

OIL INDIA LIMITED  
(A Govt. of India Enterprise)  
Udyan Vihar, Narengi, Guwahati,  
Assam

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**Tender No. & Date : GOD3162L12/1H 20.08.2011**

Bid Security Amount : INR 0.00 OR USD 0.00  
(or equivalent Amount in any currency)

**Bidding Type : Single Bid (Composite Bid)**

Bid Closing On : 13.10.2011 at 13:00 hrs. (IST)  
Bid Opening On : 13.10.2011 at 13:00 hrs. (IST)

Performance Guarantee : Not Applicable

OIL INDIA LIMITED invites Limited tenders for items detailed below:

Item No./ Mat. Code	Material Description	Quantity	UOM
<b>10</b> 99040771	<b>OPTICAL FIBRE CABLE</b> Multi Grade, Non-Metallic, Single Mode, Composite Optical Fibre cable with 24 Fibre counts, out of this 6 fibre counts are as per ITU-G-655 and 18 fibre counts are as per ITU-G-652 specifications.  <b>(Detailed Specification attached as per Annexure -IA)</b>	20	KM

**Standard Notes:** 1.0 Bidder should have the experience of successfully executing at least 1(one) similar order in the last 2(two) years preceding the bid closing date of the tender. Documentary evidence in this regard must be provided along with the quotation, failing which the offer will be rejected. 'Similar Order' shall mean supply of Single Mode OFC as per Technical specification.

2.0 Pre-dispatch Inspection : Pre-dispatch inspection of cables shall be carried out by OIL Engineer ( **as per clause no 1.10 of Annexure 1A** ) at supplier works before dispatch. The supplier has to give atleast 15 days prior notice for inspection. Inspection charges, if any, shall be quoted separately which will be considered for evaluation of the offers. However, all to & fro fares, boarding/lodging and other daily expenses of OIL Engineer (s) shall be borne by OIL.

3.0 Bidders other than OEM, must submit valid authorized dealership/authorization certificate from OEM along with their offer, failing which offer will be rejected.

**Special Notes** :1. To evaluate the inter-se ranking of the offers, Assam Entry Tax on purchase value will be loaded as per prevailing government of Assam Guidelines as applicable on bid closing date. Bidders may check this With the appropriate authority, while submitting their bids.

2. Bidder should quote transportation charges on actual separately if not included in basic price. Transportation charges have to be quoted for transportation by mode as below:-

i) For consignments weighing around 50 Kgs, Actual transportation charge to be quoted for

transportation by courier service (Air/Road).

ii) For consignment weighing more than the weight mentioned in Sl.No.(i), actual transportation cost shall be quoted for transportation by Road transport.

3. Please confirm acceptance of NIT payment terms.

4. Terms and conditions applicable to this tender is enclosed vide Annexure-II to VI.

5. Any sum of money due and payable to the contractor (including Security Deposit refundable to them under this or any other contract may be appropriated by Oil India Limited and set off against any claim of Oil India Limited (or such other person or persons contracting through Oil India Limited) for payment of a sum of money arising out of this contract or under any other contract made by the contractor with Oil India Limited (or such other person or persons contracting through Oil India Limited

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**Tender issued to following parties only:**

Slno	V_Code	Vendor Name	City/Country
1	203548	KEC INTERNATIONAL LIMITED	KOLKATA
2	207126	TERACOM LIMITED	NOIDA
3	208796	FINOLEX CABLES LIMITED	GUWAHATI
4	209386	STERLITE TECHNOLOGIES	NOIDA
5	209387	BIRLA ERICSSON OPTICAL LIMITED	KOLKATA
6	209388	AKSH OPTIFIBRE LIMITED	NEW DELHI

**1. Optical Fibre (OF) Cable :**

**1.1.1 General:**

**1.1.1** The non metallic Optical Fibre Cable to be supplied shall be 24 fibre count step index Single Mode fibre out of which 6 fibre counts shall be Non-Zero Dispersion Shifted (**NZ-DSF**) type as per ITU **G.655** specification and remaining 18 fibre counts shall be Non Dispersion Shifted Fibre (**NDSF**) as per ITU **G.652** specification.

**1.1.2** The metal free duct OF Cable shall be suitable for underground installation in permanently lubricated HDPE duct buried at an approximate depth of **1.65** meters from the ground level and be required to cross various roads, railways, canals, small rivers, marshy areas etc. through appropriate casings. The optical fibre cable shall be low weight, small volume and high flexibility for laying in a permanently lubricated HDPE duct using blowing techniques. The cable shall have build-in protection against termites and rodents.

**1.1.3** The life of the cables should be better than 25 yrs. The bidders shall submit necessary statistical calculation along with the technical bid.

**1.1.4.** The metal free duct OF cable to be supplied is 2Km in length per single drum without any joint/splice. Negative tolerance in length will not be acceptable. The bidders shall provide the data on weight of OFC cable in single drum and also per Km basis.

**1.2 Cable Construction Detail:**

**1.2.1** The inner strength member shall be Fibre Reinforced Plastic (**FRP**) rod , non metallic member with minimum diameter of **2mm**.The strength member shall provide strength and adequate flexibility of the cable and shall have anti buckling property. This shall also keep the fibre strain within the permissible value.

**1.2.2** Around the strength member, **4** Nos of **loose tubes** made of Polyamide/PBTP or other thermoplastic material are to be symmetrically placed using helical or reverse lay technique with **6** nos of primary coated fibres in each tube. Two polyethylene **dummy fillers tubes** are to be added so that the cable gets packed into near round configuration .The tubes are to be filled up moisture resistant **thixotropic jelly**, which should be compatible with the coated fibres in the tube. The colour of the loose tubes containing fibres shall be of 4 different distinct colours. The 6 fibre counts of G. 655 type shall be housed in a single tube, rest of 18 fibres to be distributed equally in remaining 3(three) tubes. The loose tube containing G.655 type fibre shall be **Red Colour** and other three tubes containing G.652 type fibres shall be **Yellow, Green** and **Brown Colour**. The tube assembly and the core shall be flooded with the moisture resistant jelly.

**1.2.3** **Aramid yarn** strength members distributed equally over the periphery of loose tube should be provided along with the solid FRP strength member for peripheral strength. The quantity of yarn used per Km length of the cable along its with dimensions shall be indicated by the bidder.

**1.2.4** The main cable core containing fibres shall be wrapped with a **water blocking polyester of foil / tape** of minimum 0.15 thickness. The nylon/polyester binder thread shall be used to hold the tape.

**1.2.5** The cable core containing fibres and core assembly shall be protected by flooding **water resistant jelly** having non-hygroscopic dielectric compound.

**1.2.6** The loose tube wrapped with water resistant tapes are to be enclosed by a weather resistant inner **black** coloured **HDPE sheath** of minimum **1.8 mm** thickness. The material of the HDPE shall be UV stabilized.

**1.2.7** An **outer covering jacket** of termite and rodent resistant Nylon -12 material of **orange** colour, free from pin holes, scratches and other defects and with a thickness of  $0.6 \pm 0.1$  mm and overall diameter(nominal) of  $12.0 \pm 0.5$ mm shall be provided for the non metallic duct.

**1.2.8** Suitable **rip cord** (s) shall be provided which shall be used to open the HDPE sheath of the cables. The rip cord (s) shall be properly waxed to avoid wicking action and shall not work as water carrier.

**1.2.9** The fibre in a single cable drum length shall not have any joints.

**1.2.10** The filling compound used in loose tube and in the cable core shall be compatible to fibre, secondary protection of fibre, core wrapping etc. The fibre movement shall not be constrained by stickiness and shall be easily removable for splicing.

**1.2.11** The maximum cable diameter shall not exceed 14 mm for non-metallic duct OF Cable. The finished cable diameter shall be within  $\pm 0.5$  mm from the defined cable diameter.

**1.2.12** The bidder shall submit a core sectional diagram of the cables with dimensional and material details of each layer including the fibre refractive index, index profile and percentage of excess fibre length in the cable jacket length along with the **Technical Bid**.

### **1.3 Material**

**1.3.1** The material used in the manufacturing the optical fibre cable shall be non-toxic and dermatologically safe in its lifetime.

**1.3.2** The cable shall use the raw materials as per the Telecommunication Engineering Centre(TEC) specification **GR No.:** **TEC/GR/TX/ORM-01/04/SEP 2009** and its subsequent amendments ( if any).

**1.3.3** The material used in optical fibre cable must not evolve hydrogen, which will affect the fibre loss.

**1.3.4** The raw material used for manufacturing the cable shall be clearly indicated by the bidder. The bidder shall submit detailed technical specifications including the reflection index, percentage of excess fibre per metre of cable length, index profile and source raw material.

### **1.4 Marking**

The markings on the outer surface of the cable (i.e. orange nylon jacket for OF cable) shall be indelible and durable and shall stand out in contrast to the colour of the background surface.

The following legend marking shall be adopted:

- |    |                                      |   |
|----|--------------------------------------|---|
| a) | <b>OIL INDIA LIMITED</b> with logo   |   |
| b) | Total Fibre Count                    | : <b>24</b>   |
| c) | Type of fibre                        | : <b>6</b> Nos. G .655 (in Red loose tube)<br>: <b>18</b> Nos. G.652 (in Yellow, Brown, Green loose tube)               |
| d) | <b>Manufacturing year &amp; date</b> | : This shall be interleaved with length marking in every meter with an accuracy of +0.5% of the actual measured length. |

## 1.5 Mechanical & Environmental Characteristics:

### 1.5.1. Non Metallic Duct OF Cable:

- 1) Maximum Tensile Load : 2.5 W (W=Weight/Km) of Cable or 2670 N, which ever is higher.
- 2) Operating Temperature : -20° C to 70° C
- 3) Minimum Bending Diameter : 20x Cable Diameter
- 4) Crush Resistance : 400 N/ Cm
- 5) Impact Resistance : 50 N from 500 mm height

## 1.6 Geometrical Characteristic of Optical Fibre :

- 1.6.1 Nominal Cladding Diameter : 125  $\mu\text{m} \pm 1 \mu\text{m}$
- 1.6.2 Cladding Non Circularity :  $\leq 1\%$
- 1.6.3 Core/Clad Concentricity :  $\leq 0.5 \mu\text{m}$
- 1.6.4 Diameter over primary coated with double ultra Violet cured acrylate : 245  $\mu\text{m} \pm 10\mu\text{m}$

## 1.7 Mechanical Characteristics of OF :

- 1.7.1 Proof Test for minimum strain level : 1%
- 1.7.2 Strip ability force (F) to remove of the fibre. :  $1.3 \leq F \leq 8.9$  primary coating
- 1.7.3 Fibre Curl :  $\geq 4$  meter radius of curvature
- 1.7.4 Dynamic tensile strength
  - a) Un-aged :  $\geq 3.8$  Gpa
  - b) Aged :  $\geq 3.0$  Gpa

## 1.8 Transmission Characteristic of Type G 652 Fibre:

- 1.8.1 Attenuation co-efficient
  - a) At 1310 nm :  $\leq 0.35\text{db/Km}$
  - b) At 1550 nm :  $\leq 0.20 \text{ db/Km}$
- 1.8.2 Mode Field Diameter (MFD) at
  - a) 1310 nm :  $9.2 \mu\text{m} \pm 0.4 \mu\text{m}$
  - b) 1550 nm :  $10.4 \mu\text{m} \pm 0.8 \mu\text{m}$
- 1.8.3 Cut -off wave length on 2 meter sample of fibre :  $\leq 1320 \text{ nm}$
- 1.8.4 Cable cut-off frequency :  $\leq 1260 \text{ nm}$

- 1.8.5 Total Dispersion
- a) 1285-1330 nm :  $\leq 3.5$  ps/nm.km
  - b) 1270-1340 nm :  $\leq 5.3$  ps/nm.km
  - c) Zero dispersion wave length : 1300- 1324 nm
  - d) Zero dispersion slope :  $\leq 0.093$  ps / (nm<sup>2</sup> .km)
- 1.8.6 Polarized Mode dispersion in cable Maximum individual fibre :  $\leq 0.20$ ps/√Km
- 1.8.7 Attenuation with bending
- a) 100 turns around 60 mm diameter mandrel :  $\leq 0.05$  dB at 1550nm
  - b) 1 turn around 32±0.5 mm diameter mandrel :  $\leq 0.5$  dB at 1550nm  
:  $\leq 0.6$  dB at 1625nm

### **1.9 Transmission Characteristic of Type G 655 Fibre:**

- 1.9.1 Attenuation
- a) At 1550 nm :  $\leq 0.22$  dB/Km
  - b) At 1625 nm :  $\leq 0.25$  dB/Km
- 1.9.2 Mode Field Diameter (MFD) : 9.2 to 10.00  $\mu$ m at 1550 nm
- 1.9.3 Cut-off wave length on 2 meter sample of fibre :  $\leq 1450$  nm
- 1.9.4 Cabled cut-off frequency :  $\leq 1260$  nm
- 1.9.5 Total Dispersion:
- a) 1530-1565 nm :  $\leq 2.6$  to 6.0 ps/nm.km
  - b) 1565-1625 nm :  $\leq 4.0$  to 8.9 ps/nm.km
  - c) Zero dispersion wave length :  $< 1530$ nm
  - d) Zero dispersion slope :  $\leq 0.05$  ps/(nm<sup>2</sup>.km)
- 1.9.6 Polarized Mode dispersion in cable Maximum individual fibre :  $\leq 0.10$  ps/√Km
- 1.9.7 Attenuation with bending:
- a) 100 turns around 60 mm diameter mandrel :  $\leq 0.05$  dB at 1550 nm
  - b) 1 turn around 32±0.5 mm diameter mandrel :  $\leq 0.5$  dB at 1550 nm  
:  $\leq 0.6$  dB at 1625 nm

## 1.10 Pre-delivery Factory Test

1.10.1 The following tests shall be conducted by the representative(s) of OIL at the premises of the manufacturing unit where the supplied cable is manufactured for acceptance of the product prior to delivery:

a) Mechanical:

- i) Visual inspection
- ii) Test for moisture barrier
- iii) Abrasion resistance test
- iv) Crush test
- v) Impact test
- vi) Repeated test
- vii) Cable bend test
- viii) Torsion test
- ix) Kink test
- x) Cable bend test
- xi) Temperature cycling
- xii) Water penetration test
- xiii) Tensile strength

b) Test on transmission characteristics:

- i) Attenuation test
- ii) Mode field diameter
- iii) Cut-off wave length
- iv) Polarised mode dispersion
- v) Attenuation under bending

1.10.2 OIL at its own discretion will delete or include certain Telecommunication Engineering Centre (TEC) recommended test(s) if the cable is manufactured under strict quality assurance programme and raw materials are procured from reputed sources. All the tests will be conducted as per relevant IEC and TEC guidelines.

1.10.2 It shall be explicitly understood that under no circumstances shall any approval of OIL or its representative after conduction of factory test relieve the supplier of its responsibility of reliable performance of the supplied material .

## 1.11 **Fibre Identification Colour:**

The coatings shall be in various distinct colours in order to facilitate fibre identification. Fibres colours shall correspond to IEC publication 793-2 and 304. The colours shall correspond reasonably with standard colours and shall readily be identifiable and shall be durable. The colours used should have fast colours properties and should not fade during the lifetime of cable. The coating and colour shall not react with surrounding jelly. The supplier shall take prior approval from OIL for the colour scheme for fibre identification before commencement of manufacture of OFC.

### Colour Scheme of the 6 fibers per loose tube:

Blue  
Orange  
Green  
Brown  
Slate  
Yellow

**2. Packaging:**

2.1 The cable shall be rolled in wooden drums with rugged construction to withstand multiple transshipment and handling as well as storage in open area under adverse weather conditions. The drum (confirming to GR No. G/CBD-01/02 Nov. 94 and subsequent amendments) should be marked to identify the direction of rotation of the drum. Both ends of the cable should be kept inside the drums.

2.2 Packaging of cable shall be done in a manner in such a way that it will allow 2 meter length of cable at each end to be pulled out for performing various tests. The end shall be protected by heat shrinkable sleeves.

2.3 The cable drums shall have adequate protection from rain, dust, insect and rodents.

2.4 The cable drum shall be marked with an arrow to indicate the coiling sense.

2.5 The cable drum and crate shall be marked with the following:

<u>Consignees Name</u>	: Oil India Ltd.
Site Name	: .....
Material	: .....
Quantity	: .....
Overall weight	: .....
Batch Name	: .....
Date of Manufacturing	: .....
Manufactured and Supplied by	: .....

2.7 A packing list containing details of cable and test certificate shall accompany each cable drum, secured by abrasion and waterproof jacket fixed to the drum in a strategic location.

**3. Documents:**

The bidder shall submit 5 copies of technical documents in English original bound volume containing comprehensive information on the following pertaining to the supplied material:

- i) Fibre cable construction detail
- ii) Fibre preparation for splicing
- iii) Test and measurement procedure and equipment at bidder's site
- iv) Fibre splicing types and procedures
- v) Safety in handling of fibre cable
- vi) Various types of connector and practical method of connectors
- vii) Jointing and termination box detail

Clause by Clause compliance statement shall be provided for all clauses from 1 to 3 (including all sub clauses).

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