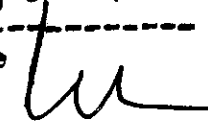


**BHARAT HEAVY ELECTRICALS LIMITED**  
**TRICHIRAPPALLI-14**

Standard Purchase Specification for 'SCP' (Spares Centre 'P' Category) items.

Spare Code;		Name of the Component;	SCP NO. 13001
Material Code;	96 424 082	Slip on pipe Coupling 933 mm OD (36.9")	Rev.No.: 00
Indigenous	✓		Effective Dt.: 28.01.94
Imported;	-	Issued by: SDGM/CE&M	Signature 

- 1.0 Applicable PGMA : 65736
- 2.0 Applicable Drg.No. with Rev.No. & Date : Nil
- 3.0 Applicable Standard No. with Rev.No. & Date : Nil
- 4.0 Specification : GF-001
- 5.0 Supply condition of Matl.; As per supplier's packing. Procedure.

- 6.0 TDC No. with Rev. No. & Dt. : TDC:5:189:01 02 *March*
- 7.0 QP No. with Rev.No. & Dt. : NOT APPLICABLE
- 8.0 QCP No. with Rev. No. & Dt. : NOT APPLICABLE
- 9.0 Weight/Piece : : 30.00 Kg.
- 10.0 Unit : : NO.
- 11.0 Estimated Price and Date : -
- 12.0 Previous Purchase Order No. and Date : -
- 13.0 Vendors to be contacted : As per approved vendor's list
- 14.0 Remarks. 1. Latest revision of Specification & TDC to be used.

	REV.NO & DATE	CHECKED BY	APPROVED BY
PREPARED BY : P. PRAKASAM <i>P. Prakasham</i>			
CHECKED BY : T.S.SIVASUBRAMANIAN <i>T.S. Sivasubramanian</i>			
APPROVED BY : K.Y. PRABHU <i>K.Y. Prabh</i>			

MATERIAL CODE : 96-426-082

FEEDER STATION :  
LOCATION : 65-716

NO. OF FEEDERS : ONE

DESCRIPTION : SLIP-ON PIPE COUPLING SUITABLE FOR  
933 MM (36 3/4) O.D. STAINLESS STEEL PIPE AS PER THE  
FIGURE.

MATERIAL :

MIDDLE RING : SA 240 TYPE 316 STAINLESS STEEL (OR) SS-304

FOLLOWERS : FORGED OR CAST STEEL

GASKETS : SILICONE

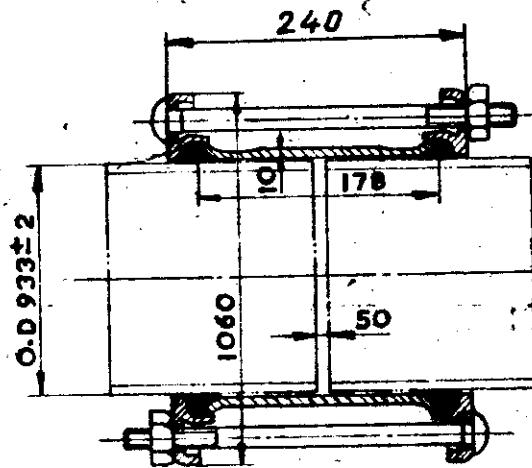
ELLIPTICAL TRACK-HEAD BOLTS AND NUTS : IS 1075 CLASS IV STEEL

NO. OF TRACK-HEAD BOLTS AND NUTS : 18 SETS OF M16 SIZE

TOLERANCE ON THE OD OF THE MATING PIPE IS  $\pm 2$  MM.


TESTING } 1. COUPLING ASSY. TO BE HYDRAULIC TESTED FOR 100 PSI MINI.  
REQT. } WITH 3 DEGREE DEFLECTION AND WITHOUT DEFLECTION.

2. TEMP. WITH STANDING CAPABILITY FOR SILICONE RUBBER GASKET.



SCP NO: 13001

REV	LTG. RPT.	TESTING RPT.
01	ADD.	16-7-92
PREPARED	D.N. CHEZHIVAN	
CHECKED		
APPROVED		

	<b>BHEL – Tiruchirappalli - 620014, India.</b> <b>Quality Assurance Department</b> <b>TECHNICAL DELIVERY CONDITIONS</b>	DOC No: <b>TDC:5:189</b> Rev: <b>03</b> Effective Date: 01/08/2015 Page: <b>1 of 6</b>
<b>Product: Pipe Couplings with Gaskets for use in Fuel Systems</b>		

**Record of Revisions:**

Rev. No.	Clause No.	Details of revision	Remarks
02	----	Totally revised	
03	----	Revised in entirety to indicate latest standards & requirements of suitable strapping arrangement for preventing slipping/missing of gaskets from the pipe coupling assemblies.	

**1. SCOPE:**

This TDC details out the technical requirements for procurement of pipe couplings with gaskets used in fuel systems.

**2. REFERENCE DOCUMENTS:**

- a) Purchase specification and drawings
- b) AWWA Std.C-606 (latest revision)

**3. GENERAL:**

- 3.1. The pipe coupling are of mechanical type connecting coal lines with a positive grip which allows some degree of angular deflection .The couplings are of three types:
  - a) Shoulder/Groove type
  - b) Sleeve type
  - c) Slip on type
- 3.2. The coupling gasket should be manufactured as per BHEL drawing and purchase specification.
- 3.3. The manufacturer shall obtain approval from BHEL/QA for vendors for critical components like coupling housing, track bolts, follower ring and silicon gaskets, if procured from sub-vendors.
- 3.4. In case of any discrepancy in the requirements of this TDC & standards indicated/referred, requirements specified in this TDC shall prevail.

**4. TECHNICAL REQUIREMENTS:**
**4.1. Applicable material specifications (latest revisions as on the date of PO) :**
**a) Shoulder/Groove type couplings:**

Coupling Housing: ASTM A 536 Gr 65-45-12 or ASTM A47 Gr 32510  
Track bolt: SA 105 or BS 970 080 M40 (EN8)  
Nut: IS 1367 Part - 6 Cl 6

**b) Sleeve type couplings:**

Middle ring: IS-2062 E250 Gr-A or Gr B (refer BHEL drawing)  
Follower ring: ASTM A 536 Gr 65-45-12  
Bolt & Screw: ASTM A 325 Type 3 Class: B or IS 1367 Part-3 Property Class 10.9.  
Nut: IS 1367 Part - 6 Cl 6

**c) Slip on type couplings - Refer to latest revisions of Engineering Specification Nos: GF-295 for 18" (OD), GF-121 (for 20 3/4", GF-234 for 24 3/4" and GF-235 for 36 3/4".**

Middle ring: AISI 410  
Follower ring: ASTM A 27 Gr 70-36 or ASTM A 536 Gr 65-45-12  
Bolts: ASTM A 325 Type 3 Class: B or IS 1367 Part-3 Property Class 10.9.  
Nut: ASTM A 325 Type 3 Class: B or IS 1367 Part - 6 Cl 6

**d) Gasket : Silicon rubber as per ASTM D2000, D412, D573, D2240, D865**



**Product: Pipe Couplings with Gaskets for use in Fuel Systems**

- e) The manufacturer shall ensure that the casting supplier identifies the casting by punching or embossing the melt number on the material. All the relevant tests as per the material specification shall be carried out and the TC shall be provided. The foundry must send one test piece for each melt along with the castings to manufacturer.
- f) The manufacture shall identify the raw material (coupling body, follower ring, bolts & nuts) batch wise. Verify the TC for its compliance before accepting the material. Carry out the material check melt-wise for its properties. TC shall be from any government approved/NABL accredited laboratory and report shall be maintained.

**4.2. MARKING AND IDENTIFICATION:**

**a) Shoulder/Groove type Coupling Body:**

- i. The coupling body shall be given a running serial number. Match mark the segment of shoulder type coupling after machining and encircle the same by paint.
- ii. Dimensions shall be as per drawing and the profiles to be checked with template. Inspection report shall be maintained.
- iii. All castings shall be traceable to melt number, manufacturer and size of coupling.

**b) Middle ring, Follower ring of sleeve/slip on type coupling**

- i. Machined middle ring, follower ring shall be given a running serial number.
- ii. Conduct LPI for middle ring. No visible defects shall be acceptable and report shall be maintained. The middle ring flared portion is to be checked with template and the inside diameter is to be checked with template gauge and reported.
- iii. All castings shall be traceable to melt number, manufacturer and size of coupling.

**4.3. WELDING REQUIREMENTS:**

**a) Welding Procedure (WPS & PQR) and Personnel/Operators (WPQ) qualifications shall be as per AWS D1.1 / ASME Sec IX.**

**b) All welds shall be tested by MPI as per ASTM E 709 with the following acceptance norms:**

Indications which have any dimension >1.5 mm shall be considered relevant. A linear indication is one having a length > 3 times the width. A rounded indication is one of circular or elliptical shape with a length ≤ 3 times its width.

**Acceptance criteria:** All surfaces examined shall be free of:

- i. relevant linear indications;
- ii. relevant rounded indications > 5 mm;
- iii. four or more relevant rounded indications in a line separated by 1.5 mm or less, edge to edge.

**5. SILICON GASKETS**

**5.1 If the coupling manufacturing manufactures gaskets, following are the requirements:**

- a) Verify the raw material T.C.
- b) Visually check the coloring accelerator. It shall be free from foreign material.
- c) Silicon rubber compound shall be formed by mixing coloring accelerator in the mixing mill. Inspection report shall be maintained as mentioned below (fill actual values, after tests):

SI No	Type of Check	Required	Actual
1	Dimensions	As per Drawing	
2	Confirmation of material to Silicon	Conformity certificate	
3	Hardness on final Product Durometer (shore) A	55 to 70	
4	Specific gravity (Raw material)	1.1 to 1.4	
5	Stability of gasket dimensions	At 150°C for 3 hours	



**Product: Pipe Couplings with Gaskets for use in Fuel Systems**

The permissible variation from the original properties for silicon rubber of ASTM D2000 is as follows.

Shore hardness	:	+10 max
Tensile strength	:	-25% to - 40%
Ultimate elongation	:	-30% to - 60%

- d) Ensure that a calibrated thermometer /thermocouple is used to measure the temperature.
- e) Check all the dimensions and profile on one gasket from each production lot. Check the hardness of the gasket. The hardness shall be within 55 to 70 Durometer (shore) A.
- f) Serial number of gasket, manufacturer's code, batch no and date of manufacture shall be identified, marked/painted on the gaskets and inspection report shall be maintained.
- g) Gaskets shall be visually checked for freedom from discoloration, cracks, fissures and report to be submitted.
- h) Apply chalk power and properly pack with polythene cover.

**5.2 If the silicon gaskets are bought out items for coupling manufacturer, following are the requirements:**

- a) It shall be procured from BHEL approved vendors with TC and inspection report in format A, and comply with clause 5.1.(c)
- b) Check the size, profile and Durometer (Shore) A hardness on 10% of quantity as per drawing. The hardness shall be between 55 to 70 Durometer (Shore) A.
- c) **Type test for mechanical properties and heat resistance** at 175°C for 70 hours for each batch of silicon rubber gaskets as per ASTM D 865 (latest revision) **shall be done at least once in a year.**
- d) Gaskets shall be visually checked for freedom from discoloration, cracks, fissures and report to be submitted.

**6. TRACK BOLTS:**

**6.1 If coupling manufacturer manufactures track bolts, following are the requirements:**

- a) Procure the raw material with relevant TC. Identify the raw material batch-wise.
- b) For every batch, test the materials for its chemical & mechanical properties in a government recognized/NABL accredited laboratory.
- c) Check the dimensions as per drawing and maintain inspection report as given in format B.

**6.2 If coupling manufacturer procures track bolts, following are the requirements:**

- a) These shall be procured from BHEL approved sources with TC and inspection report as given in format C.
- b) Conduct hardness check on 10% of the quantity of bolts procured (Max. 5 nos per batch).
- c) Conduct material tests for its chemical & mechanical properties in a government recognized/NABL accredited laboratory once in every batch of bolts procured from every vendor.

**6.3 Other Fasteners:**

Procure the fasteners from reputed fastener manufacturers. Visually inspect on receipt and adequate evidence shall be obtained from the manufacturer to ensure the dimensions are maintained as per drawing, and it confirms to specification. Conduct Mechanical, Chemical tests at NABL approved lab and produce TC. All fasteners are to be identified with Manufacturers code and specification /Grade.

**7. HYDRAULIC TESTING OF PIPE COUPLING**

**7.1.** The coupling manufactured shall be hydraulic tested at a pressure of 300 psi for shoulder/groove type & sleeve type couplings and at 100 psi for slip on type coupling. The hydraulic testing shall be carried out both in horizontal and deflected position as detailed below.

- a) Test shall be conducted in the presence of BHEL Inspection/BHEL Authorized Inspection Agency (AIA).
- b) Before hydraulic test, it shall be ensured that the component is complete as per the drawing.
- c) Only calibrated pressure gauges shall be used for pressure measurement.




**Product: Pipe Couplings with Gaskets for use in Fuel Systems**

- d) Suitable fixtures, as per AWWA C-606 (latest revision), shall be used for the Hydraulic testing. The fixture shall be inspected before the test to ensure water tightness. A non-return valve shall be provided at the water inlet to hold water at the rated pressure. The water used for hydraulic test shall be at ambient temperature, in case less than 21°C.
- e) The coupling and the gasket shall be assembled with the fixture. The assembly shall be filled with water, ensure that the air entrapped is driven off completely. Pressure shall be slowly increased to the required test pressure. The pressure shall be retained for 15 minutes. No leak is permitted. After the test, water shall be drained completely.
- f) The coupling in the fixture shall be given a deflection of 1.5 degree (max) for shoulder type coupling, 3 degree for slip on type coupling and 4 degree for sleeve type coupling. The hydraulic test shall be repeated as above.
- g) The coupling shall be removed from the fixture, dismantled and the gasket shall be visually examined for free from any damages.
- h) A hydraulic test report shall be prepared and duly countersigned by BHEL/QC or its Authorized Inspection Agency.

- 7.2. In case the test was already done by a vendor for a particular size and type of coupling, this need not be repeated by same vendor upto that size for that type of coupling as long as the raw materials for critical components are procured from BHEL approved sources and adequate controls as per Cl 4.2 are exercised during processing. However, test shall be carried out for higher sizes for which hydraulic test was not carried out earlier.
- 7.3. For all new vendors hydraulic test shall be done on one coupling of largest diameter of the size ordered (based on size required) to demonstrate his capability to comply with the specification. Based on this, hydro test in other size couplings need not be done.
- 7.4. If the vendor prefers to procure the raw material from new sources, the couplings need to be hydro tested and approval for this shall be obtained from BHEL before manufacturing. BHEL approval has to be obtained for the new source before bulk supply.

## **8. PAINTING, PRESERVATION AND PACKING**

- 8.1. Thoroughly clean all the components. It shall be free from rust, grease, oil and other foreign materials.
- 8.2. All machined surfaces shall be applied with rust preventive oil.
- 8.3. One coat of red oxide (IS 2074) and one coat of red enamel paint shall be applied for shoulder type coupling.
- 8.4. One coat of red oxide (IS 2074) and one coat of blue enamel paint shall be applied for sleeve type.
- 8.5. One coat of red oxide (IS 2074) and one coat of smoke grey enamel paint shall be applied for slip on type.
- 8.6. Enamel paint shall be as per IS 2932.
- 8.7. If gasket is supplied along with coupling, it shall be wrapped with polythene tape (after applying French chalk) and then put on to coupling with identification of size, serial number of gasket, manufacturer's code and date of manufacture, etc. Suitable steel strapping arrangement is to be provided to prevent slipping of gaskets from the shoulder/groove type coupling assembly. The steel straps are to be provided minimum at 4 places (90 deg. apart) around the coupling. In case of sleeve or slip on type couplings, 4 angle shaped sheets to be provided at 90 deg. apart, which is to be fastened along with the coupling studs/bolts. Proper care shall be taken while attaching the steel straps (to prevent any damage to gaskets).
- 8.8. If gasket is supplied loose, it shall be placed in a polythene bag, after applying French chalk, with all required identification details like P.O., size, serial number of gasket, material code (if applicable), manufacturer's code and date of manufacture, etc.

	<b>BHEL – Tiruchirappalli - 620014, India.</b> <b>Quality Assurance Department</b> <b>TECHNICAL DELIVERY CONDITIONS</b>	DOC No: <b>TDC:5:189</b> Rev: <b>03</b> Effective Date: 01/08/2015 Page: 5 of 6
<b>Product: Pipe Couplings with Gaskets for use in Fuel Systems</b>		



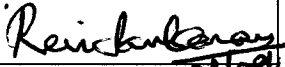
## 9. IDENTIFICATION & TRANSPORTATION

- 9.1. Manufacturer's identification mark/code number and coupling serial number, type of coupling shall be punched/stenciled on each coupling earmarked by border painting.
- 9.2. Each coupling shall be identified with PO/work order number and material code by metal tag.
- 9.3. Care shall be taken to avoid any damage during handling and transportation.

## 10. DOCUMENTATION

The manufacturer shall submit the following documents to M/s BHEL:

- a) Material TC for castings, track bolts and rubber compound.
- b) Lab test report of rubber compound for specific gravity, hardness and dimensional stability of gasket after heating at 150°C for three hours.
- c) Hydraulic test report (if applicable, as per Cl 7.2, 7.3 & 7.4).
- d) Certificate on shelf life for silicon gasket (for minimum period of two years).
- e) Visual inspection report(s) of gaskets.

R. Venkanna 01/08/2015		M. Somasundaram		
Venkanna Rupani Sr.Engineer/QA	G. Panneer Selvam DGM/QA	M. Somasundaram SM/MM/BOI	M. Thandapani DGM/PE/FB (FS)	U. Revisankaran AGM/QA&BE
Prepared By	Reviewed by			Approved by



**BHARAT HEAVY ELECTRICALS LIMITED**  
**TIRUCHIRAPPALLI-620 014**

*Fuel Systems/PE(FB)*

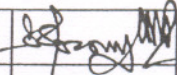


*Title Sheet*

*Specification for Slip on Pipe Coupling*  
*(36 3/4 inch)*

*Specification Number: GF-235*

*Revision No. : 04*

04	11/11/02	General updation. Computerised the manual specification / drawing	
03	09/10/98	1- Material specification altered 2- Size was 933 mm	-sd-
02	05/06/95	1- Note 'c' removed 2- Sketch altered 3- Retraced	-sd-
01	22/03/95	1- Dimension altered. 2. Stud M16 was bolt M16 3. Description altered in Page 02/04 4. Note 'c' on page 03/04 altered	-sd-
<i>Rev. No.</i>	<i>Rev. Date</i>	<i>Revision statement</i>	<i>Chd &amp; Appd.</i>

	<i>Name</i>	<i>Signature</i>	<i>Date</i>
<i>Prepared</i>	<i>S.Gnanaraj</i>	<i>Sd.,</i>	<i>01/07/1995</i>
<i>Checked</i>	<i>J.Swaminathan</i>	<i>Sd.,</i>	<i>01/07/1995</i>
<i>Approved</i>	<i>M.Alagarswamy</i>	<i>Sd.,</i>	<i>02/07/1995</i>



**Specification for Slip On Pipe Coupling  
(36 ¾ inch)**

GF - 235  
Rev:04

1. **Scope:**  
*Coupling assembly complete for connecting two pipes of specified size*
2. **Constructional features and special requirements:**
  - a. *The couplings are installed in coal pipes (feed pipe to mill)*
  - b. *The coupling shall consist of*
    - i. *Stainless Steel middle ring of thickness and length specified*
    - ii. *Steel followers*
    - iii. *Rubber compounded wedge section gaskets*
    - iv. *Sufficient stud with nuts and washers to properly compress the gasket. ®/01*
  - c. *Generally the coupling shall be as per the enclosed sketch*
  - d. *The middle ring and followers of the coupling shall be true circular sections free from irregularities like flat spots or surface defects. They shall be formed from mill sections with the follower ring section of such design as to provide confinement of the gasket after welding. They shall be tested by cold expanding a maximum of 1% beyond the yield point*
  - e. *[®/01, ®/02] The gasket of the coupling shall be composed of a crude or synthetic rubber base compounded with other products to produce a material which will not deteriorate from age, heat or exposure to air under normal storage conditions. It shall also possess the quality of resilience and ability to resist cold flow of the material so that the joint will remain sealed and tight indefinitely when subjected to shock, vibration, pulsation and temperature or other adjustments of the pipe line. The coupling shall be assembled on the job in a manner to ensure permanently tight joint under all reasonable conditions of expansions, contractions, shifting, settlement etc.,*
3. **Functional and terminal condition:**
  - a. *The coupling shall be capable of connecting pipes carrying raw coal*
  - b. *It shall be capable of taking vibration*
  - c. *The coupling shall be complete in all aspects so as to fix it with pipe ends*
4. **Application requirement:**
  - a. *Inclination: 1 in 10*
  - b. *Deflection: ± 2°*
  - c. *Expansion: 10 mm*



**Specification for Slip On Pipe Coupling  
(36 3/4 inch)**

GF - 235  
Rev:04

**5. Operating conditions:**

- a. Operating temperature: Normal: 90° C and Maximum: 150° C
- b. Maximum operating pressure: 3.5 Kg / cm<sup>2</sup>
- c. Load on the coupling : 5000 Kg

**6. Testing Requirement:**

- Coupling assembly to be hydraulically tested for 100 psi minimum with 3 degree deflection and with out deflection
- Withstanding capability for silicon rubber gasket and coupling assembly

**7. Applicable drawing:**

Vendor's General arrangement drawing shall be submitted for Purchaser's review and approval [®/02&04]

**8. Inspection & Testing:**

- a. Dimensional checks
- b. Material test certificate
- c. Refer TDC 5/189 [®/01]

**9. Packing:**

Painting, preservation and packing shall be as per relevant QP

**10. Information to be furnished by vendor:**

- a. Dimensional drawing of the coupling including the sectional view
- b. Catalogues
- c. Guarantees
- d. O&M manuals – minimum of 3 hard copies and 1 set of soft copy on CD
- e. List of recommended spares for 2 to 3 years of trouble free operation
- f. List of special tools required
- g. Installation procedure
- h. Test certificates [®/01]



## Specification for Slip On Pipe Coupling (36 3/4 inch)

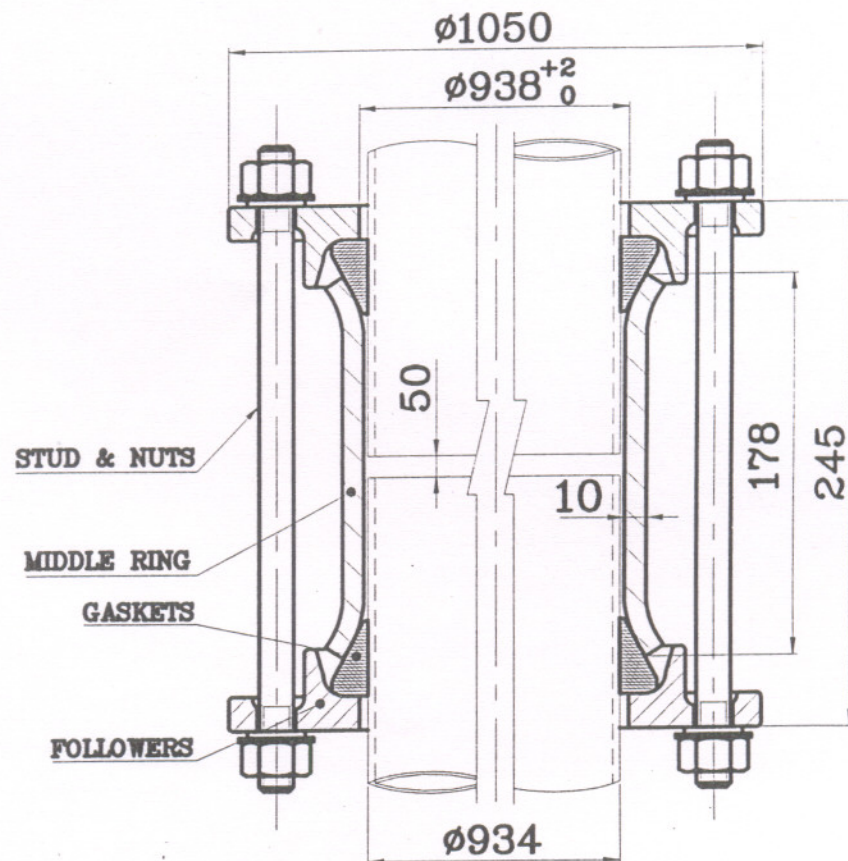
GF - 235  
Rev:04

### 11.0 General Arrangement

- 11.1 Material Code : 96-424-082  
11.2 Location : 65-736  
11.3 Description : Slip on Pipe Coupling suitable for 934 mm (36 3/4 inches OD) Stainless Steel pipe as per the sketch given below.

### 11.4.0 Material

- 11.4.1 Middle ring : SA 240 type 410 Stainless Steel ®/03  
11.4.2 Followers : A 536 Gr. 65-45-12 ®/03  
11.4.3 Gaskets : Silicone  
11.4.4 Stud with nuts & washers : IS 1875 class IV steel  
11.4.5 Number off : To be decided by supplier



**Note:** Arrangement shown is typical only. Supplier can submit their own arrangement subject to purchaser's approval.