



**PLANT PURCHASING
SPECIFICATION
HYDERABAD**

HY 19580

Rev. No.00

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AUSTENITIC STAINLESS STEEL CASTINGS

GR : CF 8M

1.0 GENERAL:

This specification governs the quality requirements of grade CF8M austenitic stainless steel castings.

2.0 APPLICATION:

The castings are used for applications like impellers of cooling water pumps, etc.

3.0 CONDITION OF DELIVERY :

The castings shall be supplied in solution treated and rough machined condition, unless otherwise specified in the drawing / purchase order.

4.0 COMPLIANCE WITH NATIONAL STANDARD :

This specification complies in general with the requirements of ASTM A743 Gr: CF8M.

5.0 DIMENSIONS AND TOLERANCES :

5.1 The casting shall be true to the pattern/ drawing. Supplier shall send their production drawings for approval, incorporating necessary details, allowances etc. marked with red pencil.

Holes upto and including 60 mm in diameter are to be cast solid unless otherwise stated on the drawing/order. Untoleranced dimensions, weights etc., for the castings shall be as per Corporate Standard AA 023 04 02, class-5. However, in case of components requiring special tolerances, the relevant drawing/product standard details enclosed with the order shall be applicable.

5.2 All rough machined surfaces shall have a minimum machining allowances of 4 ± 1 mm per surface for final machining at BHEL.

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6.0 MANUFACTURE:

6.1 The steel shall be made by electric furnace process with or without separate refining such as Argon Oxygen Decarburisation (AOD). Any other process of steel making shall be referred to BHEL for approval.

6.2 The steel castings shall be made from fully killed steel.

6.3 The castings shall not be peened, plugged or impregnated to stop leaks etc.

7.0 HEAT TREATMENT:

The recommended heat treatment shall be as follows:

7.1 The castings shall be cooled below the transformation temperature before any heat treatment is performed.

7.2 The castings shall be solution treated as follows:

Solution treatment: Heating uniformly to 1040°C minimum and soaking for not less than one hour per 25 mm of max. thickness followed by quenching in water or rapid cooling by other means.

8.0 FINISH:

8.1 Fettling: The castings shall be cleaned and fettled thoroughly ensuring complete removal of sand, slag, fins and scales from both internal and external surfaces.

8.2 Preparation for non-destructive testing: Wherever ultrasonic or radiographic examination is called for in the drawing/specification, the relevant areas shall be cleaned to the finish required as called for in the respective testing standard.

9.0 FREEDOM FROM DEFECTS:

9.1 Foundry defects like blow holes, shrinkage cavities porosity, non-metallic inclusions etc. appearing on the surfaces to be machined shall be opened out and smoothly ground provided the depth of any of these defects when so ground, doesn't exceed 2/3 of the machining allowance.

In case where pressure tightness is called for (though the test may be required to be conducted at BHEL) the requisite quality must be ensured to guarantee the same.

9.2 All as-cast surfaces shall be free from harmful foundry defects like slag inclusions, sand spots, cold shuts, shrinkage, scabs etc.

9.3 Cracks are not permitted on any surface of the casting.



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10.0 CHEMICAL COMPOSITION:

The analysis of the steel shall conform to the following requirements.

Element		C	Si	Mn	Cr	Ni	Mo	S	P
Ladle Analysis	Min	-	-	-	18.00	9.00	2.00	-	-
	Max.	0.08	2.00	1.50	21.00	12.00	3.00	0.040	0.040

11.0 TEST SAMPLES:

- 11.1 When integral test piece is called for in the drawing / order, the test coupon shall be cast on the external surface of the casting or a place of maximum section thickness or any position where casting quality is not affected.

Otherwise separate test coupons shall be cast from the same melt from which the castings are poured.

- 11.2 The number of test coupons to be integrally cast with each casting shall be sufficient to test the various properties as specified in this standard, both at the supplier end and BHEL, and to carryout repeat tests, if required.

The size of the test coupons shall be length-200 mm, Bottom width-100 mm, Height-150 mm, Top width- 60 mm.

- 11.3 The integrally cast coupons shall not be removed prior to complete heat treatment and they shall be suitably stamped & identified by BHEL inspector. One such coupon (minimum) shall be sent integrally with the castings to BHEL.

- 11.4 Separate test coupons, if cast shall be heat treated along with the castings and properly stamped and identified.

- 11.5 Testing shall be done per melt per heat treatment batch in case of separate cast coupons while individual casting shall be tested in case of integral test pieces.

12.0 MECHANICAL PROPERTIES:

The mechanical properties tested shall be as follows:

Tensile strength N/mm ² min.	Yield Strength N/mm ² min.	Elongation in 50 mm min. %
485	205	30



NOTE: The tensile test shall conform to IS:1608 or any other reputed national standard.

13.0 HYDRAULIC TEST:

The hydraulic test shall be carried out at BHEL if mentioned in the drawing. In case the supplier needs to carryout the test, the same will be indicated in the drawing/order. The test pressure shall be maintained for a minimum of 30 minutes (unless otherwise mentioned) without leakage.

14.0 NON-DESTRUCTIVE TESTS:

The following non-destructive tests shall be performed.

14.1 Radiographic Test:

If specified on the drawing or order, the casting shall be examined by radiography test as per E186/E280/E446 and the quality of defect shall be severity level 2 for categories A, B & C of these specifications. Defects of categories D, E, F & G are not acceptable.

14.2 Liquid penetrant Test:

The surfaces marked on the drawing shall be liquid penetrant examined in accordance with ASTM E 165. For the acceptance standard the following indications will be unacceptable.

- a) any cracks or linear indications
- b) rounded indications with dimensions greater than 5mm.
- c) four or more rounded indications in a line separated by 1.5mm or less edge to edge.
- d) ten or more rounded indications in any 3900mm surface with the major dimension of this area not to exceed 150 mm with the area taken in the most unfavorable location relative to the indications being evaluated.

15.0 REPAIR WELDING:

The defects in the castings shall be reported to the BHEL and repairs shall be carried out after obtaining a written consent and approval of the repair procedure from the BHEL in accordance with the requirement of the relevant ASTM material specification.

Casting in which the depth of any cavity prepared for repair welding exceeds 20% of the wall thickness or 25 mm whichever is smaller or castings in which any cavity prepared for repair welding is greater than 6500 Sq.mm shall undergo heat treatment after completion of final repairs.

The method of heat treatment shall be as per cl.7.2



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16.0 RETEST:

16.1 In case of failure due to mechanical causes like machining etc. the supplier shall test another specimen from the same casting/lot.

16.2 If the results of the mechanical tests for any heat of castings do not conform to the requirements specified in this specification, the castings may be reheat treated and tested at the manufacturer's option.

Testing after reheat treatment shall consist of the full number of specimens taken from locations as specified in the specification / order.

17.0 TEST CERTIFICATE:

17.1 The supplier shall furnish five copies of certificates (in English) to BHEL including one transparent copy containing the following details.

- 1) HY19580
- 2) BHEL Order No.
- 3) Item description and Drawing No. of the Castings.
- 4) Supplier's Name
- 5) Melt No. & Heat treatment Cycle.
- 6) Casting Serial No. per melt.
- 7) Details of manufacture.
- 8) Heat treatment and welding repair details (if any)
- 9) Results of all tests as per this specification

17.2 The certificate shall be attested by the chief of Inspection/chief Metallurgist of the supplier and BHEL inspector.

18.0 MARKING & PACKING:

18.1 The following details shall be punched clearly on the castings and the same shall be encircled by paint.

- a) HY 19580
- b) Heat treatment cycle No
- c) Melt No.
- d) Drawing No.
- e) BHEL Inspector's Stamp
- f) Supplier's mark

18.2 The castings shall be suitably packed and protected from damage during transit.



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Clause 11.0 TEST SAMPLES :

"11.6 Integrally cast keel blocks or separately cast test coupons representative of the casting, duly identified and stamped by BHEL representative, shall be supplied alongwith the consignment for testing at BHEL works.

Integrally cast keel blocks or separately cast test coupons shall fulfil the requirements of clause 11.1 to clause 11.5 given above."

REF:	AMD.NO.	APPROVED	ISSUED	DATE	CUM. Sl.No.
	01	MANAGER, STDS. ENGG.	STDS. ENGG.	19.01.2002	A 0365

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