SPHEROIDAL OR NODULAR GRAPHITE IRON CASTINGS - Gr: 400/15

1.0 GENERAL

This specification governs the quality requirements of Spheroidal or Nodular Graphite Iron Castings having a tensile strength of 400 N/mm^2, minimum.

2.0 APPLICATION

Suitable for general engineering purpose.

3.0 CONDITION OF DELIVERY

As cast unless otherwise specified on BHEL order/drawing.
Castings may be supplied without heat treatment provided the properties are attained without heat treatment.

Castings shall not be painted.

4.0 COMPLIANCE WITH NATIONAL / INTERNATIONAL STANDARD

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

IS: 1865-1991 (Reaffirmed 2005) : Iron Castings with Spheroidal or Nodular Graphite Gr: SG 400/15

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 on 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 AA 023 04 02.

6.0 MANUFACTURE

The method of manufacture is left to the discretion of the manufacturer.

7.0 HEAT TREATMENT

Heat treatment, if considered necessary to attain the properties specified, is left to the discretion of the manufacturer. Record of heat treatment of each batch shall, however, be maintained by the manufacturer.

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 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.

When it is necessary to remove risers by flame cutting, care shall be taken to make the cut at 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 composition of iron is left to the discretion of the manufacturer. (But in special applications this may be agreed to between BHEL and manufacturer).

11.0 TEST SAMPLES:

Selection of test samples shall be in accordance with clause 10 and 11 of IS: 1865.

12.0 MECHANICAL PROPERTIES:

12.1 Tensile:

When tested in accordance with IS:1608, the test pieces (14 mm gauge diameter and 70 mm gauge length) shall show the following properties:

Property	Separately cast test sample	Integrally cast test sample, casting thickness, mm 30 to 60	61 to 200
Tensile strength, N/mm^2, min.	400	390	370
Proof stress, 0.2% N/mm^2, min.	250	250	240
Elongation, percent, min.	15	15	12

12.2 Hardness (Brinell):

130 to 180 HB

13.0 MICROSTRUCTURE (For information only):

Predominant structural constituent is Ferrite.

14.0 REPAIR OF CASTINGS:

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

15.0 TEST CERTIFICATES

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

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 19721: S.G Iron castings-Gr:400/15.
BHEL Order No.
Consignment/Identification No.
Melt No.
Weight
Supplier's Name

17.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 1865 2. AA 023 04 02

ANNEXURE 1 - RECOMMENDED TEST CERTIFICATE FORMAT FOR CASTINGS

SUPPLIERS'S NAME AND ADDRESS

1. Customer :
2. TC No. & Date :
3. PO No. :
4. Process of Melting :
5. Deoxidisation Process
6. Cast No. & Date :
7. Batch No. :
8. Heat Code :
9. Spec., No. :
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. 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 and Seal of the Chief of Quality Control
Chief Metallurgist of the Supplier.

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.