Enquiry No 4102100023 dt 05.10.2021
Procurement of BW Fittings (CS & AS)

Dear Sir / Madam,

Sub: Procurement of BW Fittings (CS & AS) as per BHEL Enquiry- 4102100023 dt 05.10.2021.

We are pleased to inform that Global open Tender Enquiry has been floated for the **"Procurement of BW Fittings (CS & AS)"** as per BHEL Enquiry No 4102100023 dt 05.10.2021. Prospective suppliers are requested to submit their offer thru BHEL's E-Procurement portal (https://eprocurebhel.co.in/nicgep/app) in Two Parts basis (Part I- Techno-Commercial bid; Part II- Price bid) on or before **15:00 HRS IST** on **26.10.2021**. Part I bid will be opened on **16:30 HRS** on the tender due date**.**

All corrigenda, addenda, amendments, time extensions, clarifications etc (if any) will be hosted on BHEL's E-Procurement portal of NIC. Such corrigenda, addenda, amendments, time extensions, clarifications etc will not be published in newspapers or any other media. Bidders shall regularly visit the above websites to keep themselves updated.

The following are enclosed for information-

1.0 PQR & Techno commercial requirements
2.0 Technical Delivery Conditions
3.0 Quality Plan
4.0 Technical Deviation Format
5.0 Packing Procedure
6.0 Applicable items list
7.0 Annexure A- General Terms & Conditions
8.0 Make in India declaration format
9.0 Drawings
10.0 Integrity Pact

Bids on Two Part basis shall be submitted in line with the Terms & Conditions of the NIT. Care shall be given to submit the following documents along with Part I offer without fail-

- Technical deviation sheet (in case of any deviations)
- UDHYAM certificate and Make in India declaration in formats attached (in case purchase preference is applicable)

Any clarification on technical specifications can be obtained from BHEL before tender opening. Suppliers are welcome to have pre-bid meeting with BHEL Engineers for better understanding our requirements. Please note that as per BHEL's Policy, **BHEL cannot allow price impact post Part I opening for the requirement / scope of supply which is a part of specifications of our Enquiry**. Hence, please read specification / documents thoroughly and submit your offer as per specifications of Enquiry. In case of any query / un-clarity on any of the clause / requirement of specification, please get them clarified from BHEL before submission of offer. No deviation & request regarding un-clarity / contradictory conditions / ambiguity of specifications would be entertained after opening of Part I bid. Vendors are required to thoroughly understand the scope of supply and submit their quotation before the Enquiry due date indicated above.

Enquiry No 4102100023 dt 05.10.2021
Procurement of BW Fittings (CS & AS)

In the event of any Technical or Commercial queries, the same may please be addressed to the following concerned before Part I opening-

- Sandeep, Sr. Engineer / Purchase- sandeepj@bhel.in, +91-9445159877, +91-044-28161315
- Shreelekha S Chandar, DM /Purchase -shreelekha@bhel.in, +91-044-28161385

In the event of any queries during submission of the tender thru BHEL's E-Procurement NIC portal, you may pls contact-

- NIC Customer Care- support-eproc@nic.in, 0120-4001002, 0120-4001005, 0120-6277787

General Note-

- BHEL reserves the right to increase or decrease the tendered quantity and split the tendered quantity. BHEL reserves the right to negotiate or re-float the tender opened if L1 price is not the lowest acceptable price to them inter-alia other reasons.
- One agent cannot represent two or more suppliers or quote on their behalf in a particular tender. If so found at any stage, BHEL Piping Centre is likely to cancel bids of such suppliers. Further, such Indian Agent is likely to be de-listed (Black listed for business from BHEL). Any agent representing the supplier shall upload agency agreement along with the part-I bid of the tender.
- In order to protect the commercial interests of BHEL, it becomes necessary to take action against suppliers / contractors by way of suspension of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business / money / reputation, indulge in malpractices, cheating, bribery, fraud or any other misconduct or formation of cartels so as to influence the bidding process or influence the price etc. Suspension of Business Dealings could be in the form of "Hold" or "Banning" a supplier / contractor or a bidder or an applicant for registration as a registered supplier. For this purpose, the abridged version of guidelines hoisted at website http://www.bhel.com/vender_registration/vender.php (Suspension of business dealings with suppliers / contractors) is being followed across all BHEL units. Bidders shall keep themselves aware of these guidelines before submission of their quote.

For BHEL Piping Centre,

Sandeep
SE / Purchase
+91-044-28161315
+91-9445159877

PRE-QUALIFICATION REQUIRMENTS- ENQUIRY 4102100023 Dt. 05.10.2021			
Sl No	PQR description	Documents to be submitted	Bidder response (Submitted / Not submitted / NA)
1	Bidder shall be a regular manufacturer or authorized agent of manufacturer for BW fittings (Traders / distributors / dealers are not acceptable). Agents of foreign principals not to represent more than one firm.	Proof for being a manufacturer of BW fittings like valid copy of ISO 9001:2015 certificate, IBR certificate and product catalogue.	
2	IBR qualification.	1. In case of indigenous bidders- Firm should have been approved by IBR. IBR certificate/Form-IIIC to be enclosed. 2. In case of Foreign bidders- Latest Copy of any Form-III C signed by recognised inspecting / competent authorities.	
3	Availability of in-house facility for manufacturing of fittings.	1. List of machinery facilities available for manufacturing BW fittings. 2. Valid Furnace calibration report for the temperature for CS & AS items mentioned in TDG102 rev09.	
4	Bidder shall have prior experience in successful manufacture and supply of formed fittings to Carbon Steel (SA234WPB/SA234WPC)/ Alloy Steel (P22) specification as per tender in “Seamless” construction. Experience for supply of Tee will qualify for Elbow and reducers also. Experience in Elbow/reducer supply will qualify for the respective supplied item (Elbow/ reducer) only. Experience submitted in Carbon steel Grade will qualify only for Carbon steel fittings. Experience in higher Grades like P22/P91/P92 will qualify for all carbon steel (SA234WPB/SA234WPC) and Alloy Steel (P22) Grade of fittings of tender. Supply experience being furnished shall not be prior to 3 years from the date of the Enquiry.	1. Copy of PO, MTC’s, invoice, packing list and LR / BL. 2. In case of Foreign bidder, supporting MTC’s to experience cited shall be witnessed / reviewed by any reputed Third Party Inspection agency like Lloyds, BV, TUV etc. In lieu of the above, proof of at least one export supply made (outside domestic market preferably Europe or USA or India) shall be furnished.	
5	Bidder should have carried out design proof test (Burst test) as per ASME B16.9 for quoted items (Tee/Elbow/reducer). Bidder will be qualified only for the items (Tee/Elbow/reducer) for which burst test report is qualified.	Design proof test (burst test) report witnessed by Third Party Agency / customer.	
6	Firm should have made a turnover of at least Rs. 1 core for anyone of last 3 audited Financial Year (FY 2020-21, 2019-20 or 2018-19). In case of foreign bidder, financial turnover shall be an equivalent of Rs. 1 core in their regional currency. For foreign bidder, exchange rate as on the date of Part I opening will be considered for arriving equivalent turn over in INR.	1. Indigenous bidders shall submit audited Company Financial statement- Balance Sheet and P&L statement for the past 3 years (FY 2020-21, 2019-20 or 2018-19) meeting financial turnover criteria. Bidder shall submit the latest audited balance sheet (FY 2020-21) also. 2. In case of foreign bidder, recent credit rating report issued by any reputed third party rating agencies like D&B / Creditreform will be accepted in place of the above.	
7	Bidder to submit all supporting documents in English language. If documents submitted by bidder are in a language other than English, a self-attested English translated document shall also be submitted.	Translated documents (if applicable).	

Note-

1. Only the bids fulfilling PQR will be considered for further Techno-Commercial evaluation.
2. For indigenous Startups and MSE bidders, financial turnover criteria as per Sl No 6 and prior experience criteria as per Sl No 4 are relaxed as follows subject to bidder meeting technical and quality criteria of the PQR-

a. Financial turnover criteria w.r.t sl. No. 6 of PQR – Relaxed to Rs. 50 lakhs.

b. Prior experience criteria- Experience w.r.t Sl. No. 4 of PQR is relaxed as not to be prior to 4 years from the date of the Enquiry.

3. Bidders proposing to avail said relaxation as indicated above shall submit applicable documentary proof along with Pre-Qualification bid. In case the required documents are not submitted by the bidder, no relaxation will be provided.

a. For Startups – Certificate of Recognition by Department of Industrial Policy & Promotion.

b. For MSE – Copy of UDHYAM certificate .

4. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract in the overall interest of BHEL.

TECHNO_COMMERCIAL REQUIRMENTS- ENQ No. 4102100023 dt. 05.10.2021 DUE ON 26.10.2021

Sl No	BHEL requirement	Bidder response
1	Quotation no	
2	Quotation date	
3	Currency of quote (Import vendors should quote only in foreign currency)	
4	Applicable GST % shall be indicated (Import vendors may indicated "Not applicable")	
5	Techno-Commercial terms confirmation- All techno-commercial terms and conditions shall be as per general terms and conditions (Annexure-A) of the tender. If any deviations are found, they need not be considered / evaluated by BHEL. Terms finalized in Annexure-A and requirements as per TDG /QP shall be final. Vendors shall confirm acceptance to the terms and conditions of the tender, Quality Plan and TDC.	
6	Technical requirements- 1) TDG 102 Rev 09 is applicable. 2) QPG 46 Rev 01 is applicable. 3) Packing procedure shall be as per PC-PKG-01. 4) EP shall be as per DRG 3-80-300-19825/04 if not indicated explicitly in the drawing. 5) Fittings tolerance shall be as per drawing 4-80-301-26192 Rev 01.	
7	Technical deviations (if any)- Bidders may note that except for the deviations listed in the 'Technical Deviation Format', the bid shall be deemed to comply with all the requirement in the bidding documents and the bidders shall be required to comply with all terms, conditions and specifications of the bidding documents irrespective of any mention to the contrary, anywhere else in the bid. Deviations taken by vendors (if any) are subject to BHEL approval. If deviation format is not submitted by bidder, it will be construed that the bidder complies to all the technical requirements of BHEL without any deviation.	
8	Bid validity- 4 months from the date of Part I bid opening. Bids with lesser validity shall be rejected.	
9	Delivery period- 5 months from LOI / PO date .	
10	Delivery term- 1. Foreign bidder - 'CFR' Chennai port (all inc of P&F, inspection charges, freight etc). 2. Indigenous bidder - 'FOR' BHEL Trichy / Site (all inc of P&F, F&I, testing, inspection charges etc).	
11	Liquidated Damage clause- 0.5% of the price for each week of delay upto a maximum of 10% of the price of delayed / undelivered portion. For the purpose of LD calculation, BL date / LR date will be considered respectively for import and indigenous bidders. In case of deviation to BHEL's standard LD terms, loading will be applicable and will be limited to the extent to which it is not agreed to by the bidder.	
12	Evaluation & Ordering- 1. Evaluation will be done on par for both indigenous and foreign bidders. For foreign bidders, inland freight from Chennai port to BHEL Trichy, miscellaneous charges as applicable and net customs duty shall be loaded on the quoted rates. For the purpose of evaluation, Exchange Rate (SBI TT Selling rate) as on the date of Part I bid opening will be considered. 2. Item wise evaluation and ordering will be resorted to. 3. Minimum Order Quantity (MOQ) / Minimum Order Value (MOV) condition will not be accepted. Bids of such bidders (if any) insisting for MOQ / MOV will be rejected.	
13	Container detention period- For foreign bidders, 21 days free container detention period for cargo clearance shall be provided.	
14	Payment term- 1. Indigenous supplier- 100% payment after 60 days after receipt and acceptance of materials (site acknowledgement to be submitted in case of Direct to Site supplies). 2. Import supplier- 100% thru CAD after 60 days from the date of receipt of documents specified in PO at BHEL bank. 3. In case of any new import supplier who is not approved with BHEL Piping Centre for any of the Material Categories of Fittings / Forgings, Payment terms will be on CAD basis after 60 days from the date of receipt & acceptance of material.	
15	**Price Finalization through Reverse Auction-** Finalization of prices will be thru Reverse Auction after opening of Part II price bids .Bidder shall confirm acceptance for participation in Reverse Auction (refer Annexure A for details).	
16	Cancellation / termination of contract, default / breach of contract and risk purchase- As per BHEL's Standard Cost and Risk clause indicated in Annexure A enclosed. By submitting the bid, vendor explicitly accepts to BHEL's requirement. Bids deviating from BHEL's standard condition will be rejected.	
17	Purchase Preference (Import vendors may indicate "Not applicable")- If Make in India preference is applicable as per Annexure A to NIT, declaration format as per NIT shall be submitted. In the event of non-submission of declaration, purchase preference will not be extended to bidders.	
18	**Purchase Preferences for the Enquiry-** If MSE preference is applicable as per Annexure A to NIT, supporting documents as per NIT shall be submitted. In the event of non-submission of supporting documents, purchase preference will not be extended to bidders.	
19	**Integrity Pact-** Signed copy of Integrity Pact shall be submitted (refer Sl No 4 of Annexure A enclosed for IEM details).	
20	Modality for tie items (if any) during price evaluation- In the eventuality of any tie item / items during price evaluation, L1 vendor will be ascertained by BHEL by inviting snap bid or thru paper lot / lottery system. The modality of proceedings will be intimated to applicable vendors if case arises.	
21	All other terms and conditions other than those indicated above shall be as per Annexure A- General Terms and Conditions enclosed.	
22	General note- Any disparity to BHEL's terms and conditions indicated above and vendors offer, only the agreed terms and conditions above shall stand valid. Vendor's terms and conditions which are in conflict will be ignored and will not be taken into consideration by BHEL.	

Note : Bidders can quote depending on their manufacturing capability and design proof test qualification as indicated. Bids will be considered only for size range (OD / Thk), specification and construction based on following criteria.

a. Sizes (OD & Thk) qualified based on the burst test done as per Clause 9 of ASME B16.9.
b. One OD size (NPS) and One Schedule thickness more than that supplied by vendor in the past (PO copy and supply proof is required).
c. Experience shall be counted based on the least of a & b indicated above.
d. Experience in CS will qualify only for CS items, whereas that in AS will qualify for both CS & AS.
e. Details of experience shall be filled in the Annexure-1 for consideration by BHEL.

ANNEXURE-1 - EXPERIENCE DETAILS TO BE FURNISHED BY THE SUPPLIER FOR BW-CS/AS FITTINGS - ENQ. No. 4102100023 dt. 05.10.2021

Name of the company: **Dt:**

Sl no	ITEM DESCRIPTION (Elbow /Tee /Reducer)	***Quoted Sizes of the tender (items)***	Burst test report* (certificate number)	**Third party** who has approved the burst test	Burst test size	***Size qualification based on burst test***	PO number, date*	IBR form III-C (number)*	Inspection report (number) *	***Size of the supplied item***
(for CS fittings)										
1	Elbow	…	…							
1 (a)	…	…	…							
1(b)	…									
2	Tee									
	…									
	…									
3	Reducer									
	…									
	…									
(for AS fittings upto WP22)										
1	Elbow	…	…							
1 (a)	…	…	…							
1(b)	…									
2	Tee									
	…									
	…									
3	Reducer									
	…									
	…									

Note : * kindly ensure that copies of the various supporting documents are provided in proof of the experience and burst tests.

1.0 SCOPE: -

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

2.0 RAW MATERIALS: -

a) All fittings shall be of seamless construction unless otherwise specified in the purchase order. Pipes used for manufacturing of seamless fittings shall be seamless pipes or forgings only.

b) All pipes used for fittings shall meet the respective specification. The test certificate shall be furnished with Traceability

c) **For Gr-91 Pipes:** Shall be procured from the Mills listed in document ref.QCP:19(latest revision). For pipe sources not listed in QCP:19, credentials shall be submitted by the vendor along with offer for BHEL review and approval. Indigenous vendors shall procure the raw material for Alloy Steel other than SA 335 P91 from IBR approved "creep resistance steel makers".

d) Raw material Steel for IBR forging items to be inspected at Mill & test certificate countersigned by IBR approved Authority, if the mill is not approved under IBR as well-known steel maker.

e) **For Gr-91 Forgings:** 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 Alloy Steel other than SA182 F91 from IBR approved sources.

3.0 MANUFACTURING & TESTING REQUIREMENTS:

3.1 MANUFACTURING PROCESS :

(i) Seamless Fittings:-

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

B) Elbows : Formed type for all thickness

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

3.2 Machined Fittings (Max size permitted 4"- directly from bar) – Reducers, Couplings & End Caps : Fittings machined from Castings are **prohibited.**

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

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

<table>
<tr><td>Starting material:</td><td>Heat treatment shall be as per starting material specification</td><td>CS – Normalised
AS – Normalised & Tempered
SS & Duplex SS (UNS32205) – Solution Annealed</td></tr>
<tr><td>1)Tube & Pipe</td><td>NDE – UT</td><td>UT shall be done as per - ASTM E 213 with longitudinal notch of 5% wall thickness with max.1.5mm and min. 0.3mm. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>2) Forged blank (For End covers)</td><td>NDE – UT</td><td>For size above 40mm
UT shall be done as per - ASTM A 388
In acceptance to - ASME Sec.VIII Div.2 Cl.3.3.4. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>3) Plate</td><td>NDE – UT</td><td>For size above 10mm
SA 578, Acceptance Level – B. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td rowspan="6">Finished fitting (cold/hot forming)</td><td>Heat treatment after forming</td><td>Shall be done as per SA234 and follow below table for heat treatment values.
<table>
<tr><td rowspan="2">Material</td><td colspan="2">Heat Treatment Temp,◦C</td><td colspan="2">Soaking time, hr/in</td></tr>
<tr><td>Normalising</td><td>Tempering</td><td>Normalising</td><td>Tempering</td></tr>
<tr><td>CS- WPB & WPC</td><td>870-900</td><td>-</td><td>1/2</td><td>-</td></tr>
<tr><td>AS–WP11 & WP12</td><td>920-960</td><td>640-670</td><td>1/2</td><td>1</td></tr>
<tr><td>AS–WP22</td><td>920-960</td><td>680-710</td><td>1/2</td><td>1</td></tr>
<tr><td>AS- WP91</td><td>1040-1080</td><td>760-780</td><td>1/2</td><td>1</td></tr>
</table>
Stainless Steel - All grades & Duplex SS (UNS32205): - Solution Annealed: 1050-1100 Deg C
Soaking time : ½ hr per inch with minimum 15 minutes
Note: Normalising shall be done for a minimum time of 30 min while tempering to be done for a minimum time of 60min for all materials except SS & Duplex SS (UNS32205).</td></tr>
<tr><td>NDE (for all sizes) – Except for Plate formed Dished end</td><td>• MT (100%) - Shall be as per - ASTM E709 No linear indications are acceptable. For WP91 Wet MPI shall be done.
• LPI – SS & Duplex SS (UNS32205): Shall be done as per ASTM E165. No linear indications are acceptable.</td></tr>
<tr><td>NDE–for Plate formed Dished end</td><td>For Plate Formed Dished end – 100% MT as per - ASTM E709 on both inner and outer surfaces of Knuckle radius and weld ends. No linear indications are acceptable.
UT shall be as per A578 Level-B. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td rowspan="2">NDE – UT

For OD >/= 200mm
or

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

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

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

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

Note: Normalising shall be done for a minimum time of 30 min while tempering to be done for a minimum time of 60min for all materials except SS & Duplex SS (UNS32205).</td></tr>
<tr><td>NDE – UT
For OD >/= 200mm or W.T >/= 6mm</td><td>UT shall be done as per - ASTM A388
In Acceptance to - ASME Sec.VIII Div.2 Cl.3.3.4. Actual measured notch depth to be specified in Test Certificate.</td></tr>
<tr><td>NDE (for all sizes)</td><td>MT- (100%) Shall be done as per ASTM E709.
No linear indications are acceptable.

For WP91 Wet MPI shall be done.

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

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

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

<table>
<tr><td>Starting material:
Plate</td><td>NDE – UT</td><td>For thickness above 10mm
SA 578, Acceptance Level – B.</td></tr>
<tr><td rowspan="6">Finished fitting</td><td>Heat Treatment

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

4.0 GENERAL REQUIREMENTS:

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

d) **Mechanical Testing** –Test samples shall be tested in the Heat treatment of fitting delivered condition.
   1. *Tensile Test*:- One sample of each specification, heat, heat treatment lot and size shall be subjected to Tension Test as per applicable standard.
   2. The following *supplementary tests* shall be carried out for specifications namely SA 234 WPC / WP11 / WP12 / WP22 / WP91 (No supplementary test applicable for SA 234 WPB)
      i) Product analysis – one / heat / size.
      ii) Tension test – one / heat / heat treatment lot / size

e) **Photomicrograph test for WP91**:- Photomicrograph test shall be carried out on one per heat, per size. 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.

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

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

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

5.0 POSITIVE MATERIAL IDENTIFICATION (PMI) FOR ALLOY STEEL 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.

6.0 WORKMANSHIP, FINISH AND REPAIR

All items shall have smooth, workman like finish, and to be free from scale & defects like laps, seams, folds, cracks, etc. Pickled & Passivated as per ASTM A380 for SS items & Duplex SS (UNS32205). Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum dimension after repair shall meet drawing / Specification. Repairs by fusion welding are prohibited.

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

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

7.0 PAINTING, COLOUR CODING & MARKING

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

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

The internal surface shall be protected with rust preventive coating or rust inhibitor.

Stainless steel and Duplex SS (UNS32205) fittings need not be painted.

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

Material Specification		Colour Code
	WPB	Red
	WPC	Blue
	WP11	Green & White

SA 234	WP12	Black & Red
	WP22	Blue & Red
	WP91	Brown & Red
SA 403	WP304	Blue & Yellow
	WP304H	Black, Blue & Yellow
	WP316	Black & Green
	WP316L	Blue, Brown & Yellow
	WP321	Blue & Brown
	WP347	Yellow & Black
SA815 (Duplex Stainless Steel)		Red, White & Green

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

7.3.1 The fittings dispatched to **BHEL Stores** shall be hard punched / etched with Material code, Heat number, material specification, maker`s emblem, Inspectors seal, Running Serial number for the P.O. quantity and Statutory authorities seal as applicable.

In addition, the above details along with size shall be paint stencilled 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 stencilled. Fittings of size up to 2" (50mm) shall be tied together and the above details shall be punched / engraved in a separate tag and tied to it.

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

Sample format for Punching & Stencilling is given below.

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

Makers Emblem
Insp. Authority Stamp

8.0 PACKING AND END PROTECTION:

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

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

9.1 All 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 III C & Form III-I for Dished Ends shall be submitted along with the Work Test Certificate countersigned by the above authorities and shall include the following (Three ink signed originals required).

1. Test Certificate Number & date.
2. BHEL P.O Number & Amendment Number
3. BHEL P.O. Serial Number
4. BHEL TDC Number
5. Size-wise Quantity
6. Specification, Grade & Year of code.

7. Heat/Melt Number
8. Starting material details with traceability.
9. Steel making process
10. Ladle Analysis of Raw Material and product analysis of fitting.
*11. Supplementary Test (Product analysis, Tension test.) results.
12. Tensile Test Report
*13. Guarantee of HTP shall be given as follows:- "Fittings are capable of withstanding without failure, leakage or impairment of their serviceability a hydrostatic test pressure equal to that prescribed for the specified matching pipe of equivalent material".

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

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

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

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

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

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

10.0 AUDIT CHECKS AT BHEL

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

11.0 RECORDS OF REVISION:-

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

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

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

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

Rev 05 : **a)** New material specification SA 815 Duplex Stainless Steel included.

b) Para 4.1, 4.2, 5.0 (d), 7.1 & 7.2 are revised.

c) 5.0 (a), (b), (c), (e), (f), (g), 7.3.1 & 7.3.2 are modified for better clarity.

Rev 06 : **a)** Para 8.2 added.

b) Para 5.0(d), 5.0(g), 7.1, & 8.1 are revised.

c) Para 1.0 & 7.2 are modified.

Rev 07 : Para 8.2 - vii added.

Rev 08 : **a)** Title revised for better clarity

b) Para 1.0,2.0(a),5.0(c),8.4,9.1(8) & 9.2(vi) are revised.

c) From Para 3.0(f),4.2,5.0(d),(f),(g),7.2 forging spec removed

d) Para 2.0(c),(f),3.0(a),7.0 & 10.0 added

e) Para 3.0(e) deleted

f) Document no.TDG102:002 Rev.00 added.

Rev 09 : Fully revised for better clarity

*****

THICKNESS MEASUREMENT REPORT FOR ELBOW

Doc No: TDG102:001 Rev.00

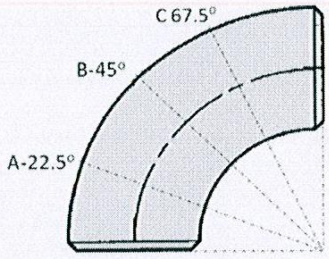
Date: 03.02.2014

PO Number:

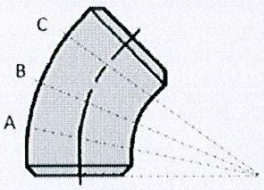
Work order/Du:

Heat no:

Size:



90° Elbow



Less than 90°

Measurement (Extrodus) points

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

Description of item :
Material Spec :
Material Code :

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

THICKNESS MEASUREMENT REPORT FOR TEE's

Doc No: TDG102:002 Rev.00

Date: 20.06.2015

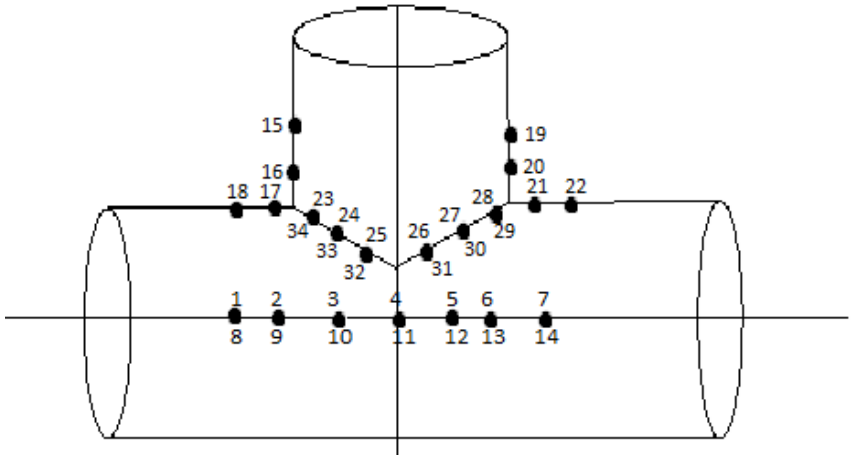
PO Number:

Description of Material:

Size:

Material Spec.

Work order/Du:



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

BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS – 17 QUALITY ASSURANCE & CONTROL DEPT.	STANDARD QUALITY ASSURANCE PLAN FOR BUTT WELDED FITTINGS CONFORMING TO ASME SA 234	QP NO : QPG: 46 REV.NO : 01 DATE : 13-10-2015

REF: BHEL TDC No. : TDG:102 (latest revision)

SL. NO.	COMPONENT OR OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	TYPE OF RECORD		AGENCY		REMARKS
									D*	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15
1.0	Raw material sources for P91 shall be as per QCP:19(Latest Revision); Any other source proposed by the vendor shall be subjected to BHEL approval.. The Test Certificate for all material specifications received from RM manufacturer shall meet IBR requirements.											
1.1	Seamless Pipe	Chemical Composition, Mechanical Properties & HT/UT	Major	Verification of MTC & Ladle Analysis Report	100%	As per Required Material (ASME) Specification		MTC	X	P	V/R	Refer Note:1 MTC - Mill Test Certificate
1.2		Surface defect	Major	Visual	100%	As per Required Material (ASME) Specification		Report	X	P	V	
1.3		Dimensions Outer Dia.,Thk.etc	Major	Measurement	100%	As per Spec		Report	X	P	V	
1.4		Pipe Check (chemical)	Major	PMI	100%	As per Required Material (ASME) Specification		Report	X	P	R/W*	*For 1st off trial at random
1.5		Hardness Test for P91 material	Major	Measurement	100%	As per Spec		Report	X	P	R/W*	
1.6	Plates	Co-relation & verification of Mill TCs for										
1.7		a) Chemical Composition & b) Mechanical Properties	Major	Verify	100%	BHEL Drawing , Material Spec.		Mill TCs	X	P	V	
1.8		c) Soundness	Major	UT	100%	SA578						
1.9		d) Dimension & Surface finish	Major	Measurement & Visual	100%	BHEL Drawing , Material Spec.						

LEGEND: M:- Manufacturer; B:- BHEL/ BHEL Nominated Agency; P - Perform; V - Verification; R-Review; W - Witness; H - Hold.
D* - Documents required if marked "X"

PREPARED & REVIEWED BY: VIVEKANANDA YELLU

APPROVED BY: PARAMESWARAN.H

BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS – 17 QUALITY ASSURANCE & CONTROL DEPT.	STANDARD QUALITY ASSURANCE PLAN FOR BUTT WELDED FITTINGS CONFORMING TO ASME SA 234	QP NO : QPG: 46 REV.NO : 01 DATE : 13-10-2015

REF: BHEL TDC No. : TDG:102 (latest revision)

SL. NO.	COMPONENT OR OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	TYPE OF RECORD		AGENCY		REMARKS
									D*	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15
2.0	IN PROCESS INSPECTION											
2.1	Fitting Forming Procedure	procedure qualification	Major	Review	100%	ASME SA 234 & BHEL TDG:102 Refer Note : 5		Appd. Procedure	X	P	V	Forming Procedure shall be approved by BHEL.
2.2	MT Procedure	Procedure Review	Major	Review	100%	ASME SA 234 & BHEL TDG:102		Appd. Procedure	X	P	V	MT - Magnetic Particle Test
2.3	UT Procedure	Procedure Review	Major	Review	100%	ASME SA 234 & BHEL TDG:102		Appd. Procedure	X	P	V	UT - Ultrasonic Test
2.4	RT Procedure	Procedure Review	Major	Review	100%	ASME SA 234 & BHEL TDG:102		Appd. Procedure	X	P	V	RT - Radiography Test
2.5	Forming of pipe fittings	Process parameters	Major	Temperature, Measurement & Visual	100%	ASME SA 234 & Appd.Procedure		Internal report	X	P	---	
2.6	Heat Treatment	Rate of Heating, Rate of Cooling & Soaking time	Critical	Temp & Time graph	100%	ASME SA 234 & BHEL TDG:102 Refer Note : 2		HT Chart	X	P	V/ W*	W* : For 1st off trial at random
2.7	Test Piece Marking (TPM)	Selection of Test coupons	Major	Measurement & Marking	One Sample / Heat / Size/ HT Batch	As per ASTM A370		Internal report	X	P	V/ W*	
3.0	TESTS											
3.1	Finished product	YS, UTS, % Elongation (Mandatory)	Major	Tensile Strength,	One Sample / Heat / Size/ HT Batch	ASME SA 234 & BHEL TDG:102		Test Report	X	P	V	
3.2		Hardness	Major	Hardness test	100% / 10%	ASME SA 234 & BHEL TDG:102		Test Report	X	P	W	100% for WP91 ; 10% for others

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SL. NO.	COMPONENT OR OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	TYPE OF RECORD	D*	AGENCY M	AGENCY B	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	15
3.3		Volumetric Defect	Major	NDE - UT	100% / 10%	ASTM E213 - longitudinal notch of 5% - For Pipe Fittings		Test Report	X	P	W	100% for WP91 ; 10% for others
3.4		Sub-surface Defect	Critical	NDE - MT	100% / 10%	ASTM E709	ASME B31.1 Cl. 136.4.3	Test Report	X	P	W	100% for WP91 ; 10% for others
3.5		Volumetric Defect - Welded Fittings	Major	NDE - RT	100%	ASME SEC-V & ASME SecVIII Div-1, UW-51		Test Report	X	P	W	
3.6		Microstructure (Applicable for WP 91 Fittings)	Major	Metallographic test	One Sample / Heat / Size/ HT Batch	No micro fissures. Microstructure shall show tempered martensite. Grain growth if any has to be examined further.		Test Report (Magnification at 500x) Refer Note :9	X	P	W	Actual magnification shall be indicated in the photomicrograph. Photomicrographs shall be provided as records for review & acceptance and future in-service reference.
3.7	Supplementary tests as per TDC on Finished Product	Product Analysis	Major	Chemical Composition	One Sample / Heat / Size	ASME SA 234 & BHEL TDG:102		Test Report	X	P	V/ W*	
		YS, UTS, % Elongation	Major	Tensile Strength,	One Sample / Heat / Size/ HT Batch	ASME SA 234 & BHEL TDG:102		Test Report	X	P	V/ W*	
3.8	PMI for AS fittings	Chemical	Major	PMI	100%	ASME SA 234 & BHEL TDG:102		Test Report	X	P	W	

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BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS – 17 QUALITY ASSURANCE & CONTROL DEPT.	STANDARD QUALITY ASSURANCE PLAN FOR BUTT WELDED FITTINGS CONFORMING TO ASME SA 234	QP NO : QPG: 46 REV.NO : 01 DATE : 13-10-2015

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SL. NO.	COMPONENT OR OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	TYPE OF RECORD	D*	AGENCY M	AGENCY B	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	15
3.9	Burst Test	Performance & Design Proof	Critical	Hydro Test	One / Type (on similar Fitting$)	ASME B 16.9 & ASME SA 234 Refer Note : 3		Test Report	X	P	R /W#	$ - As allowed in relevant standard # - WITNESS -if size is not qualified as per Burst Test Report available.
4.0	FINAL INSPECTION											
4.1		Surface check, Bend angle, Radius, End-to-end dimn, Ovality, Thickness, Wrinkles, d1 at ends, Edge preparation & other dimensions as per Drg.	Major	Visual & Measurement	100%	ASME B16.9, BHEL Drg.. & P.O.		Report	X	P	W	Refer Note : 12
4.2		IBR Certification	Major	all tests as per IBR	100%	IBR		FORM-IIIC	X	P	IBR	
4.3		Marking / Color coding	Critical	Visual	100%	BHEL TDG:102 & P.O.		Report	X	P	V	Refer Note : 17
4.4		Surface Protection, Preservation & Packing	Critical	Visual	100%	BHEL TDG:102 & P.O.		Report	X	P	V	Refer Note : 13 & 16
5.0	Inspection clearance	Documentation	Critical	Verification	100%	All reports as required in this QAP		Report	X	P	H	

NOTES :-

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

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

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BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE, MADRAS – 17 QUALITY ASSURANCE & CONTROL DEPT.	STANDARD QUALITY ASSURANCE PLAN FOR BUTT WELDED FITTINGS CONFORMING TO ASME SA 234	QP NO : QPG: 46 REV.NO : 01 DATE : 13-10-2015

REF: BHEL TDC No. : TDG:102 (latest revision)

SL. NO.	COMPONENT OR OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	TYPE OF RECORD		AGENCY		REMARKS
									D*	M	B	
1	2	3	4	5	6	7	8	9	10	11	12	15
2.0	POST FORMING HEAT TREATMENT :-											
	For P91 materials : Normalise at 1040 - 1060 deg.C & Temper at 750-770 deg.C; Soaking shall be 2Hrs minimum for thickness upto 50mm and 4Hrs minimum for thickness 51-100mm											
	Normalising and Tempering shall be carried out within 72 hours after completion of forming.The items shall be kept dry and stress free. The temperature shall be brought down to room temperature											
	after hot forming before normalizing and also after normalizing before tempering. Normalising and tempering of Gr91 shall be done encompassing the entire component.											
	SA234 WPB : As per Specn; SA105 & SA234WPC : Normalised; SA234 WP11/WP12/WP22 : Normalised & Tempered.											
3.0	BURST TEST (Type test) : Burst test procedure shall be submitted by the vendor to BHEL for approval. Burst test will be witnessed by BHEL.											
	After successfull completion of the burst test regular production may be permitted.											
4.0	Seal tranfer on pieces to be cut shall be done by BHEL inspector & IBR for Gr-91 materials and IBR for other than Gr-91 materials.											
5.0	Welded Fittings shall be made from Two - Halves.											
6.0	Chemical & Mechanical tests shall be performed at in-house or NABL approved laboratories.											
7.0	Welding consumables shall be approved by BHEL.											
8.0	All NDE procedures shall be submitted to BHEL for review. NDE procedures shall have Level-III certified personnel approval incase of in-house. Incase of non-availability of inhouse facility											
	NDE shall be performed by NABL approved laboratories.											
9.0	Items shall be visually checked. No hard scales shall be present on inside & outside surfaces.											
10.0	Gas cutting & Plasma cutting are prohibited for Gr91 material.											
11.0	3 replicas in one fitting. 1 replica for the size Nb 80 & below. Actual magnification shall be indicated in the photomicrograph. Photomicrographs shall be provided as records											
	for review & acceptance and future in-service reference.											
12.0	Minimum thickness measured at any location on the finished fitting shall be not less than 0.875 of the specified nominal thickness.											
13.0	All fittings shall be Painted as below when not specified in the P.O./Drawing:-											
	Three coats of 20 microns each of total DFT 60 microns minimum of Heat Resistance Aluminium Paint to IS 13183 Gr II, after surface preparation by Blast cleaning (SSPC-SP10).											
14.0	All items shall be inspected and cleared by BHEL / BHEL authorised Inspection agency & IBR authorities.											
15.0	Necessary IBR Requirements shall be fulfilled and IBR documents to be submitted.											
16.0	Machined ends shall be well protected using end caps and suitably packed to avoid transit & other damages. Tack welding is prohibited on P91 material.											
17.0	Marking :- a) Items dispatched to Stores : The finished components shall be punched & paint stencilled with Material code, Heat number, material specification, maker`s emblem,											
	Inspectors seal and Statutory authorities seal (as applicable)											
	b) DTS (Direct to Project Site) Items :- 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 15 (a).											
	Colour coding : Red for WPB ; Blue for WPC ; Blue & Red for WP22; Brown & Red for WP91.											
18.0	If the thickness of the fitting is less than 6 mm, punching is not permitted and the above details shall be paint stencilled. Fittings of size up to 2" (50mm) shall be tied together and the above details											
	shall be punched / engraved in a separate tag and tied to it.											

LEGEND: M:- Manufacturer; B:- BHEL/ BHEL Nominated Agency; P - Perform; V - Verification; R-Review; W - Witness; H - Hold.
D* - Documents required if marked "X"

PREPARED & REVIEWED BY: VIVEKANANDA YELLU

APPROVED BY: PARAMESWARAN.H

PURCHASE / MM / BOI
ENQUIRY DEVIATION

429-024

PAGE

SCHEDULE OF DEVIATION TO BOI ENQUIRY NO:	4102100023	DATE	
DESCRIPTION	BW Fittings CS & AS		
SPECIFICATION	TDG 102 Rev 09 QCP 46 rev 01		
Drawing No	As enclosed with tender		
QUALITY PLAN	QCP 46 rev 01		
PACKING PROCEDURE	PC-PKG-01 Rev 00		

DOCUMENT REFERENCE	BHEL CALLED FOR	FIRM'S ALTERNATIVE OFFER

CERTIFIED THAT OTHER THAN THE ABOVE DEVIATIONS, WE ARE ACCEPTING ALL THE OTHER SPECIFICATIONS AND REQUIREMENTS IN FULL TO YOUR ENQUIRY.

STATION:

DATE: SIGNATURE OF FIRM'S REPRESENTATIVE FIRM SEAL

NOTE 1. Deviations should be taken only in the extreme case.
2. If necessary, use additional sheets with page control number.

PACKAGING INSTRUCTIONS FOR PIPING COMPONENTS
PC: PKG: 01

Revision summary

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

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

Contents

1. SCOPE

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

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

2. PACKAGING

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

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

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

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

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

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

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

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

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

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

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

3. Criteria for Selection of Packaging:

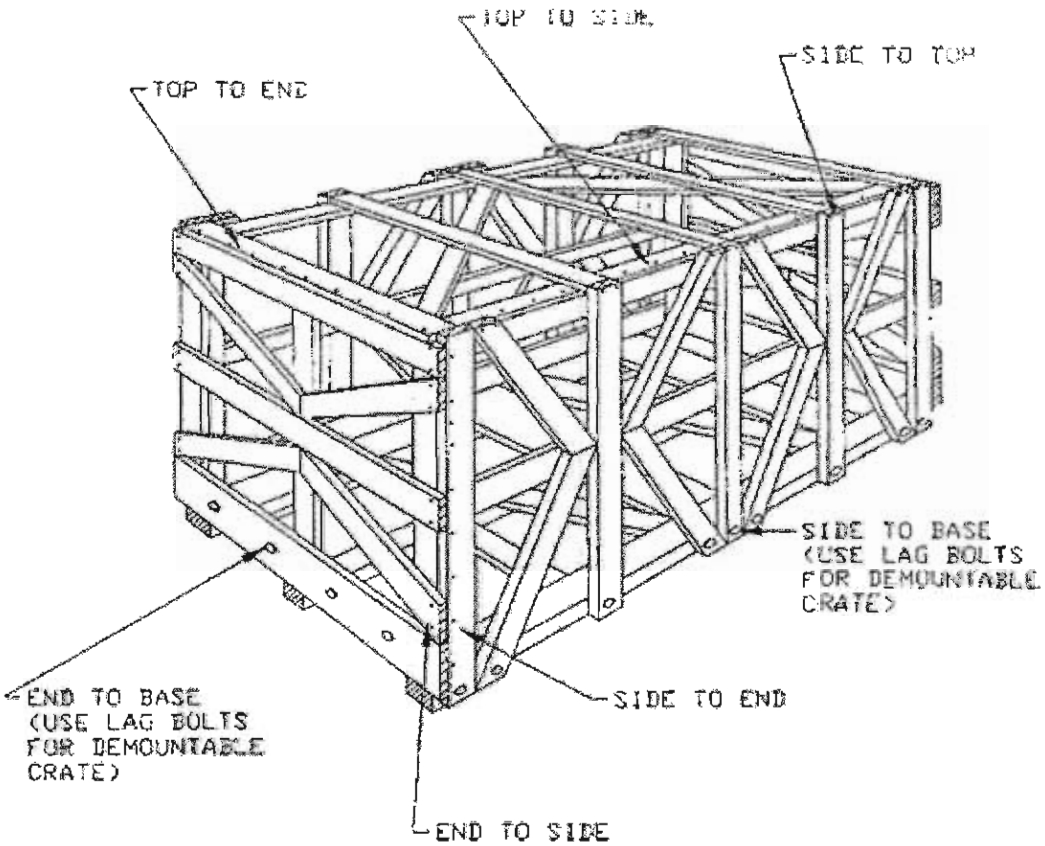
Packages are to be made according to categories listed in Table-6 (see page – 24), depending on the type of materials and size.

4. TYPES OF PACKAGING:

4.1 CRATES

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

WOODEN CRATE



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

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

4.3 SADDLES

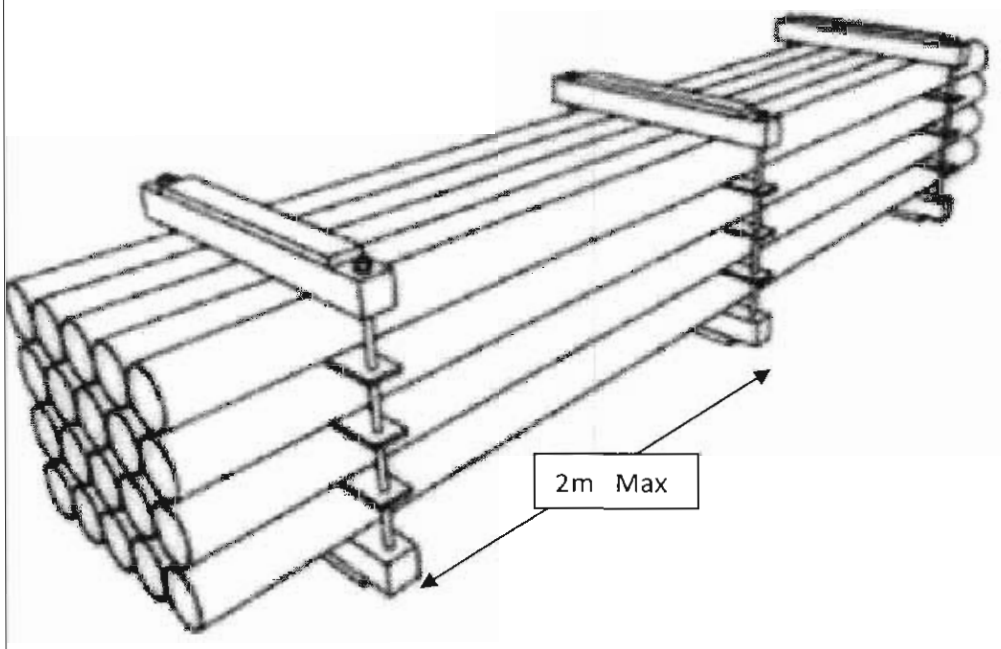
- Saddles are defined as profiled supports made of wood, and are used to cradle and support Tanks, pipe bends and pressure vessels.
- Ensure that the end chamfering of the bends are duly protected for the transit.
- Tanks are to be completely drained and dried.
- Adequate amount of the specified desiccant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

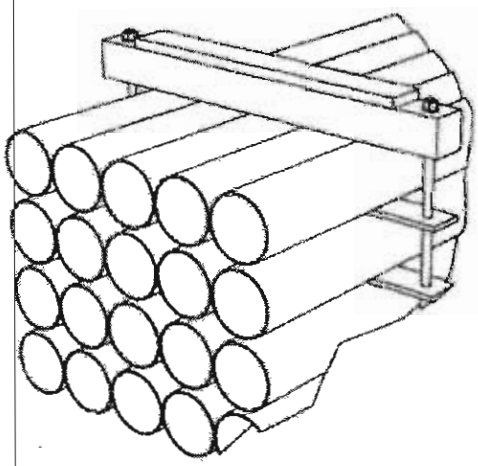
4.4 CASES

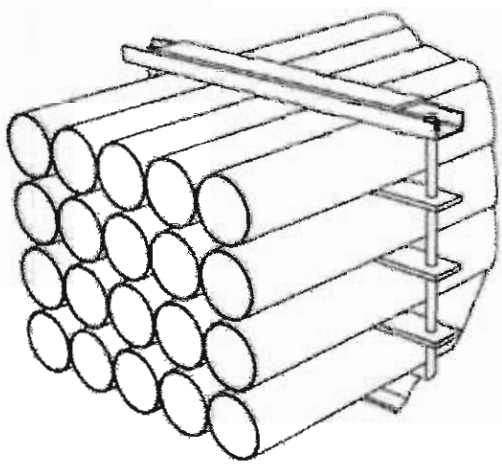
- Other components such as fittings and Mitres are to be packed inside wooden cases.
- The insides of the cases are to be lined with hi-density polythene.
- Air vents to be provided in the cases for ventilation.
- Components to be placed in such a way that metal to metal contact is avoided.
- Small components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

4.5 BUNDLES

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


2m Max





5. SLING PROTECTIONS

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

6. MARKING AND LABELLING

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

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

7. PACKING LIST

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

8. General Instructions for packaging

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

9. Reference drawings

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

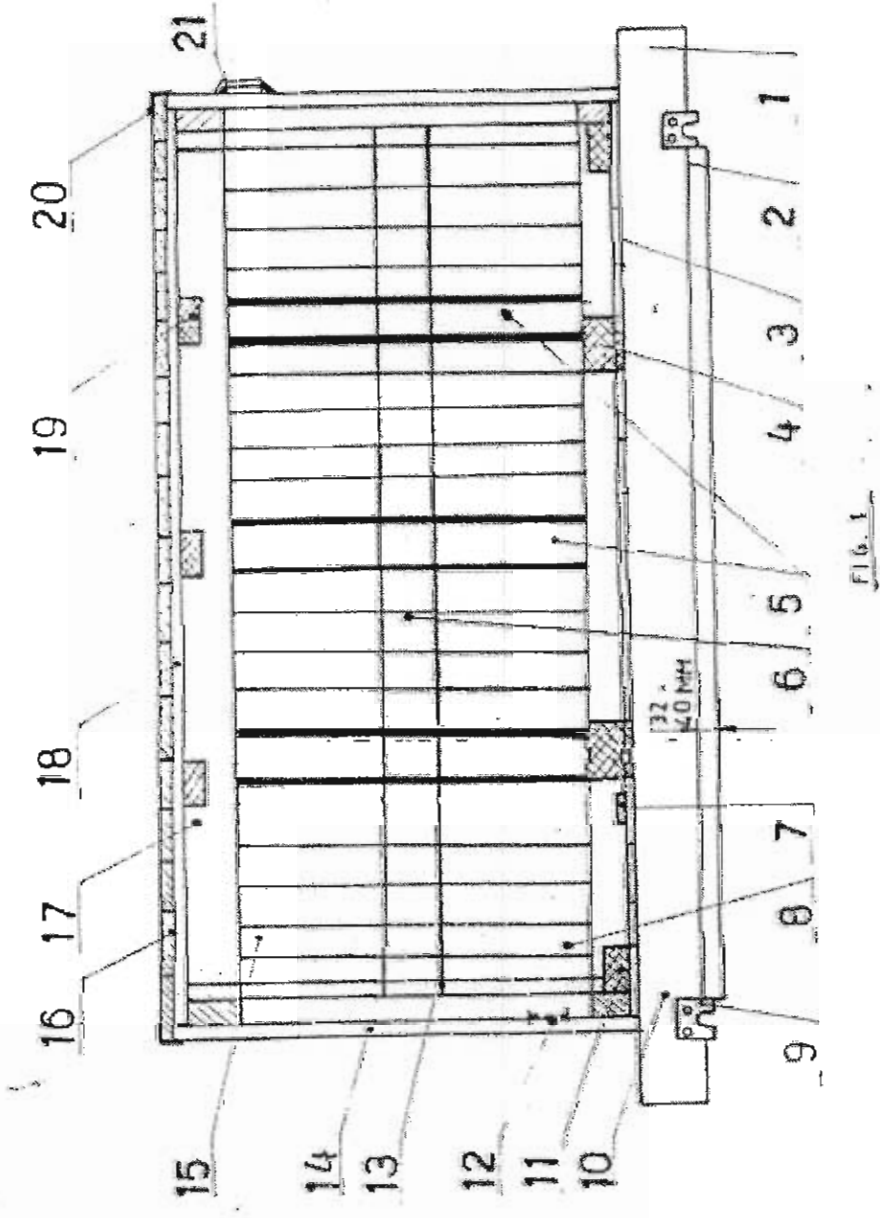


FIG. 1

NOMENCLATURE OF PARTS OF PACKING

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

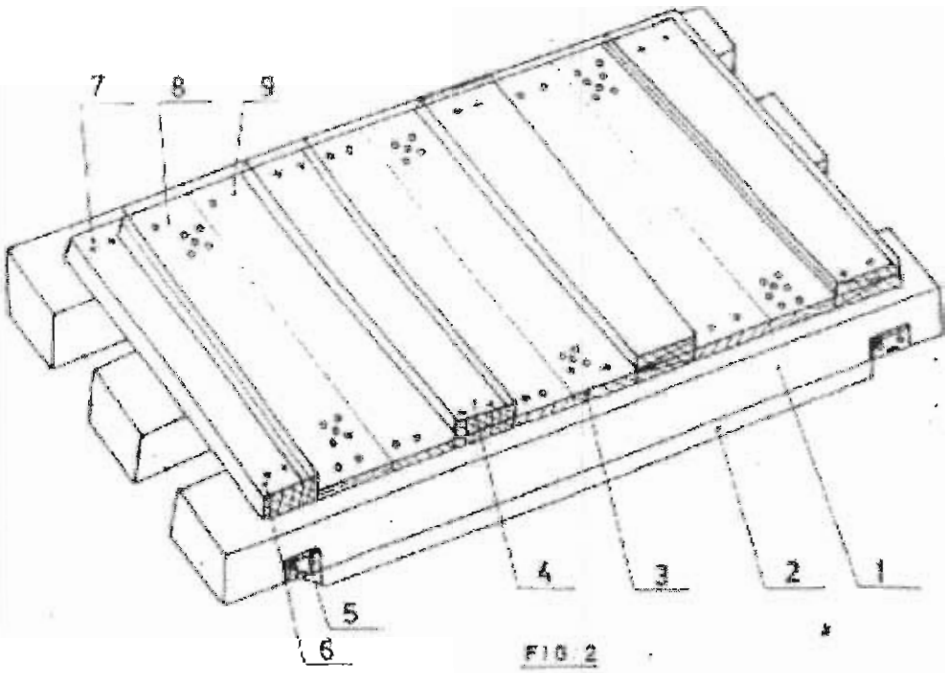


FIG 2

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

TOP FRAME ARRANGEMENT FOR TYPES

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

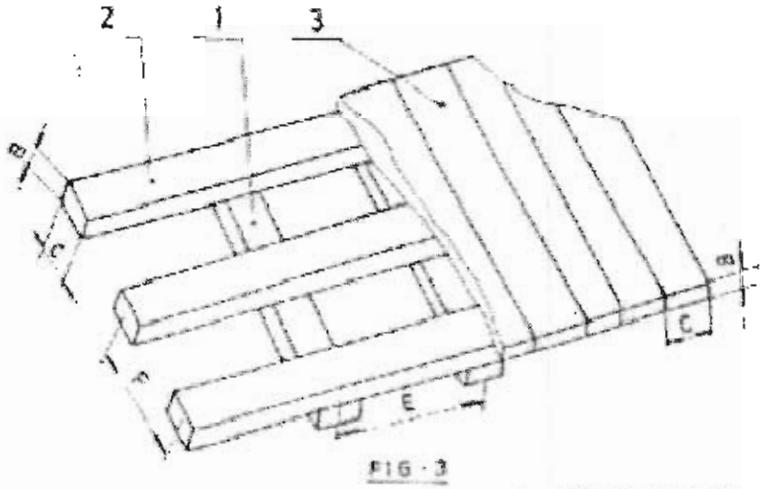


FIG · 3

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

PROVISION OF DIAGONAL BRACING ARRANGEMENT

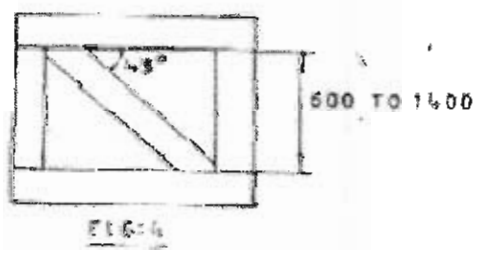


FIG-4

ARRANGEMENT OF DIAGONAL BRACING & HORIZONTAL SUPPORT

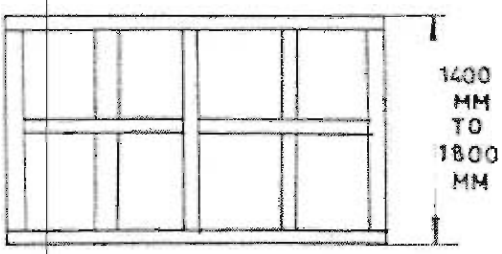


FIG. 5

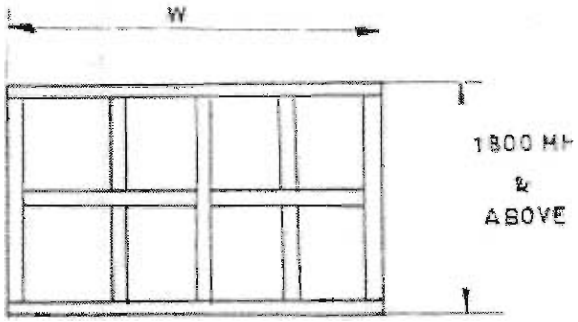


FIG. 6

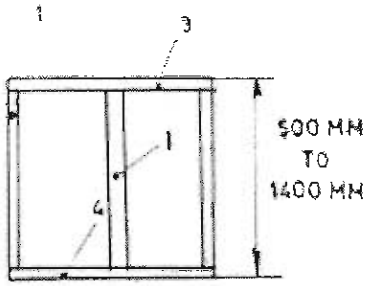


FIG : 7

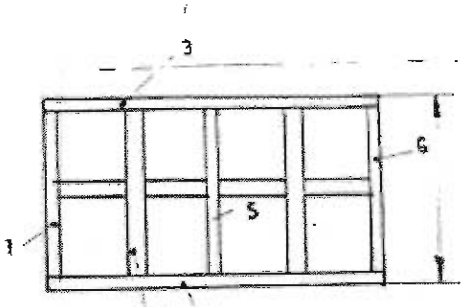


FIG. 8

1. VERTICAL SUPPORT

3. UPPER HORIZONTAL SUPPORT

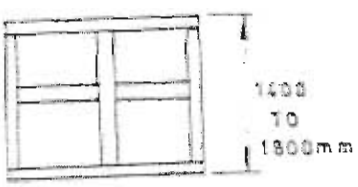
4. LOWER HORIZONTAL SUPPORT

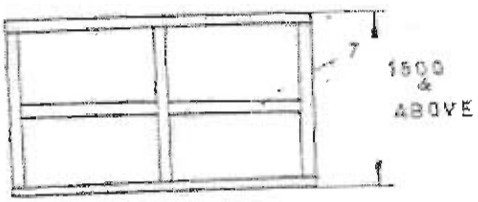
1,2,5, 6 - VERTICAL SUPPORT

3 - UPPER HORIZONTAL SUPPORT

4 - LOWER HORIZONTAL SUPPORT

ARRANGEMENT OF DIAGONAL BRACING AND HORIZONTAL SUPPORT





7 – MIDDLE HORIZONTAL SUPPORT

ARRANGEMENT OF PACKING CASE

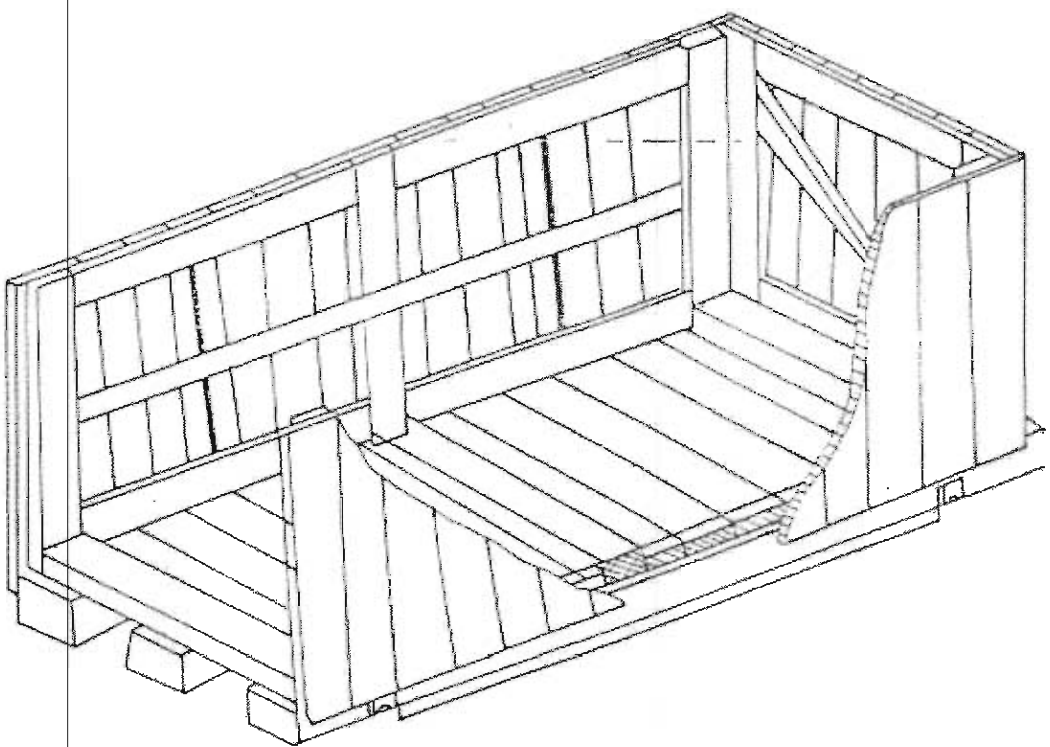


FIG : 11

ARRANGEMENT OF ANGLE IRON CLEATS

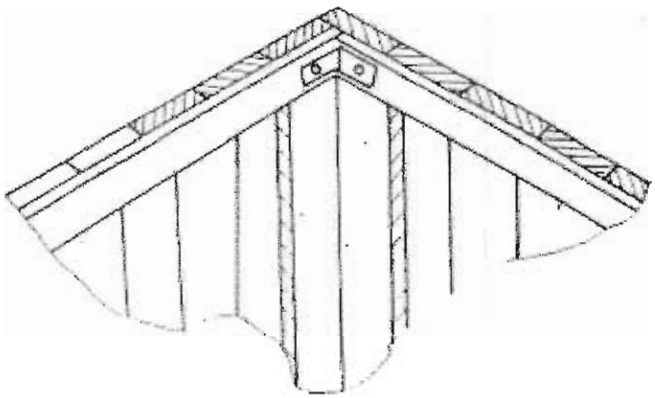
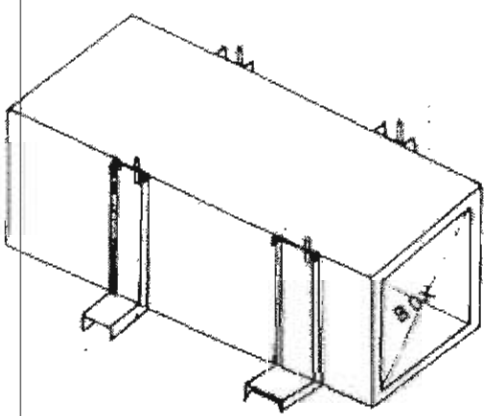


FIG : 12

ARRANGEMENT OF C-CLAMPS AROUND CASES



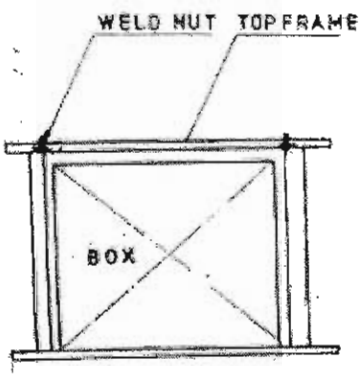


FIG:13

ARRANGEMENT OF SLING - PLATE ON CASES

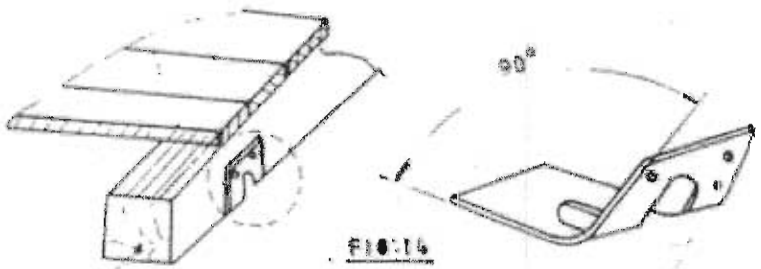
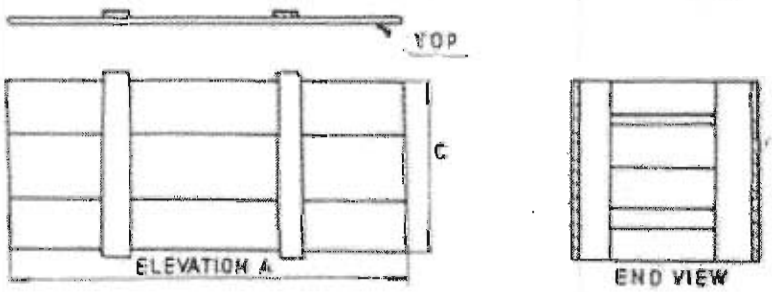


FIG:14

ARRANGEMENT OF SMALL CASES



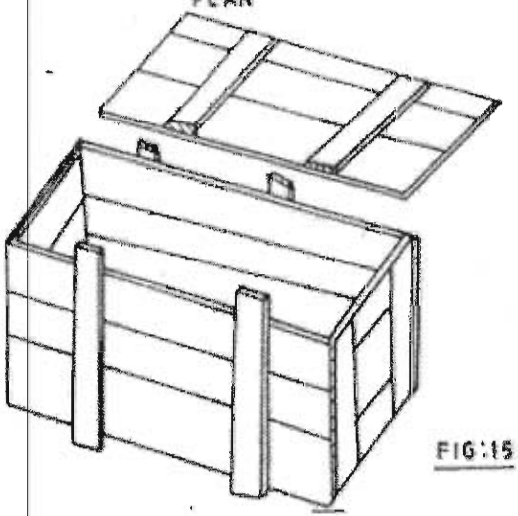


FIG:15

TYPE 654, 633

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

IN MM ONLY

1. BOTTOM BOARD
2. CROSS TRAVERS BOARD

A. UNIFORMLY DISTRIPUTED
B. CONCENTRATED LOAD

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

ANNEXURE – A

WOODEN BOXES

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

TABLE - 1

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

TABLE - 2

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

TABLE – 3

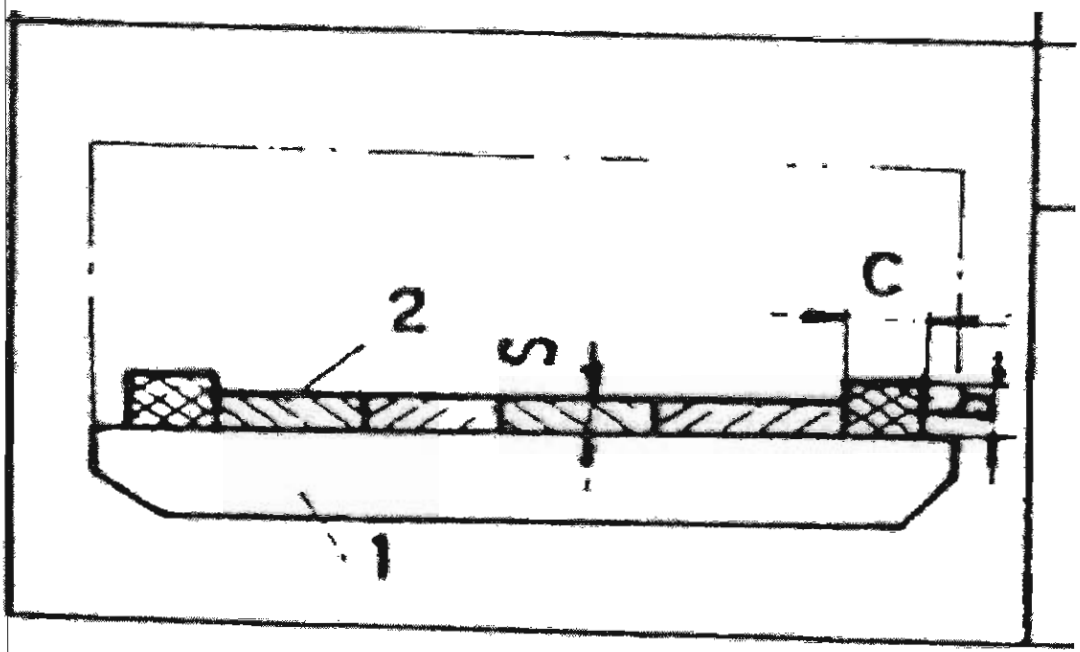
Distance between top horizontal scans dim 'f'	Distance between the axis of the traverse bar dimension 'E' in fig -3				
	500	600	700	800	900
	Size b x c				
700 – 1000 mm	30 x 100	30 x 100	30 x 100	30 x 100	30 x 100

TABLE-4

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

TABLE-5

BOTTOM TRAVERSE:



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

10. Cautionary symbols

FRAGILE, HANDLE WITH CARE

PROTECT FROM HEAT AND RADIOACTIVE SOURCES

USE NO HOOKS

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

KEEP DRY

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

THIS WAY UP

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

CENTRE OF GRAVITY

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

KEEP AWAY FROM HEAT

STACKING LIMITATION

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

International 'sling here' symbol

11. Packing Reference Table

TABLE-6

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

12. CHECK LIST

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

DETAILS OF TENDER ITEMS FOR REFERENCE

Enq Sl No	Material Code	Description	Net qty (Nos)	Specification	Construction	Technical Requirements	Fitting D1 value	Drawing (if any)	Quoted / Regretted	Currency of quote	Unit Rate (FC / INR)	Net Rate (FC / INR)	Exchange Rate	Unit Rate (INR)	Net Rate (INR)
1	925244600000	BW LR 90DEG ELL 60.3X5.54SA234WP22CL1	5	SA234WP22CL1	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D49	ASMEB16.9							
2	925244580000	BW LR90DEG ELL559X28.58SA234WP22CL1	3	SA234WP22CL1	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	P506.8	ASMEB16.9							
3	925196970000	BW CAP OD457.2X9.53 SA234WPB	4	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 438.5	ASMEB16.9							
4	925278810000	BW RED 88.9X5.49/48.3X5.08 SA234WPB	4	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D79 / D39.2	ASMEB16.9							
5	921171080000	BW RED 114.3X6.02/60.3X5.54 SA234WPB	15	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D103.5/D49	ASMEB16.9							
6	925174110000	BW RED 168.3X7.11/114.3X6.02 SA234WPB	8	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D155.6/D103.5	ASMEB16.9							
7	925174770000	BW RED 168.3X7.11/141.3X7.11 SA234WPB	5	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 155.6	ASMEB16.9							
8	921177360000	BW RED 168.3X21.95/114.3X13.49 SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	P/128.2/D/89.6	ASMEB16.9							
9	925174640000	BW RED 219.1X6.35/168.3X7.11 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D206.4/D155.6	ASMEB16.9							
10	925174300000	BWCON RED 273.1X6.35/219.1X6.35 SA234WPB	10	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D260.3/D206.4	ASMEB16.9							
11	921171150000	BW RED 273.1X9.27/114.3X6.02 SA234WPB	5	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D254.5/D103.5	ASMEB16.9							
12	925174400000	BW RED 323.9X6.35/219.1X6.35 SA234WPB	7	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 311.2 / D 206.4	ASMEB16.9							
13	925174410000	BW RED 323.9X6.35/273X6.35 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 311.5/D 260.9	ASMEB16.9							
14	925272490000	BW RED 323.9X6.35/114.3X6.02 SA234WPB	7	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 311.5/D103.5	ASMEB16.9							
15	921171190000	BW RED 323.9X9.53/219.1X8.18 SA234WPB	1	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D304.8/D202.7	ASMEB16.9							
16	921178220000	BW RED 323.9X9.53/273X12.7 SA234WPB	4	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY-D-D1-304.8/247.6	ASMEB16.9							
17	921177200000	BW RED 323.9X12.7/273X12.7 SA234WPC	7	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D/298.9/247.7	ASMEB16.9							
18	925170940000	BW RED 355.6X7.92/273X6.35 SA234WPB	1	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 339.8 / D 260.3	ASMEB16.9							
19	921174550000	BW RED 355.6X9.53/273X6.35 SA234WPB	4	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D/336.5/260.3	ASMEB16.9							
20	925272790000	BW RED 355.6X9.53/323.9X9.53 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D336.5/D304.8	ASMEB16.9							
21	925175360000	BW RED 406.4X9.53/355.6X9.53 SA234WPB	5	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D387.3/D336.5	ASMEB16.9							
22	925175500000	BW RED 406.4X9.53/273X9.27 SA234WPB	12	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 387.3 / D 254.5	ASMEB16.9							
23	925178160000	BW RED 406.4X12.7/273X9.27 SA234WPB	1	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D381.3 / D 254.5	ASMEB16.9							
24	925277170000	BW RED 457.2X12.7/323.9X9.53 SA234WPB	4	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D432.1/D304.8	ASMEB16.9							
25	925270280000	BW RED OD965X37/406.4X17.5 SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STYLE P- 894.4/373.1	ASMEB16.9							
26	925042330000	BW 90DEG LR ELBOW ID195X49 SA234WPC	10	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P-195	4-80-423-82228-R01							
27	925042370000	BW 90DEG LR ELBOW ID150X39 SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P-150	4-80-423-82229-R01							
28	925042420000	BW 30DEG LR EL ID300X52 SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P 300	4-80-423-82482-R01							
29	925042440000	BW 30DEG LR EL ID295X51 SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P-295	4-80-423-82481-R01							
30	925042680000	BW 90DEG LR EL OD323.9X14.27 SA234WPC	11	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY D 298	ASMEB16.9							
31	925240440000	BW 90DEG LR ELBOW ID200x36 SA234WPC	10	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P-200	4-80-423-82239-R00							
32	925043030000	BW SR 90DEG ELBOW ID370X64 SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	4-80-423-83466							
33	925042590000	90DEG BW LR ELBOW ID405X66 SA234WPC	8	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	REF DRG	4-80-424-82598							
34	925240170000	BW LR 90DEG ELL OD88.9X15.24 SA234WPC	10	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	P61.6	ASMEB16.9							
35	925044250000	BW LR 90DEG ELL OD114.3X6.02 SA234WPC	46	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D103.5	ASMEB16.9							
36	925045710200	BW LR 45DEG ELL OD114.3X6.02 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 103.5	ASMEB16.9							
37	921044750200	45° BW LR ELBOW 168.3X7.11 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D155.6	ASMEB16.9							
38	925042890200	BW LR 45DEG ELL OD219.1X6.35 SA234WPB	3	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D206.4	ASMEB16.9							
39	925042250000	BW SR 90DEG ELL OD273X6.35 SA234WPB	1	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D260.3	ASMEB16.9							
40	925042900200	BW LR 45DEG ELL OD273X6.35 SA234WPB	14	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D260.3	ASMEB16.9							
41	921044610000	90° BW LR ELBOW 273X9.27 SA234WPB	19	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D254.5	ASMEB16.9							
42	925247800000	BW LR 90DEG ELL OD273X12.7 SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D/248	ASMEB16.9							
43	925040210000	BW LR 90DEG ELL OD273X50 SA234WPC	11	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY 'P' 181	ASMEB16.9							
44	925042800000	BW LR 90DEG ELBOW ID205X48 SA234WPC	4	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	4-80-423-83208							
45	921044780000	45° BW LR ELBOW 323.9X9.53 SA234WPB	5	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 304.8	ASMEB16.9							
46	925041340000	BW LR 90DEG ELL OD323.9X9.53 SA234WPC	25	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D304.8	ASMEB16.9							
47	925044290000	BW LR 90DEG ELL OD323.9X12.7 SA234WPC	3	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D298.9	ASMEB16.9							
48	925045440000	BW LR 90DEG ELL OD355.6X9.53 SA234WPB	29	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D336.5	ASMEB16.9							

Enq Sl No	Material Code	Description	Net qty (Nos)	Specification	Construction	Technical Requirements	Fitting D1 value	Drawing (if any)	Quoted / Regretted	Currency of quote	Unit Rate (FC / INR)	Net Rate (FC / INR)	Exchange Rate	Unit Rate (INR)	Net Rate (INR)
49	925243000000	BW LR 45DEG ELL OD355.6X9.53 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 336.5	ASMEB16.9							
50	925042750000	BW LR 90DEG ELBOW ID265X62 SA234WPC	20	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	4-80-423-83204							
51	925041320000	BW LR 90DEG ELL OD406.4X9.53 SA234WPC	7	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D387.3	ASMEB16.9							
52	925242020000	BW LR 45DEG ELL OD457.2X9.53 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D-438.1	ASMEB16.9							
53	925041190000	BW LR 90DEG ELL OD457.2X16 SA234WPC	5	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	P-427.7	ASMEB16.9							
54	925040190000	BW LR 90DEG ELL OD457.2X20 SA234WPB	10	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	P421	ASMEB16.9							
55	925041930000	BW LR 45 DEG ELBOW OD457.2X23.82 WPC	8	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	P-412.5	ASMEB16.9							
56	925042830000	BW LR 90DEG ELBOW ID370X64 SA234WPC	14	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	4-80-423-83210							
57	921042950000	BW LR 90DEG ELL OD508X6.35 SA234WPB	4	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D495.3	ASMEB16.9							
58	925045720000	BW LR 45DEG ELL OD508X9.53 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 488.9	ASMEB16.9							
59	921044240000	BW LR 45DEG ELL OD508X12.7 SA234WPB	4	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D482.8	ASMEB16.9							
60	921044840000	BW LR 90DEG ELL OD508X12.7 SA234WPB	7	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D482.8	ASMEB16.9							
61	925052270000	BW EQT ID445X76 SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY PM-445	3-80-423-35636/03							
62	925250560000	BW UEQT ID415X101/ID295X73 - SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY PM-415/295	3-80-423-34678-R01							
63	925250570000	BW EQT ID415X101 - SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY PM-415	3-80-423-34679-R01							
64	925250580000	BW UEQT ID225X56/ID150X39-SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P-225/150	3-80-423-34681-R01							
65	925250590000	BW EQT ID415X71 - SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY PM-415	3-80-423-34682-R01							
66	925250650000	BW UEQT ID415X71/ID295X51 - SA234WPC	4	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY PM415/P295	3-80-423-34683-R00							
67	925250660000	BW EQT ID315X55 - SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P-315	3-80-423-34684-R00							
68	925250670000	BW UEQT ID315X55/ID200x36	3	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY P-315/200	3-80-423-34685-R00							
69	925250690000	BW UEQT ID445X76/ID295X51 - SA234WPC	3	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY PM445/P295	3-80-423-34687-R00							
70	925251010000	BW UEQT ID415X101/ID225X56 SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	STY PM/P-415/225	3-80-423-35387/01							
71	925052210000	BW UEQT 88.9X5.49/48.3X5.08 SA234WPB	2	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D79/D39.2	ASMEB16.9							
72	921054790000	BW EQT OD114.3X6.02 SA234WPB	1	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D103.5	ASMEB16.9							
73	925052660000	BW UEQT 114.3X6.02/60.3X5.54 SA234WPB	5	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D103.5/D49	ASMEB16.9							
74	925253400000	BW EQT OD114.3X6.02 SA234WPC	1	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D 103.5	ASMEB16.9							
75	921051370000	BW EQT OD219.1X6.35 SA234WPB	11	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D206.4	ASMEB16.9							
76	925052590000	BW EQT OD273X6.35 SA234WPB	3	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D260.3	ASMEB16.9							
77	921055000000	BW EQT OD273X9.27 SA234WPB	5	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D254.5	ASMEB16.9							
78	925052020000	BW UEQT 273.1X6.35/168.3X7.11 SA234WPB	3	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	D260.3/D155.6	ASMEB16.9							
79	925255880000	BW UEQT 323.9X9.53/273X6.35 SA234WPB	1	SA234WPB	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	304.8 / 260.3	ASMEB16.9							
80	925051990000	BW UN EQT ID265X62/OD273X50 SA234WPC	6	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	3-80-423-35616/02							
81	925052000000	BW EQUAL TEE ID370X64 SA234WPC	4	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	3-80-423-35617							
82	925053100000	BW UNEQUAL TEE ID 370X64 / OD 168.3X27.5	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	P-370 / P-119.3	3-80-423-36126							
83	925051950000	BW UN EQT ID370X84/ID265X62 SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	3-80-423-35612							
84	925051960000	BW UN EQT ID370X84/ID205X48 SA234WPC	2	SA234WPC	Seamless	TDC 102 Rev 09; QPG 46 Rev 01	AS PER DRG	3-80-423-35613							

Note-

1. Unit rate to be quoted (all inc of inspection charges, P&F, freight, insurance (if applicable) etc)-

a. For foreign bidder- 'CFR' Chennai port basis

b. For indigenous bidder- 'FOR' BHEL Trichy / Site basis

2. Inspection as per TDC / QP is under vendor scope.Inspection charges (if any) will not be borne by BHEL.

3. For foreign bidders, prevailing incidental charges for import purchase (presently @2.75%) and net customs duty will be applicable on the rate quoted.

4. SBI TT Selling rate as on the date of Part I opening will be considered for foreign bidder.

5. Bidders can quote depending on their manufacturing capability and design proof test qualification as indicated. Bids will be considered only for size range (OD / Thk), specification and construction based on following criteria.

a. Sizes (OD & Thk) qualified based on the burst test done as per Clause 9 of ASME B16.9.

b. One OD size (NPS) and One Schedule thickness more than that supplied by vendor in the past (PO copy and supply proof is required).

c. Experience shall be counted based on the least of a & b indicated above.

d. Experience in CS will qualify only for CS items, whereas that in AS will qualify for both CS & AS.

Annexure A – General Terms & Conditions

1. PURCHASE PREFERENCE FOR MAKE IN INDIA

"For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/ Nonlocal Supplier and purchase preference to Class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before finalization of contract / PO / WO against this NIT". In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable.

'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the Item procured (excluding net domestic indirect taxes) minus the value of imported. Content in the item (including all customs duties) as a proportion of the total value, in percent.
'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50%, as defined under this Order.
'Class-Il local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%, as defined under this Order.
'Non-Local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than or equal to 20%, as defined under this Order.

In case item is divisible, following procedure will be followed-

- Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract for full quantity will be awarded to L 1.
- If L1 bid is not a 'Class-I local supplier', 50% of the order quantity' shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to local supplier's quoted price falling within the margin purchase preference, and contract for that quantity shall be awarded to 'Class-I local supplier' subject to matching the L 1 price. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some Quantity is still left uncovered on Class-I local suppliers, then such balance quantity may also be ordered on the L 1 bidder.

In case item is not divisible, following procedure will be followed-

- Among all qualified bids, the lowest bid will be termed as L1. If L1 is from a 'Class-I local supplier', the contract will be awarded to L1.
- If L1 is not from a local supplier, the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to 'Class-I local supplier's' quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.
- In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, then the contract may be awarded to the L1 bidder.
- Any item wherein the net quantity is less than 2 (i.e. if qty is 1 No.) will be considered as not divisible for the purpose of operating purchase preference.

"Class-II local supplier" will not get purchase Preference in any procurement.

Document certifying local content and penal action in case of wrong declaration by suppliers.

- The 'Class-I local supplier'/ 'Class-II local supplier' at the time of tender, bidding or solicitation shall be required to provide self-certification on their letter head certified by the authorized signatory of the bidder that the item offered meets the minimum local content and shall give details of the location(s) at which the local value addition is made.
- In cases of procurement for a value in excess of Rs. 10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
- False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.
- A supplier who has been debarred by any procuring entity for violation of this order shall not be eligible for preference for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities, the debarment takes effect prospectively from the date of uploading on the website(s) of The Department of Expenditure, GOI in such a manner that ongoing procurements are not disrupted.
- The onus of submission of appropriately certified documents lies with the bidder and BHEL shall not have any liability to verify the contents and will not be responsible for the same. However, in case BHEL has any reason to doubt the authenticity of the Local Content, BHEL reserves the right to obtain the complete back up calculations before award of contract failing which the bid shall be rejected.

2. REVERSE AUCTION

"*BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) for this tender. RA shall be conducted among all the techno-commercially qualified bidders.*

Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."

3. PURCHASE PREFERENCE FOR MSE SUPPLIERS.

- Purchase preference for local MSE's quoting in the tender will be 25%.
- Within the 25% reservation for local MSE's, 3% reservation will be applicable for women owned MSE's and 6.25% reservation will be applicable for MSE's owned by SC / ST.
- Payment for MSE Indigenous vendors will be as per MSMED Act, 2006

Document to be submitted as proof of MSE.

MSE suppliers can avail the intended benefits only if they submit ***UDHYAM CERTIFICATE*** along with the offer.

Non submission of documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for the Enquiry if any deficiency in the above required documents are not submitted before price bid opening.

However, credentials of all MSE suppliers will be verified before considering the intended benefits for MSE suppliers at the time of tender evaluation.

In case item is not divisible, following procedure will be followed-

- Among all qualified bids, the lowest bid will be termed as L1. If L1 is from a MSE supplier, the contract will be awarded to L1.
- If L1 is not from a MSE supplier, the lowest bidder among the MSE suppliers, will be invited to match the L1 price subject to MSE supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such MSE supplier subject to matching the L1 price.
- In case such lowest eligible MSE supplier fails to match the L1 price, the MSE supplier with the next higher bid within the margin of MSE preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the MSE suppliers within the margin of purchase preference matches the L1 price, then the contract may be awarded to the L1 bidder.
- Any item wherein the net quantity is less than 2 (i.e. if qty is 1 No.) will be considered as not divisible for the purpose of operating purchase preference.

Note: - In case of L1 vendor is having any one of MSE OR Make in India preference, but vendor is falling in MSE/MII price range with both MSE and Make in India preference then quantity will be counteroffered to the vendor who is giving both the preferences.

4. Integrity Pact

Integrity Pact (IP) attached is an integral part of commercial terms and conditions of this Enquiry. IP shall be signed and submitted along with the Part I bid as a token of acceptance of the conditions of the pact. IP is applicable as per Govt. guidelines & all bidders shall submit duly signed and stamped IP to qualify for further processing of the bid.

IP is a tool to ensure that activities and transactions between the Company and its Bidders / Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl No	IEM	Email
1	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with Techno-Commercial bid (Part-I, in case of two / three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.

Annexure A – General Terms & Conditions

No routine correspondence shall be addressed to the IEM (phone / post / email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification / issues shall be addressed directly to the tender issuing department's officials whose contact details are provided below-

Name	Mr. Sandeep	Mr. Indrajit Biswas	Ms. R Prabha
Dept.	Sr.Engineer / Purchase	Manager / Purchase	AGM / Purchase
Phone	044-28161315	044-28161928	044-28161901
Email	sandeepj@bhel.in	ibiswas@bhel.in	rprabha@bhel.in

Bids of the bidders who are under suspension / banned and also the bids of the bidders, who engage the services of the banned firms, shall be rejected. List of banned firms is available at https://www.bhel.com/supplier-registration.

While submission of IP, following requirements shall be adhered to-

- Authorized signatory of the bidder should sign along with seal on all the pages of the IP.
- Bidder should mention their full name with address on first page of the IP.
- Authorized signatory of the bidder should sign along with seal on the last page of the IP.
- Witness shall sign with name and address on the last page of the IP.

5. BHEL STANDARD GUARANTEE CLAUSE

The materials are to be guaranteed for satisfactory performance for a period of 24 months from the date of dispatch or 18 months from the date of commissioning / putting into use whichever is earlier and if any defect is noticed during the above period, the same shall be rectified / replaced free of cost on FOR destination basis within a reasonable time, maximum limited to the agreed delivery period. To this effect a guarantee certificate should be sent along with the dispatch documents in the event of an order.

6. Force Majeure

If at any time during the continuance of this contract the performance in whole or part by either party of any obligation under this contract shall be prevented or delayed by reason of war, hostilities ,acts of public enemy, civil commotions, sabotage, fire, flood, explosion, epidemic, quarantine restrictions or acts of God(here in referred to as events), then provided the notice of the happenings of any such event is given by either party to other party within 21(twenty one)days from the date of occurrence thereof, either party shall reason of such event, not be entitled to terminate this contract nor shall either party have any claim for damages against other in respect of such non-performance and delay in performance and delivery under the contract shall be resumed soon as practicable after such event has come to an end or ceased to exist and the decision of the BHEL as to whether the deliveries, have been so resumed or not shall be final and conclusive. If the performance in whole or part of any obligation under the contract is for extension of time shall be granted for periods, considered reasonable by the Vendor to the BHEL subject to prompt notification by the Vendor to the BHEL of the particulars of the events and supply to the BHEL if required of any supporting evidence. Any waiver of time in respect of particular part and thereof shall not be deemed to be a waiver of time in respect of remaining deliveries.

7. **Arbitrations & Conciliation**

Except as provided elsewhere in this contract, in case amicable settlements is not reached between the parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the contract; or, the respective rights and liabilities of the parties; or, in relation to interpretation of any provision of the contract; or, in any manner touching upon the contract, then, either party may, by a notice in writing to other party refer such dispute or difference to the sole arbitration of an arbitrator appointed by Head of the BHEL Piping Centre, Chennai.

Arbitrator shall pass a reasoned award and the award of the arbitrator shall be final and binding upon the parties.

Subject as aforesaid, the provisions of arbitration and conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be BHEL Piping Centre. The cost of arbitration shall be borne as per the award of the Arbitrator.

Subject to the arbitration, the courts at Chennai shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract.

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

8. Laws Governing the Contract:

a. The contract shall be governed by the Laws of the Government of India in force.
b. Irrespective of the place of execution of the contract, place of delivery, place of payment under the contract, the contract shall be deemed to have been made at the place at which the Acceptance of the tender has been issued.

9. Jurisdiction of the Court

The Courts of the place from where the acceptance of the tender has been issued shall alone have jurisdiction to decide any dispute arising out of or in respect of the contract.

10.CANCELLATION / TERMINATION OF CONTRACT, DEFAULT / BREACH OF CONTRACT AND RISK PURCHASE

In case of abnormal delays (beyond the maximum late delivery period as per Penalty clause) in supplies / defective supplies or non-fulfilment of any other terms and conditions given in Purchase Order as enumerated subsequently in this clause, Purchaser shall be entitled to cancel the Order / Contract either in whole or portion thereof without compensation to Seller / Contractor and if the Purchaser so desires, may procure upon such terms and in such manner as deemed appropriate, stores not so delivered or others of similar description where stores exactly complying with particulars are not, in the opinion of the Purchaser, which shall be final, readily procurable, at the risk and cost of the Seller / Contractor and the Seller / Contractor shall be liable to the Purchaser for any excess costs provided that the Seller / Contractor shall continue the performance of the Order / Contract to the extent not cancelled under the provisions of

this clause. The Seller / Contractor shall on no account be entitled to any gain on such repurchases. If bidder does not agree to the above Risk Purchase Clause, BHEL reserves the right to reject the offer.

Risk & Cost Clause, in line with Conditions of Contract may be invoked in any of the following cases:

a. Contractor / supplier's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor/ supplier including unexecuted portion of work / supply does not appear to be executable within balance available period (#) considering its performance of execution.
b. Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.
c. Non completion of work / Non-supply by the Contractor / supplier within scheduled completion / delivery period as per Contract or as extended from time to time, for the reasons attributable to the contractor / supplier.
d. Termination of Contract on account of any other reason (s) attributable to Contractor / Supplier.
e. Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.
f. Non-compliance to any contractual condition or any other default attributable to Contractor / Supplier.

Risk and Cost amount against Balance Work

Risk & Cost Amount= **[(A-B) + (A x H/100)]**

Where,

A= Value of Balance scope of Work / Supply (*) as per rates of new contract

B= Value of Balance scope of Work / Supply (*) as per rates of old contract being paid to the contractor / supplier at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H= Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

***(Balance scope of work / supply)**

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work / Supply for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute / extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute / extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

Note: In case portion of work is being withdrawn, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work / supply' for calculating Risk & Cost amount.

LD against delay in executed work / supply in case of Termination of Contract in case of Risk and Cost Option

LD against delay in executed work / supply shall be calculated in line with LD clause of the contract for the delay attributable to contractor / supplier. For limiting maximum LD value, contract value shall be taken as Executed Value of work / supply.

Method for calculation of "LD against delay in executed work / supply" is given below.

a. Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor / supplier= T1
b. Let the value of executed work / supply till the time of termination of contract= X
c. Let the Total Executable Value of work / supply for which inputs / fronts were made available to contractor / supplier and were planned for execution till termination of contract= Y
d. Delay in executed work / supply attributable to contractor/supplier i.e. T2= (1- X/Y) * T1
e. LD shall be calculated in line with LD clause of the Contract for the delay attributable to contractor / supplier taking "X" as Contract Value and "T2" as delay attributable to contractor / supplier.

Note: In case portion of work / supply is withdrawn, no LD shall be applicable for portion of work / supply withdrawn.

Recovery from Supplier

Recoveries from contractor / supplier on whom risk & cost has been invoked shall be made from the following:

a. Dues available in the form of Bills payable to contractor / supplier, SD, BG's against the same contract.
b. Dues payable to contractor / supplier against other contracts in the same Region / Unit / Division of BHEL.
c. Dues payable to contractor / supplier against other contracts in the different Region / Unit / division of BHEL.
d. Legal Options for recovery of dues payable by the supplier / contractor.

11.SUSPENSION OF BUSINESS DEALING

In order to protect the commercial interests of BHEL, it becomes necessary to take action against suppliers / contractors by way of suspension of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business / money / reputation, indulge in malpractices, cheating, bribery, fraud or any other misconduct or formation of cartels so as to influence the bidding process or influence the price etc. Suspension of Business Dealings could be in the form of "Hold" or "Banning" a supplier / contractor or a bidder or an applicant for registration as a registered supplier. For this purpose, the abridged version of guidelines hoisted at website http://www.bhel.com/vender_registration/vender.php (Suspension of business dealings with suppliers / contractors) is being followed across all BHEL units. Vendors shall keep themselves aware of these guidelines before submission of their bid.

12.FRAUD PREVENTION POLICY

The Bidder along with their associates / collaborators / sub-contractors / sub-vendors / consultants / service providers shall strictly adhere to BHEL fraud prevention policy displayed on BHEL website at www.bhel.com/pdf/BHEL Fraud Prevention Policy.pdf and shall immediately bring to the notice of BHEL management about any fraud or suspected fraud as soon as it comes to their notice.

13.FORWARDING OF TEST CERTIFICATES & INSPECTION REPORTS

Test certificates (TC) along with Inspection Reports (IR) as called for in the TDC (Three ink signed originals) / approved Quality Plan shall be sent to Manager / Purchase (Fittings), BHEL Piping Centre immediately after the shipment / dispatch of items. Forthcoming section may please be refereed for detailed list of documents to be submitted to respective agencies in BHEL.

TC & IR shall be furnished for each batch of shipment / dispatch. If entire PO quantity is manufactured in one lot but dispatched in phased manner, original "IBR Form" should be submitted with the first consignment. For subsequent consignments, attested Xerox copy of IBR along with copies of TC and IR indicating invoice detail against which original TC and IR was handed over to BHEL shall be submitted. Soft copies of the all the test certificates shall also be submitted through email.
Year of code for the technical standards shall be latest and the specific year shall be indicated in the MTC's as well as applicable IBR Forms.

Additionally foreign vendors shall indicate the item description as "Boiler Components- Fittings" in all the dispatch documents like Bill of Lading, Invoice, Packing list, Country of origin certificate etc. Vendor shall negotiate the documents with bank only "For the net shipment value" (ie. invoice value excluding the LD value).

14.PAYMENT DOCUMENTS

In case of indigenous vendors

Payment shall be made against submission of the following documents-

a. Original GST compliant invoice and 2 copies of the same.
b. Original site acknowledged Lorry Receipt (Goods Receipt (GR) date for in case of BHEL Trichy stores).
c. Original inspection report and all original documents as called for in TDC / approved QP.

If one original certificate / LR is applicable for more than one invoice quantity / invoice, Xerox copy is acceptable with original correlation details on the Xerox copy with attestation by suppliers Quality in charge.
GST compliance-

a. Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration No (GSTIN) which should be clearly mentioned in the offer. If the dealer is exempted from GST registration, a declaration with due supporting documents need to be furnished for considering the offer. Dealers under composition scheme should declare that he is a composition dealer supported by the screen shot taken from GST portal. The dealer has to submit necessary documents if there is any change in status under GST.
b. Supplier shall mention their GSTIN in all their invoices (incl. credit Notes, Debit Notes) and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No. which is linked/uploaded in GSTN network shall be clearly indicated), Billed to party (with GSTIN) & Shipped to party details, item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, Place of Supply etc.

c. All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code).

d. Invoices will be processed only upon completion of statutory requirement and further subject to following:
   - Vendor declaring such invoice in Form GST ANX-1
   - Receipt of Goods or Services and Tax invoice by BHEL

e. As the continuous uploading of tax invoices in GSTN portal (in GST ANX-1) is available for all (i.e. both Small & Large) tax payers under proposed new GST Return System, all invoices raised on BHEL may be uploaded

immediately in GST portal on dispatch of material /rendering of services. The supplier shall ensure availability of Invoice in GST portal before submission of invoice to BHEL. Invoices will be admitted by BHEL only if the invoices are available in GSTN portal (in BHEL's GST ANX-2).

f. In case of discrepancy in the data uploaded by the supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note or debit note (details also to be uploaded in GSTN portal) for the shortages or rejections in the supplies or additional claims, within the calendar month informed by BHEL.

g. In cases where invoice details have been uploaded by the vendor but failed to remit the GST amount to GST Department (Form PMT-08 or Form GST RET-01 to be submitted) within stipulated time, then GST paid on the invoices pertaining to the month for which GST return not filed by the vendor will be recovered from the vendor along with the applicable interest(currently 24% p.a) and all subsequent bills of the vendor will not be processed till filing of the GST return by the vendor

h. In case GST credit is denied to BHEL due to non-receipt or delayed receipt of goods and/ or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount claimed in the invoice shall be disallowed to the vendor.

i. Where any GST liability arising on BHEL under Reverse Charge (RCM), the vendor has to submit the invoices to BHEL well within the timeline prescribed in GST Law, to enable BHEL to discharge the GST liability. If there is a delay in submission of invoice by the vendor resulting in delayed payment of GST by BHEL along with Interest, then such Interest payable or paid shall be recovered from the vendor.

j. Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contracts. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Tax Invoice will be issued by BHEL indicating the respective supply invoice number.

k. GST TDS will be deducted as per Section 51 of CGST Act 2017 and in line with Notification 50/2018 – Central Tax dated 13.09.2018. GST TDS certificate which will be generated in GST portal subsequent to vendor accepting the TDS deduction in the GST portal, will be issued to the vendor.

In case of foreign vendors

Payment shall be made against presentation of the following documents thru bank-

a. Original Bill of Lading (BL).
b. Original Invoice.
c. Packing List.
d. Country of origin certificate.

The following documents shall be forwarded to DGM / Purchase directly-

a. Original inspection report.
b. Original test certificates.
c. Guarantee certificate.

15.FORWARDING OF DISPATCH DOCUMENTS (APPLICABLE FOR FOREIGN VENDORS)

Annexure A – General Terms & Conditions

Dispatch documents and Test Certificates shall be forwarded as indicated below (details indicated are as applicable as on date and any revision to the same shall be communicated along with PO)-

1. BHEL Regional Operating Division (ROD)-

Copy of Invoice, Bill of Lading, Packing List, Country of origin certificate, Test Certificate (selected documents namely TPI covering letter, IBR Form IIIC and MTC only) to be mailed to the following persons in BHEL ROD for material clearance at Chennai Port-

1. R.B.Maheshwari, Deputy Manager/ROD Chennai / Phone no – 044 24589844 /rbmaha@bhel.in
2. S P Velmurugan, Dy. Engineer /BHEL, ROD(MS) /044-24589845/ vels@bhel.in
3. A Srinivasalu / 04424374329/ asvasalu@bhel.in

Mail copy mail shall also be sent to the following persons in Piping Centre.

a. Mr Indrajit Biswas – ibiswas@bhelin
b. Mrs Priya Balaji – pb@bhel.in
c. Mr V Sundaram – vsundaram@bhel.in
d. Mrs M Ramya – mramya@bhel.in

Copy of above referred dispatch documents shall also be sent to R.B.Maheshwari, BHEL ROD thru courier. The address of ROD division will be in BHEL Purchase Order.

All dispatch documents including BL shall be signed by competent authorities.

2. BHEL Piping Centre-

Copy of Invoice, Bill of Lading, Packing List, Country of origin certificate, Credit note for LD value (if LD is applicable) shall be mailed to the following persons at BHEL Piping Centre, Chennai-

a. Mr Indrajit Biswas – ibiswas@bhelin
b. Mrs Priya Balaji – pb@bhel.in
c. Mr V Sundaram – vsundaram@bhel.in

Copies of Invoice, Bill of Lading, Packing List, Country of origin certificate, Credit note for LD value (if LD is applicable) along with one complete set of Original Test Certificates along with one copy shall be sent thru courier to Mr Indrajit Biswas, Manager / Purchase, Piping Centre, Chennai.

Scanned copies of complete set of Test Certificates (TPI covering letter, IBR Form IIIC, MTC and all Inspection reports as called for in BHEL TDC / approved QP) shall be mailed to-

a. Mr Indrajit Biswas – ibiswas@bhelin
b. Mrs Priya Balaji – pb@bhel.in
c. Mr V Sundaram – vsundaram@bhel.in

3. Bank-

Three sets of original Invoice & Packing list, one set of original Bill of Lading and Country of origin certificate, Credit note for LD value (if LD is applicable) along with one complete set of Test Certificate shall be forwarded thru Bank. The documents shall be negotiated with Bank only for the 'Net shipment value'. Net Shipment Value = Invoice value – LD value.

16.BILL OF ENTRY FILING (APPLICABLE FOR FOREIGN VENDORS)

Indian Customs has imposed a penalty on late filing of Bill of Entries (Air / Sea Shipments) by the importer @ INR 5,000/- per day (for Initial 03 days) & INR 10,000/- per day (thereafter). The maximum free time allowed for filing Bill of Entry is 24 hrs from the time of arrival of cargo at final port of discharge. The amount indicated is as prevailing on date. The actual penalty amount as prevailing on the date clearance shall be levied on the vendor if applicable.

The vendor should furnish the Non-Negotiable Documents (Air Way Bill / Bill of Lading, Error free Commercial Invoice, Packing List, Certificate of Origin) by mail and by post / courier to BHEL well in advance (ie. minimum 5 days prior to landing in case of sea and 2 days prior to landing in case of Air) at final port of discharge.

Vendor will be held responsible for the penalty arising against the late filing of Bill of entry due to-

a. Non-availability of Non-Negotiable Documents (NND's) before the cargo arrival
b. Discrepancy in documents
c. Short landing of consignments (For shipments on CFR Chennai Port)

For all shipments for the contracts (PO's) finalized on CFR Chennai Port basis-

a. Delivery Orders involving multiple agencies like liners / freight forwarders are not allowed. There must be a single agency office at the final discharge Port (Chennai) for issuing the Delivery Order to BHEL.
b. Detention / demurrage charges arising due to the delay in collection of Delivery Orders from multiple agencies of liner / freight forwarder also whose offices are not at available Chennai, the same amount will be deducted from vendor's bills only.
c. Bill of Lading should clearly endorse the detention free period and the same should be honoured by the freight forwarder and liner. Detention / demurrage if any due to non-acceptance of detention free period indicated in bill of lading will be to vendors account only.

Apart from the normal charges like Terminal Handling Charges, Container cleaning Charges, Delivery Order Charges at final port of discharge, other charges* indicated in delivery order will not be borne by BHEL. The liner / freight forwarders should be properly communicated by the vendor not to claim such charges for issuing Delivery Order. If the liner / freight forwarder claims such charges in their invoices, the same amount will be deducted from the vendor bills without any prior intimation in order to avoid the delay in Customs clearance.

*The likely additional / hidden costs or other charges (not payable by BHEL) as indicated above are-

a. CIC - Container Imbalance Charges / Surcharges
b. EIC - Equipment Imbalance Charge / Surcharges
c. CAF - Container / Currency Adjustment Factor
d. BAF - Bunker adjustment Factor
e. RDS - Rupee Depreciation Surcharge
f. CDS - Currency Depreciation Surcharge
g. ISPS - International Ship and Port Facility Security charges
h. OHS - Origin handling Charges
i. Port Congestion Charges
j. Interim surcharge

k. Chennai Trade charge

Declaration to be issued on Company letter head

In line with Government Public Procurement Order (Preference to Make in India) Order (PPP-MII Order), 2017 vide No. P-45021/2/2017-PP (BE-II) dated 04.06.2020, issued by DPIIT, Ministry of Commerce and Industry, we hereby certify that we, …….. (Supplier name) are

a) 'Class-I local supplier' meeting requirement of local content equal to or more than 50%,
b) 'Class-Il local supplier' meeting requirement of local content more than 20% but less than 50%,
c) 'Non local supplier' meeting requirement of local content equal to or less than 20%,

(Strike off whichever is not applicable)

As defined under above referred Order for the following Enquiry Item Sl Nos of BHEL Enquiry No 4102100023 dt 05.10.2021.

- Enquiry Item No./(s) -

Details of location at which local value addition will be made is as follows:

……..

……..

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

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

Seal and Signature of authorized signatory

Special Note-
In cases of procurement for a value in excess of Rs. 10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

Annexure-1

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

Manufacture and supply of BW Fittings (CS & AS) for Tender Enquiry No. 4102100023 dt. 05.10.2021

_____ . The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions:

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors

6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.

6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 - Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.

8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.

8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.12 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.

9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal

SANDEEP

(Office Seal)

Digitally signed by SANDEEP
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Date: 2021.10.05 12:13:10 +05'30'

Place----------

Date----------

Witness:

(Name & Address)

SHREELEKHA S CHANDAR

Digitally signed by SHREELEKHA S CHANDAR
DN: c=IN, o=BHARAT HEAVY ELECTRICALS LIMITED, ou=NA, 2.5.4.20=3e4a0aac5a3f659afbda622eab0ca494d85d61a1a41c028d71f0317a3e31a401, postalCode=620014, st=TAMIL NADU, serialNumber=c6f09e4c43905cbbe75c6155838c681364c9d13241e29f953c6c0534ba507f8b, cn=SHREELEKHA S CHANDAR, l=TIRUCHIRAPPALLI, pseudonym=c6f2d12d12e44555a8c3942dbe5ef926, email=SHREELEKHA@BHEL.IN
Date: 2021.10.05 12:24:50 +05'30'

For & On behalf of the Bidder/

Contractor

(Office Seal)

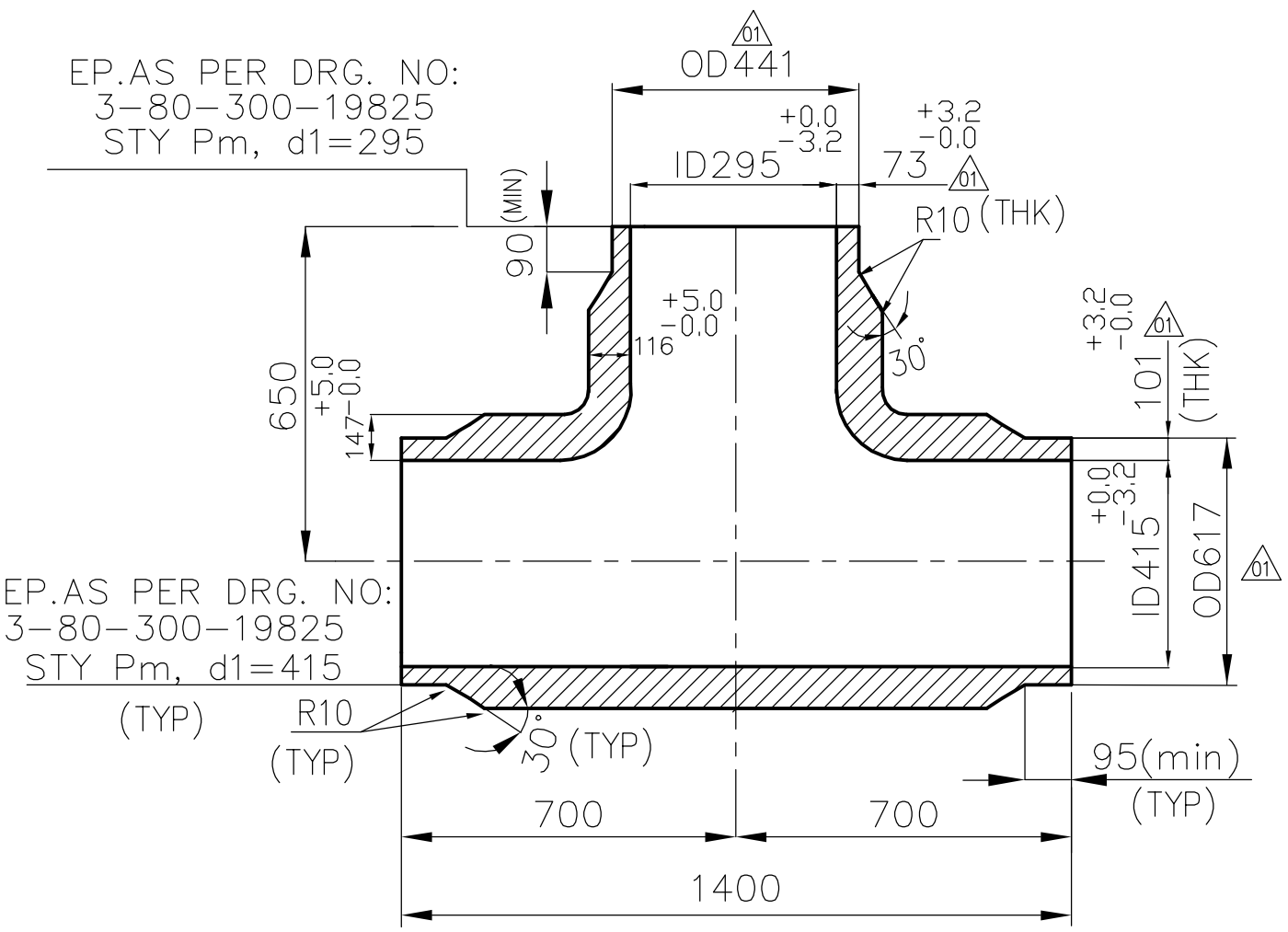
Witness:

(Name & Address)

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No 3-80-423-34678

12.5



NOTES :-

01. DESIGN PRESSURE : 512kg/sq.cm.(g) 01
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW UEQT ID415X101/ID295X73 01	3-80-423-34678		92 525 056 0000 / SA234WPC	A	2850.000 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		22.02.19	
CHD	KONDAPA NAIDU		22.02.19	
APPD	R.SESHAGIRI		22.02.19	

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD: KONDAPANAIDU / APPD : SARAVANAN
02			01	09.07.19	

ALL REVISIONS ARE INDICATED AS 01

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~2850		

TITLE: BW UEQT (ID415X101/ID295X73) 01

CARD CODE: U 01

DRAWING No.: 3-80-423-34678

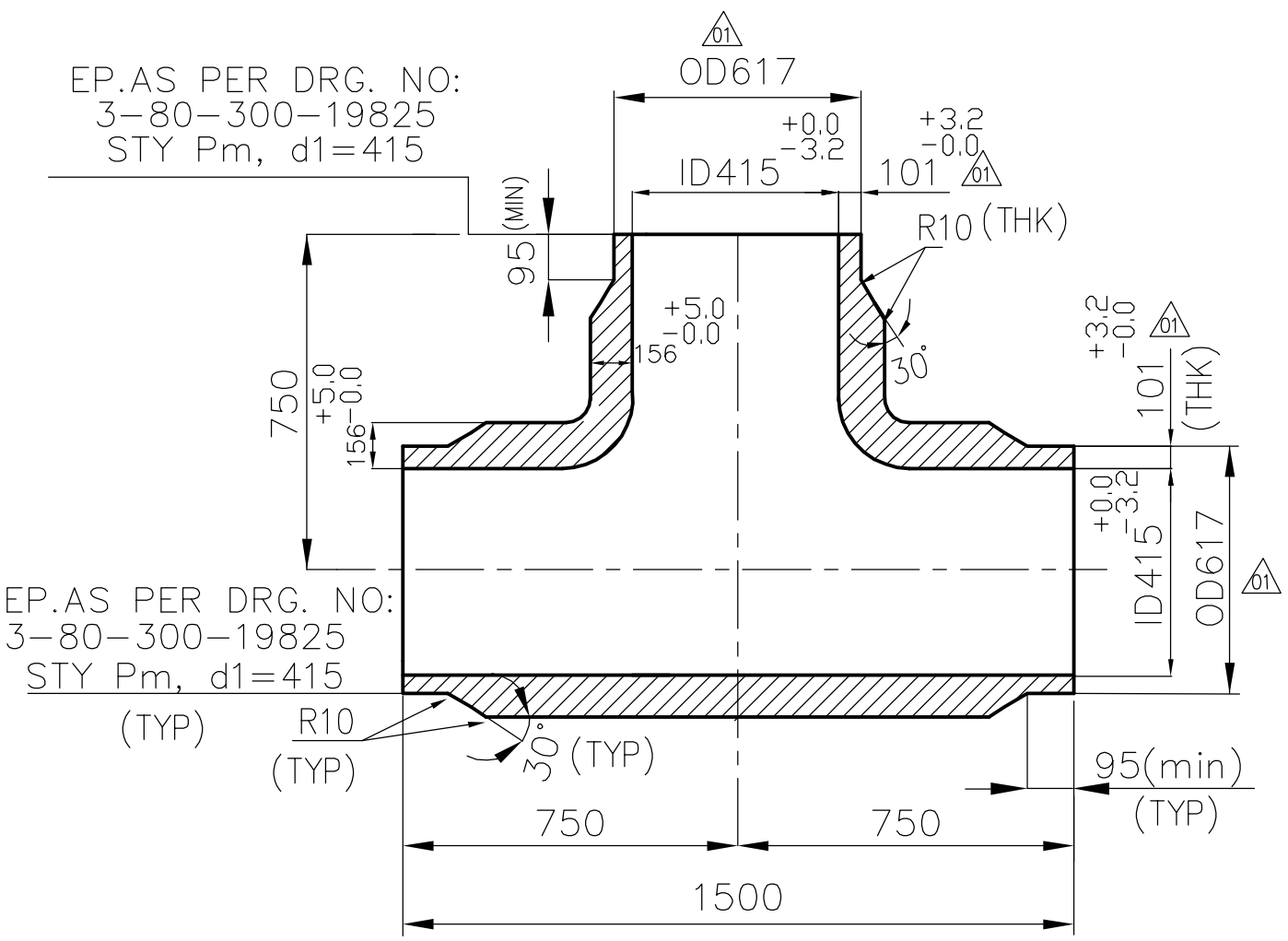
REV: 01

SIZE A3

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No 3-80-423-34679

12.5



NOTES :-

01. DESIGN PRESSURE : 512kg/sq.cm.(g) 01
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW EQT ID415X101 01	3-80-423-34679		92 525 057 0000 / SA234WPC	A	3650.000 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		22.02.19	
CHD	KONDAPA NAIDU		22.02.19	
APPD	R.SESHAGIRI		22.02.19	

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD: KONDAPANAIDU / APPD : SARAVANAN
02			01	09.07.19	

ALL REVISIONS ARE INDICATED AS 01

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~3650		

TITLE: BW EQT (ID415X101) 01

CARD CODE: U 01

DRAWING No.: 3-80-423-34679

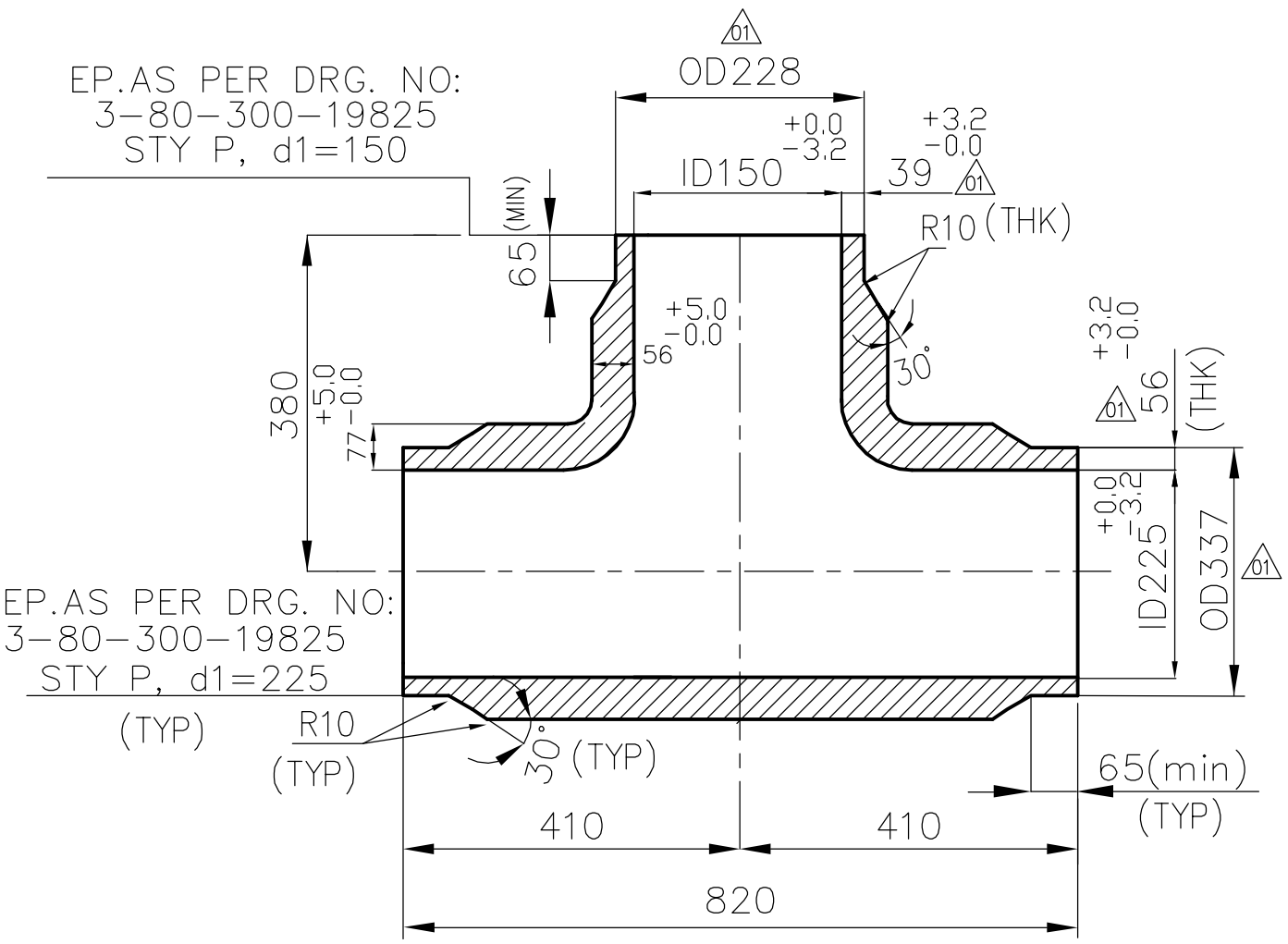
REV: 01

SIZE A3

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-423-34681

12.5



NOTES :-

01. DESIGN PRESSURE : 01 512kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW UEQT ID225X56/ID150X39 01	3-80-423-34681		92 525 058 0000 / SA234WPC	A	625.000 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		01.08.17	
CHD	KONDAPA NAIDU		01.08.17	
APPD	R.SESHAGIRI		01.08.17	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~625		

TITLE: BW UEQT (ID225X56/ID150X39) 01

CARD CODE: U 01

DRAWING No.: 3-80-423-34681

REV: 01

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD: KONDAPANAIDU / APPD : SARAVANAN
02			01	09.07.19	

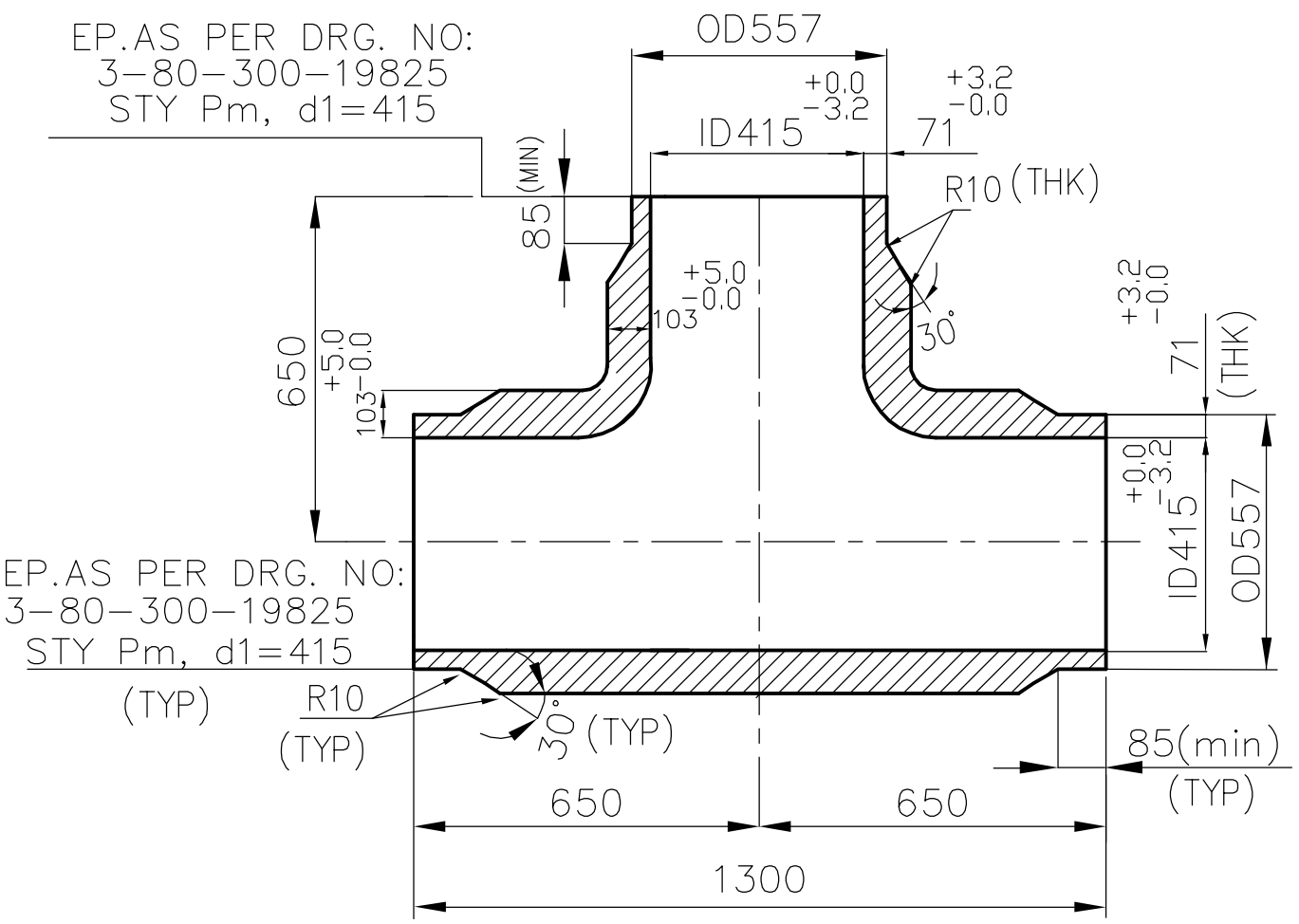
ALL REVISIONS ARE INDICATED AS 01

SIZE A3

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No. 3-80-423-34682

12.5



NOTES :-

01. DESIGN PRESSURE : 381kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

				01		
01	BW EQT ID415X71	3-80-423-34682		92 525 059 0000	A	1750 | 000
				SA234WPC		1
ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO.	MATERIAL CODE	A / C	UNIT WT.
			VAR NO.	MATERIAL SPEC.		QTY.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		25.02.19	
CHD	KONDAPA NAIDU		25.02.19	
APPD	R.SESHAGIRI		25.02.19	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~1750		

TITLE	CARD CODE	DRAWING No.	REV
BW EQT (ID415X71)	U 01	3-80-423-34682	01

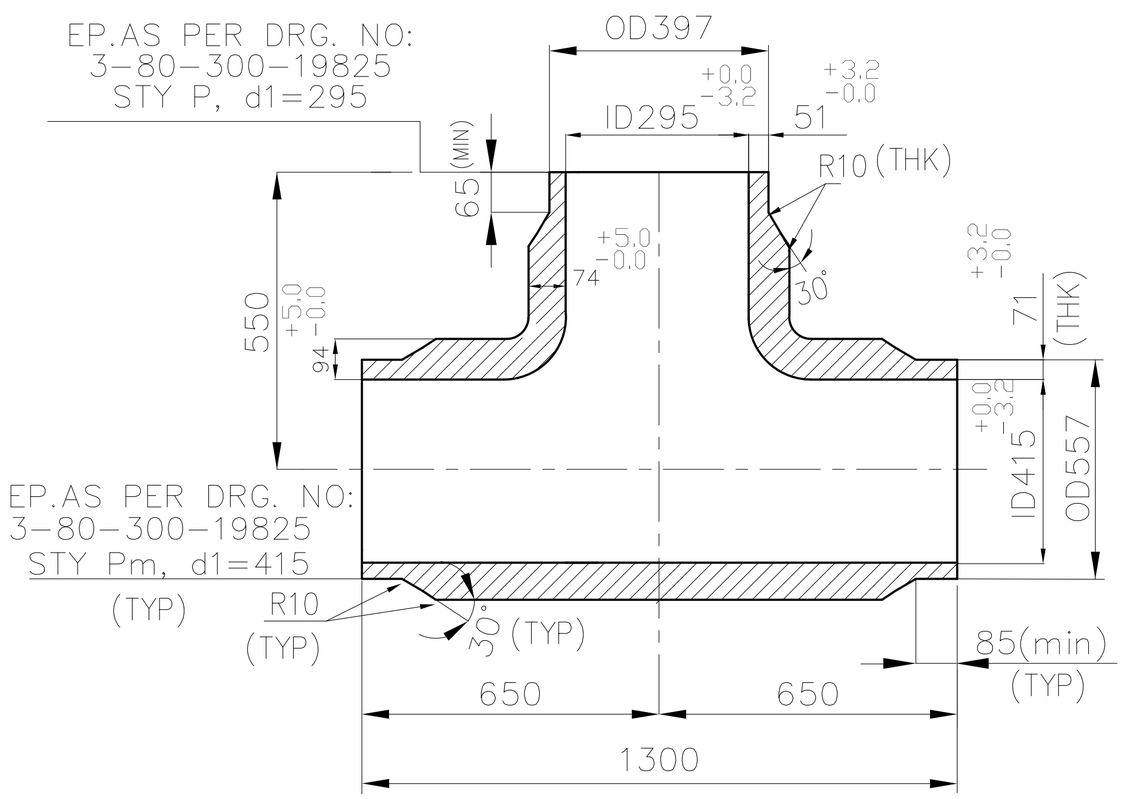
REV	DATE	ALTD : / APPD :	REV	DATE	ALTD: KONDAPANAIDU / APPD : SARAVANAN
02			01	09.07.19	

ALL REVISIONS ARE INDICATED AS 01

SIZE A3

DRAWING No. 3-80-423-34683

12.5



NOTES :-

01. DESIGN PRESSURE : 381kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

01	BW UEQT ID415X71/ID295X51	3-80-423-34683		92 525 065 0000 SA234WPC	A	1700 | 000 1
ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. VAR NO.	MATERIAL CODE MATERIAL SPEC.	A / C	UNIT WT. QTY.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		01.08.17	
CHD	KONDAPA NAIDU		01.08.17	
APPD	R.SESHAGIRI		01.08.17	

DEPT. / CODE	GRADE OF UN TOL. DIM		SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F		N.T.S.	~1700		

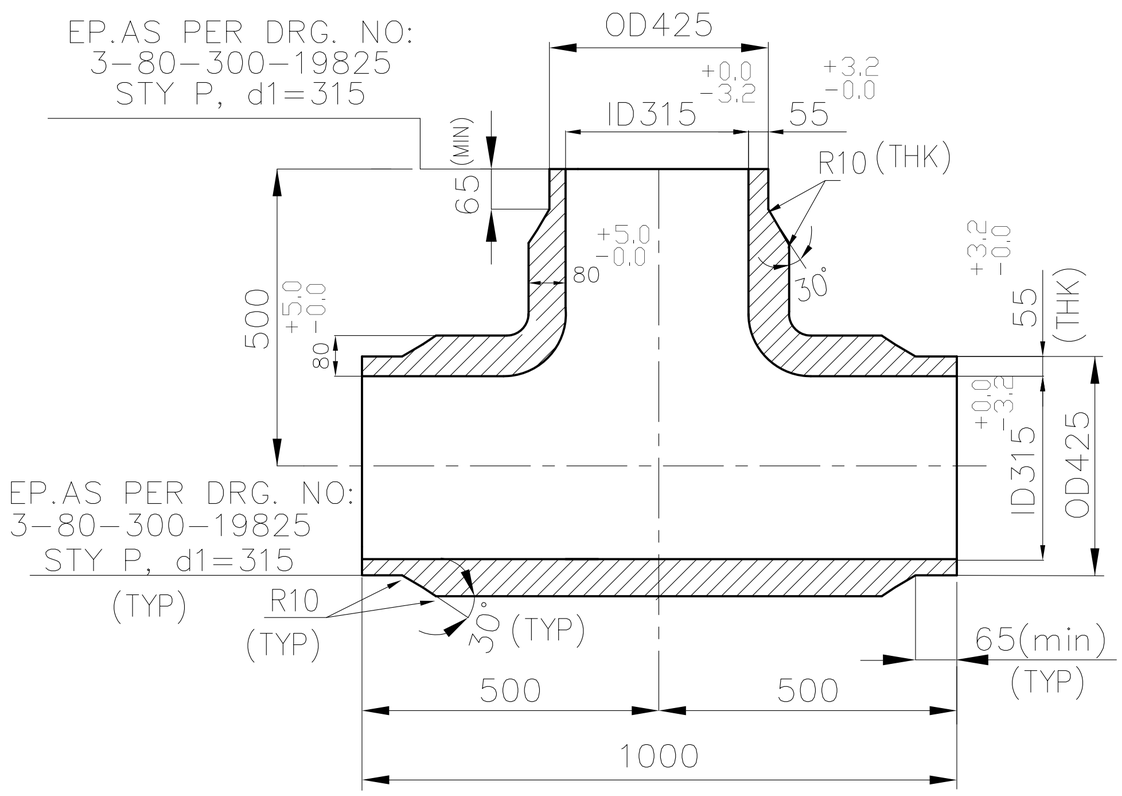
TITLE	CARD CODE	DRAWING No.	REV
BW UEQT (ID415X71/ID295X51)	U 01	3-80-423-34683	00

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD : / APPD :
02			01		

SIZE A3

DRAWING No **3-80-423-34684**

12.5



NOTES :-

01. DESIGN PRESSURE : 381kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A/C	UNIT WT. / QTY.
01	BW EQT ID315X55	3-80-423-34684		92 525 066 0000 / SA234WPC	A	800.000 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		01.08.17	
CHD	KONDAPA NAIDU		01.08.17	
APPD	R.SESHAGIRI		01.08.17	

DEPT. / CODE	GRADE OF UN TOL. DIM		SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F		N.T.S.	~800		

TITLE **BW EQT** (ID315X55)

CARD CODE U 01

DRAWING No. **3-80-423-34684**

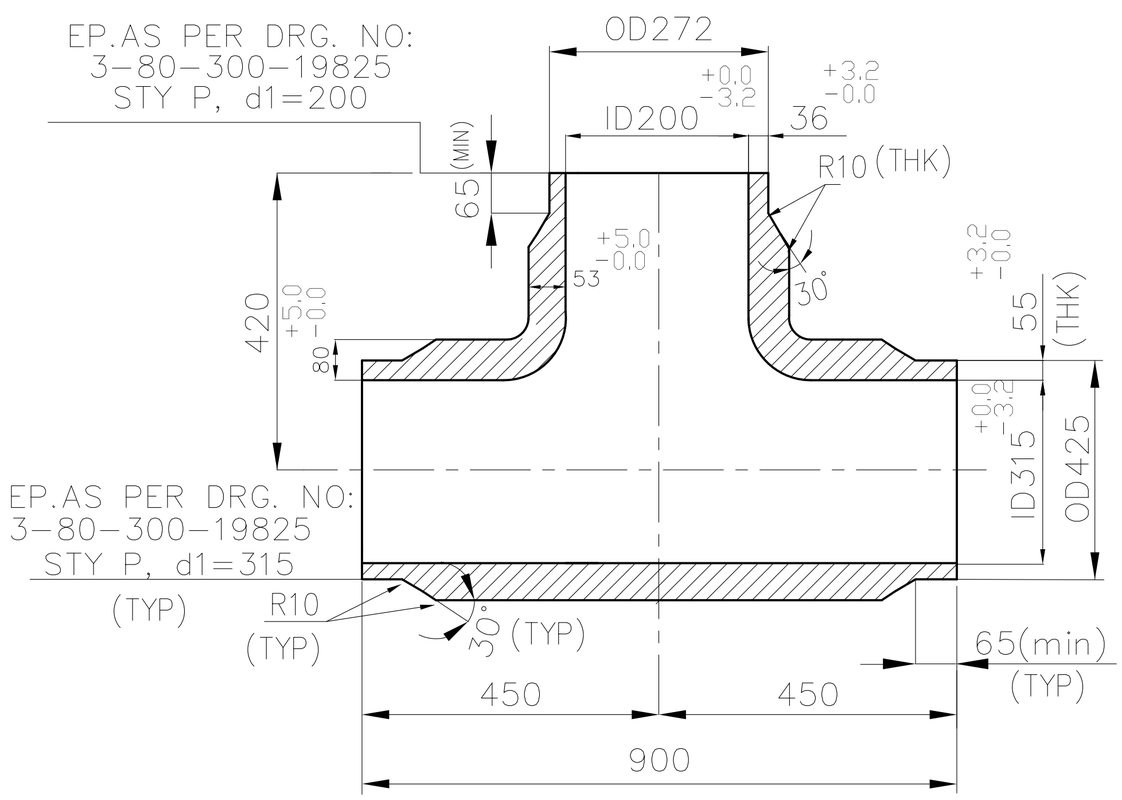
REV **00**

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD : / APPD :
02			01		

SIZE A3

DRAWING No **3-80-423-34685**

12.5



NOTES :-

01. DESIGN PRESSURE : 381kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 305° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A/C	UNIT WT. / QTY.
01	BW UEQT ID315X55/ID200X36	3-80-423-34685		92 525 067 0000 / SA234WPC	A	800 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		25.02.19	
CHD	KONDAPA NAIDU		25.02.19	
APPD	R.SESHAGIRI		25.02.19	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~800		

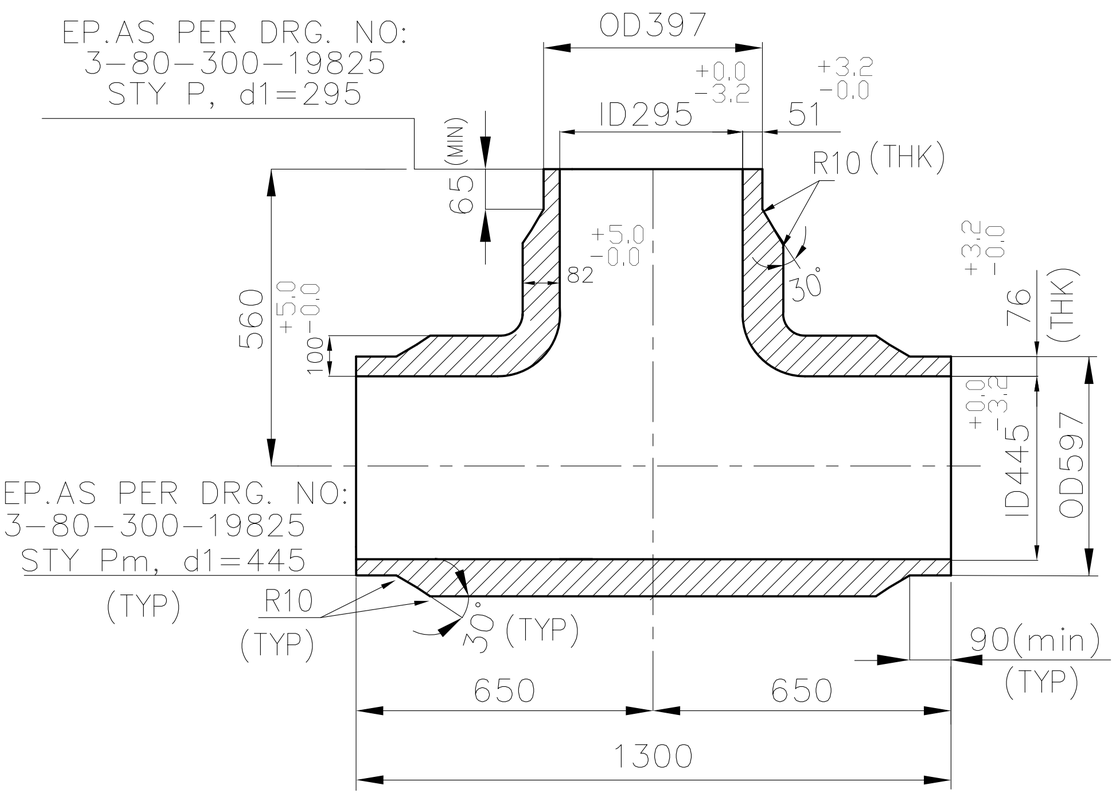
TITLE	CARD CODE	DRAWING No.	REV
BW UEQT (ID315X55/ID200X36)	U 01	3-80-423-34685	00

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD : / APPD :
02			01		

SIZE A3

DRAWING No **3-80-423-34687**

12.5



NOTES :-

01. DESIGN PRESSURE : 381kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 305° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
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08. CONSTRUCTION SHALL BE SEAMLESS

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A/C	UNIT WT. / QTY.
01	BW UEQT ID445X76/ID295X51	3-80-423-34687		92 525 069 0000 / SA234WPC	A	1750,000 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		25.02.19	
CHD	KONDAPA NAIDU		25.02.19	
APPD	R.SESHAGIRI		25.02.19	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~1750		

TITLE	CARD CODE	DRAWING No.	REV
BW UEQT (ID445X76/ID295X51)	U 01	3-80-423-34687	00

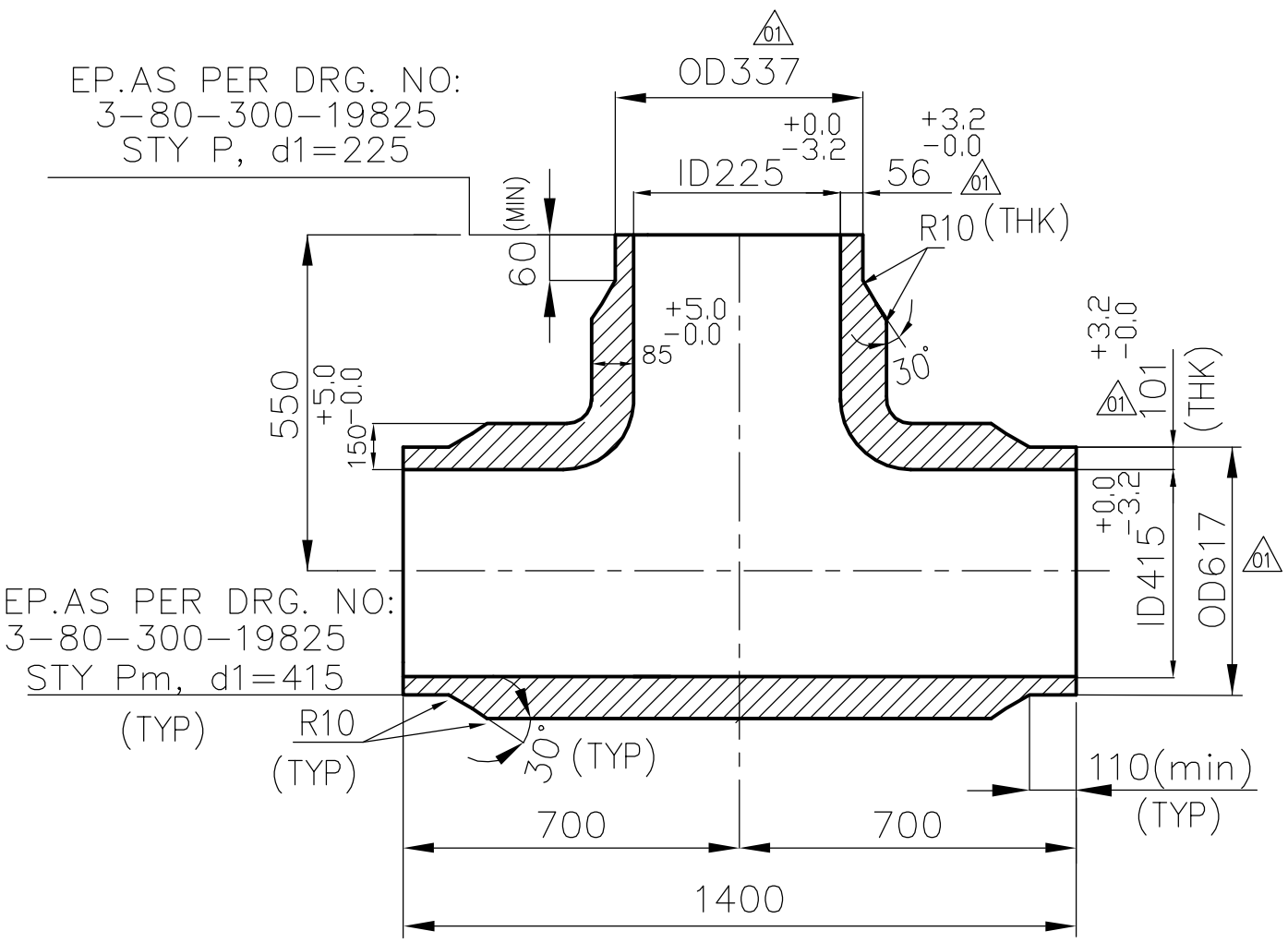
REV	DATE	ALTD : / APPD :	REV	DATE	ALTD : / APPD :
02			01		

SIZE A3

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No 3-80-423-35387

12.5



NOTES :-

01. DESIGN PRESSURE : 512kg/sq.cm.(g) 01
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
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07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

01	BW UEQT ID415X101/ID225X56 01	3-80-423-35387		92 525 101 0000	A	2750 | 000
				SA234WPC		1
ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO.	MATERIAL CODE	A / C	UNIT WT.
			VAR NO.	MATERIAL SPEC.		QTY.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	RP SINGH		22.02.19	
CHD	KONDAPA NAIDU		22.02.19	
APPD	R.SESHAGIRI		22.02.19	

DEPT. / CODE	GRADE OF UN TOL. DIM		SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F		N.T.S.	~2750		

TITLE: BW UEQT (ID415X101/ID225X56) 01

CARD CODE: U 01

DRAWING No.: 3-80-423-35387

REV: 01

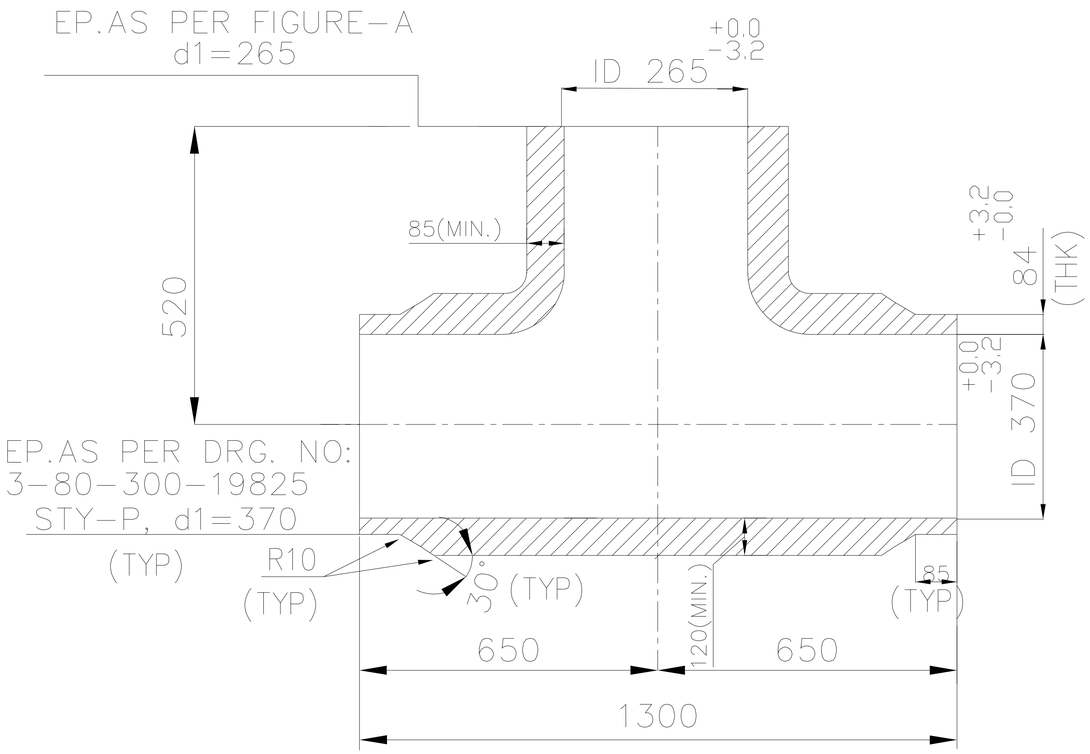
REV	DATE	ALTD : / APPD :	REV	DATE	ALTD: KONDAPANAIDU / APPD : SARAVANAN
02			01	09.07.19	

ALL REVISIONS ARE INDICATED AS 01

SIZE A3

DRAWING No 3-80-423-35612

12.5



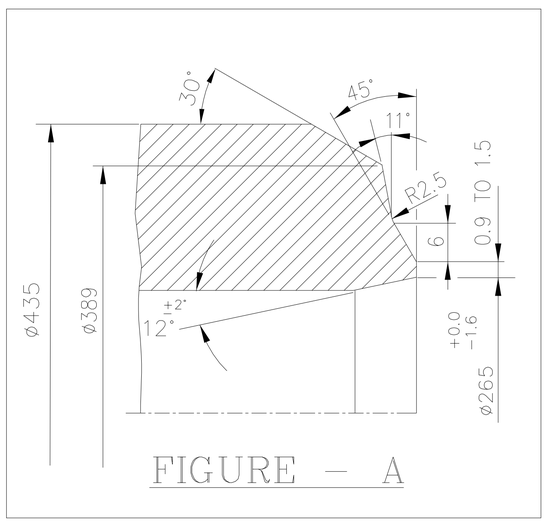


FIGURE – A

NOTES :-

01. DESIGN PRESSURE : 490 kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234.
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST REVISION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. ACTUAL WEIGHT TO BE FURNISHED BY FITTING SUPPLIER.
08. CONSTRUCTION SHALL BE SEAMLESS
09. AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE
10. DETAILED DIMENSIONS SHALL BE SUBMITTED FOR REVIEW

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW UNEQUAL TEE ID370X84/ID265X62	3–80–423–35612		92 505 195 0000 / SA234WPC	A	2225.189 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	S ARUNSHARMA		12.04.19	
CHD	P SURESH		12.04.19	
APPD	SARAVANAN C		12.04.19	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.			

TITLE: **BW UNEQUAL TEE** (ID370X84/ID265X62–SA234WPC)

CARD CODE: U 01

DRAWING No.: 3-80-423-35612

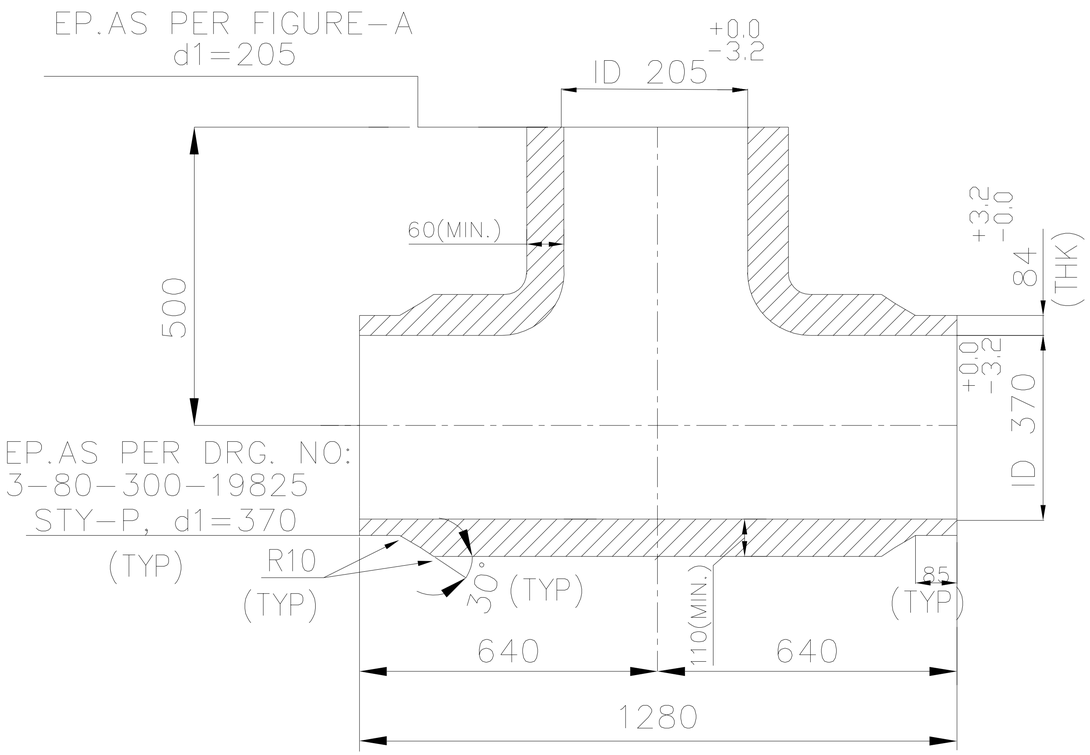
REV: 00

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD : / APPD :
02			01		

SIZE A3

DRAWING No 3-80-423-35613

12.5



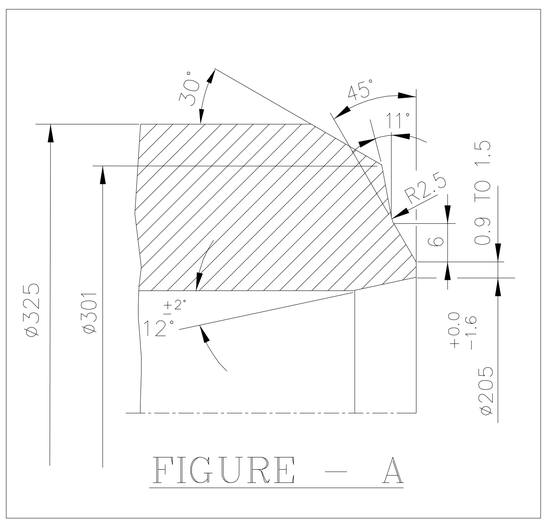


FIGURE – A

NOTES :-

01. DESIGN PRESSURE : 490 kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234.
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST REVISION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. ACTUAL WEIGHT TO BE FURNISHED BY FITTING SUPPLIER.
08. CONSTRUCTION SHALL BE SEAMLESS
09. AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE
10. DETAILED DIMENSIONS SHALL BE SUBMITTED FOR REVIEW

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW UNEQUAL TEE ID370X84/ID205X48	3-80-423-35613		925051960000 / SA234WPC	A	1808.316 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	S ARUNSHARMA		12.04.19	
CHD	P SURESH		12.04.19	
APPD	SARAVANAN C		12.04.19	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.			

TITLE: BW UNEQUAL TEE (ID370X84/ID205X48–SA234WPC)

CARD CODE: U 01

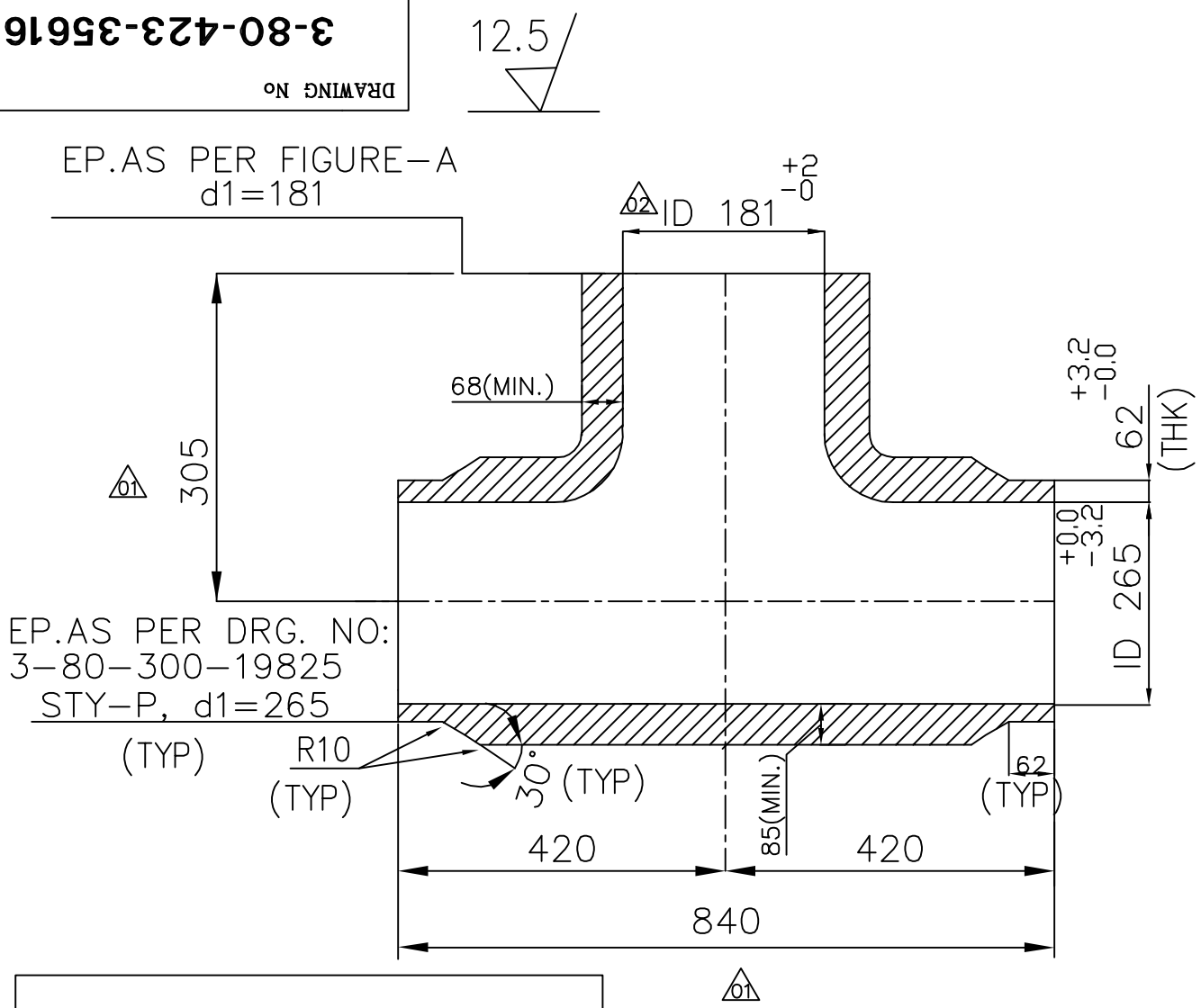
DRAWING No.: 3-80-423-35613

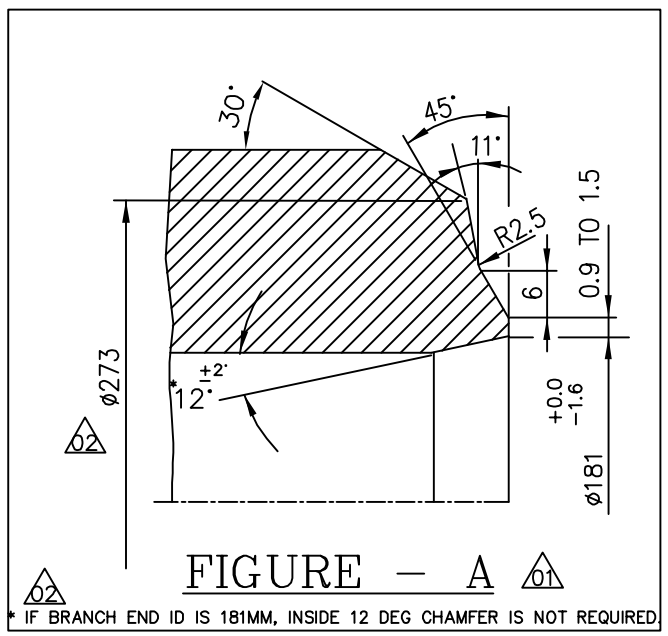
REV: 00

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD : / APPD :
02			01		

SIZE A3

DRAWING No **3-80-423-35616**





NOTES :-

01. 01. DESIGN PRESSURE : 490 kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234.
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST REVISION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. ACTUAL WEIGHT TO BE FURNISHED BY FITTING SUPPLIER.
08. CONSTRUCTION SHALL BE SEAMLESS
09. AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE
10. DETAILED DIMENSIONS SHALL BE SUBMITTED FOR REVIEW

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW UNEQUAL TEE ID265X62/OD273X50	3–80–423–35616		92 505 199 0000 / SA234WPC	A	714.000 / 1

01

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	S ARUNSHARMA		12.04.19	
CHD	P SURESH		12.04.19	
APPD	SARAVANAN C		12.04.19	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.			

TITLE
BW UNEQUAL TEE
(ID265X62/OD273X50–SA234WPC)

CARD CODE: U 01

DRAWING No. **3-80-423-35616**

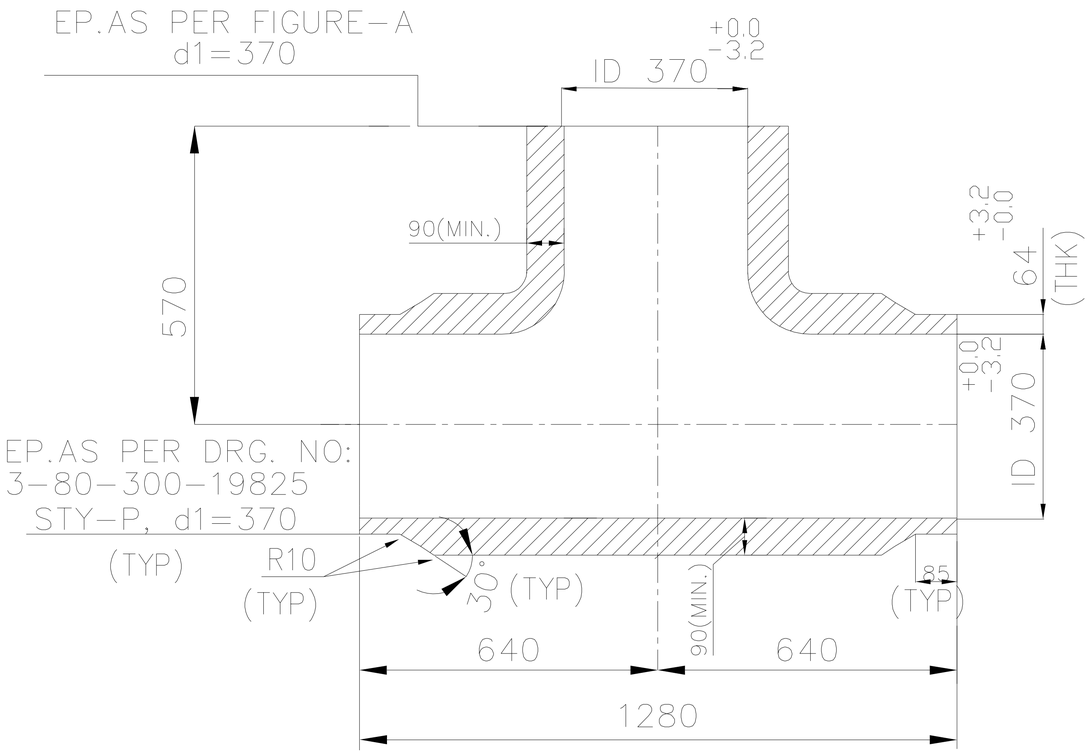
REV **02**

REV	DATE	ALTD / APPD	
02	15.03.21	ALTD : S.ARUN SHARMA APPD : P.SURESH	BRANCH END DIMENSION MODIFIED. ALL REVISIONS MARKED AS 02
01	04.10.19	ALTD : S.ARUN SHARMA APPD : P.SURESH	DIMENSIONS AND NOTE 01 REVISED ALL REVISIONS MARKED AS 01

SIZE A3

DRAWING No 3-80-423-35617

12.5



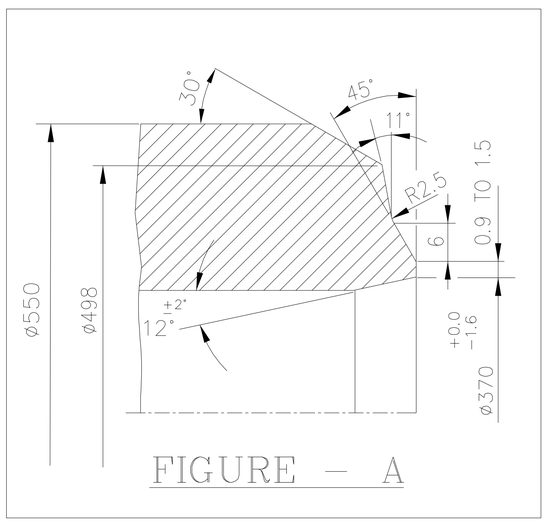


FIGURE – A

NOTES :-

01. DESIGN PRESSURE : 390 kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234.
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST REVISION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. ACTUAL WEIGHT TO BE FURNISHED BY FITTING SUPPLIER.
08. CONSTRUCTION SHALL BE SEAMLESS
09. AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE
10. DETAILED DIMENSIONS SHALL BE SUBMITTED FOR REVIEW

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW EQUAL TEE ID370X64	3–80–423–35617		92 505 200 0000 / SA234WPC	A	1933.834 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	S ARUNSHARMA		12.04.19	
CHD	P SURESH		12.04.19	
APPD	SARAVANAN C		12.04.19	

REV	DATE	ALTD : / APPD :
02		
01		

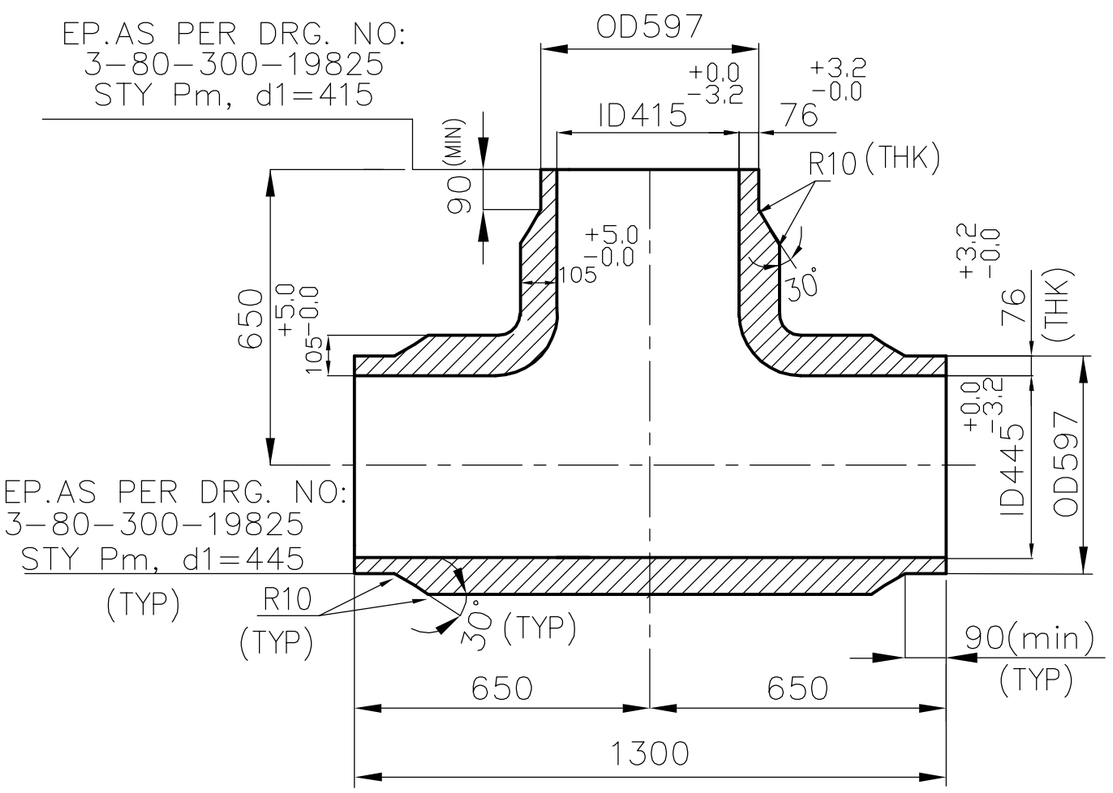
DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.			

TITLE	CARD CODE	DRAWING No.	REV
BW EQUAL TEE (ID370X64–SA234WPC)	U 01	3-80-423-35617	00

SIZE A3

DRAWING No 3-80-423-35636

12.5



NOTES :-

01. DESIGN PRESSURE : 381kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 305° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST VERSION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. VENDOR SHALL SUBMIT FINAL DRAWING WITH DIMENSIONS AND ACTUAL WEIGHT FOR APPROVAL BEFORE MANUFACTURING.
08. CONSTRUCTION SHALL BE SEAMLESS

REV	DATE	ALTD: KONDAPANAIDU
02	09.07.19	APPD : SARAVANAN

ALL REVISIONS ARE INDICATED AS 03

REV	DATE	ALTD: KONDAPANAIDU
02	09.07.19	APPD : SARAVANAN

ALL REVISIONS ARE INDICATED AS 02

REV	DATE	ALTD: KONDAPANAIDU
01	09.07.19	APPD : SARAVANAN

ALL REVISIONS ARE INDICATED AS 01

ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.
01	BW EQT ID445X76 03	3-80-423-35636		92 505 227 0000 / SA234WPC	A	1900 / 1

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE
DRN	RP SINGH		25.02.19
CHD	KONDAPA NAIDU		25.02.19
APPD	R.SESHAGIRI		25.02.19

NO OF ITEMS

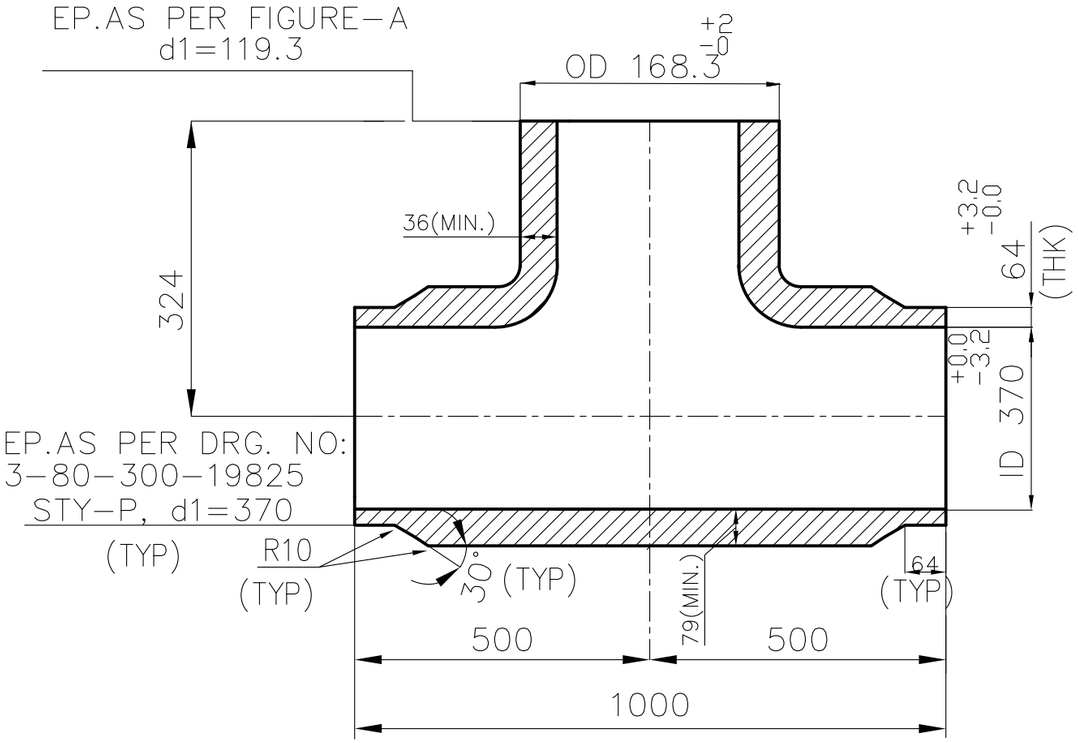
DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~1900		

TITLE	CARD CODE	DRAWING No.	REV
BW EQT 02 (ID445XX76)	U 01	3-80-423-35636	03

SIZE A3

DRAWING No. 3-80-423-36126

12.5



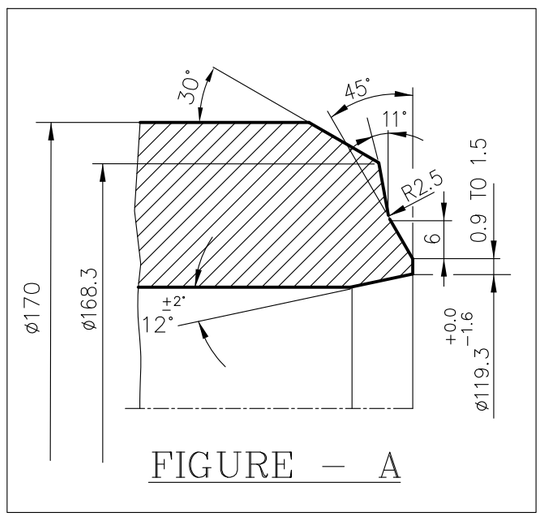


FIGURE - A

NOTES :-

01. DESIGN PRESSURE : 390 kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 200° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234.
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FOLLOW TDG:102 (LATEST REVISION)
07. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. ACTUAL WEIGHT TO BE FURNISHED BY FITTING SUPPLIER.
08. CONSTRUCTION SHALL BE SEAMLESS
09. AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE
10. DETAILED DIMENSIONS SHALL BE SUBMITTED FOR REVIEW

01	BW UNEQUAL TEE ID370X64/OD168.3X27.5	3-80-423-36126		925053100000	A	886.260
				SA234WPC		1
ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. / VAR NO.	MATERIAL CODE / MATERIAL SPEC.	A / C	UNIT WT. / QTY.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO OF ITEMS
DRN	S ARUNSHARMA		01.11.19	
CHD	P SURESH		01.11.19	
APPD	SARAVANAN C		01.11.19	

DEPT. / CODE	GRADE OF UN TOL. DIM	SCALE	WEIGHT (Kg).	BHEL PO REF.NO:	ITEM No.
	C/M/F	N.T.S.	~886.260		

TITLE: BW UNEQUAL TEE (ID370X64/OD168.3X27.5-SA234WPC)

CARD CODE: U 01

DRAWING No.: 3-80-423-36126

REV: 00

REV	DATE	ALTD : / APPD :	REV	DATE	ALTD : / APPD :
02			01		

SIZE A3

REV	DATE	ALTD: KONDAPANAIDU
01	18.07.19	APPD : SARAVANAN

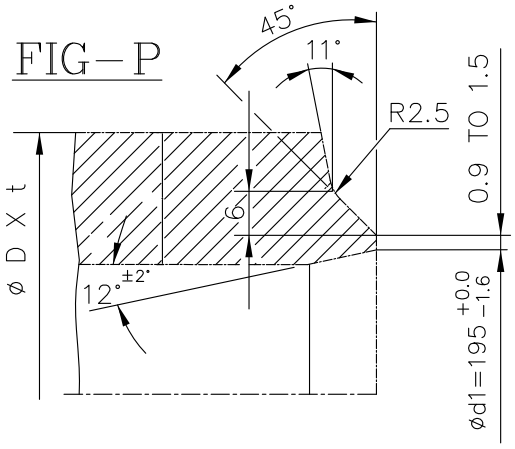
ALL REVISIONS ARE INDICATED AS 01

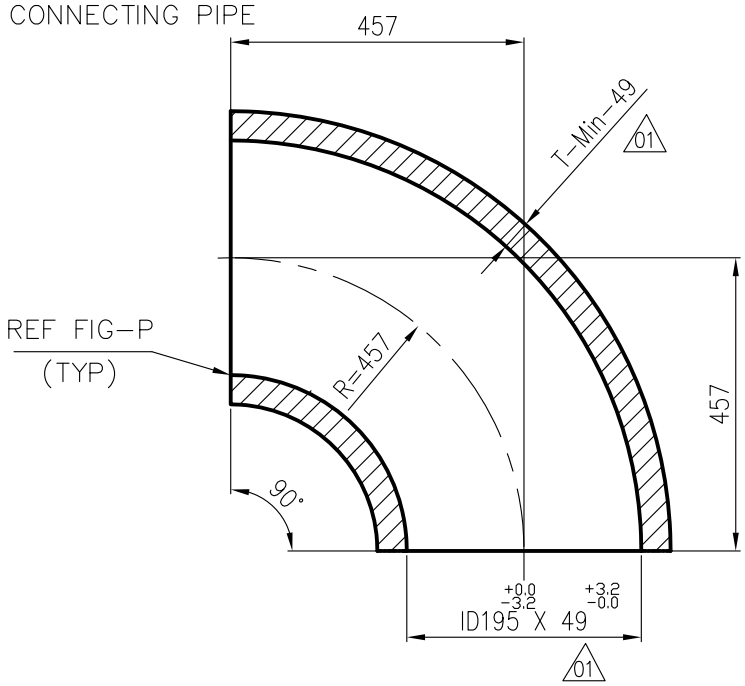
12.5

NOTES:

1) DESIGN PRESSURE : 512 Kg/Cm^2 (g) 01
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID195X49 01
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

FIG–P





VAR No.	DESCRIPTION	STD	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT	UNIT WT. (KG) / QUANTITY
–	BW LR 90DEG ELBOW ID195X49 01		92 504 233 0000 / SA 234 WPC	A		211 / 1

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	RP SINGH		21.02.19
CHD	KONDAPANAIDU		21.02.19
APPD	R SESHAGIRI		21.02.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S		–

TITLE: BW LR 90DEG ELBOW ID195X49 01

DRAWING NO : 4–80–423–82228

REV: 01

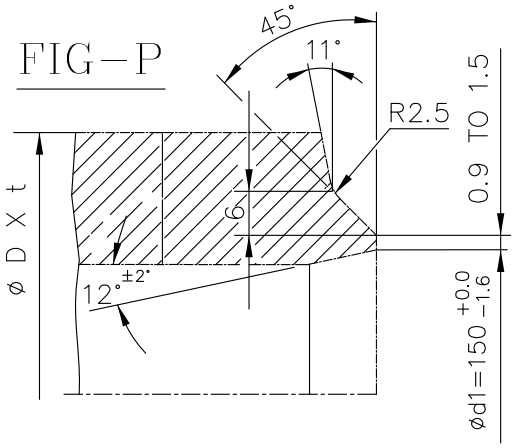
REV	DATE	ALTERED :
01		CHD & APPD :

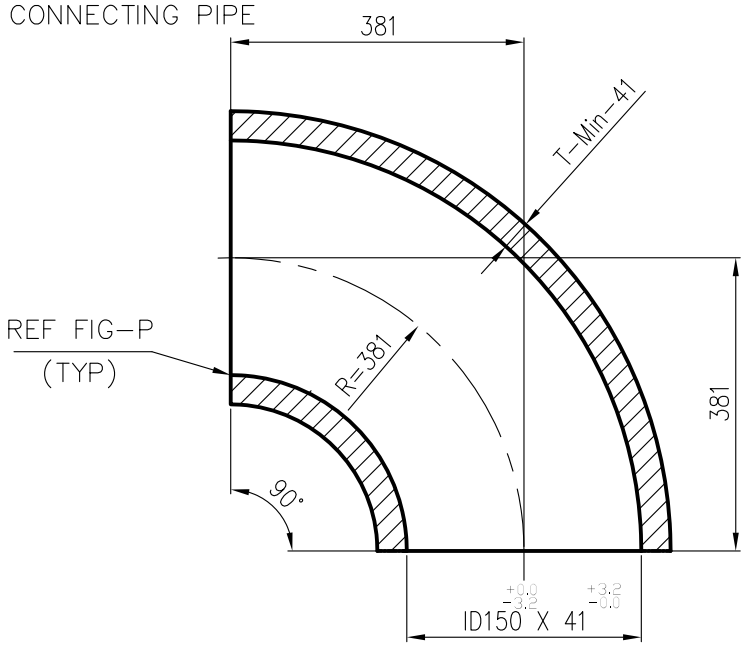
NOTES:

1) DESIGN PRESSURE : 542 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID150X41
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

12.5

FIG–P





VAR No.	DESCRIPTION	STD	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT	UNIT WT. (KG) / QUANTITY
–	BW LR 90DEG ELBOW ID150X41		92 504 237 0000 / SA 234 WPC	A		115 / 1

	NAME	SIGNATURE	DATE
DRN	RP SINGH		21.02.19
CHD	KONDAPANAIDU		21.02.19
APPD	R SESHAGIRI		21.02.19

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	115.51	–

TITLE: BW LR 90DEG ELBOW ID150X41

DRAWING NO : 4–80–423–82229 REV 00

REV	DATE	ALTD: KONDAPANAIDU
01	09.07.19	APPD : SARAVANAN

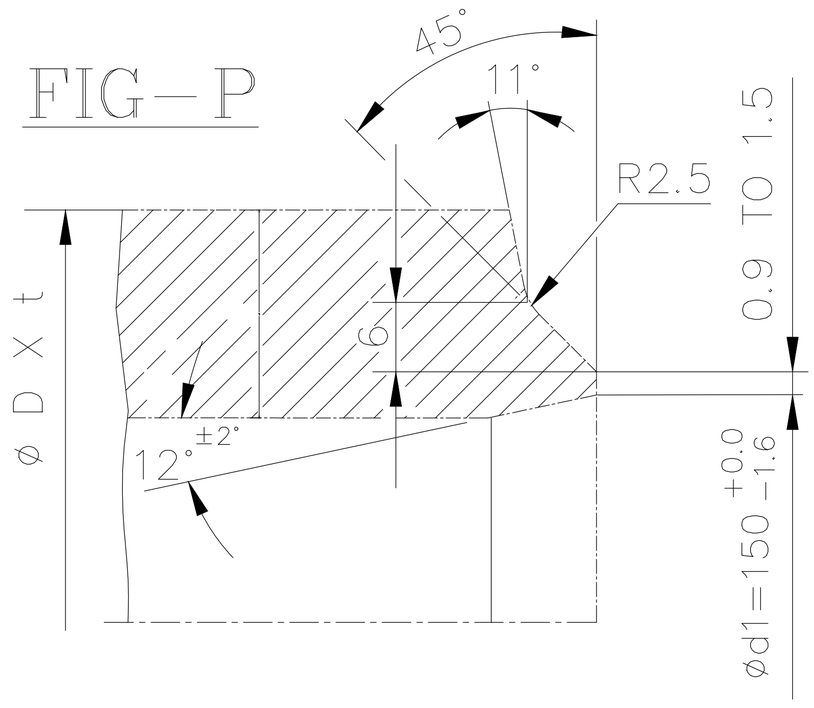
ALL REVISIONS ARE INDICATED AS 01

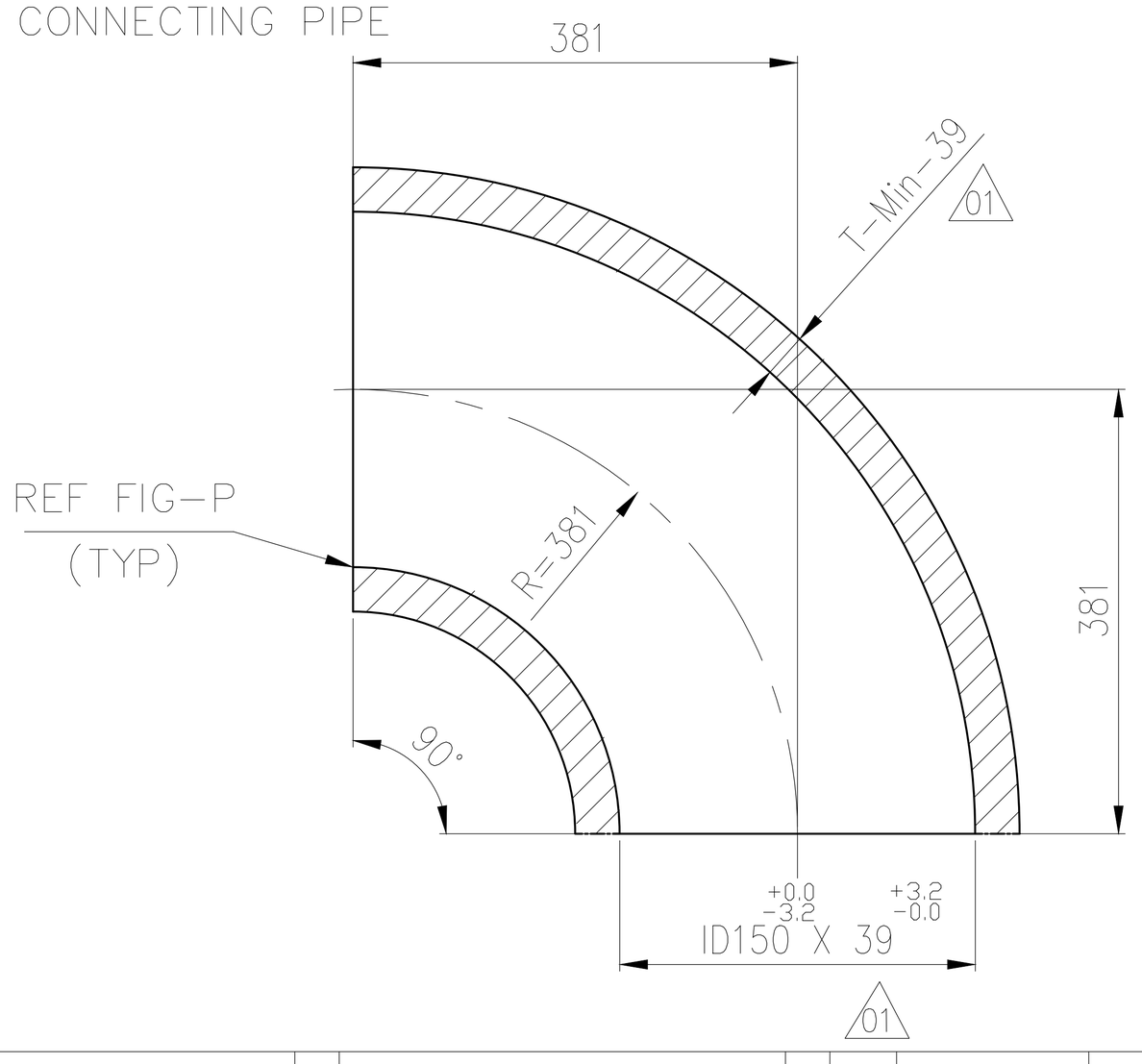
NOTES:

1) DESIGN PRESSURE : 512 $Kg/Cm^2(g)$ 01
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID150X39 01
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

12.5

FIG–P





–	BW LR 90DEG ELBOW ID150X39 01		92 504 237 0000	A		108	730
			SA 234 WPC			1	
VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)	
			MATERIAL SPECN			QUANTITY	

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	RP SINGH		21.02.19
CHD	KONDAPANAIDU		21.02.19
APPD	R SESHAGIRI		21.02.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S		–

TITLE

BW LR 90DEG ELBOW ID150X39 01

DRAWING NO : 4–80–423–82229

REV 01

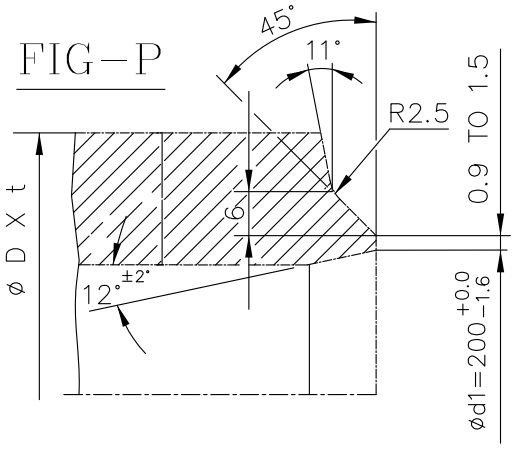
REV	DATE	ALTERED :
01		CHD & APPD :

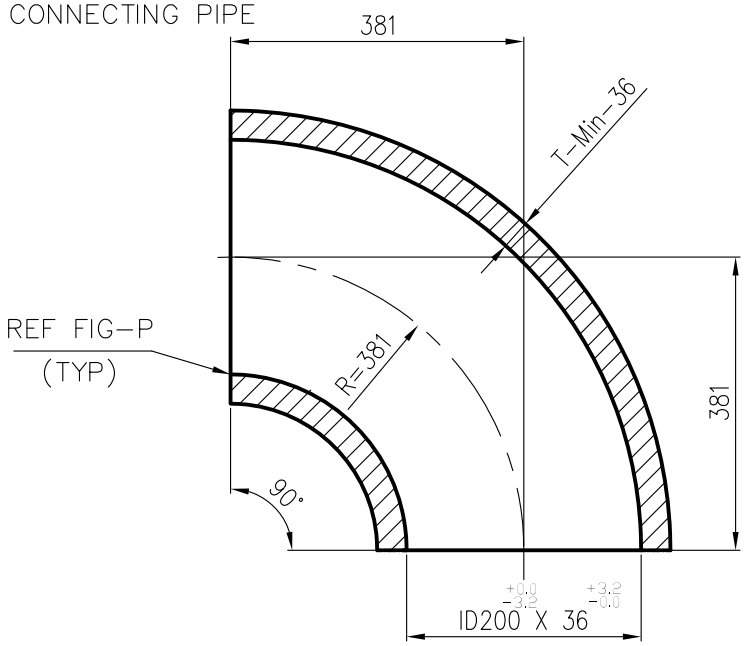
NOTES:

1) DESIGN PRESSURE : 381 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 305 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID200X36
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

12.5

FIG–P





–	BW LR 90DEG ELBOW ID200X36		92 524 044 0000	A		125	320
			SA 234 WPC			1	
VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)	
			MATERIAL SPECN			QUANTITY	

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	RP SINGH		22.02.19
CHD	KONDAPANAIDU		22.02.19
APPD	R SESHAGIRI		22.02.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	125.32	–

TITLE	DRAWING NO :	REV
BW LR 90DEG ELBOW ID200X36	4–80–423–82239	00

REV	DATE	ALTERED: RP SINGH
01	19.06.19	CHD & APPD: KONDAPANAIDU

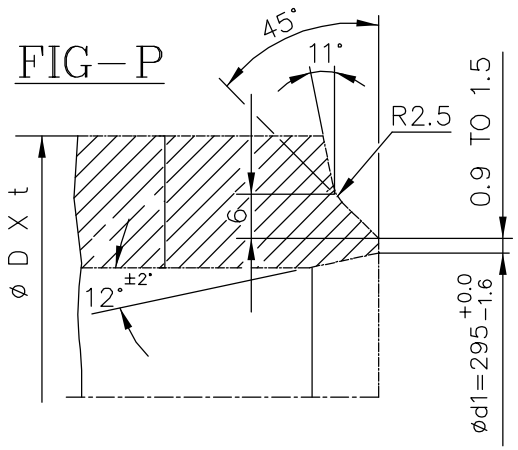
ALL REVISIONS ARE INDICATED AS 01

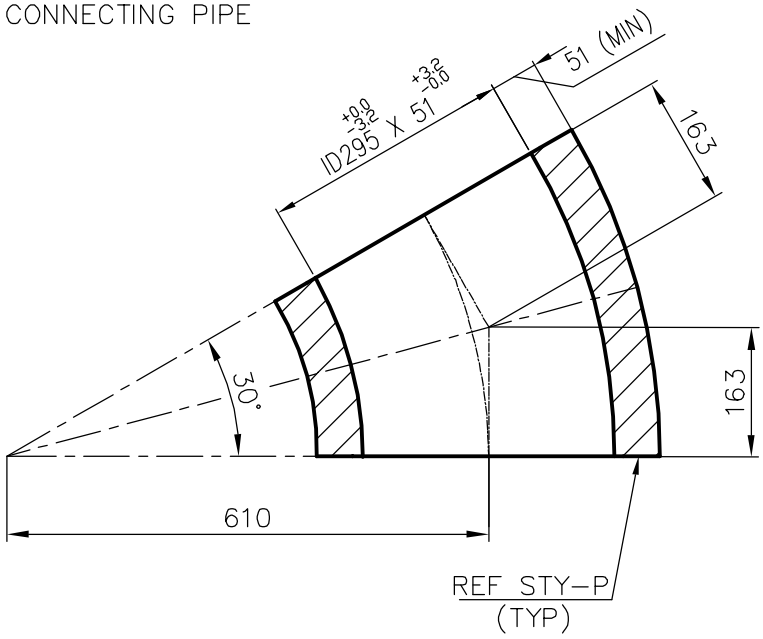
12.5

NOTES:

1) DESIGN PRESSURE : 381 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID295X51
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE 01

FIG–P





–	BW LR 30DEG ELBOW ID295X51		92 504 244 0000	A		138	910
			SA 234 WPC			1	
VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)	
			MATERIAL SPECN			QUANTITY	

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	RP SINGH		22.02.19
CHD	KONDAPANAIDU		22.02.19
APPD	R SESHAGIRI		22.02.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	138.91	–

TITLE	DRAWING NO :	REV
BW LR 30DEG ELBOW ID295X51	4–80–423–82481	01

REV	DATE	ALTERED: RP SINGH
01	19.06.19	CHD & APPD: KONDAPANAIDU

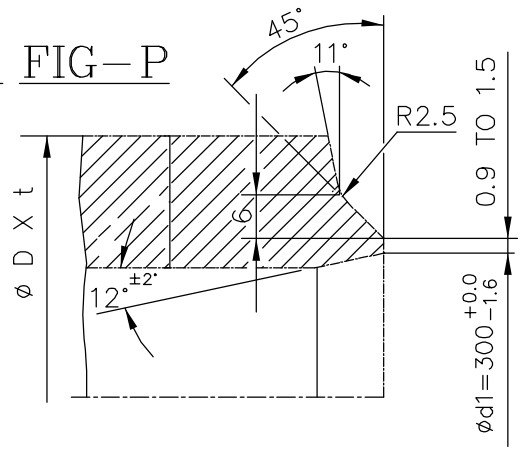
ALL REVISIONS ARE INDICATED AS 01

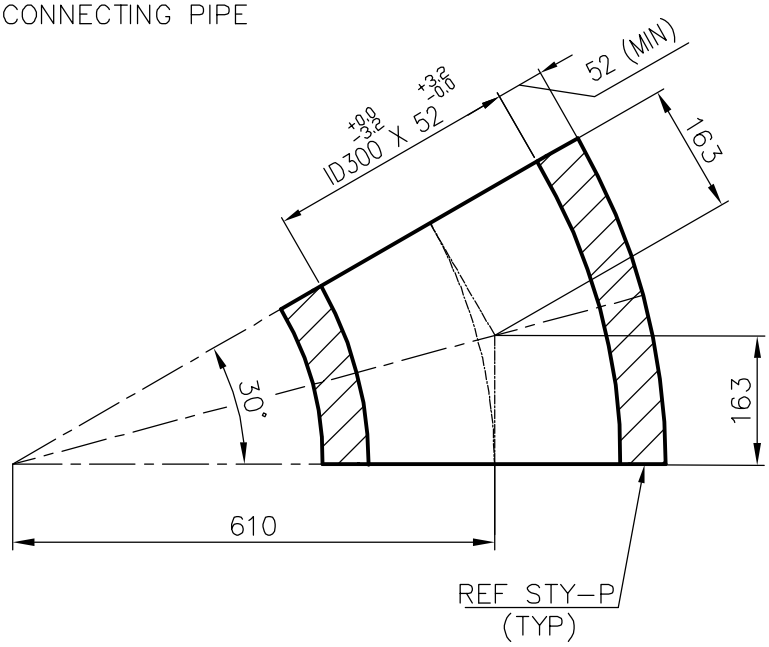
NOTES:

1) DESIGN PRESSURE : 381 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 230 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID300X52
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE 01

12.5

FIG–P





–	BW LR 30DEG ELBOW ID300X52		92 504 242 0000	A		144	000
			SA 234 WPC			1	
VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)	
			MATERIAL SPECN			QUANTITY	

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	RP SINGH		22.02.19
CHD	KONDAPANAIDU		22.02.19
APPD	R SESHAGIRI		22.02.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	144.00	–

TITLE	DRAWING NO :	REV
BW LR 30DEG ELBOW ID300X52	4–80–423–82482	01

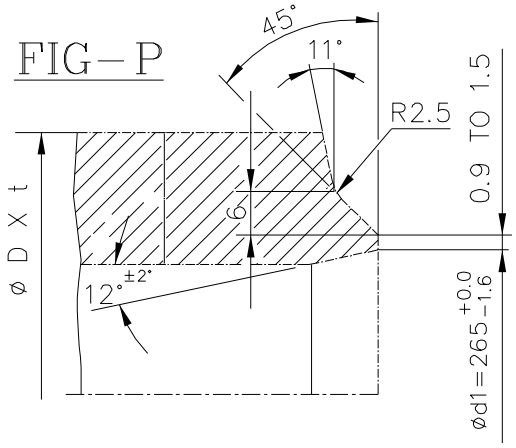
REV	DATE	ALTERED :
01		CHD & APPD :

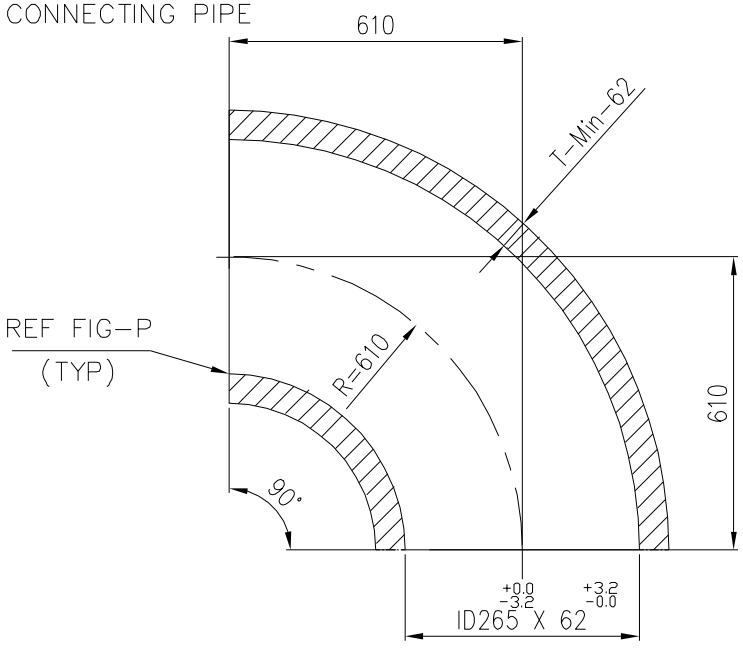
NOTES:

1) DESIGN PRESSURE : 490 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID265X62
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

12.5

FIG–P





–	BW LR 90DEG ELBOW ID265 X 62		92 504 275 0000	A		538	827
			SA 234 WPC			1	
VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)	
			MATERIAL SPECN			QUANTITY	

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	S ARUNSHARMA	-SD-	11.04.19
CHD	P SURESH	-SD-	11.04.19
APPD	SARAVANAN.C	-SD-	11.04.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	538.827	–

TITLE	DRAWING NO :	REV
BW LR 90DEG ELBOW ID265 X 62	4–80–423–83204	00

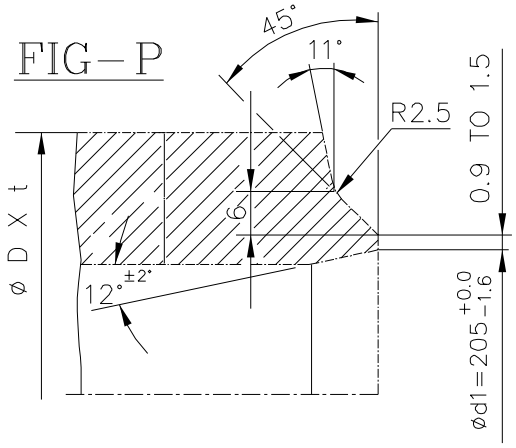
REV	DATE	ALTERED :
01		CHD & APPD :

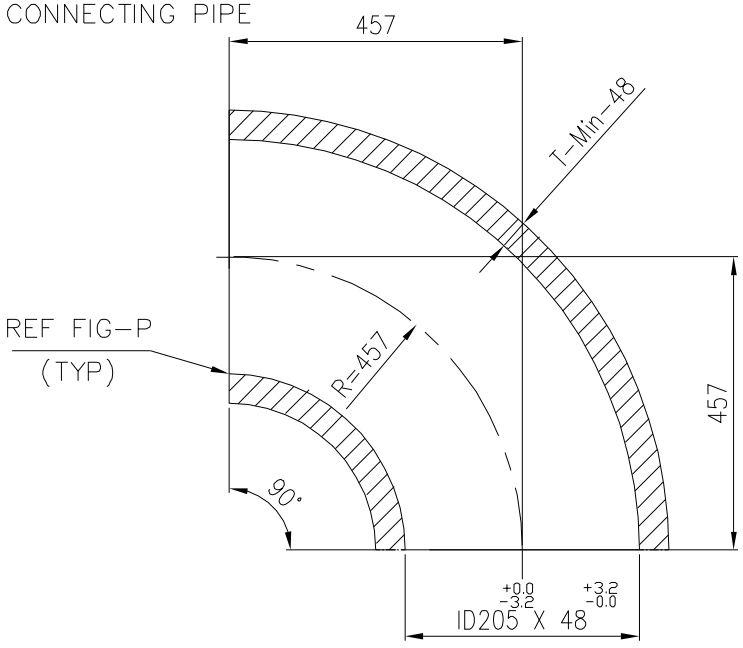
NOTES:

1) DESIGN PRESSURE : 490 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID205X48
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

12.5

FIG–P





–	BW LR 90DEG ELBOW ID205 X 48		92 504 280 0000	A		241	844
			SA 234 WPC			1	
VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)	
			MATERIAL SPECN			QUANTITY	

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	S ARUNSHARMA	-SD-	11.04.19
CHD	P SURESH	-SD-	11.04.19
APPD	SARAVANAN.C	-SD-	11.04.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	241.844	–

TITLE	DRAWING NO :	REV
BW LR 90DEG ELBOW ID205 X 48	4–80–423–83208	00

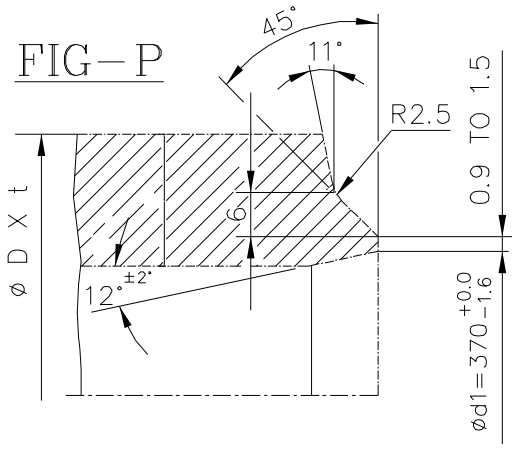
REV	DATE	ALTERED :
01		CHD & APPD :

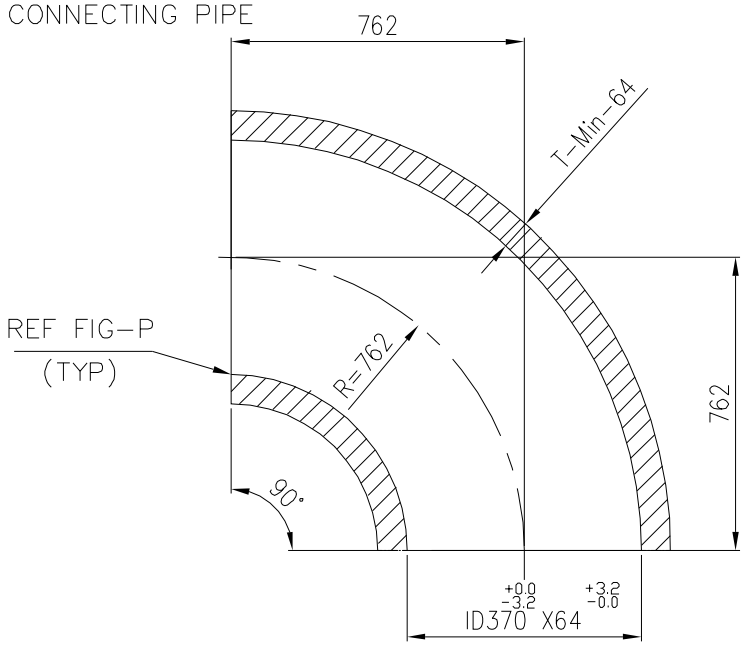
NOTES:

1) DESIGN PRESSURE : 390 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID370X64
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

12.5

FIG–P





VAR No.	DESCRIPTION	STD	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT	UNIT WT. (KG) / QUANTITY
–	BW LR 90DEG ELBOW ID370 X 64		92 504 283 0000 / SA 234 WPC	A		819 / 848 / 1

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	S ARUNSHARMA	–SD–	11.04.19
CHD	P SURESH	–SD–	11.04.19
APPD	SARAVANAN.C	–SD–	11.04.19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	819.848	–

TITLE	DRAWING NO :	REV
BW LR 90DEG ELBOW ID370 X 64	4–80–423–83210	00

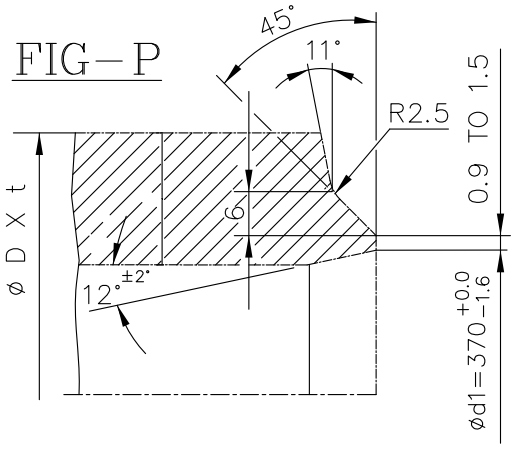
REV	DATE	ALTERED :
01		CHD & APPD :

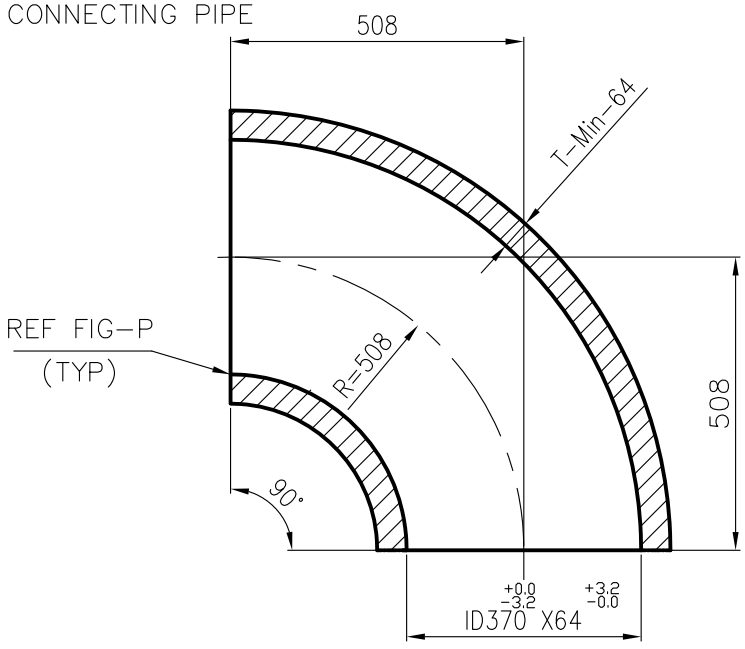
NOTES:

12.5

1) DESIGN PRESSURE : 390 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 200 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) CONNECTING PIPE SIZE IS PIPE ID370X64
8) MATERIAL SPECIFICATION SHALL BE SA234WPC
9) CONSTRUCTION SHALL BE SEAMLESS
10) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
11) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

FIG–P





VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)
–	BW SR 90DEG ELBOW ID370 X 64		925043030000	A		546 565
			SA 234 WPC			1
			MATERIAL SPECN			QUANTITY

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	S ARUNSHARMA	–SD–	18–07–19
CHD	P SURESH	–SD–	18–07–19
APPD	SARAVANAN.C	–SD–	18–07–19

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S	546.565	–

TITLE	DRAWING NO :	REV
BW SR 90DEG ELBOW ID370 X 64	4–80–423–83466	00

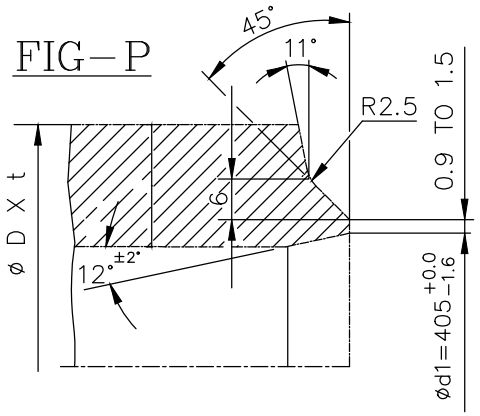
REV	DATE	ALTERED :
01		CHD & APPD :

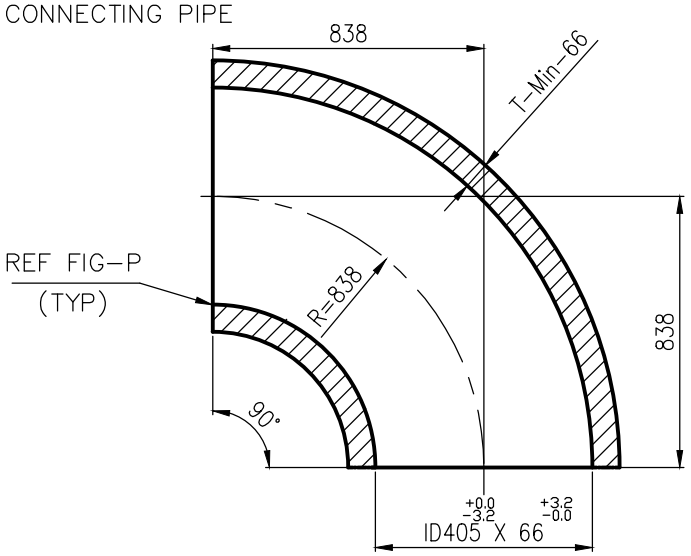
NOTES:

12.5

1) DESIGN PRESSURE : 375 $Kg/Cm^2(g)$
2) DESIGN TEMPERATURE : 320 °C
3) WORKING MEDIUM : WATER
4) FOLLOW TDC No. : AS APPLICABLE
5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
6) MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
7) FITTING TO COMPLY WITH ASME B16.9, DIMENSIONS AND TOLERANCES ARE AS PER THIS DRAWING.
8) CONNECTING PIPE SIZE IS PIPE ID405 X 66
9) MATERIAL SPECIFICATION SHALL BE SA234WPC
10) CONSTRUCTION SHALL BE SEAMLESS
11) WEIGHT GIVEN IN BOM IS INDICATIVE ONLY.
12) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

FIG–P





–	BW LR 90DEG ELBOW ID405 X 66		92 504 259 0000	A		1008	500
			SA 234 WPC				1
VAR No.	DESCRIPTION	STD	MATERIAL CODE	A/C/P	UNIT	UNIT WT. (KG)	
			MATERIAL SPECN			QUANTITY	

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

	NAME	SIGNATURE	DATE
DRN	E VENU KUMAR	–SD–	05.03.20
CHD	E PYRIADHARSINI	–SD–	05.03.20
APPD	VENKATA RAMANA	–SD–	05.03.20

DEPT / CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
			N.T.S		–

TITLE: **BW 90DEG LR ELBOW**
ID405 X 66

DRAWING NO : 4–80–424–82598

REV 00

DRAWING No. 3-80-300-19825

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

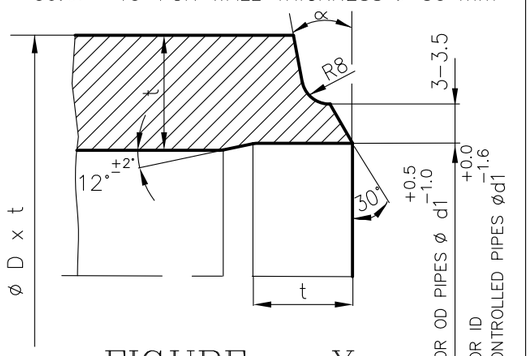


FIGURE – X

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

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

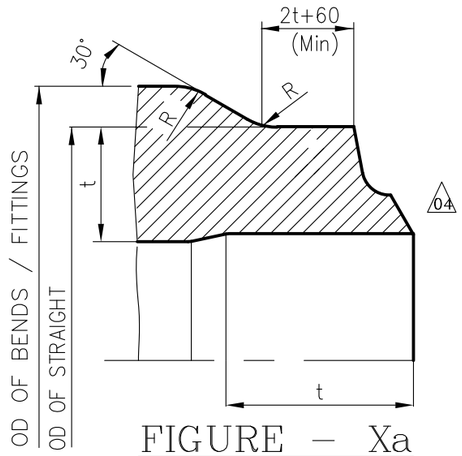
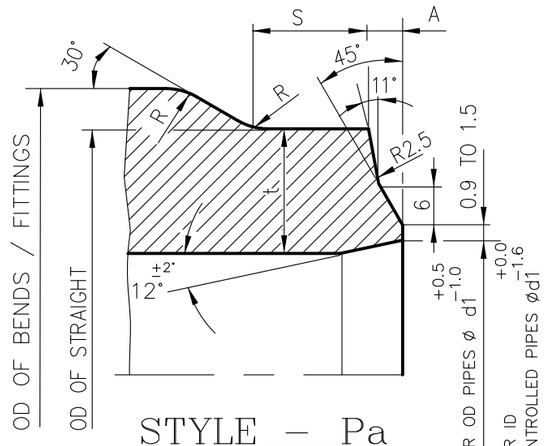


FIGURE – Xa

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

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



STYLE – Pa

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

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

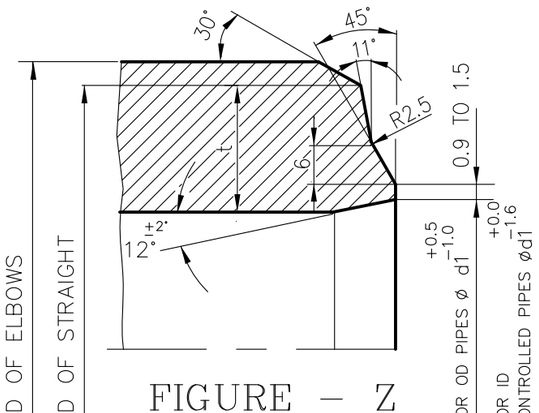


FIGURE – Z

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

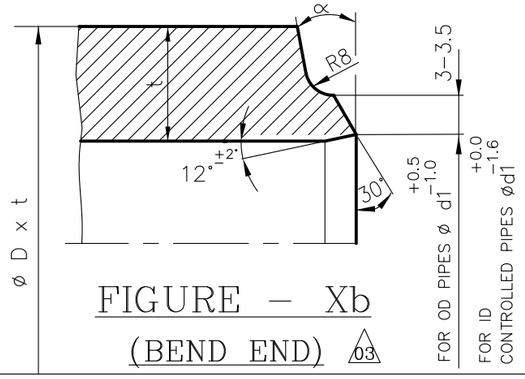


FIGURE – Xb
(BEND END) 03

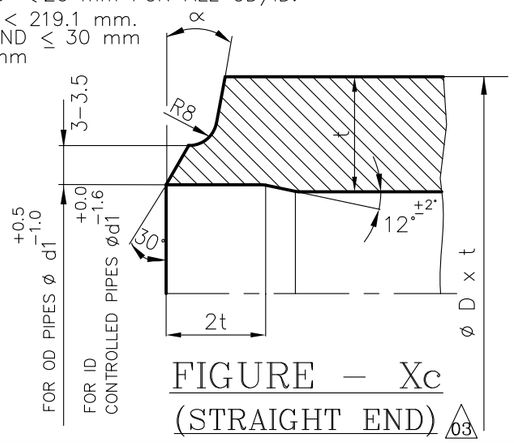
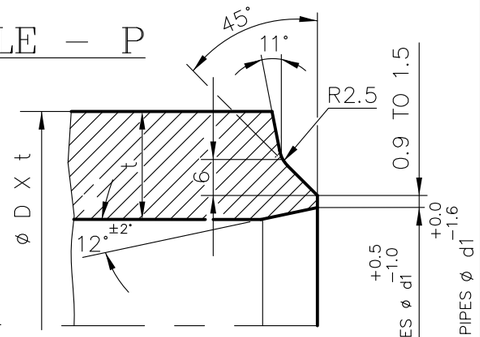


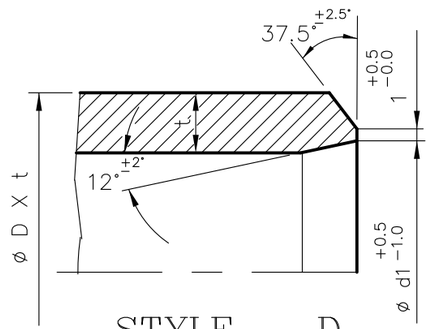
FIGURE – Xc
(STRAIGHT END) 03

STYLE – P



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

NOTES: –
01. USE WHEN t < 14.2 mm.



STYLE – D

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

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

REV	DATE	ALTERED/APPROVED
04	07.12.16	ALTERED: P SURESH APPROVED: R SESHAGIRI
ZONE	SHEET 2 OF 2 IS ADDED. NOTES ADDED, MODIFIED AND DELETED IN FIGURE–X, Xa, Xb, Xc AND STYLE–P	
REV 03	10.04.13	ALTERED: M.R.K APPROVED: C.K.N
ZONE	FIG.Xb AND FIG.Xc ADDED. IN FIG.X, NOTE 01 MODIFIED. IN FIG.Xa,STY–Pa,FIG.Z, P92 MATERIAL ADDED	
REV 02	10.01.13	ALTERED: M.R.K APPROVED: C.K.N
ZONE	IN FIG.Xa, NOTE 04 ADDED. GENERAL NOTES 03 ADDED. IN FIG.Xa, 8MM OD MISMATCH IS REMOVED	
REV 01	11.05.04	ALTERED: R.SENDHIL APPROVED: A.VELAYUTHAM
ZONE	PROJECT NAME REMOVED AND STANDARD INCORPORATED IN TITLE BLOCK	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

01 STANDARD

BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS

	NAME	SIGN	DATE
DRN	K.B.RAGUNATH		11.10.01
CHD	M.C.SEKARAN		11.10.01
APPD	A.VELAYUTHAM		11.10.01

NO OF ITEMS

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

TITLE: EDGE PREPARATION DETAILS

CARD CODE: U 01

DRAWING No. 3-80-300-19825 SHEET 1 OF 2

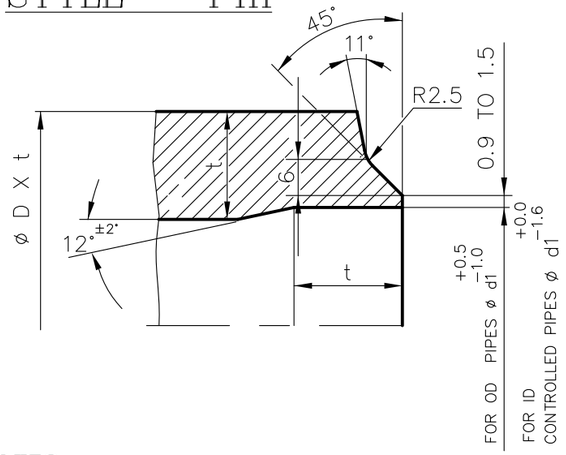
REV 04

SIZE A3

EP1

DRAWING No. 3-80-300-19825

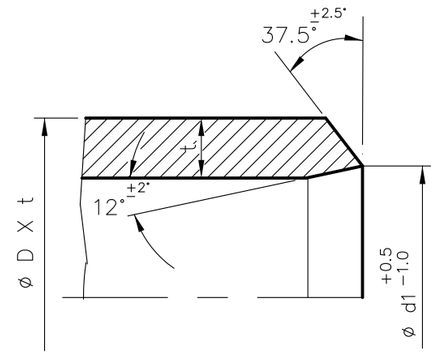
STYLE – Pm



NOTES: –

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

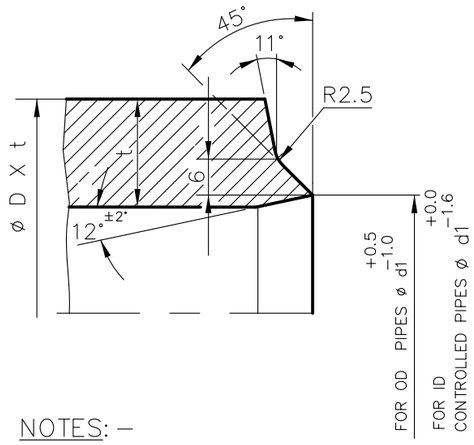
STYLE – D_L



NOTES: –

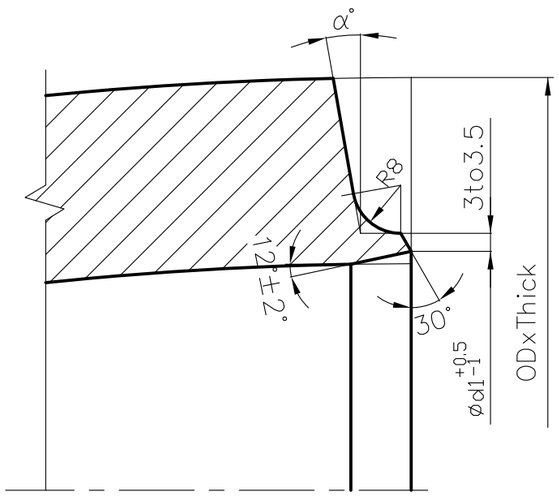
01. USE FOR P91 / P92 PIPES AND FITTINGS WHEN t < 14.2 mm (ALL OD/ID).

STYLE – P_L



NOTES: –

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



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

FIGURE–Xf

NOTE :

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

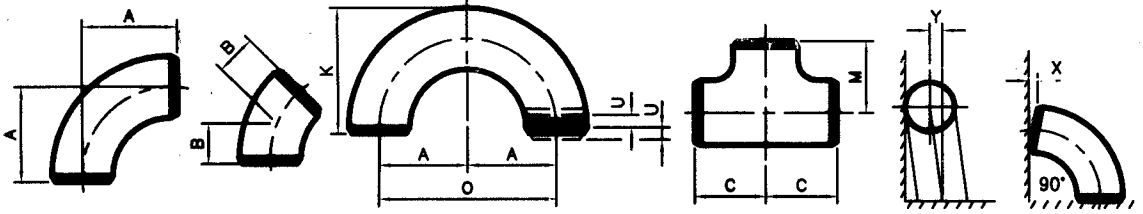
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	STANDARD					
BHARAT HEAVY ELECTRICALS LTD., PIPING CENTRE, MADRAS		NAME	SIGN	DATE	NO OF ITEMS
	DRN	P SURESH		07.12.16	
	CHD	R SESHAGIRI		07.12.16	
	APPD	C KARUNAKARAN		07.12.16	
DEPT. / CODE	GRADE OF UN TOL. DIM: C/M/F	SCALE	WEIGHT (Kg).	NAME OF ORIGINAL ORGANISATION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

SIZE A3

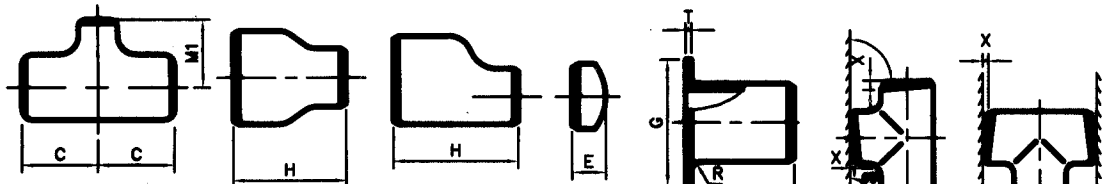
REV	DATE	ALTERED
01	05.02.05	APPROVED APMK

TITLE BLOCK AND DRAWING ALTERED

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



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



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

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

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

NOTES : 1. ALL DIMENSIONS ARE IN MILLIMETRES

STANDARD

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE
CHENNAI 600 017

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

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

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

Size A4

V1A4