



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
TRACTION MACHINES ENGINEERING DIVISION

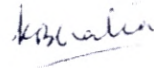
TME/2013

PRODUCT STANDARD CONCURRENT SHEET

GENERAL INFORMATION : Original PS date: 20.02.2013 with revision-00

PRODUCT STANDARD NO. : **TM 10583**

DESCRIPTION : **Carbon Steel Castings - 295 N/mm² YS**

REVISION NO.	DETAILS OF REVISION		
	NAME	SIGNATURE	DATE
PREPARED BY:	RAHUL CHAUDHRY		20.02.2013
AGREED BY	REMARK DEPTT./SEC	SIGNATURE	DATE
M.VERMA	TME		20.02.2013
S.K.BHATIA	TME		20.02.2013



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CARBON STEEL CASTINGS – 295 N/mm² YS

1.0 GENERAL :

This specification governs the quality requirements of Carbon steel castings having an yield strength of 295 N/mm² minimum and is based on corporate purchasing specification AA19512 rev.07 except chemical composition, mechanical properties & hardness value (which are as per Rev.04 of AA19512).

2.0 APPLICATION:

Suitable for general engineering purposes.

3.0 CONDITION OF DELIVERY:

Heat treated.

Rough machining of the castings shall be carried out, unless otherwise specified on BHEL order/drawing.

Castings shall not be painted.

4.0 DIMENSIONS AND TOLERANCES :

The castings shall be true to the pattern/ drawing.

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

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

5.0 MANUFACTURE:

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

The steel shall be fully killed.

Revision : 00

Date : 20.02.2013

Distribution

Qty.

Approved :

(S.K.Bhatia)

TME

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Prepared:

Checked:

Date:

TXM

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Rohit
(R.Chaudhry)

M. Verma
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20.02.2013

QTM

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6.0 FREEDOM FROM DEFECTS:

The castings shall be free from defects such as porosity, blow holes, sand inclusions, shrinkage, cavities, hard spots, cold shuts, cracks, etc., 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.

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 CHEMICAL COMPOSITION :

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

Element	Melt analysis, Percent, Max	Permissible variation, percent, max
* Carbon	0.45	+ 0.04
Silicon	0.60	+ 0.05
* Manganese	1.00	+ 0.10
Sulphur	0.050	+ 0.005
Phosphorus	0.050	+ 0.005

NOTE:

- * For each reduction of 0.01% carbon below the maximum specified, an increase of 0.04% manganese above the maximum specified shall be permitted upto a maximum of 1.1%.



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10.0 TEST SAMPLES:

Manufactures shall carryout mechanical testing as per following sampling plan.

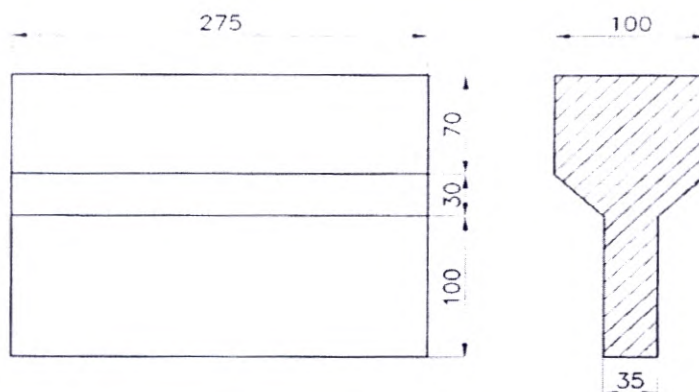
10.1 Unless otherwise specified for castings weighing up to 500 kg piece weight 3 keel blocks, separately cast per melt per heat treatment batch shall be supplied according to the sketch given below;

10.2 Unless otherwise specified, castings weighing more than 500 kg shall be provided with integrally cast keel blocks.

10.3 Retests shall be carried out as per IS: 8800.

10.4 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

11.0 MECHANICAL PROPERTIES:

The test pieces, after being heat treated as per clause CI. 6 above, shall show the following properties:

11.1 Tensile:

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

Tensile strength	: 540 N/mm ² , min
Yield strength	: 295 N/mm ² , min
Elongation on 5.65 $\sqrt{S_0}$ gauge length	: 14 percent, min



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11.2 Charpy Impact Value (V-Notch):

The test pieces shall show a Charpy Impact Value of 18.0 Joules at 20⁰ C, when tested to IS: 1757/BS 131 Part-2.

11.3 Hardness (Brinell): 160-205 HB.

12.0 NON-DESTRUCTIVE TESTS:

The following tests shall be conducted:

- i) Ultrasonic examination to BHEL standard AA 085 01 04/AA 085 01 05.
- ii) Liquid penetrant examination to BHEL standard AA 085 01 31.
- iii) Magnetic particle examination to BHEL standard AA 085 01 33 and norms of acceptance as per BHEL standard AA 085 01 34.

Norms of acceptance shall be as per level 2 of above referred BHEL standards.

13.0 REPAIR OF CASTINGS :

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

14.0 TEST CERTIFICATES :

Test certificates shall be supplied unless otherwise stated in BHEL 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) Details of heat treatment.
- iii) Chemical composition.
- iv) Results of mechanical tests.
- v) Results of NDT tests.



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15.0 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 shall be legibly marked or casting (when supplied separately) shall be punched, with the following information:

TM 10583: Carbon Steel Casting
BHEL PO No.
Consignment/Identification No.
Melt No.
Weight
Supplier's Name.

16.0 REJECTION AND REPLACEMENT :

If the castings do not comply with the requirements of this specification during receipt inspection at BHEL or if any defect is found during the course of preparation, machining, testing or erection such casting shall be rejected notwithstanding any previous certification of satisfactory testing and/or inspection.

The manufacturer shall replace the rejected castings at his own cost and the rejected castings shall be taken back by the supplier after fulfilling the commercial terms and conditions.



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ANNEXURE 1 – RECOMMENDED TEST CERTIFICATE FORMAT FOR CASTINGS

SUPPLIER'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. 0.5/0.2% Proof N/mm ²	% E on GL 5.65 VSO	% 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)

Date :

Signature & Seal of the Chief of Quality Control
Chief Metallurgist of the Supplier

Date :

INSTRUCTION:

- Test Certificates are to be furnished as per Purchase Order and Specifications.
- All the entries including signature should be in black Ink.
- If testing is done by outside agencies, the original TCs shall be furnished.
- The actual test Certificate may run into more than one A4 size paper, if needed, to facilitate filling up of details.

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