



BHARAT HEAVY ELECTRICALS LIMITED
INDUSTRIAL VALVES PLANT
433, INDUSTRIAL COMPLEX
GOINDWAL SAHIB
DISTT. TARN TARAN- PUNJAB

No. BHE:IVP:VR:
2010-11/03

NOTICE INVITING
EXPRESSION OF INTEREST
AND
REGISTRATION OF CASTING VENDORS

BHARAT HEAVY ELECTRICALS LIMITED [BHEL] is manufacturing Industrial Valves and other Boiler accessories at its Industrial Valves Plant, Goindwal Sahib unit. The range of valves include Cast Carbon Steel, Alloy Steel and Stainless Steel- Gate, Globe and Non-return Valves of Pressure classes upto C600 of sizes 2" to 24" at present. The plant is heading towards increasing its volume as well as range of items. For an annual turnover to the tune of ₹ 200 Cr.

BHEL is looking for prospective **casting manufacturers** having sound foundry infrastructure and experience/willingness to supply castings components required for our valves sizes upto 6" NB [single piece weight range ~2 kgs to ~200 kgs and in material grades Carbon Steel [ASTM A 216 Gr. WCB, WCC], Alloy Steel [ASTM A 217 Gr.WC6, WC9] and Stainless Steel [ASTM A 351 Gr. CF8, CF8M]. Total annual requirement upto 1000 MT.

Details about components unit weight, approx quantity- material grade wise and sample drawings of few components are attached. Procedure of registration and establishment of castings is also attached.

Foundries interested in supplying castings of **these weight range** are requested to visit our plant on any working day from Monday to Saturday between 0900 Hrs to 1600 Hrs/ contact undersigned for any clarification.

Gurbax Singh Sokhal, Manager(MM, P&D)

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BHARAT HEAVY ELECTRICALS LIMITED
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Procedure of registration and establishment of castings:

- ❖ Prospective foundries need to fill the supplier registration form and submit it to us. Form can be downloaded from our website www.bhel.com available as a downloadable link at http://www.bhel.com/images/pdf/vendor/Guidelines_Indian_Suppliers_SEARP2010Amdt.02.pdf Form can also be requested from undersigned.
Suppliers already registered with any other unit of BHEL also need to fill the form and submit.
- ❖ Evaluation of forms/visits will be conducted by BHEL and recommendation will be given by duly constituted committee for issuing development/trial enquiries.
- ❖ After placement of development/trial purchase order(s), establishment of patterns shall be carried out by dimensionally checking the sample castings and radiographic testing for internal soundness besides checking of physical and mechanical properties.
- ❖ Major requirement is of IBR castings, i.e. the casting should be poured by an IBR approved valid Well known foundry or any other foundry under IBR authorities witness. For foreign foundries, alternate to IBR can be informed.
- ❖ For detailed requirement and procedure, please refer to the Technical delivery conditions attached.

BHEL IVP GOINDWAL SAHIB						
List of casting components						
Size	Rating	Type	Desc	Material Code	Drawing Number	~Weight. Kg
2	150	FV	Body-FL	920249410000	1V515802778R/01	20.80
2	150	FV	Body-BW	922015250000	2V517913766R/00	20.80
2	150	FV	FLAP	920336540000	3V515306405P/00	0.52
2	150	FV	COVER	922017390000	3V515824641R/00	8.20
3	150	FV	Body-FL	920249230000	1V515702777R/01	37.80
3	150	FV	Body-BW	922015400000	2V517813885R/00	31.83
3	150	FV	FLAP	920336530000	3V515206405P/00	1.75
3	150	FV	COVER	922017380000	3V515724641R/00	13.00
4	150	FV	Body-FL	920249220000	1V515602776R/01	57.00
4	150	FV	Body-BW	920270610000	1V517702871R/02	46.00
4	150	FV	FLAP	920336340000	3V514406405P/00	3.20
4	150	FV	COVER	922017370000	3V515624641R/00	17.30
6	150	FV	Body-FL	920249210000	1V515502775R/01	92.70
6	150	FV	Body-BW	920270600000	1V517602888R/02	84.50
6	150	FV	FLAP	920336470000	3V515106405P/00	9.00
6	150	FV	COVER	922017410000	3V515124641R/00	32.10
2	300	FV	Body-FL	920249100000	1V515302769R/01	35.30
2	300	FV	Body-BW	922015370000	2V517513880R/00	22.00
2-1/2	300	FV	Body-BW	922006620000	2VM47606211R/01	43.50
2	300	FV	FLAP	920336540000	3V515306405P/00	0.52
2	300	FV	COVER	922017350000	3V515324641R/00	16.50
3	300	FV	Body-FL	920249090000	1V515202768R/01	52.70
3	300	FV	Body-BW	920270620000	1V517102653R/02	42.00
3	300	FV	FLAP	153392810000		7.70
3	300	FV	COVER	922017400000	3V515224641R/00	19.00
4	300	FV	Body-FL	920248630000	1V514402746R/01	73.80
4	300	FV	Body-BW	922015410000	2V517213886R/00	54.80
4	300	FV	FLAP	920336340000	3V514406405P/00	3.20
4	300	FV	COVER	922017340000	3V514424641R/00	21.00
6	300	FV	Body-FL	920249030000	1V515102766R/01	125.00
6	300	FV	Body-BW	922001880000	2V517305741R/00	95.00
6	300	FV	FLAP	920336470000	3V515106405P/00	9.00
6	300	FV	COVER	922017410000	3V515124641R/00	29.00
6	600	FV	Body-BW	922012160000	2V203808285R/00	128.00
6	600	FV	Cover	922010170000	4V201626148R/00	51.30
6	600	FV	ARM	922010190000	3V201623352R/00	4.00
2	150	GV	Body-FL	920270560000	2VN07303401R/03	15.10
2	150	GV	Body-BW	922003200000	2VN29805885R/01	12.50
2	150	GV	Yoke	922005060000	2VN29806107R/01	10.00
2	150	GV	Wedge	920342890000	3VN07306628R/03	2.12
3	150	GV	Body-FL	920270370000	1VN02502864R/02	26.50
3	150	GV	Body-BW	922002960000	2VN28905875R/00	25.00
3	150	GV	Yoke	922003600000	2VN31305937R/01	13.00
3	150	GV	Wedge	920342830000	3VN02506598R/00	3.10
4	150	GV	Body-FL	920270390000	1VN03302862R/02	42.75
4	150	GV	Body-BW	922003010000	2VN29405878R/00	36.00
4	150	GV	Yoke	922003550000	2VN31705925R/02	18.85
4	150	GV	Wedge	922010940000	2VN03303379R/02	5.50
6	150	GV	Body-FL	920270140000	1VN00102827R/02	65.90
6	150	GV	Body-BW	920249980000	1VN00502833R/02	56.45
6	150	GV	Yoke	920084900000	2VN00403328R/01	24.98
6	150	GV	Wedge	920342800000	2VN00103304R/00	10.20
2	300	GV	Body-FL	920270570000	2VN08103404R/02	22.70
2	300	GV	Body-BW	922002820000	2VN25905869R/02	15.00
2	300	GV	Yoke	922005100000	2VN32806099R/01	12.00
2	300	GV	Wedge	920342890000	3VN07306628R/03	2.12
2-1/2	300	GV	Body-BW	922006500000	2VM47206207R/00	35.70
3	300	GV	Body-FL	920270380000	1VN04902868R/02	42.80
3	300	GV	Body-BW	922002740000	2VN25505867R/00	35.50
3	300	GV	Yoke	922003570000	2VN32605934R/01	21.40
3	300	GV	Wedge	920342840000	3VN04906599R/00	4.90
4	300	GV	Body-FL	920270660000	2VN09703439R/01	68.00
4	300	GV	Body-BW	922002660000	2VN25105865R/00	51.50
4	300	GV	Yoke	922003580000	2VN32405935R/03	24.40
4	300	GV	Wedge	922011190000	2VN09703436R/02	6.30
6	300	GV	Body-FL	920270360000	1VN01702858R/03	124.00
6	300	GV	Body-BW	922002630000	2VN24805837R/00	94.50
6	300	GV	Yoke	922003830000	2VN21105901R/01	45.40
6	300	GV	Wedge	922010890000	1VN01702860R/02	12.40
2	600	GV	Body-FL	920249670000	1VB00102672R/01	39.50
2	600	GV	Body-BW	922015450000	2VF60113891R/00	29.50
2	600	GV	Yoke	920084720000	1VB00102681R/02	21.50
2	600	GV	Wedge	920342670000	2VB00103228R/01	3.40
3	600	GV	Body-FL	920338600000	2VF50205987R/00	56.50
3	600	GV	Body-BW	920338610000	2VF60205990R/00	43.00
3	600	GV	Yoke	920338620000	2VF50205989R/00	27.00
3	600	GV	Wedge	920338630000	2VF50205988R/00	3.70
4	600	GV	Body-FL	920338640000	2VF50306028R/00	102.00
4	600	GV	Body-BW	920338780000	2VF60306102R/00	63.00

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List of casting components						
Size	Rating	Type	Desc	Material Code	Drawing Number	~Weight, Kg
4	600	GV	Yoke	920338650000	2VF50306030R/00	33.00
4	600	GV	Wedge	920338660000	2VF50306036R/00	7.00
6	600	GV	Body-FL	922002380000	2VF50405835R/00	197.00
6	600	GV	Body-BW	920338790000	2VF60406103R/00	135.00
6	600	GV	Yoke	920338870000	2VF70406215R/00	62.50
6	600	GV	Wedge	920338520000	2VF50405890R/03	16.70
2	300	RV	Body-FL	920242950000	2V247701775R/03	23.00
2	300	RV	Body-BW	920270740000	2V290803470R/02	15.25
2	300	RV	Yoke	920082480000	2V247601776R/01	12.00
3	300	RV	Body-FL	920243040000	2V247807750R/01	46.50
3	300	RV	Body-BW	920249420000	2V288508231R/00	34.00
3	300	RV	Yoke	922016590000	2V289714085R/01	23.00
4	300	RV	Body-FL	920243050000	1V247905153R/02	72.00
4	300	RV	Body-BW	920249530000	1V292302664R/02	53.00
4	300	RV	Yoke	920082080000	2V247801777R/00	27.00
6	300	RV	Body-FL	920243950000	1V248001392R/02	130.50
6	300	RV	Body-BW	920249430000	1V288702635R/03	99.80
6	300	RV	Yoke	920082490000	2V248001846R/01	47.00
List shown is not exhaustive and is an indicative in respect of any data.						
Same component may be required in any of the WC8/WCC, WC6, WC9, CF8 or CF8M grades						

BHEL IVP GOINDWAL SAHIB

List of items and approx quantity and corresponding approx weight

Description				Approx Wt of castings set consisting of Body/Bonnet/W edge in (kg)	Approx requirement, Qty			Approx requirement, Wt, MT		
Size	Rating	Type	Desc		WCB	CF8	CF8M	WCB	CF8	CF8M
2	150	FV	FL	29.00	300			9		
2	150	FV	BW	28.00	100			3		
3	150	FV	FL	52.25	300			16		
4	150	FV	FL	77.50	200			16		
4	150	FV	BW	66.50	100			7		
6	150	FV	FL	133.80	300			40		
6	150	FV	BW	125.60	50			6		
3	300	FV	FL	79.40	150			12		
3	300	FV	BW	68.70	200			14		
4	300	FV	FL	98.00	100			10		
4	300	FV	BW	79.00	200			16		
6	300	FV	FL	163.00	300			49		
6	300	FV	BW	133.00	50			7		
2	150	GV	FL	26.00	1200	900		31	23	
2	150	GV	BW	23.00	250			6		
3	150	GV	FL	42.00	600	400		25	17	
3	150	GV	BW	37.00	1800		350	67		13
4	150	GV	FL	67.00	450	100		30	7	
4	150	GV	BW	60.00	800		300	48		18
6	150	GV	FL	101.00	600	125		61	13	
6	150	GV	BW	92.00	800		170	74		16
2	300	GV	FL	37.00		770			28	
3	300	GV	FL	69.00	300	250		21	17	
3	300	GV	BW	58.00	600			35		
4	300	GV	FL	96.00	200			19		
4	300	GV	BW	77.00	500		90	39		7
2	300	RV	FL	35.00	700			25		
3	300	RV	FL	69.50	150			10		
3	300	RV	BW	57.00	800		90	46		5

List shown is not exhaustive and is an indicative in respect of any data.

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Revision record: Rev 15: 27-12-08 : (1)Modified in entirety.

1.0 MATERIAL:

Specification : ASME / ASTM {Latest on date of Purchase Order (PO)}:

CARBON STEEL(CS) : SA / ASTM A216 WCB, WCC & 352 LCB , LCC

ALLOY STEEL(AS) : SA / ASTM A217 WC6, WC9, C12A.

STAINLESS STEEL(SS): SA / ASTM A351 CF3M,CF8,CF8C & CF8M.

Additional Requirement : As listed below(Supplementary to Specification)

Size, Qty, Grade/Class : As per Purchase order & Drawing / Pattern.

2.0 CHEMICAL COMPOSITION AND PROCESS:

Melting: As per the Specification, Fully Killed.

Carbon= 0.25% maximum : for SA / ASTM A216 WCB only.

Carbon= 0.15% maximum : for SA / ASTM A217 WC6 & WC9 (For the castings used in

QCNRV,CRHNRV,TOA Valves & Conventional valves having contours for welding.)

Product Analysis on test bar for each melt including residual elements shall be carried out.

Additional requirements for API-6D materials:

CS: Carbon=0.23% max.(in ladle) and 0.25% max.(in Product analysis)

Carbon Equivalent=0.43 max.(in ladle) and 0.45 max.(in Product analysis)

Carbon Equivalent= $\%C+(\%Mn/6)+(\%Cr+\%Mo+\%V)/5+(\%Ni+\%Cu)/15$

SS: Carbon=0.03% max. except as below.

Carbon=0.08% max.for stabilized steels with Nb >10xC.and

for stabilized steels with Nb and Ta mass of (Nb+Ta)>8xC.

3.0 DIMENSIONS AND TOLERANCES:

Tolerances as per the Drawing.

Untoleranced Dimensions for valve components as per the Drawing:VL:STDC:023(Latest)

4.0 HEAT TREATMENT :(HT)

CS. Castings of High Pressure Valve.(Cl.1500 & above),QCNRV & CRHNRV: Shall be in Annealed Condition.

AS. Castings: Normalized and Tempered.

Normalizing Temperature: for SA/ASTM A217 WC6, WC9: 920-950 °C and for C12A: 1050-1080 °C

Tempering temperature(Minimum): SA/ASTM A217 WC6: 680°C; WC9: 720 °C; C12A: 740-780°C

Others: Heat Treated as per the Specification.

5.0 MECHANICAL TESTS:

Test bars to be cast integral with the casting or separately. If cast separately, they shall be cast at the same time as the castings and from the same ladle. A metal strip with heat number stamped shall be fused with the test bar during casting, to maintain traceability. If one(1) casting is made from more than one heat, separate test bars for each cast to be poured & all test bars shall satisfy the requirements. Following tests to be conducted per heat / Heat treatment batch, as per ASTM A370.

S.NO	TEST	Material specification		
		SA/ASTM A216,217	SA/ASTM A352	SA/ASTM A 351
1	Tension Test	As per the Specification		
2	Hardness Test	As per the Specification	225 BHN. max.	Not applicable
3	Bend Test	S3 of SA703 For SA217 WC6 Angle of Bend-120 Deg.	Not applicable	S3 of SA703
4	Charpy- U Impact for all QCNRV.CRHNRV BODIES FOR IBR.	As per IBR. at Room temperature. Acceptance: Avg /Single=36J/32J min.	Not applicable	Not applicable
5	Charpy- V Impact for CE Marking-Pressure Equipment Directive (PED) items as Specified in the Purchase Order.	At 20 Deg.C temperature. Acceptance: Avg /Single=40J/27J min.	Not applicable	Not applicable
6	Charpy- V Impact for API -6D items if design temperature below minus 29°C (-29 °C)	Test Temperature=As per specification Acceptance: Avg/Single=34J/25J	Not applicable	Not applicable

6.0 FETTLING, DRESSING & CLEANING:

Dressing of castings-Free from risers, in gates, notches, undercuts, deep marks etc.

Fused wires, parting line fins, chills etc. shall be removed by grinding.

Gas cutting if employed shall be done before Heat treatment.

Preheat the material to 200 Deg. C. before gas cutting the Alloy steels.

Castings shall be blast cleaned both inside and outside for the removal of fused sand, scales etc.

Visual inspection of castings for surface quality as per MSS-SP-55 shall be carried out.

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7.0 NON DESTRUCTIVE TESTING (NDT) AFTER HEAT TREATMENT:

Castings shall be free from surface and internal defects like porosity, shrinkage, sand inclusion, crack, cold shut and other harmful defects.

7.1: MAGNETIC PARTICLE INSPECTION (MPI): As per ASTM E709

7.1.1: 100% on all critical areas like change of sections, riser & ingate portions at the time of Development of casting. However weld repaired areas identified in visual examination for doubtful indications to be probed by MPI.

7.1.2: All accessible surfaces including belly shall be tested for Special class valves, QCNRV, CRHNRV, Body & Wedges of TOA Valves (Class: 1500 & above):.

7.2: LIQUID PENETRANT INSPECTION (LPI): As per ASTM E165

LPI Can be substituted for MPI in all inaccessible area and for stainless steel castings.

Acceptance for MPI & LPI: ASME B16.34.

(1) Cracks are not permitted.

(2) For linear indications (with length > 3 times width) other than cracks, indications must be separated by a distance greater than the length of an acceptable indication.

Maximum allowable length of the indication shall be:

(a) For thickness (t) up to 13mm = 8mm,

(b) For thickness from 13 to 25mm = 13mm and (c) For thickness above 25mm = 18mm.

(3) For rounded indications (circular or elliptical with length < 3 times width), 4 or more indications in a line separated by 1.5 mm or less edge to edge are unacceptable.

Maximum allowable diameter of the indication shall be:

(a) For thickness up to 13mm = 8mm, and (b) For thickness above 13mm = 13mm

7.3: RADIOGRAPHIC TESTING (RT):

All castings shall be of radiographic quality. Procedure: ASME B16.34.

No cracks, hot tear or unfused chaplets, inserts permitted.

7.3.1: CONVENTIONAL AND API 6D VALVES :-

a) Pressure containing parts with pressure rating of ASME Class 600 & above:

RT on critical areas indicated in the drawing/ASME B16.34 (latest). **Acceptance:** Table-2 below and For butt weld ends Gas hole/Porosity and sand inclusions to be within level A1 & B1 respectively.

b) During developmental stages & When called for in the PO., Casting rating less than Class. 600 shall be 100% radiographed. (on critical areas indicated in the drawing/ASME B16.34 (latest)).

Acceptance: Table-1 below

c) Butt welding ends shall be free of shrinkage, crack and hot tear.

TYPE OF DISCONTINUITY	ACCEPTANCE LEVEL CATEGORY	TABLE-1 (< 600 CLASS)		TABLE-2 (= > 600 CLASS)	
		Thickness ≤ 2"	Thickness > 2"	Thickness ≤ 2"	Thickness > 2"
Gas Porosity	A	A2	A3	A1	A2
Sand/Slag inclusion	B	B3	B3	B2	B2
Shrink Type-1	C	CA2	CA3	CA1	CA2
Shrink Type-2	C	CB3	CB3	CB2	CB2
Shrink Type-3	C	CC3	CC3	CC2	CC2
Crack	D	NONE	NONE	NONE	NONE
Hot Tear	E	NONE	NONE	NONE	NONE
Inserts (Chills/Chaplets)	F	NONE	NONE	NONE	NONE

d) During developmental stage RT on sample castings of yoke, yoke clamp & wedge/disc shall meet Level-3 of ASTM E446/E186/E280

7.3.2: FOR QCNRV AND CRHNRV BODIES:

1) For Class 150 and 300:- RT on Butt weld ends only.

2) For Class 600 and above & For other classes if shown in the Purchase Order:- RT/UT on Butt weld ends, Change of sections including seat and neck portion. **Acceptance:** Same as conventional valves.

7.3.3: FOR SAFETY VALVE (SV) AND SAFETY RELIEF VALVE (SRV):

1) For Safety Valve and Safety Relief Valve Base and Bonnet Castings:

The Zones for RT: Areas shown in the sketch (PAGE-4). The areas where RT cannot be carried out MPI Shall be done as per ASME B 16.34. **Acceptance:** Class-4 of ASTM E446/E186.

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7.3.3: Contd....

2) All SV& SRV (Flanged End & BW end) base Castings:

- One(1) Number for Every 10 Nos (10%) of casting covering 100% area. **(Sampling)**
- Additionally on Butt Weld Ends: All Castings 100% RT and shall be free of shrinkage, crack & hot tear. Gashole/Porosity and sand inclusions to be within level A1 & B1 respectively.

3) For SRV Nozzles: 100% RT –All areas.

Acceptance: Class 2 of ASTM E446/E186. Hot tear, Crack unacceptable.

4) Radiography not required after satisfactory development of casting & production based on established method for following parts: SRV Bonnet, Disc holder, Upper and Lower adjusting rings, Packed cap, Cover plate, Yoke and SRV guide flanges.

5) The defective castings to be repaired. In such cases the method followed by the foundry to be reviewed and corrected. The first casting poured after corrective action to be radiographed and accepted before bulk production.

6) Sampling shall be done as follows: (Wherever specified)

The vendor shall inform to BHEL the readiness of the lot (along with melt number / SI.nos of the castings covered in the lot) for Radiography. On intimation of the lot quantity details from the vendor, BHEL / QC will indicate the specific castings by melt number / SI.no punched on the casting, on which radiography checks are to be done. The vendor shall radiograph these specified castings and incorporate the lot size and melt no/SI.no in the RT reports along with the other SI.nos of the other castings covered in the lot. If the identified casting is defective then 2 more castings shall be radiographed. If these 2 castings are defect free then the lot is acceptable. If any one of these castings is defective then all the remaining castings shall be radiographed and all defective areas shall be repaired.

8.0 REPAIR:

- 8.1: Castings with unacceptable cracks, hot tears, shrinkage, etc. to be rectified by grinding & if required by welding. Welding to be done by qualified welder and qualified procedure as per ASME Section IX. For IBR items welder shall be qualified as per IBR.
- 8.2: CS & AS to be Post weld heat treated (PWHT) after weld repair if repair depth > 20% of wall thickness or 25mm whichever is less or the extent of repair exceeds 65 sq.cm.
- 8.3: Weld repair in C12A material to be done only after approval by BHEL. All repaired C12A castings to be Post weld heat treated irrespective of depth or size of repair.
- 8.4: The repaired area shall be re-examined by the NDE method which originally disclosed the defect. MT/PT shall be performed after PWHT if performed as above. Weld repairs made as a result of RT shall be RT tested after welding. The acceptance standards for porosity and slag inclusion shall be as per UW-51 of ASME Section VIII Division 1.

9.0 SURFACE TREATMENT:

SS castings to be pickled & passivated (after repair & HT if any) as per ASTM A380. Satisfactory passivity of the surface to be checked using SS passivity test kit (Free iron test). After passivation, rinsing & test, the rinsed demineralised water to be checked for chloride with 1% Silver nitride, which shall not exceed 0.5 PPM.

10.0 SAMPLE CASTINGS:

Foundry to ensure, first sample pieces meet dimensional & Quality requirements in this TDC, before starting bulk production. 3 Castings with nominal bore (NB) ≤ 100mm. & 1 casting with NB > 100mm., for each type of casting to be inspected (proof machined wherever necessary). at BHEL for dimensions & RT. Supplier to be appraised of acceptability or modifications to castings required. In case of deviations, Supplier to submit further samples if required. Accepted sample castings may be considered for fixing the nominal weight of the castings.

11.0 DIMENSIONAL CHECK:

For all QCNRV & CRHNRV Body Castings: Thickness of the body shall be checked throughout the surface on a grid of 50mm x 50mm and recorded & submitted to BHEL.

12.0 MARKING AND PACKING:

Details to be marked on each casting, on a raised pad using low stress stamps:

- 1. Foundry code, 2. Specification, grade & Melt number, 3. Other details as per drawing.
- Castings shall be suitably packed to avoid damage during transit.

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13.0 INSPECTION AND CERTIFICATION:

13.1: For IBR items, inspection and tests to be witnessed by an Inspecting Authority approved by IBR.

Test certificate countersigned by the Inspecting Authority for each product with following details shall accompany the product (in format approved by Boiler inspectorate for IBR items).

If the Foundry is recognised as "Well known Foundry" under IBR, suppliers TC is sufficient.

1. Purchase Order No. (BHEL), TDC No. & Test certificate number
2. Specification and Grade with applicable year of code, Heat Number, Quantity & Size
3. Steel making process, Chemistry including incidental elements - Heat wise.
4. Heat treatment details of the material and test bars.
5. Mechanical test results, NDE test results with reference & acceptance standard.
6. Repair details including HT, if any, Cleaning & Surface treatment details.
7. Any other information like clearance of sample casting.
8. Dimensional Inspection Report where applicable.

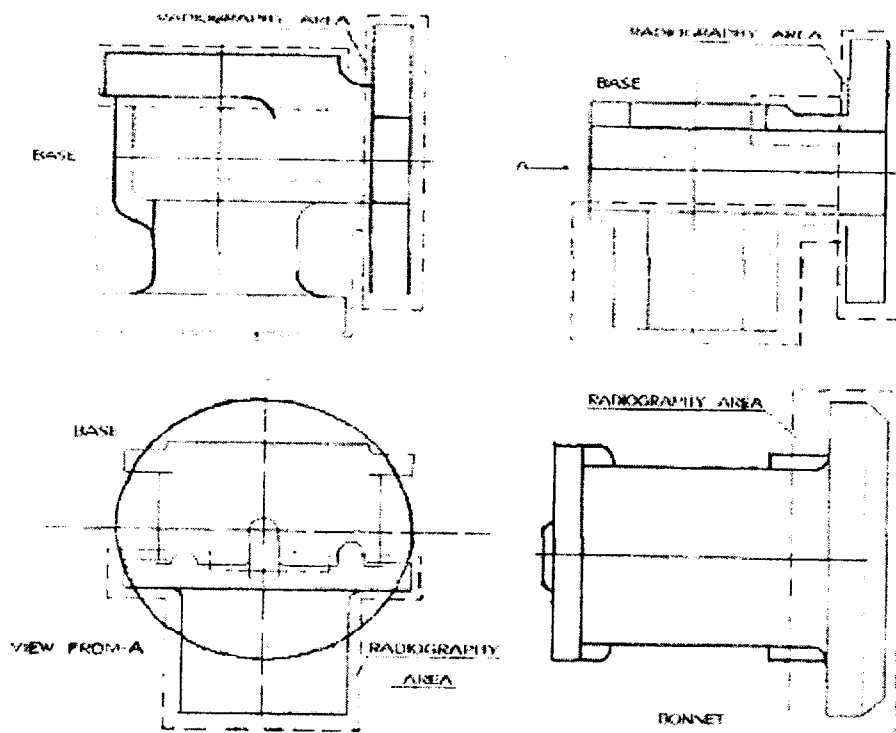
13.2: For CE-marking items the materials shall be inspected by M/s. LLoyd's/ TUV/ BVQI or any other agency approved for PED of CE marking, if the foundry is not certified to ISO 9000 by any of the above organisation.

14.0 AUDIT CHECKS AT BHEL:

BHEL reserves the right to carry out audit checks for chemistry, HT condition, mechanical test and NDT on representative test bars or job. Items found defective during check or subsequent processing at BHEL are liable for rejection.

15.0 END USE:

For use in valves and other components like flanges, fittings etc. for high temperature & high pressure applications meeting IBR, ASME Section I, ASME B 16.34 and API.

SV and SRV Base castings: Sketch of zones for RT

V. KALYANARAMAN QUALITY ASSURANCE	M. RAJAKUMAR ENGG/VALVES	K. GANESAN PURCHASE/VALVES	S. SELVARAJUN QUALITY ASSURANCE	K. RENGACHARI QUALITY CONTROL	C. R. RAJU QUALITY ASSURANCE
PREPARED BY	REVIEWED BY				APPROVED BY

MASTER COPY

SECTION-EE

DRAWING RETRACTED WITH REV. 02 ON 17.06.97

NOTES:

1. NECESSARY MACHINING ALLOWANCES HAVE BEEN ADDED ON ALL MACHINABLE SURFACES
2. FINISHED MACHINED DIMENSIONS ARE INDICATED WITHIN BRACKETS FOR INFORMATION
3. $\frac{100}{\nabla}$ CASTING SURFACES MUST BE HIGH QUALITY WITHOUT SURFACE UNWENESS
4. UNSPECIFIED CASTING RADI $R3 - 5 \mu m$
5. CASTING SHALL COMPLY WITH THE REQUIREMENTS OF APPLICABLE QUALITY PROCEDURE,ISIN
6. $\otimes$ SURFACES TO BE MACHINED
7. HEIGHT OF CAST LETTERS 12 MM
8. RISER REMAINS ARE TO BE COMPLETELY REMOVED SUITABLY.

07	LCB	92 200 592	A352 LCB CERTIFY	NR	10	--	2VXN38.05937R	05
06	CFBW	92 200 590	A351 CFBW CERTIFY	SH	46	--	2VXN38.05937R	05
05	CYB	92 200 588	A351 CFB CERTIFY	SH	46	--	2VXN38.05937R	05
04	WC9	92 200 588	A217 WC9 CERTIFY	N & T	20	--	2VXN39.05937R	05
03	WC6	92 200 587	A217 WC6 CERTIFY	N & T	20	--	2VXN30.05937R	03
02	WCC	92 200 586	A215 WCC CERTIFY	NORMALISED	10	--	2VXN39.05937R	05
01	WCB	92 200 380	A216 WCB CERTIFY	NORMALISED	10	--	2VXN33.05937W	05
5.	WALL, WAVE TO BE EAST	WALL CODE	WALL SPEECH	WAVE FREQUENCY	REC'D SIGNAL	REF. SIGNAL	WAVE FREQUENCY	WAVE TO BE EAST

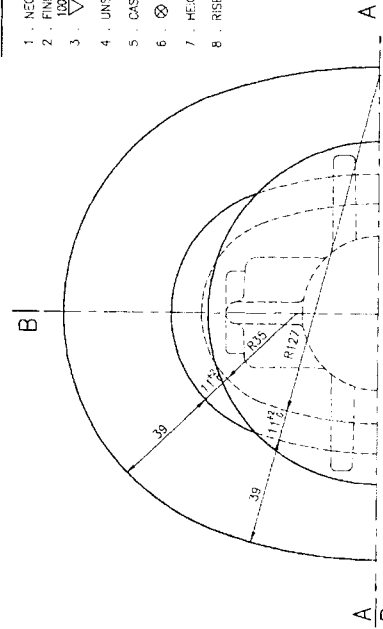
TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT[illegible]

CAUTION: The information in this document is the property of HEAVY ELECTRICAL and may be used directly or indirectly for the benefit of any company detrimental to the company.

REV DATE ALTERED BY
03 17.05.97 CHD & APPD
FZONG

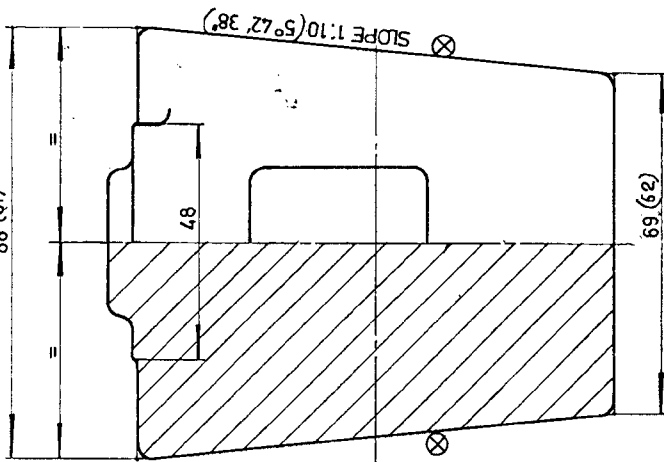
SL No. 07 INCLUDED.

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SECTION-AA

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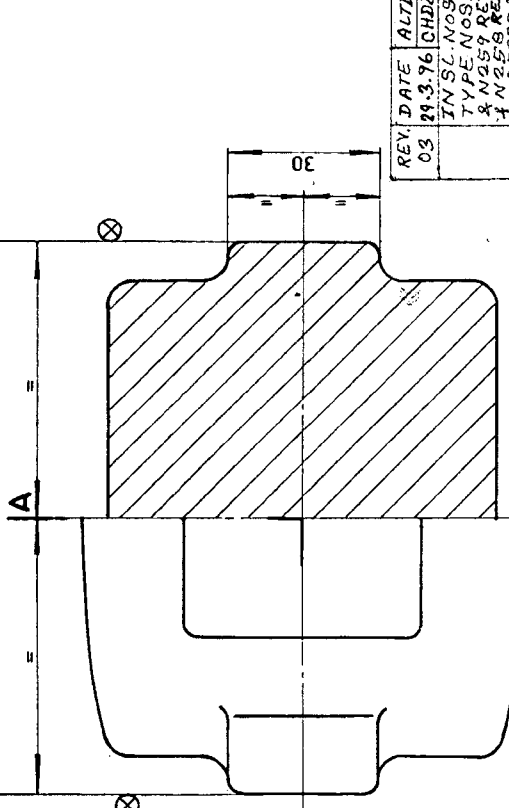
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REFER NOTE NO. 8

SECTION-BB

118 (112)



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NOTES:-

1. NECESSARY MACHINING ALLOWANCES HAVE BEEN ADDED ON MACHINABLE SURFACES.
2. SURFACES TO BE MACHINED.
3. UNSPECIFIED CASTING RADIUS R3-R5.
4. CASTING SURFACES MUST BE HIGH QUALITY WITHOUT SURFACE UNEVENNESS.
5. PERMISSIBLE DIMENSIONAL DEVIATION OF CASTING SURFACES REFER TO CHART.
6. FINISH MACHINED DIMENSIONS ARE INDICATED WITHIN BRACKETS.
7. CASTING SHALL MEET THE REQUIREMENTS OF TDC WITH LATEST REVISION.
8. THE FOLLOWING IDENTIFICATION MARKING TO BE PUNCHED IN THE ZONE SPECIFIED IN THE DRG.

3 - 300C

MATL. MARK
SUPPLIER'S CODE
MELT NO.

SL. NO.	DRAWING NO.	MATL. CODE	MATL. SPECN.	MATERIAL MARK TO BE CAST	APPLICABLE TYPE NOS.
01.	3-V-N049-06599R	92 034 284	ASTM A216 WCB NORMALISED	A216 WCB	N049
02.	3-V-N364-06599R	92 200 438	ASTM A351 CF8 SH. CERTIFY	CF8	N364
03.	3-V-N373-06599R	92 200 478	ASTM A351 CF8M SH. CERTIFY	CF8M	N373
04.	3-V-N256-06599R/01	92 200 479	A216 WCC NR CERTIFY	WCC	N256
05.	3-V-N257-06599R/01	92 200 480	A217 WCC NT CERTIFY	WCC	N257
06.	3-V-N258-06599R/01	92 200 481	A217 WCC NT CERTIFY	WCC	N258

BHARAT HEAVY ELECTRICALS LTD., BOILER PLANT UNIT, TIRUCHIRAPALLI-14

DRAWN	CHECKED	APPROVED	DATE	TITLE
T. L. Kumar	P. S. Kumar	S. Kumar	12/6/81	WEDGE 3" - 300C

CAUTION
THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD., BOILER PLANT UNIT, TIRUCHIRAPALLI-14 AND SHALL NOT BE USED WITHOUT THEIR EXPRESS WRITTEN PERMISSION FOR ANY OTHER PURPOSE THAN FOR WHICH IT IS SENT TO YOU.

33-115
3 - V - 0000 - 06599R

REV	DATE	ALTD	BY	CHKD	APPD
03	24.3.76	CHD	APPD	APPD	APPD
02	21.12.75	CHD	APPD	APPD	APPD

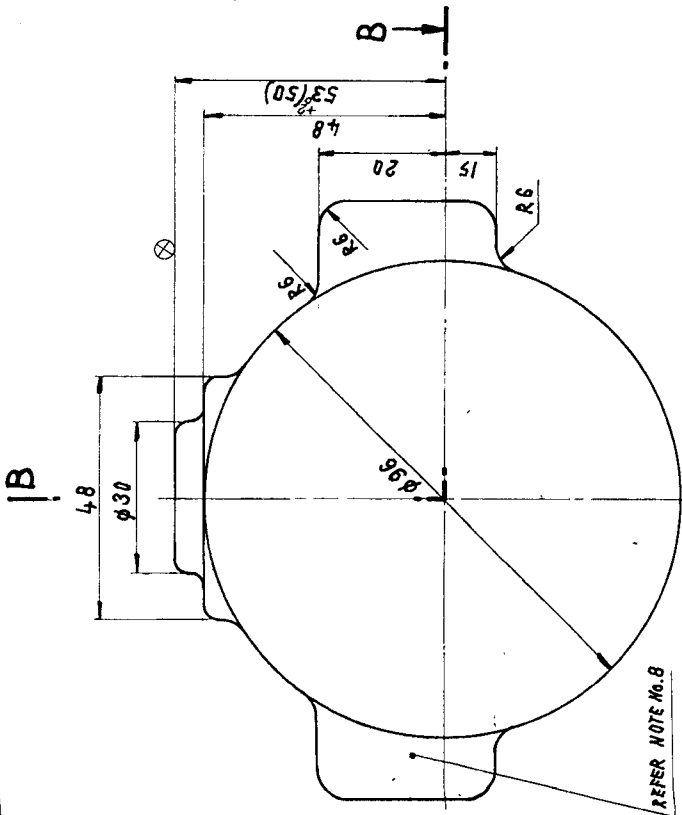
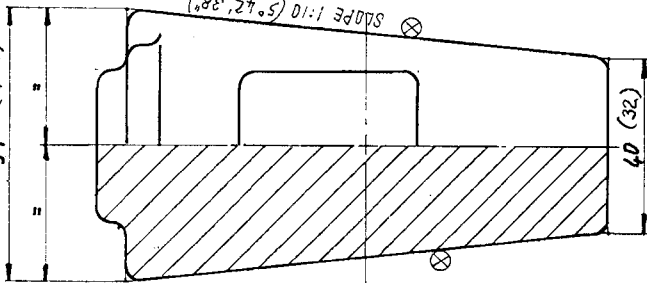
REV	DATE	ALTD	BY	CHKD	APPD
01	21.11.75	CHD	APPD	APPD	APPD

REV	DATE	ALTD	BY	CHKD	APPD
03	24.3.76	CHD	APPD	APPD	APPD

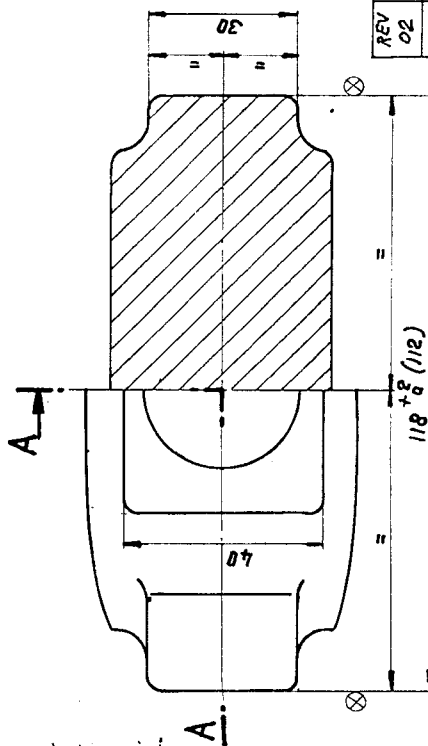
REV	DATE	ALTD	BY	CHKD	APPD
01	21.11.75	CHD	APPD	APPD	APPD

SECTION-AA

59 (51.1)



SECTION-BB



NOTE:

1. NECESSARY MACHINING ALLOWANCES HAVE BEEN ADDED ON ALL MACHINABLE SURFACES.
2. SURFACES TO BE MACHINED
3. UNSPECIFIED CASTING RADII R3-R5
4. CASTING SURFACES MUST BE HIGH QUALITY WITHOUT SURFACE UNEVENNESS.
5. PERMISSIBLE DIMENSIONAL DEVIATION OF CASTING SURFACES - REFER TO CHART
6. FINISH MACHINED DIMENSIONS ARE INDICATED WITHIN BRACKETS
7. CASTING SHALL MEET THE REQUIREMENTS OF APPLICABLE TDC (WITH LATEST REVISION)
8. THE FOLLOWING IDENTIFICATION MARKING TO BE PUNCHED IN THE ZONE SPECIFIED IN THE DRG.

3" 150C

MATL. MARK
SUPPLIERS CODE
MELT NO.

REV	DATE	ALTD.	T.C.L.C.
05	17.6.97	CHD&APPD.	
SL NO. 06 INCLUDED.			

SL NO.	DRAWING NO.	MATL. CODE	MATL. SPECN.	MATERIAL MARK TO BE CAST	APPLICABLE TYPE NO.
01	3-V-N025-06598R	92 034 283	ASTM A216 WCB NORMALISED	A 216 WCB	N049
02	3-V-N286.06598R	92 200 311	ASTM A351 CF8M CERTIFIED SOLUTION HEAT TREATED	A351 CF8	N286
03	3-V-N338.06598R	92 200 406	ASTM A351-CF8M CERTIFIED SOLUTION HEAT TREATED	CF8M	N338
04	3-V-N291.06598R	92 200 678	ASTM A217 WCB CERTIFIED NORMALISED & TEMPERED	WC6	N291
05	3-V-N292.06598R	92 200 700	ASTM A217 WCB CERTIFIED	WC9	N292
06	3-V-M768.06598R	92 200 896	A352 LCB CERTIFY	LCB	M768

BHARAT HEAVY ELECTRICALS LTD.
BOILER PLANT UNIT, TIRUCHIRAPALLI-14

REV	DATE	ALTD.	T.C.L.C.
02	3.10.95	CHD&APPD.	
SL NO. 03 INCLUDED			

REV	DATE	ALTD.	T.C.L.C.
01	31.05.98	CHD&APPD.	
SL NO. 02 15 INCLUDED			

REV	DATE	ALTD.	T.C.L.C.
04	10.9.96	CHD&APPD.	
SL NO. 01 05 INCLUDED.			

REV	DATE	ALTD.	T.C.L.C.
01	31.05.98	CHD&APPD.	
SL NO. 02 15 INCLUDED			

REV	DATE	ALTD.	T.C.L.C.
01	31.05.98	CHD&APPD.	
SL NO. 02 15 INCLUDED			

REV	DATE	ALTD.	T.C.L.C.
01	31.05.98	CHD&APPD.	
SL NO. 02 15 INCLUDED			

CAUTION

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33-115

TITLE **WEDGE** 3" 150C

DRAWING NO. **3-V-0000-06598R**
REVISION **05**

