Manufacture & Supply of BW Fittings (CS & AS)-Annexure-A

SL NO	Schedule	PROJECT	MATLCD	TEMP	Description	FITTING TYPES	SPECIFICATION	SEAMLESS /WELDED	TDC	Quality Plan	Painting Scheme	ASME SPEC	D1 Value for Edge Preperation	Quantity
1	Schedule 1	**Bhadradri**	**921171080000**	**921171080000-Schedule 1**	BW RED 114.3X6.02/60.3X5.54 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D103.5/D49	1
2	Schedule 2	**MAHAGENCO BHUSAWAL**	**925053710000**	**925053710000-Schedule 2**	BW UEQT 168.3X7.11/60.3X5.54 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D155.6/D49	1
3	Schedule 3	**NORTH CHENNAI**	**921171090000**	**921171090000-Schedule 3**	BW RED 114.3X6.02/88.9X5.49 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D103.5/D79	1
4	Schedule 4		**925045700200**	**925045700200-Schedule 4**	BW LR 90DEG ELL OD114.3X6.02 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 103.5	32
5	Schedule 5		**921052900000**	**921052900000-Schedule 5**	BW UNEQT OD219.1X6.35/OD141.3X5.4, WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	206.4/130.5	10
6	Schedule 6		**921052910000**	**921052910000-Schedule 6**	BW UNEQT OD273X6.35/OD141.3X5.4, WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	260.3/130.5	6
7	Schedule 7		**921173840000**	**921173840000-Schedule 7**	BW RED OD88.9X5.49/OD60.3X3.91 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	79/52.5	5
8	Schedule 8		**921178820000**	**921178820000-Schedule 8**	BW ECCRED OD219.1X6.35/OD141.3X5.4, WPB	ECCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	206.4/130.5	10
9	Schedule 9		**921179450000**	**921179450000-Schedule 9**	BW RED 355.6X6.35/273X6.35 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	342.9/260.3	1
10	Schedule 10		**925042860200**	**925042860200-Schedule 10**	BW LR 90DEG ELL OD219.1X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4	236
11	Schedule 11		**925042880200**	**925042880200-Schedule 11**	BW LR 90DEG ELL OD323.9X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D311.2	44
12	Schedule 12		**925046160000**	**925046160000-Schedule 12**	BW LR 90DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D-D1=342.9	15
13	Schedule 13		**925050050000**	**925050050000-Schedule 13**	BW EQT OD355.6X6.35 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	342.9	7
14	Schedule 14		**925052420000**	**925052420000-Schedule 14**	BW UEQT 219.1X6.35/114.3X6.02 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4/D103.5	10
15	Schedule 15		**925052590000**	**925052590000-Schedule 15**	BW EQT OD273X6.35 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D260.3	4
16	Schedule 16	**NTPC KAHALGAON**	**925052860000**	**925052860000-Schedule 16**	BW UEQT 323.9X6.35/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D311.2/D155.6	13
17	Schedule 17		**925053040000**	**925053040000-Schedule 17**	BW UEQT 355.6X7.92/219.1X6.35 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D339.8/D206.4	10
18	Schedule 18		**925053050000**	**925053050000-Schedule 18**	BW UEQT 88.9X5.49/60.3X5.54 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D79/D49	10
19	Schedule 19		**925053780000**	**925053780000-Schedule 19**	BW UEQT 355.6X9.53/273X9.27 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D336.5/D254.5	1
20	Schedule 20		**925053920000**	**925053920000-Schedule 20**	BW UEQT 355.6X9.53/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D336.5/D155.6	10
21	Schedule 21		**925170640000**	**925170640000-Schedule 21**	BW RED 219.1X6.35/114.3X6.02 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 207.2/D 103.5	10
22	Schedule 22		**925174110000**	**925174110000-Schedule 22**	BW RED 168.3X7.11/114.3X6.02 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D155.6/D103.5	2
23	Schedule 23		**925174300000**	**925174300000-Schedule 23**	BWCON RED 273.1X6.35/219.1X6.35 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D260.3/D206.4	1
24	Schedule 24		**925174640000**	**925174640000-Schedule 24**	BW RED 219.1X6.35/168.3X7.11 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4/D155.6	6
25	Schedule 25		**925174770000**	**925174770000-Schedule 25**	BW RED 168.3X7.11/141.3X7.11 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 155.6	13
26	Schedule 26		**925247320000**	**925247320000-Schedule 26**	BW LR 45DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 342.9	6
27	Schedule 27		**925251570000**	**925251570000-Schedule 27**	BW UEQT 219.1X6.35/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4/D155.6	3
28	Schedule 28		**921042870000**	**921042870000-Schedule 28**	BW LR 90DEG ELL OD406.4X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 393.6	8
29	Schedule 29		**921042900000**	**921042900000-Schedule 29**	BW LR 45DEG ELL OD406.4X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 393.7	1
30	Schedule 30		**921178820000**	**921178820000-Schedule 30**	BW ECCRED OD219.1X6.35/OD141.3X5.4, WPB	ECCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	206.4/130.5	20
31	Schedule 31		**921179450000**	**921179450000-Schedule 31**	BW RED 355.6X6.35/273X6.35 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	342.9/260.3	2
32	Schedule 32		**925042860200**	**925042860200-Schedule 32**	BW LR 90DEG ELL OD219.1X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4	20
33	Schedule 33		**925046160000**	**925046160000-Schedule 33**	BW LR 90DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D-D1=342.9	2
34	Schedule 34		**925050050000**	**925050050000-Schedule 34**	BW EQT OD355.6X6.35 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	342.9	5
35	Schedule 35	**NTPC KORBA**	**925052860000**	**925052860000-Schedule 35**	BW UEQT 323.9X6.35/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D311.2/D155.6	10
36	Schedule 36		**925053040000**	**925053040000-Schedule 36**	BW UEQT 355.6X7.92/219.1X6.35 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D339.8/D206.4	30
37	Schedule 37		**925053170000**	**925053170000-Schedule 37**	BW UEQT 219.1X6.35/88.9X5.49 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4/D79	6
38	Schedule 38		**925053650000**	**925053650000-Schedule 38**	BW EQT OD406.4X6.35 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 393.7	3
39	Schedule 39		**925170640000**	**925170640000-Schedule 39**	BW RED 219.1X6.35/114.3X6.02 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 207.2/D 103.5	6
40	Schedule 40		**925247320000**	**925247320000-Schedule 40**	BW LR 45DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 342.9	4
41	Schedule 41		**925252150000**	**925252150000-Schedule 41**	BW UEQT 406.4X9.53/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 387.3/D 155.6	1
42	Schedule 42		**925277280000**	**925277280000-Schedule 42**	BW RED 406.4X6.35/323.9X6.35 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 393.6/D311.2	1
43	Schedule 43	**PANKI**	**925251460000**	**925251460000-Schedule 43**	BW UEQT 168.3X27.5/114.3X20 SA234WPC	UNEQUAL TEE	SA234WPC	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	P119.3/P78.2	1
44	Schedule 44		**921044640000**	**921044640000-Schedule 44**	BW LR 90DEG ELL 168.3X10.97 SA234WP22CL1	ELBOW	SA234WP22CL1	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D147.4	13
45	Schedule 45		**921044650000**	**921044650000-Schedule 45**	BW LR 90DEG ELL OD273X9.27 SA234WP22CL1	ELBOW	SA234WP22CL1	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D254.5	4
46	Schedule 46		**925041340000**	**925041340000-Schedule 46**	BW LR 90DEG ELL OD323.9X9.53 SA234WPC	ELBOW	SA234WPC	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D304.8	4
47	Schedule 47	**PATRATU**	**925043440000**	**925043440000-Schedule 47**	BW LR 90DEG ELL OD168.3X7.11 SA234WPC	ELBOW	SA234WPC	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D155.6	9
48	Schedule 48		**925043530400**	**925043530400-Schedule 48**	BW LR 90DEG ELL OD457.2X9.53 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 437.2	20
49	Schedule 49		**925175760000**	**925175760000-Schedule 49**	BW RED 168.3X7.11/60.3X5.54 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D155.6 / D 49	2
50	Schedule 50		**925253400000**	**925253400000-Schedule 50**	BW EQT OD114.3X6.02 SA234WPC	EQUAL TEE	SA234WPC	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 103.5	2
51	Schedule 51		**921042900000**	**921042900000-Schedule 51**	BW LR 45DEG ELL OD406.4X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 393.7	2
52	Schedule 52		**921171090000**	**921171090000-Schedule 52**	BW RED 114.3X6.02/88.9X5.49 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D103.5/D79	8
53	Schedule 53		**925042350000**	**925042350000-Schedule 53**	BW SR 90DEG ELL OD323.9X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D311.2	2
54	Schedule 54		**925042640000**	**925042640000-Schedule 54**	BW LR 45DEG ELL OD88.9X5.49 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D79	20
55	Schedule 55		**925042860200**	**925042860200-Schedule 55**	BW LR 90DEG ELL OD219.1X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4	49
56	Schedule 56		**925045480000**	**925045480000-Schedule 56**	BW LR 90DEG ELL 60.3 X 5.54 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D49	44
57	Schedule 57	**TSGENCO BHADRADRI**	**925045700200**	**925045700200-Schedule 57**	BW LR 90DEG ELL OD114.3X6.02 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 103.5	28
58	Schedule 58		**925052420000**	**925052420000-Schedule 58**	BW UEQT 219.1X6.35/114.3X6.02 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4/D103.5	8
59	Schedule 59		**925052900000**	**925052900000-Schedule 59**	BW UEQT 273X6.35/114.3X6.02 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D260.3/D103.5	7
60	Schedule 60		**925053650000**	**925053650000-Schedule 60**	BW EQT OD406.4X6.35 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 393.7	1
61	Schedule 61		**925054630000**	**925054630000-Schedule 61**	BW UEQT 114.3X6.02/73X7.01 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	103.5 / 59.0	4
62	Schedule 62		**925242470000**	**925242470000-Schedule 62**	BW LR 45DEG ELL 60.3 X 5.54 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D49	8
63	Schedule 63		**925271570000**	**925271570000-Schedule 63**	BW RED 48.3X5.08/33.4X4.55 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D39.2/D25.2	12
64	Schedule 64		**921171090000**	**921171090000-Schedule 64**	BW RED 114.3X6.02/88.9X5.49 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D103.5/D79	1
65	Schedule 65		**925042640000**	**925042640000-Schedule 65**	BW LR 45DEG ELL OD88.9X5.49 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D79	4
66	Schedule 66		**925042860200**	**925042860200-Schedule 66**	BW LR 90DEG ELL OD219.1X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4	19

Manufacture & Supply of BW Fittings (CS & AS)-Annexure-A

SL NO	Schedule	PROJECT	MATLCD	TEMP	Description	FITTING TYPES	SPECIFICATION	SEAMLESS /WELDED	TDC	Quality Plan	Painting Scheme	ASME SPEC	D1 Value for Edge Preperation	Quantity
67	Schedule 67	TSGENCO KOTHAGUDEM	925046160000	925046160000-Schedule 67	BW LR 90DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D-D1=342.9	1
68	Schedule 68		925053040000	925053040000-Schedule 68	BW UEQT 355.6X7.92/219.1X6.35 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D339.8/D206.4	1
69	Schedule 69		925053050000	925053050000-Schedule 69	BW UEQT 88.9X5.49/60.3X5.54 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D79/D49	1
70	Schedule 70		925175460000	925175460000-Schedule 70	BW RED 88.9X5.49/60.3X5.54 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D79/D49	1
71	Schedule 71		925242470000	925242470000-Schedule 71	BW LR 45DEG ELL 60.3 X 5.54 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D49	2
72	Schedule 72		925247320000	925247320000-Schedule 72	BW LR 45DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 342.9	1
73	Schedule 73		925252650000	925252650000-Schedule 73	BW EQT 33.4 X 6.35 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 22	2
74	Schedule 74	TSGENCO YADADRI	921042900000	921042900000-Schedule 74	BW LR 45DEG ELL OD406.4X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 393.7	2
75	Schedule 75		921054810000	921054810000-Schedule 75	BW EQUAL TEE 219.1X8.18 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 202.7	5
76	Schedule 76		921054840000	921054840000-Schedule 76	BW EQT OD406.4X9.53 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D387.3	2
77	Schedule 77		925042860200	925042860200-Schedule 77	BW LR 90DEG ELL OD219.1X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D206.4	35
78	Schedule 78		925046160000	925046160000-Schedule 78	BW LR 90DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D-D1=342.9	29
79	Schedule 79		925050050000	925050050000-Schedule 79	BW EQT OD355.6X6.35 SA234WPB	EQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	342.9	5
80	Schedule 80		925052390000	925052390000-Schedule 80	BW UEQT 168.3X7.11/114.3X6.02 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D155.6/D103.5	20
81	Schedule 81		925052810000	925052810000-Schedule 81	BW UEQT 355.6X7.92/273X6.35 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D339.8/D260.3	2
82	Schedule 82		925053690000	925053690000-Schedule 82	BW UEQT 273.1X9.27/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D254.5/D155.6	10
83	Schedule 83		925053790000	925053790000-Schedule 83	BW UEQT 355.6X9.53/219.1X8.18 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D336.5/D202.7	5
84	Schedule 84		925054000000	925054000000-Schedule 84	BW UEQT 273X9.27/114.3X6.02 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D254.5/D103.5	10
85	Schedule 85		925170660000	925170660000-Schedule 85	BWCONRED219.1X8.18/168.3X7.11 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D202.7/D155.6	5
86	Schedule 86		925174110000	925174110000-Schedule 86	BW RED 168.3X7.11/114.3X6.02 SA234WPB	CONCENTRIC REDUCER	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D155.6/D103.5	20
87	Schedule 87		925242770000	925242770000-Schedule 87	BW LR 90DEG ELL OD610X10 SA234WPB(W)	ELBOW	SA234WPB(W)	WELDED	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 590	1
88	Schedule 88		925247320000	925247320000-Schedule 88	BW LR 45DEG ELL OD355.6X6.35 SA234WPB	ELBOW	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 342.9	2
89	Schedule 89		925251540000	925251540000-Schedule 89	BW UEQT 355.6X7.92/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D339.8/D155.6	6
90	Schedule 90		925252150000	925252150000-Schedule 90	BW UEQT 406.4X9.53/168.3X7.11 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D 387.3/D 155.6	10
91	Schedule 91		925255790000	925255790000-Schedule 91	BW UEQT 323.9X9.53/219.1X8.18 SA234WPB	UNEQUAL TEE	SA234WPB	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D304.8/D202.7	1
92	Schedule 92	UDANGUDI	925279180000	925279180000-Schedule 92	BW RED 168.3X7.11/114.3X6.02 SA234WP22CL1	CONCENTRIC REDUCER	SA234WP22CL1	SEAMLESS	TDG 102 REV 10	QPG 46 Rev 03	As per TDG 102 REV 10	As per ASME B16.9	D155.6/D103.5	2
														1040

1. Fitting Tolerances shall be as per Drawing No 4-80-301-26192 Rev 01.
2. Edge Preperation (EP) shall be as per Drawing No 3-80-300-19825 Rev 04.D1 value for EP shall be as indicated above.
3. Despatches of the schedules shall be made directly to the Respective Project sites.

BHARAT HEAVY ELECTRICALS LIMITED
MM/PURCHASE
BHEL / TRICHY-620 014.

Annexure B
ENQ.No. 4102400028

Dt.18-10-2024

Enquiry Terms & Conditions for BW Fittings(CS&AS)

Note: This Annexure has to be mandatorily filled & signed by the manufacturer (or) mill and submitted along with Technical bid.

Any deviation to the below mentioned terms shall be stated specifically in the comments column for each term and also in case of acceptance to our terms, it will be construed that the whole term is understood and agreed in totality without any deviation. (If otherwise mentioned).

Sl No	BHEL Requirements	Supplier Comments
01	**Material specification:** Supply of **BW Fittings(CS&AS)** shall be made strictly as per specification ***TDG 102 Rev 10, QPG 46 Rev 03 and all other technical documents*** furnished as mentioned in the enquiry.	
02	**Specification, Size & Quantity:** a) All the **BW Fittings(CS&AS)** are to be supplied fully meeting the ***TDG 102 Rev 10, QPG 46 Rev 03 and all other technical documents*.** If there is any deviation, the same should be mentioned clearly in the offer itself. b) **Quantity of the BW Fittings shall be as per tendered quantity and it is not splittable.** c) **Nominated Inspection Agency:** On behalf of the Buyer organization, any one of the following Inspection Agency would be conducting inspection of stores before acceptance: Pre-dispatch Inspection at Seller Premises (applicable only if pre-dispatch inspection clause has been selected in ATC): By IBR / IBR authorized TPI & BHEL / BHEL authorized TPI at Supplier works. Post Receipt Inspection at consignee site before acceptance of stores: By BHEL. d) Point wise confirmation for Pre-Qualification Criteria (PQR) and manufacturing facility details are to be mandatorily filled & signed by the bidder and to be uploaded in NIC portal (https://eprocurebhel.co.in) along with Technical Bid (Part 1 bid).	
03	**Offer Submission:** a) This Tender is hosted in EPS portal & offer to be submitted through EPS portal only. You are requested to submit your 2 parts offer before due date & time of the enquiry through NIC (https://eprocurebhel.co.in) only. b) Offer is to be submitted in TWO part bids system (Technical bid + Price bid) in the E-Procurement NIC PORTAL (https://eprocurebhel.co.in) ONLY. c) Scanned copy of the filled Annexure-A, Tender documents etc., shall be uploaded in the EPS portal. d) At its option, BHEL may consider extending the due date/s for the tender openings. Sufficient notice would be given by BHEL for such extensions and it will be published as corrigendum in following websites, **https://eprocurebhel.co.in** **http://www.bhel.com/tender/** e) Acceptance of offer will be subject to existing customer approval. f) The quoted / finalized rates shall be Firm till execution of the supplies. Offer with PVC clause will not be considered.	
04	**Authorization for participation in EPS portal through DSC: E-Tender. Participation requirements:** Either Principal or authorized agent shall register their Digital Signature Certificate (DSC) (Class 3- SHA2- 2048 BIT-SIGNING & ENCRYPTION). Suppliers are advised to go through the FAQ available in the web portal (https://eprocurebhel.co.in). DSC shall be registered for the authorized person and all transaction done using that DSC against our tenders shall be taken as valid communication and shall be binding on principal/agent and is valid legally. **For foreign Principal**	

	In case of Principal (being foreigner), they may apply for DSC through Indian embassy at their country and can register with us for participating in E-tenders. Details of the applicable procedure is available in the webpage http://www.cca.gov.in/cca/. **For Indian agent** In case of agents participating/registering their DSC (of authorized person), it will be at the sole authorization of principal to their agents to participate on their behalf and all transactions done using that DSC against our tenders shall be known as valid communication and shall binding on principal and is legally valid.	
05	**Validity:** The offers shall be kept open for acceptance for 90 days from the date of Part 1 bid opening. Once the tenders are submitted, rates cannot be changed on any grounds.	
06	**Delivery Period shall be 60 days** from the date of PO. Bids deviating from the same if any will be liable to rejection. Delivery period indicated above is inclusive of transit time till material receipt at project site.	
07	**Goods and Service Tax (GST)** **Indigenous suppliers:** • Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration No (GSTIN) which should be clearly mentioned in the offer. If the dealer is exempted from GST registration, a declaration with due supporting documents need to be furnished for considering the offer. Dealers under composition scheme should declare that he is a composition dealer supported by the screen shot taken from GST portal. The dealer has to submit necessary documents if there is any change in status under GST. • Supplier shall mention their GSTIN in all their invoices (incl. credit Notes, Debit Notes) and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No. which is linked/uploaded in GSTN network shall be clearly indicated), Billed to party (with GSTIN) & Shipped to party details, item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, Place of Supply etc. • All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code). • Invoices will be processed only upon completion of statutory requirement and further subject to following: o Vendor declaring such invoice in Form GST ANX-1 o Receipt of Goods or Services and Tax invoice by BHEL • As the continuous uploading of tax invoices in GSTN portal (in GST ANX-1) is available for all (i.e. both Small & Large) tax payers under proposed new GST Return System, all invoices raised on BHEL may be uploaded immediately in GST portal on despatch of material /rendering of services. The supplier shall ensure availability of Invoice in GST portal before submission of invoice to BHEL. Invoices will be admitted by BHEL only if the invoices are available in GSTN portal (in BHEL's GST ANX-2). • In case of discrepancy in the data uploaded by the supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note or debit note (details also to be uploaded in GSTN portal) for the shortages or rejections in the supplies or additional claims, within the calendar month informed by BHEL. • In cases where invoice details have been uploaded by the vendor but failed to remit the GST amount to GST Department (Form PMT-08 or Form GST RET-01 to be submitted) within stipulated time, then GST paid on the invoices pertaining to the month for which GST return not filed by the vendor will be recovered from the vendor along with the applicable interest (currently 24% p.a) and all subsequent bills of the vendor will not be processed till filing of the GST return by the vendor • In case GST credit is denied to BHEL due to non-receipt or delayed receipt of goods and/ or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount claimed in the invoice shall be disallowed to the vendor. • Where any GST liability arising on BHEL under Reverse Charge (RCM), the vendor has to submit the invoices to BHEL well within the timeline prescribed in GST Law, to enable BHEL to discharge the GST liability. If there is a delay in submission of invoice by the vendor resulting in delayed payment of GST by BHEL along with Interest, then such Interest payable or paid shall be recovered from the vendor. • Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contracts. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Tax Invoice will be issued by BHEL indicating the respective supply invoice number. • GST TDS will be deducted as per Section 51 of CGST Act 2017 and in line with Notification 50/2018 – Central Tax dated 13.09.2018. GST TDS certificate which will be generated in GST portal subsequent to vendor accepting the TDS deduction in the GST portal, will be issued to the vendor. • GST CREDIT: Suppliers are advised to get registered to GSTN portal. Tenderer under "GST credit" shall be preferred.	

08	**Indigenous vendors – Terms of delivery:** • Bidders should submit their offer on FOR Destination –Projects site. The quote should be inclusive of all charges, including testing, packing & forwarding, inspection, Insurance etc. (Ex-Works offers will not be considered). • The soft copies of the Invoice, LR copy & Test certificates shall be forwarded to BHEL immediately after dispatch.	
09	**Acceptance of materials supplied:** a) The supply shall strictly as per the specifications in the tender /purchase order. b) Delivery of the ordered items as per the delivery terms in the Purchase Order does not automatically constitute acceptance of the delivered items. c) The acceptance or otherwise of the delivered items will be separately communicated to the supplier by BHEL either through B2B portal or through e mail within 120 days' from the delivery of items or delivery of the required test certificates /other documents whichever is later. d) In case of rejection of the delivered items, either part or full, the vendor shall replace the rejected items as per the specification in the Purchase order/tender at their cost within specified days/months of communication of rejection to the supplier. e) In case of rejection of the delivered items, either part or full, if the supplier fails to replace the rejected items within the specified days/months of communication of the rejection, the same shall be treated as failure to execute the contract and actions as per the Guidelines for Suspension of Business Dealings with Suppliers /Contractors available in the webpage: http://www.bhel.com/vender_registration/vender.php. would be taken against such supplier.	
10	**Payment terms:** **Indigenous:** **Payment for MSE vendors will be as per MSMED Act, 2006.** For Micro & Small Enterprises vendors, BHEL Payment term is 100% direct EFT payment within 45 days from the date of Site Acknowledgement subject to acceptance of materials. **For Medium Enterprises**, BHEL Payment term is 100% direct EFT payment within 60 days from the date of Site Acknowledgement subject to acceptance of materials. **For Non MSME vendors**, BHEL Payment term is 100% direct EFT payment within 90 days from the date of Site Acknowledgement subject to acceptance of materials. Subject to submission of GST invoice (Triplicate), Packing List (Triplicate), GeM invoice, copy of Site Acknowledged LR. Any deviation in the above payment term will attract loading as mentioned below: Marginal cost lending rate (MCLR) of SBI (as applicable on the date of bid opening, Techno commercial bid opening in case of two part bids) + 6%, shall be considered for loading for the period of relaxation sought by bidders. **New Suppliers:** For new suppliers not registered with BHEL, Trichy for the product, Payment shall be made 90 days after receipt and acceptance of materials. **Offers with payment terms as Advance Payment & LC at Sight Shall be rejected.**	
11	**Liquidated Damage (Indigenous & Imports):** 1. Time is the essence of the contract. 2. The ordered items shall be delivered as per the delivery period mentioned in the Purchase Order. 3. In case the supplier supplies the ordered items beyond the delivery period specified, Liquidated Damages - LD - as detailed below shall be will be levied from the supplier without prejudice to any other relief /compensation available to BHEL, Tiruchirappalli under any other condition of the contract/applicable legal provisions. 4. **LD shall be 0.5% of the undelivered portion per week or part thereof subject to a maximum of 10% of the total order value**. 5. Any deviation from the above LD clause, loading will be applied to the extent to which it is not agreed by the bidder (at offered value). 6. Any change in applicable rates of Tax or any other statutory levies (Direct / Indirect) or any new introduction of any levy by means of statute and its corresponding liability for the deliveries beyond the agreed delivery date for reasons not attributable to BHEL will be to vendors account. BHEL will not reimburse the same and any subsequent claim in this respect will be summarily rejected.	

	Indigenous: For "FOR Delivery terms", Vehicle / Gate entry date will be taken for LD calculation	
12	**Breach of contract, Remedies and Termination:** In case of breach of contract, wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is 10% of the contract value or more, such security instruments to the extent of 10% contract value will be encashed. In case no security instruments are available or the value of the security instruments available is less than 10% of the contract value, the 10% of the contract value or the balance amount, as the case may be, will be recovered in all or any of the following manners: I. from dues available in the form of Bills payable to defaulted supplier against the same contract. II. from the dues payable to defaulted supplier against other contracts in the same Region/Unit /any other region/unit. III. In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against defaulted supplier. Further, levy of liquidated damages, debarment, termination, de-scoping, short-closure, etc., will be applied as per provisions of the contract.	
13	**Warrantee:** Supplier to accept warrantee against non-compliance to specification requirements for "18 months from the date of supply or 12 months form the date of commissioning whichever Is earlier". Supplier shall replace defective material free of cost (inclusive of all Testing, Inspection, TPI, Service charges etc.) up to destination within two months from defect notification date.	
14	**O&M Manual:** Detailed O&M manuals shall be furnished. Three soft copies of O&M manuals in (CD ROM) compact disc to be submitted.	
15	**Non-Disclosure Agreement(NDA)** The bidders shall enter into the Non-disclosure agreement totally voluntarily, with full knowledge of its meaning and without duress. (Format attached).	
16	**Patent Right** The supplier shall, at all times, indemnify and keep indemnified the purchaser, free of cost, against all claims which may arise in respect of goods & services to be provided by the supplier under the contract for infringement of any intellectual property rights or any other right protected by patent, registration of designs or trademarks. In the event of any such claim in respect of alleged breach of patent, registered designs, trademarks etc. being made against the purchaser, the purchaser shall notify the supplier of the same and the supplier shall, at his own expenses take care of the same for settlement without any liability to the purchaser.	
17	**Evaluation Criteria:** The Evaluation Currency for this tender shall be "INR". The offers of vendors will be evaluated on total landed cost to BHEL, Trichy. The evaluation process is as detailed below: **Indigenous:** **Total Landed cost = FOR Rate in INR (A) + Applicable Taxes (B) + Loading for payment term & LD (C) – Applicable input tax credit (D)** A. Indigenous vendors submit offers on Free on Road (FOR), Trichy in INR. B. GST and any other charges quoted by indigenous vendors will be added to the base price. C. Loading for payment terms & non-acceptance of Liquidated Damages (LD) will be added to the FOR value for arriving the landed rate. **D.** However, input credit is availed for GST (SGST, CGST/IGST), hence the same is excluded for arriving at the landed cost. Note: "In the course of evaluation, if more than one bidder happens to occupy L1 status, effective L1 will be decided by soliciting discounts from the respective L1 bidders. In case more than one bidder happens to occupy the L1 status even after soliciting discounts, the L1 bidder shall be decided by a toss/draw of lots, in the presence of the respective L1 bidders or their representatives. Ranking will be done accordingly. BHEL decision in such situations shall be final and binding".	

18	**General condition:** a) Bids including all enclosures and supporting documents like catalogues, pamphlets, etc., shall be submitted / uploaded in ENGLISH language only. If the documents submitted have other than English language, translation of the same shall be provided for evaluation. b) Three sets of documents containing Test certificates, Copies of the approved quality documents and test procedures, DCR and Drawings, etc must be provided along with the supply of materials. Dispatch clearance for material shall be given after acceptance of TC's by BHEL & NPCIL. c) Supplier has to submit Quality documents and related test procedures for BHEL and NPCIL approval within two weeks from the placement of Purchase Order. d) Delivery of **BW Fittings (CS&AS)** shall be as per the dates mentioned in the enquiry. e) For Indigenous supply, chemical composition and mechanical test are to be carried out in NABL accredited laboratory only. f) No revision of prices shall be allowed after the tenders are opened. g) BHEL will consider the ranking after the loading is applied wherever deviations are observed. h) BHEL reserves the right to negotiate L1 rate or re-float the tender opened if L1 price is not the lowest acceptable price to them inter-alia other reasons. i) In the event of our customer order covering this tender being cancelled / placed on hold / otherwise modified, BHEL would be constrained to accordingly cancel / hold / modify the tender / your purchase order at any stage of execution. j) Offer will be evaluated based on Landed cost to BHEL- Trichy only. k) Vendor should physically weigh the materials before stuffing them into container and incorporate the same in BL and packing slip. l) Offers for partial quantities of a given item are not acceptable to BHEL. While tenderers can quote for some or all the tendered items, no supplier shall quote for partial quantity of any given enquiry item. Such partial offer would not be considered in the enquiry for that item. m) No payment will be made for the excess quantity. n) Offer should be submitted only as per the Unit of Measurement (UOM) specified in the enquiry. o) Documents not signed and stamped by the authorized signatory of the bidder shall not be accepted and considered for registration / evaluation of the bid etc. p) Any additional documents submitted by supplier / bidder, during processing of registration application / tender or after placement of order, shall not be accepted unless it is submitted with forwarding letter and duly signed and stamped as mentioned above. q) All documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder. r) This Tender is hosted in EPS portal & offer to be submitted through EPS portal only. You are requested to submit your 2 parts offer before due date & time of the enquiry through **NIC** (https://eprocurebhel.co.in) only. SEALED COVER BIDS / E-MAILS / FAX / MANUAL OFFERS WILL NOT BE ACCEPTED. For any clarification you can contact to *abshaik@bhel.in,* Contact no. **0431 2577079.**	
19	**Fraud Prevention Policy** "The bidder along with its associate/collaborators/sub-contractors /consultants/service providers shall strictly adhere to BHEL Fraud prevention policy displayed on BHEL website htpp://www.bhel.com and shall immediately bring to the notice of BHEL Management about fraud or suspected fraud as soon as it comes to their notice."	

20	**Suspension of Business Dealings with Suppliers/Contractors:** The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the banned firms /principal/agents, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com. If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in any act, including but not limited to, mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or tampers the tendering process or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India or does anything which is actionable under the Guidelines for suspension of business dealing, then, action may be taken against such bidder/ supplier/ contractor as per extant guidelines of the company available on www. bhel.com and/or under applicable legal provisions. Guidelines for suspension of business dealings is available in the webpage: http://www.bhel.com/vender_registration/vender.php.	
21	**Integrity commitment, performance of the contract and punitive action thereof:** **Commitment by BHEL** BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity. **Commitment by Bidder/ Supplier/ Contractor** • The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India. • The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL. • The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.	
22	**Cartel Formation:** The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.	
23	**Resolution of Disputes:** The Parties agree that if at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the contract/tender which the Parties are unable to settle mutually), arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof. **Notes:** 1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators. 2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators. 3. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Annexure X to this Enquiry Conditions. 4. The Annexure together with its appendices will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in these Enquiry Conditions.	

	5. Except as provided elsewhere in this Contract, in case amicable settlement is not reached between the parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract ; or , in any manner touching upon the Contract, then, either Party may , by a notice in writing to other Party refer such dispute or difference to sole arbitration of an arbitrator appointed as per the Arbitration and Conciliation Act, 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force . 6. The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the parties. Subject as aforesaid, the provision of Arbitration & Conciliation Act 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceeding under this clause. 7. The seat of arbitration shall be Trichy, Tamil Nadu, India. The cost of arbitration shall be borne as per the award of the Arbitrator. Subject to arbitration in terms of clause above, the Courts at Trichy, Tamil Nadu, India shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract. 8. The contract shall be governed, construe and interpreted in accordance with the laws of India. 9. Notwithstanding the existence or any dispute or difference and/or reference for the arbitration, the vendor shall proceed with and continue without hindrance the performance of its obligation under this Contract with due diligence and expedition in a professional manner except where the Contract has been terminated by either Party in terms of this Contract. **<u>In Case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:</u>** In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/Port Trusts *inter se* and also between CPSEs and Government Departments/Organizations (Excluding disputes concerning Railways, Income Tax, Customs & Excise Departments, such dispute or difference shall be taken up by either party for resolution through AMRCD as mentioned in DPE OM No. 05/003/2019-FTS-10937 dtd. 14th December, 2022 and the decision of AMRCD on the said dispute will be binding on both the parties.	
24	**<u>In the event of Force Majeure:</u>** a. Notwithstanding the provisions contained in other clauses, the supplier shall not be liable for imposition of any such sanction so long the delay and/or failure of the supplier in fulfilling its obligations under the contract is the result of an event of Force Majeure. For purposes of this clause, Force Majeure means an event beyond the control of the supplier and not involving the supplier's fault or negligence and which is not foreseeable and not brought about at the instance of the party claiming to be affected by such event and which has caused the non – performance or delay in performance. Such events may include, but are not restricted to, wars or revolutions, hostility, acts of public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restrictions, strikes excluding by its employees, lockouts excluding by its management, freight embargoes and Acts of GOD. b. If a Force Majeure situation arises, the supplier shall promptly notify the Purchaser/Consignee in writing of such conditions and the cause thereof within twenty-one days of occurrence of such event. Unless otherwise directed by the Purchaser/Consignee in writing, the supplier shall continue to perform its obligations under the contract as far as reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event. c. If the performance in whole or in part or any obligation under this contract is prevented or delayed by any reason of Force Majeure for a period exceeding sixty days, either party may at its option terminate the contract without any financial repercussion on either side. d. In case due to a Force Majeure event the Purchaser/Consignee is unable to fulfil its contractual commitment and responsibility, the Purchaser/Consignee will notify the supplier accordingly and subsequent actions taken on similar lines described in above sub-paragraphs.	
25	**<u>Execution of the order:</u>** a. BHEL will have the option to pre-inspect the materials at Supplier's works by BHEL's own inspector or by third party agency appointed by BHEL or BHEL‟s end customer/s. b. If the inspection fails, the vendor shall offer the material again as per ordered terms and specifications for further inspection. c. The mere act of the pre-dispatch inspection (PDI) does not absolve the Supplier from giving the specifications as agreed upon in the Purchase Order. d. In the case of overseas suppliers Inspection call for carrying out the inspection shall be given 30 days before the scheduled contract delivery date. The Inspection date/s given by the Supplier shall be on firm basis. For local Suppliers the Notice period of Inspection shall be 10 working days.	

	e. In the event of any short supply, it shall be the responsibility of the supplier to deliver such short supplied/ missing items on Free-of-Cost basis at BHEL stores, including customs clearances at Indian Ports in the case of foreign suppliers.	
26	**Set-off Clause**: BHEL shall have the right to recover any money which in the sole opinion of BHEL is due from the Contractor from any money due to the Contractor under this Contract or any other contract or from the Security Deposit furnished by the Contractor under this Contract or any other contract.	
27	**Conflict of Interest Among Bidders/Agents:** A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if: a. they have controlling partner (s) in common; or b. they receive or have received any direct or indirect subsidy/ financial stake from any of them; or c. they have the same legal representative/agent for purposes of this bid; or d. they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder; or e. Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly. Assemblies from one bidding manufacturer in more than one bid; or f. In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorise only one agent/dealer. There can be only one bid from the following: 1. The principal manufacturer directly or through one Indian agent on his behalf; and 2. Indian/foreign agent on behalf of only one principal; or g. A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid; or h. In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business in the format provided as Annexure.	
28	**Caution:** a) The suppliers are severely cautioned to note that the price bid document accepts the price in figures only. It does not allow the supplier to write the value by words. Therefore, all care shall be exercised by the supplier while filling in the figures. Once the price bid is opened no option is available for the supplier to retract the offer under any grounds. If a supplier, for any reason whatsoever approaches BHEL with a request for change in the price, it would be treated as going back on the offer submitted. In such cases, action would be initiated by BHEL for suspending further business dealings with such suppliers as per policy of BHEL which prevails at that point of time. b) The language in the tender documents downloaded by the Bidders shall at no point of time be changed, altered or modified in any manner by the Tenderer. If such changes are made by any tenderer, it shall be considered as tampering with BHEL's terms and the offer shall be summarily rejected, whenever it is noticed by BHEL. Such Bidders would be disqualified from the Bidding Process and their offers would be forfeited / Bank Guarantees invoked. They would also not be allowed to participate in future tenders of BHEL.	
29	**Special Provisions for Micro and Small Enterprises (MSE) bidders registered as per MSME act:** (Subject to participating MSE vendors meeting the tender requirements of BHEL) a) As per Gazette Notification no. S.O. 2119(E) dated 26.06.2020 issued by Ministry of MSME applicable/existing Micro and small suppliers are requested to get registered with Udyam Registration portal and share us the Udyam registration certificate. b) In the event of Non MSE supplier becoming L1 and MSE supplier quotes within the price band of L1+15% and it is not possible to split the tendered quantity on account of reasons like customer contract requirement/technical requirements, then 100% of the quantity will be offered to MSE suppliers subject to acceptance of L1 price by MSE supplier.	

	c) If more than one MSE vendors are available in the L1+15% price band then lowest of the MSE vendor will be selected for counteroffering. If lowest MSE vendor is not accepting it will be counteroffered to the next MSE vendor in the price band and so on. Finally, if none of the MSE vendor in the price band is not accepting it will be ordered on L1 non MSE vendor. d) Counter offering of L1 rate will not be made with any MSE vendor whose quoted rate is more than the price band of L1+15%. e) Payment to MSE vendor will be as per the applicable provisions of the MSMED Act 2006. f) If L1 offer is from a Micro / Small enterprise, the 25% earmarking provision is not applicable. g) In case of any change in the MSE status of the bidder, it shall be the responsibility of the bidder to notify the change as a part of the bid document. If at a later date it comes to the knowledge of BHEL, that the change in the status has not been intimated by the bidder and the order is obtained under the premise of an MSE then BHEL would cancel the pending order against this tender and take necessary steps for suspension of the business dealing with the bidder as per the procurement policy of BHEL. h) MSE suppliers can avail the intended benefits only if they submit along with the offer, Valid EM-II certificate along with CA certificate or valid NSIC certificate or UAM certificate along with attested copy of a CA certificate (Format enclosed as below) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. Documents should be notarized or attested by a Gazetted officer. However, credentials of all MSE suppliers will be verified before considering the intended benefits for MSE suppliers at the time of tender evaluation. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents.	
30	**<u>Preference to Make in India:</u>** For this procurement, the local content to categorize a supplier as a class I local supplier/class II local supplier /Non-local supplier and purchase preference to class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent Orders issued by the respective Nodal Ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of part II bids against this NIT. The 'Class-I local supplier'/ 'Class-II local supplier' shall be required to provide a declaration/certificate in this regard as per Govt. of India guidelines for Public Procurement.	
31	**<u>Restrictions for Procurement from a country sharing its land border with India</u>** Orders issued by Govt. of India with respect to Restriction under Rule 144 (xi) of GFR on procurement from bidders representing countries sharing land border with India will be applicable for this tender. In case of subsequent orders issued by Govt. of India regarding procurement from bidders representing countries sharing land border, the same shall be applicable even if issued after issue of this NIT.	
32	**<u>Enclosures:</u>** a) Unpriced Bid (As per Annexure A) b) Pre-Qualification Criteria (PQR) c) Technical Delivery conditions TDG 102 Rev 10 d) QPG 46 Rev 03 e) Declarations-formats of MII, NDA, TDF and RoD f) Edge Preparation and Fitting Tolerance g) Packing procedure	

RAMASAMY MEGANATHAN Digitally signed by RAMASAMY MEGANATHAN Date: 2024.10.18 18:00:15 +05'30' (On behalf of BHEL)	**<u>SIGNED BY MANUFACTURER / MILL</u>** Name of Mill: Designation / Department: Seal & Signature

Enquiry Checklist

Item Description	**Manufacture & Supply of BW Fittings(CS&AS)**
BHEL Enquiry No 4102400028	

Details to be furnished by the bidder		
1	Confirmed that all the Techno-Commercial terms and conditions of the Enquiry have been accepted in toto without any deviation. Terms and conditions if any of the bid submitted that are in contravention to the terms & conditions of the Enquiry will be ignored by BHEL. Terms & Conditions of BHEL Enquiry shall be final and binding.	

Seal and Signature of authorized signatory

Make in India declaration format

(Declaration to be issued on company letter head)

In line with Government Public Procurement Order 2017 dated 04.06.2020, we hereby certify that we, _____ (supplier name) are 'Class-I local supplier' / 'Class-II local supplier' (**strike off whichever is not applicable**) meeting requirement of local content equal to or more than 20% / 50% (**strike off whichever is not applicable**) and meeting requirement of minimum local content as defined in above order for BHEL Enquiry No:4102400028

Details of location at which local value addition will be made is as follows (factory address to be indicated):

……

……..

By issuing this declaration, we understand and are in acceptance to the following-

- False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.
- In case of debarment by any procuring entity for violation of the provisions of the Public Procurement (Preference to Make in India), Order 2017 we shall not be eligible for preference for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities, the debarment takes effect prospectively from the date of uploading on the website(s) of The Department of Expenditure, GOI in such a manner that ongoing procurements are not disrupted.
- We undertake the onus of responsibility of submission of appropriately certified documents. We understand that BHEL is not at liability to verify the contents and will not be responsible for the declaration made by us. However, in case BHEL has any reason to doubt the authenticity of the local content, BHEL reserves the right to obtain the complete back up calculations before award of contract and we are liable to submit the same if requested by BHEL. We also understand that our bid is liable for rejection in case we fail to submit the details as requested by BHEL.

Seal and Signature of authorized signatory

Special Note-

In cases of bid value is more than Rs. 10 Crore, Make in India declaration to be submitted shall be counter signed by the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies).

Enquiry for Manufacture & Supply of BW Fittings (CS&AS)
Technical Deviation Format

Page No

BHEL Enquiry No	**4102400028**	**Enquiry Date**	**18.10.2024**

Enquiry Description	**Manufacture & Supply of BW Fittings (CS&AS)**	
Specification	As per TDG 102 REV 10 and Enquiry Schedule List	
Drawing No	As per Enquiry Schedule List	
Quality Plan	As per QPG 46 Rev 03	
Painting Scheme	As per TDG 102 REV 10	
Packing Procedure	PC:PKG:01 Rev 00	
Document Reference	**Required by BHEL as per Enquiry**	**Firm's alternate offer**

Certified that other than the above deviations, we are accepting to all other technical requirements of the Enquiry without any deviation.

Sign & Seal of authorized signatory of the firm

Note:

1. Deviations should be taken only in extreme cases. Deviations taken are subject to BHEL's review and acceptance. BHEL reserves the right to reject the bid submitted in to or part thereof if the deviation taken by bidder is not acceptable to BHEL.
2. If necessary, use additional sheets with proper page control.

THIRD PARTY NON-DISCLOSURE AGREEMENT

I,_____, on behalf of the_____ (Name of Company), acknowledge that the information received or generated, directly or indirectly, while working with BHEL, Trichy on contract is confidential and that the nature of the business of the BHEL, Trichy is such that the following conditions are reasonable, and therefore:

I warrant and agree as follows:

I, or any other personnel employed or engaged by our company, agree not to disclose, directly or indirectly, any information related to the BHEL, Trichy Without restricting the generality of the foregoing, it is agreed that we will not disclose such information consisting but not necessarily limited to:

- Technical information: Methods, drawings, processes, formulae, compositions, systems, techniques, inventions, computer programs/data/configuration and research projects.
- Business information: Customer lists, project schedules, pricing data, estimates, financial or marketing data,

On conclusion of contract, I, or any other personnel employed or engaged by our company shall return to BHEL, Trichy all documents and property of BHEL, Trichy, including: drawings, blueprints, reports, manuals, computer programs/data/configuration, and all other materials and all copies thereof relating in any way to BHEL, Trichy's business, or in any way obtained by me during the course of contract. I further agree that I, or any others employed or engaged by our company shall not retain copies, notes or abstracts of the foregoing.

This obligation of confidence shall continue after the conclusion of the contract also.

I acknowledge that the aforesaid restrictions are necessary and fundamental to the business of the BHEL, Trichy and are reasonable given the nature of the business carried on by the BHEL, Trichy I agree that this agreement shall be governed by and construed in accordance with the laws of country.

I enter into this agreement totally voluntarily, with full knowledge of its meaning, and without duress.

Dated at _____, this _____ day of _____, 20____.

Name

Company

Signature

Resolution of Disputes

The Parties agree that if at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the contract / tender which the Parties are unable to settle mutually), arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL / Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.
2. Any other person(s) can be appointed as Conciliator(s) who is / are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Annexure X to this Enquiry Conditions.

Annexure X.pdf

The Annexure X together with its appendices will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in these Enquiry Conditions.

Except as provided elsewhere in this Contract, in case amicable settlement is not reached between the parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract, then, either Party may, by a notice in writing to other Party, refer such dispute or difference to sole arbitration of an arbitrator appointed as per the Arbitration and Conciliation Act, 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force.

The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the parties. This contract shall be governed, construed and interpreted in accordance with the laws of India. Subject as aforesaid, the provisions of Arbitration & Conciliation Act 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceeding under this clause.

The seat of arbitration shall be Trichy, Tamil Nadu, India. The cost of arbitration shall be borne as per the award of the Arbitrator. Subject to arbitration in terms of clause above, the Courts at Trichy, Tamil Nadu, India shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract.

Notwithstanding the existence or any dispute or difference and / or reference for the arbitration, the vendor / contractor shall proceed with and continue without hindrance the performance of its obligation under this Contract with due diligence and expedition in a professional manner except where the Contract has been terminated by either Party in terms of this Contract.

In Case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs) / Port Trusts inter se and also between CPSEs and Government Departments / Organizations (Excluding disputes concerning Railways, Income Tax, Customs & Excise Departments, such dispute or difference shall be taken up by either party for its resolution through AMRCD as mentioned in DPE OM No.05/003/2019-FTS-10937 dtd. 14th December, 2022 and the decision of AMRCD on the said dispute will be binding on both the parties.

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-300-19825

NOTES: –
01. APPLICABLE FOR P91/P92
03 i) STRAIGHT WITH STRAIGHT/FITTING
ii) BEND WITH BEND/FITTING
04 02. FOR OD MISMATCH, REFER FIGURE–Xa
04 03.REFER STYLE–D_LFOR THICKNESS <14.2mm (FOR ALL OD/ID)
04 04. REFER STYLE–P_L
i)WHEN THICKNESS IS ≥14.2 mm &<20mm (FOR ALL OD/ID)
ii)WHEN THICKNESS ≥20mm & OD <219.1mm.
04 05. ∝ = 6° FOR WALL THICKNESS ≥20MM AND ≤ 30 mm
06. ∝ = 10° FOR WALL THICKNESS > 30 mm

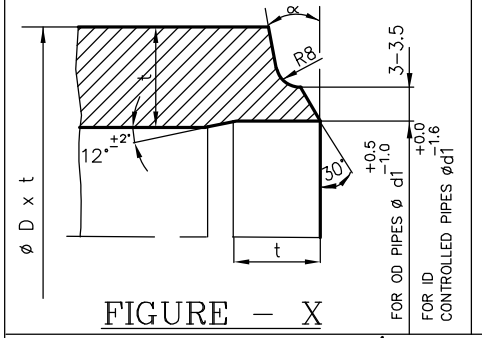


FIGURE – X

MATCHING EDGE PREPARATION
02 FOR MISMATCH OD APPLICABLE FOR BENDS/FITTINGS OF P91/P92 MATERIALS 03

NOTES: –
01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
02 02. t = THK OF CONNECTING PIPE (STRAIGHT)

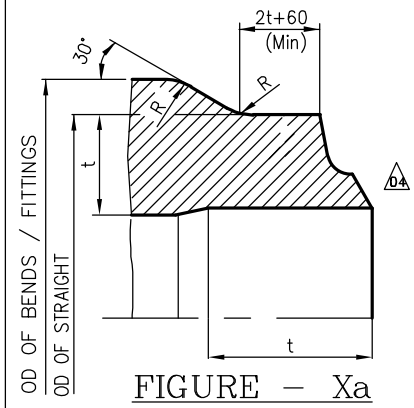
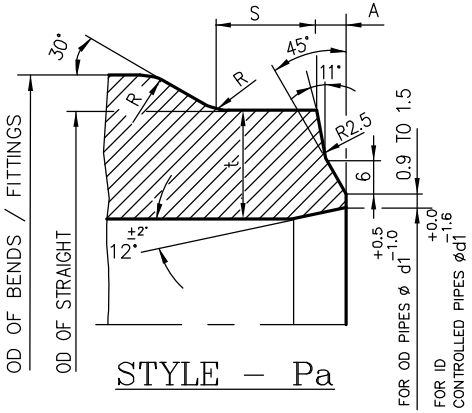


FIGURE – Xa

MATCHING EDGE PREPARATION FOR MISMATCH OD DIAMETRICALLY GREATER THAN 8 mm (ie OD1 – OD2 > 8mm) APPLICABLE FOR BENDS/FITTINGS OTHER THAN P91/P92 MATERIALS

NOTES: – 03
01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
02. WHEN t<65, S+A = 65 Min. & t>65,S=65 Min. WHERE t=THK OF CONN.PIPE(STRAIGHT).



STYLE – Pa

MATCHING EDGE PREPARATION FOR MISMATCH OD DIAMETRICALLY GREATER THAN 8 mm (ie OD1 – OD2 > 8mm) APPLICABLE FOR ELBOWS OTHER THAN P91/P92 MATERIALS

NOTES: – 03
01. OD = OUTSIDE DIA OF CONN. PIPE (STRAIGHT) TO BE PHYSICALLY MEASURED/VERIFIED.
02. t = THK OF CONN.PIPE (STRAIGHT)
03. t = THK OF CONN.PIPE (STRAIGHT)

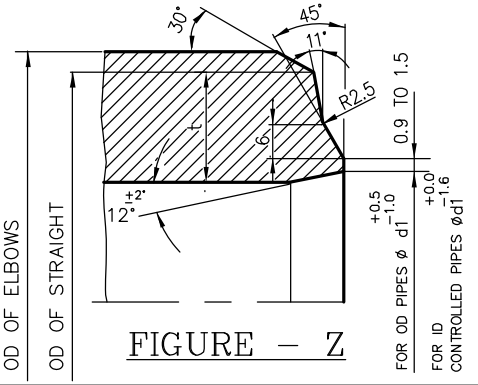


FIGURE – Z

NOTES: – 03
01. APPLICABLE FOR P91/P92 ZERO ARM PIPEBEND WELDED WITH P91/P92 STRAIGHT PIPE
02. FOR OD MISMATCH, REFER FIGURE–Xa
03.REFER STYLE–D_LFOR THICKNESS <14.2mm (FOR ALL OD/ID)
04 04.REFER STYLE–P_L
i)WHEN THICKNESS IS ≥14.2 mm AND <20 mm FOR ALL OD/ID.
ii) WHEN THICKNESS ≥20mm AND OD < 219.1 mm.
05. ∝=6° FOR WALL THICKNESS ≥20MM AND ≤ 30 mm
06. ∝ = 10° FOR WALL THICKNESS > 30 mm

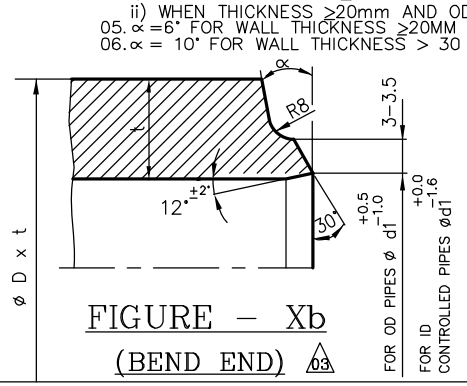


FIGURE – Xb (BEND END) 03

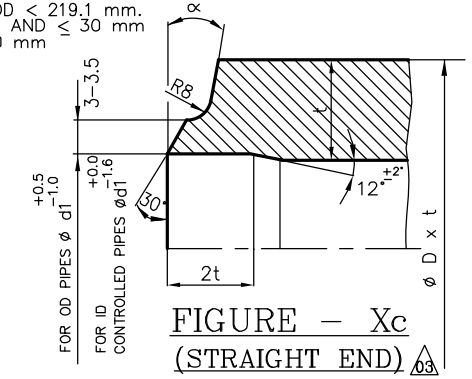
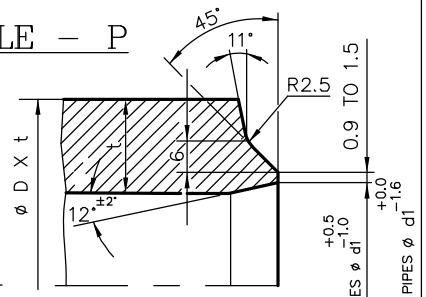


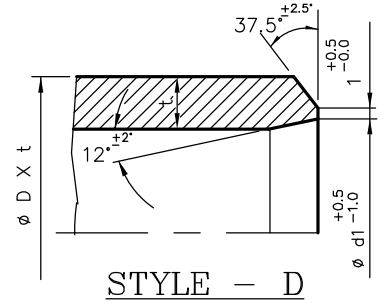
FIGURE – Xc (STRAIGHT END) 03

STYLE – P



NOTES: –
04 01. USE WHEN t ≥ 14.2 mm AND < 70mm.
04 02. FOR t ≥ 70.0 mm REF. STYLE–Pm
03. FOR OD MISMATCHING REF. STYLE–Pa

NOTES: –
01. USE WHEN t < 14.2 mm.



STYLE – D

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 01 STANDARD

GENERAL NOTES :
01. THE MINIMUM THICKNESS AT WELD END SHALL NOT BE LESS THAN
a) 0.875 TIMES t NOM. FOR OD PIPES.
b) t MIN. FOR ID CONTROLLED PIPES.
02. t NOM & t MIN SHALL BE AS PER SPECIFIED PIPE SIZE.
03. SHARP CORNERS SHALL BE ROUNDED OFF WHEREEVER 'R' IS INDICATED. 02

NOTES FOR WELDING:
01. WELD REINFORCEMENT TO BE FLUSH GROUND AND MERGED WITH PARENT METAL WITHOUT ANY UNEVENNESS.

REV	DATE	ALTERED: P SURESH
04	07.12.16	APPROVED: R SESHAGIRI
ZONE	SHEET 2 OF 2 IS ADDED. NOTES ADDED, MODIFIED AND DELETED IN FIGURE–X, Xa, Xb, Xc AND STYLE–P	
REV	DATE	ALTERED: M.R.K
03	10.04.13	APPROVED: C.K.N
ZONE	FIG.Xb AND FIG.Xc ADDED. IN FIG.X, NOTE 01 MODIFIED. IN FIG.Xa,STY–Pa,FIG.Z, P92 MATERIAL ADDED	
REV	DATE	ALTERED: M.R.K
02	10.01 13	APPROVED: C.K.N
ZONE	IN FIG.Xa. NOTE 04 ADDED. GENERAL NOTES 03 ADDED. IN FIG.Xa, 5MM OD MISMATCH IS REMOVED	
REV	DATE	ALTERED: R.SENDHIL
01	11.05.04	APPROVED: A.VELAYUTHAM
ZONE	PROJECT NAME REMOVED AND STANDARD INCORPORATED IN TITLE BLOCK	

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE	NO OF ITEMS
DRN	K.B.RAGUNATH		11.10.01	
CHD	M.C.SEKARAN		11.10.01	
APPD	A.VELAYUTHAM		11.10.01	

DEPT.	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	NAME OF ORIGINAL ORGANISATION	ITEM No.
CODE	C/M/F				

TITLE: EDGE PREPARATION DETAILS

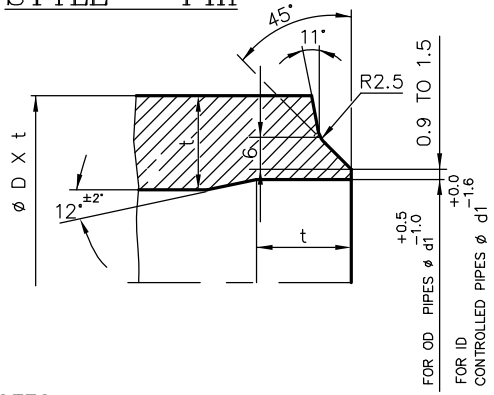
CARD CODE	DRAWING No.	REV
U 01	3–80–300–19825 SHEET 1 OF 2	04

SIZE A3

EP1

DRAWING No. 3-80-300-19825

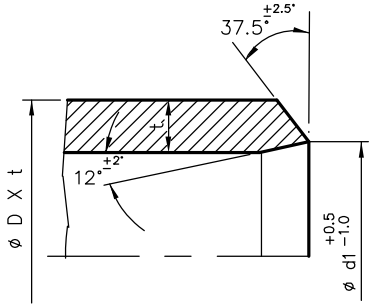
STYLE – Pm



NOTES: –

01. USE FOR SA106GRC PIPES WHEN t ≥ 70.0 mm.
02. FOR OD MISMATCHING REF. FIGURE–Pa
03. FOR FITTINGS USE STYLE–P.

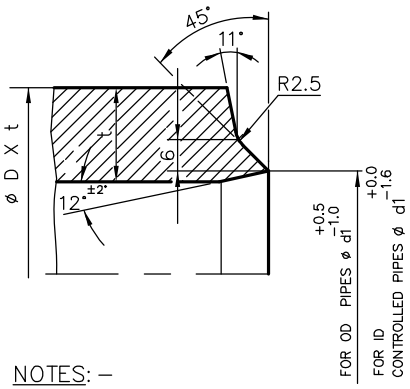
STYLE – D_L



NOTES: –

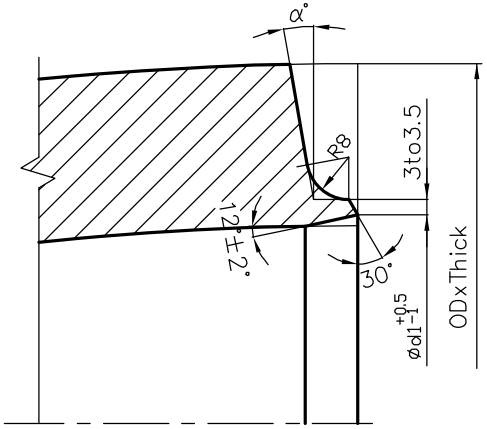
01. USE FOR P91 / P92 PIPES AND FITTINGS WHEN t < 14.2 mm (ALL OD/ID).

STYLE – P_L



NOTES: –

01. USE FOR P91 / P92 PIPES AND FITTINGS
    i)WHEN THICKNESS IS ≥14.2 mm AND <20 mm FOR ALL OD/ID.
    ii) WHEN THICKNESS ≥20mm AND OD < 219.1 mm.
02. FOR OD MISMATCHING REF. FIGURE–Pa



01. USE FOR P91 / P92 FITTINGS
02. REFER STYLE–D_L FOR THICKNESS <14.2mm FOR ALL OD/ID.
03. REFER STYLE–P_L
    i)WHEN THICKNESS IS ≥14.2 mm AND <20 mm FOR ALL OD/ID.
    ii) WHEN THICKNESS ≥20mm AND OD < 219.1 mm.
04. α = 6° FOR WALL THICKNESS ≥ 20MM AND ≤ 30 mm
05. α = 10° FOR WALL THICKNESS > 30mm.
06. FIGURE–Xf IS APPLICALBE FOR ALL BUTT WELDED FITTINGS NOT COVERED IN NOTES 02 & 03

FIGURE–Xf

NOTE :

01. FOR GENERAL NOTES AND NOTES FOR WELDING REFER SHEET 1 OF 2.

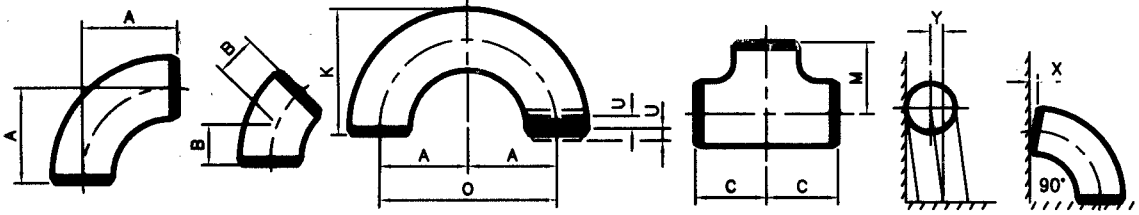
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	STANDARD					
BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS		NAME	SIGN	DATE	NO OF ITEMS
	DRN	P SURESH		07.12.16	
	CHD	R SESHAGIRI		07.12.16	
	APPD	C KARUNAKARAN		07.12.16	
DEPT. / CODE	GRADE OF UN TOL. DIM: C/M/F	SCALE	WEIGHT (Kg).	NAME OF ORIGINAL ORGANISATION	ITEM No.	
TITLE: EDGE PREPARATION DETAILS	CARD CODE: U 01	DRAWING No.: 3-80-300-19825 SHEET 2 OF 2	REV: 04			

SIZE A3

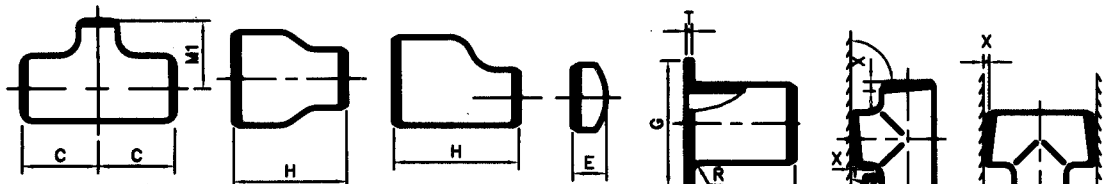
REV	DATE	ALTERED
01	05.02.05	APPROVED APMK

TITLE BLOCK AND DRAWING ALTERED

(REFERENCE : IBR ,REG.NO 361(A) INCLUDED IN AMENDMENT)



90° BEND | 45° BEND | 180° RETURN | EQUAL TEE



REDUCING TEE | CONCENTRIC REDUCER | ECCENTRIC REDUCER | CAP | LAP JOINT STUB-END

ALL FITTINGS				90°&45° ELBOWS AND TEES	REDUCER	180° RETURNS			CAPS	LAP-JOINT		STUB END	
DN.	O.D AT BEVEL	I.D AT END	WALL THICK NESS	CENTER TO END A,B,C,M,M1	OVERALL LENGTH H	CENTER TO CENTER O	BACK TO FACE K	ALIGN-MENT OF END U	OVER ALL LENGTH E	END TO END F	RADIUS R	DIA OF LAP G	THICKNESS OF LAP
15 TO 65	+1.6 −0.8	±0.8	NOT LESS THAN 87 1/2% OF NOMINAL THICKNESS	±1.6	±1.6	±6.4	±6.4	±0.8	±3.2	±1.6	+ 0 −0.8	+ 0 −0.8	+1.6 − 0
80 TO 90	±1.6	±1.6		±1.6	±1.6	±6.4	±6.4	±0.8	±3.2	±1.6	+ 0 −0.8	+ 0 −0.8	+1.6 − 0
100	±1.6	±1.6		±1.6	±1.6	±6.4	±6.4	±0.8	±3.2	±1.6	+ 0 −0.8	+ 0 −0.8	+1.6 − 0
125 TO 200	+2.4 −1.6	±1.6		±1.6	±1.6	±6.4	±6.4	±0.8	±6.4	±1.6	+ 0 −0.8	+ 0 −0.8	+1.6 − 0
250 TO 400	+4.0 −3.2	±3.2		±2.4	±2.4	±9.5	±6.4	±1.6	±6.4	±2.4	+ 0 −1.6	+ 0 −1.6	+1.6 − 0
500 & ABOVE	+6.4 −4.8	±4.8		±2.4	±2.4	±9.5	±6.4	±1.6	±6.4	±2.4	+ 0 −1.6	+ 0 −1.6	+1.6 − 0

OFF-SQUARE TOLERANCES		
NOMINAL SIZE OF FITTING	OFF SQUARE TOLERANCE, X	OFF SQUARE TOLERANCE, Y
UP TO AND INCLUDING 100	0.8	1.6
125 TO 150	1.2	2.4
200 TO 550	1.6	3.2
600 & ABOVE	3.2	6.4

NOTES : 1. ALL DIMENSIONS ARE IN MILLIMETRES

STANDARD

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGN	DATE	NO.OF VAR
DRN	ENGG.ENTERPRISES	Sd	15.10.1986	
CHD	R.ANANTH	Sd	15.10.1986	
APPD	J.JUDE	Sd	15.10.1986	

DEPT / CODE	GRADE OF UNTOL.DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.	ITEM NO.	NO. OF ITEMS
	C / M / F	N.T.S	–	–	–	–

TITLE	CARD CODE	DRAWING NO.	REV
TOLERANCES ON FITTINGS	U 01	4-80-301-26192	01

Size A4

V1A4

PACKAGING INSTRUCTIONS FOR PIPING COMPONENTS
PC: PKG: 01

Revision summary

Rev No	Revision Details	Issued on
00	Fresh issue	28-05-2014

	Prepared by	Reviewed & Approved by
	S.ARUN KUMAR	K.VEDAPRASAD

Contents

1. SCOPE

This procedure elicits the general requirements to be complied with for packaging of piping components. The packaging is intended to preserve and protect the contents.

The handling, storage, cleaning, packaging, and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration.

2. PACKAGING

This procedure contains requirements for packaging of items for protection against corrosion, contamination, physical damage, or any effect that would lower the quality or cause the components to deteriorate during the time they are shipped and stored at sites.

Items shall be inspected for cleanliness immediately before packaging. Dirt, oil, residue, metal chips or other forms of contamination shall be removed.

Adequate protection shall be provided against mechanical damage and atmospheric corrosion in transit and, for equipment suitable for outside storage, for prolonged storage at the site prior to installation.

Water proof barrier material – high density polythene shall be used as a resistant to grease and water; it shall protect items from airborne and windblown soils.

Desiccants like silica gel to be used inside pipe components. Silica gel shall conform to IS 3401.The gel is to be packed in sachets placed at different positions inside the components for absorbing moisture. The quantity of silica gel shall be adequate for storage period of one year.

Components to be placed in such a way that metal to metal contact is avoided.

For mechanical components, (1) all openings shall be covered or plugged with substantial (1/2 inch minimum thick) one piece plywood or metal closures, securely fastened and suitable for prolonged exposure prior to final installation; (2) all tapped openings in equipment shall be plugged with plastic plugs to protect internal threads; and (3) all welding end connections shall be provided with adequate weld bevel protectors to protect from corrosion and physical damage.

Austenitic stainless steel and nickel-based alloy materials shall be handled in such a manner that they are not in direct contact with carbon steel materials or with materials containing halogen, sulphur, zinc and lead.

Each components/item of stainless steel materials should be wrapped with high density polythene.

All equipment shall be packed, securely anchored (skid mounted when required) and weather protected for the shipment method adopted.

Temporary bracing or supports, marked and tagged for removal after equipment installation, shall be provided to prevent damage during shipment and shall be painted bright, fluorescent yellow.

3. Criteria for Selection of Packaging:

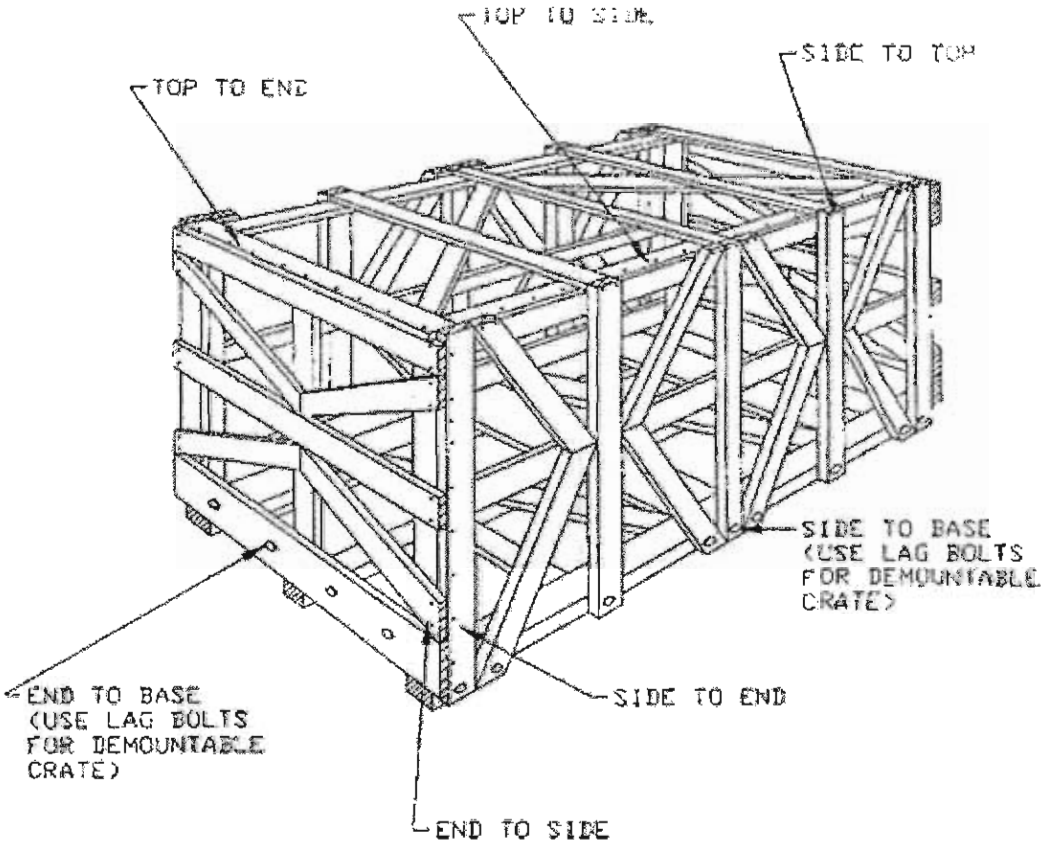
Packages are to be made according to categories listed in Table-6 (see page – 24), depending on the type of materials and size.

4. TYPES OF PACKAGING:

4.1 CRATES

- These are to be made of seasoned wood and are intended for packaging heavy materials Viz., straight pipes and pipes with attachments.
- The crates are to be lined with hi-density polythene, to prevent entry of moisture.
- The dimensions of the crates are to be restricted to 20 x5x5 feet.
- Pipes up to OD 350mm are to be crated.
- Pipes are to be stacked inside the crate so that the weight of the pipe does not rest on branch stubs or carrier plates.
- Contents of the crate should not come in contact with each other or with the crating, and should be adequately cushioned to preserve the painting.
- The gross weight of the crate should not exceed 2 Tons.
- For further instructions refer ASTM D6039 Standard Specification for Open and Covered wood Crates.

WOODEN CRATE



Max Net Load (KGS)	Length (mm)	Width (mm)	Height (mm)
2000	6096	1524	1524

All the dimensions shown in the above table are maximum inside dimensions.

4.3 SADDLES

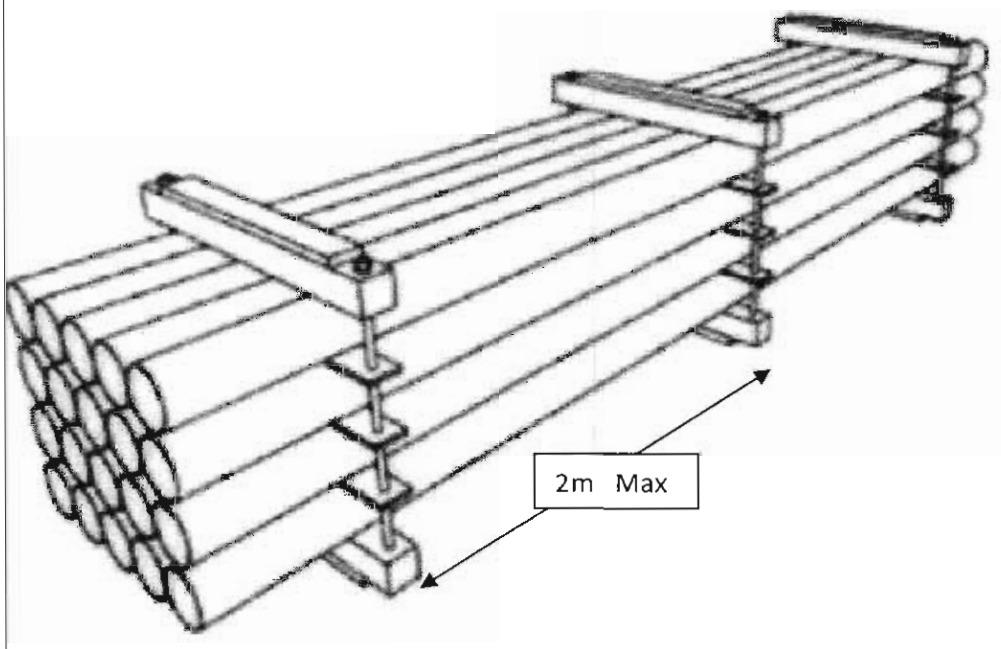
- Saddles are defined as profiled supports made of wood, and are used to cradle and support Tanks, pipe bends and pressure vessels.
- Ensure that the end chamfering of the bends are duly protected for the transit.
- Tanks are to be completely drained and dried.
- Adequate amount of the specified desiccant is to be placed inside the tank/ vessel.
- Ensure that all openings are covered and /or plugged.

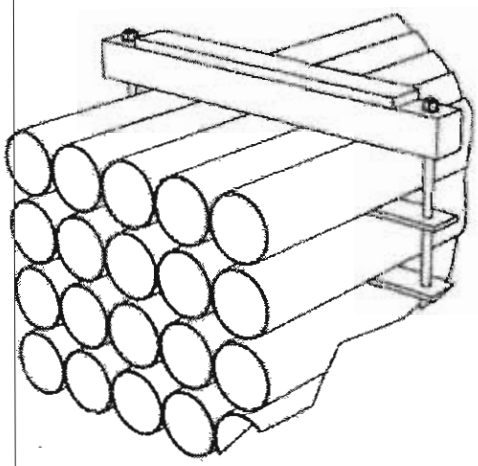
4.4 CASES

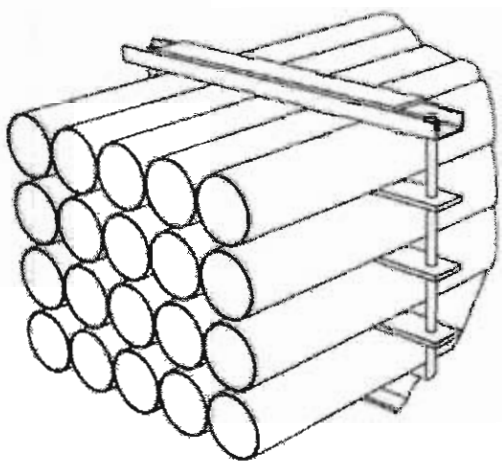
- Other components such as fittings and Mitres are to be packed inside wooden cases.
- The insides of the cases are to be lined with hi-density polythene.
- Air vents to be provided in the cases for ventilation.
- Components to be placed in such a way that metal to metal contact is avoided.
- Small components like Fasteners, gaskets are to be packed in high density polythene covers and placed inside the wooden cases.
- Holes to be provided in the case floor to act as drains.

4.5 BUNDLES

- Bundles are transportable units where a large number of straight pipes of the same diameter and even lengths are arranged securely and are fit to be lifted by cranes and also stacked.
- Pipe ends should be covered fully with plastic end caps.
- Pipes can be bundled only when they can bear the stack compression load without additional support.
- Clamps made of wood or steel clamps with wooden inserts are to be used.
- Clamps must be locked firmly so that the pipes cannot slide out of bundle.
- Bundle must be held together by at least three sets of clamps as indicated in the diagram.


2m Max





5. SLING PROTECTIONS

The lifting points of the case or crate or bundle must be equipped with sling protections suitable to the respective package gross weight.

6. MARKING AND LABELLING

Components and their containers shall be identified by marking. Shipping marks shall be on all sides of package. The shipping marks shall be at least 3 inches high where space permits. Markings are to be in black paint or ink depending on shade of the package surface.

Cautionary symbols to be stencilled in red waterproof paint or ink.

7. PACKING LIST

One complete packing list inside a watertight envelope must be affixed outside of each package and be covered by sheet metal. One more copy of the packing slip wrapped in polyethylene bag is to be kept inside the box at the pertinent place.

8. General Instructions for packaging

- The quantity of Slides / Runners is selected depending upon the weight and over-all dimension of the Load, to be carried. Table-1 and 2 details out the number of Slides, length and cross sections of the Slides to be provided with their carrying capacity.
- The construction of bottom frame is as shown in the Figure-2.
- The construction of the top frame is, as shown in the figure -3.
- Thickness of the boards, used for sheathing for the top, sides and end panels, shall be 25 mm.
- The top of the Box consist of Beam supported on top traverse bar and sheathing, as shown in the figure- 3.
- The dimension of items 1, 2 f figure - 3 shall be as table - 3.
- Diagonal braces shall be used in packing cases with height, exceeding 600 mm as shown in the figure- 4.
- The angle between the lower (or) upper horizontal supports and diagonal braces, shall be in the range of 20° to 60° and if possible, this angle preferably be kept at 45°.
- If the height of the box exceeds more than 1400 mm the diagonal braces, shall cross each other and when this dimension exceeds 1800mm additional horizontal supports shall be provided as shown in figure-5 and figure- 6.
- Size of upper and lower horizontal supports and vertical supports, shall be as per Table 4 refer figure 7, 8, 9 & 10 for the arrangement.
- The cross section of end traverses bar (item -1) and thickness of bottom boards (item-2), shall be used as per table - 5.
- All boxes measuring more than 600 mm height shall be constructed by assembling end, side and top shook's on a bottom, forming a complete enclosed Box (refer figure-11).
- Angle iron cleats shall be used for strengthening the joints, as indicated in figure -12.
- Boxes will be strengthened by steel bands to withstand transit damages.

9. Reference drawings

1. SLIDE
2. LONGITUDINAL UNDER SLIDE BOARD.
3. BOTTOM BOARD
4. CARRIER TRAVERSE BAR
5. INTERMEDIATE VERTICAL SUPPO
6. HORIZONTAL BRACING
7. DRAINAGE HOLES
8. BATTEN
9. SLING PLATE
10. NUT BOLT WASHER
11. END TRAVERSE BAR
12. WATER PROOF LINING OF BITUMANISED PAPER
13. VERTICAL SUPPORTS
14. END SHETING BOARD
15. SIDE SHEATING BOARD
16. TOP SHEATING BOARD
17. LONGITUDINAL SUPPORT
18. TOP HORIZONTAL BEAN
19. TOP SHEATING BOARD
20. TOP CORNER STRIPS (FOR STRENGTHENING)
21. OUT SIDE DOCUMENTS CONTAINER.

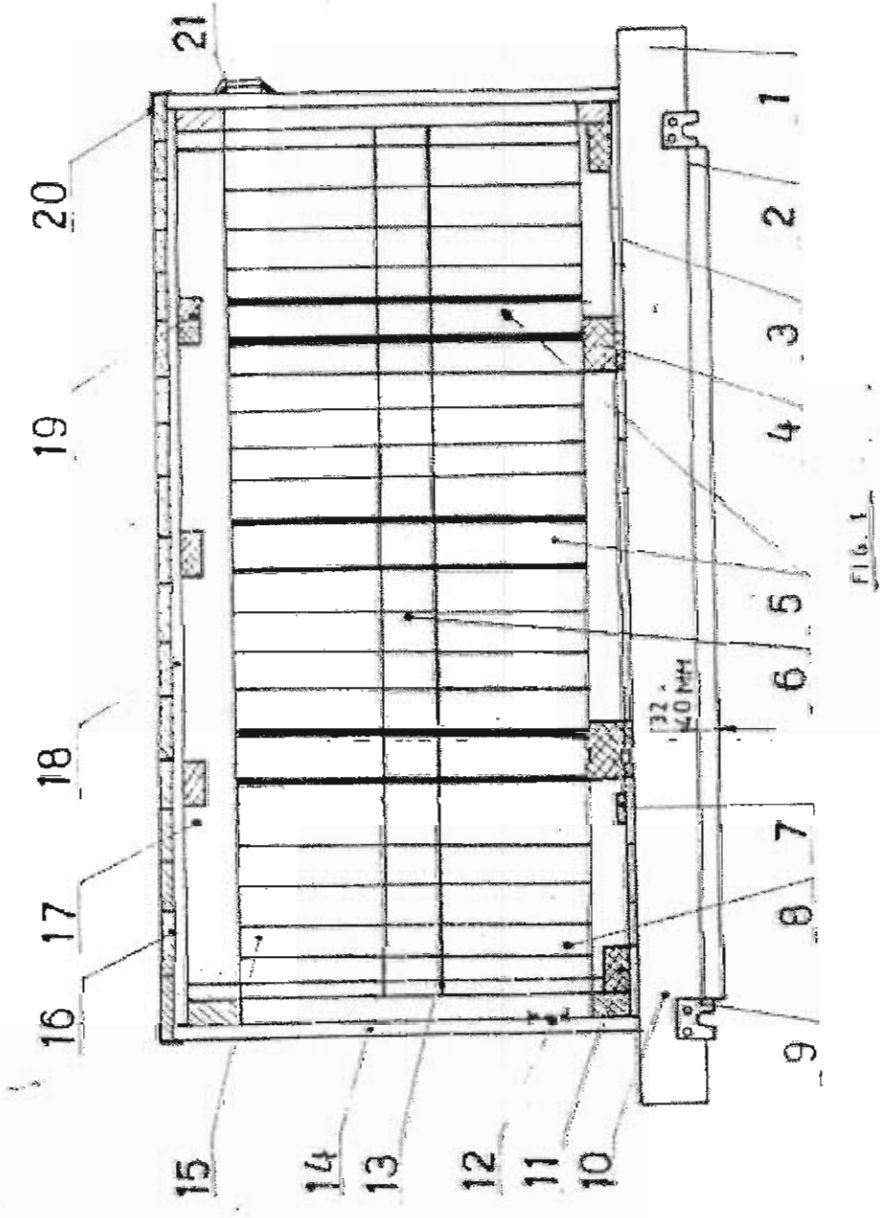


FIG. 1

NOMENCLATURE OF PARTS OF PACKING

BOTTOM FRAME ARRANGEMENTS FOR TYPES 633, 654, 966, 1296, 1122, 1144, 1399, 1577

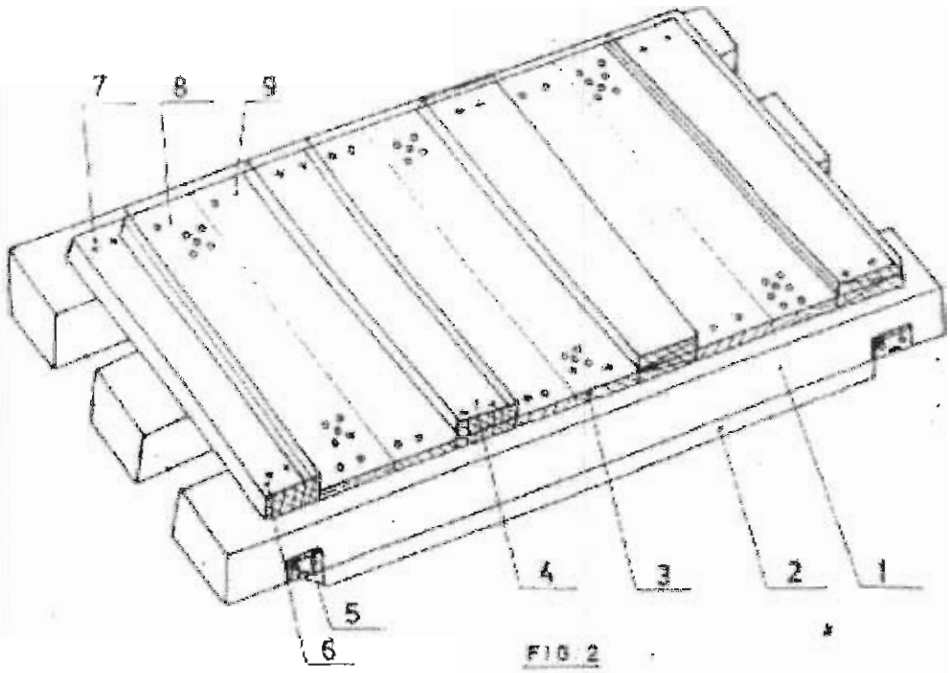


FIG 2

1. SLIDE
2. UNDER SLIDE BOARD
3. BOTTOM BOARD
4. CARRIER TAVERSE BAR
5. SLING PLATE
6. TRAVERSE BAR
7. BOLT, NUT & WASHER
8. DRAINAGE HOLES
9. NAILS

TOP FRAME ARRANGEMENT FOR TYPES

633, 654, 966, 1296, 1122, 1144, 1399 & 1577

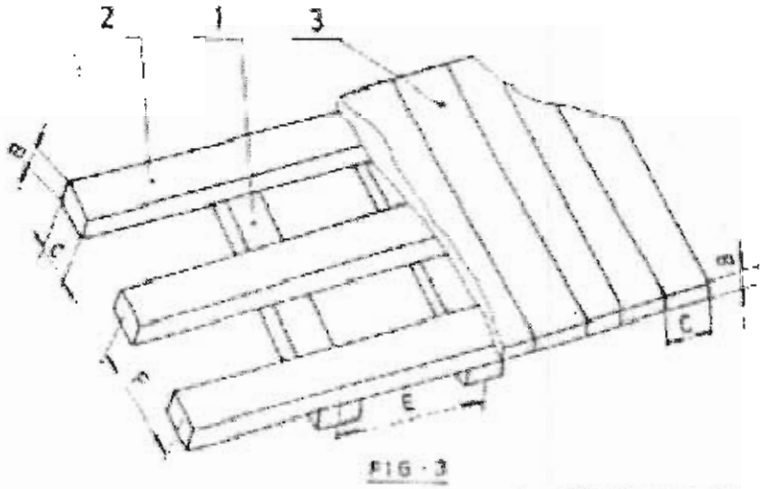


FIG-3

1 - Traverse Bars
2 - Horizontal Beams
3 - Top Board

PROVISION OF DIAGONAL BRACING ARRANGEMENT

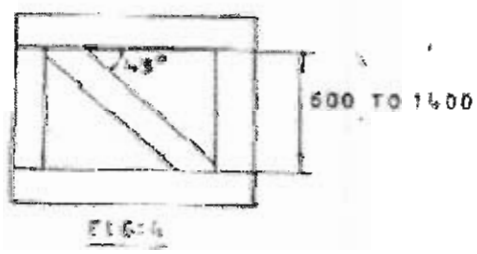


FIG-4

ARRANGEMENT OF DIAGONAL BRACING & HORIZONTAL SUPPORT

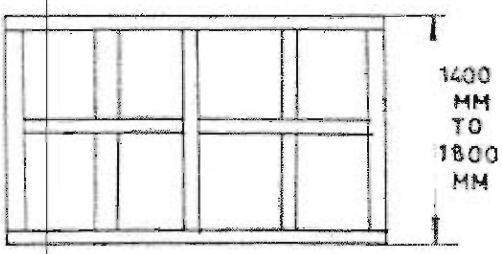


FIG. 5

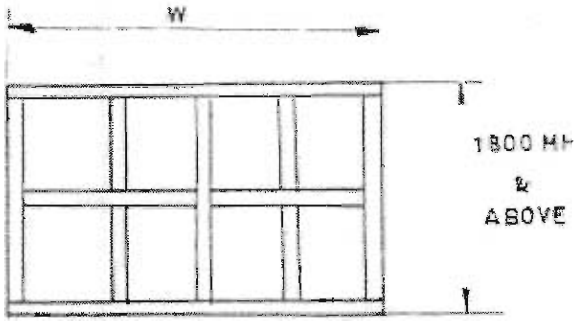


FIG. 6

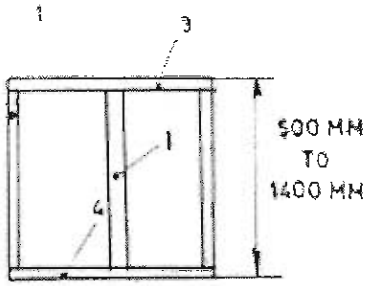


FIG : 7

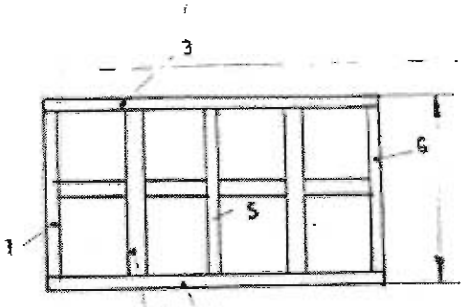


FIG. 8

1. VERTICAL SUPPORT

3. UPPER HORIZONTAL SUPPORT

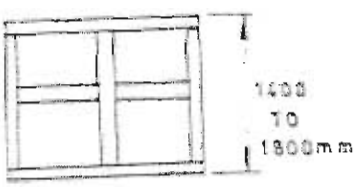
4. LOWER HORIZONTAL SUPPORT

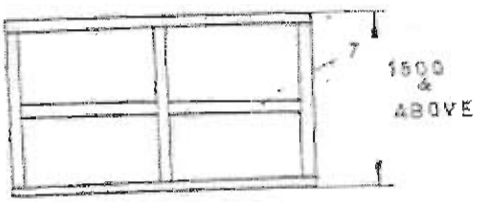
1,2,5, 6 - VERTICAL SUPPORT

3 - UPPER HORIZONTAL SUPPORT

4 - LOWER HORIZONTAL SUPPORT

ARRANGEMENT OF DIAGONAL BRACING AND HORIZONTAL SUPPORT





7 – MIDDLE HORIZONTAL SUPPORT

ARRANGEMENT OF PACKING CASE

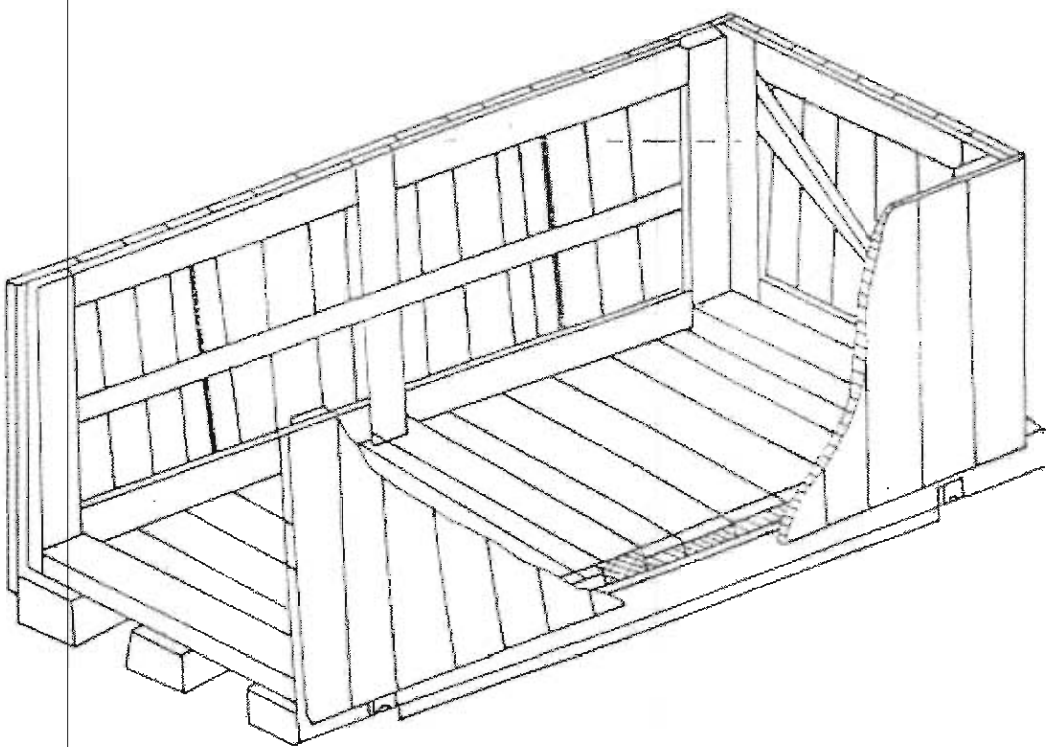


FIG : 11

ARRANGEMENT OF ANGLE IRON CLEATS

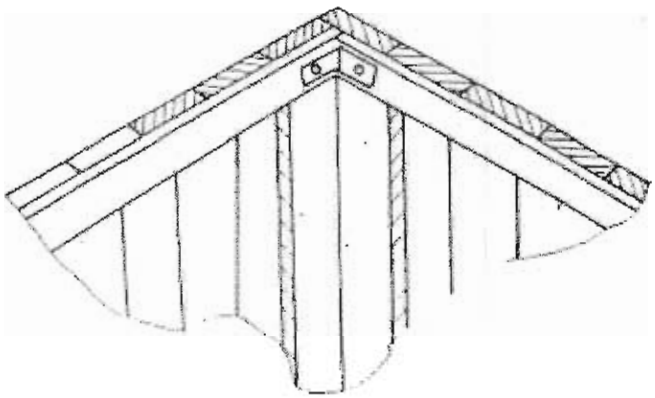
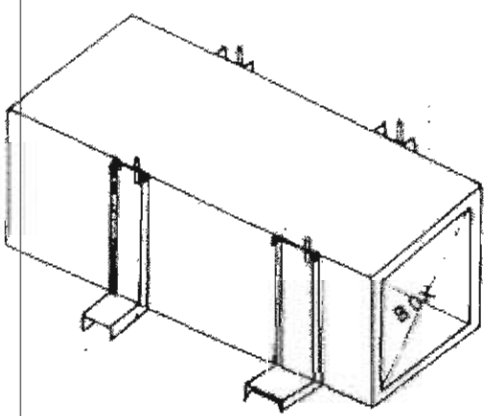


FIG : 12

ARRANGEMENT OF C-CLAMPS AROUND CASES



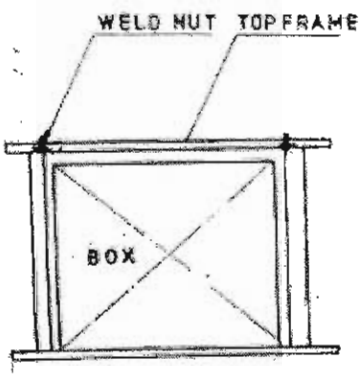


FIG:13

ARRANGEMENT OF SLING - PLATE ON CASES

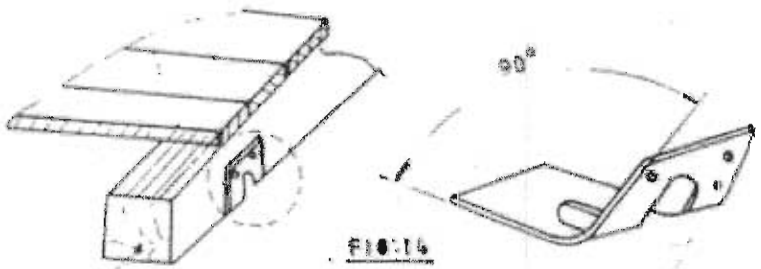
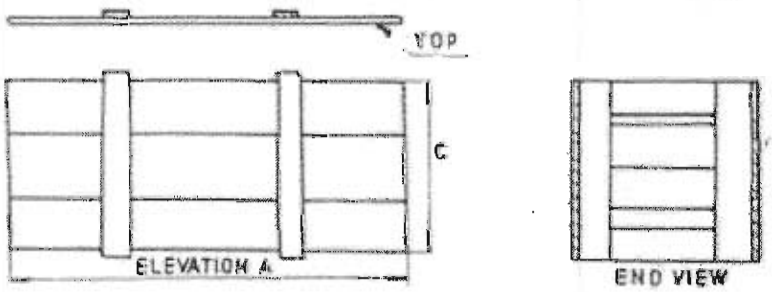


FIG:14

ARRANGEMENT OF SMALL CASES



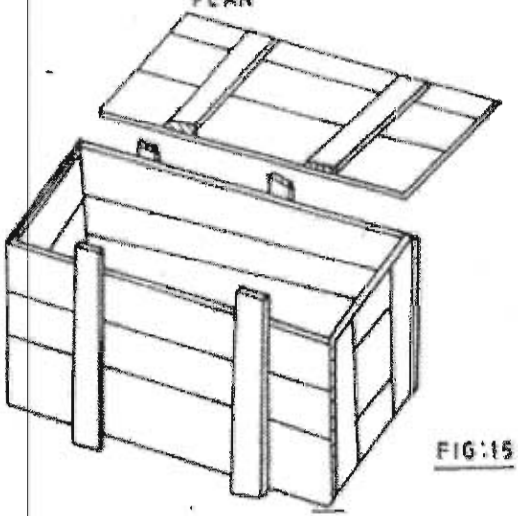


FIG:15

TYPE 654, 633

DMS / TYP	A	B	C
654	600	500	400
633	600	300	300

IN MM ONLY

1. BOTTOM BOARD
2. CROSS TRAVERS BOARD

A. UNIFORMLY DISTRIPUTED
B. CONCENTRATED LOAD

The sizes of boxes given below are indicative. Actual sizes may vary according to size and positioning of component inside.

ANNEXURE – A

WOODEN BOXES

TYPE	L X B X H (MM)	CARRYING CAPATCITY IN KGS
633	600x300x300	200
654	600x500x400	500
966	900x600x600	1000
1296	1200x900x600	2000
1122	100x200x200	300
1144	110x400x400	300
1399	1300x900x900	2500
1577	1500 X 700 X 700	1500

TABLE - 1

No. of slides	Length of slides	Weight in (kgs)	Types of loading
2	600 - 1800 mm	0 - 1000	Two slides for central loading near the ends or uniformly distributes load.
3	1801 - 2500 mm	1001 - 5000	Three slides with load concentrates near the end or uniformly distributed load.

TABLE - 2

LOAD	Length of slides						
	600	800	1000	1200	1300	1500	2000
	CROSS SECTION B x C				c b		
500	30 x 100	30 x 100	30 x 100	30 x 100	30 x 100	30 x 100	30 x 100
800	30 x 100	30 x 100	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100
1000	30 x 100	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100
1500	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100
2000	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100
2500	100 x 100	100 x 100	100 x 100	100 x 100	100 x 100	120 x 150	120 x 150
3000	100 x 100	120 x 150	120 x 150	120 x 150	120 x 150		

TABLE – 3

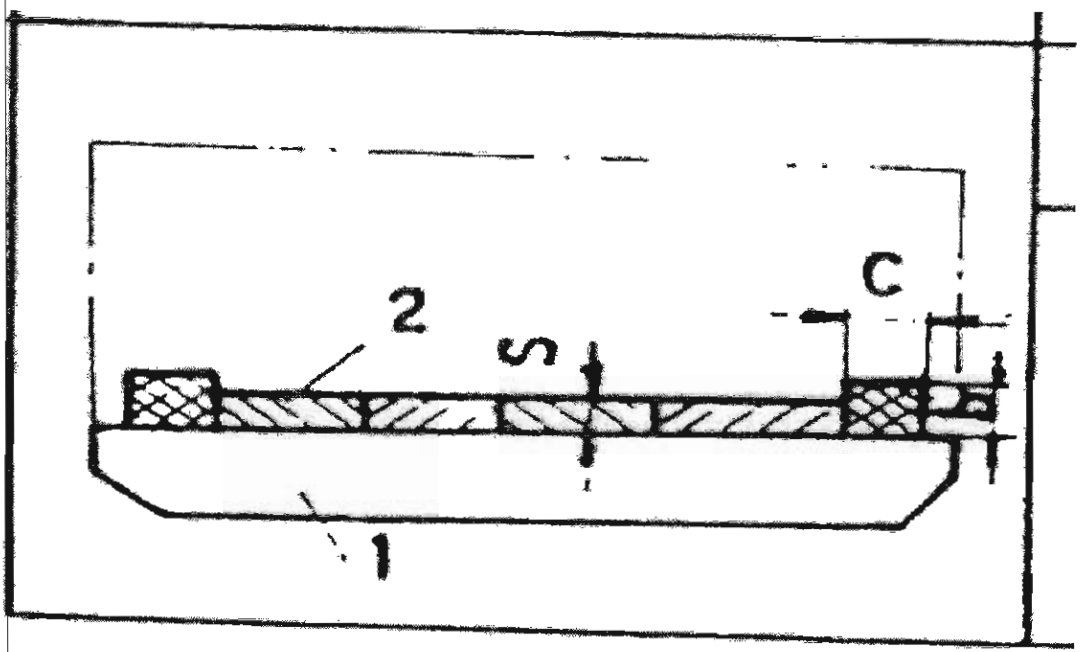
Distance between top horizontal scans dim 'f'	Distance between the axis of the traverse bar dimension 'E' in fig -3				
	500	600	700	800	900
	Size b x c				
700 – 1000 mm	30 x 100	30 x 100	30 x 100	30 x 100	30 x 100

TABLE-4

End and side panels	Width of the panels	Distance Between Longitudinal Support DIM 'D'						
		600	800	1000	1200	1400	1600	1800
		Cross section (b x c) Item 1 to 7						
Fig - 7	600 to 1200	30 x 100	30 x 100	30 x 100	30 x 130	30 x 130	30 x 130	30 x 130
Fig - 8	1201 to 1600	30 x 130	30 x 130	30 x 130	30 x I30	30 x 130	30 x 130	30 x 130
Fig - 9	1601 to 2000	30 x 130	30 x 130	30 x 130	30 x 130	30 x 130	30 x 130	30 x 130
Fig - 10	2001 to 3000	30 x 130	30 x 130	30 x 130	30 x 130	30 x 130	30 x 130	40 x 150
	3001 to 4000	30 x 130	30 x 130	40 x 150	40 x 150	40 x 150	40 x 150	40 x 150

TABLE-5

BOTTOM TRAVERSE:



Cross section of end traverse bar item 1 fig. X and thickness of bottom board (item – 2)			
Load in kg	Width of the box	Cross section	S
Up to 3000	Above 1000 mm	100 x 100	25

10. Cautionary symbols

FRAGILE, HANDLE WITH CARE

PROTECT FROM HEAT AND RADIOACTIVE SOURCES

USE NO HOOKS

NOTE. The design of heavy gross packages cannot always resist lop lifting by grabhooks.

KEEP DRY

NOTE. Not all cases have waterproof (external liners; plywood used in the construction may or may not have a waterproof glueline.

THIS WAY UP

NOTE. Certain lengths of small cases make it difficult to distinguish top from bottom.

CENTRE OF GRAVITY

NOTE. This should be stencilled as a minimum on the two longest case sides (this information will normally be supplied by the manufacturer of the item(s) packed).

KEEP AWAY FROM HEAT

STACKING LIMITATION

NOTE. The maximum load in kilograms should be marked above the arrow.

International 'sling here' symbol

11. Packing Reference Table

TABLE-6

No	Packing Method -> / Description	Wooden Crates	Bundles	Saddle supports	HD Polythene Sheet Wrapping	Wooden boxes (Cases)	Spider	Remarks
1	Straight Pipes	✓	✓					Crates for random length
2	Pipes with attachments	✓						
3	Pipes with Fittings	✓						
4	Tanks			✓				
5	Mitre bends			✓		✓		Saddle or cases to be used
6	Fasteners					✓		
7	Hanger components					✓		
8	Clamps					✓		
9	Fittings >nb200/ Flanges					✓		Fittings <200 shall be packed in boxes
10	Plates(Cut to size)					✓		
11	SS Pipes		✓		✓			Wrap SS pipes before bundling
12	SS fittings / Flanges	✓				✓		Fittings <200 shall be packed in boxes
15	SS Fasteners					✓		
16	CW piping(>900mm)						✓	To maintain circularity of pipes
17	CW fittings(>900mm)						✓	
18	CW fittings(<900mm)							
19	Structurals(<200mm)		✓					

12. CHECK LIST

S No	VENDOR TO PROVIDE DETAILS	
1	On despatch of components/items , vendor has to provide the following information for each package of despatched items: 1. Contents of package (Packing list) 2. Corrosion Prevention: Rust-preventive coating /protective painting/Silica gel/ other corrosion inhibitors (please mention) 3. Lifting Instructions: Crane using slings/Fork lift/any other means (please mention) 4. Dimensions (LxBxH) mm: 5. Gross Weight (Kgs): 6. Net Weight (kgs):	
S No	**VENDOR TO CONFIRM**	
1	Where ever items are despatched as a bundle, they should be clamped together with bolted timber block clamps or bolted steel section clamps with timber block inserts. Adequate number of clamps should be provided along the length of the bundle with sufficient projection of the clamps beyond the width and height of the bundle.	
2	Only such materials which can withstand corrosion and environmental conditions are allowed to be packed in wooden crates or bundles.	
3	In case of wooden packing, planks of 20-25 mm thick and 100-150mm wide needs to be suitably placed at close intervals for giving rigidity to packing appropriately.	
4	Wood used for packing should be seasoned & shall be free of termites.	
5	Damages, if any, resulting due to improper/inadequate packing will be to vendors account. It will be the responsibility of the vendor to identify suitable and adequate packing for his supplies to protect it from damage and/or deterioration during storage, stacking, transport and handling.	
6	All packing should be suitable for loading/unloading by cranes/forklifts & suitable for transport by road. Suitable marking should be made on the packing indicating the lifting positions.	

Pre – Qualification Requirement (PQR) for Manufacture & Supply of BW Fittings (CS & AS Upto P22)

Sl No	PQR description	Documents to be submitted	Bidder response (Submitted / Not submitted / NA)
1	Bidder must be a manufacturer (Traders / distributors / dealers are not acceptable).	Product Catalogue or IBR Certificate.	
2	Bidder must have a valid ISO certification.	Copy of ISO 9001:2015 or Quality Management System Certificate or Written Down Procedure.	
3	Bidder must have in-house facility for manufacturing of fittings.	1. List of in-house facilities for manufacture of BW Fittings. 2. Valid furnace calibration report meeting requirements of CS / AS Fittings as per TDG 102 Rev 10.	
4	Bidder shall have supplied formed fittings in either CS or AS specification. Experience in a higher grade like Gr.91 & Gr.92 will also qualify the tender requirement. Experience in supply of Seamless Fittings in CS or AS specification will qualify for Welded Fittings also provided Sl No 5 of the PQR is met. Experience in supply of Welded Fittings will qualify only for Welded Fittings.	Copy of Purchase Order, Inspection Report, Material Test Certificates, Invoice, Lorry Waybill / Bill of Lading (in case of export supply) etc as per Annexure 1 to PQR.	
5	Availability of in-house facility for welding (in case quoting for Welded Fittings).	Approved WPS & PQR from any reputed TPI agency like Lloyd, BV, SGS, DNV etc, for welding of P1, P4, P5 materials as applicable.	
6	Bidder must have qualified Design Proof Test (Burst Test) for Elbow or Tee or Reducer as per ASME B16.9 meeting the tendered size. Bids of only those products (Elbow, Tee, Reducer) and sizes range (OD, Thickness) that qualify design proof test only will be considered.	1. Copy of Design Proof Test (Burst Test) report issued / witnessed by any Third Party Agency / End Customers. 2. Details of Deign Proof Test (Burst Test) as per Annexure 1 to PQR.	
7	Bidder shall have necessary financial capability for execution of the quoted requirements.	1. Audited copy of Balance Sheet and Profit & Loss Statement for last two years (or from date of incorporation whichever is less). 2. Proprietary and partnership firms shall submit IT returns for last two years (or from date of incorporation whichever is less).	

Bidder- Manufacturer / Mill. Details to be furnished by the bidder.

Pre – Qualification Requirement (PQR) for Manufacture & Supply of BW Fittings (CS & AS Upto P22)

Note-

- Bidders can quote depending on their manufacturing capability and design proof test qualification. Bids will be considered only for those products (Elbow or Tee or Reducer), size range (OD & Thk) and manufacturing capability that qualify PQR.
- Only the bids fulfilling PQR will be considered for further Techno-Commercial evaluation.
- Notwithstanding anything stated above,
  - BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract in the overall interest of BHEL.
  - BHEL reserves the right to undertake on-site assessment of the facilities at bidder works during the bid evaluation.
  - BHEL reserves the right to check the authenticity of the PQ details furnished. In any case if the submitted details are found to be falsified, such erring bidders will be dealt as per extant guidelines in vogue.

NAGARAJU VURITLA

Digitally signed by NAGARAJU VURITLA
DN: c=IN, o=BHARAT HEAVY ELECTRICALS LIMITED, ou=HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI, 2.5.4.20=5a16fba2581d1f0f70837cb3b4f4075df95163584df087e72034cc23e51f843d, postalCode=620014, st=Tamil Nadu, serialNumber=DF15704A1C33BC6BF85E2047ABAF04E38340957955ED26EDD62B1EE26BAE8675, cn=NAGARAJU VURITLA
Date: 2024.04.11 14:35:54 +05'30'

M MANOJ PANDI

Digitally signed by M MANOJ PANDI
DN: cn=M MANOJ PANDI, o=BHEL-TRICHY, ou=HPBP, email=manojpandi@bhel.in, c=IN

BHARAT HEAVY ELECTRICALS LIMITED TRICHY PIPING QUALITY DEPT.	STANDARD QUALITY ASSURANCE PLAN FOR BUTT WELDED FITTINGS CONFORMING TO ASME SA 234, SA 403 AND SA815	QP NO : QPG: 46 REV.NO : 03 DATE : 07-10-2024

REF: BHEL TDC No. : TDG:102 (Latest Rev. Attached as annexure)

SL. NO.	COMPONENT OR OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	RECORD		AGENCY		REMARKS
								Type	Req	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15
1.0	**i) P91/P92 requirement - RAW MATERIAL sources for P91/P92 shall be as per QCP:19(Latest Rev.Attached as annexure); Any other source proposed by the vendor shall be subjected to BHEL approval. ii) IBR requirement- The Test Certificate for all material specifications received from RM manufacturer shall meet IBR requirements for SA 234 .**											
1.1	Seamless Pipe / Forging	Chemical and Mechanical property & Hydro Test / UT	Major	Verification of MTC & Ladle Analysis Report	100%	As per Required Material (ASME) Specification		Form III-A / Form III-G - (for CS, AS) Mill TC - (for SS)	√√	P	R	Refer Note:1
1.2		Radiaactive contamination for SS & Duplex SS	Major	Measurement	100%	Acceptance limits: Shall be less than 0.1 milli Rontgen (MR) per hr or 1 micro Sievert per hr.		Mill TC - (for SS)	√√	P	R	Either clause 1.2 or 4.2
1.3		Surface defect & Dimensions Outer Dia.,Thk.etc	Major	Visual & Measurement	100%	As per Spec		Raw Material Inspection Report	√	P	V	
1.4		Raw Material Check (chemical)	Major	PMI	100%	As per Required Material (ASME) Specification						
1.5		Hardness Test for P91 & P92 material	Major	Measurement	100%	As per Spec						
1.6	Plates	Co-relation & verification of Mill TCs for										
1.7		a) Chemical & Mechanical	Major	Verify	100%	BHEL Drawing , Material Spec.		Form IV - (for CS, AS) Mill TC - (for SS)	√√	P	R	
1.8		b) Soundness	Major	NDE - UT $	100%	SA578 Acceptance level - B						$ t > 10 mm
1.9		c) Dimension & Surface finish	Major	Measurement & Visual	100%	BHEL Drawing , Material Spec.						

LEGEND: M:- Manufacturer; B:- BHEL/ BHEL Nominated Agency; P - Perform; V - Verification; R-Review; W - Witness; H - Hold ;

LEGEND: Record Requirement - " √ "- Documents required for verification only; "√√" - Documents required for Review and Witness and same to be submitted to BHEL.

PREPARED BY: M MANOJ PANDI / MGR PIPING-QA	REVIEWED BY: K SARANYA / MGR PIPING-QA	APPROVED BY: S JEGAN / SM PIPING QUALITY	

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								Type	Req	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15
2.0	**IN PROCESS INSPECTION**											
2.1	Fitting Forming / Forging Procedure	Procedure qualification	Major	Review	100%	ASME SA 234 & BHEL TDG:102		BHEL Approved Procedure	√	P	V	Procedure shall be approved by BHEL.
2.2	NDE - MT, UT and RT Procedure	Procedure Review	Major	Review	100%	ASME SA 234 & BHEL TDG:102		BHEL Approved Procedure	√	P	V	Procedure shall be approved by BHEL.
2.3	Forming/ Forging of pipe fittings	Process parameters	Major	Temperature, Measurement & Visual	100%	ASME SA 234 & Appd.Procedure		Internal report	√√	P	W*	W* : For 1st off trial at random
2.4	Heat Treatment (HT)	Rate of Heating, Rate of Cooling & Soaking time	Critical	Temp & Time graph	100%	ASME SA 234 & BHEL TDG:102 Clause: 3.2, 3.3, 3.4, 3.5		HT Chart	√√	P	R / W*	W* : For 1st off trial at random
2.5	Welding	Procedure qualification	Major	Review	100%	ASME SA 234 & BHEL TDG:102 Clause 3.1.(ii) & 3.5 Refer Note : 4 & 5		WPS, PQR, WPQ	√	P	V	Welded Fittings shall be made from Two - Halves.
2.6	Post weld Heat Treatment (PWHT)	Rate of Heating, Rate of Cooling & Soaking time	Critical	Temp & Time graph	100%	ASME SA 234 & BHEL TDG:102 Refer Note : 2		PWHT Chart	√√	P	R / W*	W* : For 1st off trial at random
3.0	**TESTS**											
3.1	Test Piece	Selection of Test coupons	Major	Measurement & Marking	One Sample / Heat / HT Batch	As per ASTM A370 Refer Note : 4 & 6		Report	√√	P	R / W*	W* : For 1st off trial at random
3.2	Test Piece	Product Analysis	Major	Chemical Composition	One Sample / Heat	ASME SA 234 & BHEL TDG:102		Test Report	√√	P	R / W*	W* : For 1st off trial at random
3.3	Test Piece	YS, UTS, % Elongation	Major	Mechanical	One Sample / Heat / HT Batch	ASME SA 234 & BHEL TDG:102		Test Report	√√	P	R / W*	W* : For 1st off trial at random
3.4	Finished Products	Hardness	Major	Hardness test	100% / 10%	ASME SA 234 & BHEL TDG:102		Test Report	√√	P	W	100% for WP91 & 92; 10% for others

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PREPARED BY: M MANOJ PANDI / MGR PIPING-QA	REVIEWED BY: K SARANYA / MGR PIPING-QA	APPROVED BY: S JEGAN / SM PIPING QUALITY	PAGE : 2 of 5

BHARAT HEAVY ELECTRICALS LIMITED TRICHY PIPING QUALITY DEPT.	STANDARD QUALITY ASSURANCE PLAN FOR BUTT WELDED FITTINGS CONFORMING TO ASME SA 234, SA 403 AND SA815	QP NO : QPG: 46 REV.NO : 03 DATE : 07-10-2024

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								Type	Req	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15
3.5	Finished Products	Volumetric Defect for OD ≥ 219 mm or WT ≥ 6 mm.	Major	NDE - UT	100% / 10%	ASTM E213 - longitudinal notch of 5% - For Pipe Fittings ASTM A578 Level-B - For Plate		Test Report	√√	P	W	100% for WP91 & 92 ; 10% for others
3.6	Finished Products	Sub-surface Defect for all sizes	Critical	NDE - MT	100% / 10%	ASTM E709	ASME B31.1 Cl. 136.4.3	Test Report	√√	P	W	100% for WP91 & 92 ; 10% for others
	Finished Products			NDE - DPT for SS & Duplex SS	100% / 10%	ASTM E165	No linear indications	Test Report	√√	P	W	
3.7	Finished Products	Volumetric Defect - Welded Fittings	Major	NDE - RT	100%	ASME SEC-V & ASME SecVIII Div-1, UW-51		Test Report	√√	P	R*	R* - Review of RT films
3.8	Finished Products	Photomicrograph test & Microstructure for WP91 & 92 Fittings	Major	Metallographic test	One Sample / Heat / HT Batch	BHEL TDG:102 Clause 4.0.e (No micro fissures. Microstructure shall show tempered martensite. Grain growth if any has to be examined further. Delta ferrite for Gr 92 - 3% max)		Test Report (Magnification at 500x)	√√	P	W	Photomicrographs shall be provided as records for review & acceptance and future in-service reference
3.9	PMI for AS, SS & Duplex SS fittings	Chemical	Major	PMI	100%	ASME SA 234, SA 403 , SA 815 & BHEL TDG:102 Clause 5.0		Test Report	√√	P	W	
3.10	Burst Test	Performance & Design Proof	Critical	Hydro Test	One / Type (on similar Fitting$)	ASME B 16.9 & ASME SA 234		Test Report	√	P	V	$ - As allowed in relevant standard
4.0	**FINAL INSPECTION on Finished Products**											
4.1	Dimensional Inspection	Surface check, Bend angle, Radius, End-to-end dimn, Ovality, Thickness, Wrinkles, d1 at ends, Edge preparation & other dimensions as per Drg.	Critical	Visual & Measurement	100%	ASME B16.9 / BHEL Drg BHEL TDG:102 Clause 6.0 & P.O. for D1 details		Report; [Thickness Report format as Doc No. - TDG 102 : 001 for Elbow & TDG 102 : 002 for Tee]	√√	P	W	Minimum thickness measured at any location on the finished fitting shall be not less than 0.875 of the specified nominal thickness.

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								Type	Req	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15
4.2	Radiaactive contamination for SS & Duplex SS	Radioactivity	Major	Measurement	100%	BHEL TDG:102 Clause 4.0.h		Report	√√	P	W#	W# - 10%; Either clause 1.2 or 4.2
4.3	Surface Protection	Paint TC	Major	Verification of TC	100%	BHEL TDG:102 Clause 7.1 & P.O for Additional req		Paint TC	√√	P	R	
4.4	Finished Products	Marking	Major	Visual	100%	BHEL TDG:102 Clause 7.3 & P.O for Additional req			√√	P	W#	W# - 10%
4.5	Finished Products	Color coding	Major	Visual	100%	BHEL TDG:102 Clause 7.2 & P.O for Additional req			√√	P	W#	W# - 10%
4.6	Painting	Finish and Workmanship (Chalking, Peeling, Flaking, sagging, Ugly Brushmark, Uneven/over coating and other painting flaws are not accepted) (Weld Primer to be applied on weld edge)	Major	Visual	100%	BHEL TDG:102 Clause 7.1 & P.O for Additional req		Report Format as Doc No. - TDG 102 : 003	√√	P	W	W - 100%
4.7		Paint Thickness	Major	DFT	100%	BHEL TDG:102 Clause 7.1 & P.O for Additional req			√√	P	W#	W# - 10%
4.8	Pre Dispatch Inspection	Preservation & Packing	Major	Visual	100%	BHEL TDG:102 Clause 8.0 & P.O for Additional req		Report Format as Doc No. - TDG 102 : 004	√√	P	R	
5	DOCUMENTATION & CERTIFICATION											
5.1	Documentation Clearance	Manufature Test Certificate	Critical	Verification	100%	BHEL TDG:102 Clause 9.0 & P.O for Additional req			√√	P	H	
5.2		IBR Certification	Critical	all tests as per IBR	100%	IBR		FORM III-C / FORM III-I	√√	P	H	Not applicable for SS & Duplex SS
5.3		Other Reports	Critical	Verification	100%	All reports as required in this QAP with proper correlation.		Report	√√	P	H	Note-14

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BHARAT HEAVY ELECTRICALS LIMITED TRICHY PIPING QUALITY DEPT.	STANDARD QUALITY ASSURANCE PLAN FOR BUTT WELDED FITTINGS CONFORMING TO ASME SA 234, SA 403 AND SA815	QP NO : QPG: 46 REV.NO : 03 DATE : 07-10-2024

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								Type	Req	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15

NOTES :-

1.0 (a) If the raw materials are received directly from RM Manufacturer's works, the material shall be accepted based on (i)correlation of Heat number on material with TC and (ii)verification of TCs.

(b) If the materials are received through Dealers place, check test (Chemical and Mechanical tests on one sample per Heat/ size) shall be done in addition to the above for accepting the material

POST FORMING HEAT TREATMENT :-

For Gr91 & 92 materials :

Normalise at 1040 - 1080 deg.C & Temper at 760-780 deg.C; Soaking shall be 2Hrs minimum for thickness upto 50mm and 4Hrs minimum for thickness 51-100mm

Normalising and Tempering shall be carried out within 72 hours after completion of forming.

The items shall be kept dry and stress free.

2.0 The temperature shall be brought down to room temperature after hot forming before normalizing and also after normalizing before tempering

Normalising and tempering of Gr91 & 92 shall be done encompassing the entire component.

SA234 WPB : As per Specn; **SA105 & SA234WPC :** Normalised; **SA234 WP11/WP12/WP22 :** Normalised & Tempered.

POST WELDING HEAT TREATMENT :

For Gr91 & 92 materials : PWHT at 760 ± 10 deg.C; Soaking shall be at the rate of 2.5 minutes per mm of thickest weld - minimum `1 hr. Preheat shall be maintained till welding is completed. Interpass temperature shall be limited to 350 deg C. After post heating, joints shall be slowly cooled at room temperature and then kept at that temperature for a maximum of 72 hrs before PWHT.

3.0 Forged Fitting shall be forged to the shape with a minimum forge reduction ratio of 1:4. Forged Fitting shall not be machined from a forged block.

4.0 Seal tranfer on pieces to be cut shall be done by BHEL inspector & IBR for Gr-91 & 92 materials and IBR for other than Gr-91 & 92 materials.

5.0 Welding consumables shall be approved by BHEL.

6.0 Chemical & Mechanical tests shall be performed at NABL approved laboratories.

7.0 All NDE procedures shall be submitted to BHEL for review and approval.

8.0 NDE procedures shall have Level-III certified personnel approval incase of in-house. Incase of non-availability of inhouse facility NDE shall be performed by NABL approved laboratories.

9.0 Gas cutting & Plasma cutting are prohibited for Gr91 & 92 material.

10.0 All items shall be inspected and cleared by BHEL / BHEL authorised Inspection agency & IBR/IBR Authorized Inspecting Authorities.

11.0 Necessary IBR Requirements shall be fulfilled and IBR documents to be submitted.

12.0 Documents Marked as "√" for verification only shall be submitted to BHEL / BHEL authorised Inspection agency on demand

13.0 1st off trial Documents shall be verified by BHEL / BHEL authorised Inspection agency before review of present document

14.0 For TPIA - All applicable documents as per QAP to be attested and uploaded in BHEL CQIR portal before issue of Final IR.

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1.0 SCOPE: -

The fittings shall meet Indian Boiler Regulations (IBR) except SS and Duplex SS (UNS32205) specifications unless otherwise specified, and the following requirements in addition to the standards specified in the Purchase Order (PO).

2.0 RAW MATERIALS: -

a) All fittings shall be of seamless construction unless otherwise specified in the purchase order. Pipes used for manufacturing of seamless fittings shall be seamless pipes or forgings only.
b) The raw material used for fittings shall meet the respective specification. The test certificate shall be furnished with Traceability.
c) Raw material Steel for IBR items to be inspected at Mill & test certificate countersigned by IBR Authorized Inspecting Authority, if the mill is not approved under IBR as well-known steel maker.
d) For Gr-92 items : Si : 0.10-0.50% ; Ni : 0.30max and Cu : 0.25 max. (both Ladle & Product analysis)

3.0 MANUFACTURING & TESTING REQUIREMENTS:

3.1 MANUFACTURING PROCESS :

(i) Seamless Fittings:-

A) Tees & Reducers : Upto 80mm thickness : Formed Type.
Above 80mm thickness Formed or Forged type.

B) Elbows : Formed type for all thickness

(ii) Welded Fittings:- Supplied only if indicated in P.O and shall be of **Two-Half construction.**

3.2 Machined Fittings (Max size permitted 4"- directly from bar) – Reducers, Couplings & End Caps :

Fittings machined from Castings are **prohibited.**

Starting material Rolled or Forged Bars (Killed Steel)	Heat treatment	CS – Normalised ; AS – Normalised & Tempered SS & Duplex SS (UNS32205) – Solution Annealed
	NDE – UT	To be done after Heat treatment. For size above 40mm – to be done as per ASTM A 388 Acceptance to - ASME Sec.VIII Div.2 Cl.3.3.4. Actual measured notch depth to be specified in Test Certificate.
Finished fitting (after machining)	Heat treatment	Not required
	NDE (for all sizes)	• MT (100%) - Procedure - As per ASTM E709. No linear indications are acceptable (Linear Indication : Length ≥ 3XWidth) For WP91 & WP92 Wet MPI shall be done • LPI – **SS & Duplex SS (UNS32205)**: Shall be done as per ASTM E165. No linear indications are acceptable.
	Hardness	Base material Hardness for. WPB, WPC, WP11, WP12, WP22 – 197 HBW max. WP91 - 190-250 HBW – 100% to be checked WP92 - 196-250 HBW – 100% to be checked Duplex SS (UNS32205) – 300BHN max
	Dimension	ASME B16.9 or as per Engineering Drawing indicated in Purchase Order.
	Bend Test (for IBR items)	Specimen: 19mm. Thickness (t) x 25.4mm width - cold bent 180 deg. over thin section without fracture, mandrel radius: CS :<=6.35 mm. AS, SS : <=1.5 times specimen thick.

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3.3 Seamless Formed Fittings – Ells, Tees, Reducers, Dished end (End cover / Cap)

<table>
<tr><td>Starting material:</td><td>Heat treatment shall be as per starting material specification</td><td>CS – Normalised
AS – Normalised & Tempered
SS & Duplex SS (UNS32205) – Solution Annealed</td></tr>
<tr><td>1)Tube & Pipe</td><td>NDE – UT</td><td>UT shall be done as per - ASTM E 213 with longitudinal notch of 5% wall thickness with max.1.5mm and min. 0.3mm. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>2) Forged blank (For End covers)</td><td>NDE – UT</td><td>For size above 40mm ; UT shall be done as per - ASTM A 388
In acceptance to - ASME Sec.VIII Div.2 Cl.3.3.4. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>3) Plate</td><td>NDE – UT</td><td>For size above 10mm
SA 578, Acceptance Level – B. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td rowspan="7">Finished fitting (cold/hot forming)</td><td>Heat treatment after forming</td><td>Shall be done as per SA234 and follow below table for heat treatment values.
<table>
<tr><td rowspan="2">Material</td><td colspan="2">Heat Treatment Temp,◦C</td><td colspan="2">Soaking time, hr/in</td></tr>
<tr><td>Normalising</td><td>Tempering</td><td>Normalising</td><td>Tempering</td></tr>
<tr><td>CS- WPB & WPC</td><td>870-900</td><td>-</td><td>1/2</td><td>-</td></tr>
<tr><td>AS–WP11 & WP12</td><td>920-960</td><td>640-670</td><td>1/2</td><td>1</td></tr>
<tr><td>AS–WP22</td><td>920-960</td><td>680-710</td><td>1/2</td><td>1</td></tr>
<tr><td>AS- WP91</td><td>1040-1080</td><td>760-780</td><td>1/2</td><td>1</td></tr>
<tr><td>AS- WP92</td><td>1040-1080</td><td>760-780</td><td>1/2</td><td>1</td></tr>
</table>
Stainless Steel - All grades & Duplex SS (UNS32205): - Solution Annealed: 1050-1100 Deg C
Soaking time : ½ hr per inch with minimum 15 minutes
Note: Normalising shall be done for a minimum time of 30 min while tempering to be done for a minimum time of 60min for all materials except SS & Duplex SS (UNS32205).</td></tr>
<tr><td>NDE (for all sizes) – Except for Plate formed Dished end</td><td>• MT (100%) - Shall be as per - ASTM E709 No linear indications are acceptable. For WP91 & WP92 Wet MPI shall be done.
• LPI – SS & Duplex SS (UNS32205): Shall be done as per ASTM E165. No linear indications are acceptable.</td></tr>
<tr><td>NDE–for Plate formed Dished end</td><td>For Plate Formed Dished end – 100% MT as per - ASTM E709 on both inner and outer surfaces of Knuckle radius and weld ends. No linear indications are acceptable.
UT shall be as per A578 Level-B. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td rowspan="2">NDE – UT

For OD >/= 219mm
or

W.T >/= 6mm</td><td>If made from Pipe & Tube –
Shall be done as per - ASTM E 213 with longitudinal notch of 5% wall thickness with max.1.5mm and min. 0.3mm. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>If made from Forging - Shall be as per - ASTM A 388
In acceptance to - ASME Sec.VIII Div.2 Cl.3.3.4. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>Hardness</td><td>Base material Hardness for
WPB, WPC, WP11, WP12, WP22 – 197 HBW max.
WP91 - 191-250 HBW – 100% to be checked
WP92 - 196-250 HBW – 100% to be checked
Duplex SS (UNS32205) – 300HBW max</td></tr>
<tr><td>Dimension</td><td>ASME B16.9, As per Engineering drawing indicated in Purchase Order. The ends of reducers shall have a straight portion of Minimum 13mm.</td></tr>
<tr><td>Bend Test for IBR iems (if starting material is forged blank)</td><td>Specimen: 25.4 mm x 19 mm thick - cold bent 180 deg. over thin section without fracture, internal radius of bend: CS :<=6.35 mm.
AS, SS: <=1.5 times specimen thick.</td></tr>
</table>

3.4 Forged Fittings –Tees, Reducers, Couplings, Flanges & Dished End (End cover/Cap)

Shall be forged to the shape with a minimum forge reduction ratio of 1:4. Fitting shall not be machined from a forged block.

<table>
<tr><td rowspan="2">Starting material:
Rolled or Forged Bars, Blooms, Billets (Killed steel)</td><td>Heat treatment shall be as per starting material specification</td><td>CS – Normalised
AS – Normalised & Tempered
SS & Duplex SS (UNS32205) – Solution Annealed</td></tr>
<tr><td>NDE – UT</td><td>To be done for diameter or thickness above 40mm
Procedure - As per ASTM A388
In acceptance to - ASME Sec.VIII Div.2 Cl.3.3.4. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td rowspan="5">Finished fitting</td><td>Heat treatment
After forging (cold/hot forging)</td><td>Shall be done as per SA234 and follow below table for heat treatment values.
<table>
<tr><th rowspan="2">Material</th><th colspan="2">Heat Treatment Temp,◦C</th><th colspan="2">Soaking time, hr/in</th></tr>
<tr><th>Normalizing</th><th>Tempering</th><th>Normalizing</th><th>Tempering</th></tr>
<tr><td>CS- WPB & WPC</td><td>870-900</td><td>-</td><td>1/2</td><td>-</td></tr>
<tr><td>AS–WP11 & WP12</td><td>920-960</td><td>640-670</td><td>1/2</td><td>1</td></tr>
<tr><td>AS–WP22</td><td>920-960</td><td>680-710</td><td>1/2</td><td>1</td></tr>
<tr><td>AS- WP91</td><td>1040-1080</td><td>760-780</td><td>1/2</td><td>1</td></tr>
<tr><td>AS- WP92</td><td>1040-1080</td><td>760-780</td><td>1/2</td><td>1</td></tr>
</table>
Stainless Steel - All grades & Duplex SS (UNS32205): - Solution Annealed: 1050-1100 Deg C
Soaking time : ½ hr per inch with minimum 15 minutes

Note: Normalising shall be done for a minimum time of 30 min while tempering to be done for a minimum time of 60min for all materials except SS & Duplex SS (UNS32205).</td></tr>
<tr><td>NDE – UT
For OD >/= 219mm or W.T >/= 6mm</td><td>UT shall be done as per - ASTM A388
In Acceptance to - ASME Sec.VIII Div.2 Cl.3.3.4. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>NDE (for all sizes)</td><td>MT- (100%) Shall be done as per ASTM E709.
No linear indications are acceptable.
For WP91 & WP92 Wet MPI shall be done.

LPI – SS & Duplex SS (UNS32205): Shall be done as per ASTM E165. No linear indications are acceptable.</td></tr>
<tr><td>Hardness</td><td>WPB, WPC, WP11, WP12, WP22 – 197 BHN max.
WP91 - 191-250 BHN – 100% to be checked
WP92 - 196-250 HBW – 100% to be checked
Duplex SS (UNS32205) – 300BHN max</td></tr>
<tr><td>Dimension</td><td>ASME B16.9 or ASME B16.5 or as per Engineering drawing indicated in Purchase order.</td></tr>
<tr><td>Bend Test (for IBR items)</td><td>Specimen: 19mm. Thickness (t) x 25.4mm width - cold bent 180 deg. over thin section without fracture, mandrel radius: CS :<=6.35 mm.
AS, SS : <=1.5 times specimen thick.</td></tr>
</table>

3.5 Welded Fittings– Ells, Tees, Reducers (Two-Half construction):

Pipe made from plate and long seam welded shall not be used as a starting material.

<table>
<tr><td>Starting material:
Plate</td><td>NDE – UT</td><td>For thickness above 10mm
SA 578, Acceptance Level – B.</td></tr>
<tr><td rowspan="5">Finished fitting</td><td>Heat Treatment

After forming</td><td>Shall be done as per SA234 and follow below table for heat treatment values.
<table>
<tr><td rowspan="2">Material</td><td colspan="2">Heat Treatment Temp,◦C</td><td colspan="2">Soaking time, hr/in</td></tr>
<tr><td>Normalizing</td><td>Tempering</td><td>Normalizing</td><td>Tempering</td></tr>
<tr><td>CS- WPBW & WPCW</td><td>870-900</td><td>-</td><td>1/2</td><td>-</td></tr>
<tr><td>AS–WP11W & WP12W</td><td>920-960</td><td>640-670</td><td>1/2</td><td>1</td></tr>
<tr><td>AS–WP22W</td><td>920-960</td><td>680-710</td><td>1/2</td><td>1</td></tr>
<tr><td>AS- WP91W</td><td>1040-1080</td><td>760-780</td><td>1/2</td><td>1</td></tr>
<tr><td>AS- WP92W</td><td>1040-1080</td><td>760-780</td><td>1/2</td><td>1</td></tr>
</table>
Stainless Steel - All grades & Duplex SS (UNS32205): - Solution Annealed: 1050-1100 Deg C
Soaking time : ½ hr per inch with minimum 15 minutes</td></tr>
<tr><td>Post Weld Heat Treatment (PWHT)</td><td>PWHT shall be done as indicated below.
<table>
<tr><td>Material</td><td>Heat Treatment Temp,◦C</td><td>Soaking time</td></tr>
<tr><td>CS- WPB-W & WPC-W
If weld thk>19mm</td><td>595-635</td><td rowspan="2">2.5min per mm of weld thk; Minimum 30minutes.</td></tr>
<tr><td>AS–WP11-W&WP12-W</td><td>650-680</td></tr>
<tr><td>AS–WP22-W</td><td>690-710</td><td rowspan="3">2.5min per mm of weld thk; Minimum 60minutes.</td></tr>
<tr><td>AS- WP91-W</td><td>760-780</td></tr>
<tr><td>AS- WP92-W</td><td>760-780</td></tr>
</table></td></tr>
<tr><td>NDE (for all sizes)</td><td>• MT (100%)- Procedure - As per ASTM E709.
No linear indications are acceptable
For WP91 & WP92 Wet MPI shall be done
• LPI – SS & Duplex SS (UNS32205) : Shall be done as per ASTM E165.
No linear indications are acceptable.</td></tr>
<tr><td>NDE – for Weld</td><td>• RT (100%)- Acceptance norm shall be UW 51 of ASME Sec VIII DIV-1.</td></tr>
<tr><td>Hardness</td><td>Base material Hardness for
WPB, WPC, WP11, WP12, WP22 – 197 BHN max.
WP91 - 191-250 BHN – 100% to be checked
WP92 - 196-250 HBW – 100% to be checked
Duplex SS (UNS32205) – 300BHN max
Weld Hardness
WP91 - 300 BHN max. – 100% to be checked
WP92 - 300 BHN max. – 100% to be checked</td></tr>
<tr><td>Dimension</td><td>ASME B16.9 or as per Engineering drawing indicated in Purchase order.</td></tr>
<tr><td>Bend Test (for IBR items)</td><td>Specimen: 19mm. Thickness (t) x 25.4mm width - cold bent 180 deg. over thin section without fracture, mandrel radius: CS :<=6.35 mm.
AS, SS : <=1.5 times specimen thick.</td></tr>
</table>

4.0 GENERAL REQUIREMENTS:

a) Carbon < or = 0.25% for WPB (all thickness) and WPC (thickness < or = 20mm)
b) Carbon < or = 0.30% for WPC (thickness > 20mm)
c) **If UT not done on the starting material, the same shall be done by the fitting manufactures before forming / fabrication.**

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d) **Chemical and Mechanical Testing** – Test samples shall be tested in the Heat treatment of fitting delivered condition.
   i) Product analysis – one / heat / size.
   ii) Tension test – one / heat / heat treatment lot / size
   iii) Hardness test – 100% for Gr91 and Gr92. 10% for others.

e) **Photomicrograph test for WP91 & WP92** :- Photomicrograph test shall be carried out on one per heat, per size. 3 replicas in one fitting. 1 replica for the size Nb 80 & below. Acceptance norms - The Material shall be free from any micro fissures. Microstructure shall show tempered martensite and also to be examined for any grain growth and delta ferrite (to be maintained within 3% for Gr92 when measured as per VD TUV 1272). Photomicrograph with 500x (Min) magnification along with Photomicrograph report to be provided. The actual magnification shall be indicated.

f) In case of welded fittings, WPS, PQR & welder qualification shall be approved by BHEL, prior to start of welding.

g) Unless otherwise specified in the P.O SA 234 WP 11/12/22 fittings shall be supplied as per class1.

h) **Stainless Steel (SS) & Duplex SS (UNS32205) :** Finished fittings shall be checked for radioactive contamination and reported. Survey meter shall be used to measure at 5cm near the surface. Acceptance limits: Shall be less than 0.1 milli Rontgen (MR) per hr or 1 micro Sievert per hr.

5.0 POSITIVE MATERIAL IDENTIFICATION (PMI) FOR ALLOY STEEL (AS), STAINLESS STEEL (SS) AND DUPLEX SS (UNS32205) FITTINGS.

Each AS, SS and Duplex SS (UNS32205) fitting shall be checked for the correctness of the material during manufacturing and final inspection using X-ray fluorescence principle or spark emission spectrography.

6.0 WORKMANSHIP, FINISH AND REPAIR

All items shall have smooth, workman like finish, and to be free from scale & defects like laps, seams, folds, cracks, etc. Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum dimension after repair shall meet drawing / Specification. Repairs by fusion welding are prohibited.

Flatness on curved surfaces of fittings shall be limited to 6% of nominal OD.

Thickness: Outer Diameter & Transition: Variation shall be merged smooth to min 1:4 taper.

7.0 PAINTING, COLOUR CODING & MARKING

7.1 **PAINTING:** All fittings (except stainless steel and galvanized) shall be **painted** on the external surface as given below (unless otherwise specified): -

a) **Surface preparation:** Blast cleaning to SSPC SP-10 (SA 2½) with surface profile 35-50 microns.
b) **Primer coat:** One coat of 60 microns of In-Organic Ethyl Zinc Silicate primer.
c) **Finish coat:** Two coats of 20 microns each of Heat Resistance Aluminium paint to IS13183 Gr-1.
d) **Total DFT:** 100 microns minimum.
e) **Shade:** Aluminium -- for all fittings.

The internal surface shall be protected with rust preventive coating or rust inhibitor. Edge preparations for Site ends shall be protected with weldable primer.

Stainless steel and Duplex SS (UNS32205) fittings need not be painted. Stainless steel and Duplex SS (UNS32205) fittings to be surface treated (Pickling & Passivation) as per ASTM A380.

7.2 **COLOUR CODING:** All fittings shall be colour coded circumferentially at all ends as given below:

Material Specification		Colour Code
SA 234	WPB	Red
	WPC	Blue
	WP11	Green & White
	WP12	Black & Red
	WP22	Blue & Red
	WP91	Brown & Red
	WP92	Brown & Blue
SA 403	WP304	Blue & Yellow
	WP304L	Blue, Red & Yellow
	WP304H	Black, Blue & Yellow
	WP316	Black & Green
	WP316L	Blue, Brown & Yellow
	WP321	Blue & Brown
	WP347	Yellow & Black
SA815 (Duplex Stainless Steel)		Red, White & Green

7.3 **MARKING** (In English only):

7.3.1 For fittings of size above 2" (50mm) :
All the fittings shall be necessarily hard punched / etched and paint stencilled with the details: Material code, Heat number, material specification, size, maker`s emblem, Inspectors seal, Running Serial number for the P.O. quantity and Statutory authorities seal as applicable, if fittings are sent to BHEL Stores. (Letter size shall be 6mm minimum and bordered with white paint for easy identification)

7.3.2 For fittings of size 2" (50mm) & below :

a) Engraving on each fitting with minimum details like melt, branch no and Paint stencilling of all above details. Where paint stencil is not possible, permanent metal marker shall be used. (Normal white board permanent marker shall not be used).
b) Fittings of size up to 2" (50mm) shall be tied together of appropriate numbers and the above details as indicated in Para 7.3.1 shall be engraved in a separate metal/plastic tag and securely tied to it.

7.3.3 For fittings of thickness less than 6mm :
If the thickness of the fitting is less than 6 mm, punching is not permitted. The above details as indicated in Para 7.3.1 shall be engraved and paint stencilled on each fitting. Where paint stencil is not possible, permanent metal marker shall be used. (Normal white board permanent marker shall not be used).

7.3.4 In case of fittings dispatched directly to project site as **DTS**, material code shall be replaced with DU code (14-digit work order DU detail) as given by Purchase during DTS advice. All other details shall be hard punched and paint stencilled as indicated in Para 7.3.1.

Sample format for Punching & Stencilling is given below.

Vendor code & Name	:	Makers Emblem Insp. Authority Stamp
Material code / DU details :		
Melt No.	:	
Material Specification	:	
Qty.	:	
Serial No	:	(Example : 1,2,3,.....& 25)
Weight.	:	

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8.0 PACKING AND END PROTECTION:

Machined ends of the fittings shall be well Protected using end caps and fittings shall be suitably packed in box / crate as per the Packaging procedure PC: PKG: 01 to avoid transit & other damages.

9.0 INSPECTION & CERTIFICATION (In English only):

9.1 All items are to be Inspected at the manufacturer's works by the Inspection agencies / authorities as per IBR and as indicated in the P.O. Inspection certificate in IBR Form III C & Form III-I for Dished Ends shall be submitted along with the Work Test Certificate countersigned by the above authorities and shall include the following (Three ink signed originals required).

1. Test Certificate Number & date.
2. BHEL P.O Number & Amendment Number
3. BHEL P.O. Serial Number
4. BHEL TDC Number
5. Size-wise Quantity (MTC shall contain size and spec details strictly as per PO)
6. Specification, Grade & Year of code.
7. Heat/Melt Number
8. Starting material details with traceability.
9. Steel making process
10. Ladle Analysis of Raw Material and product analysis of fitting.
11. *Supplementary Test (Product analysis, Tension test) results.
12. Tensile Test Report.
13. Painting Report as per format Doc no TDG102:003.
14. Photocopy of Marking details of one sample for one PO Serial No vetted by TPIA.
15. *Guarantee of HTP shall be given as follows:- "Fittings are capable of withstanding without failure, leakage or impairment of their serviceability a hydrostatic test pressure equal to that prescribed for the specified matching pipe of equivalent material".

*Details furnished in the Tests certificate in lieu of chart/report is acceptable.

9..2 The following reports shall be **furnished separately** along with the IBR Forms & MTC indicated in para 9.1 above.

i. NDE reports for MT, RT, UT (UT Reports in soft copy + hard copy). Actual measured UT-notch depth to be specified in Test Certificate.
ii. Positive Material identification (PMI) report
iii. Heat Treatment Chart.
iv. Hardness Test report.
v. Photomicrograph test report along with photomicrograph with minimum 500x magnifications.
vi. Dimensional report (as built drawing with dimensions)
vii. Thickness Measurement Report for Elbows & Tees as per Doc No : TDG102:001 & TDG102:002.

The above report numbers shall be indicated in the MTC for ready correlation. Vendor shall ensure correlation and traceability wrt documentation.

9.3 For CE marking items if indicated in P.O. the TCs with details specified above shall be submitted as per EN-10204 (Latest).

i. For pressure parts test certificates of type 3.1 or 3.2 is acceptable.
Type 3.1 – Suppliers shall have ISO 9001-2008/2015 (with validity as applicable) certification certified by Notified Body recognized by European Community and test certificate certified by suppliers authorized inspection representative.

Type 3.2 – Components inspected and test certificates certified by both the supplier's authorized inspection representative and Notified Body recognized by European Community.

ii. For non-pressure parts test certificates of type 2.2 is acceptable.
Type 2.2 – Suppliers test certificates certified by the supplier's authorized inspection representative with test results as required by this TDG.

10.0 AUDIT CHECKS AT BHEL :

BHEL reserves the right to carry out audit checks for Chemistry, HT condition, Mechanical test and NDT on fittings.
Supplies found defective during check at BHEL are liable for rejection.

11.0 RECORDS OF REVISION :

Rev 01 : a) Fully revised for better clarity.
b) Para 2.0 (e) added.

Rev 02 : a) Para 2.0 (c): UT acceptance norms revised from level A to B.

Rev 03 : a) Fully revised for better clarity.
b) Para 4.2, 6.0, 8.0 (11) added.
c) Para 2 (d), 4.1, 5 (d) are revised.

Rev 04 : a) Para 5.0 (g), 7.0 and 8.0 (17) are revised.

Rev 05 : a) New material specification SA 815 Duplex Stainless Steel included.
b) Para 4.1, 4.2, 5.0 (d), 7.1 & 7.2 are revised.
c) 5.0 (a), (b), (c), (e), (f), (g), 7.3.1 & 7.3.2 are modified for better clarity.

Rev 06 : a) Para 8.2 added.
b) Para 5.0(d), 5.0(g), 7.1, & 8.1 are revised.
c) Para 1.0 & 7.2 are modified.

Rev 07 : Para 8.2 - vii added.

Rev 08 : a) Title revised for better clarity
b) Para 1.0,2.0(a),5.0(c),8.4,9.1(8) & 9.2(vi) are revised.
c) From Para 3.0(f),4.2,5.0(d),(f),(g),7.2 forging spec removed
d) Para 2.0(c),(f),3.0(a),7.0 & 10.0 added
e) Para 3.0(e) deleted
f) Document no.TDG102:002 Rev.00 added.

Rev 09 : Fully revised for better clarity

Rev 10 : (a) Title and Para 1.0 revised.
(b) Requirement of Gr92 fittings included, hence TDG 120 will become obsolete.
(b) Cl 1.0 - Creep test requirement removed.
(c) Cl 7.0 - Painting, Color coding & Marking modified for better clarity.
(d) Cl 9.0 - Revised for improved documentation.
(e) Document no.TDG102:003 and TDG102:004 Rev.00 added.

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THICKNESS MEASUREMENT REPORT FOR ELBOW

Doc No: TDG102:001 Rev.00

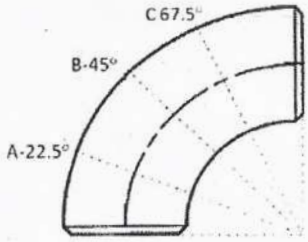
Date: 03.02.2014

PO Number:

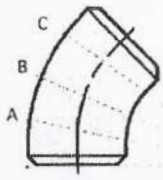
Work order/Du:

Heat no:

Size:



90° Elbow



Less than 90°

Measurement (Extrodus) points

Angle	A	B	C
90	22.50°	45.00°	67.50°
60	15.00°	30.00°	45.00°
45	11.25°	22.50°	33.75°
30	NA	15.00°	NA

Description of item :
Material Spec :
Material Code :

No	Wall thickness at ends		Wall Thickness at angle			Remarks
	End 1	End 2	A	B	C	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						

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Prepared by	Reviewed by		Approved by

THICKNESS MEASUREMENT REPORT FOR TEE's

Doc No: TDG102:002 Rev.00

Date: 20.06.2015

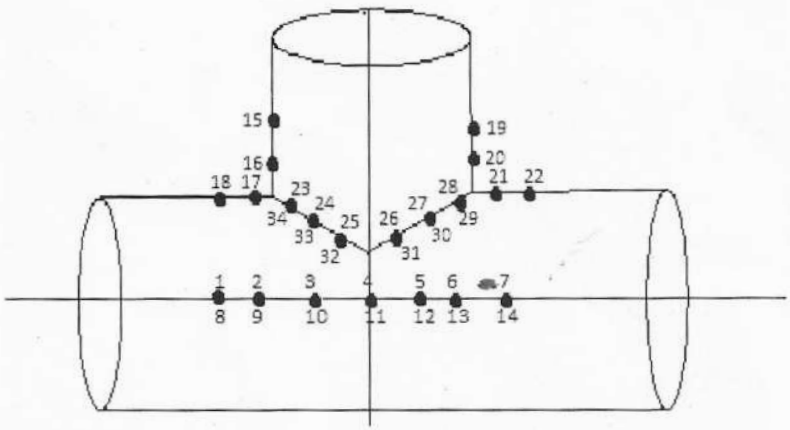
PO Number:

Description of Material:

Size:

Material Spec.

Work order/Du:



Location	Thickness (mm)	Location	Thickness (mm)	Location	Thickness (mm)
1		13		24	
2		14		25	
3		15		26	
4		16		27	
5		17		28	
6		18		29	
7		19		30	
8		20		31	
9		21		32	
10		22		33	
11		23		34	
12		24			

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Prepared by	Reviewed by		Approved by

PAINTING & MARKING REPORT

Doc No: TDG102:003 Rev.00
Date: 15.02.2024

Report No: **Date:**

BHEL PO. NO & Date :
TDG No :
Applicable Painting Scheme :
Surface Preparation :
Primer Coat :
Primer paint Batch no & Expiry date :
Finish Coat & Shade :
Finish paint Batch no & Expiry date :
Internal surface coating (if applicable) :

PO. Sl.No	Description	Quantity	Total DFT Required	Total DFT Measured	Remarks

(Add Annexure, if no of PO Sl.no is more)

Color Code (marked Circumferentially at all ends) :
Marking : As per TDG & PO requirements.

It is hereby confirmed that the above mentioned components/items/equipment was/were painted as per the TDG & PO requirements as referred above and found acceptable.

Verified
(Vendor QC Sign & Seal)

Reviewed
(BHEL QC Sign & Seal)

J.NANTHINI MGR/ QA	PRIYA BALAJI SDGM / MM	C. SARAVANAN AGM / ENGINEERING	S.JEGAN SR.MGR / QUALITY
Prepared by	Reviewed by		Approved by

PRE DISPATCH INSPECTION REPORT

Doc No: TDG102:004 Rev.00

Date: 15.12.2024

S NO	PO NO & PO SI NO	MATERIAL CODE / WORK ORDER NO	ITEM DESCRIPTION	QUANTITY	WEIGHT (MT)

OBSERVATIONS : (Photos also to be enclosed)

PDI DONE BY

(BHEL/BHEL AIA Sign & Seal)

J.NANTHINI MGR/ QA	PRIYA BALAJI SDGM / MM	C. SARAVANAN AGM / ENGINEERING	S.JEGAN SR.MGR / QUALITY
Prepared by	Reviewed by		Approved by