



CORPORATE PURCHASE SPECIFICATION

AA 101 09

Rev. No. 03

PAGE 1 OF 4

HOT ROLLED CARBON STEEL BARS (CLOSE TOLERANCES)

1.0 GENERAL

This specification governs the quality requirements of Hot Rolled Carbon Steel Bars having closed tolerances.

2.0 APPLICATION :

Production of machined parts (Note: AA 101 08 for general engineering purposes where close tolerances are not required).

3.0 CONDITION OF DELIVERY :

Hot Rolled .

Bars shall be supplied in straight lengths with ends square and true.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall comply with the requirements of the following National standard and also meet the requirements of this specification.

IS : 1570, (Part 2-Sec.1)-1979	:	Schedules for Wrought Steels- Part 2 :
(Reaffirmed 1998)	:	Carbon Steels (Unalloyed Steels) -Sec.1:
Gr : 20 C8 (C20), Hot rolled	:	Wrought products (other than wire) with
		specified Chemical Composition
		and related Properties.

5.0 DIMENSIONS AND TOLERANCES :

5.1 Dimensions:

5.1.1 Sizes:

Bars shall be supplied to the dimensions specified on BHEL order.

5.1.2 Length :

Bars shall be supplied in lengths of not less than 2.5 metres.

Revisions :

CI 24.4.3 of MOM of MRC-S&GPS

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Corp. R&D

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**5.2 Tolerances :**

The tolerances on bars shall be as follows:

5.2.1 On Size:

Diameter / width across flats, mm	Tolerance
Upto and including 20	— 0 + 0.38
Above 20	— 0 + 2 percent

5.2.2 Straightness :

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

6.0 MANUFACTURE:

The steel shall be manufactured by the open hearth, electric, basic oxygen or a combination of these processes.

Material shall be manufactured from killed steel.

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

7.0 FREEDOM FROM DEFECTS :

The bars shall be sound, straight and free from cracks, surface flaws, laminations, rough, jagged and imperfect wedges and internal & surface defects such as seams, laps and injurious imperfections. Bars shall be free from twists and bends.

8.0 CHEMICAL COMPOSITION :

The melt analysis of steel and the permissible variation in the composition of the material from the melt analysis shall be follows :

Element	Melt analysis, percent,		Permissible variation, percent,
	Min.	Max.	
Carbon	0.15	0.25	± 0.02
Silicon	0.05	0.35	± 0.03
Manganese	0.60	0.90	± 0.04
Sulphur	---	0.045	+ 0.005
Phosphorus	---	0.045	+ 0.005



CORPORATE PURCHASE SPECIFICATION

AA 101 09

Rev. No. 03

PAGE 3 OF 4

9.0 TEST SAMPLES :

9.1 Tensile :

Bars from the same melt and of the same size shall be grouped in batches of 40,000 kg or part thereof. One tensile test piece shall be cut from a selected bar from each batch.

For bars of sizes upto and including 40 mm, the test pieces shall be machined concentrically from the bars selected for test. Alternatively the full cross-section of the bars may be tested.

For bars of sizes over 40 mm the longitudinal axes of the test pieces shall not be less than 12.5 mm from the surface of the bars selected for test.

Tensile test pieces shall have a gauge length equal to $5.65 \sqrt{S_o}$.

9.2 Bend Test:

One bend test shall be carried out for every 40,000 kg or part thereof the bars of the same size and from the same melt.

The bend test pieces shall preferably be cut from bars already selected for tensile test.

Bars of sizes upto and including 20mm shall be tested full size and the edges may be rounded to a radius not exceeding 1.6mm.

Bars of sizes over 20mm shall be turned down to a diameter of 20mm.

10.0 MECHANICAL PROPERTIES :

10.1 Tensile:

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

Tensile strength : 440 - 520 N/mm²

Elongation on $5.65 \sqrt{S_o}$ gauge length : 24 percent , min.

10.2 Bend:

Bend test shall be conducted in accordance with IS:1599. The test piece shall be bent through an angle of 180°, until the internal radius is equal to the size of the test piece. It shall not break and shall be free from cracks on the outside as seen by an unaided eye. No account need be taken of small cracks appearing at the edges.

11.0 HARDNESS (BRINELL):

When tested in accordance with IS:1500, the material shall show a Brinell hardness in the range of 126 - 179 HB.

Note: Hardness test shall be conducted only when tensile test can not be performed.

**12.0 TEST CERTIFICATES :**

Three copies of test certificates shall be supplied, unless otherwise stated on the order.

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 :

AA 1011 09; Rev. No. 03

BHEL order No,

Supplier's Reference :

Name

Identification No.

Melt No.

Details of heat treatment.

Results of Tests :

Results of Dimensional inspection.

Results of chemical analysis and mechanical tests.

13.0 PACKING AND MARKING :

The material shall be suitably packed in bundles - hessian wrapped-to prevent sagging, corrosion and damage during transit. A suitable clear temporary rust preventive shall be applied on all the bars.

Each bar over 50 mm shall be stamped at one end with "AA 101 09", melt no., BHEL order No., at one end or on the end face.

Bars 50 mm and below shall be bundled together and tied with wire at 3 to 4 places along the length of the bars.

A metal label shall be securely attached to each bundle and shall bear the following information :

AA 101 09: Hot rolled carbon steel bars (Close tolerance).

BHEL Order No.

Consignment/Identification No.

Melt No.

Size and Weight.

Supplier's Name.

14.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 1500

2. IS : 1570, Part II, Sec.1

3. IS :1599

4. IS : 1608



CORPORATE PURCHASING SPECIFICATION

AA 107 25

Rev. No. 07

PAGE 1 OF 2

STAINLESS STEEL BARS (AUSTENITIC, Ti STABILIZED) SOLUTION ANNEALED (ASTM A 276M, TYPE 321)

ORDERING DESCRIPTION

1.0 GENERAL :

This specification governs the quality requirements of Stainless Steel Bars (Austenitic, Ti Stabilized), Solution Annealed to the latest version of ASTM A 276M, Type 321 and comply with the following additional requirements.

2.0 APPLICATION :

For application requiring acid, corrosion and heat resistance and weldability.

3.0 CONDITION OF DELIVERY:

Cold / Hot rolled and solution annealed . Above 100 mm size, forged bars are acceptable
 The ends of bars shall be square and true. The bars shall be supplied in straight lengths.

4.0 DIMENSIONS AND TOLERANCES

Bars shall be supplied to the dimensions specified on BHEL order. The tolerances on length, twist and straightness shall be as per ASTM A484M

5.0 CHEMICAL COMPOSITION :

As per ASTM A 276M, Type 321.

6.0 TEST CERTIFICATES :

Three copies of test certificates shall be supplied, unless otherwise stated on the order. 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 :

BHEL References :

AA 107 25-Rev. No.07 (ASTM A 276M, Type 321)
 BHEL order No,

Revisions :

Cl. 32.6.5 of MOM of MRC-S&GPS

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JUNE, 1978

Supplier's References :

Name

Identification No.

Melt No.

Details of heat treatment.

Result of Tests:

Dimensional inspection.

Results of chemical analysis, mechanical tests

7.0 PACKING AND MARKING :

Bars shall be suitably oiled and packed in boxes to prevent corrosion and damage during transit.

Each bar and flat over 50 mm in diameter or width across flats shall be stamped with 'AA 107 25 Rev 07(ASTM A 276M, Type 321)', melt No., BHEL order No., at one end or on the end face.

Bars bar/flat upto and including 50 mm in dia./width across flats shall be bundled together and tied with wire at 3 to 4 places along the length of the bars.

A metal label shall be securely attached to each bundle and shall bear the following information :

AA107 25 Rev 07 - Solution Annealed.(ASTM A 276M, Type 321)

BHEL Order No.

Consignment/Identification No.

Melt No.

Size and Weight.

Supplier's Name.

FOR INFORMATION ONLY**CHEMICAL COMPOSITION**

C	Si	Mn	Ni	Cr	S	P	Ti
≤ 0.08	≤ 1.0	≤ 2.0	9.0-12.0	17.0-19.0	≤ 0.030	≤ 0.045	5X(C+N)-0.70

Nitrogen content is to be reported for this grade.

MECHANICAL PROPERTIES

Hardness Max		0.2% PS min N/mm ²	UTS min N/mm ²	% El min	% Ra
HBS	HRC				
----	----	205	515	40	50

	CORPORATE PURCHASING SPECIFICATION			AA 107 30	
				Rev. No. 07	
				PAGE 1 OF 2	
AUSTENITIC STAINLESS STEEL SHEETS, PLATES AND STRIPS - SOLUTION ANNEALED (ASTM A 240M, TYPE 316 L) ↑					
<u>ORDERING DESCRIPTION</u>					
1.0 GENERAL:					
The sheets, plates and strips shall conform to the latest version of ASTM A 240M, Type 316 L and comply with the following additional requirements.					↑
2.0 APPLICATION:					
For general engineering purposes, where corrosion resistance is essential.					
3.0 CONDITION OF DELIVERY:					
Hot/Cold rolled, solution annealed and descaled (Finish number 1 or 2 B/2D).					
4.0 DIMENSIONS AND TOLERANCES:					
Material shall be supplied to the dimensions specified in BHEL order.					
5.0 CHEMICAL COMPOSITION :					
As per ASTM A 240M, Type 316 L.					↑
6.0 TEST CERTIFICATES :					
Three copies of test certificates shall be supplied along with the following information:					
<u>BHEL References :</u>					
AA 107 30 -Rev. No.07 / ASTM A 240M, Type:316 L BHEL order No,					↑
<u>Supplier's References :</u>					
Name Identification No. Melt No. Process of manufacture Details of heat treatment.					
<u>Result of Tests:</u>					
Dimensional inspection. Results of chemical analysis, mechanical tests					
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**7.0 PACKING AND MARKING:**

Sheets shall be supplied in bundles or in packages each weighing upto a maximum of 3000kg. Plates shall be suitably packed to prevent damage during transit.

For plates below 25 mm thick, each pile (preferably of 16 plates) shall be marked with suppliers identification mark, 'AA 107 30 / ASTM A 240 M, Type:316 L, melt No., BHEL order No., on the top plate.

Each plate of 25mm thickness and above shall be stamped/painted with the suppliers identification mark, 'AA 107 30 / ASTM A 240 M, Type:316 L , melt No., BHEL order No., on the top plate

FOR INFORMATION ONLY**CHEMICAL COMPOSITION :**

C	Si	Mn	Ni	Cr	Mo	S	P	N
≤ 0.03	≤ 0.75	≤ 2.0	10.0-14.0	16.0-18.0	2.0-3.0	≤ 0.030	≤ 0.045	≤ 0.10

MECHANICAL PROPERTIES :

Hardness Max		0.2% PS min	UTS min	% El min	Cold Bend	î
BHN	HRB	N/mm ²	N/mm ²			
217	95	170	485	40	-	



CORPORATE PURCHASING SPECIFICATION

AA10755

Rev No. 09

PAGE 1 of 2

SEAMLESS STAINLESS STEEL PIPES (AUSTENITIC, Ti STABILIZED) (ASTM A312, TP321)

ORDERING DESCRIPTION FOR ASTM A312, TP321

1.0 GENERAL:

The pipes shall conform to the latest version for ASTM A312, TP 321 and comply with the following additional requirements.

2.0 APPLICATION

For corrosion resistant applications.

3.0 DIMENSIONS AND TOLERANCES:

3.1 Sizes:

Pipe outside diameter and wall thickness shall be as specified in BHEL order. Unless otherwise specified, pipes shall be supplied in lengths of not less than 4.5 metres.

3.2 TOLERANCES:

As per ASTM A999.

4.0 MANUFACTURE:

Either hot finished or cold drawn.

5.0 CHEMICAL COMPOSITION:

As per ASTM A312, TP 321.

6.0 MECHANICAL PROPERTIES:

As per ASTM A 312 TP 321.

7.0 HYDROSTATIC TEST/ NDT:

Each length of pipe shall be subjected to Hydrostatic test as per ASME SA530.

As an alternative to the Hydrostatic test, each length of pipe shall be subjected to NDT as given below:

- a) For thickness upto 3.6mm, inclusive, Eddy current test as per ASTM E309 or for thickness upto 12mm, inclusive, Flux leakage test as per ASTM E570.

or

- b) Ultrasonic test as per ASME SE213.

Norms of acceptance shall be as specified in the respective standards mentioned above.

Revisions:

As per Cl 39.16 of 39th MOM of MRC – S&GPS

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CORPORATE PURCHASING SPECIFICATION



8.0 INSPECTION AT SUPPLIER'S WORKS:

BHEL's representative shall have free access at all times to all parts of the manufacture's works, until the work on the contract of BHEL is being performed. The manufacturer shall offer BHEL's representative all reasonable facilities, without charge, to satisfy the latter that the material is being furnished in accordance with the specification.

9.0 REPAIRS:

9.1 Repair involving fusion welding is prohibited.

9.2 When defects are repaired by mechanical means, the wall thickness requirements shall be satisfactorily met with and the surfaces shall be smoothly dressed up without any sharp edges.

10.0 CERTIFICATION:

Test certificate shall be as per ASTM A999.

11.0 PACKING AND MARKING:

As per BHEL Standard AA0490001.

12.0 REJECTION AND REPLACEMENT:

If each length of pipe does not comply with the requirements of this specification during receipt inspection at BHEL or if any defect is found during further processing of pipes BHEL reserves the right to reject the whole consignment and the supplier shall replace the material free of cost. The rejected material shall be taken back by the supplier after fulfilling the commercial terms and conditions.

FOR INFORMATION ONLY

CHEMICAL COMPOSITION

C	Si	Mn	Ni	Cr	S	P	Ti	N
≤ 0.08	≤ 1.0	≤ 2.0	9.0 – 12.0	17.0 – 19.0	≤ 0.030	≤ 0.045	5XC-0.70	≤ 0.10

MECHANICAL PROPERTIES

Wall Thickness	0.2% PS min N/mm ²	UTS min N/mm ²	% El min	
			Longitudinal	Transverse
≤ 9.52 cm	205	515	35	25
>9.52 cm	170	415	35	25