

**CORPORATE PURCHASING SPECIFICATION**

AA 195 03

Rev. No. 07

PREFACE SHEET

AUSTENITIC MANGANESE STEEL CASTINGS - GRADE 1

FOR INTERNAL USE ONLY
REMOVE THIS PREFACE SHEET BEFORE ISSUE TO SUPPLIERS

Comparable Standards:

- | | | |
|-------------|---|-----------------------------|
| 1. INDIAN | : | IS: 276 -2000
Gr: 1 |
| 2. AMERICAN | : | ASTM A 128-1990
Gr: A |
| 3. BRITISH | : | B.S.:3100 -1991
Gr: BW10 |

Suggested / Probable Suppliers and Grades:

Use plant vendor's list

User Plant References:

- | | | |
|------------------|---|----------------|
| 1. BHOPAL | : | PS 10598 |
| 2. HPBP, TIRUCHY | : | IS : 276. Gr:1 |

Revisions:
Cl 29.6.27 of MOM of MRC-FC&F+HTM

APPROVED :
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE-MRC (FC&F+HTM)

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BHOPAL

Corp. R&D

September, 1977



AUSTENITIC MANGANESE STEEL CASTINGS - GRADE 1

1.0 GENERAL

This specification governs the quality requirements of Austenitic Manganese Steel Castings, Grade-1.

2.0 APPLICATION

Suitable for parts requiring high ductility and greater resistance to wear.

3.0 CONDITION OF DELIVERY

Heat treated

Rough machining of castings shall be carried out, unless otherwise specified in BHEL order.

Castings shall not be painted.

4.0 COMPLIANCE WITH NATIONAL / INTERNATIONAL STANDARD

Castings shall comply with the requirements of the following national standards and also meet the requirements of this specification.

IS: 276 - 2000 : Austenitic Manganese Steel Castings
Gr: 1

5.0 DIMENSION AND TOLERANCES

Castings shall be true to the pattern / drawing.

Holes for machining up to and including 50mm in diameter are to be cast solid, unless otherwise stated in BHEL order / drawing.

Unless otherwise specified in BHEL order/ drawing, untoleranced dimensions for the casings shall be as per tolerance class 4 of BHEL standard AA 023 04 02.

Revisions :

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6.0 MANUFACTURE

Steel for the castings shall be made by basic electric furnace process or such other process as may be agreed to between BHEL and manufacturer.

7.0 HEAT TREATMENT

All castings shall be suitably heat treat to render them tough and ductile. This treatment shall consist of heating the castings to suitable temperatures, holding them till they are uniformly heated throughout and quenching them with a minimum time lag in water from a minimum temperature of 1040°C

A record of heat treatment of the castings and test sample heat treated along with the casting shall be maintained by the manufacturer.

Test samples shall also be heat treated alongwith the castings they represent.

8.0 FINISH

All castings shall be properly fettled and dressed and all surfaces shall be thoroughly cleaned.

Machined surfaces shall have the surface finish as indicated in the drawing.

9.0 FREEDOM FROM DEFECTS:

Castings shall be free from defects such as porosity, blow holes, sand inclusions, shrinkage's, cavities, hard spots, cold shuts, cracks, etc. which may adversely affect machining and utility of castings.

Flame or arc cutting of risers is not recommended. But, when it is necessary care shall be taken to prevent cracks or any other defect being introduced into the casting due to metallurgical characteristics of the material.

10.0 CHEMICAL COMPOSITION

The melt analysis of the steel and the permissible variation in the composition of the castings from the melt analysis shall be as specified below:

Element	Melt analysis , percent		Permissible Variation percent, Max
	Min.	Max	
Carbon	1.05	1.35	± 0.04
Silicon	-	1.00	+ 0.05
Manganese	11.00	14.00	± 0.60
Sulphur	-	0.025	+ 0.008
Phosphorus	-	0.08	+ 0.008



CORPORATE PURCHASE SPECIFICATION

AA 195 03

Rev. No. 07

PAGE 3 OF 5

NOTE:

It is desirable to have a minimum ratio of manganese to carbon as 10:1. But manganese should not be less than 11 percent when carbon is below 1.1 percent.

11.0 TEST SAMPLES:

Test samples shall be cast separately in accordance with IS: 6907. They shall be selected per melt for each heat treatment batch.

Size of the test samples shall be 13 x 20 x 225 mm long.

Test samples as specified above with proper identification and representative of castings shall be supplied alongwith the consignment for testing at BHEL works. Tests will be carried out as per IS: 6907

12.0 MECHANICAL PROPERTIES:

12.1 Bend Test:

The test specimen when tested in accordance with IS:1599 after being heat treated as per clause 7, shall with stand cold bending through 150° around a mandrel of 50mm in diameter without breaking into two pieces. (Surface cracks after bending are not considered as failure if the sample is in one piece). The edges of the test specimens may be rounded to a radius not exceeding 1.5 mm.

12.2 Hardness (Brinell):

Casting shall have a Brinell hardness in the range of 229 HB when tested in accordance with IS : 1500. Hardness test shall be carried out per melt for each heat treatment batch.

13.0 ADDITIONAL TESTS:

If specified in BHEL drawing/order, the following tests shall be conducted:

- 1) Radiographic examination to BHEL standard AA 085 01 40.
- 2) Liquid penetrant examination to BHEL standard AA 085 0131.
- 3) Hydraulic test.
- 4) Any other tests.

Norms of acceptance shall be as specified in BHEL order/drawing.

14.0 REPAIR OF CASTINGS

Repair of castings shall not be carried out by the manufacturer without the prior permission of BHEL.

**15.0 TEST CERTIFICATES**

Three copies of test certificates shall be supplied unless otherwise stated in order, preferably in the test certificate format annexed to this specification (Annexure -1).

In addition, the supplier shall ensure to enclose one copy of the test certificate along with their despatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

- i) Dimensional inspection.
- ii) Detail of heat treatment.
- iii) Chemical composition.
- iv) Results of mechanical tests
- v) Results of additional tests called for in the order / drawing.

16.0 PACKING AND MARKING

Castings shall be suitably packed to prevent corrosion and damage during transit. Machined surfaces shall be properly protected with anticorrosive compounds. Each package or casting (when supplied separately) shall be legibly marked with the following information.

AA 195 03: Austenitic Maganese Steel castings-Gr:1.

BHEL Order No.

Consignment/Identification No.

Melt No.

Weight

Supplier's Name

17.0 REFERRED STANDARDS (Latest Publications Including Amendments):

- | | | |
|-----------------|-----------------|-----------------|
| 1. AA 023 04 02 | 2. AA 085 01 31 | 3. AA 085 01 40 |
| 4. IS:276 | 5. IS:1500 | 6. IS: 1599 |
| 7. IS: 6907 | | |



CORPORATE PURCHASE SPECIFICATION

AA 195 03

Rev. No. 07

PAGE 5 OF 5

ANNEXURE 1 - RECOMMENDED TEST CERTIFICATE FORMAT FOR CASTINGS

SUPPLIERS'S NAME AND ADDRESS											
1. Customer :						6. Cast No. & Date :					
2. TC No. & Date :						7. Batch No. :					
3. PO No. :						8. Heat Code :					
4. Process of Melting :						9. Spec.. No. :					
5. Deoxidisation Process						10. Test Bar Size					
II. CASTING COVERED BY T.C.											
Sl. No.	Drawing No. & Item No.					Description	Quantity & Weight				
12. CHEMICAL COMPOSITION (PERCENT)											
Element	C	Si	Mn	S	P						
As per Min.											
Spec. Max..											
Actual Values.											
13. HEAT TREATMENT (To be accompanied by Recorder Chart, wherever called for)											
Condition	Temp. °C				Soaking Time. Hrs..			Cooling Medium			
14. MECHANICAL PROPERTIES											
	T.S. N/mm2	Y.S. 0.5/0.2% Proof N/mm2	% E on GL 5.65 SO	% R.A. Mn	Hardness BHN Min. 3 Values	Impact Value, Joules	Bend				
As per Min.											
Spec. Max.											
Actual Values.											
15. Surface Finish (When called for in the order/drg)											
16. DIMENSIONAL INSPECTION											
17. NON-DESTRUCTIVE TESTS											
Nature of Test	Acceptance Level	Instrument used			Range	Results	Any other details				
Ultrasonic											
Radiographic											
Dye Penetrant/ Magnetic Particle											
18. OTHER TESTS, IF ANY (MICRO- Scopic, Hydraulic, Etc.)											
19. IDENTIFICATION ON CASTING AS PER CPS.											
We hereby certify that the items mentioned above have been tested and inspected in our presence and are found to be in accordance with the drawings, specifications and purchase order.											
Signature & Seal of the Inspecting Officer (Purchase Representative)						Signature and Seal of the Chief of Quality Control Chief Metallurgist of the Supplier.					
Date :						Date :					
INSTRUCTION:											
a) If steel is produced by LD or Oxygen process, Nitrogen content should be furnished and shall not exceed 0.009%											
b) Test Certificates are to be furnished as per Purchase Order and Specifications, in A4 Size transparent paper.											
c) All the entries including signature should be in black ink.											
d) If testing is done by outside agencies, the original TCs shall be furnished.											
e) The actual Test Certificate may run into more than one A4 size paper, if needed, to facilitate filling up of details.											