for the commissioning operation,
- provide all explosion-proof equipment required for the commissioning operation.
- supply all protective clothing which may be required for the works hereunder,
- make a final clean-up after work is completed and accepted by the Owner. All remaining scrap, debris, waste, surplus materials, tools and equipment shall be removed from the job site, except for the equipment required for maintenance in the guarantee period, in accordance with the Contract. All surplus materials shall be returned to Owner's warehouse,
- bear all costs of the works hereunder including the costs of the supply, transportation, connection and erection of all equipment required therefore,
- keep complete records of the works hereunder.

26.2.3 Before any pipeline section is commissioned, the following conditions shall be met and the Contractor shall carry out a review to ensure that said conditions have been met: a test of functions shall be made to ensure that all flow paths which may be set on the pipeline including station inlet and outlet lines during commissioning can effectively be set,

- any installation, commissioning and operation instructions issued by the supplier or manufacturer or any equipment or facilities installed in or in the pipeline section shall be available on site and shall be complied with,
- a check shall be made to ensure that all equipment which must be installed in a specific direction with reference to the direction of flow has been installed in the correct direction,
- all relevant installations such as block valves and similar facilities shall be numbered prior to commissioning using the same numbers as those indicated in the commissioning plan,
- Explosion-hazard areas shall be determined and marked with appropriate signs. The Contractor shall ensure that all personnel comply with safety precautions laid down for explosion-hazard areas including areas which are designated as explosion-hazard areas temporarily (e.g. during methanol or any other drying agent filling and disposal),

- an emergency plan shall be prepared detailing all immediate action to be taken in the case of a fire or an environmental pollution incident,
- Functional checks of alarm and shut-down systems shall be completed and accepted by Owner prior to commissioning.

26.3 **General Start-up Conditions**

- Contractor shall provide a complete operating team, including necessary vendor representatives capable of starting up and operating the plant under the supervision of Owner's operating personnel. It is required that Owner operations personnel grant prior approval to Contractor before any operating decisions are implemented. It will be Contractor's responsibility to not only prove the operation of the new facility, but also to train Owner operating and maintenance personnel in the proper procedures for safe, reliable facilities operation.
- Pumps, motors, exchangers, vessels and other equipment shall all have operated at or near design conditions without undue care and attention, except initial correction and maintenance by Contractor.
- Instrumentation shall have operated correctly in the manner intended by the project specifications. It shall have maintained the plant operating at the required set points, allowed safe start-up, running and shut-down. It shall have monitored the plant in such a manner that it provided the plant operators with a clear understanding of the plant condition at all times. Emergency shut- down systems shall be tested for proper operation.