

Form No:	 BHEL PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52052	
		TECHNICAL SPECIFICATION FOR		Rev. No. 00	
		CS & SS LINE BLANKS (150, 300, 600 & 1500 CLASS)		Page 1 of 5	

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TECHNICAL SPECIFICATION FOR CS & SS LINE BLANKS (150, 300, 600 & 1500 class)

1.0 Scope
 This specification covers the technical requirements of steel line blanks to be placed between ASME 16.5 flanges in 150, 300, 600, 1500, 2500 pressure class.

2.0 Designation
 Steel line blanks are designated as

- **'Figure 8 Blanks'** up to line size of 8"
- **'Space and Blind'** for size 10" and above.

2.1 On drawings:

(i) Material specification column : PY52052

(ii) Description column:

CS FIGURE 8 BLANK 3/ 4" # 150 RF
CS SPACER & BLANK 10" # 150 RF

2.2 For placing indents on Purchase Dept.:

CS FIGURE 8 BLANK 3/ 4" # 150 RF as per PY 52052
CS SPACER & BLANK 10" # 150 RF as per PY 52052

2.3 For issuing enquiries and purchase orders:
 The above description at cl 2.2 shall be specified and a copy of this standard shall be enclosed

3.0 Compliance with standards

3.1 Dimensions: As **per ASME B 16.48** - latest edition

3.2 Tolerances: **As per ASME B 16.48** - latest edition

3.3 Facing : Raised face / Female ring joint as per variant table

3.4 Markings : As **per ASME B 16.48** - latest edition

3.5 Material : Carbon steel to **ASME SA 105**
 Stainless steel to **ASTM A182 F321**.

4.0 Technical Delivery Conditions:
 As per corporate standard **HY 0851401** (a copy to be enclosed)

Form No:	LAYOUT & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
	PROJECT ENGINEERING & SYSTEMS DIVISION	NKB	UP	VVSSS	07.11.14

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52052
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Variant Table (CS -150#)

Var.No.	Description	UWT	MCODE
01	CS FIGURE 8 BLANK 1/2" # 150 RF	.8	PY9752052010
02	CS FIGURE 8 BLANK 3/4" # 150 RF	1.6	PY9752052029
03	CS FIGURE 8 BLANK 1" # 150 RF	1.8	PY9752052037
04	CS FIGURE 8 BLANK 1 1/2" # 150 RF	3	PY9752052045
05	CS FIGURE 8 BLANK 2" # 150 RF	4.7	PY9752052053
06	CS FIGURE 8 BLANK 3" # 150 RF	9	PY9752052061
07	CS FIGURE 8 BLANK 4" # 150 RF	12.4	PY9752052070
65	CS (GALV) FIGURE 8 BLANK 4" # 150 RF	12.4	PY9752052657
08	CS FIGURE 8 BLANK 6" # 150 RF	19.8	PY9752052088
09	CS FIGURE 8 BLANK 8" # 150 RF	32.5	PY9752052096
10	CS SPACER & BLANK 10" # 150 RF	47	PY9752052100
11	CS SPACER & BLANK 12" # 150 RF	71	PY9752052118
12	CS SPACER & BLANK 14" # 150 RF	99	PY9752052126
13	CS SPACER & BLANK 16" # 150 RF	123	PY9752052134
14	CS SPACER & BLANK 18" # 150 RF	149	PY9752052142
15	CS SPACER & BLANK 20" # 150 RF	193	PY9752052150
80	CS SPACER & BLANK 22" # 150 RF	200	PY9752052800
16	CS SPACER & BLANK 24" # 150 RF	286	PY9752052169
71	CS SPACER & BLANK 26" # 150 RF	300	PY9752052711

Variant Table (CS -300#)

Var.No.	Description	UWT	MCODE
17	CS FIGURE 8 BLANK 1/2" # 300 RF	2	PY9752052177
18	CS FIGURE 8 BLANK 3/4" # 300 RF	2.6	PY9752052185
19	CS FIGURE 8 BLANK 1" # 300 RF	3	PY9752052193
20	CS FIGURE 8 BLANK 1 1/2" # 300 RF	6	PY9752052207
21	CS FIGURE 8 BLANK 2" # 300 RF	8	PY9752052215
22	CS FIGURE 8 BLANK 3" # 300 RF	15.9	PY9752052223
23	CS FIGURE 8 BLANK 4" # 300 RF	25	PY9752052231
24	CS FIGURE 8 BLANK 6" # 300 RF	50	PY9752052240
25	CS FIGURE 8 BLANK 8" # 300 RF	60	PY9752052258
26	CS SPACER & BLANK 10" # 300 RF	80	PY9752052266
27	CS SPACER & BLANK 12" # 300 RF	125	PY9752052274
28	CS SPACER & BLANK 14" # 300 RF	175	PY9752052282
29	CS SPACER & BLANK 16" # 300 RF	200	PY9752052290
30	CS SPACER & BLANK 18" # 300 RF	250	PY9752052304
31	CS SPACER & BLANK 20" # 300 RF	300	PY9752052312
64	CS SPACER & BLANK 22" # 300 RF	219	PY9752052649
32	CS SPACER & BLANK 24" # 300 RF	350	PY9752052320
67	CS SPACER & BLANK 26" # 300 RF	370	PY9752052673
66	CS SPACER & BLANK 32" # 300 RF	450	PY9752052665

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		TECHNICAL SPECIFICATION FOR	Rev. No. 00
		CS & SS LINE BLANKS (150, 300, 600 & 1500 CLASS)	Page 3 of 5

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Variant Table (CS -600#)

Var.No.	Description	UWT	MCODE
33	CS FIGURE 8 BLANK 1/2" # 600 RF	2	PY9752052339
34	CS FIGURE 8 BLANK 3/4" # 600 RF	3	PY9752052347
35	CS FIGURE 8 BLANK 1" # 600 RF	4	PY9752052355
36	CS FIGURE 8 BLANK 1 1/2" # 600 RF	8	PY9752052363
37	CS FIGURE 8 BLANK 2" # 600 RF	11	PY9752052371
38	CS FIGURE 8 BLANK 3" # 600 RF	25	PY9752052380
39	CS FIGURE 8 BLANK 4" # 600 RF	40	PY9752052398
40	CS FIGURE 8 BLANK 6" # 600 RF	80	PY9752052401
41	CS FIGURE 8 BLANK 8" # 600 RF	120	PY9752052410
62	CS SPACER & BLANK 10" # 600 RF	150	PY9752052622
68	CS SPACER & BLANK 12" # 600 RF	160	PY9752052681
93	CS SPACER & BLANK 14" # 600 RF	180	PY9752052932
72	CS SPACER & BLANK 16" # 600 RF	200	PY9752052720
84	CS SPACER & BLANK 18" # 600 RF	206	PY9752052843
85	CS SPACER & BLANK 20" # 600 RF	276	PY9752052851
69	CS SPACER & BLANK 24" # 600 RF	280	PY9752052690
81	CS SPACER & BLANK 26" # 600 RF	300	PY9752052819
70	CS SPACER & BLANK 28" # 600 RF	320	PY9752052703

Variant Table (CS -1500#)

86	CS FIGURE 8 BLANK 1/2" # 1500 RJ	0.8	PY9752052860
87	CS FIGURE 8 BLANK 3/4" # 1500 RJ	1.2	PY9752052878
88	CS FIGURE 8 BLANK 1" # 1500 RJ	1.6	PY9752052886
89	CS FIGURE 8 BLANK 1 1/2" # 1500 RJ	2.4	PY9752052894
90	CS FIGURE 8 BLANK 2" # 1500 RJ	5.5	PY9752052908
91	CS FIGURE 8 BLANK 3" # 1500 RJ	12.5	PY9752052916
73	CS FIGURE 8 BLANK 4" # 1500 RJ	17.5	PY9752052738
74	CS FIGURE 8 BLANK 6" # 1500 RJ	36.0	PY9752052746
82	CS FIGURE 8 BLANK 8" # 1500 RJ	71.5	PY9752052827
75	CS SPACER & BLANK 10" # 1500 RJ	108	PY9752052754
92	CS SPACER & BLANK 12" # 1500 RJ	175	PY9752052924
94	CS SPACER & BLANK 14" # 1500 RJ	240	PY9752052940
95	CS SPACER & BLANK 16" # 1500 RJ	326	PY9752052959
96	CS SPACER & BLANK 18" # 1500 RJ	455	PY9752052967
97	CS SPACER & BLANK 20" # 1500 RJ	580	PY9752052975

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Variant Table (SS -150#)

Var.No.	Description	UWT	MCODE
42	SS FIGURE 8 BLANK 1/2" # 150 RF	1.6	PY9752052428
43	SS FIGURE 8 BLANK 3/4" # 150 RF	1.8	PY9752052436
44	SS FIGURE 8 BLANK 1" # 150 RF	3	PY9752052444
45	SS FIGURE 8 BLANK 1 1/2" # 150 RF	4.7	PY9752052452
46	SS FIGURE 8 BLANK 2" # 150 RF	9	PY9752052460
47	SS FIGURE 8 BLANK 3" # 150 RF	12.4	PY9752052479
48	SS FIGURE 8 BLANK 4" # 150 RF	19.8	PY9752052487
49	SS FIGURE 8 BLANK 6" # 150 RF	32.5	PY9752052495
50	SS FIGURE 8 BLANK 8" # 150 RF	47.5	PY9752052509
51	SS SPACER & BLANK 10" # 150 RF	71.5	PY9752052517
52	SS SPACER & BLANK 12" # 150 RF	99.5	PY9752052525
98	SS SPACER & BLANK 18" # 150 RF	100	PY9752052983
78	SS SPACER & BLANK 20" # 150 RF	110	PY9752052789

Variant Table (SS -300#)

Var.No.	Description	UWT	MCODE
53	SS FIGURE 8 BLANK 1/2" # 300 RF	2	PY9752052533
54	SS FIGURE 8 BLANK 3/4" # 300 RF	2.6	PY9752052541
55	SS FIGURE 8 BLANK 1" # 300 RF	3	PY9752052550
56	SS FIGURE 8 BLANK 1 1/2" # 300 RF	6	PY9752052568
57	SS FIGURE 8 BLANK 2" # 300 RF	8	PY9752052576
58	SS FIGURE 8 BLANK 3" # 300 RF	15.9	PY9752052584
59	SS FIGURE 8 BLANK 4" # 300 RF	25	PY9752052592
60	SS FIGURE 8 BLANK 6" # 300 RF	50	PY9752052606
61	SS FIGURE 8 BLANK 8" # 300RF	60	PY9752052614
83	SS SPACER & BLANK 10" # 300 RF		PY9752052835
79	SS SPACER & BLANK 12" # 300 RF		PY9752052797

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RECORD OF REVISIONS				
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00	05.11.14	First Issue	NKB	VVSS. S

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 084	
		TECHNICAL SPECIFICATION		Rev. No. 00
		SLIP-ON WELDING FLANGE, PR CLASS 150 B16.5 CARBON STEEL (A105)		Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Carbon Steel Slip-on Welding Flanges of **Pressure-Temperature Class 150** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Slip-on Flanges supplied according to this specification shall conform to the requirements of latest version of **ASME Standard B16.5 "Pipe Flanges and Flanged Fittings"** and comply with the following additional requirements.
- 1.3 This specification is applicable for Slip-on Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL & CONSTRUCTION:

Carbon Steel Forging to ASTM A105 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE AND FACE:

Flange Size (NPS in inches) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Carbon Steel Slip-on Welding Flange of Pressure-Temperature Class 150 with Raised Face shall be designated as:

FLANGE CS 10" CL 150 B16.5 SORF.

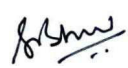
6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 – Technical Delivery Conditions for Flanges.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 SB RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
	PROJECT ENGINEERING & SYSTEMS DIVISION	 CH MANOJ	 SRIKANTH G	 SB RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 085
		TECHNICAL SPECIFICATION	Rev. No. 00
		WELDING NECK FLANGE, PR CLASS 150 B16.5 CARBON STEEL (A105)	Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Carbon Steel Welding Neck Flanges of **Pressure-Temperature Class 150** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Welding Neck Flanges supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.5 "PIPE FLANGES AND FLANGED FITTINGS" and comply with the following additional requirements.
- 1.3 This specification is applicable for Welding Neck Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL:

Carbon Steel Forging to ASTM A105 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE, THICKNESS AND FACE:

Flange Size (NPS in inches), Welding End Wall Thickness (Schedule) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Carbon Steel Welding Neck Flange of Pressure-Temperature Class 150 with Raised Face to be welded to a pipe of schedule 40, shall be designated as:

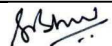
FLANGE CS 10" SCH 40 CL 150 B16.5 WNRF.

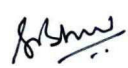
6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 - Technical Delivery Conditions for Flanges.

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RECORD OF REVISIONS:

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00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 SB RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 SB RAO	20.07.15

Form No:	 BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION PE&SD	PY 52 086	
		TECHNICAL SPECIFICATION	
		WELDING NECK FLANGE, PR CLASS 300 B16.5 CARBON STEEL (A105)	
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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Carbon Steel Welding Neck Flanges of **Pressure-Temperature Class 300** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Welding Neck Flanges supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.5 "PIPE FLANGES AND FLANGED FITTINGS" and comply with the following additional requirements.
- 1.3 This specification is applicable for Welding Neck Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL:

Carbon Steel Forging to ASTM A105 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE, THICKNESS AND FACE:

Flange Size (NPS in inches), Welding End Wall Thickness (Schedule) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Carbon Steel Welding Neck Flange of Pressure-Temperature Class 300 with Raised Face to be welded to a pipe of schedule 40, shall be designated as:

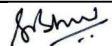
FLANGE CS 10" SCH 40 CL300 B16.5 WNRF.

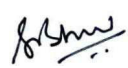
6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 - Technical Delivery Conditions for Flanges.

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RECORD OF REVISIONS:

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00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 SB RAO

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		 CH MANOJ	 SRIKANTH G	 SB RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 088
		TECHNICAL SPECIFICATION		Rev. No. 00
		WELDING NECK FLANGE, PR CLASS 300 B16.5 STAINLESS STEEL (A182GrF304)		Page 1 of 1

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WELDING NECK FLANGE, PR CLASS 300 B16.5
STAINLESS STEEL (A182GrF304)

1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Stainless Steel Welding Neck Flanges of **Pressure-Temperature Class 300** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Welding Neck Flanges supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.5 "PIPE FLANGES AND FLANGED FITTINGS" and comply with the following additional requirements.
- 1.3 This specification is applicable for Welding Neck Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL:

Stainless Steel Forging to ASTM A182 Gr F304 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE, THICKNESS AND FACE:

Flange Size (NPS in inches), Welding End Wall Thickness (Schedule) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Stainless Steel Welding Neck Flange of Pressure-Temperature Class 300 with Raised Face to be welded to a pipe of schedule 40S, shall be designated as:

FLANGE SS 10" SCH 40S CL300 B16.5 WNRF.

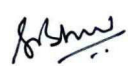
6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 - Technical Delivery Conditions for Flanges.

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		 CH MANOJ	 SRIKANTH G	 SB RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 090
		TECHNICAL SPECIFICATION		Rev. No. 00
		BLIND FLANGE, PR CLASS 300 B16.5 CARBON STEEL (A105)		Page 1 of 1

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BLIND FLANGE, PR CLASS 300 B16.5
CARBON STEEL (A105)

1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Carbon Steel Blind Flanges of **Pressure-Temperature Class 300** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Blind Flanges supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.5 "PIPE FLANGES AND FLANGED FITTINGS" and comply with the following additional requirements.
- 1.3 This specification is applicable for Blind Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL:

Carbon Steel Forging to ASTM A105 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE AND FACE:

Flange Size (NPS in inches) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Carbon Steel Blind Flange of Pressure-Temperature Class 300 with Raised Face, shall be designated as:

BLIND FLANGE CS 10" CL300 B16.5 RF.

6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 - Technical Delivery Conditions for Flanges.

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00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 SB RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 SB RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 091
		TECHNICAL SPECIFICATION		Rev. No. 00
		BLIND FLANGE, PR CLASS 150 B16.5 STAINLESS STEEL (A182GrF304)		Page 1 of 1

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BLIND FLANGE, PR CLASS 150 B16.5
STAINLESS STEEL (A182GrF304)

1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Stainless Steel Blind Flanges of **Pressure-Temperature Class 150** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Blind Flanges supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.5 "PIPE FLANGES AND FLANGED FITTINGS" and comply with the following additional requirements.
- 1.3 This specification is applicable for Blind Flanges of Sizes NPS½" to NPS24".

2.0 MATERIAL:

Stainless Steel Forging to ASTM A182 Gr F304 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE AND FACE:

Flange Size (NPS in inches) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Stainless Steel Blind Flange of Pressure-Temperature Class 150 with Raised Face, shall be designated as:

BLIND FLANGE SS 10" CL 150 B16.5 RF.

6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 - Technical Delivery Conditions for Flanges.

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Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 SB RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 SB RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 092
		TECHNICAL SPECIFICATION		Rev. No. 00
		BLIND FLANGE, PR CLASS 300 B16.5 STAINLESS STEEL (A182GrF304)		Page 1 of 1

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BLIND FLANGE, PR CLASS 300 B16.5
STAINLESS STEEL (A182GrF304)

1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Stainless Steel Blind Flanges of **Pressure-Temperature Class 300** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Blind Flanges supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.5 "PIPE FLANGES AND FLANGED FITTINGS" and comply with the following additional requirements.
- 1.3 This specification is applicable for Blind Flanges of Sizes NPS½" to NPS24".

2.0 MATERIAL:

Stainless Steel Forging to ASTM A182 Gr F304 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE AND FACE:

Flange Size (NPS in inches) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Stainless Steel Blind Flange of Pressure-Temperature Class 300 with Raised Face, shall be designated as:

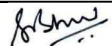
BLIND FLANGE SS 10" CL300 B16.5 RF.

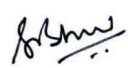
6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 - Technical Delivery Conditions for Flanges.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 SB RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
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Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED	PY 52 093
		PROJECT ENGINEERING & SYSTEMS DIVISION	Rev. No. 01
		TECHNICAL SPECIFICATION	Page 1 of 1
		HALF COUPLING SOCKET WELDING/THREADED	

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Socket Welding/Threaded Half Couplings/Vertical Inserts made of Carbon Steel/Stainless Steel/Alloy Steel of Class Designation 3000/6000/9000 as per ASME B16.11.
- 1.2 The Half Couplings supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.11 "FORGED FITTINGS, SOCKET-WELDING AND THREADED" and comply with the following additional requirements.
- 1.3 This specification is applicable for Half Couplings of Sizes NPS ½" to NPS 4".

2.0 MATERIAL:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified in BHEL Enquiry / Order.

- 2.1 Carbon Steel : Forging to ASTM A105.
Galvanizing as per ASTM A123, if specified.
- 2.2 Stainless Steel : Forging to ASTM A182 Gr F304 / F321
- 2.3 Alloy Steel : Forging to ASTM A182 Gr F11/F22.

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.11 (Latest edition).

4.0 SIZE AND CLASS DESIGNATION:

Half Coupling Size (NPS in inches), Class Designation (CL3000 / CL6000 / CL9000) and End Connection (SW-Socket Welded/SC-Screwed) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 1" Socket Welding Carbon Steel Half Coupling of Class Designation 3000, shall be designated as:

HALF CPLNG CS (A105) 1" CL3000 SW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
01	12.05.2016	UPDATED GALVANIZATION CLAUSE 2.1	 G. KALYAN	 SRIKANTH G
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
	PROJECT ENGINEERING & SYSTEMS DIVISION	 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION PE&SD	PY 52 094		
		TECHNICAL SPECIFICATION		
		FULL COUPLING SOCKET WELDING / THREADED		
			Rev. No. 01	Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Socket Welding/Threaded Full Couplings made of Carbon Steel/Stainless Steel/Alloy Steel of Class Designation 3000/6000/9000 as per ASME B16.11.
- 1.2 The Full Couplings supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.11 "FORGED FITTINGS, SOCKET-WELDING AND THREADED" and comply with the following additional requirements.
- 1.3 This specification is applicable for Full Couplings of Sizes NPS ½" to NPS 4".

2.0 MATERIAL:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified in BHEL Enquiry / Order.

- 2.1 Carbon Steel : Forging to ASTM A105
Galvanizing as per ASTM A123, if specified.
- 2.2 Stainless Steel : Forging to ASTM A182 Gr F304
- 2.3 Alloy Steel : Forging to ASTM A182 Gr F11/F22

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.11 (Latest edition).

4.0 SIZE AND CLASS DESIGNATION:

Full Coupling Size (NPS in inches), Class Designation (CL3000 / CL6000 / CL9000) and End Connection (SW-Socket Welded/SC-Screwed) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 1" Socket Welded Carbon Steel Full Coupling of Class Designation 3000, shall be designated as:

FULL CPLNG CS (A105) 1" CL3000 SW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO
01	22.03.2016	Clause no 2.1 updated to include Galvanizing Specification	 FRK	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 101
		TECHNICAL SPECIFICATION		Rev. No. 01
		ELBOW 90D, LONG RADIUS, CARBON STEEL, BUTT WELDING		Page 1 of 1

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1.0 GENERAL

- 1.1 The Butt Welding Elbows 90D supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.9 "Factory-Made Wrought Butt welding Fittings" and comply with the following additional requirements.
- 1.2 This specification is applicable for Butt Welding Elbows of Sizes NPS½" to NPS 48".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified below:

- 2.1 For Elbows of size NPS ½" to 14":
Seamless Construction according to ASTM A234 Gr WPB.
- 2.2 For Elbows of size NPS 16" to 48":
Welded Construction according to ASTM A234 Gr WPB-W.
- 2.3 *Galvanizing shall be carried out as per ASTM A123, if specified.*

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.9 (Latest edition).

4.0 SIZE AND THICKNESS:

Elbow Size (NPS in inches) and Wall thickness (Schedule) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 10" Sch 40 Carbon Steel 90D Elbow, shall be designated as:

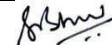
ELBOW 90D CS (A234WPB) 10" SCH 40 BW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO
01	20.07.2018	Clause 2.0 updated to include Galvanizing Specification.	 G. KALYAN	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 102
		TECHNICAL SPECIFICATION		Rev. No. 00
		ELBOW 90D, LONG RADIUS, STAINLESS STEEL, BUTT WELDING		Page 1 of 2

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1.0 GENERAL

- 1.1 The Butt Welding 90D Elbows supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.9 "Factory-Made Wrought Butt welding Fittings" and comply with the following additional requirements.
- 1.2 This specification is applicable for Butt Welding Elbows of Sizes NPS½" to NPS 48".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified below:

- 2.1 For Elbows of size NPS ½" to 14":
Seamless Construction according to ASTM A403 Gr WP304 & ASTM A403 Gr WP321
- 2.2 For Elbows of size NPS 16" to 48":
Welded Construction according to ASTM A403 Gr WP304-WX & ASTM A403 Gr WP321-WX

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.9 (Latest edition).

4.0 SIZE AND THICKNESS:

Elbow Size (NPS in inches) and Wall thickness (Schedule) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 10" Sch 40S Stainless Steel 90D Elbow, shall be designated as:

ELBOW 90D SS (A403WP304) 10" S40S BW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
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Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 101
		TECHNICAL SPECIFICATION	Rev. No. 00
		ELBOW 90D, LONG RADIUS, CARBON STEEL, BUTT WELDING	Page 2 of 2

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00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO
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Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 103
		TECHNICAL SPECIFICATION		Rev. No. 01
		REDUCER, CONCENTRIC, CARBON STEEL, BUTT WELDING		Page 1 of 2

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1.0 GENERAL

- 1.1 The Butt Welding Concentric Reducers supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.9 "Factory-Made Wrought Butt welding Fittings" and comply with the following additional requirements.
- 1.2 This specification is applicable for Concentric Reducers of sizes NPS ½" to NPS 48".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified below:

- 2.1 For Concentric Reducers of Larger End size NPS ½" to 14":
Seamless Construction according to ASTM A234 Gr WPB.
- 2.2 For Concentric Reducers of Larger End size NPS 16" to 48":
Welded Construction according to ASTM A234 Gr WPB-W.

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.9 (Latest edition).

4.0 SIZE AND THICKNESS:

Sizes of Large and Small ends of the Reducer (NPS in inches) and their corresponding Wall thicknesses (Schedule) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A Concentric Reducer of Size 12" STD x 10" STD Carbon Steel, shall be designated as:
CRDCR CS 12" x 10" STD x STD BW

A Concentric Reducer of Size 12" schedule 20 x 10" schedule 30 Carbon Steel, shall be designated as:
CRDCR CS 12" x 10" SCH 20 x SCH 30 BW

A Concentric Reducer of Size 12" Thickness 10mm x 10" Thickness 8mm Carbon Steel, shall be designated as:
CRDCR CS 12" x 10" THK 10 X THK 8 BW

6.0 TECHNICAL DELIVERY CONDITIONS:

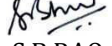
- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 103
		TECHNICAL SPECIFICATION	Rev. No. 01
		REDUCER, CONCENTRIC, CARBON STEEL, BUTT WELDING	Page 2 of 2

RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
01	02.05.2017	UPDATED S.NO.5: DESIGNATION	 G.KALYAN	 SRIKANTH G
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO

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Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 105
		TECHNICAL SPECIFICATION	Rev. No. 00
		REDUCER, CONCENTRIC, STAINLESS STEEL, BUTT WELDING	Page 1 of 1

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1.0 GENERAL

- 1.1 The Butt Welding Concentric Reducers supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.9 "Factory-Made Wrought Butt welding Fittings" and comply with the following additional requirements.
- 1.2 This specification is applicable for Concentric Reducers of sizes NPS ½" to NPS 48".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified below:

- 2.1 For Concentric Reducers of Larger End size NPS ½" to 14":
Seamless Construction according to ASTM A403 Gr WP304 & ASTM A403 Gr WP321.
- 2.2 For Concentric Reducers of Larger End size NPS 16" to 48":
Welded Construction according to ASTM A403 Gr WP304-WX & ASTM A403 Gr WP321-WX

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.9 (Latest edition).

4.0 SIZE AND THICKNESS:

Sizes of Large and Small ends of the Reducer (NPS in inches) and their corresponding Wall thicknesses (Schedule) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A Concentric Reducer of Size 12" Sch 10S x 10" Sch 10S Stainless Steel, shall be designated as:

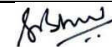
CRDCR SS 12" x 10" Sch 10S x 10S BW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
	PROJECT ENGINEERING & SYSTEMS DIVISION	 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 108
		TECHNICAL SPECIFICATION		Rev. No. 01
		TEE, STRAIGHT CARBON STEEL, BUTT WELDING		Page 1 of 1

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1.0 GENERAL

- 1.1 The Straight Tees supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.9 "Factory-Made Wrought Butt welding Fittings" and comply with the following additional requirements.
- 1.2 This specification is applicable for Straight Tees of Sizes NPS½" to NPS 48".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified below:

- 2.1 For Straight Tees of size NPS ½" to 14":
Seamless Construction according to ASTM A234 Gr WPB.
- 2.2 For Straight Tees of size NPS 16" to 48":
Welded Construction according to ASTM A234 Gr WPB-W.
- 2.3 *Galvanizing shall be carried out as per ASTM A123, if specified.*

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.9 (Latest edition).

4.0 SIZE AND THICKNESS:

Straight Tee Size (NPS in inches) and Wall thickness (Schedule) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 10" Sch 40 Carbon Steel Straight Tee, shall be designated as:

TEE STRT CS 10" SCH 40 BW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO
01	20.07.2018	Clause 2.0 updated to include Galvanizing Specification.	 G.KALYAN	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 109
		TECHNICAL SPECIFICATION	Rev. No. 00
		TEE, STRAIGHT STAINLESS STEEL, BUTT WELDING	Page 1 of 2

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1.0 GENERAL

- 1.1 The Straight Tees supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.9 "Factory-Made Wrought Butt welding Fittings" and comply with the following additional requirements.
- 1.2 This specification is applicable for Straight Tees of Sizes NPS ½" to NPS 48".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified below:

- 2.1 For Straight Tees of size NPS ½" to 14":
Seamless Construction according to ASTM A403 Gr WP304 & ASTM A403 Gr WP321.
- 2.2 For Straight Tees of size NPS 16" to 48":
Welded Construction according to ASTM A403 Gr WP304-WX & ASTM A403 Gr WP321.

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.9 (Latest edition).

4.0 SIZE AND THICKNESS:

Straight Tee Size (NPS in inches) and Wall thickness (Schedule) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 10" Sch 40S Stainless Steel Straight Tee, shall be designated as:

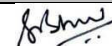
TEE STRT SS 10" Sch 40S BW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 - Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE		

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
	PROJECT ENGINEERING & SYSTEMS DIVISION	 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

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Form No:



PE&SD

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING & SYSTEMS DIVISION

PY 52 101

Rev. No. 00

Page 2 of 2

TECHNICAL SPECIFICATION

**ELBOW 90D, LONG RADIUS,
CARBON STEEL, BUTT WELDING**

SRIKANTH G

S B RAO

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 110
		TECHNICAL SPECIFICATION	Rev. No. 01
		ELBOW 90D/45D SOCKET WELDING/THREADED	Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Socket Welded/Threaded Elbows 90 Degree / 45 Degree made of Carbon Steel / Stainless Steel / Alloy Steel of Class Designation 3000 / 6000 / 9000 as per ASME B16.11.
- 1.2 The Elbows supplied according to this spec shall conform to the requirements of latest version of ASME Standard B16.11 "FORGED FITTINGS, SOCKET-WELDING AND THREADED" and comply with the following additional requirements.
- 1.3 This specification is applicable for Elbows of Sizes NPS ½" to NPS 4".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified in BHEL Enquiry / Order.

- 2.1 Carbon Steel : Forging to ASTM A105
Galvanizing as per ASTM A123, if specified.
- 2.2 Stainless Steel : Forging to ASTM A182 Gr F304/F321
- 2.3 Alloy Steel : Forging to ASTM A182 Gr F11/F22

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.11 (Latest edition).

4.0 SIZE AND THICKNESS:

Elbow Type (90D - 90 Degree/ 45D - 45 Degree), Elbow Size (NPS in inches), Class Designation (CL3000/ CL6000/ CL9000) and End Connection (SW-Socket Welded/SC-Screwed) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 1" Socket Welding Carbon Steel Elbow 90D of Class Designation 3000, shall be designated as: *ELBOW 90D CS (A105) 1" CL3000 SW.*

A 2" Threaded Carbon Steel (Galvanized) Elbow 45D of Class Designation 6000, shall be designated as: *ELBOW 45D CS (GALV) 2" CL6000 SC.*

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 - Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO
01	20.07.2018	Generally revised to include 45D Elbows and Galvanizing Specification.	 G.KALYAN	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
	PROJECT ENGINEERING & SYSTEMS DIVISION	 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 111
		TECHNICAL SPECIFICATION		Rev. No. 02
		TEE, STRAIGHT/REDUCING, SOCKET WELDING/THREADED		Page 1 of 2

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Socket Welded/Threaded Straight/Reducing Tees made of Carbon Steel / Stainless Steel / Alloy Steel of Class Designation 3000 / 6000 / 9000 as per ASME B16.11.
- 1.2 The Tees supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.11 "FORGED FITTINGS, SOCKET-WELDING AND THREADED" and comply with the following additional requirements.
- 1.3 This specification is applicable for Tees of Sizes NPS ½" to NPS 4".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified in BHEL Enquiry / Order.

- 2.1 Carbon Steel : Forging to ASTM A105
Galvanizing as per ASTM A123, if specified.
- 2.2 Stainless Steel : Forging to ASTM A182 Gr F304
- 2.3 Alloy Steel : Forging to ASTM A182 Gr F11/F22

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.11 (Latest edition).

4.0 SIZE AND THICKNESS:

Type of Tee (Straight / Reducing), Tee Size (NPS in inches of Large-Run and Small-Branch Ends), Class Designation (CL3000 / CL6000 / CL9000) and End Connection (SW-Socket Welded/SC-Screwed) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 1" Socket Welding Carbon Steel Straight Tee of Class Designation 3000, shall be designated as:

TEE STRT CS (A105) 1" CL3000 SW.

A 1.5" x 1" Threaded Carbon Steel (Galvanized) Reducing Tee of Class Designation 3000, shall be designated as:

RDTEE CS (A105-GALV) 1.5" X 1" CL3000 SC.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.11.

+++

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 S B RAO	20.07.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 111
		TECHNICAL SPECIFICATION	Rev. No. 02
		TEE, STRAIGHT/REDUCING, SOCKET WELDING/THREADED	Page 2 of 2

RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO
01	22.03.2016	Clause no 2.1 updated to include Galvanizing Specification	 FRK	 SRIKANTH G
02	20.07.2018	Generally revised to include Reducing Tees.	 FRK	 SRIKANTH G

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Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 119
		TECHNICAL SPECIFICATION		Rev. No. 00
		WELDING NECK FLANGE, PR CLASS 600 B16.5 CARBON STEEL (A105)		Page 1 of 1

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WELDING NECK FLANGE, PR CLASS 600 B16.5
CARBON STEEL (A105)

1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Carbon Steel Welding Neck Flanges of **Pressure-Temperature Class 600** with Raised Face/ Flat Face as per ASME B16.5.
- 1.2 The Welding Neck Flanges supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.5 "PIPE FLANGES AND FLANGED FITTINGS" and comply with the following additional requirements.
- 1.3 This specification is applicable for Welding Neck Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL:

Carbon Steel Forging to ASTM A105 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE, THICKNESS AND FACE:

Flange Size (NPS in inches), Welding End Wall Thickness (Schedule) and Face (RF-Raised Face/ FF-Flat Face) shall be as per BHEL Enquiry/ Order.

5.0 DESIGNATION:

A 10" Carbon Steel Welding Neck Flange of Pressure-Temperature Class 600 with Raised Face to be welded to a pipe of schedule 40, shall be designated as:

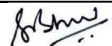
FLANGE CS 10" SCH 40 CL600 B16.5 WNRF.

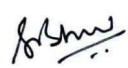
6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 - Technical Delivery Conditions for Flanges.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	01.08.2015	FIRST ISSUE	 SRIKANTH G	 SB RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 SB RAO	01.08.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED	PY 52 123
		PROJECT ENGINEERING & SYSTEMS DIVISION	
		TECHNICAL SPECIFICATION	Rev. No. 00
		REDUCING COUPLING SOCKET WELDING / THREADED	Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Socket Welding/Threaded Reducing Couplings made of Carbon Steel/Stainless Steel/Alloy Steel of Class Designation 3000/6000/9000 as per ASME B16.11.
- 1.2 The Reducing Couplings supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.11 "FORGED FITTINGS, SOCKET-WELDING AND THREADED" and comply with the following additional requirements.
- 1.3 This specification is applicable for Full Couplings of Sizes NPS ½" to NPS 4".

2.0 MATERIAL:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified in BHEL Enquiry / Order.

- 2.1 Carbon Steel : Forging to ASTM A105
Galvanizing as per ASTM A123, if specified.
- 2.2 Stainless Steel : Forging to ASTM A182 Gr F304
- 2.3 Alloy Steel : Forging to ASTM A182 Gr F11/F22

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.11 (Latest edition).

4.0 SIZE AND CLASS DESIGNATION:

Full Coupling Size (NPS in inches), Class Designation (CL3000 / CL6000 / CL9000) and End Connection (SW-Socket Welded/SC-Screwed) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 1"x3/4" Carbon Steel Socket Welded Reducing Coupling of Class Designation 3000, shall be designated as:

REDUCING CPLNG CS (A105) 1"x3/4" CL3000 SW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

+++

RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	01.08.2015	FIRST ISSUE	 SRIKANTH G	 S B RAO

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 CH MANOJ	 SRIKANTH G	 S B RAO	01.08.15

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 178	
			TECHNICAL SPECIFICATION	
		SLIP-ON THREADED FLANGE, PR CLASS 150 B16.5 CARBON STEEL (A105)		Rev. No. 01 Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Carbon Steel Slip-on Threaded Flanges of **Pressure-Temperature Class 150** with Raised Face/Flat Face as per ASME B16.5.
- 1.2 The Slip-on Flanges supplied according to this specification shall conform to the requirements of latest version of **ASME Standard B16.5 "Pipe Flanges and Flanged Fittings"** and comply with the following additional requirements.
- 1.3 This specification is applicable for Slip-on Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL & CONSTRUCTION:

- 2.1 Forging Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard A105 (latest version).
- 2.2 *Galvanizing (if specified) shall be carried out as per ASTM A123.*

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

- 3.1 Dimensions and Tolerances shall be as per ASME B16.5 (Latest edition).
- 3.2 Flanges shall have internal taper pipe thread confirming to ASME B 1.20.1.

4.0 SIZE AND FACE:

Flange Size (NPS in inches) and Face (RF-Raised Face/FF-Flat Face) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 10" Carbon Steel Slip-on Threaded Flange of Pressure-Temperature Class 150 with Raised Face shall be designated as:

FLANGE CS 10" CL150 B16.5 SCRF.

6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 – Technical Delivery Conditions for Flanges.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	09.04.2016	FIRST ISSUE	 RAGHAVENDRA SVN	 SRIKANTH G
01	10.09.2018	GENERALLY REVISED	 RAGHAVENDRA SVN	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 FARUQUE	 RAGHAVENDRA	 SRIKANTH G	09.04.16

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 181
		TECHNICAL SPECIFICATION		Rev. No. 02
		CAP CARBON STEEL(SA234 WPB)BW		Page 1 of 1

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1.0 GENERAL

- 1.1 The Butt Welding Cap supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.9 "Factory-Made Wrought Butt welding Fittings" and comply with the following additional requirements.
- 1.2 This specification is applicable for Butt Welding Cap of Sizes NPS 0.5" to NPS 14".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified below:

- 2.1 For Cap of size NPS 0.5" to NPS 14"::
Seamless Construction according to ASTM A234 Gr WPB.
- 2.2 *Galvanizing shall be carried out as per ASTM A123, if specified.*

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.9 (Latest edition).

4.0 SIZE AND THICKNESS:

Cap Size (NPS in inches) and Wall thickness (Schedule) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 10" Sch 40 Carbon Steel CAP, shall be designated as:

CAP-10"-SCH 40-BW-CS (SA 234 WPB)

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	12.04.16	FIRST ISSUE	 SVN R	 SRIKANTH G
01	12.04.17	Added 0.5" to 2" size	 IMRAN	 SRIKANTH G
02	06.08.19	Clause 2.0 updated to include Galvanizing Specification.	 IMRAN	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 FARUQUE	 SVN R	 SRIKANTH G	12.04.16

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52205
		TECHNICAL SPECIFICATION		Rev. No. 00
		CAP-SOCKET WELDED/THREADED		Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Socket Welded/Threaded Cap made of Carbon Steel / Stainless Steel / Alloy Steel of Class Designation 3000 / 6000 / 9000 as per ASME B16.11.
- 1.2 The Cap supplied according to this specification shall conform to the requirements of latest version of ASME Standard B16.11 "FORGED FITTINGS, SOCKET-WELDING AND THREADED" and comply with the following additional requirements.
- 1.3 This specification is applicable for Cap of Sizes NPS ½" to NPS 4".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the ASTM Standard (latest version) as specified in BHEL Enquiry / Order.

- 2.1 Carbon Steel : Forging to ASTM A105
Galvanizing as per ASTM A123, if specified.
- 2.2 Stainless Steel : Forging to ASTM A182 Gr F304
- 2.3 Alloy Steel : Forging to ASTM A182 Gr F11/F22

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.11 (Latest edition).

4.0 SIZE AND THICKNESS:

Cap Size (NPS in inches), Class Designation (CL3000 / CL6000 / CL9000) and End Connection (SW-Socket Welded/SC-Screwed) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 1" Socket Welding Carbon Steel Cap of Class Designation 3000, shall be designated as:

CAP CS (A105) 1" CL3000 SW.

6.0 TECHNICAL DELIVERY CONDITIONS:

- 6.1 Unless otherwise specified on the order, IBR certification is not required.
- 6.2 All other requirements shall be as per BHEL Corporate Standard AA0851402 – Technical Delivery Conditions for Pipe Fittings. ASME Standard B16.28 referred in this TDC shall be read as ASME B16.9.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	13.04.2017	FIRST ISSUE	 IMRAN	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
	PROJECT ENGINEERING & SYSTEMS DIVISION	 IMRAN	 G KALYAN	 SRIKANTH G	13.04.17

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52211
		TECHNICAL SPECIFICATION		Rev. No. 00
		SLIP-ON WELDING FLANGE, PR CLASS 300 B16.5 CARBON STEEL (A105)		Page 1 of 1

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Carbon Steel Slip-on Welding Flanges of **Pressure-Temperature Class 300** with Raised Face/Flat Face as per ASME B16.5.
- 1.2 The Slip-on Flanges supplied according to this specification shall conform to the requirements of latest version of **ASME Standard B16.5 "Pipe Flanges and Flanged Fittings"** and comply with the following additional requirements.
- 1.3 This specification is applicable for Slip-on Flanges of Sizes NPS ½" to NPS 24".

2.0 MATERIAL & CONSTRUCTION:

Carbon Steel Forging to ASTM A105 (Latest edition).

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per ASME B16.5 (Latest edition).

4.0 SIZE AND FACE:

Flange Size (NPS in inches) and Face (RF-Raised Face/FF-Flat Face) shall be as per BHEL Enquiry/Order.

5.0 DESIGNATION:

A 10" Carbon Steel Slip-on Welding Flange of Pressure-Temperature Class 300 with Raised Face shall be designated as:

FLANGE CS 10" CL300 B16.5 SORF.

6.0 TECHNICAL DELIVERY CONDITIONS:

All other requirements shall be as per BHEL Corporate Standard AA0851401 – Technical Delivery Conditions for Flanges.

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RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	20.07.2015	FIRST ISSUE	 SVN R	 SRIKANTH G

Refer Doc	LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION	PREPARED	CHECKED	APPROVED	DATE
		 SVNR	 SRIKANTH G	RCVS	18.07.17

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PY 52 218
		TECHNICAL SPECIFICATION		Rev. No. 00
		PIPE NIPPLE		Page 1 of 3

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1.0 GENERAL

- 1.1 This standard specifies requirements related to Designation, Material, Size, Dimensions and other information required for ordering purposes of Pipe nipple made of Carbon Steel / Stainless Steel / Alloy Steel as per ASTM A 733 standard
- 1.2 The pipe used for pipe nipples supplied according to this specification shall conform to the requirements of latest version of standards as indicated below:
- 1.2.1 Carbon & Alloy steel pipes – All thicknesses/schedule : as per ASME B36.10M
- 1.2.2 Stainless steel pipes –All thickness/schedule: as per ASME B36.19M
- 1.2.3 Pipe Threads : as per ASME B1.20.1
- 1.2.4 Bevel end/ Butt welding ends: as per ASME B16.25
- All other additional requirements shall be as per this specification and ASTM A733
- 1.3 This specification is applicable for Pipe nipples of Sizes NPS ½" to NPS 4".

2.0 MATERIAL & CONSTRUCTION:

Material, Construction, Chemical Composition, Mechanical Properties, Heat Treatment, Testing and other requirements related to Material shall be in accordance with the below Standards (latest version).

- 2.1 Carbon Steel - CS : As per ASTM A106 Gr B
- 2.2 Carbon Steel with galvanizing – CS(GAL) : Pipe as per ASTM A106 Gr B
Galvanizing as per ASTM A123 & A53.
- 2.3 Stainless Steel- SS : As per ASTM A312 TP 304
- 2.4 Alloy Steel - AS : As per ASTM A335 Gr P11/P22

All other requirements shall be as per ASTM A733 standard

3.0 DIMENSIONS, TOLERANCES AND OTHER REQUIREMENTS:

Shall be as per applicable standards (Latest edition) as indicated in above points 1 & 2
The threaded portion length

4.0 SIZE AND THICKNESS:

Pipe nipple Size (NPS in inches), Thickness/schedule and End connections shall be as per material description indicated in BHEL Enquiry/Order.

5.0 END CONNECTION:

PE- Plain end

BE- Bevel end/ Butt welding ends

NPT-M – Male threaded ends (NPT-M)

End Connections shall be a combination of above and shall be as per material description indicated in BHEL Enquiry/order.

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 G.KALYAN	 SRIKANTH G	 SRIKANTH G	10.08.17

6.0 DESIGNATION:

A 0.75" 100mm long pipe nipple of S160 thickness with plain end one side and male threaded end other side, of galvanized ASTM A106 Gr B carbon steel material, shall be designated as:

NIPPLE 0.75"X100 S160 CS(GAL) PEXNPT-M

A 0.75" 100mm long pipe nipple of S160 thickness with male threaded ends both side, of galvanized ASTM A106 Gr B carbon steel material, shall be designated as:

NIPPLE 0.75"X100 S160 CS(GAL) NPT-M

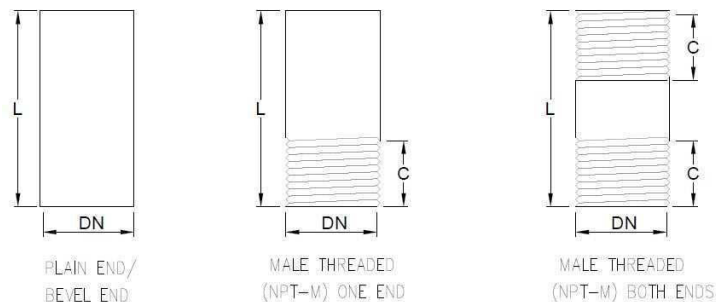
7.0 PRESERVATION:

Before dispatch, the fittings shall be dried and cleaned and the entire surface shall be well coated with a good quality rust preventive coating that will not become fluid and run off at 65 degC. Threads shall be protected with suitable grease.

8.0 TECHNICAL DELIVERY CONDITIONS:

8.1 Unless otherwise specified on the order, IBR certification is not required.

8.2 All other requirements including marking shall be as per BHEL Corporate Standard: AA0851402 – Technical Delivery Conditions for Pipe Fittings



PIPE NIPPLE
FIGURE-1

“L”- Total length of the pipe nipple as indicated in material description

“DN”- Nominal pipe size in inches as indicated in material description

“C”- Threaded portion length (at one end)

TABLE-1

NOMINAL SIZE (DN) (INCHES)	THREADED LENGTH C (MM)
0.5	25
0.75	25
1	25
1.5	30
2	30
3	45
4	45

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52 218
		TECHNICAL SPECIFICATION	Rev. No. 00
		PIPE NIPPLE	Page 3 of 3

RECORD OF REVISIONS:

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00	10.08.17	FIRST ISSUE	 G.KALYAN	 SRIKANTH G

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AMENDMENT - NOTIFICATION

AA 085 14 01 Rev.No. 03

PAGE 1 OF 1

AA 085 14 01: TECHNICAL DELIVERY CONDITIONS FOR ANSI-FLANGES

On Page 2 of 3

1) Cl 6.2 Preservation: In existing matter after 'rust preventive', the word 'material' should be replaced by 'Coating'

2) Cl 6.3 Packing: At the end of the existing matter, the following to be added:-

" The Components shall be wrapped with bitumen paper / tar paper / polyethylene paper to avoid water ingress during transit / handling in transporter's godown. Components shall be packed in a sound closed wooden/steel box"

Please see instructions on the reverse.

Ref: Cl 16.4 of 16th MOM of
IPSC, WG(SMC&RP)

Amd.No.
01

Approved
WG(SMC& RP)

Issued
CORP. R&D

Date
15th Nov.' 98

Cum.Sr.No
A 2736



CORPORATE STANDARD

AA Q85 14 01

REV.No. 03

PAGE 1 OF 3

TECHNICAL DELIVERY CONDITIONS FOR ANSI-FLANGES

1. SCOPE:

This standard stipulates the technical delivery conditions for slip-on raised face (SORF), slip-on ring joint (SORJ) weldneck raised face (WNRJ), weldneck ring joint (WNRJ) and blind flanges to ANSI:B16.5.

2. TECHNICAL REQUIREMENTS:

The flanges shall comply with ANSI:B 16.5 with the following specific requirements.

2.1 Pressure Class & Size:

The pressure class and size shall be as specified in the enquiry/order. The nominal size shall be specified in the case of SORF, SORJ and blind flanges and nominal size and schedule number shall be clearly indicated in the case of WNRJ & WNRJ flanges.

2.2 Material Specification:

The flanges shall be manufactured by forging. The material of the flanges shall be as per the enquiry/order. The material shall generally comply with the following unless otherwise specified.

Carbon Steel (Low temperature service): ASME:SA350, Gr:LF1

Carbon Steel (High temperature service): ASME:SA105

Alloy Steel..... | ASME:SA182, Gr:F11

Stainless Steel..... | ASME:SA182, Gr:F22

:ASME:SA182, Gr:F321

2.3 Heat Treatment:

The flanges shall be properly heat treated as per the relevant material specification.

2.4 Dimensions & Tolerances:

The dimensions and tolerances shall be strictly as per ANSI:B 16.5-1988.

2.5 Finish:

Unless otherwise specified, the finish of the sealing surface shall be as follows:

2.5.1 Raised Face Flanges:

Serrated concentric finish having from 24 Grooves/inch to 40 grooves/inch shall be used. The cutting tool employed shall have an approximate 0.06" or larger Radius. The resultant surface finish shall have 125 μ inch to 500 μ inch roughness.

2.5.2 Ring Joint Flange:

The side wall surface of gasket groove shall not exceed 63 μ inch roughness.

Revision:

Revised as per ANSI:B16.5-1988

Approved:

INTERPLANT STANDARDIZATION
COMMITTEE-WG (SMC+RP)

Rev.No. 03	Amd.No.	Reaffirmed	Prepared HYDERABAD	Issued CORP. R&D	Dt. of 1st issue Aug. '80
Dt. April '95	Dt.	Year:			

**2.6 Edge Preparation:**

Unless otherwise specified, the weld neck flanges shall be supplied with edge preparation for welding with the connecting pipe. The edge preparation shall be as per ANSI:B 16.5 figures 8 and 9.

3. TESTS:

Each melt used for the manufacture of flange forgings shall be tested for chemical analysis and mechanical properties as per relevant material standards.

4. TEST CERTIFICATE:

3 copies of the test certificate covering the results of chemical analysis and mechanical tests shall be furnished. The test certificate format shall be as per Annexure 1. The tests shall be witnessed and the test certificate shall be signed by M/s. Lloyds or any other inspection authority approved by IBR in that country for overseas supplies, and by the inspector authorized by Central Boilers Board (IBR) in case of indigenous supplies.

5. GUARANTEE CERTIFICATE:

The supplier shall furnish a guarantee certificate stating that the flanges supplied shall be suitable for use at the relevant pressure temperature ratings. The guarantee shall be valid for a minimum period of 18 months from the date of supply.

6. MARKING, PRESERVATION AND PACKING:**6.1 Marking:**

The following details shall be punched on the periphery of the rim of each flange.

- a) Manufacturer's name or trade mark.
- b) Pressure class.
- c) Nominal size.
- d) Type of flange (SORF, SORJ, WNRF, WNRJ, Blind & Schedule No. pipe thickness for WN flanges).
- e) Material specification grade.
- f) Melt No.
- g) Test certificate No.
- h) Letter 'R' followed by ring groove No. (in case of ring joint flanges).
- i) Mark of inspecting authority.

6.2 Preservation:

Before despatch, the flanges shall be dried and cleaned and the entire surface shall be well covered with a good quality rust preventive material that will not become fluid and run-off at 65°C.

6.3 Packing:

Flanges shall be bundled by bolting them together or securing them with wire of suitable strength passed through the bolt holes in such a manner that the flanges are paired and no flange facings remain exposed and damaged. In the case of overseas supplies, the packing shall be sea worthy.



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ANNEXURE 1 - RECOMMENDED TEST CERTIFICATE FORMAT FOR FORGINGS

SUPPLIER'S NAME AND ADDRESS

- | | | |
|---|---|------------------------------------|
| 1. Customer: | 9. Reduction Ratio | } Ingot to Bloom
Bloom to Blank |
| 2. TC No. & Date: | 10. Batch No.: | |
| 3. PO No.: | 11. Heat/Mark No. | |
| 4. Process of Making Ingot: | 12. Spec. No. | |
| 5. Decarburisation Process: | 13. Test Bar Size & Nos. | |
| 6. Forging Method: | 14. Supplier of the Ingot/Billet/ Bloom and TC reference. | |
| 7. BH&L's Reference for Approval of Bloom | | |
| 8. Quench: Top _____ % Bottom _____ % | | |

15. FORGINGS COVERED BY TEST CERTIFICATE

S.No.	Drawing No. & Item No.	Description	Quantity & Weight

16. CHEMICAL COMPOSITION (PERCENT)

Element	C	Si	Mn	S	P										
As Per Specn.	Min.														
Actual Values	Max.														

17. HEAT TREATMENT (To be accompanied by Recorder Chart, Whenever called for)

Condition	Heating Rate, °C/hr.	Temp. °C	Soaking Time, Hrs.	Cooling Rate, °C/hr	Cooling Medium

18. MECHANICAL PROPERTIES

As Per Specn.	Min.	Max.	TS N/mm ²	Y.S. 0.5% P _{0.2} Proof N/mm ²	% Elongation 5.65√S ₀ G.L.	% R.A. Min.	Hardness BHN (Min. 3 values)	Impact Value Joules	Bend Test		
									Angle of bend	Dia of mandrel	Result
Actual Values											

19. SURFACE FINISH (When called for in the order/dwg.)

20. DIMENSIONAL INSPECTION

21. NON-DESTRUCTIVE TESTS

Nature of Test	Acceptance level	Instrument used	Range	Results	Any other detail
Ultrasonic					
Radiographic					
Dye penetrant/ Magnetic Particle					

22. METALLOGRAPHIC EXAMINATION (To be conducted if called for and photo micrographs to be attached along with a report)

Location of Sample	Echant used	Magnification	Constituent observed	Relative %	
Microstructure	Macroetch	Inclusion Rating			

23. OTHER TESTS IF ANY (MICROSCOPIC, SULPHUR PRINTS, ETC.)

24. IDENTIFICATION OF FORGINGS AS PER PURCHASE SPEC

We hereby certify that the items mentioned above have been tested and inspected in our presence and are found to be in accordance with drawings, specifications and purchase order.

SIGNATURE, NAME & SEAL OF THE
INSPECTING OFFICER
DATE

SIGNATURE, NAME & SEAL OF THE
CHIEF OF QUALITY CONTROL/
CHIEF METALLURGIST OF THE SUPPLIER
DATE

INSTRUCTIONS

- Details of all heat treatment processes carried out should be furnished sequentially in 17
- Test certificates are to be furnished as per Purchase order and specification, in A4 size preferably in transparent paper.
- All the entries including signature should be in block colour ink.
- If testing is done by outside agencies, the original TCs shall be furnished
- The actual TC may run into more than one A4 size paper. If needed, to facilitate filling up of details.



CORPORATE STANDARD

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Rev. No. 04

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TECHNICAL, DELIVERY CONDITIONS FOR ANSI-PIPE FITTINGS

1.0 SCOPE:

This standard stipulates the technical delivery conditions for socket-welding fittings like elbows, tees, couplings etc. to ANSI: B16.11 and seamless butt-welding fittings like elbows, tees, reducers etc. to ANSI: B16.28.

2.0 TECHNICAL REQUIREMENTS

This socket-welding fittings shall comply with ANSI: B16.11 and butt-welding fittings with ANSI: B16.28 with the following specific requirements.

2.1 Pressure class, schedule and size : Pressure class and size for socket-welding fitting, schedule and size for butt-welding fittings shall be as specified in the enquiry/order.

2.2 Material Specification: The material of the fittings shall be as per enquiry/order. The material shall generally comply with the following, unless otherwise specified.

a) Socket welding fittings: Socket welding fittings shall be manufactured by forging to the following material specification:

Carbon Steel (Low Temperature Service)	: ASME : SA 350 Gr : LF1
Carbon Steel (High Temperature Service)	: ASME : SA 105
Alloy Steel (High Temperature Service)	: ASME : SA 182 Gr : F22
Stainless Steel	: ASME : SA 182 Gr : F321

b) Butt-Welding fittings: Butt-welding fittings shall be manufactured as per the relevant standards to the following material specification:

Carbon Steel (Low Temperature Service)	: ASME : SA 420 Gr : WPL6
Carbon Steel (High Temperature Service)	: ASME : SA 234 Gr : WPB
Alloy Steel (High Temperature Service)	: ASME : SA 234 Gr : WP11
	: ASME : SA 234 Gr : WP22
Stainless Steel	: ASME : SA 403 Gr : WP321

2.3 Heat treatment: The fittings shall be properly heat treated as per the relevant material specification:

2.4 Dimensions, Tolerances and Finish : The dimensions and tolerances, shall be strictly as per ANSI: B16.11 for forged steel fittings, socket welding and threaded, B16.9 for factory made wrought steel Butt-Welding fittings. For allowable imperfections and finish of the fittings relevant clause as per ASME : SA 234/SA 403/SA 420 shall be applicable for carbon alloy and stainless steel fittings.

Revisions :

CI 20.8.13 of MOM of WG-SMC+RP

APPROVED :

INTERPLANT
STANDARDIZATION COMMITTEE (WG-SMC+RP)

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Dt :

Year :

HYDERABAD

Corp. R&D

August 1980



All fittings shall be shot blasted both inside and outside to remove rust, scale and other foreign materials. The surface shall be clean, smooth and without any scales, burrs etc. Vendor shall note the method to be employed in their Quality Assurance Plan for approval by BHEL representative/Customers.

- 2.5 Edge Preparation:** Unless otherwise specified, the butt welding fittings shall be supplied with edge preparation for welding with the connecting pipe. The edge preparation shall be as per ANSI : B 16. 25.

3.0 CHEMICAL COMPOSITION AND PROCESS:

- 3.1 Carbon percentage shall be limited as specified in the following table:

Sl No.	Grade	Connecting pipe wall thickness	C%
1.	A105, WPC	All	0.25
2.	WPB, WPBW	All	0.25

- 3.2 Fittings shall be of seamless construction only unless otherwise specified in the purchase order. Fittings of nominal bore NB 50 and below shall be of forged construction only.

- 3.3 Fittings shall be forged, wherever specified in the purchase order. The forgings must be as close as possible to the final shape and size.

- 3.4 All the plates used for manufacturing of plate formed fittings shall be ultrasonically tested by either of the following:

- i) ASME SA 435 and acceptance standards as in SA 435 except that adjacent discontinuity indications shall be separated from each other by a distance equal to or no longer than the larger of the indications, unless both the adjacent defects can be contained in a circle of diameter equal to the acceptance standards of a single defect.

- ii) ASME SA 578 and acceptance standard shall be as per Level-1 of SA 578

4.0 INSPECTION AND CERTIFICATION:

- 4.1 Mechanical and Chemical Testing:** Material used for manufacture of the fittings shall be tested for mechanical properties and chemical composition as relevant material standards.

- 4.2 Magnetic particle Examination:** Knuckle of reducers, outer bend portion of elbows and neck portion of tees shall be magnetic particle examined after final heat treatment in accordance with practice ASME SE 709 for all carbon steel and alloy steel fittings for all schedule for sizes 2" inclusive and above.

- 4.3 Liquid Penetrant Examination:** Knuckle of reducers, outerbend portion of elbows and neck portion of tees shall be liquid penetrant examined after final heat treatment in accordance with practice ASME SE 165 for all stainless steel fittings for all schedules for sizes 2" inclusive and above.

- 4.4 Acceptance Criteria for MPE and LPE Tests:** The acceptance criterial for MPE and LPE tests shall be in accordance with Appendix 6 and 8 of ASME, Sec. VIII Div. 1

All surfaces to be examined shall be free of :

- relevant lines indications.
- relevant rounded indications greater than 3/16 inch.
- Four or more relevant rounded indications in a line separated by 1/16 inch or less (edge to edge)
- An indication of imperfection may be larger than the imperfection that causes it, however, the size of the indication is the basis for acceptance evaluation



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4.5 Wrinkless: The inner bend portion of Elbows shall be free from wrinkles and Tool marks.

5.0 CERTIFICATE:

5.1 All fittings shall be delivered along with test certificates in English.

5.2 Fittings to material specification ASME SA 105, SA 182 Gr.F22, SA 234 Gr.WPB and WP22 shall be inspected and the test certificates shall be countersigned by an inspecting authority approved under Appendix "C" of Indian Boiler Regulations.

5.3 Fittings to material specification ASME 350 Gr.LF1, SA 182 Gr.F321, SA 420 Gr.WPL6 and SA 403 Gr.WP 321 shall be subjected to inspection by authorities nominated by BHEL and the test certificates shall be countersigned by them.

5.4 Three original Test certificates shall be submitted.

6.0 GUARANTEE CERTIFICATE:

The supplier shall furnish a guarantee certificate stating that fittings supplied 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.

7.0 QUALITY PLAN:

A quality plan incorporating the process adopted by the supplier and conforming to the requirements of this specification shall be submitted for approval. Manufacturing shall commence only after the approval of the quality plan by BHEL.

8.0 MARKING, PRESERVATION AND PACKING:

8.1 **Marking:** The following details shall be punched on each fitting:

- a) Manufacturer's name and trade mark
- b) Pressure class (in case of socket welding fittings)
- c) Nominal size
- d) Schedule No. (in case of butt welding fittings)
- e) Type of fitting
- f) Material specification grade
- g) Melt No.
- h) Test certificate number
- i) Mark of inspection authority

8.2 Presentation:

Before despatch, the fittings shall be dried and cleaned and the entire surface shall be well coated with a good quality rust preventive coating that will not become fluid and run-off at 65°C.

8.3 Packing:

All fittings shall be provided with HDPE end covers to protect the weld edge preparation and to protect the internal surfaces. The fittings shall be wrapped by bitumen paper/tar paper/polyethylene paper to avoid water ingress during transit/handling in transporter's godown. Fittings shall be packed in a sound closed wooden/steel box.

9.0 REFERRED STANDARDS (Latest Publications Including Amendments):

- 1) ANSI B 16.9, B 16.11, B 16.25 & B 16.28
- 2) ASME SA 105, SA 182, SA 234, SA 350, SA 403, SA 420 SA, SA 435, SA 578, SE 165 & ASME SE 709.

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CORPORATE STANDARD



ANNEXURE-I : TEST CERTIFICATE PROFORMA FOR FORGINGS

SUPPLIER'S NAME AND ADDRESS											
TEST CERTIFICATE FOR FORGINGS											
1. Customer;						9. Reduction Ratio } Ingot to Bloom Bloom to Blank					
2. TC No. & Date;						10. Batch No.;					
3. PO No.;						11. Heat/Melt No.					
4. Process of Melting Ingot;						12. Spec. No.					
5. Deoxidisation Process;						13. Test Bar Size & Nos.					
6. Forging Method;						14. Supplier of the ingot/billet/ Bloom and TC reference.					
7. BHEL's Reference for Approval of Bloom											
8. Discard: Top _____%, Bottom _____%											
15. FORGINGS COVERED BY TEST CERTIFICATE											
S.No.		Drawing No. & Item No.				Description				Quantity & Weight	
16. CHEMICAL COMPOSITION (PERCENT)											
Element		C	Si	Mn	S	P					
As Per Specn.		Min.									
		Max.									
Actual Values											
17. HEAT TREATMENT (To be accompanied by Recorder Chart, Whenever called for)											
Condition		Heating Rate, °C/hr.		Temp. °C		Soaking Time, Hrs.		Cooling Rate, °C/hr		Cooling Medium	
18. MECHANICAL PROPERTIES											
		T.S. N/mm ²	Y.S. 0.5/0.2% Proof N/mm ²	% Elongation 5.65√So GL	% R.A. Min.	Hardness BHN (Min. 3 values)	Impact Value Joules	Bend Test			
								Angle of bend	Dia of mandrel	Result	
As Per Specn.		Min.									
		Max.									
Actual Values											
19. SURFACE FINISH (When called for in the order/drg.)											
20. DIMENSIONAL INSPECTION											
21. NON-DESTRUCTIVE TESTS											
Nature of Test		Acceptance level		Instrument used		Range		Results		Any other detail	
Ultrasonic											
Radiographic											
Dye penetrant/ Magnetic Particle											
22. METALLOGRAPHIC EXAMINATION (To be conducted if called for and photo micrographs to be attached along with a report)											
Location of Sample		Etchant used		Magnification		Constituent observed		Relative %			
Microstructure		Macroetch		Inclusion Rating							
23. OTHER TESTS IF ANY (MICROSCOPIC, SULPHUR PRINTS, ETC)											
24. IDENTIFICATION OF FORGINGS AS PER PURCHASE SPEC.											
We hereby certify that the items mentioned above have been tested and inspected in our presence and are found to be in accordance with drawings, specifications and purchase order.											
SIGNATURE, NAME & SEAL OF THE INSPECTING OFFICER DATE:						SIGNATURE, NAME & SEAL OF THE CHIEF OF QUALITY CONTROL/ CHIEF METALLURGIST OF THE SUPPLIER DATE:					
INSTRUCTIONS											
a) Details of all heat treatment processes carried out should be furnished sequentially in 17.											
b) Test certificates are to be furnished as per Purchase order and specification, in A4 size preferably in transparent paper.											
c) All the entries including signature should be in block colour ink.											
d) If testing is done by outside agencies, the original TCs shall be furnished.											
e) The actual TC may run into more than one A4 size paper, if needed, to facilitate filling up of details.											