



**Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)**

Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017
Phone : 91 (044) 28161245, e-mail: prs@bhelmipc.co.in

REF: ENQ NO: 4101000001

DT: 18.01.2010

Sub: Procurement of FORGINGS.

Ref: Enquiry No: 4101000001 dt.18-01-10

Please find the following tender documents for reference.

1. List of items
2. Tech. delivery condition TDG: 104:03

Pre qualification is the criteria for consideration for other than BHEL approved vendors. After qualifying for registration, the new vendors may be considered for future requirements, in line with BHEL system and policy. Such vendors will not be considered for this enquiry.

This is a limited tender and only vendors who are contacted through e-mail/courier may submit their offers.

The New vendors may download vendor registration forms from BHEL web site www.bhel.com and relevant data for formal registration.

Manager / Purchase
BHEL / Piping Centre
80,GN Road, T.Nagar
Chennai-600017
Ph:28161243/245



**ENQUIRY
(IMPORTS)**

BHARAT HEAVY ELECTRICALS LIMITED

ZPage 1/3

(A Government of India Undertaking)
80, G.N.ROAD, T.NAGAR
Purchase Department - Piping Centre
CHENNAI - 600 017.
TAMILNADU (INDIA)

PHONE :
GRAMS : BHARATELEC
FAX NO :
E-mail :
Web :

Enquiry No	Enquiry Date	Due Date for Quotation
4101000001	18.01.2010	01.02.2010

Please quote Enquiry No, Date and due date in all correspondences.
This is only a request for quotation and not an order

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	925166810000 MatchingpceOD600/OD558.8L=500SA182F 22CL3 DIVALUE: Draw.No: 4-80-999-93234	NO	10.000	10.00	18.04.10
20	925166820000 MatchingpceOD578/OD558.8L=500SA182F 22CL3 DIVALUE: Draw.No: 4-80-999-93235	NO	10.000	10.00	18.04.10
30	925166840000 Matchingpce OD300/ID139L=621 SA182F22CL3 DIVALUE: Draw.No: 4-80-999-93237	NO	20.000	20.00	18.04.10
40	925166850000 MatchingpceOD310/ID147L=690SA182F22 CL3 DIVALUE: Draw.No: 4-80-999-93238	NO	20.000	20.00	18.04.10
50	925166860000 Trunnion OD130X35 L=75 SA182 F22CL3 DIVALUE: Draw.No: 4-80-999-93239	NO	40.000	40.00	18.04.10
60	925166870000 STUB114.3X6.02L=140(OD148)SA182F22 CL3 DIVALUE: Draw.No: 4-80-999-93241	NO	10.000	10.00	18.04.10
70	925166880000 STUB 114.3X6.02 L=168 (OD 150) SA105 DIVALUE:	NO	10.000	10.00	18.04.10

The offers should reach us before the time of opening of tenders.
The offers will be opened at 14:30 hours on the due date in the presence of the tenderers who may like to be present.
Late tenders are liable to be rejected.

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED


MANAGER / PURCHASE
(Piping Centre)



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
80, G.N.ROAD, T.NAGAR
Purchase Department - Piping Centre
CHENNAI - 600 017.
TAMILNADU (INDIA)

4101000001 / 18.01.2010

80	<i>Draw.No: 4-80-999-93242</i> 925166890000 STUB141.3X6.02L=140(OD190)SA182 F22CL3 <i>DIVALUE:</i>	NO	10.000	10.00	18.04.10
90	<i>Draw.No: 4-80-999-93244</i> 925166900000 STUB168.3X10.97 L=155 (OD206)SA182F22CL3 <i>DIVALUE:</i>	NO	10.000	10.00	18.04.10
100	<i>Draw.No: 4-80-999-93245</i> 925166910000 STUB 168.3 X7.11 L=168 (OD205) SA105 <i>DIVALUE:</i>	NO	10.000	10.00	18.04.10
110	<i>Draw.No: 4-80-999-93246</i> 925166920000 Matching pieceOD 813 CS(SA105) withSTUBS <i>DIVALUE:</i>	NO	20.000	20.00	18.04.10
120	<i>Draw.No: 3-80-999-97759</i> 925271320004 MPCE645X31.5/355.6X32L=600 SA182F22CL3 <i>DIVALUE:</i> <i>TDC: TDG104 02</i> <i>Draw.No: 4 80 321 60835</i>	NO	3.000	3.00	18.04.10
130	925279260000 MPCE711.2X40/ID590.4MAXX35MI SA182F22CL3 <i>DIVALUE:</i> <i>TDC: TDG104 02</i> <i>Draw.No: 4 80 310 60827</i>	NO	4.000	4.00	18.04.10
140	925279270000 MPCEID800MXX55MN/OD711.2X40 SA182F22CL3 <i>DIVALUE:</i> <i>TDC: TDG104 02</i> <i>Draw.No: 4 80 310 60828</i>	NO	4.000	4.00	18.04.10


General Note:

YOUR OFFER SHOULD CONFIRM / INLINE WITH THE FOLLOWING ENCLOSURES.

- 1] TECHNICAL SPECIFICATION TDG:104 REV 03
- 2] COMPONENT DRAWINGS - 14 NO

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MANAGER / PURCHASE
(Piping Centre)



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
80, G.N.ROAD, T.NAGAR
Purchase Department - Piping Centre
CHENNAI - 600 017.
TAMILNADU (INDIA)

4101000001 / 18.01.2010

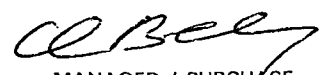
- 3] EP DRAWING 3-80-300-19825 REV 01
- 4] TOLERANCE DRAWING 4-80-301-26192 REV 01
- 5] CHECK LIST - TO BE FILLED AND SENT WITHOUT FAIL
- 6] TERMS AND CONDITIONS - TO BE FILLED AND SENT WITHOUT FAIL.

Enclosures:

"LD clause has to be confirmed without fail."

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Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED


MANAGER / PURCHASE
(Piping Centre)



1.0 CODES

Materials shall meet Indian Boiler Regulations, (IBR) in addition to the latest Version of SA105 & SA182 as on date specified in the Purchase Order (PO).

2.0 RAW MATERIAL

(a) The raw material used shall meet the respective specification and the test certificate shall be furnished.

(b) Steel for SA 182 F11, F12 & F22 if indigenously procured, to be procured from following manufacturers i) Alloy Steel Plant, Durgapur, ii) Tata Iron & Steel company, Jamshedpur & iii) Mahindra UGINE Steel Company, Mumbai, who are approved by IBR for creep resistant steels.

(c) Carbon content of Carbon steel fittings (SA 105) shall be restricted to 0.25% max

3.0 PROCESS

(a) Process of manufacture shall conform to applicable standards.

(b) Unless otherwise specified in the P.O, SA182 F11/12 fittings shall be supplied as per class 2 and SA182 F22 shall be of Class 3 only.

4.0 HEAT TREATMENT

4.1 All fittings shall be heat treated as below:

SA 105	- Normalised
SA182 F11/ F12/ F22	- Normalised & Tempered

4.2 Fittings conforming to SA182 F91 shall be normalised at 1040 to 1070 deg C (for wall thickness larger than 75 mm, accelerated cooling may be done to obtain a fully martensitic structure) and tempered at 760 ± 10 deg C

5.0 TESTING

(a) Product analysis shall be carried out on One piece / Heat / HT lot / Size.

(b) Corrosion test (IGC) shall be carried out on one piece / Heat / HT lot / Size for SS fittings.

(c) All CS & AS items shall be tested by MPI as per ASTM E-709 & SS items by LPI as per E 165.

(d) Tension test shall be carried out on one Test piece for each specification, heat, heat treatment lot and size.

(e) Bend test for CS (SA 105) : One sample of 19 mm thick and 25mm width to be bent 180 deg around mandrel of radius 6.35mm.

(f) Bend test for AS (SA182): One Sample of 25.4 mm width and thickness = t to be bent 180 deg around mandrel of radius = 1.5 t. Test on representative sample is also acceptable.

S. Jayakumar, Engg

G.Panneer Selvam, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



- (g) Dimensions shall be as per Purchase Order.
- (h) **Metallography**:- Metallography shall be carried out on one per heat, per size, per heat treatment lot of WP91 / F91 fittings. 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. Photomicrograph with 500x (Min) magnification along with Metallography report to be provided. The actual magnification shall be indicated.
- (i) Hardness test shall be carried out on all items of F91, and 10% on other material grades.
- (j) All items shall be ultrasonically tested as per SA388 and acceptance norms shall be as per 3.3.4 of ASME Sec VIII Div .2

6.0 POSITIVE MATERIAL IDENTIFICATION (PMI) FOR ALLOY STEEL FITTINGS.

Each alloy steel fitting shall be checked for the correctness of the material during manufacturing and final inspection using X-ray fluorescence principle or spark emission spectrography.

7.0 WORK MAN SHIP, 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.

8.0 PAINTING , COLOUR CODING, MARKING, PACKING & END PROTECTION

- 8.1 **PAINTING** : All fittings except SS to be applied with resin type rust preventive coating with visibility to punched and stenciled details on outside and either with rust preventive coating or rust inhibitor inside. SS fittings to be surface treated as per ASTM A380 both inside and outside.
- 8.2 **COLOUR CODING** : All fittings shall be colour coded circumferentially at ends as given below

SA105	=	Blue
SA182 F11	=	Green & White
SA182 F12	=	Black & Red
SA182 F22	=	Blue & Red
SA182 F91	=	Brown & Red
SA182 F316	=	Black & Blue

8.3 MARKING :

- 8.3.1 The fittings dispatched to **BHEL Stores** shall be punched / etched with Material code, Heat number, material specification, maker's emblem, Inspectors seal and Statutory authorities seal (as applicable) .

S. Jayakumar, Engg		Approved by	K. Vedaprasad, QC	
G.Panneer Selvam, QA			K. Ganeshan, MPL	



In addition, the above details along with size shall be paint stenciled on the fittings.

8.3.2 The fittings dispatched directly to project site as **DTS** shall be punched and paint stenciled with DU code (14 digit work order du detail) as given by purchase in addition to marking done as per para 8.3.1.

8.4 **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 to avoid transit & other damages.

9.0 **INSPECTION & CERTIFICATION :-**

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 IIIC (for items under IBR purview) shall be submitted along with the Work Test Certificate countersigned by any of the above authorities and shall include the following.

1. Test Certificate Number & date.
 2. BHEL P.O Number & Amendment Number(if any)
 3. BHEL P.O. Serial Number
 4. BHEL TDC Number
 5. Size-wise Quantity
 6. Specification, Grade & Year of code.
 7. Heat/Melt Number
 8. Steel making / forming process
 9. Laddle and product Analysis of Raw Material.
 - *10. Product analysis report.
 - *11. Heat Treatment Chart.
 - *12. NDE report. (VISUAL.MPI, LPI, UT)
 - *13. Tensile Test report
 - *14. Bend Test report.
 - *15. Hardness Test report
 - *16. Intergranular corrosion test report for SS
 17. Metallography Report along with photomicrograph with 500x (min) magnification.
 - *18. Dimensional conformance.
 - *19. Starting material details.
 - *20. Guarantee of HTP shall be given in the test certificate as follows if hydro test is not carried out :- "Forgings are capable of with standing without failure, breakage 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.

10.0 **Records of Revisions:-**

Revision 02 : Material specification SA 182 F316 added.

Revision 03 : a) Para 4.0, 6.0 included.

b) Para 5.0 (b),(c),(h),(j), 8.0 and 9.0 (17) are revised.

S. Jayakumar, Engg

Approved by

K. Vedaprasad, QC

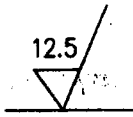
G.Panneer Selvam, QA

K. Ganeshan, MPL

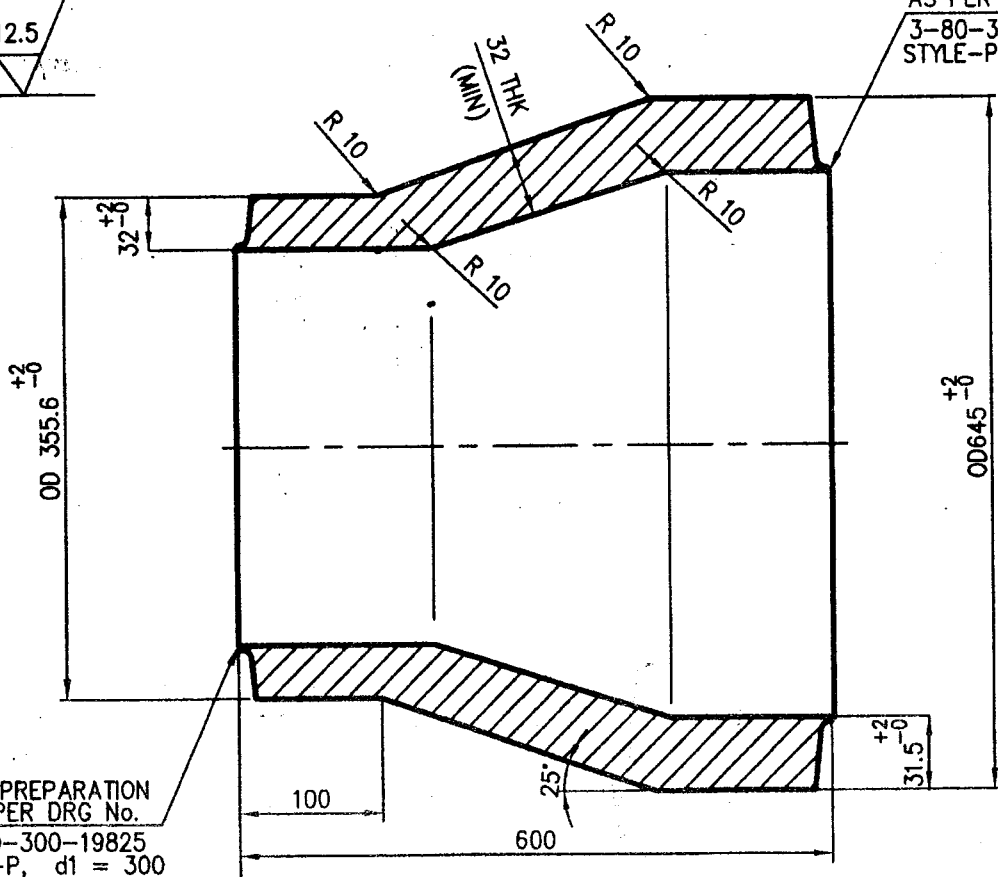
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ALL DIMENSIONS ARE IN MILLIMETRES

REV	DATE	ALTERED
01		APPROVED



EDGE PREPARATION
AS PER DRG No.
3-80-300-19825
STYLE-P, d1 = 590



EDGE PREPARATION
AS PER DRG No.
3-80-300-19825
STYLE-P, d1 = 300

VAR NO.	DESCRIPTION	STD	MATL. CODE	UNIT	QTY.
	MATCHING PIECE L=600 OD645 x 31.5/OD 355.6 x 32		92 527 132 0004 SA 182 F22 CL3	A	241 000
			MATL. SPECN.	C	

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

NAME	SIGN	DATE	NO. OF VAR
DRN A. PRIYA	<i>A. Priya</i>	05-11-05	
CHD M.C.SEKARAN	<i>M.C. Sekaran</i>	05-11-05	
APPD A.VELAYUTHAM	<i>A. Velayutham</i>	05-11-05	

DEPT	GRADE OF TOL. DIM	SCALE	WEIGHT (KG.)	BHEL PO REF. NO.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	241.000			

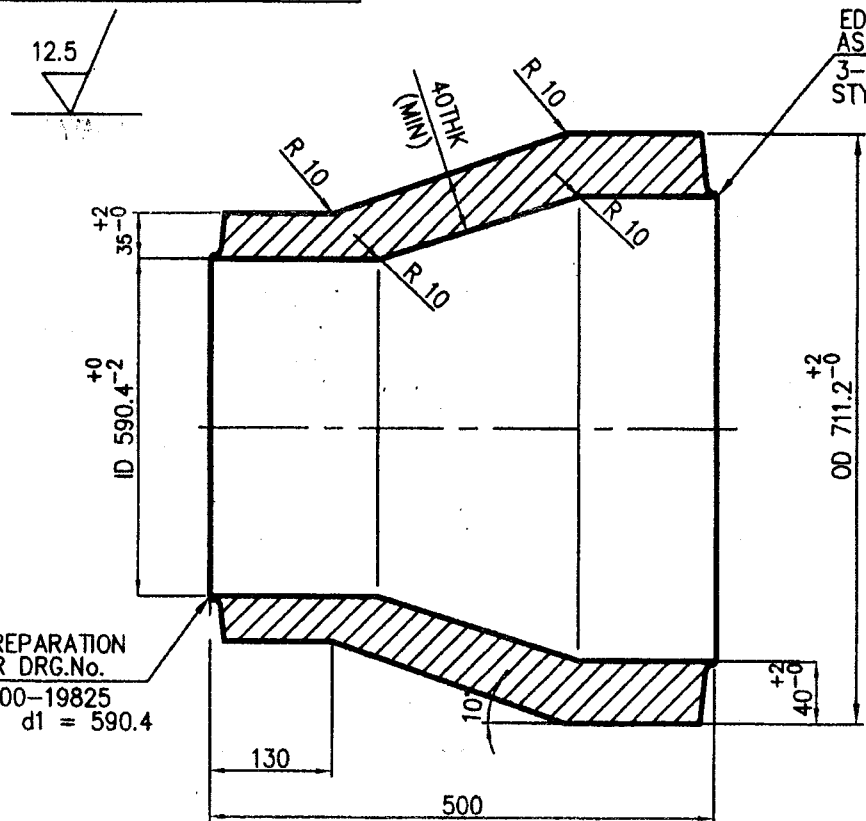
TITLE	CARD CODE	DRAWING NO.	REV
MATCHING PIECE (OD645x31.5/OD355.6x32)	U 01	4-80-321-60835	00

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REV	DATE	ALTERED :
01		APPROVED :

ALL DIMENSIONS ARE IN MILLIMETRES

EDGE PREPARATION
AS PER DRG.No.
3-80-300-19825
STYLE- P, d1 = 635



EDGE PREPARATION
AS PER DRG.No.
3-80-300-19825
STYLE-P, d1 = 590.4

	MATCHING PIECE L=500 OD711.2x40/ID590.4max X 35min	92 527 926 0000	A	313 000
		SA 182 F22 CL3		
VAR NO.	DESCRIPTION	MATL. CODE	A/C	UNIT
		MATL. SPECN.	DI	QTY.

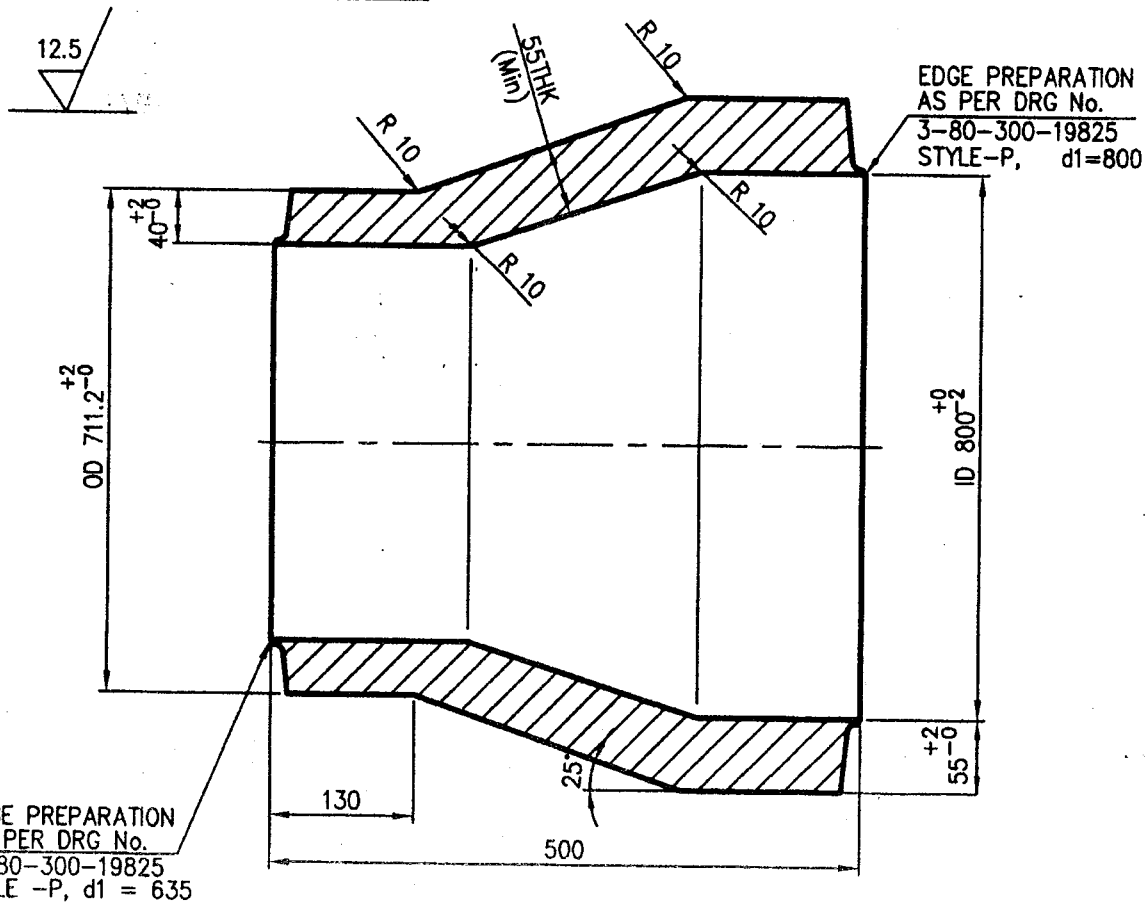
STANDARD

		BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		NAME A. PRIYA	SIGN <i>A. Priya</i>	DATE 05-11-05	NO. OF VAR
DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (KG).	BHEL PO REF. NO.:	ITEM NO.	NO. OF ITEMS	
CODE	C / M / F	N.T.S	313.000				
TITLE MATCHING PIECE (OD711.2x40/ID590.4MAXx35MIN)				CARD CODE U 01	DRAWING NO. 4-80-310-60827		REV 00

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REV	DATE	ALTERED
01		APPROVED

ALL DIMENSIONS ARE IN MILLIMETRES



EDGE PREPARATION AS PER DRG No. 3-80-300-19825 STYLE -P, d1 = 635

EDGE PREPARATION AS PER DRG No. 3-80-300-19825 STYLE-P, d1=800

MATCHING PIECE L=500 ID800max x thk55min/ OD 711.2 X40	92 527 927 0000	A	509 000
	SA 182 F22 CL3		

STANDARD

VAR NO.	DESCRIPTION	S/P	MATL. CODE	A/C	UNIT	UNIT.WT.(Kg)
			MATL. SPECN.		DI	QTY.



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

DRN	NAME	SIGN	DATE	NO.OF VAR
A. PRIYA		<i>A. Priya</i>	05-11-05	
M.C.SEKARAN		<i>M. Sekaran</i>	05-11-05	
A.VELAYUTHAM		<i>A. Velayutham</i>	05-11-05	

DEPT	GRADE OF UNTOL.DIM	SCALE	WEIGHT (KG).	BHEL PO REF.NO:	ITEM NO.	NO. OF ITEMS
	C / M / F	N.T.S	509.000			

TITLE	CARD CODE	DRAWING NO.	REV
MATCHING PIECE (ID800maxXthk55min/OD711.2X40)	U 01	4-80-310-60828	00

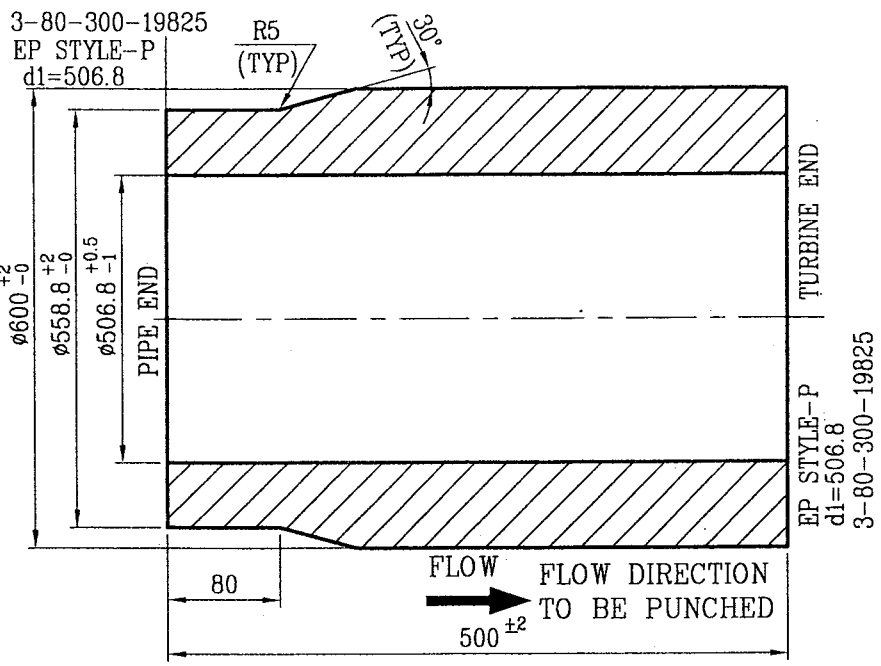
ALL DIMENSIONS ARE IN MILLIMETRES

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REV	DATE	ALTERED
		APPROVED


DESIGN PRESSURE AT 540°C : 50kg/sq.cm(g)

12.5



			92.516.681.0000	A	
			SA 182 F22 CL3		
VAR NO.	DESCRIPTION	STD	MATL CODE	A	UNIT
			MATL SPECN.	C	DI
					UNIT.WT.(Kg)
					QTY.

STANDARD

	BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	R.ANANTH	SIGN	DATE	NO. OF VAR
			CHD	R.ANANTH		31.12.09	
			APPD	M.N.VASUDEVAN		31.12.09	
DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.		ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	287.000				
TITLE			CARD CODE	DRAWING NO.		REV	
MATCHING PIECE F22 OD600/OD558.8x28.58 L500			U 01	4-80-999-93234		00	

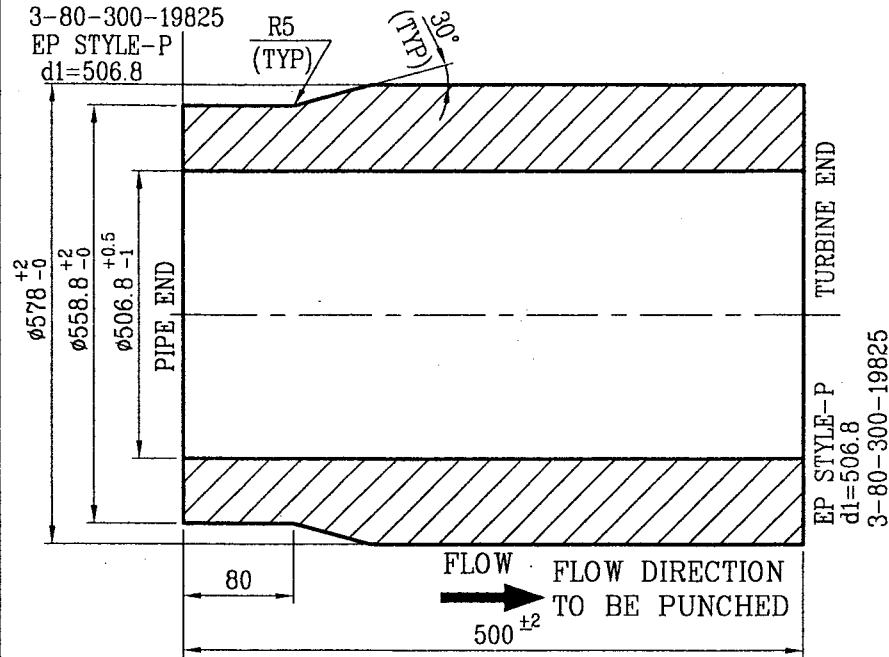
ALL DIMENSIONS ARE IN MILLIMETRES

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REV	DATE	ALTERED
		APPROVED

DESIGN PRESSURE AT 540°C : 50kg/sq.cm(g)

12.5



			92.516.682.0000	A	
			SA 182 F22 CL3		
VAR NO.	DESCRIPTION	STD	MATL. CODE	A/C	UNIT
					DI
					UNIT. WT.(Kg)
					QTY.

STANDARD

		BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN R.ANANTH	NAME R.ANANTH	SIGN M.N.VASUDEVAN	DATE 31.12.09	NO.OF VAR
DEPT CODE	GRADE OF UNTOL DIM C / M / F		SCALE N.T.S	WEIGHT (KG). 225.000	REF. TO ASSY./OLD DRG.		ITEM NO.	NO. OF ITEMS
TITLE MATCHING PIECE F22 OD578/OD558.8x28.58 L500				CARD CODE U 01	DRAWING NO. 4-80-999-93235			REV 00

ALL DIMENSIONS ARE IN MM

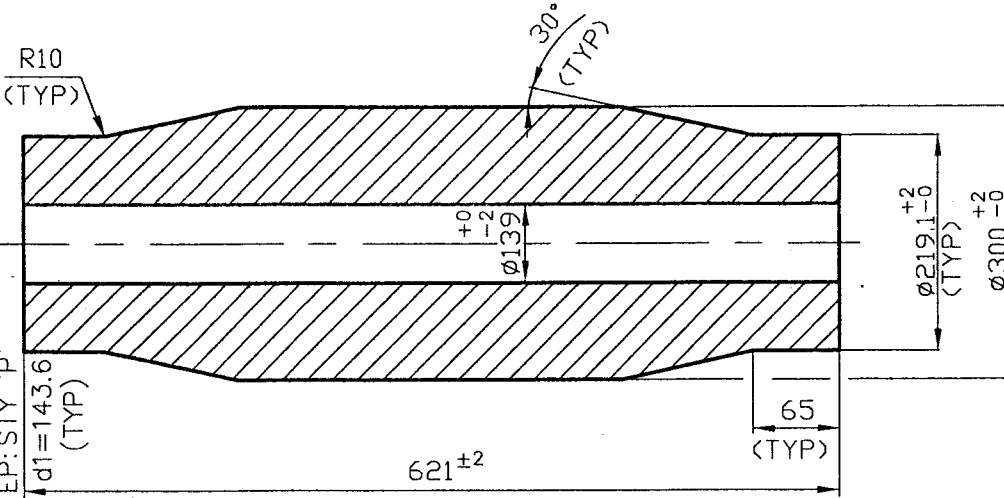
REV	DATE	ALTERED	REV	DATE	ALTERED
01		APPROVED	02		APPROVED

DESIGN PRESSURE AT 540°C : 190kg/sq.cm(g)

12.5/

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3-80-300-19825
EP: STY 'P'



		92.516.684.0000			
		SA 182 F22 CL3	A		
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	C	DI	QTY.

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED

PIPING CENTRE
CHENNAI 600 017

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	R.ANANTH		31.12.09	
APPD	M.N.VASUDEVAN		31.12.09	

DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (KG.)	REF. TO ASSY./OLD DRG.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	230.000			

TITLE	CARD CODE	DRAWING NO.	REV
MATCHING PIPE OD300/ID139/ 219.1x40 L621 F22	U 01	4-80-999-93237	00

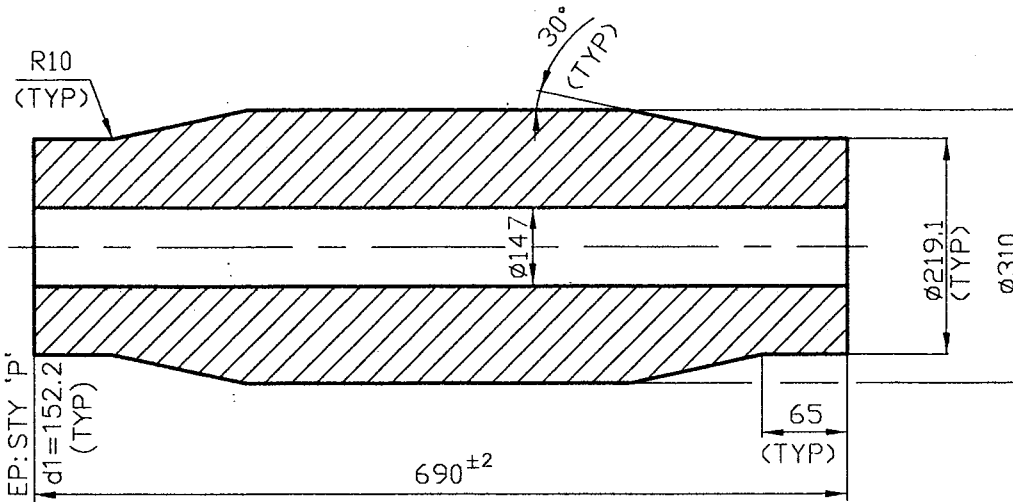
ALL DIMENSIONS ARE IN MM

REV	DATE	ALTERED	REV	DATE	ALTERED
01		APPROVED	02		APPROVED

DESIGN PRESSURE AT 540°C : 170kg/sq.cm(g)

12.5/

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		92.516.685.0000		
		SA 182 F22 CL3	A	
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT
		MATL. SPECN.	C	DI
				UNIT.WT.(Kg)
				QTY.

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED

PIPING CENTRE
CHENNAI 600 017

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	R.ANANTH		31.12.09	
APPD	M.N.VASUDEVAN		31.12.09	

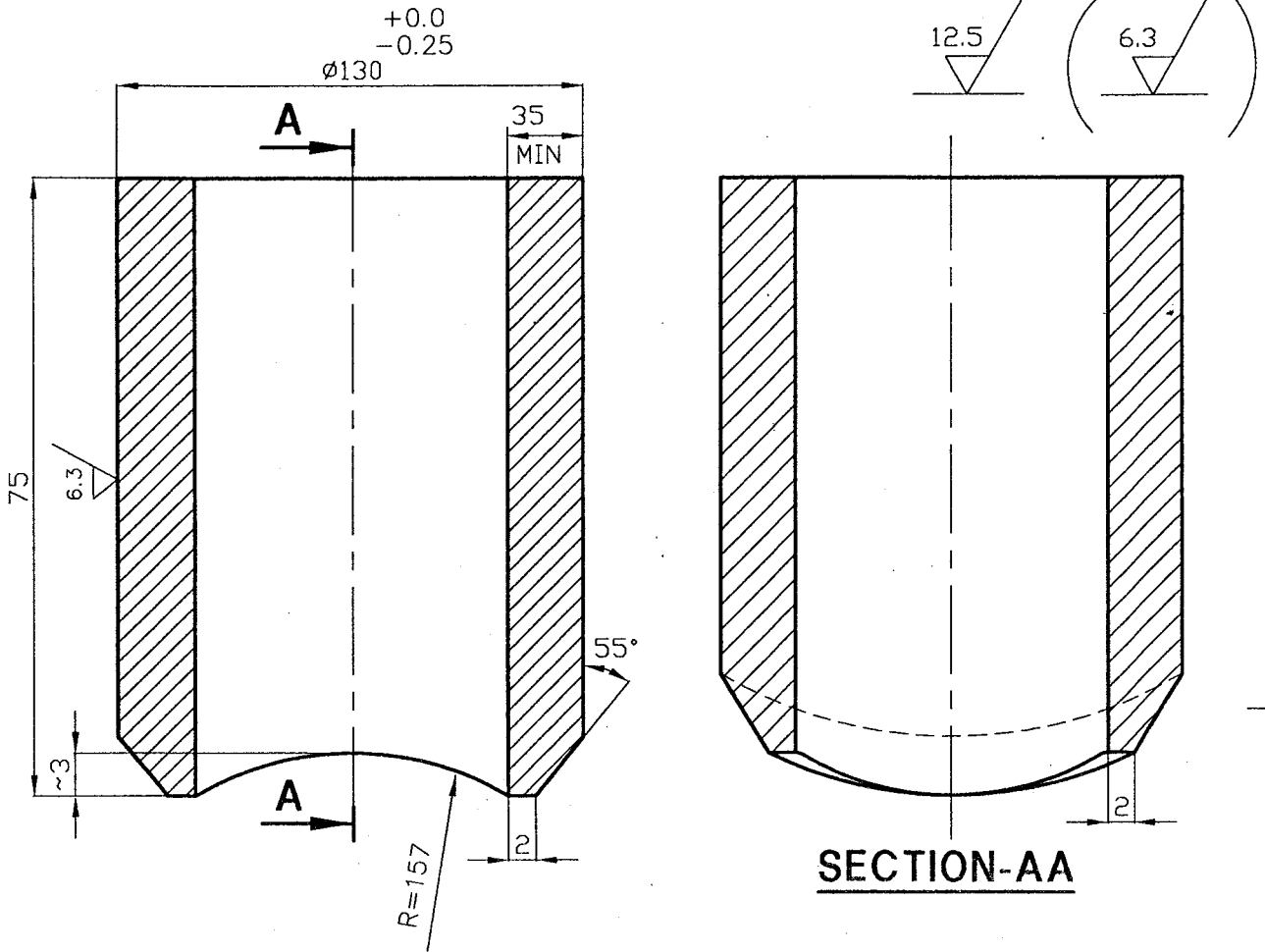
DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	247.000			

TITLE	CARD CODE	DRAWING NO.	REV
MATCHING PIPE OD310x81.5 219.1x36 L690 F22	U 01	4-80-999-93238	00

ALL DIMENSIONS ARE IN MM

REV	DATE	ALTERED
01		APPROVED

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		92.516.686.0000	C	6	000
		SA 182 F22 CL3			
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	C	DI	QTY.

STANDARD

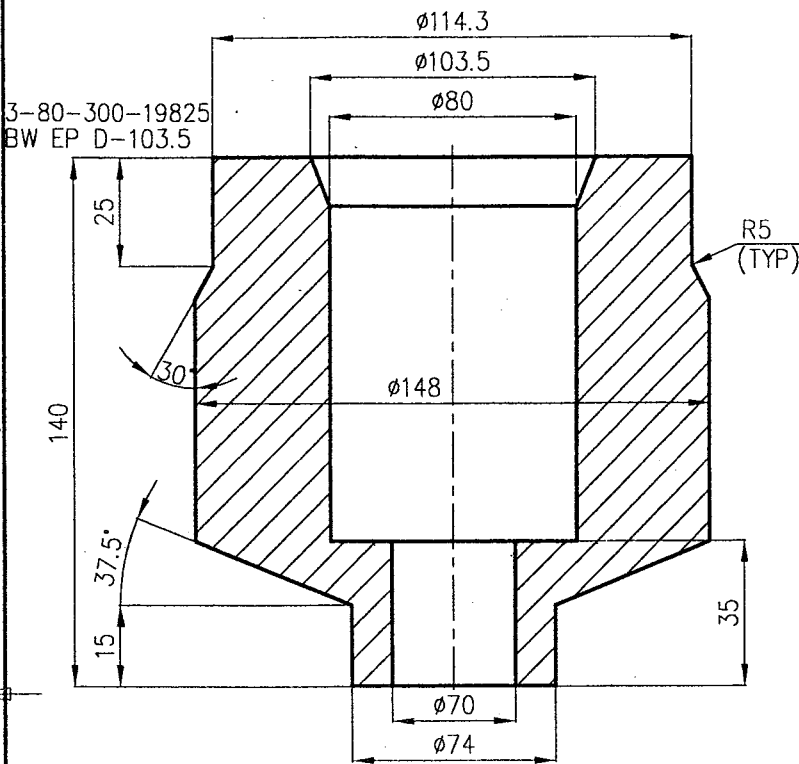
		BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	R.ANANTH	SIGN		DATE	31.12.09	NO. OF VAR
				CHD	R.ANANTH				31.12.09	
				APPD	M.N.VASUDEVAN				31.12.09	
DEPT	GRADE OF UNTOL. DIM		SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.		ITEM NO.			NO. OF ITEMS
CODE	C / M / F		N.T.S	6.000						
TITLE				CARD CODE	DRAWING NO.				REV	
TRUNNION OD130x35 L75 F22 FOR PIPE OD310				U 01	4-80-999-93239				00	

ALL DIMENSIONS ARE IN MILLIMETRES

REV	DATE	ALTERED
		APPROVED

DESIGN PRESSURE AT 500°C : 50kg/sq.cm(g)

12.5



CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

			92.516.687.0000		
			SA182F22CL3	A	
VAR NO.	DESCRIPTION	STD	MATL. CODE	A	UNIT
			MATL. SPECN.	C	DI
					UNIT.WT.(Kg)
					QTY.

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED
 PIPING CENTRE
 CHENNAI 600 017

DRN	NAME	SIGN	DATE	NO.OF VAR
CHD	R.ANANTH		31.12.09	
APPD	M.N.VASUDEVAN		31.12.09	

DEPT	GRADE OF UN TOL. DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	10.000			

TITLE	CARD CODE	DRAWING NO.	REV
STUB 114.3x6.02 L140 OD148 F22	U 01	4-80-999-93241	00

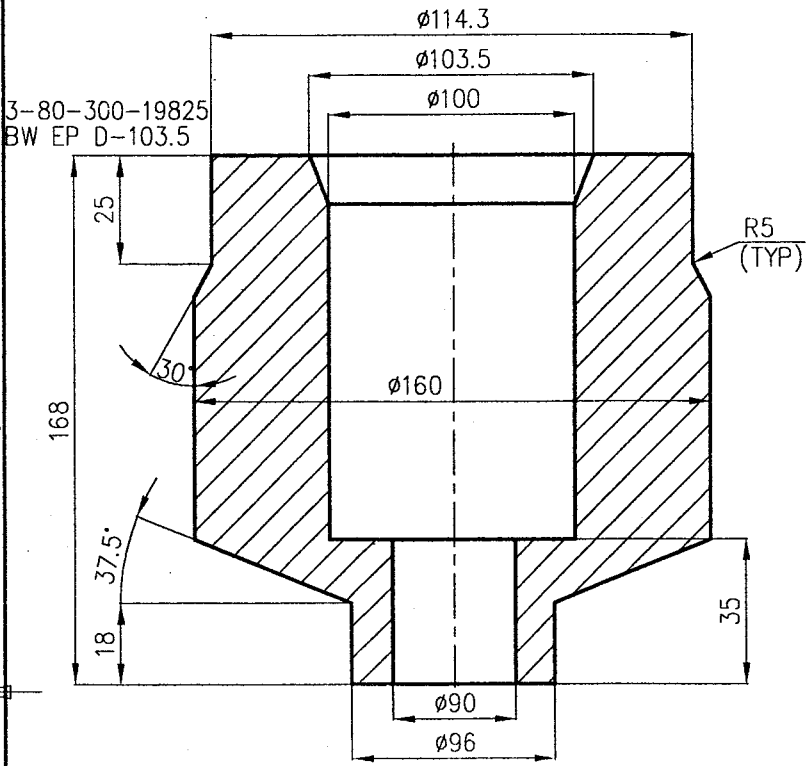
ALL DIMENSIONS ARE IN MILLIMETRES

REV	DATE	ALTERED
		APPROVED

DESIGN PRESSURE AT 370°C : 50kg/sq.cm(g)

12.5

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3-80-300-19825
BW EP D-103.5

		92.516.688.0000		
		SA105	A	
VAR NO.	DESCRIPTION	MATL. CODE	A/C	UNIT
		MATL. SPECN.	C	DI
				UNIT.WT.(Kg)
				QTY.

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

DRN	NAME	SIGN	DATE	NO.OF VAR
CHD	R.ANANTH		31.12.09	
APPD	M.N.VASUDEVAN		31.12.09	

DEPT	GRADE OF UNTOL.DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	13.000			

TITLE	CARD CODE	DRAWING NO.	REV
STUB 114.3x6.02 L168 OD150 SA105	U 01	4-80-999-93242	00

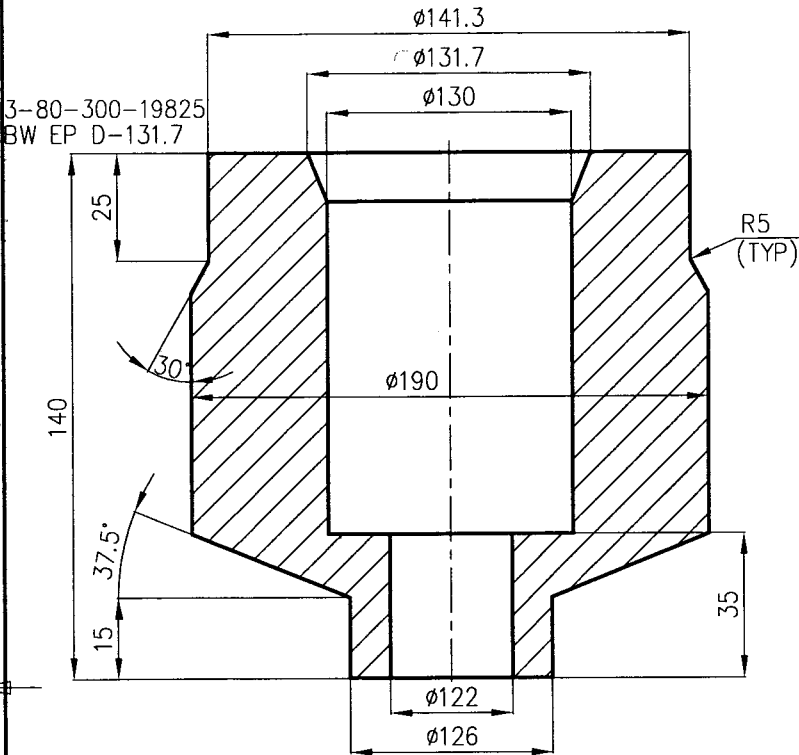
ALL DIMENSIONS ARE IN MILLIMETRES

REV	DATE	ALTERED
		APPROVED

DESIGN PRESSURE AT 500°C : 50kg/sq.cm(g)

12.5

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.



			92.516.689.0000			
			SA182F22CL3	A		
VAR NO.	DESCRIPTION	STD	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
			MATL. SPECN.	C	DI	QTY.

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

DRN	R.ANANTH	SIGN	DATE	NO.OF VAR
CHD	R.ANANTH		31.12.09	
APPD	M.N.VASUDEVAN		31.12.09	

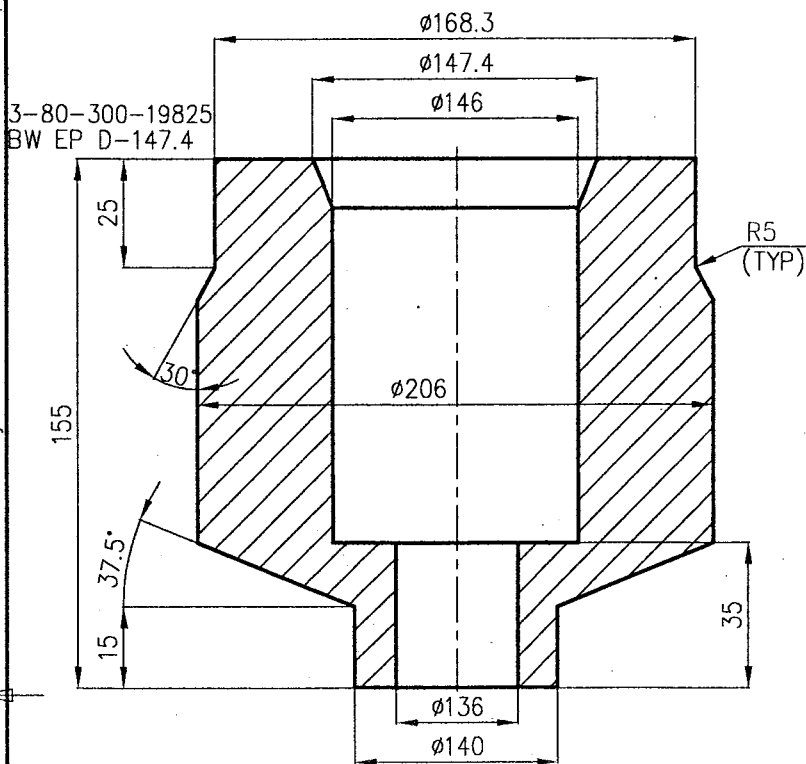
DEPT	GRADE OF UN.TOL.DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	11.000			
TITLE				CARD CODE	DRAWING NO.	REV
STUB 141.3 L140 OD190 F22				U 01	4-80-999-93244	00

ALL DIMENSIONS ARE IN MILLIMETRES

REV	DATE	ALTERED
		APPROVED

DESIGN PRESSURE AT 500°C : 50kg/sq.cm(g)

12.5



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			92.516.690.0000		
			SA182F22CL3	A	
VAR NO.	DESCRIPTION	STD	MATL. CODE	A	UNIT
			MATL. SPECN.	C	DI
					UNIT.WT.(Kg)
					QTY.

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED
 PIPING CENTRE
 CHENNAI 600 017

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	R.ANANTH		31.12.09	
APPD	M.N.VASUDEVAN		31.12.09	

DEPT	GRADE OF UN TOL. DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	15.000			

TITLE	CARD CODE	DRAWING NO.	REV
STUB 168.3x10.97 L155 OD206 F22	U 01	4-80-999-93245	00

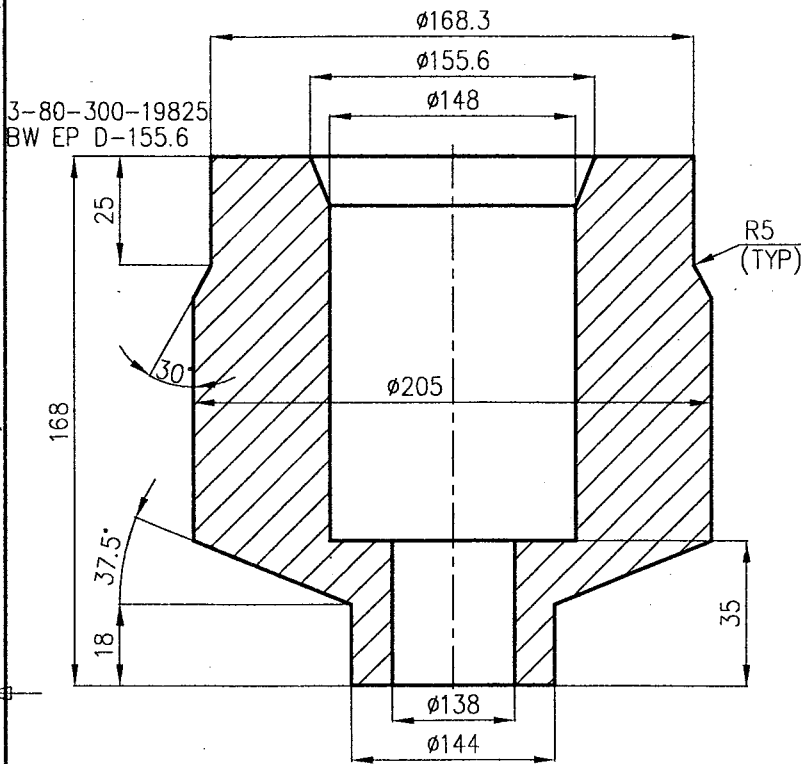
ALL DIMENSIONS ARE IN MILLIMETRES

REV	DATE	ALTERED
		APPROVED

DESIGN PRESSURE AT 370°C : 50kg/sq.cm(g)

12.5

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRIC LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.



		92.516.691.0000			
		SA105	A		
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	C	DI	QTY.

STANDARD

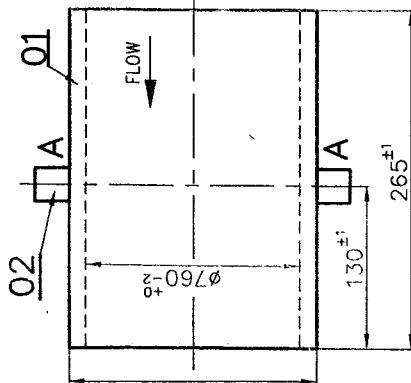
	BHARAT HEAVY ELECTRICALS LIMITED		DRN	R.ANANTH	SIGN	DATE	NO.OF VAR
	PIPING CENTRE		CHD	R.ANANTH		31.12.09	
	CHENNAI 600 017		APPD	M.N.VASUDEVAN		31.12.09	
DEPT	GRADE OF UN.TOL.DIM	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.		ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	19.000				
TITLE			CARD CODE	DRAWING NO.			REV
STUB 168.3x7.11 L168 OD205			U 01	4-80-999-93246			00
SA105							

FIRST ANGLE PROJECTION (ALL DIMENSION IN MILLIMETRF

65776-666-08-3

12.5 (FOR ITEM 01)

DRAWING NO.



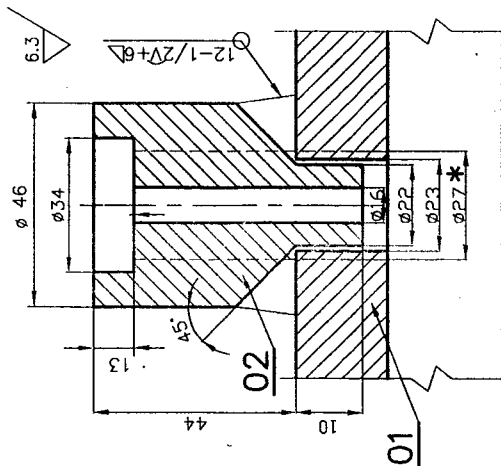
BW EP AS PER DRG.
3-80-300-19825
STYLE- P. d1=767
Ø13-42
Ø813-0

BW EP AS PER DRG.
3-80-300-19825
STYLE- P. d1=771.5

NOTES:

- 01 DESIGN PRESSURE : 55 kg/cm²(g)
- 02 DESIGN TEMPERATURE : 370 °C
- 03 WORKING MEDIUM : STEAM
- 04 FABRICATION, ERECTION & TESTING SHALL BE AS PER IBR 1950
- 05 FLOW DIRECTION SHALL BE PUNCHED ON THE OUTER SURFACE OF ITEM 01
- 06 ASSY MATL CODE No: 92-516-692-0000.
- 07 ALTERNATE / SUITABLE SIZE PIPE SA10GRC(A) CAN ALSO BE USED.

- NOTES ITEM 02:**
- A) TOLERANCE ON LENGTH: +1mm, -0mm.
 - B) BORES SHALL BE CONCENTRIC WITHIN ±0.4mm.
 - C) TOLERANCE ON DIAMETERS ± 0.1 mm.
 - D) COINCIDENCE OF AXES: THE MAXIMUM ALLOWABLE VARIATION IN THE ALIGNMENT OF FITTING BORE AND SOCKET BORE AXES SHALL BE 0.5%.
 - E) THE CRITICAL DIMENSIONS ARE IN LINE WITH ASME B16.11 (HALF COUPLING)/CL3000.



* BORE THROUGH TO Ø27 AFTER WELDING.

DETAIL-A

ITEM NO.	DESCRIPTION	DRAWING NO.	WEIGHT (kg)	REP. TO ASSY / OLD DRG.	DATE
02	ROD DIA50 L54	3-80-999-97759	15 339 142 0000	A	0 400
			SA105	A	2
01	FORGING OD813 ID760 L265	3-80-999-97759	136 000	A	136 000
			SA105	A	1
VAR NO.			MATERIAL SPEC.	A	UNIT WT.
			MATERIAL SPEC.	C	
			NAME	SIGN	DATE
			DRN R-ANANTH		31.12.2009
			CHD R-ANANTH		31.12.2009
			APPD M.N.VASUDEVAN		31.12.2009

STANDARD



BHARAT HEAVY ELECTRICALS LTD.,
PIPING CENTRE, CHENNAI, 600 017

DEPT.	GRADE OF UN TOL DIM C/M/F	SCALE	WEIGHT (kg)	REP. TO ASSY / OLD DRG.
		N.T.S.	136.800	
REV 01	DATE	ALTERED	APPROVED	
TITLE				CARD CODE
MATCHING PIECE OD813 CS WITH STUBS				U 01
DRAWING No.				REV
3-80-999-97759				00

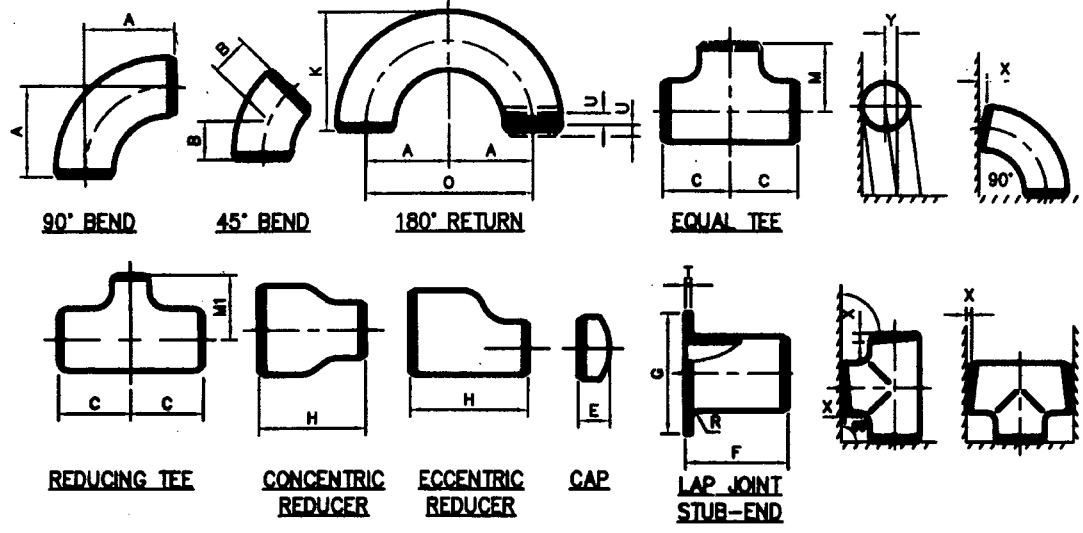
SIZE A3

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REV	DATE	ALTERED	APPROVED
01	05.02.05	<i>[Signature]</i>	<i>[Signature]</i> APMK

TITLE BLOCK AND DRAWING ALTERED

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



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 THICKNESS	CENTER TO END A,B,C,M,N1	OVERALL LENGTH H	CENTER TO CENTER O	BACK TO FACE K	ALIGNMENT OF END U	OVER ALL LENGTH E	END TO END F	RADIUS R	DIAM 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

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		DRN	NAME	SIGN	DATE	NO. OF VAR	
			CHD	R.ANANTH	Sd	15.10.1986		
			APPD	J.JUDE	Sd	15.10.1986		
DEPT	GRADE OF UNTOL. DIM		SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.		ITEM NO.	NO. OF ITEMS
CODE	C / M / F		N.T.S	-	-		-	-
TITLE				CARD CODE	DRAWING NO.			REV
TOLERANCES ON FITTINGS				U 01	4-80-301-26192			01

Size A4

92861-008-300-19825

- NOTES:-
- 01. APPLICABLE FOR PBI MATERIAL
 - 02. FOR OD MISMATCHING REF. FIGURE-Xg.
 - 03. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
 - 04. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm

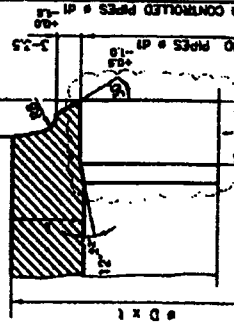


FIGURE - X

- MATCHING EDGE PREPARATION FOR MISMATCH OD DIAMETRICALLY GREATER THAN B JOIN (i.e. OD1 - OD2 > 3mm.) APPLICABLE FOR ELBOWS/FITTINGS OTHER THAN PBI MATERIALS
- NOTES:-
- 01. OD = OUTSIDE DIA OF CONNECTING PIPE (STRAIGHT) TO BE PHYSICALLY MEASURED/VERIFIED.
 - 02. $t =$ THK OF CONN. PIPE (STRAIGHT)

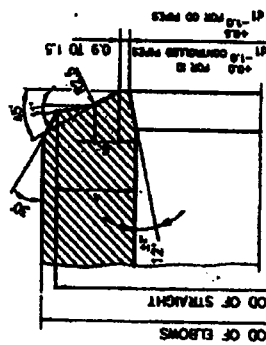


FIGURE - Z

- MATCHING EDGE PREPARATION FOR MISMATCH OD DIAMETRICALLY GREATER THAN B JOIN (i.e. OD1 - OD2 > 3mm.) APPLICABLE FOR BENDS/FITTINGS OF PBI MATERIALS
- NOTES:-
- 01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
 - 02. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
 - 03. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm

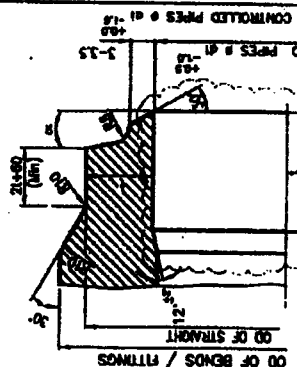
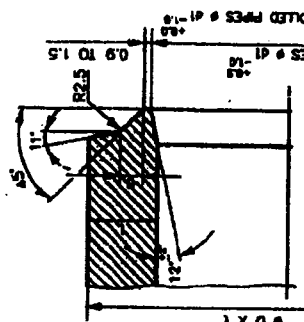


FIGURE - Xa



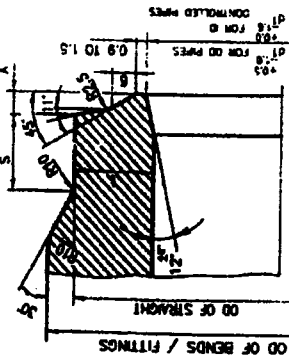
STYLE - D

- NOTES:-
- 01. USE WHEN $t < 14.2$ mm.



- NOTES:-
- 01. USE WHEN $t \geq 14.2$ mm.
 - 02. FOR OD MISMATCHING REF. FIGURE-Po

STYLE - P



STYLE - Pa

- MATCHING EDGE PREPARATION FOR MISMATCH OD DIAMETRICALLY GREATER THAN B JOIN (i.e. OD1 - OD2 > 3mm.) APPLICABLE FOR BENDS/FITTINGS OTHER THAN PBI MATERIALS
- NOTES:-
- 01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED.
 - 02. WHEN $1.65 \leq S/A \leq 65$ mm. & $1.65 \leq S/B$ mm. WHERE $t =$ THK OF CONN. PIPE (STRAIGHT).

- GENERAL NOTE:-
- 01. THE WELDING THICKNESS Δ WELD SHO NOT BE LESS THAN Δ AFTER TACK WELD FOR OD PIPES
 - 02. $1.65 \leq S/A \leq 65$ mm. & $1.65 \leq S/B$ mm. SHALL BE AS PER SPECIFIED PIPE SIZE
- NOTES FOR WELDING:-
- 01. WELD REINFORCEMENT TO BE RUSH GROUND AND WERSED WITH PARENT METAL WITHOUT ANY UNDERNESS

STANDARD

TYPE OF PRODUCT	BRABAT HEAVY ELECTRICALS LTD.	DATE	11.10.03
DESIGNATION	PIPING CENTRE, CHENNAI	REVISED	11.10.03
PROJECT NAME		PROJECT NAME ALTERNATE	
SCALE	C/A/T	SCALE	
DRWING NO.	U 01	DRWING NO.	3-80-300-19825
REV	01	REV	01

EDGE PREPARATION DETAILS