

	IMR Section, OLG 7 <sup>th</sup> Floor, 11-High Office Complex Bandra-Sion Link Road, Mumbai 400 017	Pipeline Repair Connectors (SPRUs) (Mechanical Actuation) for Sour Service (Well Fluid and Gas Lift) Data sheet no: DS-SPRU-PRP-VII- RTR
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1. **Scope of supply:**

1.1. **Connectors**

S.No	Nominal Pipe dia (inches)	Connector description	Qty
1	Refer Table 4.2 of Annexure to Section 4A (Part I)	Mechanically actuated pipeline repair connectors with MAF designed to pressure rating corresponding to ANSI 1500 class / 900 class (Refer Table 4.2 of Annexure to Section 4A (Part I)) in N <sub>2</sub> / inert gas fillable cylindrical steel containers, complete with accessories.	Refer Table 4.2 of Annexure to Section 4A (Part I)

1.2. **Accessories required with each size of connector:**

S.No	Item	Qty
1	Bolt tensioning set having number of stud tensioners equal to number of studs of connector with accessories including whips, Tee blocks, etc necessary for 100% actuation of connector in single operation	1 Set
2	Bolt tensioning set having number of stud tensioners equal to number of studs of MAF with accessories including whips, Tee blocks, etc necessary for 100% actuation of MAF in single operation.	1 Set
3	Spare repair kit for Bolt tensioners mentioned at S.No.1 above	4 Sets
4	Spare repair kit for Bolt tensioners mentioned at S.No.2 above	4 Sets
5	One spare set of stud with 2 nuts on for each connector	1 Set
6	One spare set of stud with 2 nuts on for each MAF	1 Set
7	Spare seal ring set for each MAF	2 Sets

**Note:**

- Items covered under scope of supply should be of recent manufacture, of first quality and not more than one year old at the time of delivery. This should be supported with manufacturer's certificate and certified by TPI as mentioned at 6.1(Inspection and Certification).

Whether SPRU's Connector and MAF part comprises of same sized studs or it is a single actuation type SPRU, separate set of bolt tensioners (equal to number of studs of Connector and MAF) to be supplied.

2. **Technical Specifications:**

This document describes the requirement of repair connectors required for effecting repairs to underwater pipeline so as to install the repair connector with bare metal pipe without any hyperbaric (underwater) welding and without lifting pipeline above the sea level.

A repair connector shall comprise of following items:

A. **Coupling**

A sleeve, that structurally attaches to and seals off bare ended pipes by its internal grips. This coupling should have seals for sealing the annular space between the outer surface of the pipeline and inner surface of the coupling.

B. **Misalignment Flange (MAF)**

For connecting the spool piece with coupling and having seal integrity up to +/- 10 Degree of misalignment in any axial plane from the centerline of the adjoining pipeline.

3. **Details of Pipelines and Service Conditions**

3.1. **Details of Pipeline**

Nominal diameter (inches)	WALL THICKNESS (IN MM)	GRADE OF LINE
Refer Table 4.2 of Annexure to Section 4A (Part I)	Refer Table 4.2 of Annexure to Section 4A (Part I)	Refer Table 4.2 of Annexure to Section 4A (Part I)

3.2. **Service Conditions**

3.2.1. Fluid: Crude Oil, Natural Gas, Formation/Sea Water.

3.2.2. Temp. Range: 17 Deg. Celsius - 100 Deg. Celsius.

3.2.3. Offered connector should be suitable for sour service conditions as per NACE MR-01-75 (latest edition) requirements.

3.2.4. Water Depth: Up to 100 m.

The repair connector can be used on any of the pipeline or on their riser depending upon requirement.

#### 4. Technical Features

Each Repair Connector should have features as stipulated below and comply with the following technical specifications.

- 4.1. **Weld-less connection with the pipeline:** Coupling should provide gripping and sealing over the bare pipeline and a misalignment flanged end for connecting a spool piece/extension. The sealing shall be attained using high quality Fluro elastomers / graphite seals suitable for inventory in the pipeline.
- 4.2. **Structural Integrity:** The coupling should be able to withstand all axial, shear and bending loads. Bidder shall calculate the stress distribution in the pipeline caused by external seal/grip pressure to demonstrate that pipeline (details specified in cl.3.1) is safe under such loading in cold condition when there is no pressure in the line.
- 4.3. **Sealing:** Sealing integrity of the coupling should not be affected by temperature variations in the range of 17 degrees Centigrade to 100 degrees Centigrade.
- 4.4. **Test of sealing of coupling:**
  - 4.4.1. The coupling should have a test port & bleed port to test the sealing after the installation of repair connector but before charging the line. The test port should be fitted with requisite fittings which should finally terminate with  $\frac{1}{4}$ " BSP male quick disconnect coupling and matching  $\frac{1}{4}$ " BSP female quick disconnect coupling fitted with  $\frac{1}{4}$ "BSP [male] X  $\frac{1}{4}$ "BSP [Male] adopter to be supplied as loose item.
  - 4.4.2. The bleed port should be fitted with a suitable bleeder valve cum plug.
  - 4.4.3. The pressure testing should be achieved without internally pressurizing the pipeline.
  - 4.4.4. The drawing of the connector indicating test port & bleed port in support of 4.4.1 above and a write up explaining the seal test feature in support of 4.2.3 above should be submitted along with the bid. All drawings should be supplemented with bill of materials.
- 4.5. **Actuation for gripping and sealing:** The gripping and sealing should be achieved by the following method:
  - 4.5.1. Uniform actuation of gripping and sealing in single operation by means of bolt tensioning through hydraulically operated bolt tensioners suitably interconnected for simultaneous actuation through a single hydraulic power fluid connection. To achieve this, number of tensioners and their sizes, adaptors, connectors etc. required, are to be specified and provided for repair of connector and MAF.
  - 4.5.2. The total tensioning system to be suitably designed and to be compatible with our available power pack of 20,000 PSI (maximum pressure rating) with  $\frac{1}{4}$ " BSP end connection for hose. Accordingly, the bidder should indicate the maximum hydraulic pressure and flow rate required to achieve gripping and sealing and/or testing.
  - 4.5.3. An explanation on design features supported with technical drawing/graphics in support of above should be submitted with the bid.
  - 4.5.4. The bidder should furnish details of type/model of stud tensioners & hydraulic Pressure applied to stud tensioners for setting.
- 4.6. **Length Compensation for end adjustment**
  - 4.6.1. Each coupling should have built in feature of length compensation i.e. for end adjustment covering minimum length equal to ONE DIAMETER of pipeline. This may be achieved either by telescoping feature of coupling or through a length compensation joint forming integral part of coupling or any other method. It should not involve any welding of separate items by user to achieve the above feature.
  - 4.6.2. The above feature 4.6.1 should be explained by drawing and write up and same should be submitted with the bid.
- 4.7. **Provision to take care of misalignment, Misalignment Flange (MAF)**
  - 4.7.1. The repair connector should have provision to take care of misalignment up to +/- 10 deg. in any plane from the center line axis. One part of 'MAF' should be attached to coupling with counterpart of 'MAF' bolted to this part. Sealing integrity is to be maintained at all angles of misalignment within above specified limit.
  - 4.7.2. In support of satisfying the feature 4.7.1 above, drawing and write up should be submitted along with the bid.
- 4.8. **Test of Sealing of Misalignment Flange (MAF)**
  - 4.8.1. The 'MAF' should have test port for hydrostatic testing for metal to metal seal verification without pressurizing/commissioning the pipeline.
  - 4.8.2. The MAF should have bleed port for checking the continuity of hydraulic fluid inside the sealing area.
  - 4.8.3. In support of satisfying the feature 4.8.1 & 2 above, drawing and write up should be submitted along with the bid.
- 4.9. **Test pressure**
  - 4.9.1. All pressure tests shall be carried out to satisfy ANSI Class 1500 requirements.
  - 4.9.2. Each test port of the coupling and MAF should be fitted (when Connector is supplied) with a suitable connection for connecting a high pressure hose including mating adopters compatible to  $\frac{1}{4}$ " I.D. hose. The size and thread profile of connection should be indicated in the bid. All actuation, pressure testing, will be carried out / witnessed from the deck of the vessel only.
  - 4.9.3. The acceptance and compliance of 4.9.1 and 2 above should be given by the bidder in the technical bid.
- 4.10. The Repair Connector after installation should be **piggable**. Bidder should confirm suitability of Repair

- Connector for this purpose in the technical bid.
- 4.11. **Sacrificial Anode:** Each repair connector should be supplied fitted with zinc or galvalum anode sized for a minimum life of 25 years
- 4.12. The **studs of MAF** should be long enough to accommodate hydraulic bolt tensioning device. A confirmation to this effect should be given in the bid.
- 5. Material specifications**
- 5.1. Coupling and MAF:  
ASTM-A-350 Gr.LF2/ASTM-A-694/ASTM-A-516/ASTM A-675 Gr.70 with NACE MR-01-75 (latest edition) requirements.
- 5.2. Bolts: ASTM-A-193-B7M; Nuts: ASTM-A194-Gr.2M PTFE coated.  
(In case of better/improved material specifications/physical properties, details of the same should be submitted and ONGC's decision regarding superiority or otherwise will be final.)
- 5.3. For corrosion protection from outside, white epoxy marine paint shall be applied in 3 layers to a thickness of 0.015 inches.
- 5.4. Other non-metal parts in the repair connectors such as Elastomers etc. shall be selected based on line fluid service conditions as stipulated in clause 3.2.
- 5.5. The repair connector shall be designed with corrosion allowance for 25 years.
- 5.6. Bidder shall furnish sectional drawing of connector and 'MAF' showing parts with reference numbers and bill of materials.
- 6. Inspection & Certification**
- 6.1. Inspection should be done keeping in view requirements indicated in API 6H (latest edition) and conditions of purchase order. The test certificates and quality assurance inspection reports should be provided for each connector with accessories, along with the supply. The supply order no & date, **year of manufacture of items** must be mentioned in the third party inspection certificate.
- 6.2. Third party inspection of all above items shall be arranged by supplier through any of the following Third Party Inspection agencies (TPI) like DNV, LRS, BV.
- 6.3. Cost of inspection and certification shall be borne by supplier and should be included in the connector rate. No separate inspection cost should be indicated
- 6.4. Acceptance /compliance for above should be given with the bid.
- 7. Packing**
- 7.1. Each Repair Connector shall be supplied in a Steel Container fillable with Nitrogen or any other Inert Gas, at 10 psi. Each container shall carry Identification Number and Packing List details duly written in bold letters at prominent location on the container's outer surface. The containers are to be of cylindrical shape with opening from one end only for proper sealing. Its edge must have groove for housing the seal and it should be tested at 15 psi for one hour. Pressure gauge and inert gas charging arrangement with valve should be fitted on flat face of each container. All these fittings should have protection guard to avoid any damage during handling. The container should have at least two stands welded to the container at suitable locations at 6 o'clock position to avoid rolling of container during storage on vessel deck at sea. The container should have suitable lifting pad-eye / arrangement. Suitable arrangement should be provided so as to ease the process of pulling out the connectors from containers without damage.
- 7.2. On receipt of connectors at stores, the canisters are to be pressurized with Nitrogen/inert gas to 10psi, by the supplier, within 30 days of delivery.
- 7.3. One set of following documents should be supplied along with the consignment inside the container:
- 7.3.1. Installation procedure.
- 7.3.2. As built drawing with bill of material
- 7.3.3. Details of stud tensioners / accessories & its manual.
- 7.3.4. The design features & technical data to satisfy sealing features mentioned at 4.3 to 4.5 above.
- 7.4. Other items will be suitably marked and packed for sea transportation.
- 7.5. Items such as studs/O-rings/nuts etc. should not be packed inside the canister for connector.
- 7.6. The acceptance/compliance of above should be given in bid.
- 8. General Conditions**
- 8.1. Manufacturer should supply/provide spare parts/service & technical support, for the ordered products, in future on the request of ONGC.

<b>SBD</b>	<b>BPM</b>	<b>AKM</b>	<b>ISSUED FOR BID</b>	<b>3</b>	<b>22.01.2021</b>
<b>PREPARED BY</b>	<b>REVIEWED BY</b>	<b>APPROVED BY</b>	<b>REMARKS</b>	<b>NO. OF PAGES</b>	<b>DATE</b>

Vendors for connectors (SPRUs):

#	Vendor	Indian representative
1	<p>Oceaneering International. Inc. (400914)  Pipeline Connection &amp; Repair Systems (PCRS)  111911 FM 529,  Houston, TX 77041  Phone: 713.329.4500   Fax: 713.329.4965   email:  <a href="mailto:PCRS@oceaneering.com">PCRS@oceaneering.com</a>    <a href="http://www.oceaneering.com">www.oceaneering.com</a>  Worldwide Sales  John Charalambides – General Manager, PCRS  Direct +1 (713) 329-4962  Cell +1 (832) 368-4543  <a href="mailto:JChara@oceaneering.com">JChara@oceaneering.com</a></p> <p>Al Cooper - Sales &amp; Marketing Manager  Direct +1 (713) 329-4969  Cell +1 (713) 828-6708  <a href="mailto:ACooper@oceaneering.com">ACooper@oceaneering.com</a></p> <p>William Moya - Inside Sales &amp; Proposals  Manager  Direct +1 (713) 329-4963  Cell +1 (832) 725-6814  <a href="mailto:WMoya@oceaneering.com">WMoya@oceaneering.com</a></p>	<p>Interocean Oil Services  102, glen Eagle, Plot No 7,  Gulmohar Road, JVPD  Scheme, vile Parle (W),  Mumbai 400049  Mr Mahesh Valia, Managing  Partner  9820067470  26209689/26209672  F: 26209688  email: vbplnp@yahoo.co.in</p>
2	<p>Subsea Innovation Limited  3 Roundhouse Road,  Faverdale East Business Park,  Darlington DL3 0UR,  United Kingdom  Tel: +44(0) 1325 385270  Fax: +44(0) 1325 385285  <a href="mailto:info@subsea.co.uk">info@subsea.co.uk</a></p>	<p>Libra International  Aleb 101, Manar Silver Shadows  2-1/A, Kasavana Halli, Carmelram Post  Off sarjapura Road, Bangalore 560035  9739098804  918042129196  <a href="mailto:vishy@libraint.com">vishy@libraint.com</a>  <a href="http://www.libraint.com">www.libraint.com</a></p>

3	<p>Hydratight (406102)  Bentley Road South  Darlaston, West Middlelands  England  Tel: 0121 505 0600, Fax: 0121 505 0800  <a href="http://www.hydratight.com">www.hydratight.com</a></p> <p>Hydratight Ltd  Nr 1A, Peenya Industrial Area 2nd phase  Bangalore – 560 058  India  Tel: +91-99027-83547  Email: <a href="mailto:india@hydratight.com">india@hydratight.com</a>  Murali Narasimhan, country leader-India  <a href="mailto:murali.narasimhan@hydratight.com">murali.narasimhan@hydratight.com</a></p>	<p>Oiltech Consultancy Services  11/12, Veena Beena, Gurunanak road,  Bandra  (W), Mumbai 400050  9820070012  66936500  Fax:  26514429  <a href="mailto:ashish@oiltechconsultancy.com">ashish@oiltechconsultancy.com</a>  <a href="mailto:rajesh@oiltechconsultancy.com">rajesh@oiltechconsultancy.com</a></p>
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5	<p>M/s Middle East Onshore &amp; Offshore Oil &amp; Gas  Equipment FZE quoted for the SPRUs  manufactured by:  M/s Shidarian Kish Ltd.  No.33, Industrial complex No.5, Kish Island-  IRAN  Tel:+98 764-4426065-6  Fax:+98 764-4426067  Email: <a href="mailto:info@shidarian.com">info@shidarian.com</a>  <a href="http://WWW.SHIDARIAN.COM">WWW.SHIDARIAN.COM</a></p>	

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