



TD-106. – 2 Rev. No. : 00 Form No. :			<div>PRODUCT STANDARD</div> <div>HYDERABAD</div> <div>GT ENGINEERING</div>		<div>Prod. Std. No. : GT54192</div> <div>Rev. No. 11</div> <div>Page : 1 of 4</div>
<div><div>COPYRIGHT AND CONFIDENTIAL</div><div>The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.</div></div> <div><div>TUBE FITTINGS</div><div><div>1.0 SCOPE</div><div>This specification describes the compression tube fittings (fractional series) required for critical systems of Gas Turbine like fuel oil & high-pressure lube oil. Supply should be with collars wherever applicable.</div><div><div>2.0 SPECIFICATION:</div><div><div>2.1 Material: Stainless Steel ASTM A316</div><div>2.2 HARDNESS: Body HR – B Scale: 100^{±3} Back Ferrule HR-B Scale: 90^{±2.5} Front Ferrule HR B Scale: 95^{±5}</div><div>2.3 Surface Texture: All surfaces shall be free of burrs sharp edges, gauges and foreign material.</div><div>2.4 Silver plating is to be done on threading for nuts.</div><div>2.5 Taper pipe threads per ANSI B2.1</div><div>2.6 Working Conditions: Consistent with maximum and minimum pressure and temperature rating of stainless-steel tubing. Fitting shall be suitable for continuous flow operation. Maintain sealing integrity under temperature cooling over the entire operating range for ASTM A269 tubing. Seal repeatedly under make and break conditions.</div></div><div><div>3.0 QUALITY ASSURANCE:</div><div><div>3.1 Vendor shall furnish QA plan along with offer indication all in process inspection and mandatory tests indicated as per Cl. 7.0: BHEL approved QA plan shall be used for final inspection and dispatch.</div><div>3.2 All material will be delivered in a clean useable condition. Openings will securely be covered against entry of foreign material where appropriate.</div></div><div><div>4.0 MARKING & PACKING:</div><div>Marking and Packing shall be done in accordance with the acceptable commercial practices.</div><div><div>5.0 GUARANTEE:</div><div>The supplier should gaurantee for trouble free from any defects for a period of one year after commissioning.</div><div><div>6.0 REQUIREMENT:</div><div>Refer Variant Table.</div><div><div>7.0 MANDATORY TESTS:</div><div>The following tests are to be conducted on a min. of 5% of all fittings for each size and type produced batchwise.</div><div><div>7.1 Proof Pressure Test:</div><div>Test assemblies to be subjected to a pressure of 375 kg/cm² for at least one hour without any visible leakage.</div><div>7.2 Dismantling and Reassembly test:</div><div>The assemblies successfully completing the proof pressure test as per 7.1 above are dis-assembled and assembled ten times after which they must pass the proof pressure test.</div><div>7.3 Hydro Buret Pressure Test:</div><div><div>7.3.1 Minimum hydraulic Burst Pressure of 600 kg/cm² for period of 5 min.</div><div>7.3.2 New vendor and for new types and sizes this test is mandatory as per 7.3.1.</div><div>7.3.3 For repeat orders of Qty. > 20 of each type and size test to be done as per 7.3.1.</div></div></div></div></div></div></div></div></div></div></div>					
Ref. Doc					

TD-106. – 2 Rev. No. : 00 Form No. :			PRODUCT STANDARD HYDERABAD GT ENGINEERING	Prod. Std. No. : GT54192
				Rev. No. 11
				Page : 2 of 4
<div><div><div>COPYRIGHT AND CONFIDENTIAL</div><div>The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.</div></div><div><div>7.4 Min. Static Vacuum Test</div><div>Test assemblies satisfactorily proof pressure tested are subjected to negative pressure upto 700 mbar and then disconnected from the vacuum pump. The assembly must maintain the vacuum pressure for '15' minutes. The assemblies are suitably degassed before the test and total exhausted volume should not exceed 20% of the total assembly volume.</div><div>7.5 Hydraulic Impulse and Vibration Test</div><div>7.5.1 Vibration Test</div><div>7.5.1.1 Non Seismic</div><div>The fitting assembled so as to give an unsupported tubing length of 0.5 meters and subjected to vibrations for atleast 2 hours in each of two mutually perpendicular directions. The frequency shall be 25/30 cycles per second and the amplitude of oscilation shall be such so as to stress the tube to its fatigue endurance limit. The fitting shall be rigidly fixed and the tube subjected to a constant internal pressure of about 7 kg/cm² during the test.</div><div>7.5.2 Impulse/Pressure Cycling Test:</div><div>Assembled fittings shall be subjected to impulse test comprising of pressurising to 250 kg/cm² and suddenly depressuring to a pressure of 1 kg/cm² i.e., less, at a rate of 40 cycles/minute for a total period of 250 Hrs.</div><div>At the end of this test the fittings shall be subjected to and shall pass the leak tightness test as in 7.3.</div><div>7.6 General:</div><div>The vendor shall notify the purchaser, the date and location of the performance of tests, give sufficient notice to enable the purchaser or his authorised representative to be present.</div><div>The test procedures shall be proposed by the vendor and approved by the BHEL, GT Design Department. The vendor shall provide all the test equipment required.</div><div>The purchaser or his authorised representative shall have access to the calibration certificates of the test equipment used for these tests.</div><div>The random samples required for tests shall be selected by the purchaser or his authorised representative and all the samples shall not form the part of the bulk quantity to be supplied against purchase order.</div><div>8.0 <u>Certificate of Compliance:</u></div><div>The manufacturer shall supply in duplicate, certificate of compliance stating that the material supplied is accordance with all provisions of this specification.</div><div>9.0 <u>Installation Procedures:</u></div><div>The manufacturer shall provide the recommended installation procedures and the list of installation tools. A sample copy of the instruction manual shall be submitted with the offer.</div><div>10.0 <u>Test Certificates:</u></div><div>Test certificates and quality certificates are to be provided along with the material.</div><div>11.0 <u>Preservation:</u></div><div>Preservation shall be accomplished in accordance with the acceptable commercial practices unless otherwise specified in the purchase order or quotation request.</div><div>12.0 <u>APPROVED VENDORS:</u></div><div>Compression tube fittings shall be procured only from GE-approved OEMs or their authorized dealers.</div></div></div>				
Ref. Doc				

TD-106. - 2
Rev. No. : 00
Form No. :



PRODUCT STANDARD
HYDERABAD
GT ENGINEERING

Prod. Std. No. : GT54192
Rev. No. 11
Page : 3 of 4

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Ref. Doc

VARIANT TABLE

VAR	DESCRIPTION	MAT_CODE	GECOD
01	UNION TUBE - 1/2"	GT9754192014	156A1076P007
02	UNION TUBE - 3/4"	GT9754192022	156A1076P009
03	ELBOW TUBE UNION - 1/2"	GT9754192030	156A1078P018
04	ELBOW TUBE UNION - 3/4"	GT9754192049	156A1078P020
05	TEE TUBE UNION - 1/2" X 1/2 "	GT9754192057	156A1084P019
06	TEE TUBE UNION - 3/4" X 3/4 "	GT9754192065	156A1084P013
07	CONNECTOR TUBE MALE - 1/2" X 1/2"	GT9754192073	156A1075P015
08	CONNECTOR TUBE MALE - 3/4" X 3/4"	GT9754192081	156A1075P019
09	ELBOW TUBE MALE - 1/2" X 1/2" NPT	GT9754192090	156A1077P015
10	ELBOW TUBE MALE - 3/4" X 3/4 " NPT	GT9754192103	156A1077P019
11	TEE FEMALE RUN - 1/2" X 1/2" NPT(F)	GT9754192111	156A1093P001
12	ELBOW TUBE MALE - 1/2" X 3/8 " NPT	GT9754192120	156A1077P014
13	ELBOW 45 DEG MALE - 1/2" X 3/8" NPT	GT9754192138	NOT AVL
14	TEE MALE RUN - 1/2" X 1/2" NPT(TTM)	GT9754192146	156A1092P014
15	THERMOCOUPLE CONNECTOR - 1/2" X 1/2"	GT9754192154	287A1399P010
16	CONNECTOR TUBE MALE - 3/8" X 3/8"	GT9754192162	156A1075P011
17	CONNECTOR TUBE - 3/8" X 1/2"	GT9754192170	156A1075P012
18	TEE TUBE UNION - 3/8"	GT9754192189	156A1084P018
19	REDUCER TUBE - 3/8" X 3/4"	GT9754192197	156A1080P020
20	REDUCER TUBE - 1/2" X 3/4"	GT9754192200	156A1080P023
21	CONNECTOR O RING STR THD - 1/2" X 3/4"-16	GT9754192219	156A1964P007
22	CONCTR TUBE O RING STR THD - 3/4"X1 1/6"-12	GT9754192227	156A1964P009
23	BACK FERRULE -3/8"	GT9754192235	156A1089P006
24	FRONT FERRULE- 3/8 "	GT9754192243	156A1088P006
25	NUT TUBE - 3/8 "	GT9754192251	156A1087P006
26	TEE TTF - 1/4" X 1/4"	GT9754192260	156A1083P005
27	CONNECTOR TUBE FEMALE -1/4" X 1/4 " NPT	GT9754192278	156A1085P005
28	CONNECTOR TUBE MALE - 1/4 "X 1/4" NPT	GT9754192286	156A1075P006
29	DO NOT USE	GT975419229X	DO NOT USE
30	REDUCER TUBE - 1/4 " X 3/8"	GT9754192308	156A1080P011
31	TEE TUBE UNION -1/4"	GT9754192316	156A1084P016
32	UNION TUBE BULK HEAD 3/8"	GT9754192324	156A1094P015
33	SAME AS VAR-28	GT975419233X	REFER VAR-28
34	CONNECTOR TUBE MALE - 3/8" X 1/8"	GT9754192340	156A1075P009
35	CONNECTOR TUBE MALE - 3/8" X 1/4"	GT9754192359	156A1075P010
36	SAME AS VAR -17	GT975419236X	REFER VAR-17
37	SAME AS VAR-08	GT975419237X	REFER VAR-08
38	ADAPTER TUBE TO MALE - 1/4" X 1/4"	GT9754192383	156A1097P008
39	ADAPTER TUBE TO MALE - 3/8" X 1/4"	GT9754192391	156A1097P016
40	ADAPTER TUBE TO MALE - 3/4" X 1/2"	GT9754192405	156A1097P025
41	ADAPTOR TUBE FEMALE - 3/4" X 3/4"	GT9754192413	156A1097P026
42	CONNECTOR O RING STR-THR-3/8"X9/16"-18	GT9754192421	156A1964P006
43	SAME AS VAR-21	GT975419243X	REFER VAR-21
44	CONNECTOR TUBE MALE - 1/2" X1/4"	GT9754192448	156A1075P013
45	CONNECTOR TUBE MALE -1/2" X 3/8"	GT9754192456	156A1075P014
46	CONNECTOR TUBE MALE -1/2" X 3/4"	GT9754192464	156A1075P026
47	CONNECTOR TUBE MALE - 3/4" X 1/2"	GT9754192472	156A1075P018
48	CONECTOR TUBE FEMALE - 3/4" X 3/4"	GT9754192480	156A1085P018
49	UNION TUBE 3/8"	GT9754192499	156A1076P006

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Ref. Doc

TD-106. - 2 Rev. No. : 00 Form No. :		PRODUCT STANDARD HYDERABAD GT ENGINEERING		Prod. Std. No. : GT54192
				Rev. No. 11
				Page : 4 of 4
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	50	ADAPTER TUBE TO MALE- 1/2" X 1/2"	GT9754192502	156A1097P021
	51	REDUCER TUBE - 3/8"X 1/2"	GT9754192510	156A1080P018
	52	PLUG TUBE - 3/8"	GT9754192529	156A1091P006
	53	CONNECTOR TUBE FEMALE - 3/8" X 1/4"	GT9754192537	156A1085P009
	54	CONNECTOR TUBE MALE - 1" X 3/4"	GT9754192545	156A1075P021
	55	CONNECTOR O RING STR-THR- 1/4" X 7/16"-20	GT9754192553	156A1964P004
	56	UNION TUBE 1 "	GT9754192561	156A1076P011
	57	CONNECTOR TUBE FEMALE -1" X 1"	GT9754192570	156A1085P021
	58	UNION TUBE BULK HEAD -1/2" X 1/2"	GT9754192588	156A1094P016
	59	PLUG -O RING -STR -THR 7/16-20	GT9754192596	211A9197P003
	60	CONNECTOR TUBE MALE - 1/4" X 1/8"	GT9754192600	156A1075P005
	61	UNION TUBE - 1/4 "	GT9754192618	156A1076P004
	62	ELBOW TUBE -1 "	GT9754192626	156A1078P022
	63	CONNECTOR TUBE MALE -3/4" x 1"	GT9754192634	156A1075P032
	64	PLUG TUBE - 1 "	GT9754192642	156A1091P011
	65	UNION TUBE REDUCING -1" X 3/4 "	GT9754192650	156A1095P014
	66	UNION TUBE BULK HEAD -1" X 1 "	GT9754192669	156A1094P020
	67	CONNECTOR TUBE AN - 1 "	GT9754192677	314A5306P010
	68	ELBOW TUBE - 3/8 "	GT9754192685	156A1078P013
	69	ADAPTER O RING-STR-THD -3/8" X 9/16"-18	GT9754192693	256A1670P007
	70	CONNECTOR TUBE MALE - 1"X1"	GT9754192707	156A1075P022
	71	REDUCER TUBE MALE - 1/2"X1"	GT9754192715	156A1080P024
	72	ADAPTER TUBE O-RING -3/4"X 1 1/16"-12 (MSTR)	GT9754192723	256A1670P004
	73	CONNECTOR TUBE FEMALE - 3/8"X1/2"	GT9754192731	156A1085P011
	74	CONNECTOR TUBE FEMALE - 1/2"X1/4"	GT9754192740	156A1085P012
	75	CONNECTOR TUBE FEMALE - 1/2"X3/8"	GT9754192758	156A1085P013
	76	ADAPTER TUBE MALE - 3/8"X1/8"	GT9754192766	156A1097P015
	77	ADAPTER TUBE MALE - 3/8"X3/8"	GT9754192774	156A1097P017
	78	ADAPTER TUBE MALE - 3/8"X1/2"	GT9754192782	156A1097P018
	79	ADAPTER TUBE MALE - 1/2"X1/4"	GT9754192790	156A1097P019
	80	ADAPTER TUBE - 3/4"X1"	GT9754192804	156A1097P027
	81	ADAPTER TUBE - 1"X1"	GT9754192812	156A1097P030
	82	ELBOW TUBE MALE- 1"X1"	GT9754192820	156A1077P022
	83	TEE TUBE FEMALE - 3/8"X1/4"	GT9754192839	156A1083P007
	84	TEE TUBE FEMALE - 3/4"X3/4"	GT9754192847	156A1083P010
	85	ADAPTER TUBE FEMALE - 3/4"X3/4"	GT9754192855	235A5025P026
	86	ELBOW - 1/4" X1/4" NPT (F)	GT9754192863	156A1086P005
	87	ELBOW - 3/4"X3/4" NPT (F)	GT9754192871	156A1086P017
	88	ELBOW - 1"X1" NPT (F)	GT9754192880	156A1086P020
	89	TEE -3/8"X1/4" NPT(F) TFT	GT9754192898	156A1093P007
	90	PLUG TUBE - 3/4"	GT9754192901	156A1091P009
	91	SAME AS VAR-59	GT975419291X	REFER VAR-59
	92	SAME AS VAR-25	GT975419292X	REFER VAR-25
	93	ELBOW TUBE UNION - 1/4 "	GT9754192936	156A1078P016
	94	CONNECTOR TUBE MALE - 1/4"X3/8"	GT9754192944	156A1075P025
	95	CONNECTOR TUBE MALE - 3/8"X3/4"	GT9754192952	156A1075P027
	96	TEE TUBE UNION OD - 1"X1"	GT9754192960	156A1084P022
	97	CONNECTOR TUBE FEMALE - 3/8"X3/8"	GT9754192979	156A1085P010
	98	CONNECTOR TUBE FEMALE - 1/2"X1/2"	GT9754192987	156A1085P014
	99	PLUG TUBE - 1/2"	GT9754192995	156A1091P007
Ref. Doc				

