



CORPORATE PURCHASING SPECIFICATION

AA19521

Rev No.08

PREFACE SHEET

1.5% MANGANESE STEEL CASTINGS – GRADE 1

FOR INTERNAL USE ONLY

REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS

Comparable Standards:

1. INDIAN : IS: 2708 – 1993, Gr.: 1
2. BRITISH : BS 3100 – 1991, Gr.: A4

Suggested/Probable Suppliers and Grades:

Refer plant vendors list.

User Plant References:

1. HEP, BHOPAL : PS10556
2. HPEP, HYDERABAD : CSN 422710, CSN422653.1
IS: 2708, Gr:1

Revisions:

Cl 30.8.28 of MOM of MRC-FC&F+HTM

APPROVED:

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC(FCF+HTM)

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Dt. of 1st Issue

Dt:01-10-2005

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Year:2014

HEP, Bhopal

Corp.R&D

September, 1977

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1.5% MANGANESE STEEL CASTINGS – GRADE 1

1.0 GENERAL:

This specification governs the quality requirements of 1.5% Manganese Steel Castings having a minimum tensile strength of 520 N/mm².

2.0 APPLICATION:

For general engineering purpose suitable for welding.

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 STANDARDS:

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

IS: 2708 – 1993 : 1.5% Manganese Steel Castings for General Engineering Purposes

Gr: 1

5.0 DIMENSIONS 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 on BHEL order/ drawing, untoleranced dimensions for the casings shall be as per tolerance class 4 of BHEL standard AA0230402

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:

Heat treatment shall be carried out at suitable temperatures to give the properties specified.

Any flame or arc cutting which may have to be done, shall be carried out before heat treatment.

Test pieces shall also be heat treated along with 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 which may adversely affect machining and utility of castings.

When it is necessary to remove risers by flame cutting, care shall be taken to make the cut at a sufficient distance from the body of the casting so as to prevent any defect being introduced into the casting due to local heating.

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	0.18	0.25	± 0.02
Silicon	--	0.60	+ 0.05
Manganese	1.20	1.60	± 0.06
Sulphur	--	0.050	+ 0.008
Phosphorus	--	0.050	+ 0.008

Note:

In the interest of uniform welding, the concentration of the unspecified alloying elements shall not exceed the limits specified below, whenever specified on BHEL enquiry/order; the test results of these elements shall also be included in the test certificate, however, the manufacturer shall ensure that these elements are within the limits specified.

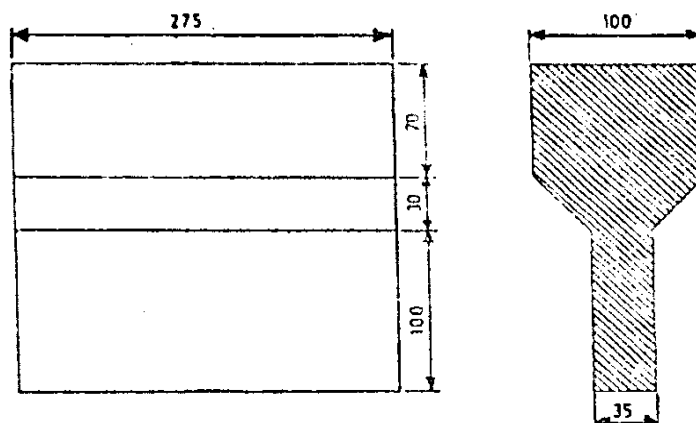
Element	Percent, max
Copper	0.30
Nickel	0.40
Chromium	0.30
Molybdenum + Tungsten	0.25
Total content of these unspecified elements	1.00

11.0 TEST SAMPLES:

Manufacturers shall carry out mechanical testing as per following sampling plan:

- 11.1 Unless otherwise specified, for castings weighing up to 500kg piece weight one keel block separately cast per melt per heat treatment batch shall be supplied according to the sketch given below.
- 11.2 Unless otherwise specified, castings weighing more than 500 kg shall be provided with integrally cast keel block.
- 11.3 Retests shall be carried out as per IS: 8800
- 11.4 Keel blocks with proper identification and representative of the castings shall be supplied along with the consignment for testing at BHEL works.

DETAILS OF KEEL BLOCK



ALL DIMENSIONS IN mm

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12.0 MECHANICAL PROPERTIES:

The test pieces after being heat treated as per clause 7.0 above, shall show the following properties:

12.1 Tensile:

The test pieces shall show the following properties, when tested in accordance with IS:1608

Tensile strength : 520 N/mm², min.

Yield strength : 320 N/mm², min.

Elongation on $5.65 \sqrt{S_0}$ gauge length : 16 Percent, min.

12.2 Hardness (Brinell):

Casting shall have a Brinell hardness in the range of 152 – 207 HB when tested in accordance with IS: 1500

12.3 Charpy Impact Value (V-Notch):

The test pieces shall show an average Charpy impact value of 30 Joules minimum over three test pieces. (However, the minimum value for each test piece shall not be less than 2/3 the average value). The test will be conducted in accordance with IS: 1757.

13.0 NON-DESTRUCTIVE TESTS:

The following tests shall be conducted:

1. Ultrasonic examination to BHEL standard AA0850104 / AA0850105
2. Liquid penetrant examination to BHEL standard AA0850131
3. Magnetic particle examination to BHEL standard AA0850133 and norms of acceptance as per BHEL standard AA0850134.

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.



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15.0 SCOPE OF THIRD PARTY INSPECTION:

Wherever, separate quality plan is not attached, the scope of third party inspection shall be as follows:

1. Review of supplier's declared chemical composition.
2. Selection of test samples for mechanical tests and witness of mechanical tests.
3. Witness of Non-destructive tests as applicable.
4. Review of HT charts.
5. Dimensional inspection.

16.0 TEST CERTIFICATE:

Three copies of test certificates shall be supplied unless otherwise stated in the 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 dispatch 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 and unspecified alloying elements whenever called for.
- iv) Results of mechanical tests
- v) Results of NDT tests.

17.0 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 of casting (when supplied separately) shall be legibly marked with the following information:

AA19521:1.5% MANGANESE STEEL CASTINGS – GRADE 1

BHEL Order No.:

Consignment / Identification No.:

Melt No.:

Weight:

Supplier's Name:

18.0 REFERRED STANDARDS (Latest publications including amendments):

- | | | |
|--------------|--------------|--------------|
| 1. AA0230402 | 2. AA0850104 | 3. AA0850105 |
| 4. AA0850131 | 5. AA0850133 | 6. AA0850134 |
| 7. IS: 1500 | 8. IS: 1608 | 9. IS: 1757 |
| 10. IS: 2708 | 11. IS:8800 | |

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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/mm ²	Y.S. 0.5% Proof N/mm ²	% E on GL 5.65 SO	% R.A. Min	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.													