



OGDCL PAKISTAN:  
OIL & GAS DEVELOPMENT  
COMPANY LIMITED

## KPD-TAY 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 ROAD, PAVEMENTS & GRAVEL FILLING

PROJECT NO.  
14-0258

DOCUMENT NO:

**0258 – CA – 7014 – 0**



**OGDCL (PAKISTAN)**  
**KPT-TAYCOMPRESSION PROJECT**  
**SPECIFICATION FOR ROAD, PAVEMENTS & GRAVEL**  
**FILLING**

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## **1.0 GENERAL**

This technical Specification covers the requirements for the construction of flexible roads and concrete paving.

All operation regarding excavation, filling, and compaction of sub-grade involved in construction of road are specified in specification for "Earthwork and Excavation".

## **2.0 ROADS**

- 2.1 The width of the roads shall be as shown on layout plans and cross-section drawings.
- 2.2 The radius of curvature at all road intersections shall be taken as 15m from centerline of roads or as indicated on drawings.
- 2.3 The maximum gradient (longitudinal slope) of the centerline of all roads shall be maximum 6%.
- 2.4 Generally, the current cross-falls (transversal slope), shall be 2.5% from centerline to the edge of road.
- 2.5 The Contractor shall be responsible to match the centre-line elevation and cross-fall of new roads with the adjacent existing road.
- 2.6 The following structural of road for premix carpeting should be used:
  - a) **Sub-grade:** The sub-grade elevation obtained from excavation/filling shall be perfectly leveled and firmly compacted with vibratory roller to the required moisture content as per BS 1377 or modified AASHTO.
  - b) **Sub-base Course:** Road sub-base course shall consist of naturally occurring or mechanically crushed stones (igneous or sedimentary rock) to a consolidated thickness of 20 cm after compaction. Size of hard crushed stone shall be 100mm down. Sub-base course shall be sprayed with Coarse sand considering 8 c.ft; per % s.ft; or as may be required to fill the compacted aggregate voids, accompanied with water sprinkling and compacted again with the compaction equipment i.e. 10 Ton Roller.
  - c) **Base Course:** Road base course shall consist of crushed stones (igneous or sedimentary rock) to a consolidated thickness of 10 cm after compaction. Size of



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hard crushed stone shall be 40mm down. Base course shall be sprayed with Coarse sand and water in the same manner as described in Item b) above.

- d) **Premix Carpeting:** Premix Carpeting shall comprise of Bitumen Priming/Tack coat over base course, application of two layer of premix carpeting of one inch (2.54 cm) each over tack coat, to a consolidated thickness of 5 cm after rolling, and finally application of seal coat.

### **3.0 CONSTRUCTION METHODS**

#### **3.1 Sub-Grade**

Preparation of sub-grade shall be carried out prior to the laying of the sub-base course. During preparation of the sub-grade, the surface shall be shaped true to cross-fall or super-elevation and shall be watered and rolled as necessary until it is smooth, firm and tight. The sub-grade shall be compacted to achieve 98% of maximum dry density at optimum moisture content. Following preparation, the sub-grade shall be protected against damage until covered by the sub- base course.

#### **3.2 Sub-Base Course**

Sub-base course shall be laid with crushed stone of size 100mm down in one layer and compacted to 100% of the Maximum dry density as determined by AASHTO Test Method. T.180 using compaction equipment such as 10-ton roller, which is most appropriate to the material concerned. Sub-base shall be sprayed with Sand, to fill the aggregate voids, then water is sprinkled and compacted again by the roller, acceptable to the OGDCL / OGDCL's Representative.

#### **3.3 Base Course**

- 3.3.1 The work shall consist of a base course composed of crushed stone metal placed and compacted on a prepared and accepted sub-base in accordance with these specifications and the lines, levels, grades, dimensions and cross sections shown on the drawings and as required by the OGDCL / OGDCL's Representative.
- 3.3.2 Aggregates for aggregate base course shall consist of naturally occurring or mechanically crushed stone, free from decomposed stone, organic matter, soft particles or excess clay or any other substances which in the opinion of the OGDCL / OGDCL's Representative, may be deleterious.



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- 3.3.3 The amount of crushing shall be regulated so that at least 50 (fifty) percent, by weight, of the pieces retained on No.4 sieve have at least one mechanically fractured face.
- 3.3.4 The material shall be crushed, washed, screened and blended as necessary to produce a grading conforming to the following table. The grading of base course shall be either Class A, or Class B as directed by the OGDCL / OGDCL's Representative. The aggregate when graded shall produce a smooth, evenly distributed curve within the following envelope for either Class A or Class B.

Sieve Size	% Passing by Weight	
	Class A	Class B
2" (50.8mm)	100	100
1½" (37.5mm)	—	—
1" (25.4mm)	70 – 90	75 – 95
¾" (19.1mm)	—	—
⅜" (9.52mm)	30 – 65	40 – 75
No. 4 (4.76mm)	25 – 35	30 – 60
No. 10 (2.00mm)	15 – 40	20 – 45
No. 40 (0.42mm)	8 – 20	15 – 30
No. 200 (0.75mm)	2 – 8	5 – 20

- 3.3.5 Aggregate mixtures shall be so transported and handled as to avoid segregation of the material. Any segregated material in the base course shall be cut out and replaced and no patching will be permitted.

3.3.6 **Compaction of Mixed Materials**

After laying, the material shall be uniformly compacted by rolling in a longitudinal direction from the sides to the centre of roadway, over lapping on adjacent passes by at least half the width of the rear roll.

The number, type and condition of rollers shall at all times be sufficient to compact the mixture to the required density while it is still in a workable condition. Rolling trials shall be carried out by the Contractor until OGDCL / OGDCL's Representative is satisfied that the equipment provided and procedure adopted by the Contractor are capable of producing a base course meeting the requirements of the Contract. Such procedures shall thereafter be maintained until the OGDCL / OGDCL's Representative



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directs otherwise. Such laid on/or compacted material as, in the opinion of the OGDCL / OGDCL's Representative, is not suitable to be incorporated in the works, shall be removed and disposed of in a manner acceptable to the OGDCL / OGDCL's Representative.

The Compaction equipment weighing 10 tons roller shall be provided for rolling the base course. The layer shall be compacted to 100% of the maximum dry density as determined by AASHTO Test Method T.180. Rollers and other equipment not in operation shall not be allowed to stand on the base course and no traffic except that unavoidably used in connection with the laying of subsequent courses shall be permitted on the base course without written authorization. The base course shall be sprayed with fine sand to fill the aggregate voids, then water is sprinkled and compacted again by the roller, acceptable to the OGDCL / OGDCL's Representative.

#### **4.0 PREMIX CARPETING**

##### **4.1 Description**

The Work shall consist of furnishing all labor, plants, equipment, appliances and material and performance of all operations required in the connection with the construction of Premix Carpeting on a prepared base course in accordance with these specification and to the area shown on the drawings and as directed by the OGDCL / OGDCL's Representative.

##### **4.2 Material**

Material such as crushed stone, sand, stone dust or filler etc. shall conform to the requirement specified herein, as necessary to produce a grading conforming to the following table, and shall be graded between these limits.

<b>Compacted Depth = 2"</b> <b>Recommended Sieve Size</b>	<b>Percentage Passing</b> <b>By Weight (No.)</b>
¾"	100
½"	80 – 100
⅜"	79 – 90
No. 4	50 – 70
No. 8	35 – 50
No. 30	18 – 29
No. 50	13 – 23
No. 100	8 – 16 (Bitumen (80 – 100))



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No. 200	4 – 10 (4 to 5% of total mix by weight) or as per mix design.
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**4.3 Premix Carpeting**

Premix Carpeting shall comprise of Bitumen priming/Tack coat over base course, application of two layer of Premix carpeting of one inch (2.54cm) each over tack coat, to a consolidated thickness of 5 cm after rolling and final application of a seal coat.

**4.4 Tack Coat**

Prior to applying Tack coat, clean and remove foreign material carefully from the surface without disturbing the base course. A tack coat of Hot Bitumen grade 80/100 shall be applied over base course at the rate of 15 lbs per % S.ft.

**4.5 Design Mix**

The Contractor shall submit the design mix for Premix Carpeting and seal coat by weight for specified material from approved laboratory confirming to the relevant international & local codes at least one week prior to the execution of the job. No extra payment will be made in this regard.

**4.6 Mixing**

Mixing shall be carried out as per design mix in an approved continuous mixer. The aggregate shall be dried to the optimum delivery and should be sufficient to provide an adequate supply of aggregates to the mixer. The bitumen temperature shall not exceed 163 °C and the mixing period to produce a uniformly consistent mix shall normally be 1 minute.

**4.7 Transporting**

The transporting of Premix Carpeting material from mixing to spreading point shall be carried out in approved clean lorries. The OGDCL / OGDCL's Representative may periodically inspect this transport and reject any that is not clean, tight or mechanically unreliable.

**4.8 Placing**

The Premix Carpeting mixture shall be so placed that after compaction the finished pavement will be smooth dense and meet the requirements of the cross-section shown on drawing, and to the entire satisfaction of OGDCL / OGDCL's Representative.



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**4.9 Density Requirement**

The density achieved in the premix layer after compaction is to be at least 97% of the density achieved for the same job mix in the Marshall stability tests carried out in the laboratory. Cores are to be cut in the carpeting layer as directed by the OGDCL / OGDCL's Representative at the Contractor's expense and the cores used for density determination.

**4.10 Compaction**

After spreading, the carpeting mixture shall be compacted in the following manner:

**First Stage**

A three wheeled roller with a bearing pressure in the rear wheels from 1.72 - 2.40 MPa, full width of wheel shall be utilized, the driven wheels leaning on the fresh mix. The change of direction in the rolling shall only be carried out with the steering wheel on partly consolidated mix so that the displacement of the mix is avoided.

A check shall then be made on the surface with the 3 meter straight edge, and while minor adjustments will require addition or subtraction of hot material. This shall be carried out while the coat is still hot.

**Second Stage**

Immediately after the initial rolling a pneumatic tyred roller shall be utilized. It shall be of the self-propelled type and shall weigh approximately 20 tonnes, the tyre pressure being 2.51 - 3.32 MPa.

**Third Stage**

The final finish shall be given with an 10 tonnes tandem roller. Each stage of rolling shall be carried out by passes with a half wheel width overlap and every care must be taken that the roller does not lift the mix and that its wheels are absolutely clean. Roller must not be allowed to stand on any coat, which is not completely consolidated.

**4.11 Longitudinal Joints**

While making longitudinal joints the spreader shall overlap the existing strip and sufficient material must be left on the overlap to allow for adequate compaction.





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Any excess material shall be carefully removed so that when rolling is carried out a thoroughly workman like- joint is left.

At the end of the day, should a longitudinal joint be left open before the adjacent section is laid, the longitudinal edge shall be carefully cut back to a straight line and the freshly cut face shall be given a tack coat of hot bitumen.

**4.12 Transverse Joints**

The edge of the previously laid strip shall be cut back to it's full depth and painted with hot bitumen immediately before the hot bituminous mixture is placed against it.

Both longitudinal and transverse joints shall be checked for continuity using a 3 meter straight edge immediately after rolling and any necessary correction be made at this stage.

**4.13 Bitumen Pavement Thickness and Surface Tolerance**

The thickness indicated for each of the various courses of bitumen pavement is nominal thickness. The pavement shall be so constructed that the final compacted thickness is not less than the nominal thickness and does not exceed the nominal thickness indicated on the plans by more than 6mm. Determination for final acceptance and payment will be made from cores of thickness and measurements taken of the completed pavement. The Contractor shall replace the cored material in a manner satisfactory to the OGDCL / OGDCL's Representative. No payment will be made for the extra thickness over and above the indicated tolerance. Materials being part of a trimming and leveling course will not be considered in determining the pavement thickness.

**4.14 Seal Coat**

Finally, seal coat shall be applied, consisting of mix of adequate quantity of chips, sand and bitumens (80/100) recommended by the approved laboratory, and shall be spread and compacted to give the smooth leveled surface, with proper camber as per cross-section shown on the drawing and to the entire satisfaction of OGDCL / OGDCL's Representative.

**4.15 Field Tests**

The following field/laboratory test will be carried out as per instruction of OGDCL / OGDCL's Representative from the approved laboratory.



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- a) Premix Carpeting mix formula by weight.
- b) Gradation Test
- c) Compaction Test
- d) Bitumen Content Test
- e) Temperature record of Bitumen & Mixture
- f) Other test related with pavement construction.

The test reports shall be submitted to the OGDCL / OGDCL's Representative and no payment will be made for above tests.

**4.16 Opening to Traffic**

No traffic shall be allowed on the completed courses until the permission of the OGDCL / OGDCL's Representative has been obtained.

**4.17 Heating of Bitumen**

For security purposes heating of bitumen will not be allowed within hazardous area. However, if for genuine reason, heating is allowed inside the Area, the Contractor will construct brick masonry wall 6 ft. high, & 8" thick, enclosing the place where heating is allowed. No extra payment will be made to the Contractor in this regard.

**5.0 PAVEMENT / FLOORS**

- 5.1 Pavement / Floors shall be constructed in panels wherever shown on drawings. First of all sub-grade shall be compacted with approved plate compactor / roller to achieve 95% of maximum dry density at optimum moisture content. Over compacted sub-grade 6" thick stone/brick soling layer shall be laid and compacted using coarse sand for filling voids. The PCC (1:2:4) concrete layer 100 / 150 mm thick (as indicated on drawings) shall be laid in alternate panels with 10 mm wide joints in between panels and filling with bitumen-sand filler. The adjoining panels shall be concreted when the side forms are struck and the jointing material placed, inspected by the OGDCL / OGDCL's Representative. A 20 mm wide joint between all type of R.C.C. Structure and Pavement / Floor shall be provided and filled with bitumen sand filler. The cost of joints and bitumen-sand filter shall deemed to be included in the quoted rates for Pavement / Floor. Each panel is to be concreted in one operation and no interruption shall be permitted during the operation. The concrete shall be tipped from the trolley slightly in advance of the working place and then shovelled in the position. The spreading shall be carried out very carefully. Compaction shall be done by means of



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1¼"th vibrator lead or approved surface vibrator. When the initial set take place the surface shall be trowelled smooth with a steel trowel to provide adverse closed surface. Pavement / Floor shall be cured by covering with hessain cloth keeping completely wet for seven days.

**5.2 Gravel Filling**

Gravel shall be provided and laid at locations shown on drawings. Before laying gravel the sub-grade shall be leveled, watered and compacted with approved mechanical plate compactor / roller to achieve 95% of maximum dry density at optimum moisture content. The sub-grade shall be protected against damage until covered by gravel. The size of gravel shall be 50 mm down and shall be laid in 75 mm thick layer or as indicated on drawings. The gravel for gravel filling shall be supplied from an approved source and shall be clean, free from clay, earth, vegetation and organic matters, alkaline or acid reactions or other deleterious matter or impurities and conforming to B.S. 812:1954.