

TENDER DETAILS

ENQUIRY No.	14025000002	ENQUIRY DATE	14.02.2025
DESCRIPTION	<i>Supply of Forged Finned Elbows as per TDC 404 Rev 19, BHEL Drawings and specification SA182F12CL2</i>	DUE DATE	14.03.2025

Item Sl. No.	Material Code	Description	Quantity	Unit
10	921042290000	FORGED ELBOW OD33.4 X 5.59 - OD38.1 X 8.13 TF AS PER DRG.3-06-735-12710 AND SPECIFICATION SA182F12CL2	3878	Numbers
20	921042570000	FORGED ELBOW OD33.4 X 5.59 - OD38.1 X 8.13 TF AS PER DRG.3-06-735-12711 AND SPECIFICATION SA182F12CL2	56	Numbers
30	921042580000	FORGED ELBOW OD33.4 X 5.59 - OD38.1 X 8.13 TF AS PER DRG.3-06-735-12712 AND SPECIFICATION SA182F12CL2	56	Numbers
40	921045210000	FORGED ELBOW OD41.3 X 7.8 - OD38.1 X 7.11 SF AS PER DRG.3-06-000-20086 AND SPECIFICATION SA182F12CL2	3934	Numbers
50	921044680000	FORGED ELBOW -TF- D33.4X5.59 - D38.1X8.13 AS PER DRG.3-06-000-19767 REV 01 WITH CREEP TEST AND SPECIFICATION SA182F12CL2	3336	Numbers
60	921044750000	FORGED ELBOW -TF- D33.4X5.59 - D38.1X8.13 ASPER DRG.3-06-000-19768 REV 01 WITH CREEP TEST AND SPECIFICATION SA182F12CL2	48	Numbers
70	921045140000	FORGED ELBOW -TF- D33.4X5.59 - D38.1X8.13 AS PER DRG.3-06-000-19769 REV 01 WITH CREEP TEST AND SPECIFICATION SA182F12CL2	48	Numbers
80	921044630000	FORGED ELBOW -SF- D38.1X6.6 AS PER DRG.3-06-000-19766 REV 01 WITH CREEP TEST AND SPECIFICATION SA182F12CL2	3384	Numbers

Specification, Size & Quantity:

- All the Forged Finned Elbows are to be supplied fully meeting the applicable **TDC 404 Rev 19, BHEL Drawings and Specification**. If there is any deviation, the same should be mentioned clearly in the offer itself.
- Burst Test is required for all the tendered items.
- Creep test to be done as per [SIP:RM:01 Rev.03](#) as mentioned in the drawings. Creep testing parameter will be same as that of SA 213 T12 in [SIP:RM:01 Rev.03](#).
- Forged Finned Elbows as shown in the drawings, is a single integral forged unit. Forging the Elbows separately and joining with fins by welding is not acceptable.

- e) **Confirmation for Pre-Qualification Requirements (PQR) along with all necessary documents shall be submitted.**
- f) Supply of Forged Finned Elbows shall be as per latest IBR amendment.
- g) Inspection by CBB-IBR inspection authority at supplier works and BHEL QC at BHEL Trichy.
- h) Ends shall be protected with suitable End covers.
- i) Quantity shall be as given in enquiry.

Note: The splitting shall be done in the ratio of 60:40 for only item no 10,40,50 & 80. In case of any MSE vendor coming under the price band of "L1+15%" and if quoted bidder is L3 or above, then 25% shall be ordered on the MSE vendor subject to accepting the L1 rate. In this case, the remaining 75% of the quantity shall be splitted in 60:40 ratios between L1 & L2. In case of more than one MSE vendor coming under the price band of "L1+15%", the quantity (25%) shall be shared proportionately, among the MSE vendors. (If MSE vendor becomes L1/L2 within the splitted ratio, the 25% earmarking provision is not applicable).

BHARAT HEAVY ELECTRICALS LIMITED, TRICHY-14
MATERIALS MANAGEMENT

PQR: MM/RM Planning/C&F/ CFFFE

Date: 16.07.2024

Pre-Qualification requirements (PQR) for the procurement of SA182F12CL2 Forged Finned Elbows through Open Tender (as per TDC: 0:404/19)

Note- Vendor to indicate nature of firm i.e. Manufacturer or Trader/Stockist. Offer will be evaluated based on the PQR for respective category.

PQR for Manufacturer:

<u>S.No</u>	<u>Pre-Qualification Conditions</u>	<u>Bidder's Confirmation</u>
A)	<u>Organizational Capability:</u>	
1	Manufacturers having manufacturing facilities for Forged Finned Elbows are only eligible to participate. Offer from fabricators is not acceptable and will not be considered for evaluation. Vendor to indicate the nature of the firm. Product catalogue shall be submitted.	
2	Suppliers shall submit list of machineries, testing facilities & valid calibration certificate for heat treatment facilities that are available in-house. Suppliers without basic manufacturing facilities in-house, shall not be considered for evaluation. In-house facilities for Heat treatment are mandatory requirement for consideration of the offer.	
3	Source of raw material for the manufacturing shall be from IBR approved well known steel maker or certified by IBR approved inspecting authority (Form-IV / Form III G to be attached). The supplier shall confirm that the raw material test certificate/s will be furnished along with product test certificate/s.	
4	Chemical, Mechanical testing shall be done in house or at Labs certified as per ISO 17025 or Government approved labs.	
5	Suppliers shall submit a valid ISO 9001 certificate or Quality management system certificate or Written down procedure.	
6	BHEL/End customer reserve the right to inspect the item ordered at any stage at vendor's works and if found not meeting the stipulated conditions, material is liable for rejection.	
7	BHEL/End customer reserves the right to inspect the first lot of materials at vendor's works for giving clearance before bulk production.	
8	BHEL reserves the right to visit supplier's works to audit and inspect to ensure the capability for technical evaluation.	

BHARAT HEAVY ELECTRICALS LIMITED, TRICHY-14
MATERIALS MANAGEMENT

PQR: MM/RM Planning/C&F/ CFFFE

Date: 16.07.2024

Pre-Qualification requirements (PQR) for the procurement of SA182F12CL2 Forged Finned Elbows through Open Tender (as per TDC: 0:404/19)

B)	<u>Technical Competence:</u>	<u>Bidder's Confirmation</u>
1	Point by point confirmation to the TDC requirements is mandatory for consideration of offer and signed TDC shall be submitted.	
2	Supply of Forged Finned Elbows shall be as per BHEL TDC, applicable BHEL Drawings and Specification/standard.	
3	Supplier shall confirm creep test and burst test requirements for forged finned elbows as indicated in tender.	
C)	<u>Past Experience/ Performance:</u>	
1	Suppliers shall have supplied forged finned elbows in the tendered specification.	
2	Details of supplies made in recent past detailing the quantity, Specification, size & customer details, year wise along with the unpriced PO copies, proof of supply (such as invoice, bill of lading copies and test certificates) in Alloy steel either in Gr 12 / Gr 22 / Gr 91 shall be submitted	
D)	<u>Financial Soundness:</u>	
1	Indigenous suppliers shall submit Audited copies of annual reports (Balance Sheets), Profit & Loss statement for last 3 years (or from date of incorporation whichever is less). Proprietary and partnership firms shall submit IT returns for last 3 years (or from date of incorporation whichever is less).	

Note:

- Necessary supporting documents shall be submitted for meeting each of the above Pre-Qualification Criteria for evaluation of the offers.
- BHEL reserves the right to consider/Not-consider the offers based on the evaluation of documents submitted for the above Pre-Qualification Criteria. BHEL also reserves the right to have on-site assessment of the facilities at supplier's works during the bid evaluation.

RAKESH
MALIK

Digitally signed by
RAKESH MALIK
Date: 2024.07.16
08:53:29 +05'30'

 16/07/24

Dr. T. SRIHARSHA
MANAGER
QUALITY ASSURANCE
BHEL, TRICHY - 620 014

BHARAT HEAVY ELECTRICALS LIMITED, TRICHY-14
MATERIALS MANAGEMENT

PQR: MM/RM Planning/C&F/ CFFFE

Date: 16.07.2024

Pre-Qualification requirements (PQR) for the procurement of SA182F12CL2 Forged Finned Elbows through Open Tender (as per TDC: 0:404/19)

PQR for Trader/Stockist:

<u>S.No</u>	<u>Pre-Qualification Conditions</u>	<u>Bidder's Confirmation</u>
1	Trader/Stockist shall submit a valid ISO 9001 certificate or Quality Assurance Manual.	
2	Trader/Stockist shall supply materials only as per BHEL TDC No 404/Rev19 and BHEL drawings.	
3	Trader/Stockist shall specify the sources of procurement in the offer for BHEL review.	
4	For projects calling for specific customer approval, acceptance of offers is subject to customer approval and meeting of any other applicable customer specific requirements such as QP etc.	
5	Mill TC & IBR forms shall be submitted only by manufacturers (not by trader/stockist).	
6	Source of raw material for the manufacturing shall be from IBR approved well known steel maker or certified by IBR approved inspecting authority (Form-IV / Form III G to be attached). The supplier shall confirm that the raw material test certificate/s will be furnished along with product test certificate/s.	
7	Trader/Stockist shall submit Guarantee Certificate.	
8	(a) In case of material supplied from stock, applicable Test certificates shall be sent along with offer. Offer will be accepted based on review and acceptance of test certificates. Further, Pre despatch inspection (Visual, Chemical & Mechanical) will be carried out by BHEL/ BHEL TPIA at warehouse. (b) For Stocked material > 6 months based on TC date, the representative sample (each size/material grade) shall be tested at NABL accredited lab for surface contamination & pitting in addition to 100% visual examination. The above tests/examinations will be witnessed by BHEL/BHEL TPIA. BHEL reserves the right to accept/reject the material based on test reports. (c) BHEL PO, BHEL TDC, Rev. no., shall be mentioned separately by the stockist/trader in the TC/IBR form. Also, the TC/IBR form shall indicate "BHEL", as the customer.	

BHARAT HEAVY ELECTRICALS LIMITED, TRICHY-14
MATERIALS MANAGEMENT

PQR: MM/RM Planning/C&F/ CFFFE

Date: 16.07.2024

Pre-Qualification requirements (PQR) for the procurement of SA182F12CL2 Forged Finned Elbows through Open Tender (as per TDC: 0:404/19)

<u>S.No</u>	<u>Pre-Qualification Conditions</u>	<u>Bidder's Confirmation</u>
9	a) In case of material manufactured and supplied after placement of order, applicable Test certificates shall be sent before despatch of material. Despatch clearance will be given only after review and acceptance of test certificates. (b) BHEL PO, BHEL TDC, Rev. no., shall be mentioned in the TC/IBR form. Also, the TC/IBR form shall indicate "BHEL", as the customer.	
10	Creep & burst tests are mandatory for all cases. Creep test & Burst test report shall be submitted along with finished jobs.	
11	Trader/Stockist shall provide replacement of material at BHEL shop/project Site in case of any non-conformance in the supplied material.	
12	Trader/Stockist shall have supplied the forgings item in alloy steel either in Gr12/Gr22/Gr91 in the last 5 years.	
13	Supply credentials in the recent past like unpriced PO copies with corresponding proof of supply such as invoice/LR, test certificates, creep & burst test report shall be submitted.	
14	Trader/Stockist shall submit copies of annual reports (balance sheets), profit & Loss Statement for the last three years (or from date of incorporation whichever is less) and GST Certificate.	

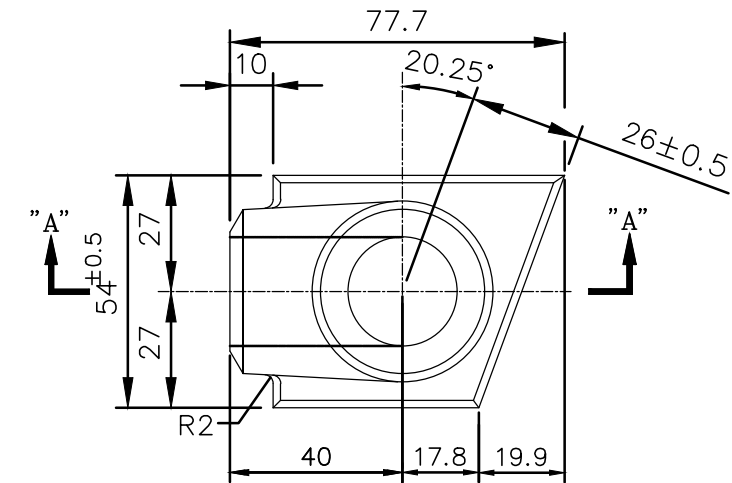
Note:

- Necessary supporting documents shall be submitted for meeting each of the above Pre-Qualification Criteria for evaluation of the offers.
- BHEL reserves the right to consider/Not-consider the offers based on the evaluation of documents submitted for the above Pre-Qualification Criteria. BHEL also reserves the right to have on-site assessment of the facilities at supplier's works during the bid evaluation.

RAKESH MALIK
Digitally signed by
RAKESH MALIK
Date: 2024.07.16
08:54:05 +05'30'

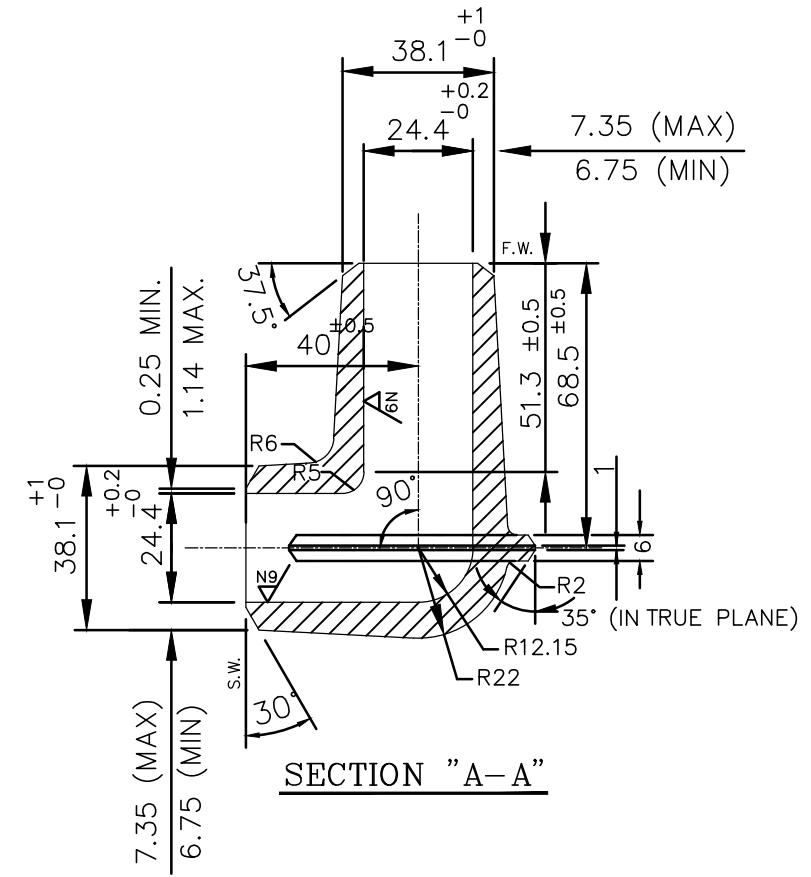

Dr. T. SRIHARSHA
MANAGER
QUALITY ASSURANCE
BHEL, TRICHY - 620 014

16/07/24



F-02F (FRONT)
F-08F (REAR)
F-17F (SIDES)

TYPICAL FORGED ELBOW FOR FURNACE
SPIRAL SIDEWALLS, REAR WALL & FRONT WALL

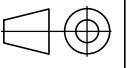


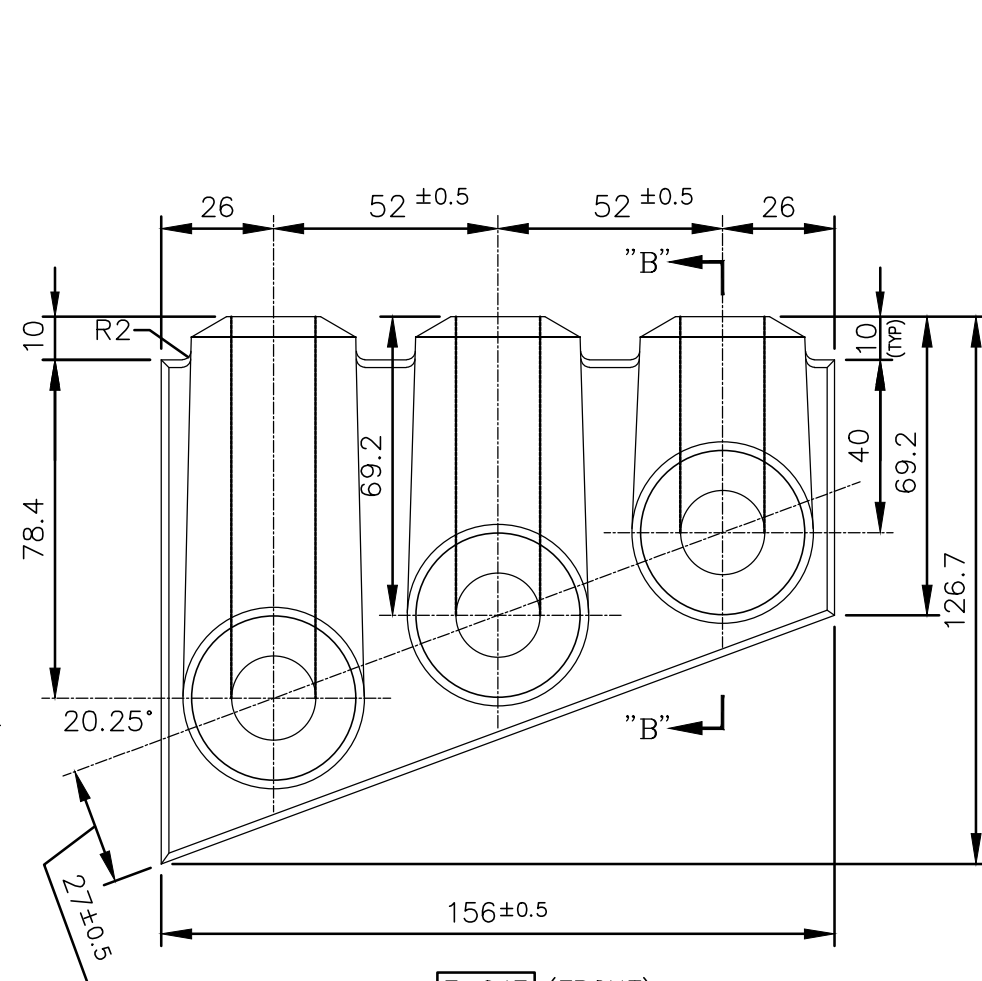
SECTION "A-A"

NOTES:

1. MATERIAL: SA-182 F12, CL2(ATTEST)
2. EXAMINATION:
100% CHECK FOR MATERIAL INCLUSIONS
100% HARDNESS TEST
100% MAGNETIC PARTICLE TEST
100% STAMPING BY SHOP Q.C.
IMPACT TEST AND TENSILE TEST
3. FINISH MUST BE WELDABLE PAINTING
4. THE RULES FOR CONSTRUCTION OF FORGED ELBOWS
SHALL COMPLY TO THE ASME POWER BOILER
CODE SECTION I.
5. BURST TESTS WILL BE REQUIRED PER ASME 2007
SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
6. QUANTITIES REQUIRED TO BE 564 PER UNIT
7. F.W. = FIELD WELD
S.W. = SHOP WELD
8. DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
9. DESIGN PRESSURE : 326.8 kg/cm²(g).
DESIGN TEMPERATURE : 438 °C
10. MATERIAL CODE : 921044630000
11. CREEP TEST TO BE DONE AS PER SIP:RM:01/ LATEST REVISION.

REV	DATE	ALTERED : T.SHYJU
01	15.03.24	CHD & APPD:R.SAI KUMAR
ZONE	NOTE-11 ADDED.	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT							
		 355-055	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME R.SAI KR	SIGNATURE	DATE 06.03.24	
			DEPT PP	ALL DIMENSIONS ARE IN MM	PROJECTION 	SCALE N.T.S	WEIGHT (Kg) 0.625	REF TO ASSY / OLD DWG 3-06-734-05679/02	
			CODE 121					DRAWING NO : 3-06-000-19766	
		TITLE FORGED ELBOW (D38.1X6.6)							

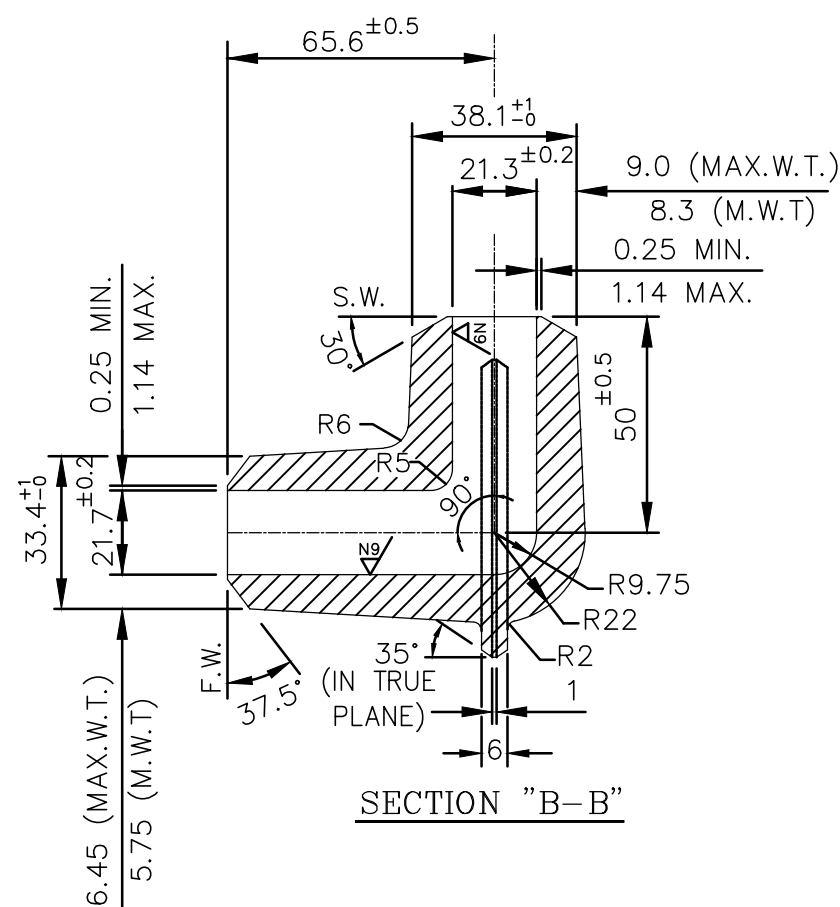


F-04F (FRONT)

F-10F (REAR)

F-19F (SIDES)

TYP FORGED ELBOW FOR
FURNACE VERTICAL FRONT,
REAR & SIDEWALLS



SECTION "B-B"

NOTES:

1. MATERIAL: SA-182 F12, CL2(ATTEST)
2. EXAMINATION:
100% CHECK FOR MATERIAL INCLUSIONS
100% HARDNESS TEST
100% MAGNETIC PARTICLE TEST
100% STAMPING BY SHOP Q.C.
IMPACT TEST AND TENSILE TEST
3. FINISH MUST BE WELDABLE PAINTING
4. THE RULES FOR CONSTRUCTION OF FORGED ELBOWS SHALL COMPLY TO THE ASME POWER BOILER CODE SECTION I.
5. BURST TESTS WILL BE REQUIRED PER ASME 2007 SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
6. F.W. = FIELD WELD
S.W. = SHOP WELD
7. QUANTITIES REQUIRED TO BE 556 PER UNIT
8. DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
9. DESIGN PRESSURE: 326.8 kg/cm² (g)
DESIGN TEMPERATURE: 438 °C
10. MATERIAL CODE : 921044680000
11. CREEP TEST TO BE DONE AS PER SIP:RM:01/
LATEST REVISION.

REV	DATE	ALTERED : T.SHYJU
01	15.03.24	CHD & APPD: R.SAI KUMAR
ZONE	NOTE-11 ADDED.	

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

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT PP
CODE 121

ALL
DIMENSIONS
ARE IN MM

PROJECTION
SCALE

N.T.S

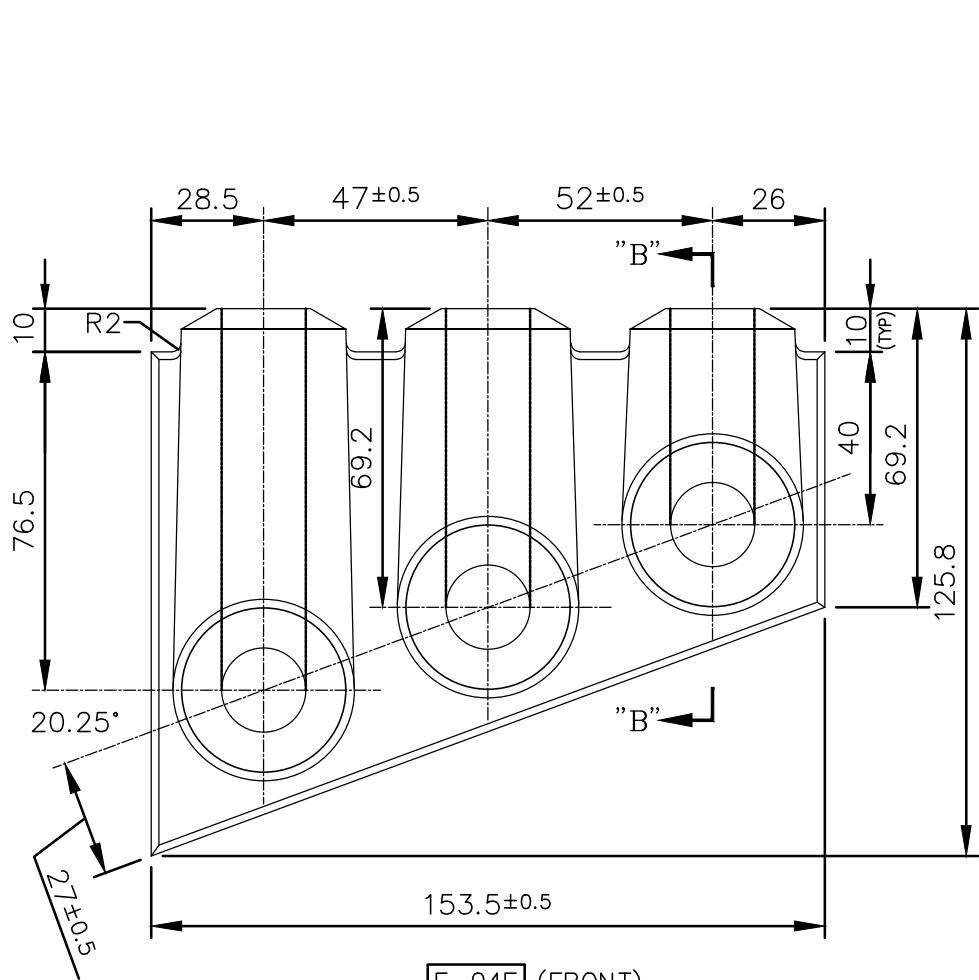
WEIGHT (Kg)
2.100

REF TO ASSY / OLD DWG
3-06-734-05680/02

TITLE
FORGED ELBOW
(D33.4 X 5.59/D38.1 X 8.13)

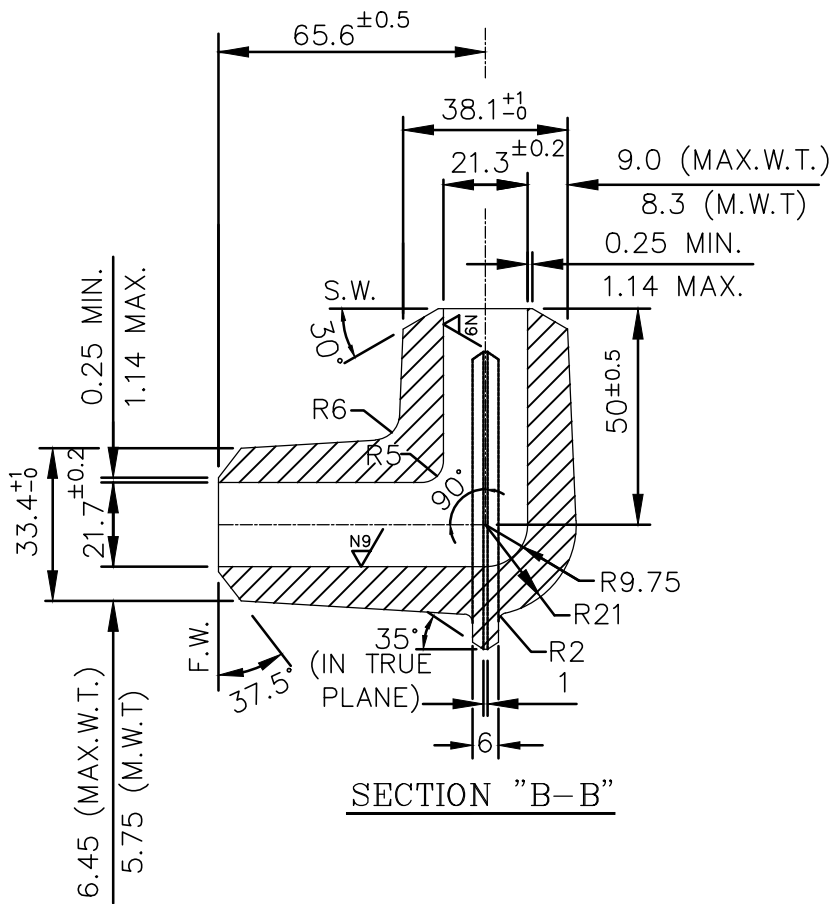
DRAWING NO :
3-06-000-19767

REV
01



F-04F (FRONT)
F-10F (REAR)
F-19F (SIDES)

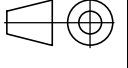
TYP FORGED ELBOW FOR
FURNACE VERTICAL FRONT,
REAR & SIDEWALLS



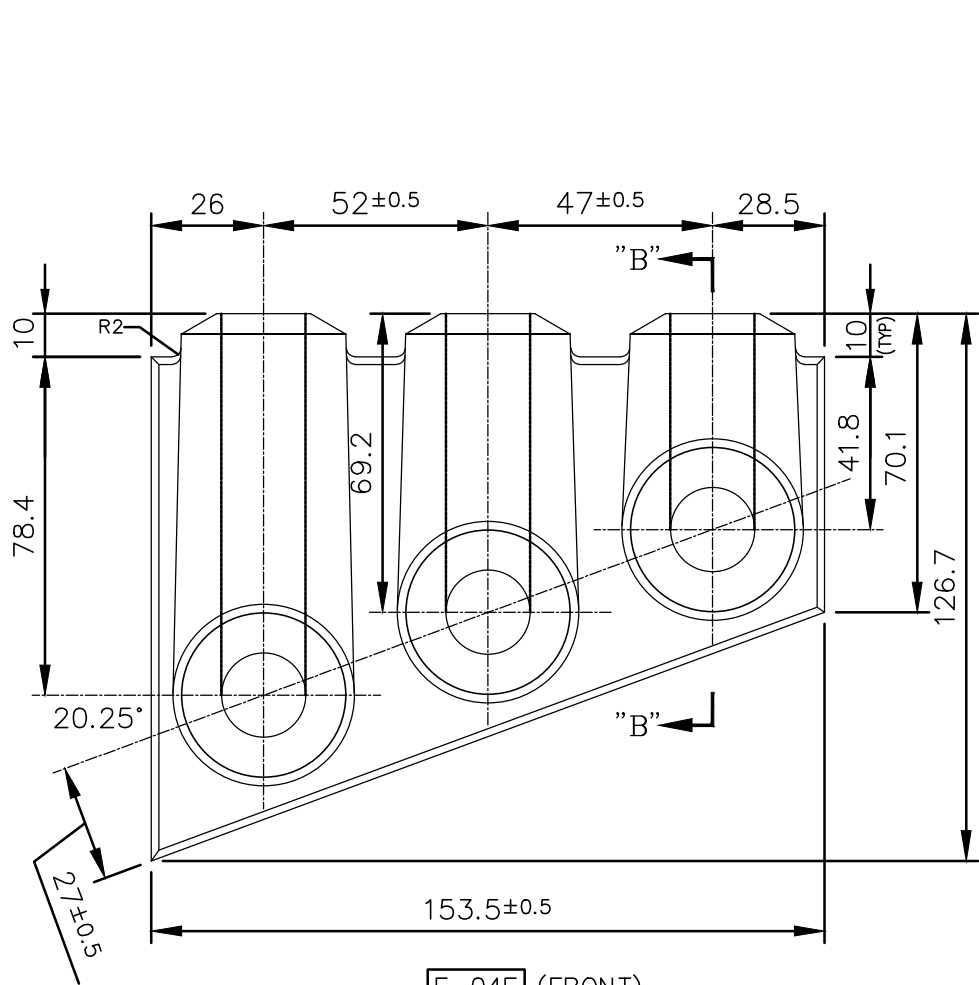
NOTES:

- MATERIAL: SA-182 F12, CL2(ATTEST)
- EXAMINATION:
100% CHECK FOR MATERIAL INCLUSIONS
100% HARDNESS TEST
100% MAGNETIC PARTICLE TEST
100% STAMPING BY SHOP Q.C.
IMPACT TEST AND TENSILE TEST
- FINISH MUST BE WELDABLE PAINTING
- THE RULES FOR CONSTRUCTION OF FORGED ELBOWS SHALL COMPLY TO THE ASME POWER BOILER CODE SECTION I.
- BURST TESTS WILL BE REQUIRED PER ASME 2007 SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
- F.W. = FIELD WELD
S.W. = SHOP WELD
- QUANTITIES REQUIRED TO BE 8 PER UNIT
- DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
- DESIGN PRESSURE: 326.8 kg/cm² (g)
DESIGN TEMPERATURE: 438 °C
- MATERIAL CODE : 921044750000
- CREEP TEST TO BE DONE AS PER SIP:RM:01/
LATEST REVISION.

REV	DATE	ALTERED : T.SHYJU
01	15.03.24	CHD & APPD:R.SAI KUMAR
ZONE	NOTE-11 ADDED.	

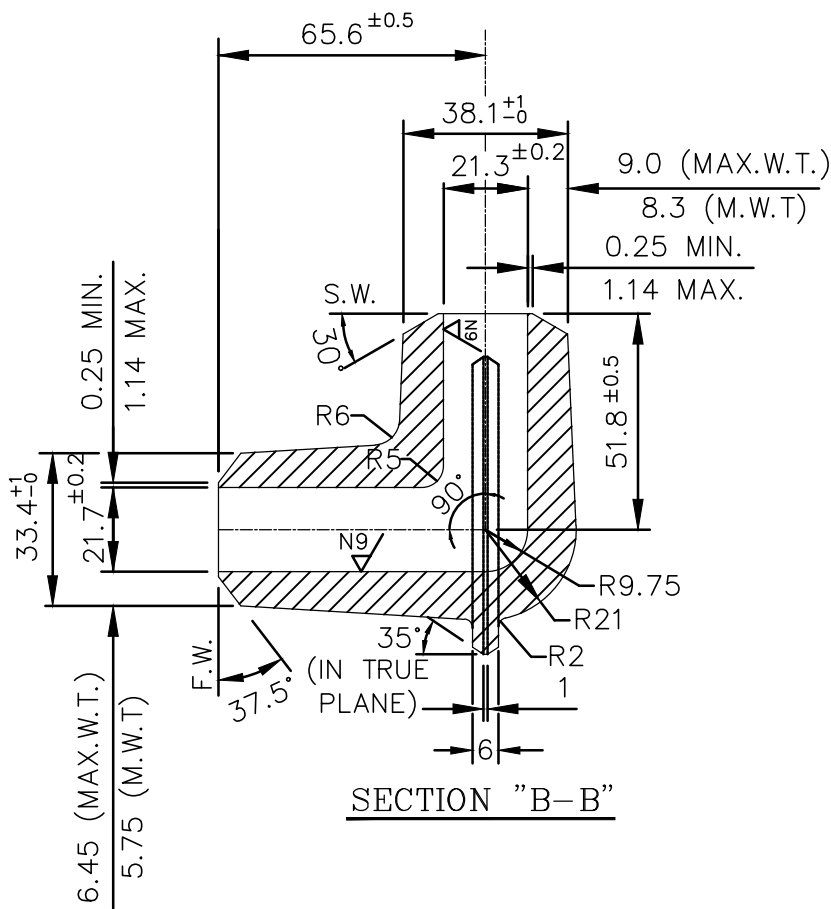
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
 355-055		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014				DRN	NAME R.SAI KR	SIGNATURE	DATE 06.03.24
						CHD	R.SAI KR		06.03.24
						APPD	N.NIRMAL		07.03.24
DEPT PP	ALL DIMENSIONS ARE IN MM	PROJECTION 	SCALE N.T.S	WEIGHT (Kg) 2.100	REF TO ASSY / OLD DWG 3-06-734-05682/02				
CODE 121	TITLE FORGED ELBOW (D33.4 X 5.59/D38.1 X 8.13)				DRAWING NO : 3-06-000-19768			REV 01	

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



F-04F (FRONT)
F-10F (REAR)
F-19F (SIDES)

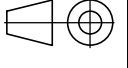
TYP FORGED ELBOW FOR
FURNACE VERTICAL FRONT,
REAR & SIDEWALLS



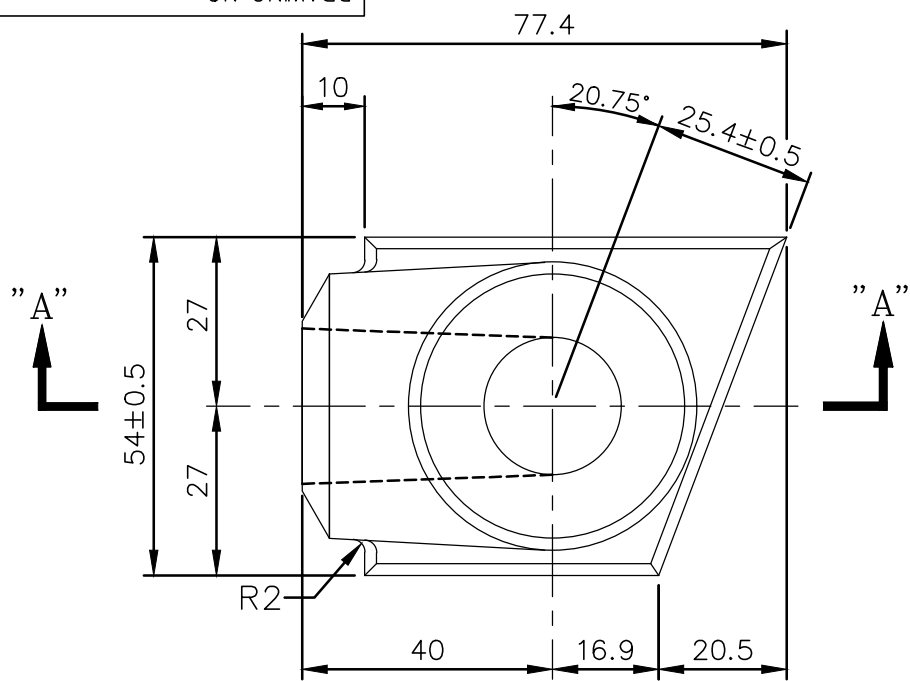
NOTES:

- MATERIAL: SA-182 F12, CL2(ATTEST)
- EXAMINATION:
100% CHECK FOR MATERIAL INCLUSIONS
100% HARDNESS TEST
100% MAGNETIC PARTICLE TEST
100% STAMPING BY SHOP Q.C.
IMPACT TEST AND TENSILE TEST
- FINISH MUST BE WELDABLE PAINTING
- THE RULES FOR CONSTRUCTION OF FORGED ELBOWS SHALL COMPLY TO THE ASME POWER BOILER CODE SECTION I.
- BURST TESTS WILL BE REQUIRED PER ASME 2007 SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
- F.W. = FIELD WELD
S.W. = SHOP WELD
- QUANTITIES REQUIRED TO BE 8 PER UNIT
- DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
- DESIGN PRESSURE: 326.8 kg/cm² (g)
DESIGN TEMPERATURE: 438 °C
- MATERIAL CODE : 921045140000
- CREEP TEST TO BE DONE AS PER SIP:RM:01/
LATEST REVISION.

REV	DATE	ALTERED : T.SHYJU
01	15.03.24	CHD & APPD: R.SAI KUMAR
ZONE	NOTE-11 ADDED.	

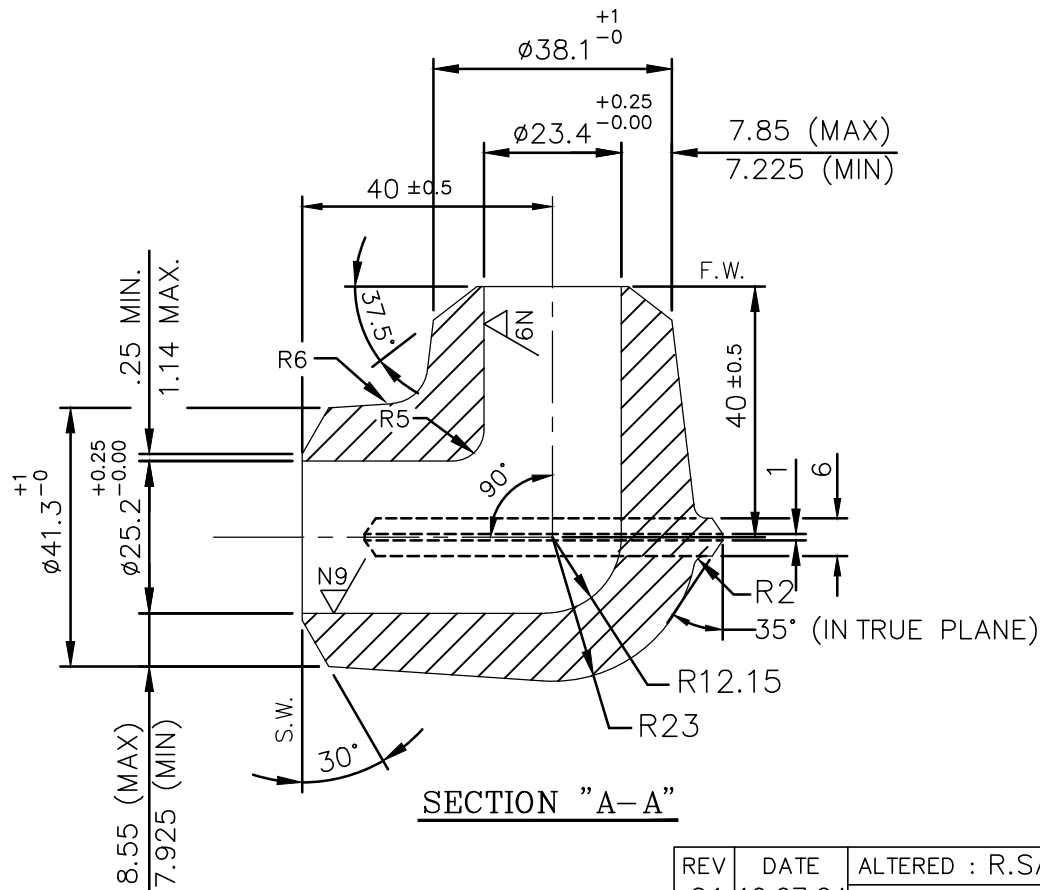
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
 355-055		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014				DRN	NAME R.SAI KR	SIGNATURE	DATE 06.03.24
						CHD	R.SAI KR		06.03.24
						APPD	N.NIRMAL		07.03.24
DEPT PP	ALL DIMENSIONS ARE IN MM	PROJECTION 	SCALE N.T.S	WEIGHT (Kg) 2.100	REF TO ASSY / OLD DWG 3-06-734-05681/02				
CODE 121	TITLE FORGED ELBOW (D33.4 X 5.59/D38.1 X 8.13)				DRAWING NO : 3-06-000-19769			REV 01	

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



F-02F (FRONT)
F-08F (REAR)
F-17F (SIDE)

TYPICAL FORGED ELBOW FOR FURNACE
SPIRAL SIDEWALLS, REAR WALL & FRONT WALL



SECTION "A-A"

REV	DATE	ALTERED : R.SAI KR
01	10.07.24	CHD & APPD: R.SAI KR
ZONE	DESIGN PARAMETERS UPDATED.	

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

NOTES:

- MATERIAL: SA-182 F12, CL2(ATTEST)
- EXAMINATION:
100% CHECK FOR MATERIAL INCLUSIONS
100% HARDNESS TEST
100% MAGNETIC PARTICLE TEST
100% STAMPING BY SHOP Q.C.
IMPACT TEST AND TENSILE TEST
- FINISH MUST BE WELDABLE PAINTING
- THE RULES FOR CONSTRUCTION OF FORGED ELBOWS SHALL COMPLY TO THE ASME POWER BOILER CODE SECTION I.
- BURST TESTS WILL BE REQUIRED PER ASME 2007 SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
- QUANTITIES REQUIRED TO BE 542 PER UNIT
- F.W. = FIELD WELD
S.W. = SHOP WELD
- THE DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
- DESIGN PRESSURE : 344.4 kg/cm²(g).
DESIGN TEMPERATURE : 478 °C
- MATERIAL CODE : 921045210000

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT PP
CODE 121

ALL
DIMENSIONS
ARE IN MM

PROJECTION
SCALE

N.T.S

WEIGHT (Kg)
0.590

REF TO ASSY / OLD DWG
3-06-735-12105/00

TITLE

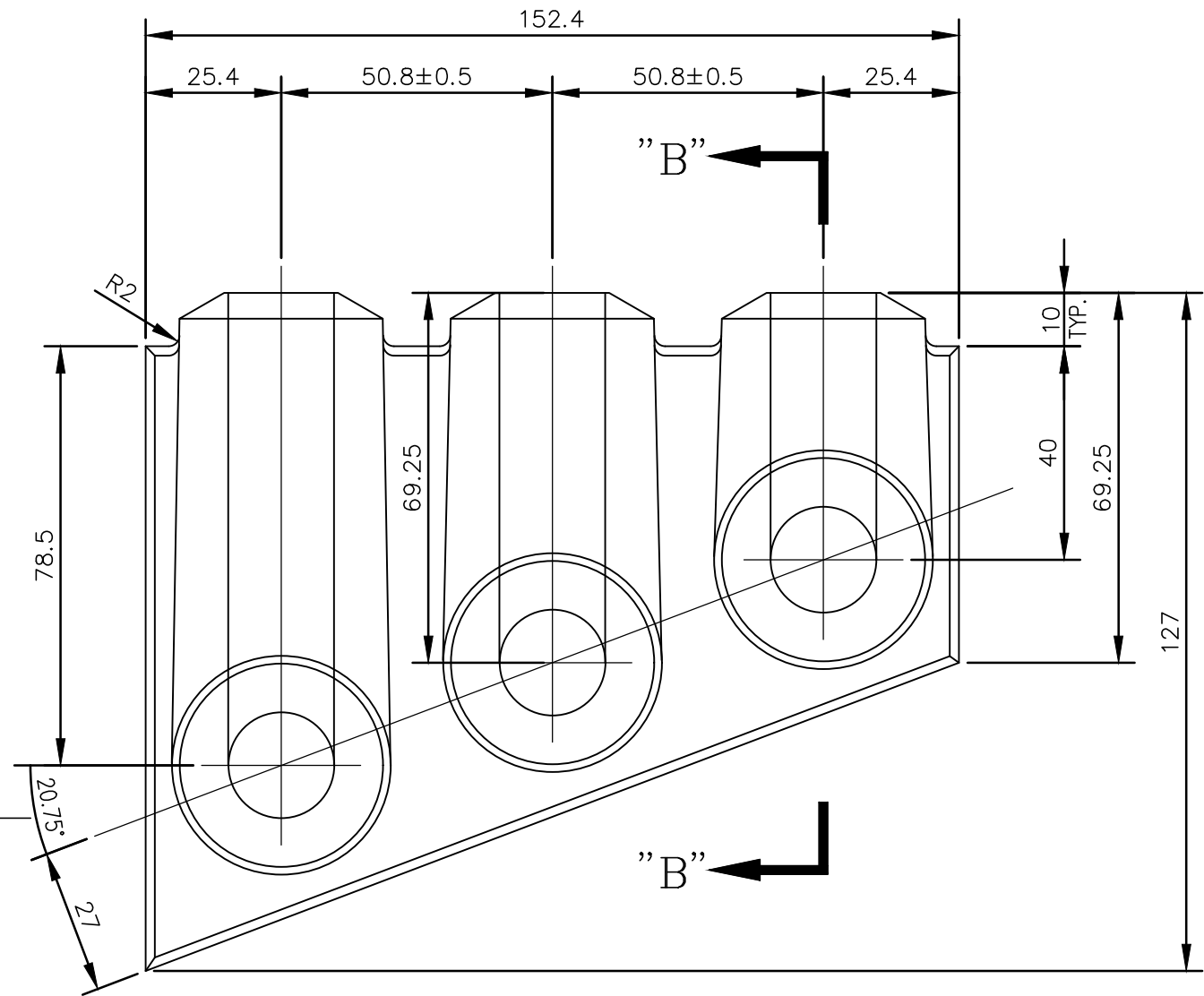
FORGED ELBOW
(ø41.3x7.8/ø38.1x7.11)

DRAWING NO :

3-06-000-20086

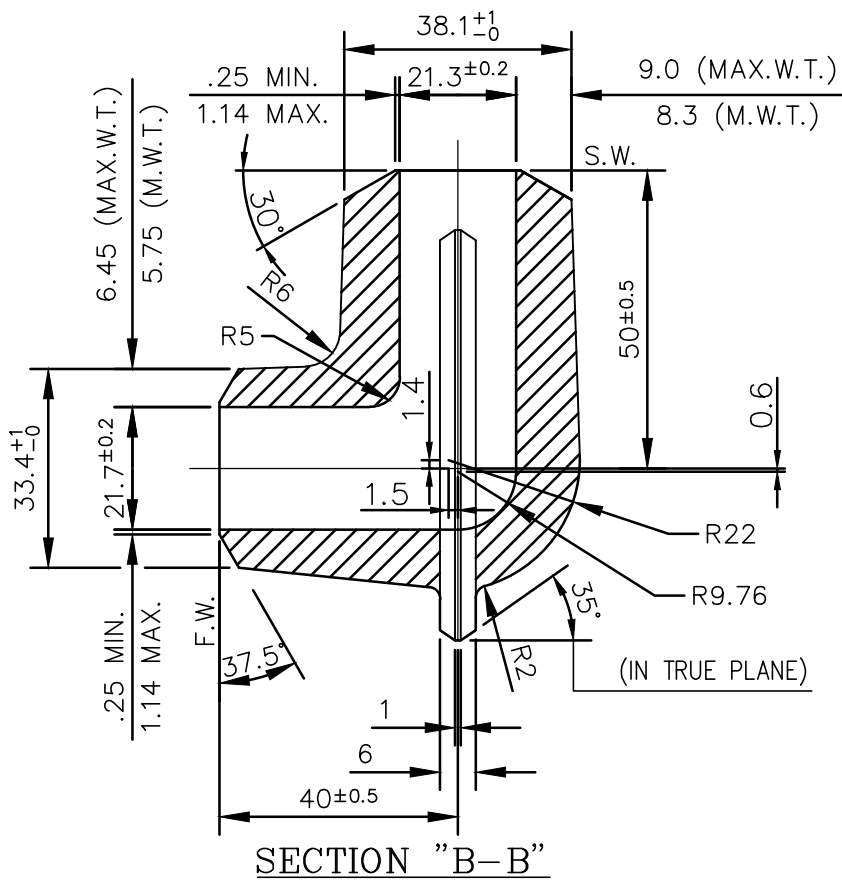
REV

01



- F-04F (FRONT)
- F-10F (REAR)
- F-19F (SIDES)

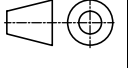
TYPICAL FORGED ELBOW FOR FURNACE VERTICAL
SIDE WALLS, REAR WALL & FRONT WALL



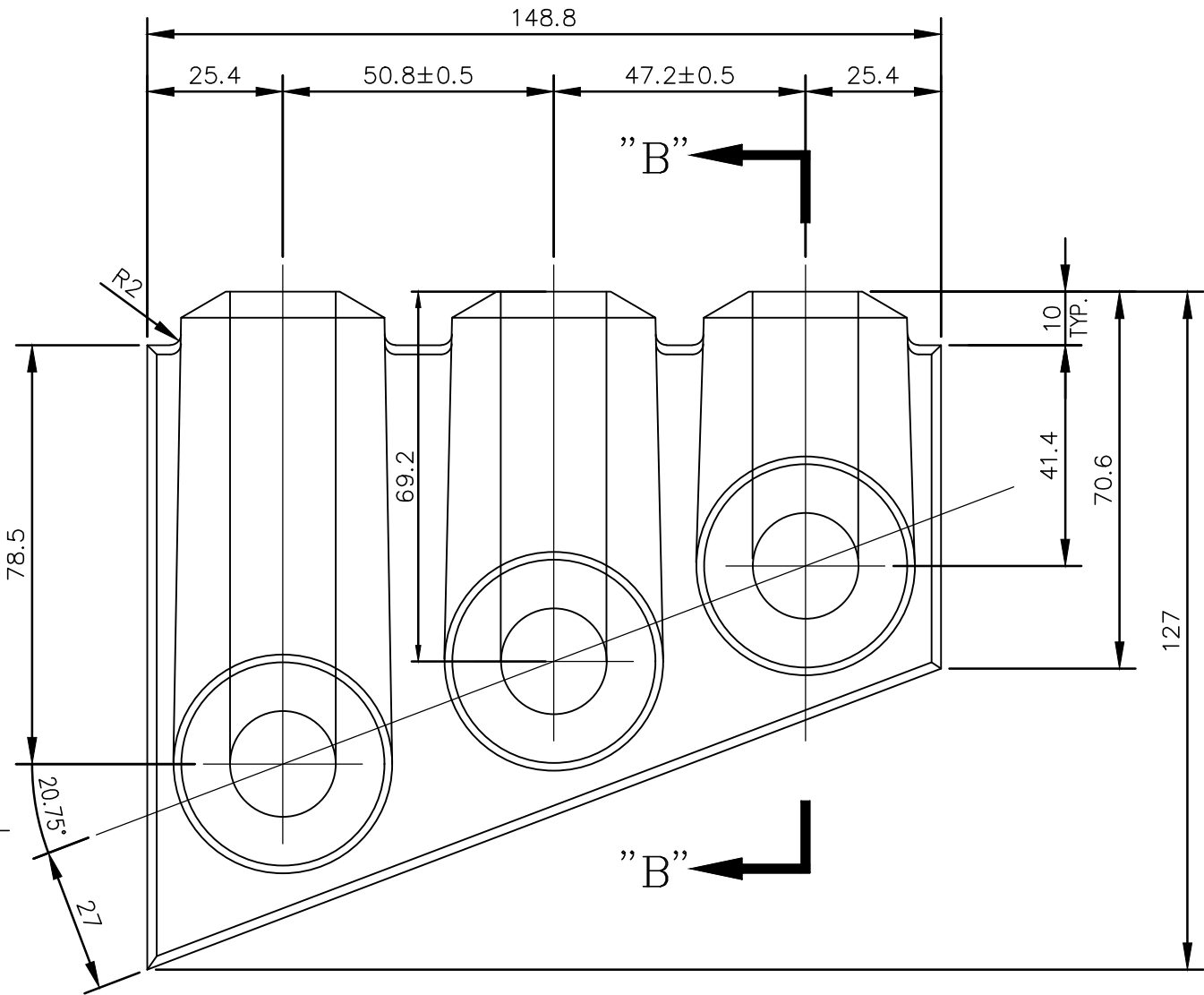
NOTES:

- 1.MATERIAL: SA-182 F12, CL2(ATTEST)
- 2.EXAMINATION:
 - 100% CHECK FOR MATERIAL INCLUSIONS
 - 100% HARDNESS TEST
 - 100% MAGNETIC PARTICLE TEST
 - 100% STAMPING BY SHOP Q.C.
- 3.IMPACT TEST AND TENSILE TEST
- 4.FINISH MUST BE WELDABLE PAINTING
- 5.THE RULES FOR CONSTRUCTION OF FORGED ELBOWS SHALL COMPLY TO THE ASME POWER BOILER CODE SECTION I.
- 6.BURST TESTS WILL BE REQUIRED PER ASME 2007 SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
- 7.QUANTITIES REQUIRED TO BE 552 PER UNIT
- 8.F.W. = FIELD WELD
S.W. = SHOP WELD
- 9.DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
- 10.DESIGN PRESS : 335.9 kg/cm² (g)
DESIGN TEMP : 508 °C
11. MATERIAL CODE : 921042290000

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

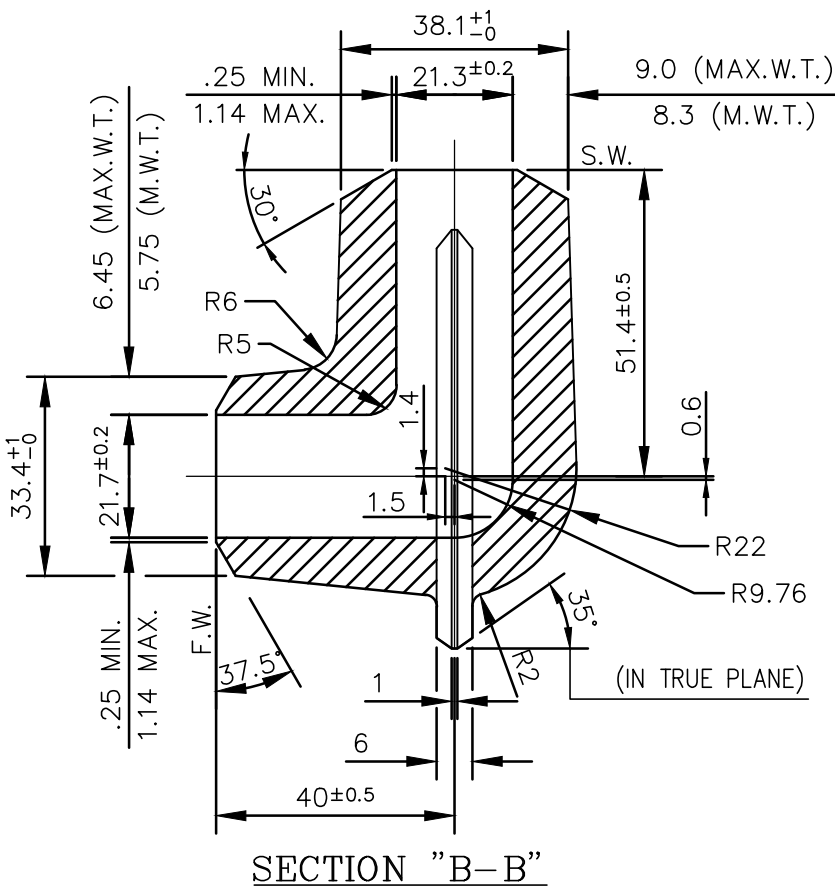
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT						
		 355-055	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	R.SAI KUMAR	SIGNATURE	DATE 19.06.17
					CHD	N.NIRMALRAJ		20.06.17
					APPD	N.KIRUBAKARAN		20.06.17
DEPT PP	ALL DIMENSIONS ARE IN MM	PROJECTION 	SCALE N.T.S	WEIGHT (Kg) 2.420	REF TO ASSY / OLD DWG E2B-000124-1C0901/00			
CODE 121	TITLE FORGED ELBOW (ø33.4x5.59/ø38.1x8.13)				DRAWING NO : 3-06-735-12710		RE 00	





F-04F (FRONT)
F-10F (REAR)
F-19F (SIDES)

TYPICAL FORGED ELBOW FOR FURNACE VERTICAL
SIDE WALLS, REAR WALL & FRONT WALL



NOTES:

- 1.MATERIAL: SA-182 F12, CL2(ATTEST)
- 2.EXAMINATION:
 - 100% CHECK FOR MATERIAL INCLUSIONS
 - 100% HARDNESS TEST
 - 100% MAGNETIC PARTICLE TEST
 - 100% STAMPING BY SHOP Q.C.
- 3.IMPACT TEST AND TENSILE TEST
- 4.FINISH MUST BE WELDABLE PAINTING
- 5.THE RULES FOR CONSTRUCTION OF FORGED ELBOWS SHALL COMPLY TO THE ASME POWER BOILER CODE SECTION I.
- 6.BURST TESTS WILL BE REQUIRED PER ASME 2007 SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
- 7.QUANTITIES REQUIRED TO BE 4 PER UNIT
- 8.F.W. = FIELD WELD
S.W. = SHOP WELD
- 9.DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
- 10.DESIGN PRESS : 335.9 kg/cm² (g)
DESIGN TEMP : 508 °C
11. MATERIAL CODE: 921042570000

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

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

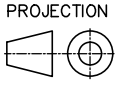
TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT



Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT PP
CODE 121

ALL
DIMENSIONS
ARE IN MM



SCALE
N.T.S

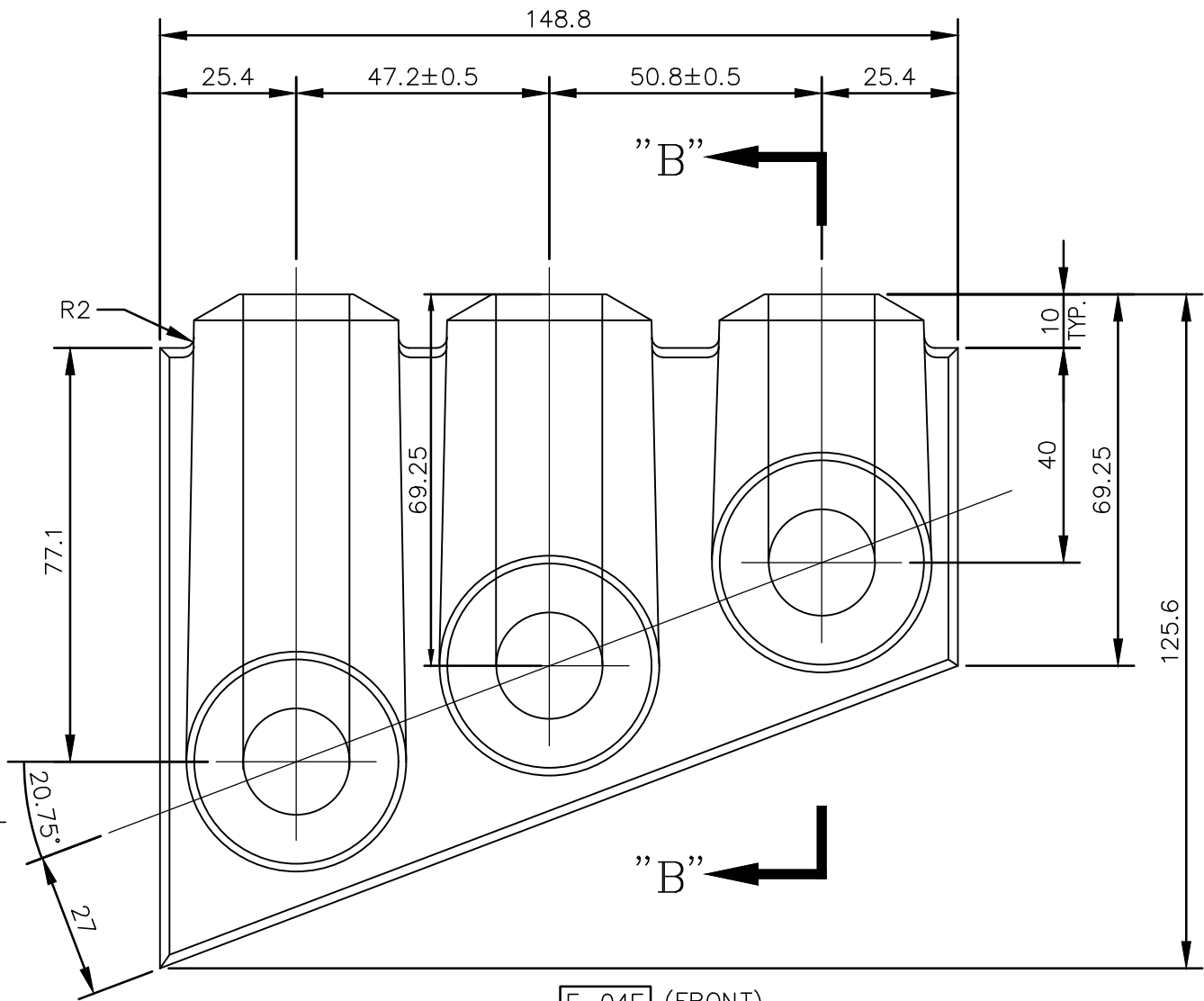
WEIGHT (Kg)
2.420

REF TO ASSY / OLD DWG
E2B-000124-1C0902/00

TITLE
FORGED ELBOW
(ø33.4x5.59/ø38.1x8.13)

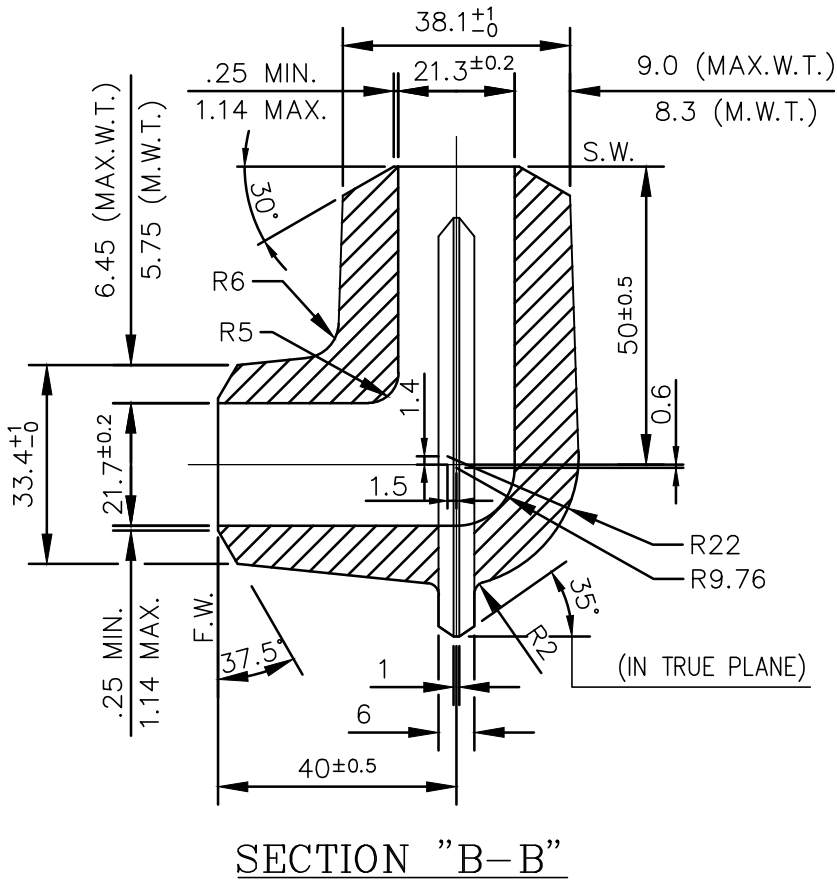
DRAWING NO :
3-06-735-12711
RE 00





F-04F (FRONT)
F-10F (REAR)
F-19F (SIDES)

TYPICAL FORGED ELBOW FOR FURNACE VERTICAL
SIDE WALLS, REAR WALL & FRONT WALL



NOTES:

- 1.MATERIAL: SA-182 F12, CL2(ATTEST)
- 2.EXAMINATION:
 - 100% CHECK FOR MATERIAL INCLUSIONS
 - 100% HARDNESS TEST
 - 100% MAGNETIC PARTICLE TEST
 - 100% STAMPING BY SHOP Q.C.
- 3.IMPACT TEST AND TENSILE TEST
- 4.FINISH MUST BE WELDABLE PAINTING
- 5.THE RULES FOR CONSTRUCTION OF FORGED ELBOWS SHALL COMPLY TO THE ASME POWER BOILER CODE SECTION I.
- 6.BURST TESTS WILL BE REQUIRED PER ASME 2007 SECTION 1, APPENDIX A-22.6.3 BURSTING TEST
- 7.QUANTITIES REQUIRED TO BE 4 PER UNIT
- 8.F.W. = FIELD WELD
S.W. = SHOP WELD
- 9.DESIGN, MANUFACTURE AND INSPECTION AS PER IBR
- 10.DESIGN PRESS : 335.9 kg/cm ² (g)
DESIGN TEMP : 508 °C
- 11.MATERIAL CODE : 921042580000

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

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

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT						
 355-055	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI – 620014		DRN	R.SAI KUMAR	SIGNATURE	DATE 19.06.17
			CHD	N.NIRMALRAJ		20.06.17
			APPD	N.KIRUBAKARAN		20.06.17
DEPT PP	ALL DIMENSIONS ARE IN MM		SCALE N.T.S	WEIGHT (Kg) 2.420	REF TO ASSY / OLD DWG	
CODE 121					E2B-000124-1C0903/00	
TITLE FORGED ELBOW (ø33.4x5.59/ø38.1x8.13)					DRAWING NO : 3-06-735-12712	RE 00



	BHEL – Tiruchirappalli - 620014, India. Quality Assurance Department TECHNICAL DELIVERY CONDITIONS	DOC No: TDC:0:404 Rev: 19 Effective Date: 05/12/2018 Page: 1 of 3
Product: Carbon, Alloy & Stainless Steel Forgings (Boilers And Valves)		

Revisions Record:

Rev 09: New materials F23, F91 & F92 requirements added in Cl.1.0, Cl.2.0, and Cl.4.0 to Cl.6.0. CE marking certification clarity included in Cl.10.

Rev 10: Cl 1:F6a Class 2 added, Code case corrected. Cl 2: Steel makers names removed and requirement for creep testing added as per IBR Reg 4, Cl 4: Tempering temperature and soaking time modified for SA 182 F91, F92 & F23. Cl 4 & 10: Photomicrograph requirement added for F91 & F92 forgings, Cl 2, 6 & 10: modified for SS, Cl 5: Bend test Clarified, Cl 6: Wet MPI added.

Rev 11: Cl 2 Pt 3, 4, 5 modified. Cl 6 – Wet MPI for CS, AS added, Cl 10.1 – IBR Forms indicated

Rev 12: Cl 1, 2, 4, 6 and 7 – requirements for grades SA 182 F1, SA 336 F1, F12, F22 Cl 3 and F91 added (for Neyveli Project). Creep test criteria in-line with BHEL R&D included. Cl 2 Pt 8 modified. Cl 6 Pt 1 – SA388 changed to ASTM A 388 based on ASME Sec II Ed 2013.

Rev 13: Dt: 17/11/2014: Cl 2 Cl 4 Cl 10 Cl 12 modified.

Rev 14: Dt: 06/10/2015: Cl.4.3, 5.2, 5.8, 10.1.b.9 added; Cl 1.0, 2.1, 2.2, 2.3, 4.1, 4.2, 5.3, 6.2, 9.0, 10 modified.

Rev 15: Dt: 23/12/2015: Cl 1, 2, 3, 5, 6, 7, 10, 11 & 12 modified.

Rev 16: Dt: 06/02/2017: Cl 1 changed to indicate the use of latest revisions of referred codes, standards, specifications, drawings, procedures, etc; Tempering temperature added for F12 material in Cl 4, Requirements of API 6D removed from Cl 1, 2, 4, 5, 10, 12 since the API 6D certificate license was not applied for; Definitions for relevant, linear and rounded indications provided in Cl 6; Type 3.2 certification changed as per BS EN 10204-2004 in Cl 10.2.

Rev 17: Dt: 27/11/2017: Cl 1, 4 modified to include SA 266 & SA 336 F92 materials; Cl 5 modified to include 100% hardness testing & Creep testing requirements; Cl 6 changed to include UT for forgings above 40 mm; Cl 10 modified suitably.

Rev 18: Dt: 21/02/2018 – Material SA182 F51 added in Cl 1 based on Engineering/Valves input and minor corrections made in Cl 4 & 5.

Rev 19: Dt: 05/12/2018 – Material SA182 F11 Class 3 & SA182 F60 added in Cl 1 based on Engineering/Valves input, Tolerance in Cl 3 modified based on guidance from corporate standard AA 102 08 Rev07, Cl 4 modified to include F11.

1. MATERIAL SPECIFICATIONS:

All the codes, standards, specifications, drawings & procedures, etc., referred in this TDC shall be of latest revision as on the date of Enquiry/Purchase Order, whichever is earlier, unless specified otherwise.

Carbon Steel (CS)	:	SA 105, SA 266, SA 350 LF 2
Alloy Steel (AS)	:	SA 182 F12 Class 2, F22 Class 3, SA 182 F23 (Code case: 2199), <i>SA182 F11 Class 3</i> SA 182 F91 & SA182 F92 (Code Case: 2179), SA 182 F1, SA 336 F1, SA 336 F12, SA 336 F22 Cl 3, SA 336 F91, SA 336 F92 (Code Case: 2179)
Stainless Steel (SS)	:	SA 182 F6a Class 2, F6a Class 3, SA 182 Gr. F 304, 304L, 316, 316L, 316H, 321, 321H, 347 & 347H; F51; <i>F60</i> AISI 410 for TOA Gland and bushings.
Additional Requirement	:	As listed below (Supplementary to above material specifications)
Size and Quantity	:	As per Purchase order & Drawing.

2. CHEMICAL COMPOSITION & PROCESS

- Melting: fully killed.
Product analysis per heat: CS: C ≤ 0.25% , AS: SA182 F23: Si: 0.25-0.50% & Cu: 0.25max
SA182 F92: Si: 0.10-0.50%, Ni: 0.30 max & Cu:0.25% max
- Raw material Steel for IBR forging items to be inspected at Mill & test certificate countersigned by IBR approved inspecting authority, if the mill is not approved under IBR as well known steel maker.
- Forging: Hot working to ensure uniformity of structure & strength with reduction ratio in area 4:1 min from ingot to final forging, close to final size & shape. Flow lines to be parallel to axis of openings. Forged Items ordered to this TDC shall be forged to the nearest shape before machining to final dimensions as per respective drawing.
- Blooms / Billets used for forgings (Side Length or Dia ≥ 50mm) shall be UT tested. For Acceptance criteria refer Cl.6.0. For finished bars, this can be done at final stage.
- SS: All raw materials used in steel making including incoming scrap shall be checked by supplier to ensure freedom from radioactivity.
- Tolerance for chemistry shall be as per the applicable material specifications/standards specified in Cl 1.

3. DIMENSIONS AND TOLERANCES

Dimensions & their tolerances shall be as per drawing.

For untoleranced dimensions: **CS & AS:** as per SA 29 for diameters upto 114.3mm. For diameters above 114.3mm and upto 300mm, tolerances shall be minus 0 plus 8 mm; **SS:** as per SA 484

4. HEAT TREATMENT(HT)

- Heat treatment shall be as per applicable drawing. Unless otherwise specified, the following heat treatment shall be following:

CS: SA 105: Normalised; SA 266: As per material specification;

SA 350 LF 2: Normalised at 880-900°C & Tempered at 620-640°C.

AS: Normalised and Tempered. For *F11*, F12: Tempering at 650°C (min).

For SA 182 F91, F92 & F23, SA336 F91, SA 336 F92: Normalising at 1050-1080°C & Tempering at 750-780°C.

SS: As per applicable material specification & grade.

	BHEL – Tiruchirappalli - 620014, India. Quality Assurance Department TECHNICAL DELIVERY CONDITIONS	DOC No: TDC:0:404 Rev: 19 Effective Date: 05/12/2018 Page: 2 of 3
Product: Carbon, Alloy & Stainless Steel Forgings (Boilers And Valves)		

AISI 410: Supply in Quenched & Tempered condition as below.

Quenching at 955-1010°C in air or water or oil or Polymer. Soaking 30 mts/inch maximum thk. Tempering at 663°C.min. Soaking :60 mts/inch maximum thickness and air cool.

- 2) Photomicrograph test for F91 & F92 forgings - one per heat treatment lot per size and shall be reported in test certificate. Acceptance – The material shall be free from any micro fissures. Microstructure shall show lathe tempered martensite and also to be examined for grain growth. Photomicrograph with 400x (Min) magnification along with Photomicrograph report to be provided. The actual magnification and result of actual microstructure shall be certified/indicated.

5. MECHANICAL TESTS

- 1) Extent of test: One Specimen for each size/heat/HT batch from sample product or identical test coupon.
- 2) **Tensile test:** The test specimens shall be removed from a test coupon (TC) after the final heat-treatment cycle. Perform tensile tests at room temperature in accordance with the procedures specified in ASTM A370. Perform a minimum of one tensile test. All yield strengths shall be determined using 0.2 % offset method of ASTM A370. The results of the tensile test(s) shall satisfy the applicable material specification requirements.

If the results of the tensile test(s) do not satisfy the applicable requirements, two additional tests on two additional test specimens (removed from the same TC with no additional heat treatment) may be performed in an effort to qualify the material. The results of each of these tests shall satisfy the applicable requirements.

- 3) **Additional requirements for SA182 F23, F91 & F92:**
F91: Yield: (0.2% offset): Min 450 MPa; Tensile: Min 630 MPa, Max 850 MPa; Hardness (HBW): Min 195, Max 248.
F92: Tensile: Min 630 MPa, Max 850 MPa; Hardness (HBW): Min 191, Max 269
F23: Tensile: Min 510 MPa, Max 730 MPa; Hardness (HBW): Min 150, Max 220
Hardness testing shall be **100%** as per ASTM E10 or E18.
- 4) AISI 410: Hardness (**100%** testing shall be as per ASTM E10 or E18): 197-235 HBW. No other mechanical test required.

Additional requirements of tests: (Other than AISI 410 Only)

- 5) **Bend test: Acceptance as per IBR**
CS: Sample 19mm.Thick(t) x 25.4mm width to be bent 180 deg. around mandrel of radius 6.35 mm.
AS, SS: Sample 19mm.Thick(t) x 25.4mm width to be bent 180 deg. Around mandrel of radius =1.5 x t.
- 6) **Impact test for QCNR Valves & CRHNR Valves:** CS, AS and SS: 1 / HT batch. As per ASTM A370, 2mm Charpy-U notch, at Room temperature. Acceptance: Avg of 3 specimens: 36 Joules, Min Single value: 24 Joules
- 7) **For PED 2014/68/EU (CE-marking) items:** Charpy- V impact test at 20°C as per ASTM A370, Acceptance: Avg of 3 specimens: 40 Joules, Min. single value: 27 Joules.
- 8) Creep testing & reporting shall be carried out as per SIP:RM:01 (latest revision) whenever indicated in the Enquiry/Purchase Order/Engineering Drawing.

6. NON DESTRUCTIVE TEST

- 1) Extent of test: for each product. Stage of test : After heat treatment.
- 2) **Volumetric NDE - UT:** As per ASTM A388. All finished forgings of dia/wall thickness **> 40 mm;** All Body & yoke of special class valves & all forgings of SA 182 F91, F92 & F23, SA 336 F91.
Acceptance: ASME Sec.VIII Div. 2 Cl.3.3.4.
- 3) **Surface NDT -**
 - a) **Relevant indication:** Surface-rupture NDE indication with major dimensions > 1.6 mm (1/16 in).
 - b) **Linear indication:** Surface NDE indication whose length is $\geq$ three times its width.
 - c) **Rounded indication:** Surface NDE indication whose length is < three times its width.
 - d) **MPI for CS & AS :** 100% : As per ASTM A275.
Dry MPI: CS, AS (other than SA 182 F91, F92, F23, SA 336 F91) : all sizes.
Wet MPI : SA 182 F91, F92, F23; SA 336 F91: all sizes.
Acceptance: ASME B16.34 Appendix II. Linear Indications like cracks, folds & other injurious defects are unacceptable.
 - e) **LPI for SS:** 100%: ASTM E165. **Acceptance:** No linear indications acceptable.
- 4) **SS:** Finished forgings shall be checked for radioactive contamination and reported. Survey meter shall be used to measure at 5 cm near the surface. Acceptance limits: Shall be less than 0.1 milli Rontgen (MR) per hr or 1 micro Sievert per hr.

7. WORKMANSHIP AND FINISH

Forged items to spec SA336 shall be machined in the inside surface as it is meant for steam application. Items to be proof machined as per drawing or shot blasted for CS/AS; Pickled & passivated as per ASTM A380 for SS, & be free from scales & defects like laps, seams, folds, cracks, etc. Machined items (except SS) to be coated with a layer of transparent rust preventive before despatch.



Product: Carbon, Alloy & Stainless Steel Forgings (Boilers And Valves)

8. REPAIR

Repairs by fusion welding are prohibited. Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum thickness after repair to meet drawing / Specification.

9. MARKING AND PACKING

Details of stamping on each item with low stress stamps: Heat/melt number; material specification, grade & class; Code case number (for Gr 92 & 23); Maker's emblem/code & Inspection Authority's seal. Forgings to be properly packed and dispatched to avoid damage during transit.

10. INSPECTION AND CERTIFICATION

10.1 For IBR Items:

- a) Products shall be inspected at supplier's works/mill and the applicable IBR Form must be countersigned by the Inspecting Authority as indicated below in case the supplier's works/mill is not recognised as a "Well known Forger/Steel maker" under IBR:
 - ☐ **Imported Items:** Inspecting Authority approved by IBR for the Country of origin.
 - ☐ **Indigenously Supplied items:** Director of Boilers/Chief Inspector of Boilers/Inspecting Authority approved by IBR, for the respective state in India.
- b) Certification in IBR Form III-G for IBR items from "IBR-Well Known Forger" or "Inspecting Authority", as applicable, to be submitted. IBR Form III-G and a separate **manufacturer** Test certificate in English language with following details, shall accompany the product (including proof machined):
 1. Purchase Order No.(BHEL), TDC No & its revision no, Test certificate no & date.
 2. Specification, Grade & Class with applicable year of code, Code case number (for Gr 92 & 23), Heat Number, Drawing No., Quantity & Size.
 3. Supplier of the steel used in making the finished product (well known and others in IBR Form IV).
 4. Melting & forging process, Chemistry with incidental elements-Heat wise, Product analysis, Carbon Equivalent (CE).
 5. Heat treatment details of the material and test bars. For F91, F92 supplies – Photomicrograph at 400x resolution.
 6. Mechanical test results- Tensile (UTS, YTS (0.2% offset), % elongation, % reduction in area), Bend, Impact, Hardness and NDE test results with reference & acceptance standards.
7. Repair details if any, Certified copy of TC for starting material.
8. **For SS:** Measured Radioactivity levels shall be reported in the Mill Test Certificate (not to be recorded in IBR Form).
9. Creep test report as per SIP:RM:01 (latest revision) whenever indicated in the Enquiry/Purchase Order/Engineering Drawing.

10.2 For PED 2014/68/EU (CE-marking) items, the test certificates with details specified in CI 10 (b) shall be submitted as per BS EN 10204.

1. **For pressure parts**, test certificates of type 3.1 or 3.2 are acceptable.
Type 3.1 – Suppliers shall have ISO 9001-2008/2015 certification certified by Notified Body recognized by European Community and test certificate certified by supplier's 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.
2. **For non-pressure parts**, test certificates of type 2.2 are acceptable.
Type 2.2 – suppliers test certificates signed by suppliers authorized inspection representative with test results as required by this TDC.

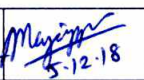
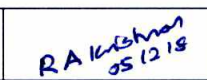
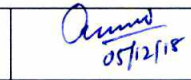
11. AUDIT CHECKS AT BHEL

BHEL reserves the right to carry out audit checks for chemistry, HT condition, mechanical test and NDT on representative test bars or job. Supplies found defective during check or subsequent processing at BHEL will be rejected.

12. END USE

Valve bodies, bonnets, discs, socket ends, body guides, etc., Pressure part fittings in boilers & low, high temperature service like discs, socket weld tees, elbows, weld neck flanges & stubs (except drum nozzles) meeting IBR, ASME Section I, ASME B16.34 and PED 2014/68/EU.

Non pressure part items in boilers and valves: For these, requirements on starting material, bend test and inspection by IBR are not required.

 05/12/2018	 05/12/18	 5/12/18	 05/12/18	 5-12-18	 05/12/18	 05/12/18
Abdur Rahman	G. Panneer Selvam	S. Anand Kumar	K. Rajasekaran	R. Rajappan	R. Ananthakrishnan	Amit Roy
Sr.Engineer/ QA	DGM/QA	SDGM/PE/ FB	DGM/Valves/ Engg	SDGM/MM	AGM/Valves/ Purchase	AGM/QA& BE
Prepared By	Reviewed By					Approved By

M Thambi Durai (Engineer/ MM/ RM/ HPBP)

From: Dinesh Karunakar K <dinesh_kk@bhel.in>
Sent: 02 June 2023 15:43
To: 'M Thambi Durai (Engineer/MM/RM/HPBP)'
Subject: FW: Talcher (1732): Material forecast revision for PGMA 06-735,06-745 & 06-759 -reg
Attachments: 3-06-000-19617.pdf; 3-06-000-19618.pdf; 3-06-000-19619.pdf; 3-06-000-19620.pdf

From: Mohd Baseem(Dy. Engineer/ PE/ FB/ HPBP) [mailto:mbaseem@bhel.in]
Sent: Friday, June 2, 2023 12:06 PM
To: 'Dinesh Karunakar K' <dinesh_kk@bhel.in>
Cc: 'K Bhuvanadevi' <bhuvanadevi@bhel.in>; 'Md. Fahad' <mdfahad@bhel.in>; 'Rudrabhatla Sai Kumar(Manager/ PE/ FB/ HPBP)' <r.saikumar@bhel.in>; 'N Nirmal Raj(Dy GM/ PE/ FB/ HPBP)' <nirmalraj@bhel.in>
Subject: RE: Talcher (1732): Material forecast revision for PGMA 06-735,06-745 & 06-759 -reg

Dear sir,
Kindly find attached revised drawings.

Thanks & regards,
M Baseem
Dy. Engineer
PP/ PE/ FB
Ph. 0431 257 5489

From: Dinesh Karunakar K <dinesh_kk@bhel.in>
Sent: 31 May 2023 13:00
To: 'Mohd Baseem(Dy. Engineer/ PE/ FB/ HPBP)' <mbaseem@bhel.in>
Cc: 'Rudrabhatla Sai Kumar(Manager/ PE/ FB/ HPBP)' <r.saikumar@bhel.in>; 'N Nirmal Raj(Dy GM/ PE/ FB/ HPBP)' <nirmalraj@bhel.in>; 'K Bhuvanadevi' <bhuvanadevi@bhel.in>; 'Md. Fahad' <mdfahad@bhel.in>
Subject: RE: Talcher (1732): Material forecast revision for PGMA 06-735,06-745 & 06-759 -reg

Sr

Kindly include creep test requirement in forged finned elbow drawings as shown below.



Tue 5/30/2023 3:46 PM

Md. Fahad <mdfahad@bhel.in>

RE: RM:01 (Creep testing requirement for SA182F12Cl2) - reg.

To: 'Dinesh Karunakar K'

Cc: 'Sakthi Ganesh A'; 'DEEPESH V'; 'JVV ARUNA KUMAR, AGM/QA/HPBP'; 'K Bhuvanadevi/Mgr/MM Plng/ HPBP'; 'r.saikumar'; 'N Nirmal Raj (DGM/Product Engineering/

Dear Sir,

For SA182 F12Cl2 creep testing parameter will be same as that of SA 213 T12 tube in [SIP:RM:01 R-03](#). i.e :

Material	Temperature in °C	Testing Load in MPa(Minimum Rupture Stress for 1000 hrs.)
SA 182F12 Cl2	585	84

Regards

Md Fahad

Dy. Manager/QA

K Dinesh Karunakar
MM/MPLG
BHEL Trichy
0431-257 5629

From: Mohd Baseem(Dy. Engineer/ PE/ FB/ HPBP) [<mailto:mbaseem@bhel.in>]

Sent: Thursday, May 11, 2023 12:14 PM

To: Dinesh K Karunakar(Dy Manager/ MM/ RM/ HPBP) <dinesh_kk@bhel.in>

Cc: Rudrabhatla Sai Kumar(Manager/ PE/ FB/ HPBP) <r.saikumar@bhel.in>; 'N Nirmal Raj(Dy GM/ PE/ FB/ HPBP)' <nirmalraj@bhel.in>

Subject: RE: Talcher (1732): Material forecast revision for PGMA 06-735,06-745 & 06-759 -reg

Sr,

Kindly find attached raw forming drawings for forge elbows.

Thanks & regards,

M Baseem

Dy. Engineer

PP/ PE/ FB

Ph. 0431 257 5489

From: Mohd Baseem(Dy. Engineer/ PE/ FB/ HPBP) <mbaseem@bhel.in>

Sent: 09 May 2023 16:14

To: Dinesh K Karunakar(Dy Manager/ MM/ RM/ HPBP) <dinesh_kk@bhel.in>

Cc: 'SAnand Kumar - HPBP(TRICHY)' <sak@bhel.in>; Rudrabhatla Sai Kumar(Manager/ PE/ FB/ HPBP) <r.saikumar@bhel.in>; 'N Nirmal Raj(Dy GM/ PE/ FB/ HPBP)' <nirmalraj@bhel.in>; 'Enaganti Murthunjoy' <muthue@bhel.in>

Subject: Talcher (1732): Material forecast revision for PGMA 06-735,06-745 & 06-759 -reg

Dear Sr,

Material forecast for PGMA 06-735,06-745 & 06-759 revised to incorporate Forge elbow forecast.

U6/ 1732-HT-418-1-06-735

U6/ 1732-HT-420-1-06-745

U6/ 1732-HT-421-1-06-759

Kindly review and approve.

Thanks & regards,
M Baseem
Dy. Engineer
PP/ PE/ FB
Ph. 0431 257 5489



BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014, INDIA

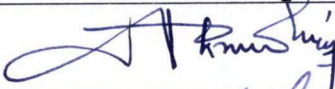
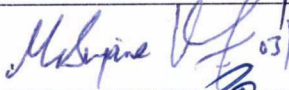
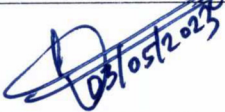
QUALITY ASSURANCE

CREEP TESTING (STRESS-RUPTURE TEST) REQUIREMENTS AS PER IBR

Prepared by

Md. Fahad
03/05/2023

Md. Fahad
Dy Manager/Quality Assurance

Reviewed by	Signature
Product Engineering – Fossil Boilers (N Nirmal Raj, DGM/PE/FB)	 16/05/23
Product Engineering- Valves (Mallemala Sujana Vinod, SM/Valves/Engg)	 03/05/23
Quality Assurance (V Deepesh, SM/QA)	 03/05/2023
Approved by	Signature
AGM/QA & BE (JVV Aruna Kumar)	 16/05/2023

RECORD OF REVISIONS

Rev. No.	DATE	Clause No.	Details of Revision
00	20/11/2017	---	Fresh issue
01	03/09/2018	1.0	Scope modified to bring more clarity
		2.0	Cl. 2 modified to bring creep requirements for all suppliers, additional labs are listed and Table 2 modified in line with the changes proposed in the new IBR draft.
02	01/03/2021	2.0	i. Table 1 Creep Stress rupture testing Requirements modified in line with the creep data values as per latest ASME BPVC 2019 Section IID ii. d) Modified the sample requirement
03	16/05/2023	2.0	i. Table 1 Creep Stress rupture testing Requirements modified in line with service temperature. ii. Creep rupture stress for Forgings included

1.0 SCOPE

- Creep testing is required as per IBR for all alloy & stainless steels materials which are to be used in furnace or in super heater zone of boilers being erected in India.
Hence, for our current boiler design, creep testing is required for tubes & forged finned elbows only.
- If the creep properties are established either by the mill on the starting raw material or by supplier on the finished product, then creep test reports shall meet the requirements of Clause 2.
- If the starting material is sourced from any mill which has not established creep properties, then creep testing shall be done as per Clause 2 on the product. If the Test results are meeting the requirements, then it can be treated as an approval of the creep values for the Mill which has supplied the starting material.

2.0 CREEP TESTING REQUIREMENTS

Creep testing shall be done in line with the following:

For the starting raw material (Ingot, billet, bloom, etc.), supplier/s shall produce the Creep (stress rupture) test report for each material grade being supplied by them as per the Table 1 given below:

Table 1. Creep Stress rupture testing Requirements

Sl. no	Grade	Testing temperature(°C)	Min Rupture Stress, S_{Rmin} (in MPa)
A	Tubes		
1	SA213 T11	540	115
2	SA213 T12	585	84
3	SA213 T22	610	66
4	SA213 T23	600	128
5	SA213 T91	665	60
6	SA213 T92	665	93
7	SA213 TP347H	695	81
8	SA213 S30432	705	105
B	Forgings		
1	SA182 F22 Cl.3	550	127
2	SA336 F22 Cl.3	550	127
3	SA182 F91	550	160
4	SA336 F91	550	160
5	SA182 F92	550	164
6	SA336 F92	550	164
7	SA182 F304	550	120
8	SA182 F316	550	129

- For steels produced indigenously, creep testing shall be carried out at National Metallurgical Laboratory, Jamshedpur, Corporate Research & Development Laboratory of Bharat Heavy Electricals Limited, Hyderabad, Well Known Steel Makers or any other Material Testing Laboratory recognized by the Central Boilers Board.

- b) For steels produced outside India, creep testing shall be carried out at Well Known Steel Makers, nationally recognized / accredited testing laboratory in the country of manufacture. Alternatively, the testing can also be done in any other laboratory if the tests are witnessed by a Competent Person working with IBR Authorized Inspection Agencies.
- c) Creep testing shall be done as per ASTM E139 (latest) or BS EN ISO 204 (latest).
- d) Two Test specimens each shall be prepared from the test bar preferably M10 round sample. Test bars for sampling shall be stamped by BHEL or BHEL authorised TPIA, as necessary.
- e) **Acceptance Criteria:** Both the samples tested shall not rupture and shall meet the creep requirements at 1,000 hours of testing at indicated temperatures & stress values as per Table 1.
- f) Reporting: As per Table 2.

Table 2. Suggested/Recommended Format for Reporting the Creep Testing Data:

SI No	Description	Details/Results
1	Report No. Date:	
2	Name and Address of the Tube/ Forged Finned Elbow/ forgings Manufacturer	
3	Name and Address of the Raw Material Supplier	
4	Material Specification & Grade (Code Case, if applicable)	
5	Heat/Melt No, SI No (if applicable)	
6	Heat treatment details (Type & Temperature)	
7	Name and Address of Testing Laboratory	
8	Testing method/ Standard (ASTM E139 or BS EN ISO 204) & Revision/Edition	
9	Test Sample Size	
10	No. of test samples	
11	Temperature at which test is conducted (°C)	
12	Stress value observed (MPa)	
13	Test Start Date & Time	
14	Test End/Reporting Date & Time	
15	Test duration (hours of creep testing)	
16	Test witnessed by (Name of Inspector & Agency)	
17	Test Result (Accepted/Not Accepted)	