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BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI 620 014 INDIA

TECHNICAL DELIVERY CONDITION FOR	PIPE COUPLINGS USED IN FUEL SYSTEM	TDC:5:189/02 PAGE 01 OF 09

EFFECTIVE DATE 20.06.1994

ACCEPTED BY	SIGNATURE	DATE
ENGINEERING		20.06.1994
PURCHASE		20.06.1994
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02	20.06.1994	QUALITY ASSURANCE	

ISSUED BY : QUALITY ASSURANCE

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RECORD OF REVISIONS

REV:NO	CLAUSE NO	DETAILS OF REVISION	REMARKS
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1.0 SCOPE:

1.1 This TDC details out the Quality requirements of Pipe couplings used in fuel system.

2.0 **REFERENCE DOCUMENTS:**

2.1 A) Purchase Specification and Drawings.
B) AWWA std.C-606-81.

3.0 **GENERAL**

3.1 The pipe couplings are of mechanical type connecting coal lines with a positive grip which allows some degree of angular deflection. The couplings are of three types (1) Shoulder type (2) Sleeve type (3)Slip on type.

3.2 The coupling and gasket shall be manufactured as per BHEL drg, and Purchase specification.

3.3 The manufacturer shall obtain approval from BHEL/QA for vendors for critical components like coupling housing, follower ring and silicon gaskets.

4.0 **TECHNICAL REQUIREMENTS**

4.1 Applicable Material Specifications.

4.1.1 Shoulder type couplings:

Coupling Housing	ASTM A 47 Gr 32510 or ASTM A 536 Gr 65-45-12.
Track bolt	SA 105
Nut	IS 1367 Cl.VI

4.1.2 Sleeve Type coupling

Middle ring	IS-2062 Gr-A
Follower Ring	ASTM A 536 Gr 65-45-12
Bolt & Screw	ASTM A 325 Type B or IS1367 Cl.10.9
Nut	IS 1367 Cl.VI

4.1.3 Slip on type coupling

Middle ring	AISI 410/AISI 304

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Follower ring ASTM A 27-35 Gr 70-36

Nut ASTM A 325 Type 3 or IS 1875 Cl.IV

4.1.4 GASKET:Silicon rubber,type VQ 1 as per ASTM D-2934

4.1.5 The manufacturer shall ensure that the Casting supplier identifies the casting by punching the melt no., on the material. All the relevant tests as per the material specification shall be carried out and the T.C.shall be provided. The foundry must send one test piece for each melt along with the castings to the manufacturer.

4.1.6 The manufacturer shall identify the raw material (Coupling body, Follower ring) batch wise. Verify the TC for its compliance before accepting the material.Carry out the material check melt wise for its properties, by testing in a Govt.,approved laboratory and report shall be maintained.

4.2 MARKING AND IDENTIFICATION:

4.2.1 Shoulder type Coupling Body

4.2.1.1 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.

4.2.1.2 Dimensions shall be as per drawing and the profiles to be checked with template.Inspection report shall be maintained.

4.2.1.3 All castings shall be traceable to the melt number.

4.2.2 Middle ring,Follower ring of Sleeve/Slip on type coupling.

4.2.2.1 Machined Middle ring, Follower ring shall be given a running serial number.

4.2.2.2 Conduct LPI for the middle ring.No visible defects shall be acceptable and report shall be maintained.

4.2.2.3 All castings shall be traceable to the melt number.

5.0 Silicon gaskets

5.1 If the coupling manufacturer manufactures the gasket the following are the requirements:

5.1.1 Verify the raw material T.C.

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5.1.2 Visually check the colouring accelerator.It shall be free from foreign material.

5.1.3 Silicon rubber compound shall be formed by mixing colouring accelerator in the mixing mill. Inspection report shall be maintained for the following

Type of check	Required	Actual
1.Dimensions	As per drg	
2.Confirmation of matl.,to Silicon	Confirmity certificate	
3.Hardness -on final product (Shore-A)	50 TO 70	
4.Specific Gravity (raw matl.)	1.1 to 1.4	
5.Stability of gasket dimensions	At 120° to 150°C for 3 hours	

The permissible variation from the original properties for VQ 1 silicon rubber of ASTM 2934 is as follows.

Shore hardness ---------- 10 - 15
Tensile strength -------- -25% to -40%
Ultimate elongation ---- -30% to-60%

5.1.6 Ensure that a calibrated thermometer/thermocouple is used to measure the temperature.

5.1.7 Check on one gasket from each production lot, all the dimensions and profile.Check the shore hardness of the gasket.The hardness shall be between 50 to 70 Shore A.

5.1.8 Serial number of gasket,manufacturer's code number and date of manufacture shall be identified and Inspection report shall be maintained.

5.1.9 Apply chalk powder and properly pack with polythene cover.

5.2 **If the silicon gasket is a bought out item, for the coupling manufacturer, following are the requirements:**

5.2.1 It shall be procured from BHEL approved vendors with TC and Inspection report as in format A ,and comply with clause 5.1.3

5.2.2 Check the size , profile and Shore hardness on 10% of quantity as per drg. The hardness shall be between 50 to 70 Shore A.

5.3 Type test of silicon rubber gasket for mechanical properties and heat resistance as per ASTM D 865 shall be done atleast once in a year.

6.0 **TRACK BOLTS:**

6.1 **If the coupling manufacturer manufacture the track bolt the following are the requirements**

6.1.1 Procure the raw material with relevant TC. Batch wise Identify the raw material.

6.1.2 For every batch , test the materials for its Chemical properties in a government recognized laboratory.

6.1.3 Check the dimension as per drg.and maintain inspection report as given in format B.

6.2. **If the coupling manufacturer procures the track bolts as a bought out item,following are the requirement:**

6.2.1 It shall be procured from the BHEL approved sources with TC and inspection report as given in format C.

6.2.2 Conduct hardness check on 10% of the quantity of bolts procured(Max.5nos per batch).

6.2.3 Conduct material test for its properties in a governmant recognized laboratory once in every batch of bolts procured from every vendor.

6.3. **OTHER FASTENERS**

6.3.1 Procure the fasteners from reputed fastner manufactures. Visually inspect it on receipt and adequate evidence shall be obtained from the manufacturer to ensure the dimensions are maintained as per drg,and it confirms to specification .

7.0 **HYDRAULIC TESTING OF PIPE COUPLING.**

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

7.1.1 Test shall be conducted in the presence of BHEL Inspection/BHEL Authorised Inspection Agency.

7.1.2 Before hydraulic test, it shall be ensured that the component is complete as per the drawing.

7.1.3 Only calibrated pressure gauges shall be used for pressure measurement.

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7.1.4 Suitable fixture 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 in let to hold at the rated pressure. The water used for the hydraulic test shall be at ambient tempr. in no case less than 21 deg.C.

7.1.5 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.

7.1.6 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

7.1.7 The coupling shall be removed from the fixture, dismantled and the gasket shall be visually examined for free from any damages.

7.1.8 A hydraulic test report shall be prepared and duly countersigned by BHEL/QC or its Authorised Inspection agency.

7.2 In case the test was already done by any one of the approved vendors for a particular size and type of coupling, this need not be repeated by other vendor for that size and type of coupling as long as the raw materials for critical components are procured from the BHEL approved source and adequate controls as per cl.4.2 are exercised during processing. The scope of the vendor regarding the hydraulic test requirements shall be indicated in the purchase order.

7.3 For all new vendors hydraulic test shall be done on One coupling of largest diameter of the size ordered (based on sizes required)to demonstrate his capability to comply with the specification. Based on this, hydro test on 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.

8.0 PAINTING, PRESERVATION AND PACKING

8.1 Thoroughly clean all the components. It shall be free from rust, grease, oil and other foreign materials.

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8.2 All machined surfaces shall be applied with rust preventive oil.

8.3 One coat of red oxide (IS2074) and one coat of Red lead paint shall be applied for the Shoulder type coupling.

8.4 One coat of red oxide (IS2074) and one coat of Blue enamel paint shall be applied for the Sleeve type.

8.5 One coat of red oxide (IS2074) and one coat of Smoke Grey enamelpaint shall be applied for the Slip type.

8.6 Enamel paint shall be as per IS 2932.

8.7 If gasket is supplied along with the coupling, it shall be wrapped with polythene tape (after applying french chalk) and then put on to the coupling.

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 etc.

9.0 **IDENTIFICATION & TRANSPORTATION**

9.1. Manufacturer"s identification mark/Code No.and coupling serial No. shall be punched on each coupling

9.2 Each batch of couplings shall be identified with work order number by a metal tag.

9.3 Care shall be taken to avoid any damage during handling and transportation.

10.0 **DOCUMENTATION**

10.1 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 deg.C for three hours.

c. Hydraulic test report (if applicable as per Cl. 7.2 & 7.3).

d. Shelf life for silicon gasket for a minimum period of two years

e. Visual inspection of gasket for discolouration,cracks, fissures,if any,to be checked and reports to be given.

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DRG. NO.

FORMAT-A

GASKET RING(IF PROCURED)

SL. NO.	DATE OF RECEIPT	SUPPLIER	QTY.PURCHASED	SIZE	PROFILE	HARDNESS SHORE A	SUPPLIER INSPECTION REPORT NO. & REVIEW	INSPN. SIGN OFF
							**1 **2	

**1 :Original mechanical properties as per ASTM A 2934-type VQI silicon rubber.
**2 :Type test for heat resistance at 150 deg.C for 70 hours as per ASTM D 865.

DRG. NO.

FORMAT-C

TRACK BOLT(IF PROCURED)

SL. NO.	DATE OF RECEIPT	SUPPLIER	BATCH NO.	SIZE.	QTY.PURCHASED.	RANDOM CHECK. ON MATL.	HARDNESS	SUPPLIER INSPECTION REPORT NO	REVIEW	INSPN. SIGN OFF

DRG. NO.

FORMAT-B

MANUFACTURING TRACK BOLT

SL.NO	DATE OF RECEIPT	RAW MATL QTY.RECD	NAME OF SUPPLIER	BATCH NO.	CHECK ON MATL.	QTY ACCEPTED	SIZE	THREAD	INSPN.SIGN OFF

Bharat Heavy Electricals Limited
Industrial Valves Plant
Goindwal

IVP:QM:Tech Req:Fuel Coupling:01
Dated: January 23, 2012.

Technical Requirements for purchase of Machined castings for Fuel Pipe Coupling.

1.1 SCOPE: These technical requirements detail out the Quality requirements of Machined castings for Shoulder Type Pipe couplings used in fuel system.

1.2 Reference Documents: TDC:5:189/02.

1.3 General: The pipe couplings are of mechanical type connecting coal lines with a positive grip, which allow some degree of angular deflection.

1.4 Applicable Material Specification: ASTM A 47 Gr 32510 Or
ASTM A 536 Gr 65-45-12.

The machined castings shall be manufactured as per BHEL drawing and purchase specification.

1.5 Each coupling casting should be embossed with melt no. and vendor code for traceability to particular heat. All the relevant tests, as per the material specification, shall be carried out in a Govt. approved laboratory and the test certificate shall be provided. The foundry must send one test piece for each melt along with the castings to BHEL.

1.6 Dimensions shall be as per drawing and the profiles to be checked with template (Go and No Go). Templates will be developed by the vendor. Dimension report for coupling housing and assembly shall be submitted to BHEL.

1.7 One set of coupling (Six pieces/set – Preferably of same heat) shall be given a unique running serial number. Vendor will match mark the segment of coupling after machining and will encircle the same by paint.

1.8 Correlation report indicating coupling no. and Heat no. on segments will be submitted to BHEL.

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1.9 For all new vendors, hydraulic testing shall be done (As per para 1.11) on minimum five sets out of first fifty sets supplied by vendor. Vendor will not be treated as established vendor until successful completion of order of first fifty sets.

1.10 After establishment of vendor, BHEL may carry out hydraulic testing randomly on any set supplied by the vendor. If, at any time, coupling does not pass the hydraulic testing, then atleast five more couplings containing the defective heat no. coupling will be tested. In case of further failure, vendor will have to give replacement for all the couplings supplied under particular heat. Additionally, vendor will have to re-establish himself for that particular size of the coupling in case of any failure in testing

1.11 The coupling manufactured shall be hydraulic tested at BHEL at a pressure of 300 psi. The hydraulic testing shall be carried out both in horizontal and deflected position (At 1.5 degree).

1.12 The coupling should be thoroughly cleaned before supply. It should be free from rust, grease, oil and other foreign materials.

1.13 All machined surfaces should be applied with rust preventive oil. No paint is to be applied to couplings.

1.14 Proper care shall be taken to avoid any damage during handling and transportation.

Sumeet Bansal 23/01/12
(Sumeet Bansal)
Sr. Engineer – QM

Sr. Manager - QM 23/1/12