



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

Piping Centre , 80, G. N. Chetty Road, CHENNAI – 600 017
Fax : 91 (044) 28161245, : Phone : 91 (044) 28161243

REF: ENQ NO: 4101400072

DT: 10.09.2014

Sub: Request for quotation – Forgings F91- reg.

Please find the following tender documents enclosed for you to submit offer. The offers should reach us before the time of opening tenders. The offer will be opened at **14:30 hrs** on the **due date 24.09.2014** in the presence of tenderers who may like to be present. Late tenders will be rejected.

List of Enclosures with the enquiry:

- 1) List of items
- 2) Items Drawings & EP Drawing
- 3) Terms and Conditions Format
- 4) TDC: TDG: 104 REV 08 & 103 REV 02

Your offer shall contain only the following:

- 1) PART 1 - Techno commercial Bid: Duly filled & signed "Terms and Conditions format & List of items without price part (indicating the quoted / not quoted items)" provided by BHEL.
- 2) PART 2 - Duly filled in Price Bid: "List of items" provided by BHEL.

NOTE:

Any other terms or conditions mentioned in your offer other than the above mentioned formats will not be evaluated and will be considered null & void. Hence your offer shall contain ONLY the above mentioned formats.

The technical bids will be opened on **24.09.2014**. Pl submit your bids **well before the due date**.

Please indicate enquiry no. and date and due date in all correspondences. This is only a request for quotation and not an order.

(Ravi Singh)
Engineer / Purchase
For Senior Manager / Purchase
BHEL / Piping Centre



TERMS & CONDITIONS FOR PROCUREMENT OF FORGINGS F91-- FOREIGN & INDIGENOUS

SL NO	BHEL REQUIREMENT	AGREE	DISAGREE
1	<p>TYPE OF BID – Offers are invited to submit in single/ Two parts</p> <p>A. In case of Single Part Bid no deviation shall be taken and bids will be rejected if any deviation is taken. The order will be finalized based on price /negotiation/RA with all other conditions being accepted by the bidder.</p>	NA	NA
	<p>B. In case of Two part bid, the following procedure shall be followed.</p> <p>Part-I TECHNICAL - CUM – COMMERCIAL PART (Un priced) :- This part of the Bid shall contain following Technical and Commercial Points only (Except Price Portion)</p> <ul style="list-style-type: none"> Acceptance to our TDC103 rev 02 & TDC104 rev 08 (Technical delivery condition) as given in the tender. Deviation if any shall be clearly indicated. UNDISCLOSED DEVIATIONS ARE NOT ACCEPTABLE. Copy of price bid without price part to know the items for which you are quoting against this tender. Confirmation to supply as per drawings if any sent along with enquiry. <p>(Money values shall not be indicated i.e. unpriced bid).</p>		
	<p>PART II PRICE PART :</p>		
	<p>Foreign vendors- The unit price shall be quoted on FOB basis. (Please name the port)</p>		
	<p>Indigenous vendors-The unit price on FOR Trichy / Site basis. (Including freight and insurance)</p>		
	<p>The price shall include all testing, inspection, packing & Forwarding charges. PLEASE DO NOT QUOTE ON EX-WORKS BASIS. This part of the Bid shall contain item-wise Price details against each Enquiry Sl.No. and the same shall be put in a sealed cover duly indicating Tender No, Tender Opening date, and “Price Bid” on the Sealed cover. Price quoted by the Supplier, itemwise including Taxes & Duties shall be furnished. Preconditions for price will not be accepted. Both the above referred parts(part I , part II) of the Bid each sealed in a separate cover shall be put in a sealed outer cover duly indicating Tender No.& Date, Tender Opening date and to be sent to</p> <p align="center">SR. MANAGER / PURCHASE (FITTINGS) BHEL: PIPING CENTRE 80, G.N CHETTY STREET T.NAGAR, CHENNAI 600 017</p>		
	<p>TENDER SHALL BE PROCESSED BY OPENING THE SUBMITTED SEALED PRICE BID.</p> <p>HOWEVER BHEL RESERVES THE RIGHT TO FINALIZE THE PRICES THROUGH REVERSE AUCTION WHICH WILL BE INFORMED AFTER TECHNICAL EVALUATION.</p> <p>Price Comparison shall be made by considering the Exchange rates as on Technical bid opening date.</p>		
2	<p>If you are not interested / not in a position to participate in the tender, please send regret letter for not participating, before due date of the tender.</p>		
3	<p>You are requested to quote only for the sizes / spec for which are within your manufacturing range and approved by BHEL, Piping Centre.</p>		

SL NO	BHEL REQUIREMENT	AGREE	DISAGREE
4	<p>Test certificates as called for in the TDC shall be sent to Purchase / Piping centre BHEL Chennai immediately after the shipment / dispatch of items and not through Bank.</p> <p>Inspection documents shall be furnished for each batch of dispatch / consignment. If entire P O quantity is manufactured in one lot but dispatched in phased manner, original IBR should be sent along with the first consignment and the attested Xerox copy of IBR shall be sent for subsequent consignments.</p> <p>Soft copy of the all the test certificates shall also be submitted through email.</p>		
5	Year of Code for Viz. the standards ASME B16.9, ASME B 28 & ASME B.16.11 etc. shall be latest and the specific year is to be mentioned in the Manufacturer's test certificates, as well as in IBR Form III-C. Also the relevant Year Code for material standard and the NDT standard (ie U.T/LPI/MPI) has to be mentioned.		
6	VALIDITY OF THE OFFER: - The quotation shall be valid at least for a period of 90 days from the date of technical bid opening / 60 days from the date of final reverse auction. Offer with lesser validity may not be considered		
7	DELIVERY SCHEDULE :- 4 MONTHS from LOI / PO date DELIVERY IS THE ESSENCE OF THE CONTRACT. As delivery will affect our project requirements, kindly quote for the above delivery period only.		
8	TERMS OF DELIVERY :- 1) Indigenous vendors FOR Trichy/Site basis		
	2) Foreign vendors FOB basis (Please name the port)		
9	TAXES & DUTIES: - Please indicate clearly the percentages of applicable taxes, duties like CST, Excise Duty or any other taxes / duties.	Indicate taxes and duties in % , if any	
10	TRANSPORT : For Indigenous suppliers: Wherever DTS advice is given, fittings shall be directly sent to respective project sites. The remaining items shall be sent to Trichy Stores.		
11	PRESERVATION & IDENTIFICATION:- As per Technical Delivery Condition		
12	<p>INSPECTION :- Indigenous suppliers. a) IBR & BHEL/ BHEL approved third Party inspection agency for CS & AS materials. b) Only BHEL/ BHEL approved third Party inspection agency for SS Materials. No IBR inspection for SS materials.</p>		
	<p>Foreign suppliers SGS / BV /LLOYDS/TUV or IBR approved inspection agency.</p>		
13	<p>Inspection Charges:- For Indigenous vendors: Inspection shall be by BHEL / BHEL approved third party inspection agency. BHEL approved TPI charges shall be borne by BHEL. However testing charges shall be included in vendors scope.</p> <p>For Foreign vendors: Inspection shall be by reputed agencies like Lloyds, BV, SGS, TUV etc (Vendor shall indicate the name of the agency in the technical bid). Inspection charges shall be included in the quoted price.</p>		
14	GUARANTEE: Vendors shall guarantee the supplies for a period of 24 months from the date of dispatch of materials or 18 months from the date of their commissioning whichever is earlier.		

SL NO	BHEL REQUIREMENT	AGREE	DISAGREE
15	<p>LD CLAUSE: - If the supplier fails to deliver the fittings within the period specified in the contract the purchaser shall deduct Liquidated Damages, a sum equivalent to 0.5% of the price for each week of delay up to a maximum of 5% of the price of delayed/undelivered portion.</p> <p>For the purpose of LD , the delivery date will be reckoned as follows:</p> <p>a) For foreign/Imported vendors: Date of Bill of Lading will be taken as delivery date. b) For Indigenous sources: LR date will be taken as the delivery date.</p>		
16	<p>TERMS OF PAYMENT: No advance payment shall be made by BHEL.</p> <p>For indigenous vendors: 100% payment within 45 days after receipt of materials: Payment shall be made against presentation of following documents to our Finance Department. However a copy of Invoice and LR shall be sent to Purchase department immediately after the dispatch is effected.</p> <p>A. Invoice in Triplicate B. Delivery Challan in duplicate. C. Guarantee certificate in duplicate. D. Lorry Way Bill Copy 1) Site acknowledged LR in case of DTS desptch 2) Proof of receipt of material at Trichy stores E. Inspection report copy F. IBR Form III-C copy G. ED gate pass original or copy with a confirmation that the original is sent with the goods.</p>		
	<p>For Foreign Vendors: 100% through CAD with PBG for 10% of PO Value. (OR) 100 % LC at sight with PBG for 10% of PO Value. It may be noted that loading for LC charges will be made @ 1.5% of quoted rates.</p>	Choose one of the given two options	
17	<p>Minimum Order quantity / Value: Order will be placed on item level L1 status only and not as a total package or minimum order Quantity/Value.</p>		
18	<p>No raw material / component /other services for (*) marked Sl. Nos. shall be sourced from China either directly or indirectly for manufacturing or supply.</p>	AGREED	
19	<p>GENERAL :-</p> <ul style="list-style-type: none"> The PO copy with all details will be given to successful bidders in soft mode also. Order will be placed on item level L1 status only and not as a total package. Acknowledgement for receipt of PO shall be sent within one week from the date of receipt. During the Contract period, any of our sister units of BHEL Piping Centre will be entitled to place order for this item on the same terms and conditions BHEL reserves the right to cancel this tender without assigning any reasons what so ever. Deviation taken after placement of order will not be accepted (Both technical & on delivery) Suppliers to analyze in detail, at the time of submission of offer with reference to our "delivery" requirement of fittings and confirm Compliance or otherwise. Lowest prices received against BHEL tenders does not mean order will be placed on that Supplier. BHEL reserves the right not to consider the same. BHEL reserves the right to negotiate or re-float the tender opened if L1 price /or other details are not acceptable to them BHEL reserves the right to order on more than one vendor at the lowest acceptable price to BHEL Risk purchase clause: In case vendor fails to meet delivery date as per Purchase order, BHEL has the right to cancel the order and order the same item on other vendor and recover the additional cost that may incur. Unsolicited offers will not be considered for this enquiry .New Vendors may download Vendor registration forms from BHEL Web site www.bhel.com, and submit all relevant data for registration purpose. 		

Note : Please confirm your acceptance/other wise to all the points indicated above positively and submit this format duly filled, signed & stamped along with the technical bid.

VENDORS SIGNATURE & SEAL

LIST OF ITEMS

FIF-91

Sl. No.	Material	Description	QTY. (Nos.)	SPECIFICATION	FITTING D1 VALUE	DRAWINGS	TDCTPPC	CURRENCY	UNIT RATE - FOB
1	920840920000	FORGING OD220XID60 - 200L SA182F91	10	SA182F91	NA	NA	TDG:104 REV:08		
2	920841100000	FORGING OD 200 X ID50- 200L SA182F91	6	SA182F91	NA	4 80 300 75314/00	TDG:104 REV:08		
3	920841810000	NZL OD 174. ID 85. L 500 SA182F91	5	SA182F91	NA	NA	TDG:104 REV:08		
4	921175180000	BW RED OD508X90 / OD355.6 X 29 SA182F91	3	SA182F91	X 337/ X 302.3	48030075325/00	TDG:104 REV:08		
5	921175690000	MATPIECE ID390X135/ID350X60 SA182F91	4	SA182F91	AS PER DRG	4-80-301-70711/01	TDG:104 REV:08		
6	921176620000	MATCHING PIECE OD559x90/ID350x60SA182F91	4	SA182F91	AS PER DRAWING	4-80-300-73498/02	TDG:104 REV:08		
7	921178280000	MATCHING PIECE OD762X80/ID675X38SA182F91	8	SA182F91	AS PER DRG	4-80-310-77031	TDG:104 REV:08		
8	921178400000	MAT PIECE ID350X60/ID355X80 SA182F91	3	SA182F91	350/355	4-80-301-77056	TDG:104 REV:08		
9	921178550000	MAT PIECE OD663X136.5/ID350X60 SA182F91	4	SA182F91	AS PER DRG	3-80-301-31143/00	TDG:104 REV:08		
10	921178580000	MATCHING PIECE ID730X58/OD762X50SA182F91	4	SA182F91	AS PER DRAWING	3-80-310-77842/00	TDG:104 REV:08		
11	925040260000	MATCHING PIECE ID730X58/ID675X38 SA182F9	4	SA182F91	STY X - 675/730	4-80-310-78055	TDG:104 REV:08		
12*	925167140000	SOCKET WELD STUB NB 25 CL-9000 SA182F91	200	SA182F91	AS PER DRG	4-80-999-93306	TDG:103 REV:02		
13	925167180000	STUB OD 88.9X15.24 SA182F91	28	SA182F91	AS PER DRG	4-80-999-93310	TDG:104 REV:08		
14	925167190000	STUB OD 60.3 SA182F91	20	SA182F91	AS PER DRG	4-80-999-93311/01	TDG:104 REV:08		
15	925167280000	SW STUB NB 50 CL 9000 SA182F91	60	SA182F91	AS PER DRG	4-80-999-93320	TDG:103 REV:02		
16	925167310000	SCREW PLUG RC 1.5 INCH SA182F91	60	SA182F91	AS PER DRG	4-80-999-93326	TDG:104 REV:08		
17	925167750000	FORGING ID 850X80 L=2620 SA182F91	2	SA182F91	NA	NA	TDG:104 REV:08		
18	925167760000	FORGING ID 627X70 L=530 SA182F91	2	SA182F91	NA	NA	TDG:104 REV:08		
19	925167770000	SAFETY VALVE STUB OD245 SA182F91	36	SA182F91	158.8	4-80-310-77988-R00	TDG:104 REV:08		
20	925167780000	SAFETY VALVE STUB OD184 SA182F91	12	SA182F91	69.9	4-80-300-77989-R00	TDG:104 REV:08		
21	925179420000	M.PCE ID400X100MIN/OD406.4X38-SA182F91	2	SA182F91	AS PER DRG	4 80 301 62568	TDG:104 REV:08		
22	925247980000	SW 90 DEG ELBOW NB25 CL9000 SA182F91	60	SA182F91	NA	NA	TDG:103 REV:02		

LIST OF ITEMS

FIF-91

No raw material / component /other services for (*) marked SI. Nos. shall be sourced from China either directly or indirectly for manufacturing or supply.

VENDOR'S SIGNATURE AND SEAL



1.0 GENERAL

Materials shall meet Indian Boiler Regulations, (IBR) in addition to the latest version of SA105, SA 182 & Code Case 2179 (for SA182 F92) 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) For SA182 F91 & F92 (code case 2179) : The raw material shall be procured from the Mills listed in document ref.QCP:18(latest revision). For raw material sources not listed in QCP:18, credentials shall be submitted by the vendor along with offer for BHEL review and approval. Indigenous vendors shall procure the raw material for other than SA182 F91 & F92 (code case 2179) from IBR approved sources.
- (c) For SA 105 : Carbon : 0.25% max.
For SA182 F92 : Si: 0.10-0.50%; Ni: 0.30 max and Cu: 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 items shall be supplied as per class 2 and SA182 F22 shall be of Class 3 only.
- (c) Dimensions shall be as per Purchase Order.
- (d) For SA182 F91 & F92 (code case 2179) : Steel for forging shall be check tested for product analysis at vendor's works and shall be witnessed by IBR / IBR authorised agency. The check test report along with Mill TC shall be certified by IBR / IBR authorised agency.
- (e) **Forging:** to ensure uniformity of structure & strength with reduction ratio in area 4: 1 min from ingot to final forging, close to final size & shape. Flow lines to be parallel to axis of openings.
- (f) **Blooms / Billets** used for forgings (Side Length, Dia \geq 50mm) shall be UT tested & for acceptance norm refer sl.5(i). For finished bars this can be done at Final stage.

4.0 HEAT TREATMENT

4.1 All items shall be heat treated as below:

- SA 105 - Normalised
- SA 182 F11/ F12/ F22 - Normalised & Tempered

4.2 SA182 F91 & F92 :-

Normalising Temp. : 1050°C - 1080°C (for wall thickness larger than 75 mm, accelerated cooling may be done to obtain a fully martensitic structure).

Tempering Temp. : 750°C - 780°C Soaking time: 2.5min/mm of thickness (1 hr min.), still air cooling.

5.0 TESTING

- (a) **Product analysis:-** Product analysis shall be carried out on One piece / Heat / HT lot / Size.
- (b) **Corrosion test:-** Corrosion test (IGC) shall be carried out on one piece / Heat / HT lot / Size for SS items.

Prepared by : Vivekananda Yellu	Reviewed by : M.S.Muralidharan
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	G.Venkataramani Engg&Quality



- (c) **MPI (After Heat Treatment)** :100%: As per ASTM E 709. Linear Indications like cracks, folds & other injurious defects are unacceptable.
Dry MPI : CS, AS (other than F91, F92) : all sizes.
Wet MPI : SA182 F91, F92 : all sizes.
- (d) **LPI (After Heat Treatment)** :100% for SS as per ASTM E165, No linear indications acceptable.
- (e) **Tension test**:-Tension test shall be carried out on one Test piece for each specification, heat, heat treatment lot and size.
- (f) **Bend test**:- (a) 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.
(b) 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.
- (g) **Photomicrograph test for F91 & F92** :- Photomicrograph test shall be carried out from a specimen of forging in the as finished condition for each individual size (OD and wall thickness) from each heat per heat treatment batch. 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 Photomicrograph report to be provided. The actual magnification shall be indicated.
- (h) **Hardness test**:- (i) For SA 182 F91 :- 100% of items; Value: 191-250 BHN
(ii) For SA 182 F92 :- 100% of items; Value: 196-250 BHN
(iii) For other specn :- 10% of items; Value - As per specn.
The hardness test values shall be indicated in the Test certificate.
- (i) **Ultrasonic Test**:- All items shall be ultrasonically tested as per SA388 and acceptance norms shall be as per ASME Sec VIII Div .2 Cl. 3.3.4.

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

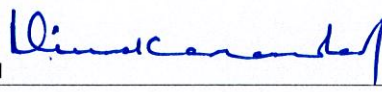
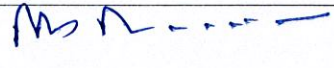


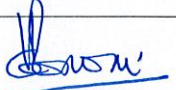
Each alloy steel item shall be checked for the correctness of the material during manufacturing and final inspection using X-ray fluorescence principle or spark emission spectrography.

7.0 WORKMANSHIP, FINISH AND REPAIR

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

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

- 8.1 **PAINTING**: All items 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 items to be surface treated as per ASTM A380 both inside and outside.

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8.2 **COLOUR CODING:** All items 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 F92	=	Brown & Blue
SA182 F316	=	Black & Blue
SA182 F316L	=	Blue, Brown & Yellow

8.3 **MARKING** (In English only) :-

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

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

8.3.2 The items dispatched directly to project site as **DTS** shall be hard punched and paint stencilled 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 items shall be well protected using end caps and shall be suitably packed in box / crate to avoid transit & other damages.

9.0 **INSPECTION & CERTIFICATION** (In English only) :-

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 (Form IIIF for well known forger under IBR) 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. Ladle and product Analysis of Raw Material.
10. IBR approved certificate for manufacturing creep resistance steel in case of indigenous steel makers.
- *11. Product analysis report.
- *12. Heat Treatment Chart.
13. NDE report. (VISUAL.MPI, LPI, UT)
- *14. Tensile Test report

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- *15. Bend Test report.
- *16. Hardness Test report
- *17. Intergranular corrosion test report for SS
- 18. Photomicrograph test report along with photomicrograph with 500x (min) magnification.
- *19. Dimensional conformance.
- *20. Repair details if any, Certified copy of TC for starting material.
- *21. 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 Test certificate in lieu of chart/report is acceptable.

10.0 AUDIT CHECKS AT BHEL

BHEL reserves the right to carry out audit checks for chemistry, HT condition, mechanical test and NDT on representative test bars or job.

Supplies found defective during check or subsequent processing at BHEL are liable for rejection.

11.0 Records of Revisions:-

- Revision 02 : Material specification SA 182 F316 added.
- Revision 03 : (i) Para 4.0, 6.0 included.
(ii) Para 5.0 (b),(c),(h),(j), 8.0 and 9.0 (17) are revised.
- Revision 04 : (i) New material specification SA 182 F92 added.
(ii) Para 1.0, 3.0, 4.2, 5 (f), (g) & 8.2 are revised.
(iii) Para 5 (a) to (h) are modified for better clarity.
- Revision 05 : (i) Para 10.0 added.
(ii) Para 2 (c), 3.0, 8.2, 8.3.2 & 9.0 are revised.
(iii) Para 5 (c), 5 (d) & 5 (i) are modified for better clarity.
- Revision 06 : (i) Para 2 (b), 3 (e),(g) & 9.0 are revised.
(ii) Para 4.1, 4.2, 5(h), 6.0, 8.1, 8.2, 8.3 & 8.4 are modified for better clarity.
- Revision 07 : (i) Para 3 (e) deleted-(Creep Test (Type Test) requirement), further clauses renumbered..
(ii) Para 9.0 revised.
- Revision 08 : (i) Para 2.0(b), 3.0(d) & 5.0(g) are revised.
(ii) Para 4.2 modified for better clarity.

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Approved by: A.P.Madhavan Kutty Quality 	 K. Ganeshan OP&C and MPL	 G.Venkataramani Engg&Quality



1.0 CODES

The fittings shall meet Indian Boiler Regulations, (IBR) in addition to the standards specified in the Purchase Order (PO).

2.0 RAW MATERIALS

- (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 from following Manufacturers approved under IBR for creep resistant steels: i) Alloy Steel Plant, Durgapur, ii) Tata Iron & Steel company, Jamshedpur & iii) Mahindra UGINE Steel Company, Bombay.
- (c) The raw materials shall be ultrasonically tested (UT) as per SA 388 and the acceptance norms shall be as per 3.3.4 of ASME Sec . VIII Div.2.
- (d) 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) Dimensions shall be as per ASME B 16.11
- (c) 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) All CS & AS fittings shall be tested by MPI as per ASTM E-709 and SS fittings shall be LPI tested as per ASTM E 165.
- (b) One fitting of each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard. Test on representative sample acceptable.
- (c) Hardness test shall be carried out on each fittings of F91; for other fittings on

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



10% of the fittings.

- (d) **SUPPLEMENTARY TEST** : The following supplementary tests shall be carried out for specifications namely SA105, SA 182 F11 / F12 / F22 / F91
- Product analysis – one / heat / size.
 - Tension test – one / heat / heat treatment lot / size.
- (e) **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

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

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

8.1 **PAINTING** : All fittings (except stainless steel and galvanised) shall be **painted** on the external surface as given below

- surface preparation : Blast cleaning
- Primer coat : 50 microns of Red oxide zinc phosphate conforming to IS 12744
- Final coat : 70 microns of Synthetic enamel paint conforming to IS2934 .
- Shade : (i) smoke grey – shade no 692 of IS5 for all carbon steel fittings
(ii) Sea green -- shade no 217 of IS5 for all Alloy steel fittings

The internal surface shall be protected with rust preventive coating or rust inhibitor
Stainless steel and Galvanised fittings need not be painted.

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

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



SA182 F22	=	Blue & Red
SA182 F91	=	Brown & Red
SA 182 F 304	=	Blue & Yellow
316	=	Black & Green
321	=	Blue & Brown
347	=	Yellow & Black

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

If the thickness of the fitting is less than 6 mm, punching is not permitted and the above details shall be paint stenciled only. Fittings of size up to 2" (50mm) shall be tied together and the above details shall be punched / etched in a separate tag and tied to it.

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 fittings 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 IIC (for fittings 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
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. Ladle Analysis of Raw Material and product analysis of fittings wherever applicable.
- *10. Supplementary Test S2/S3/S4 as applicable.
- *11. Heat Treatment Chart.
- *12. NDE report. (VISUAL, MPI, LPI, UT)

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL



- *13. Tensile Test Report
- *14. Hardness Test Report
- 15. Metallography Report along with photomicrograph with 500x (min) magnification
- *16. Dimensional conformance.
- *17. Starting material details.

*18. Guarantee of HTP shall be given as follows:- “Fittings 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 REVISION : -

- 01 Fully revised for better clarity.
Cl 2.0 a) added
- 02 a) Para 4.0, 6.0 included.
b) Para 2(c) ,5.0(b), 5.0(e), 5.0(f), 8.0 and 9.0 (15) are revised.

S. Jayakumar, Engg

P. Elangovan, QA

Approved by

K. Vedaprasad, QC

K. Ganeshan, MPL

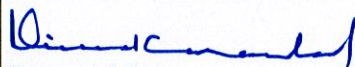


Bharat Heavy Electricals Limited, Piping Centre, Chennai.

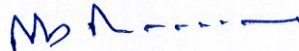
**List of Raw material sources for SA182 F91 & F92
(Indigenous & Foreign)**

QCP : 18
Rev : 00
Date : 02.12.2013

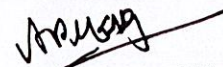
SI	Vendor Name	Location
A) INDIGENOUS SOURCES - FOR INDIGENOUS VENDORS ONLY		
1	M/s Kalyani Carpenter Special Steels Ltd	PUNE
2	M/s Remi Metals	BARUCH, GUJARAT
B) FOREIGN SOURCES - FOR INDIGENOUS & FOREIGN VENDORS		
1	Forge Fedriga	ITALY
2	Forgiatura Morandini	ITALY
3	Forgiatura Marcora	ITALY
4	La Forgia Di Bollate	ITALY
5	Pilsen Steel	ITALY
6	Abs Spa	ITALY
7	Foc Ciscato	ITALY
8	Veronal Steel	ITALY
9	Italfond S.P.A.	ITALY
10	Sider Plating Scaiigera	ITALY
11	Afar spa	ITALY
12	Forge Monchieri spa	ITALY
13	Metalcam spa	ITALY
14	Coprosider ISF spa	ITALY
15	Olifer ACP spa	ITALY
16	Breitenfeld Edelstahl AG	AUSTRIA



Prepared By:
Vivekananda Yellu



Reviewed By:
M.S. Muralidharan



Approved By:
A.P. Madhavan Kutty



BHARATH HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
PIPING CENTRE, MATERIAL MANAGEMENT
80, Gopathy Narayanaswamy Road, T.Nagar, Chennai – 600 017.

PART I FORMAT - TECHNOCOMMERCIAL BID (EXCEPT PRICE)

VENDOR NAME:		ENQ NO :	4101400072 dt 10.09.2014
VENDOR QUOTATION REF:		ITEM:	FORGINGS F91

SL NO	BHEL TERMS	VENDORS CONFIRMATION
01	All the techno-commercial terms and conditions (other than the conditions mentioned below) shall be as per finalized MOU ref BHEL: PC: IMP: MOU: FIF91: REV 00 . We have not taken any other deviation to the finalized MOU in our offer. If any such deviations are found, they need not be considered / evaluated by BHEL .Terms finalized in MOU shall be final.	AGREED
02	The rates shall be quoted on FOB basis (Please name the port).	AGREED
03	Delivery period: 04 months from the date of PO.	AGREED
04	TDG: 103:REV.02 & TDG: 104:REV.08 (Revised) enclosed, To be confirmed by Vendor.	AGREED
05	No raw material / component /other services for (*) marked Sl. Nos. shall be sourced from China either directly or indirectly for manufacturing or supply.	AGREED
06	EP Drawing 3-80-300-19825 REV. 03 shall be followed.	AGREED

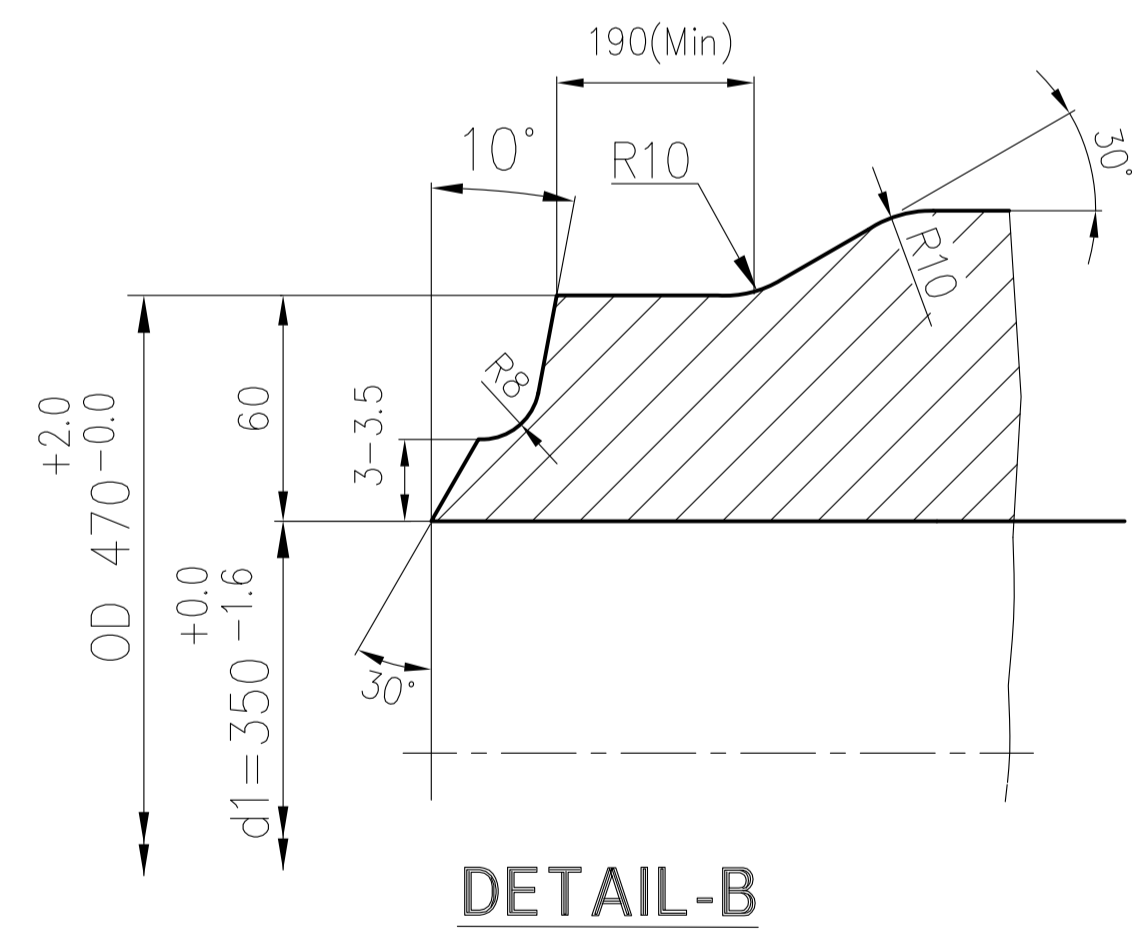
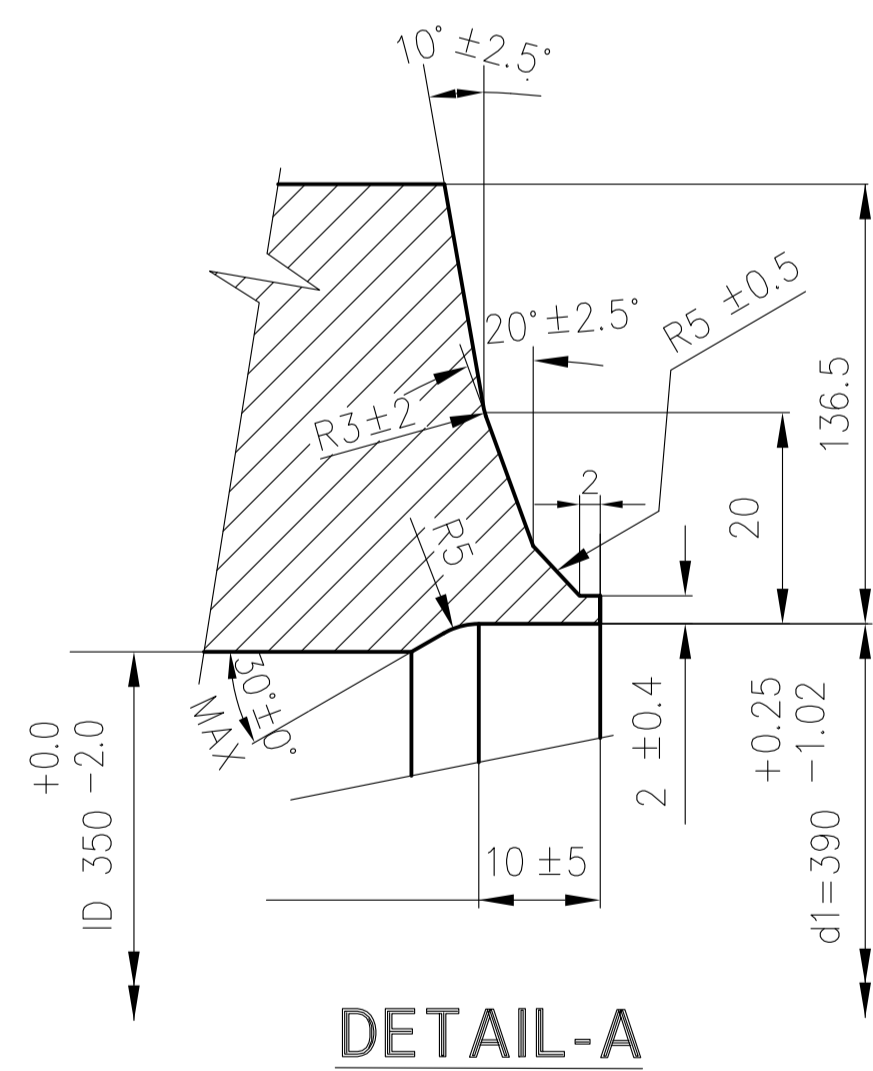
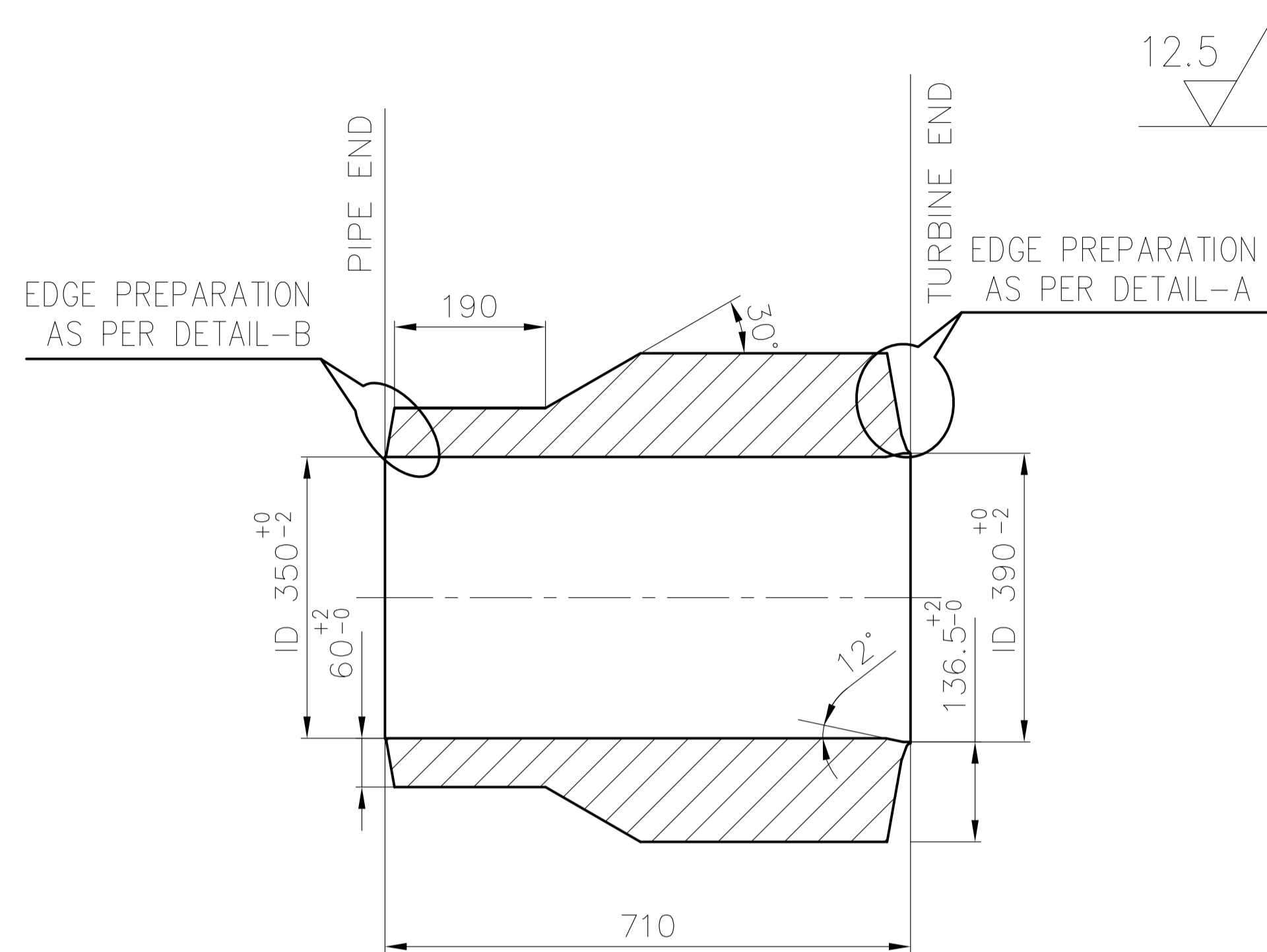
Bids shall be submitted only in the format given in this tender (Part-1 & Part- 2), other documents need not be submitted and will be considered null and void by BHEL and same shall be acceptable to you.

DATE:

SIGNATURE OF VENDOR WITH SEAL

DRAWING No 3-80-301-31143

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NOTES

- DESIGN PRESSURE : 275 Kg/Cm²(g)
- DESIGN TEMPERATURE : 568 °C
- PIPE 'SA 335 P91'(A) CAN ALSO BE USED IN PLACE OF 'SA 182 F91'(A)
- THE FINISHED MATERIAL SPECIFICATION IS 'SA 182 F91'(A)
- FOLLOW TDC No. : TDG-104 (LATEST REVISION)

01	FORGING OD663 / ID350 L=710	3-80-301-31143		-	A	1012,000
ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO.	MATERIAL CODE	A	UNIT WT.
			VAR NO.	MATERIAL SPEC.	C	QTY.

SPACE FOR IBR APPL.

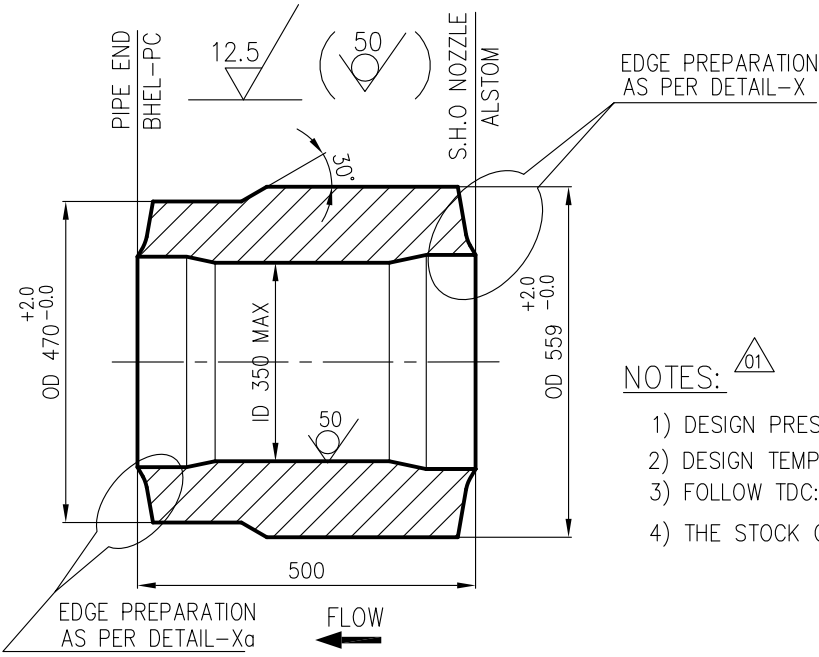
	BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, CHENNAI 600 017			NAME	SIGN	DATE	NO OF ITEMS
	DRN	KONDAPA				03.12.13	-
	CHD	KONDAPA				03.12.13	
APPD	R.SESHAGIRI				03.12.13		

DEPT.	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
CODE	C/M/F	N.T.S.	1012.00	-	-
TITLE	MATCHING PIECE (OD663X136.5/ID350X60)		CARD CODE	DRAWING No.	REV
			U 01	3-80-301-31143	00

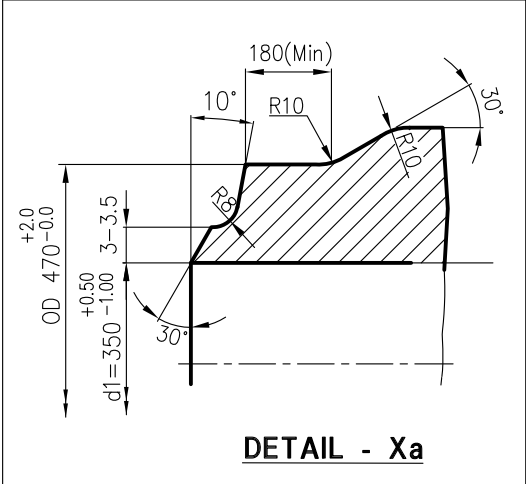
ALL DIMENSIONS ARE IN MILLIMETRES

REV 01	DATE 20.08.11	ALTERED : KBN CHD & APPD : SP	REV 02	DATE 07.03.14	ALTERED : P SURESH CHD & APPD : SARAVANAN C	REV 03	DATE	ALTERED : CHD & APPD :
NOTE ALTD AS MARKED.			DESIGN PRESSURE CORRECTED					

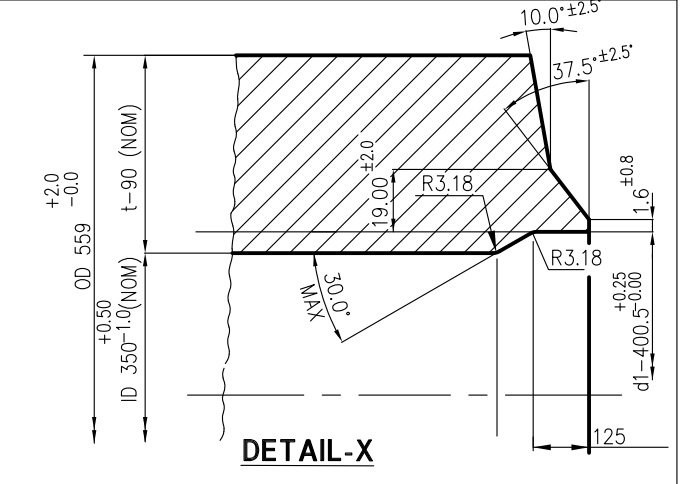
CAUTION: THE INFO ON THIS DOCUMENT IS THE PROPERTY OF BHEL. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL



- NOTES:**
- DESIGN PRESSURE : 272 Kg/sq.cm(g)
 - DESIGN TEMPERATURE : 568 °C
 - FOLLOW TDC:104 LATEST REVISION
 - THE STOCK CODE FOR THE MATCHING PIECE: 921176620000



DETAIL - Xa



DETAIL - X

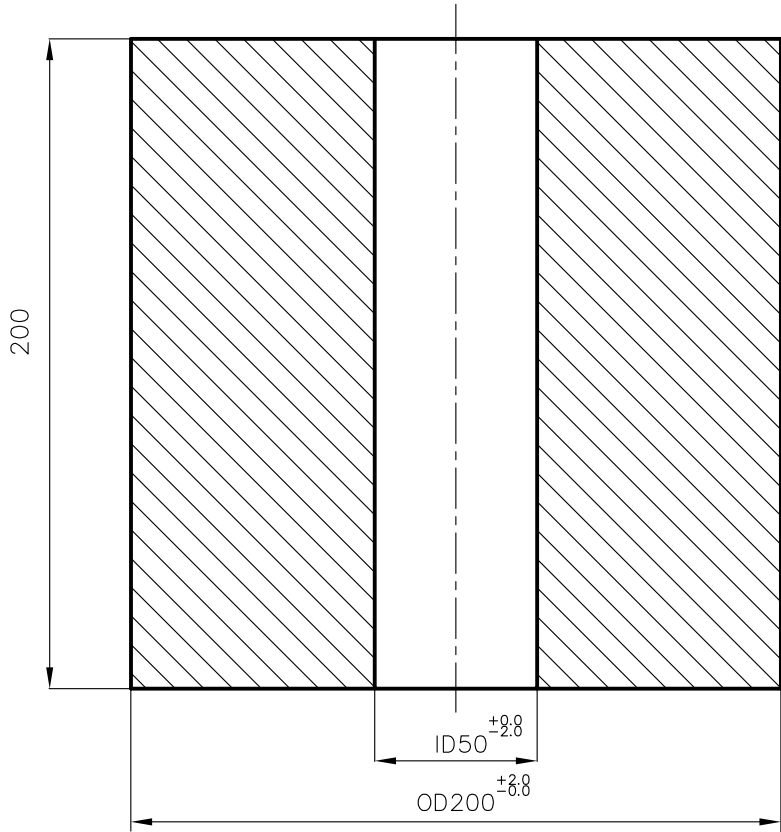
VARIANT NUMBER	DESCRIPTION	STD	MATCHING PIECE OD559x90/ID350x60 L=500		580	000
			SA 182 F91		A	
			MATERIAL CODE		A/C/P	UNIT WEIGHT(KG)
			MATERIAL SPECN		UNIT	QUANTITY

	BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	NAME MANOJ	SIGNATURE Sd.....	DATE 04.08.11
			CHD	K. BOOPALAN	Sd.....	04.08.11
			APPD	S. PANDA	Sd.....	04.08.11
DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	
CODE			N.T.S	580.0		
TITLE				DRAWING NO :		REV
MATCHING PIECE OD559x90/ID350x60				4-80-300-73498		02

ALL DIMENSIONS ARE IN MILLIMETRES

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REV	DATE	ALTERED
01		APPROVED



	HOLLOW FORGING OD200 / ID50	92 084 110 0000	A	93	00
		SA 182 F91			
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT.WT.(Kg)	
		MATL. SPECN.	C	QTY.	

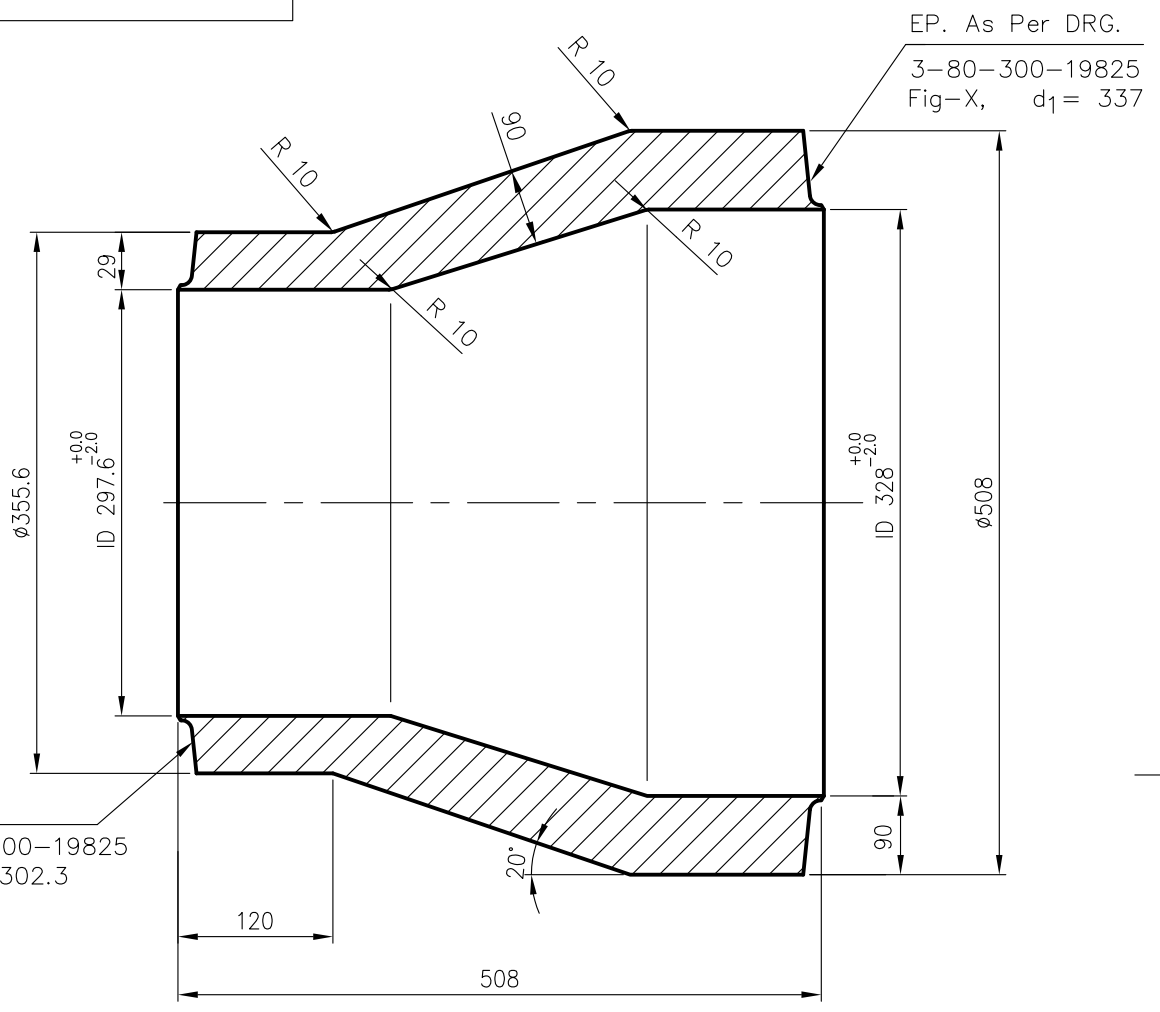
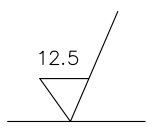
	BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	PAVANKUMAR	SIGN	DATE	NO. OF VAR
			CHD	PAVANKUMAR		01.06.12	
			APPD	C KARUNAKARAN		01.06.12	
DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (KG).	BHEL PO REF.NO:		ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	93.000				
TITLE			CARD CODE	DRAWING NO.		REV	
HOLLOW FORGING OD200 / ID50			U 01	4-80-300-75314		00	

Size A4

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REV	DATE	ALTERED :
01		APPROVED :

ALL DIMENSIONS ARE IN MILLIMETRES



EP. As Per
DRG. 3-80-300-19825
Fig-X, d₁ = 302.3

REDUCER L=508 OD 508x90/OD 355.6x29	92 117 518 0000	A	590 000
DESCRIPTION	SA 182 F91	UNIT	UNIT.WT.(Kg)
	MATL. CODE	DI	QTY.
	MATL. SPECN.		

	BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI- 600 017		DRN	NAME	SIGN	DATE	NO. OF	
			CHD	SOURAV		06.09.14	VAR	
			APPD	M MANO		06.09.14		
DEPT	GRADE OF		SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.		ITEM NO.	NO. OF
CODE	UNTOL.DIM		N.T.S	590.000				ITEMS
TITLE			CARD	DRAWING NO.			REV	
MACHINED REDUCER (OD 508 x 90/OD 355.6 x 29)			CODE U 01	4-80-300-75325 00			00	

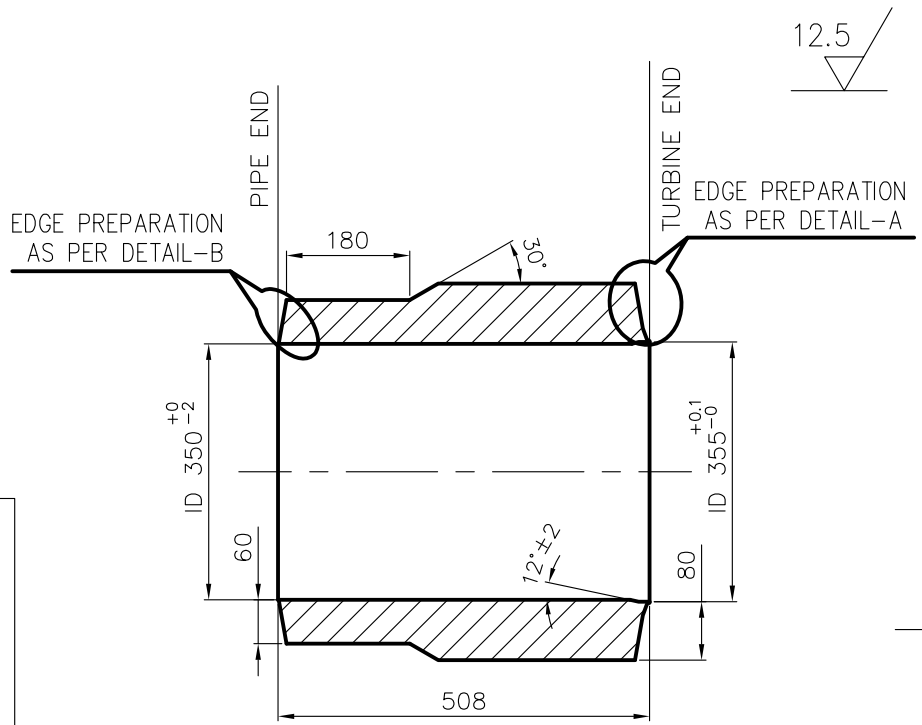
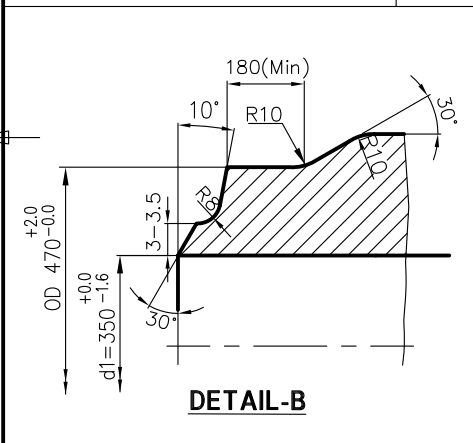
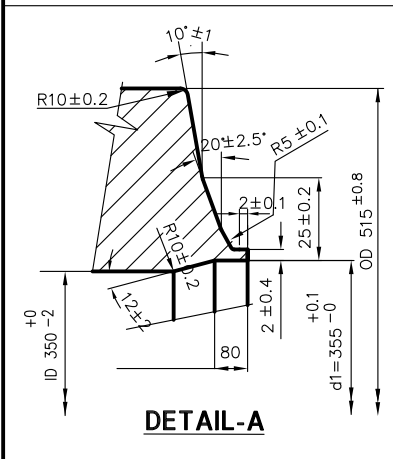
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

REV 01	DATE	ALTERED
		APPROVED

NOTES

ALL DIMENSIONS ARE IN MILLIMETRES

- 1) DESIGN PRESSURE : 269 Kg/Cm²(g)
- 2) DESIGN TEMPERATURE : 568 °C
- 3) FOLLOW TDC No. : TDG-104 (LATEST REVISION)
- 4) THE FINISHED MATERIAL CODE IS '92 117 840 0000'



—	FORGING OD515/ID350 L=508	—	A	380	000
VAR NO.	DESCRIPTION	STD	MATL. CODE MATL. SPECN.	UNIT	UNIT.WT.(Kg) QTY.



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGN	DATE	NO. OF VAR
DRN	POONGKODI.V	—sd—	15/06/2013	—
CHD	SUKUMAR.B	—sd—	15/06/2013	—
APPD	C.V.NATHAN	—sd—	15/06/2013	—

DEPT CODE	GRADE OF UNTOL.DIM C / M / F		SCALE N.T.S	WEIGHT (KG). 380.000	BHEL PO REF.NO: —	ITEM NO —	NO. OF ITEMS —
TITLE MATCHING PIECE (ID350x60/ID355x80)				CARD CODE U 01	DRAWING NO. 4-80-301-77056	REV 00	

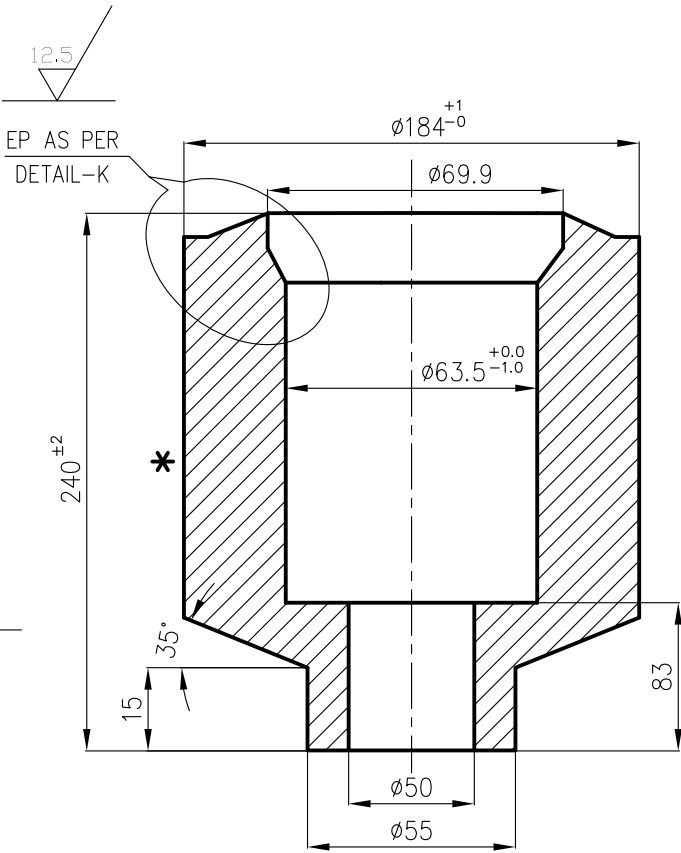
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

REV 01	DATE	ALTERED
		APPROVED

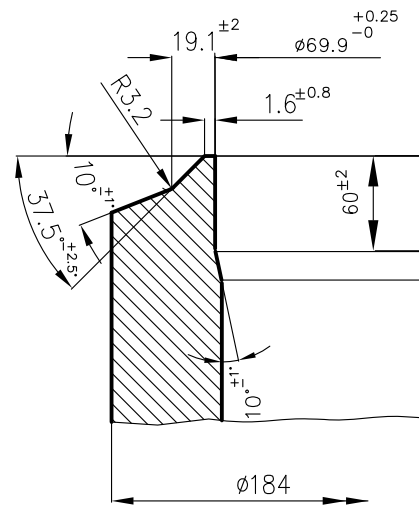
ALL DIMENSIONS ARE IN MILLIMETRES

NOTES:

- 01 DESIGN PRESSURE : 272.4 kg/sq.cm(g)
- 02 DESIGN TEMPERATURE : 573 °C
- 03 HARD PUNCH "F91" AT PLACE MARKED WITH *
- 04 ALTERNATE/SUITABLE SIZE OF SA182 F91 FORGING CAN ALSO BE USED.
- 05 FOLLOW TDC: TDG:104, REV.04
- 06 THIS STUB IS REQUIRED FOR MS SYSTEM OF OTSC BOILERS



DETAIL-K



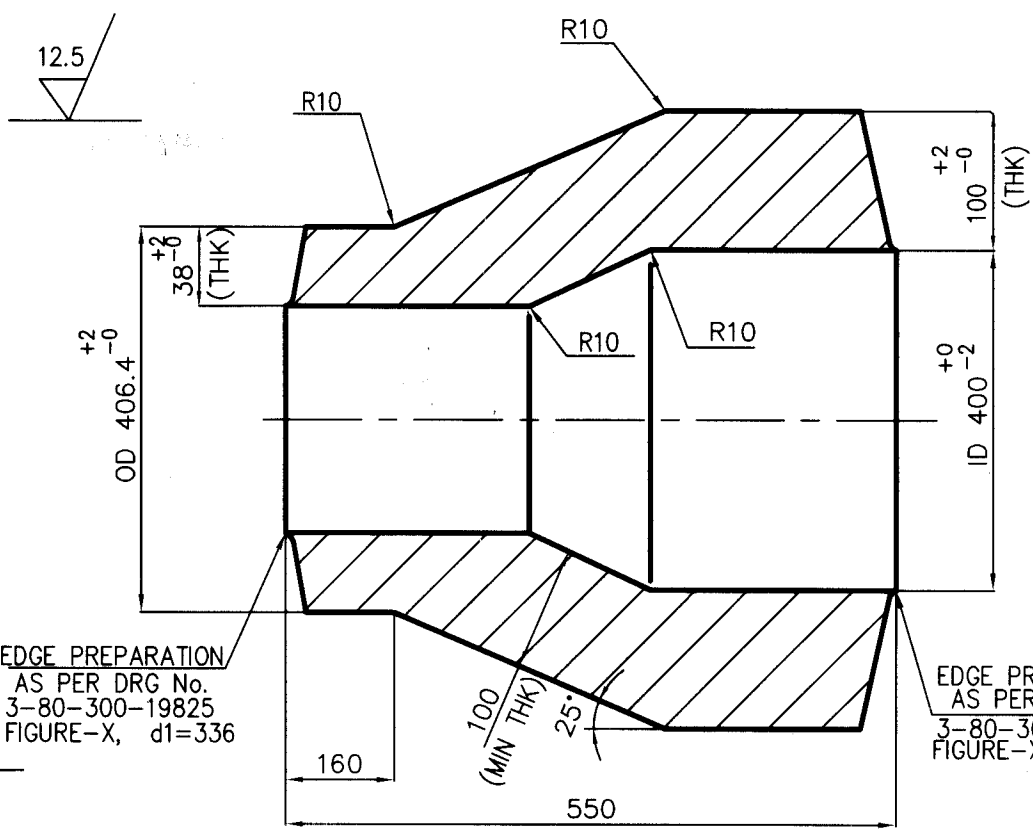
	FORGED STUB L=240 OD184/ID50	92 516 778 0000	A	42 000
		SA182F91		
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT
		MATL. SPECN.	C	DI
				UNIT.WT.(Kg)
				QTY.

	BHARAT HEAVY ELECTRICALS LIMITED		DRN	NAME	SIGN	DATE	NO. OF VAR
	PIPING CENTRE		CHD	C.DEEPAK		14.05.14	
	CHENNAI 600 017		APPD	M.MANO		14.05.14	
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	42.000				
TITLE			CARD CODE	DRAWING NO.			REV
SAFETY VALVE STUB OD 184 SA182F91			U 01	4-80-300-77989			00

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REV	DATE	ALTERED
		APPROVED

ALL DIMENSIONS ARE IN MILLIMETRES



EDGE PREPARATION
AS PER DRG No.
3-80-300-19825
FIGURE-X, d1=336

EDGE PREPARATION
AS PER DRG No.
3-80-300-19825
FIGURE-X, d1=400

	MATCHING PIECE ID 400 Max x Thk 100 min OD406.4 x 38 L=550	92 517 942 0000	A	343 000
VAR NO.	DESCRIPTION	MATL. CODE	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	DI	QTY.

STANDARD



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGN	DATE	NO. OF VAR
DRN	K.R.BALA	<i>K.R.Bala</i>	19-07-08	
CHD	C.SARAVANAN	<i>C.Saravanan</i>	19-07-08	
APPD	T.N.ELANGOVAN	<i>T.N.Elango</i>	19-07-08	

DEPT	GRADE OF UNTOL DIM	SCALE	WEIGHT (KG).	BHEL PO REF. NO.	ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S	343.000			

TITLE	CARD CODE	DRAWING NO.	REV
MATCHING PIECE (ID400 max x Thk 100 min/OD406.4x38)	U 01	4-80-301-62568	00

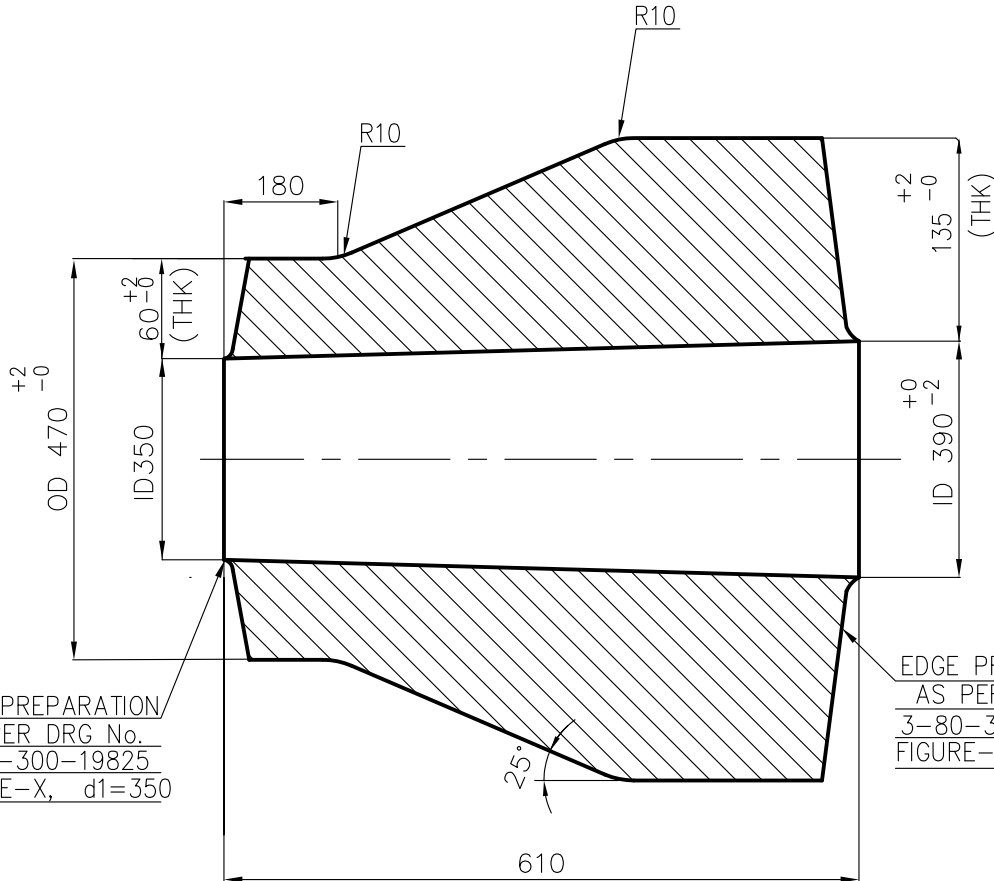
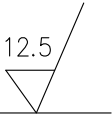
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

REV	DATE	ALTD : K.BOOPALAN -SD.-
01	14.08.2012	APPD : S.PANDA -SD.-
DESIGN PRESSURE ALTERED REVISION INDICATED AS $\triangle 01$		

ALL DIMENSIONS ARE IN MILLIMETRES

NOTES:-

- $\triangle 01$ 01. DESIGN PRESSURE : 272 Kg/Cm²(g)
- 02. DESIGN TEMPERATURE : 568° C
- 03. FITTING SHALL CONFORM TO ALL THE REQUIREMENTS OF ASME B16.9 & A 234(LATEST).
- 04. THIS DRAWING IS FOR INDICATING THE OVER ALL DIMENSIONS, CONNECTING PIPE SIZE AND MATERIAL SPECIFICATION.



EDGE PREPARATION
AS PER DRG No.
3-80-300-19825
FIGURE-X, d1=350

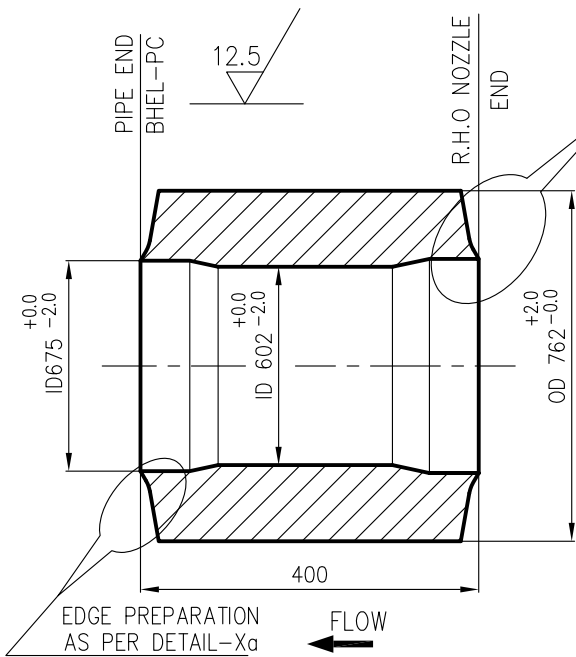
EDGE PREPARATION
AS PER DRG No.
3-80-300-19825
FIGURE-X, d1=390

	MATCHING PIECE ID 390 Max x Thk 135 min ID350 x 60 L=610	92 117 569 0000	A	1010	000
VAR NO.	DESCRIPTION	STD	MATL. CODE	UNIT	UNIT.WT.(Kg)
			MATL. SPECN.	DI	QTY.

		BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		NAME	SIGN	DATE	NO. OF VAR
DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (KG).	DRN			
CODE	C / M / F	N.T.S	1010.000	CHD	C.SARAVANAN	16.05.10	
TITLE		CARD CODE		APPD	C.SARAVANAN	16.05.10	
MATCHING PIECE (ID390 x Thk 135 min/ID350x60)SA182F91		U 01		DRAWING NO.			REV
				4-80-301-70711			01

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IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL

REV 01	DATE	ALTERED :
		CHD & APPD :

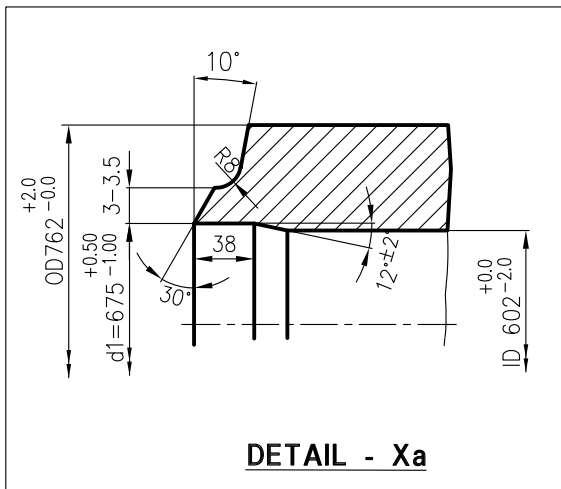


EDGE PREPARATION AS PER DETAIL-X

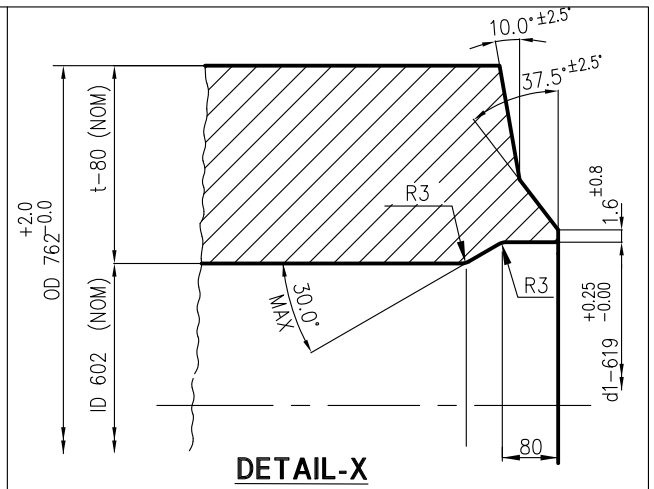
NOTES:

- 1) DESIGN PRESSURE : 70 Kg/sq.cm(g)
- 2) DESIGN TEMPERATURE : 601 °C
- 3) FOLLOW TDG: 104
- 4) THE FINISHED MATERIAL CODE IS 92 117 828 0000

EDGE PREPARATION AS PER DETAIL-Xa


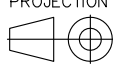


DETAIL - Xa



DETAIL-X

VARIANT NUMBER	MATCHING PIECE OD 762x80/ ID 675X38 L=400	STD	A	470	000	
	DESCRIPTION			SA 182 F91		
			MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT(KG)
			MATERIAL SPECN			QUANTITY

	BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	NAME KONDAPA	SIGNATURE	DATE 10.06.13
			CHD	KONDAPA		10.06.13
			APPD	R.SESAHGIRI		10.06.13
DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	
CODE			N.T.S	470.0		
TITLE	MATCHING PIECE OD 762x80/ ID 675X38 (SA182F91)			DRAWING NO :		REV
				4-80-310-77031		00

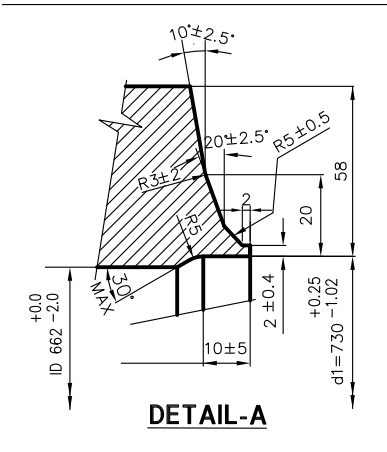
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REV 01	DATE	ALTERED
		APPROVED

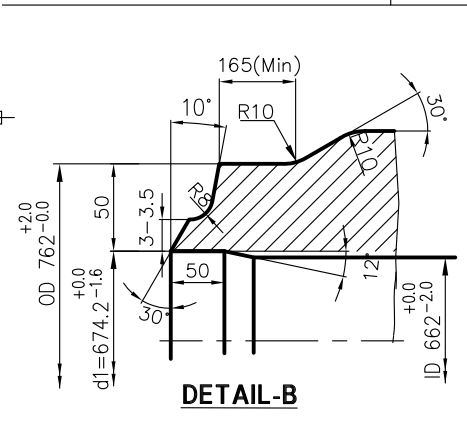
NOTES

ALL DIMENSIONS ARE IN MILLIMETRES

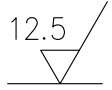
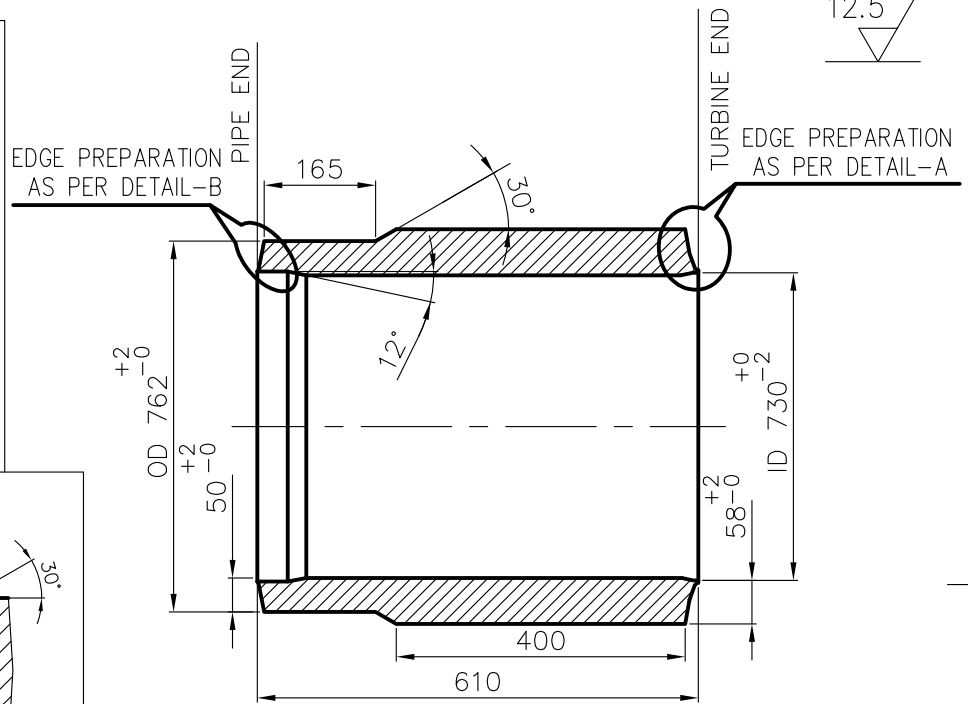
- 1) DESIGN PRESSURE : 70 Kg/Cm²(g)
- 2) DESIGN TEMPERATURE : 596 °C
- 3) FOLLOW TDC No. : TDG-104 (LATEST REVISION)



DETAIL-A



DETAIL-B



-	FORGING OD846/ID662 L=610	-	-	875	000
VAR NO.	DESCRIPTION	STD	MATL. CODE	UNIT	UNIT.WT.(Kg)
			MATL. SPECN.	DI	QTY.
			SA 182 F91	A	



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGN	DATE	NO. OF VAR
DRN	KONDAPA		02.04.2014	
CHD	KONDAPA		02.04.2014	-
APPD	R.SESHAGIRI		02.04.2014	

DEPT	GRADE OF UNTOL DIM	SCALE	WEIGHT (KG).	BHEL PO REF.NO:	ITEM NO.	NO. OF ITEMS
CODE	C / M / P	N.T.S	875.000	-	-	-
TITLE	MATCHING PIECE (OD762X50/ID730x58)		CARD CODE	DRAWING NO.	REV	
			U 01	4-80-310-77842	00	

Size A4

HRH-TG END

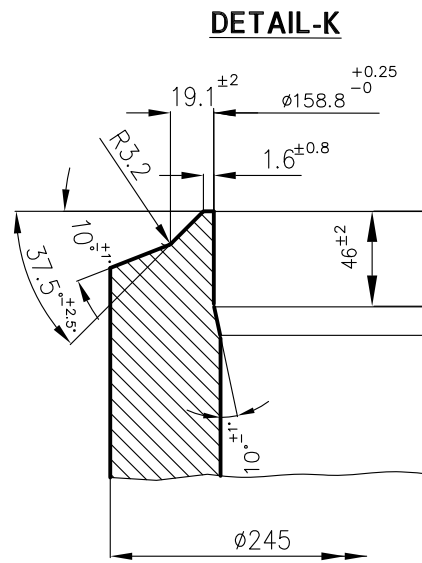
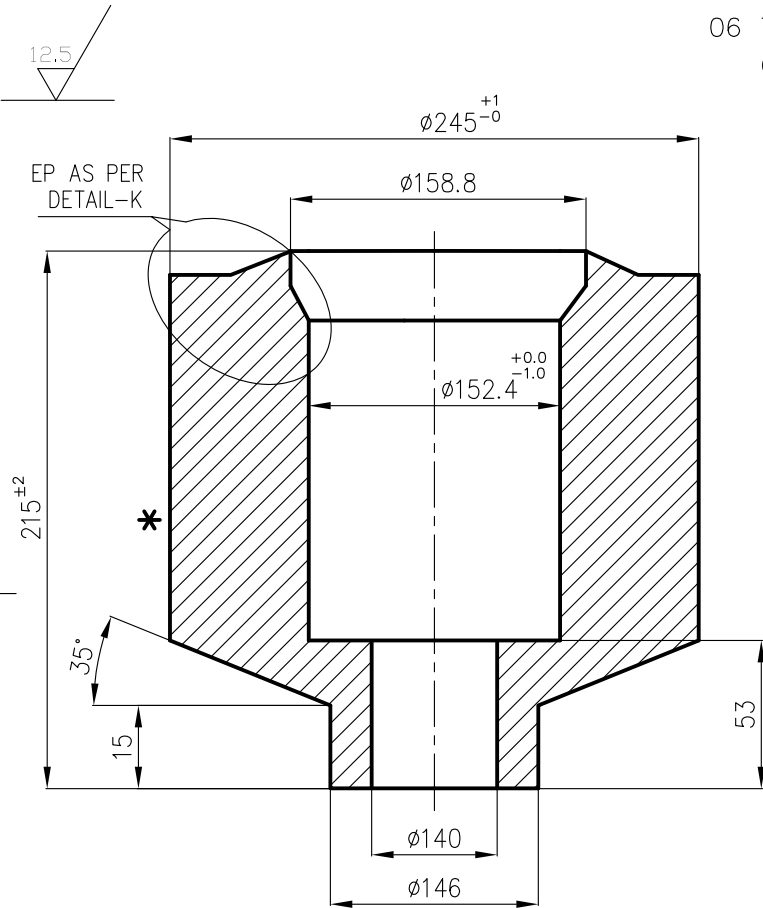
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REV	DATE	ALTERED
01		APPROVED

ALL DIMENSIONS ARE IN MILLIMETRES

NOTES:

- 01 DESIGN PRESSURE : 68kg/sq.cm(g)
- 02 DESIGN TEMPERATURE : 601°C
- 03 HARD PUNCH "F91" AT PLACE MARKED WITH *
- 04 ALTERNATE/SUITABLE SIZE OF SA182 F91 FORGING CAN ALSO BE USED.
- 05 FOLLOW TDC: TDG:104, REV.04
- 06 THIS STUB IS REQUIRED FOR HRH SYSTEM OF OTSC BOILERS



	SV STUB L=215 OD245	92 516 777 0000		38	000
		SA182F91	A		
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	C	DI	QTY.

		BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	NAME	SIGN	DATE	NO.OF VAR
				CHD	M.MANO		14.05.14	
				APPD	CKN		14.05.14	
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	38.000				
TITLE				CARD CODE	DRAWING NO.			REV
SAFETY VALVE STUB OD 245 SA182F91				U 01	4-80-310-77988			00

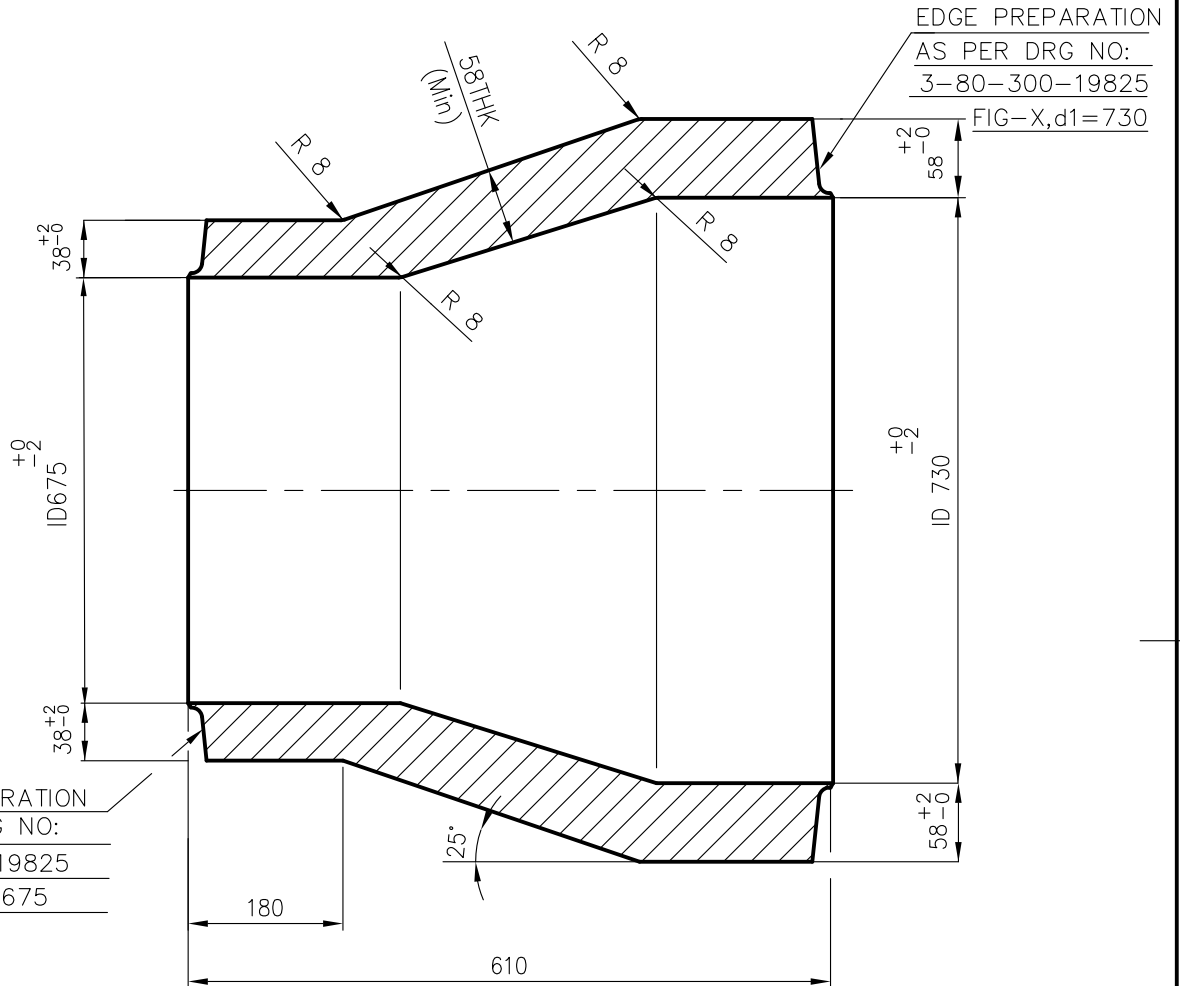
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REV	DATE	ALTERED
01		APPROVED

ALL DIMENSIONS ARE IN MILLIMETRES

NOTES :-

- 01. DESIGN PRESSURE : 70 Kg/Cm²(g)
- 02. DESIGN TEMPERATURE : 596° C
- 03. FITTING SHALL CONFORM TO ALL THE REQUIREMENTS OF ASME B16.9 & A 234(LATEST).
- 04. THIS DRAWING IS FOR INDICATING THE OVER ALL DIMENSIONS, CONNECTING PIPE SIZE AND MATERIAL SPECIFICATION.
- 05 FOLLOW APPLICABLE TDC



	MATCHING PIECE L=610 ID730max x thk58min/ ID675X38	92 504 026 0000	A	598 000
		SA 182 F91		
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT
		MATL. SPECN.	C	DI
				UNIT.WT.(Kg)
				QTY.

		BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	NAME	SIGN	DATE	NO.OF VAR
				CHD	SRM	-sd-	02.06.14	
				APPD	KVR	-sd-	02.06.14	
DEPT	GRADE OF UNTOL.DIM	SCALE	WEIGHT (KG).	BHEL PO REF.NO:			ITEM NO.	NO. OF ITEMS
CODE	C / M / F	N.T.S						
TITLE				CARD CODE	DRAWING NO.			REV
MATCHING PIECE (ID730 X 58/ID675X38) SA182F91				U 01	4-80-310-78055			00

ALL DIMENSIONS ARE IN MILLIMETRES

REV 01	DATE	ALTD:
		APPD:

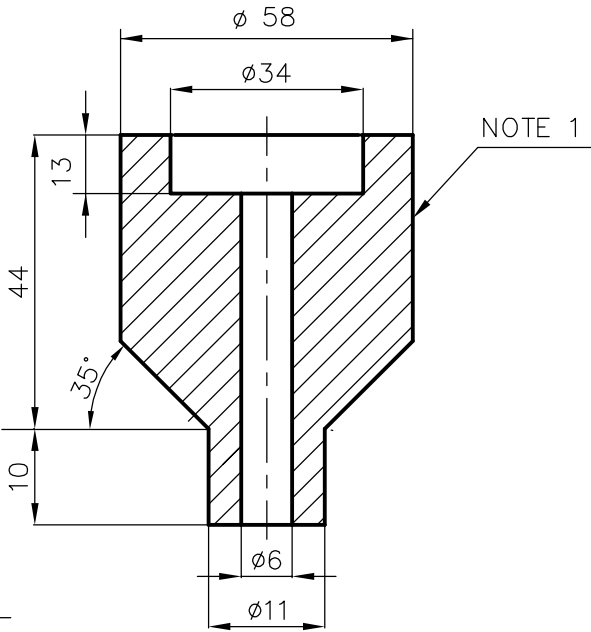
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DESIGN PRESSURE: 272 kg/sq.cm(g) DESIGN TEMPERATURE: 568°C
 DESIGN PRESSURE: 69 kg/sq.cm(g) DESIGN TEMPERATURE: 596°C

NOTES:

- 01 HARD PUNCH "SA182F91(A) CL9000-25", AT PLACE MARKED WITH *
- 02 FINISHED COMPONENT CODE IS 925167140000
- 03 ALTERNATE/SUITABLE SIZE OF SA182 F91 FORGING CAN ALSO BE USED.
- 04 FOLLOW TDC: TDG:104, REV.03
- 05 THIS STUB IS REQUIRED FOR HRH & MS SYSTEM OF 660/800 MW UNITS.
- 06 THE CRITICAL DIMENSIONS ARE IN LINE WITH ASME B16.11 (HALF COUPLING)/CL 9000.
- 07 RAW MATERIAL CODE IS 15 339 405 0000



STANDARD

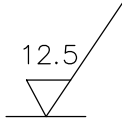
	ROD ϕ 80 ; L=54				0 810
		SA 182 F91	A		
NO.	DESCRIPTION	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	C	DI	QTY.

BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		NAME	SIGN	DATE	NO. OF VAR		
		DRN	LALIT	16.12.10			
		CHD	SVR.KALAISELVAN	16.12.10			
		APPD	AP.MADHAVANKUTTY	16.12.10			
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	0.810			
TITLE			CARD CODE	DRAWING NO.		REV	
SOCKET WELDED STUB NB 25-CL 9000 SA182F91			U 01	4-80-999-93306		00	

Size A4

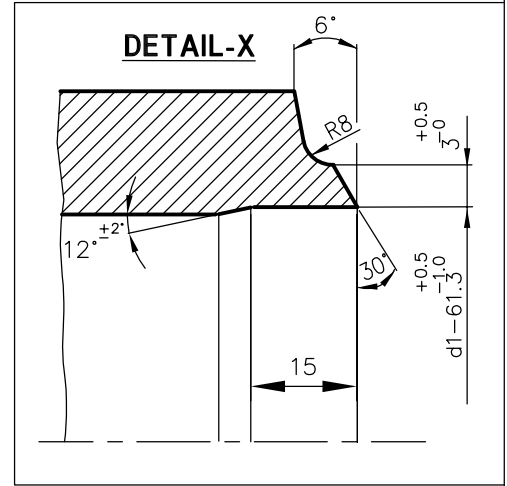
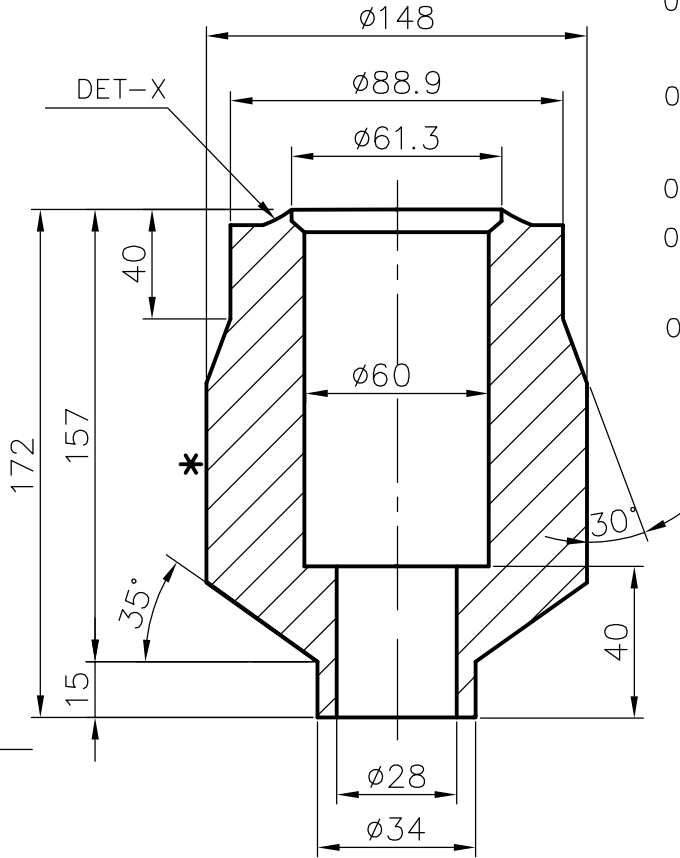
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IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL

REV 01	DATE	ALTERED : CHD & APPD :
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NOTES:

- 01 DESIGN PRESSURE : 272 kg/sq.cm(g)
- 02 DESIGN TEMPERATURE : 568 °C
- 03 HARD PUNCH "F91" AT PLACE MARKED WITH *
- 04 FINISHED COMPONENT CODE IS 925167180000
- 05 ALTERNATE/SUITABLE SIZE OF SA182 F91 FORGING CAN ALSO BE USED.
- 06 FOLLOW TDC: TDG:104, REV.03
- 07 THIS STUB IS REQUIRED FOR MS SYSTEM START UP VENT OF 660/800 MW UNITS.
- 08 RAW MATERIAL CODE IS 15 339 407 0000



STANDARD

VARIANT NUMBER	ROD DIA: 150 L=172	STD	A/C/P	UNIT	10	100
	SA 182 F91					
	MATERIAL CODE					UNIT WEIGHT
	MATERIAL SPECN					QUANTITY

	BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	NAME LALIT	SIGNATURE	DATE 20.10.10
			CHD	SVR.KALAISELVAN		20.10.10
			APPD	AP.MADAHVANKUTTY		20.10.10
DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	
CODE			N.T.S.	10.100	4-80-300-66381	
TITLE STUB OD88.9x15.24 SA182F91				DRAWING NO : 4-80-999-93310		REV 00

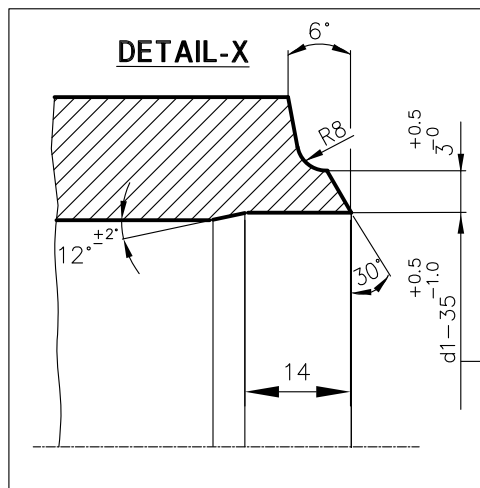
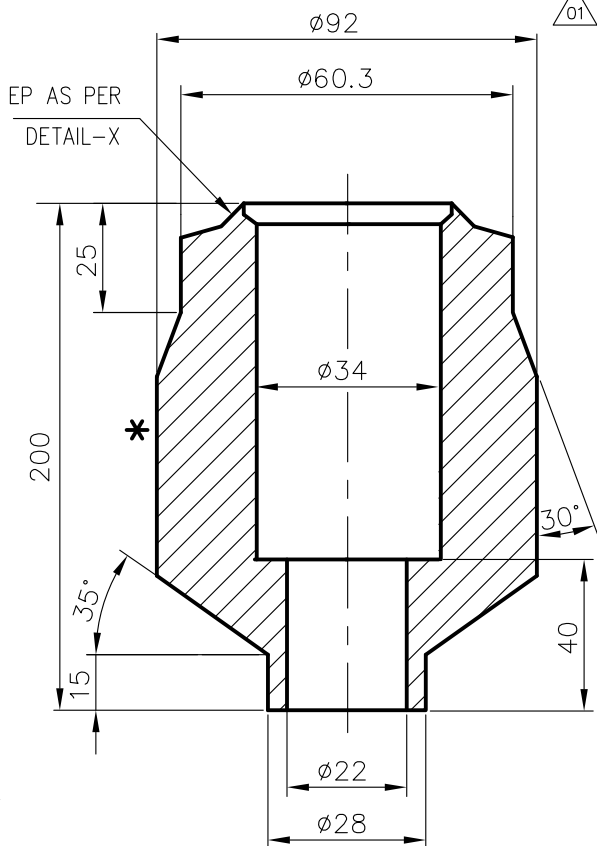
ALL DIMENSIONS ARE IN MILLIMETRES

12.5/

REV	DATE	ALTERED	S.PANDA -SD.-
01	21.08.2012	APPROVED	APMK -SD.-
DESIGN PRESSURE ADDED		REVISION INDICATED AS $\triangle 01$	

NOTES:

- | | | | |
|----------------|--|-----|------|
| $\triangle 01$ | 01 DESIGN PRESSURE, kg/cm ² (g) : | 272 | 68.8 |
| $\triangle 02$ | 02 DESIGN TEMPERATURE, °C : | 568 | 596 |
- 03 HARD PUNCH "F91" AT PLACE MARKED WITH *
- 04 FINISHED COMPONENT CODE IS 925167190000
- 05 ALTERNATE/SUITABLE SIZE OF SA182 F91 FORGING CAN ALSO BE USED.
- 06 FOLLOW TDC: TDG:104, REV.03
- 07 THIS STUB IS REQUIRED FOR MS SYSTEM VENT OF 660/800 MW UNITS.
- 08 RAW MATERIAL CODE IS 15 339 406 0000



STANDARD

VAR NO.	DESCRIPTION	STD	MATL. CODE	MATL. SPECN.	A	UNIT	UNIT.WT.(Kg)	QTY.
	ROD $\phi 100$, L=200		SA 182 F91		A		6	160



BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	LALIT		20.10.10	
APPD	C.SARAVANAN		20.10.10	
	C.SARAVANAN		20.10.10	

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	6 160			
TITLE			CARD CODE	DRAWING NO.	REV	
STUB OD60.3 SA182F91			U 01	4-80-999-93311	01	

Size A4

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ALL DIMENSIONS ARE IN MILLIMETRES

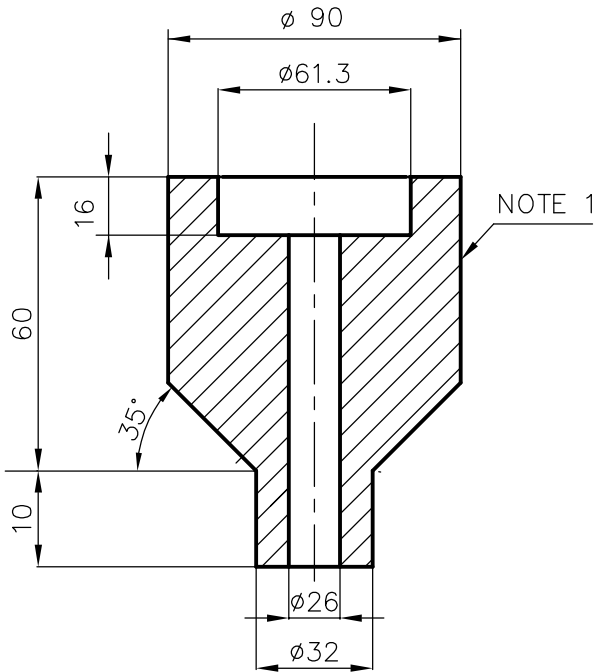
REV 01	DATE	ALTD:
		APPD:

6.3

DESIGN PRESSURE: 70 kg/sq.cm(g) DESIGN TEMPERATURE: 596°C
 DESIGN PRESSURE: 272 kg/sq.cm(g) DESIGN TEMPERATURE: 568°C

NOTES:


- 1) STAMP IDENTIFICATION MARK:
"SA182F91 A CL9000-50".
- 2) ALTERNATE/SUITABLE SIZE OF SA182 F91 FORGING CAN ALSO BE USED.
- 3) THE CRITICAL DIMENSIONS ARE IN LINE WITH ASME B16.11 (HALF COUPLING)/CL 9000.
- 4) FINISHED COMPONENT CODE IS 925167280000
- 5) FOLLOW TDC: TDG:104, REV.03
- 6) THE RAW MATERIAL CODE IS 15 339 406 0000
- 7) THIS STUB IS APPLICABLE FOR MS AND HRH SYSTEMS OF 660/800 MW UNITS.



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STANDARD

	ROD $\phi 100$; L=75		A	2	440
		SA 182 F91			
NO.	DESCRIPTION	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	C	DI	QTY.

 BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		NAME	SIGN	DATE	NO. OF VAR	
		DRN	LALIT	16.12.10		
		CHD	SVR.KALAISELVAN	16.12.10		
		APPD	AP.MADHAVANKUTTY	16.12.10		
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	2.440			
TITLE			CARD CODE	DRAWING NO.	REV	
SOCKET WELDED STUB NB 50-CL 9000 SA182F91 (CONN. PIPE $\phi 60.3 \times 11.07$)			U 01	4-80-999-93320	00	

Size A4

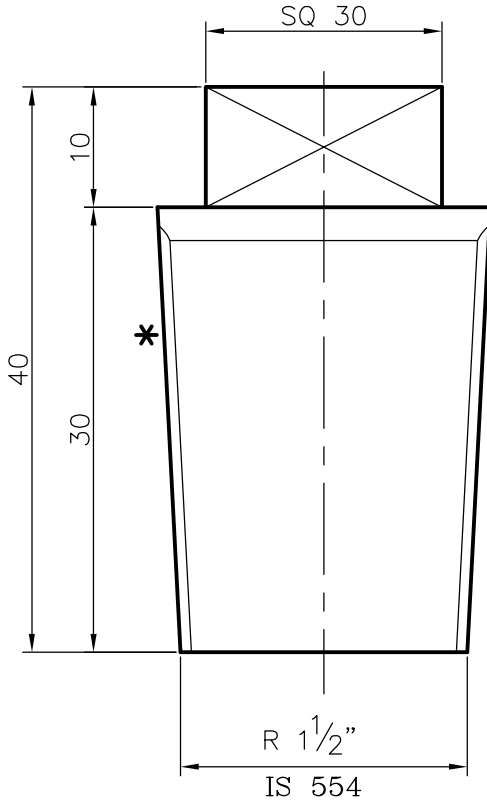
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REV	DATE	ALTERED
		APPROVED

12.5

NOTES:

- 01 DESIGN PRESSURE : 272 kg/sq.cm(g)
- 02 DESIGN TEMPERATURE : 596°C
- 03 HARD PUNCH "F91" AT PLACE MARKED WITH *
- 04 FINISHED COMPONENT CODE IS 925167310000
- 05 ALTERNATE/SUITABLE SIZE OF SA182 F91 FORGING CAN ALSO BE USED.
- 06 FOLLOW TDC: TDG:104, REV.03
- 07 RAW MATERIAL CODE IS 153394050000
- 08 ALL SHARP CORNERS ARE TO BE ROUNDED OFF.



STANDARD

	ROD ϕ 80 ; L=40			0	500
		SA 182 F91	A		
VAR NO.	DESCRIPTION	MATL. CODE	A	UNIT	UNIT.WT.(Kg)
		MATL. SPECN.	C	DI	QTY.

		BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		DRN	JUDE ANTONE	SIGN	DATE	NO. OF VAR
				CHD	SVR.KALAISELVAN		04.01.11	
				APPD	AP.MADHAVANKUTTY		04.01.11	
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	0.500	4-80-300-56137			
TITLE				CARD CODE	DRAWING NO.			REV
SCREW PLUG RC 1.5" SA 182 F91				U 01	4-80-999-93326			00

