



**PLANT PURCHASING
SPECIFICATION
HYDERABAD**

HY10199

Rev. No. 03

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**CARBON STEEL BARS
(Gr. 15 C8)**

1.0 GENERAL:

This specification governs the quality of hot rolled/forged Carbon Steel bars of grade 15 C8.

2.0 APPLICATION :

For the manufacture of machined parts for general engineering purposes. Bars of dia 100 mm and above may be used for the manufacture of forged components also.

3.0 CONDITION OF DELIVERY :

3.1 Bars upto dia / size 100 mm (inclusive) shall be supplied in hot rolled condition.

3.2 Bars above 100 mm dia / size can be supplied in hot rolled or forged condition.

3.3 Bars upto 40 mm dia / size can be supplied in as rolled condition if the mechanical properties specified in this specification are achieved.

3.4 All the bars above 40 mm dia / size shall be supplied in Normalised condition.

3.5 The bars shall be supplied with ends square and true. The bars shall be supplied in straight lengths.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

This specification complies with

(1) IS: 1570 (Part II) – 1979] Schedules for Wrought Steels
Gr: 15 C 8] Part II Carbon Steels (unalloyed Steels)

(2) IS: 1875 – 1992 – Carbon steel bars for forgings.

Revisions:

Revised to include carbon steel bars for reforcing also.

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5.0 DIMENSIONS AND TOLERANCES:

5.1 Sizes: The bars shall be supplied to the dimensions specified on the order. Unless otherwise specified, Hot rolled bars / rounds shall be supplied in random lengths of 3 to 5 metres. However, the minimum length for Square bars shall be 4 metres.

Forged bars shall be supplied in the length of 1.5 to 3.0 meters.

5.2 Tolerances:

5.2.1 Hot rolled bars / flats: The dimensional tolerances shall be in accordance with Grade I of IS:3739.

5.2.2 Forged Bars: + 8 mm on diameter/side width.
- 0

5.2.3 Straightness: Unless otherwise agreed to, the permissible deviation in straightness shall not exceed 5 mm in any 1000 mm length.

5.2.4 The tolerance as per any other international standard are also acceptable with prior written approval of BHEL.

6.0 MANUFACTURE:

The steel shall be manufactured by the electric furnace, basic oxygen, duplex process or by a combination of these processes. The bars shall be manufactured from Killed steel.

Sufficient reduction and discard shall be made from each ingot to ensure freedom from piping, segregation and other harmful defects.

7.0 FREEDOM FROM DEFECTS:

The bars shall be sound and free from internal and surface defects like cracks, surface flaws and laminations.

8.0 HEAT TREATMENT :

The bars shall be normalised at a temperature of 880-910°C. The normalizing operation is optional for bars upto dia / size of 40 mm (inclusive).

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9.0 CHEMICAL COMPOSITION:

9.1 The melt analysis of the material shall be as follows:

Element		C	Mn	Si	S	P
Ladle Analysis	% Min.	0.10	0.60	0.15	-	-
	% Max.	0.20	0.90	0.35	0.030	0.040
Permissible variation in product analysis		± 0.02	± 0.05	± 0.03	+0.005	+0.005

Note: 1. When the steel is aluminium killed or killed with both aluminium and silicon, the requirement of minimum silicon content is not applicable.

9.2 The following elements shall be tested and reported in the test certificate. The limits are specified below.

Ni = 0.30% max. ; Cr = 0.30% max. ; Cu = 0.25% max.
Mo = 0.15% max. ; B = 0.0003% max. ; V = 0.05% max.
Sn = 0.05%

Note: (1) $(Cr + Ni + Mo \leq 0.50\%)$
(2) $(Cu\% + 10 \times Sn\% \leq 0.5\%)$
(3) Carbon Equivalent = 0.42% max.

10.0 SELECTION OF TEST SAMPLES:

10.1 One sample of each heat shall be analysed for chemical composition.

10.2 One sample from each melt / heat treatment batch / size shall be taken for mechanical testing. Location of the test sample shall be in line with IS 1875.

11.0 MECHANICAL PROPERTIES:

11.1 **Tensile :** When tested in according with IS : 1608, the test pieces shall show the following properties :

Tensile Strength : 410 N/mm², minimum
Yield strength : 220 N/mm², minimum
Elongation on
5.65 $\sqrt{S_0}$ gauge length : 25 percent min.

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11.2 Hardness: 10% of the bars or minimum 10 bars (whichever is more) shall be tested for hardness in accordance with IS 1500 or any other reputed national standard. The hardness shall not be less than 110 BHN.

12.0 ULTRASONIC TEST :

Each bar above 100 mm dia / side width shall be ultrasonically tested in accordance with AA 085 01 18 to ensure freedom from internal defects. The norms of acceptance shall be as per category 2 of the same.

13.0 TEST CERTIFICATES:

Three copies of the test certificate bearing the following information shall be furnished.

BHEL Order No :

BHEL Specification No : HY 10199 Rev. 03

Supplier's Name:

Cast No :

Results of Chemical analysis and Mechanical tests.

Results of ultrasonic test (if applicable)

14.0 PACKING AND MARKING:

Bars shall be supplied in securely packed bundles and shall be suitably protected from corrosion and damage during transit. Bars over 50 mm diameter shall be stamped at one end with cast number, HY10199, and BHEL P.O. for easy identification.

Bars of 50 mm diameter and below shall be bundled and a metal label shall be securely attached to each bundle bearing the following details:

HY 10199 Rev. 03 : Hot rolled Carbon Steel bars, Gr:15 C8

BHEL Order No:

Consignment or Identification No:

Cast No:

Size and Weight:

Supplier's name:

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