



OGDCL PAKISTAN:
OIL & GAS DEVELOPMENT
COMPANY LIMITED

NASHPA COMPRESSION PROJECT (PHASE-II)

ISSUED FOR TENDER

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ENAR Petrotech Services (Pvt.) Limited ,
7-B , Sector 7-A , Korangi Industrial Area ,
Karachi Pakistan

TITLE:

SPECIFICATION FOR LV POWRE & CONTROL CABLE

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NASHPA COMPRESSION PROJECT (PHASE-II)
SPECIFICATION FOR LV POWER
& CONTROL CABLES**

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**CLIENT : OIL & GAS DEVELOPMENT COMPANY LTD.
(OGDCL)**

PROJECT: NASHPA COMPRESSION PROJECT (PHASE-II)

**SPECIFICATION FOR LV POWER &
CONTROL CABLES**



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1. PURPOSE

This specification covers the general requirements for design, manufacturing and testing of the Electrical Power and Control Cable.

Cables shall comply with the Reference Standards and Codes. Where the manufacturer's standards differ from other supplementary requirements of this Specification details shall be submitted to the Purchaser for approval.

In case discrepancies are found between this specification and other documents, Purchaser shall be referred for correct interpretation.

2. REFERENCE STANDARDS & CODES

It shall be manufacturer's responsibility to become, knowledgeable of the requirements of these standards and codes. Any changes, alternations and any necessary re-certification of the equipment to make it meet standards and codes requirements shall be at the expense of the Manufacturer.

The equipment and material selection, design, manufacturing, testing and inspection shall conform to the latest editions of the following Codes and Standards as applicable. Any changes, alterations and necessary re-certification of the equipment for compliance with the applicable Codes and Standards shall be at the expense of the Contractor.

IEC – 502	Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV)
IEC - 6004	(For 450 / 750 & 300 / 500V General Wiring Cables)
IEC – 228	Conductor of insulated cables
IEC– 332	Tests on electric cable under fire condition
IEC – 364-5-523	Electric installation of buildings
BSS – 6346	(For 600 / 1000 & 1900 / 3300 V L.V. Cables)

In addition to the above, the following codes shall be considered;

- NFPA-70 / National Electric Code.
- Relevant British Standard Specification and Codes of Practice
- The Institute of Petroleum – Model Code of Sage Practice Electrical
- The Institute of Electrical Engineers, Regulations for Electrical Installation- Latest Edition.
- Institute of Electrical & Electronic Engineers (IEEE)
- Electricity Act. (Govt. of Pakistan)
- Oil & Gas (Safety in Drilling and Production) Regulation 1974, Govt. of Pakistan.



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In the event of conflict between Standards, the most stringent shall prevail.

3. SERVICE CONDITIONS

Electrical design shall be based on the following:

Temperature:	Maximum	115 °F
	Minimum	35 °F
Humidity:	Maximum	70%
	Minimum	10%

The rated characteristics of the power supplies are:

Low Voltage (3-Phase)	400V ac
Low Voltage (1-Phase)	230V ac
Frequency	50 Hz. \pm 2 Hz

4. DESIGN REQUIREMENTS

4.1 General

Cable /conductor shall be annealed copper wire and shall be in accordance with IEC / BS standards.

All cables shall be flame retardant to meet the test requirements to IEC 60332 Part 3 Category C. All cables shall utilize materials that are UV stabilized and will not deteriorate under direct sunlight.

For 400/230 V power system, cables shall be 600 / 1000 volts grade as specified. For control system, cables shall be 600 / 1000 volts grade.

The Conductor shall be stranded, high conductivity, soft annealed copper. Conductor of single core cables shall be circular, whereas of multi-core cables may be circular or shaped according standard practices, and codes.

Cable protective sheaths shall be suitable for good resistance to ageing, good mechanical resistance to laceration, and repellent to termite and flame retardant. Sustainable temperature rise during short circuit is 60 °C for PVC and 250 °C for XLPE.

Polymeric insulated cables using cross-linked polyethylene (XLPE) shall have a maximum operating temperature of 90°C. XLPE cores shall be individually copper wire screened. The screen shall be heavy duty. Polymeric insulated cables using polyvinyl chloride (PVC) (for administration buildings cables shall have a maximum operating temperature of 75°C. The laid up cores of three core cables shall have the interstices filled with non-hygroscopic filler

to achieve a circular cross-section. Where installed, the earth conductor in multi-core cables shall be an insulated conductor with the same insulation level as the phase conductors.

Cables cores shall be identified throughout its length as follows

- | | |
|-------------------|---------------------------|
| – 1 Core | Black |
| – 2 Core | Red and Black |
| – 3 Core | Red-Yellow and Blue |
| – 4 Core | Red-Yellow-Blue and Black |
| – 5 and more Core | Cores shall be numbered |

4.2 Control Cables

Control cables shall satisfy the construction requirements of the relevant standard in Section 2. Conductors shall be stranded, annealed copper conductors to the relevant standard in Section 2, laid up in a concentric arrangement.

Cables shall have the length, number of cores, cross-sectional area, sheathing, insulation material, insulating voltage and armoring as stipulated in the cable schedules (created during detail design stage).

The designated operating voltage shall be 0.6/1 kV.

Polymeric insulated cables using cross-linked polyethylene (XLPE) shall have a maximum operating temperature of 90°C. XLPE cores shall be individually copper wire screened. The screen shall be heavy duty.

Multi-core armoured control cables shall have a layer of helically applied galvanised steel armour wires applied over the laid up assembly.

4.3 Earthing Cables

Earthing cables shall be single core satisfying the construction requirements of the relevant standard in Section 2. Conductors shall be high conductivity, stranded, circular, hard drawn copper conductor to the relevant standard in Section 2.

For above ground installation earthing cables shall be PVC insulated, coloured green with yellow stripes.

For below ground installation earthing cables shall be bare. Earthing cable requirements shall be as stipulated in the cable schedules (created during detail design stage).

4.4 Steel wire Armouring

Steel wire armouring for multi-core cables shall consist of circular galvanized steel wire which shall be electrically continuous over the entire length of cable.



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Aluminum wire armouring (AWA) shall be applied to single core cables.

4.5 Labels

A master nameplate shall be provided on each starter to show the following:

- Manufacturer's name or trade mark
- Type designation or CABLE identification number
- Governing Code / Standard
- Year of manufacture
- Size
- Type
- Voltage Rating
- No of cores
- Temperature rating

Each cable shall be identified by manner tapes incorporated in each cable at regular intervals along the entire length with the following information including but not limited

Vendor shall furnish the type test reports to purchaser.

5. TESTS

The testing procedure shall be submitted to the Purchaser for his approval prior to testing. All tests shall be conducted according to reference Standards and Codes.

The Manufacturer shall give at least one month notice prior to final tests. Purchaser may witness the tests at the Manufacturer's facility.

1) The vendor shall confirm the following routine and sample factory testing in accordance with IEC 502 and quality control will provide for 100% testing and checking (including dimensional checks) of all electrical properties and physical properties of cables.

- Routine Test
- Sample Test
- Type test report

2) The Cable test shall include those quality control and other tests necessary to demonstrate the qualities of the materials used in the manufacturing of cables.

3) Incase where cables are re-drummed from manufacturing onto shipping drums after factory test, insulation resistance (Megger) tests shall be carried out on all the shipping drums.



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6. GUARANTEE

The Manufacturer shall guarantee that the cable is free from fault in design, workmanship, is of adequate size and capacity, and of proper material to satisfactorily fulfill the operating conditions specified. Should any defect in design, material, workmanship or operating characteristics develop during the first year of operation, the Manufacturer shall make all necessary alterations, repairs, and replacements of defective equipment / components, at his own cost including transportation, installation and testing.

7. SHIPPING

The material shall be properly conditioned for shipping against all possible damages. Manufacturer shall be responsible for shipment of equipment to site and for the adequacy of the preparations for shipment ensuring that materials and equipment arrive at their destination in undamaged condition. All components shall be shipped simultaneously.

Cable ends shall be sealed to prevent ingress of moisture during shipping and site storage.

Cable ends shall be wound on cables drums. Cable drums ends shall be, securely and clearly labeled with the following information

- Cable type
- Cable length

Total weight of cable plus drum.