



CORPORATE PURCHASING SPECIFICATION

AA10108

Rev No. 11

PAGE 1 of 2

STRUCTURAL STEEL-STANDARD QUALITY

(PLATES, SECTIONS, STRIPS, FLATS & BARS)

(ORDERING DESCRIPTION)

1.0 GENERAL:

This specification governs the quality requirements of structural steel plates, strips, flats, bars and sections such as angles, beams, channels and tees etc. of IS: 2062 – 2011, Gr: E250, Quality A

2.0 APPLICATION:

For general engineering purpose.

3.0 CONDITION OF DELIVERY:

Plates, Bars & Sections: Hot rolled in straight lengths without twists & Bends

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

Material shall comply with the requirements of IS: 2062 – 2011, Gr: E250, Quality A

Material offered to EN 10025-2:2004 Gr. S275JR is also acceptable. The tolerance on dimensions for plates shall comply with EN 10029.

5.0 DIMENSIONS AND TOLERANCES:

5.1 DIMENSIONS:

5.1.1 Sizes

Material shall be supplied to the dimensions specified on BHEL Order.

5.1.2 Length

Unless otherwise specified, hot rolled bars and sections shall be supplied in 3 to 6 metres length.

5.2 Tolerances:

5.2.1 The tolerances on hot rolled material shall comply with IS: 1852. However, no plate shall be under the specified thickness at any point.

Revisions:
As per Cl. No. 38.1 of MOM of MRC-S&GPS

APPROVED:
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC(S&GPS)

Rev No.11	Amd No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue
Dt:22-02-2014	Dt:	Year:	HPEP, Hyderabad	Corp.R&D	July, 1976

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5.2.2 Straight for hot rolled bars:

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

6.0 HARDNESS (BRINELL):

When tested in accordance with IS: 1500, the material shall show a brinell hardness in the range of 120-156 HB.

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

7.0 TEST CERTIFICATES:

Unless otherwise specified, three copies of test certificates shall be supplied.

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.

AA10108 Rev.11 / IS:2062 Grade: E250 Quality A / EN 10025-2 Gr. S275JR,

BHEL order no., Melt no. Size, Results of chemical analysis and Mechanical tests, Supplier's name, Identification no. TC no., Signature of competent authority etc.

8.0 PACKING AND MARKING:

Plates shall be transported suitably to avoid damage during transit.

For plates below 10 mm thick, each pile (preferably of 16 plates) and each plate 10 mm thick & over shall be marked with melt no. AA10108, BHEL order no., Supplier's name, Identification no., Size & weight on any one corner and encircled with paint preferably of white colour.

9.0 REFERRED STANDARDS (Latest publications including amendments):

1) IS: 1500

2) IS: 1852

3) EN 10029



CORPORATE PURCHASE SPECIFICATION

AA 102 08

Rev. No. 07

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HOT ROLLED / FORGED CARBON STEEL BARS, Gr: 40 C8-NORMALISED**1.0 GENERAL**

This specification governs the quality requirements of Hot Rolled / forged Carbon Steel Bars, Normalised.

2.0 APPLICATION

Production of machined parts for general engineering purposes.

3.0 CONDITION OF DELIVERY

Hot Rolled / forged and Normalised.

Note: Sizes upto 100mm in hot rolled
>100 to 180mm in hot rolled or forged
abov 180mm in forged.

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

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

Material shall comply with the requirements of the following National Standards and also meet the requirements of this specification.

IS : 1570-Part II, Section 1-1979 : Schedule for wrought Steels-Carbon steels
Gr:40C8 (C40), Normalised : (Unalloyed Steels)

5.0 DIMENSION AND TOLERANCES**5.1 Sizes**

Bars shall be supplied to the dimensions in BHEL order.

5.2 Length:

Unless otherwise specified, hot rolled bars shall be supplied in 3 to 6 metres length and forged bars shall be supplied in lengths of 1.5 to 3 metres

Revisions :

Cl 26.6.18 of MOM of MRC-S&GPS

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Dt :

Year: 2013

BHOPAL

Corp. R&D

AUGUST, 1976

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5.2 Tolerances:

5.2.1 For Forged bars: The tolerances shall be as per Cl 5.2.2 for bars $\leq 100\text{mm}$.
The tolerances shall be $+8\text{ mm} -0\text{ mm}$ for bars $> 100\text{ mm}$

5.2.2 Tolerances on hot rolled bars shall comply with those of Grade 2 of IS:3739: Dimensional Tolerances for Carbon and Alloy Constructional Steel Products, reproduced below:

5.2.2.1 Round Square Bars:

Nominal Size mm		Tolerances, mm	
Over	Up to & Including	Permissible deviation	Out of round / square
--	25	± 0.50	0.50
25	50	± 0.75	0.75
50	80	± 1.00	1.00
80	100	± 1.25	1.25
> 100		$\pm 1.6\%$ of diameter or width of side	75 % of total tolerance (+ and -)

5.2.2.2 Flats:

Nominal width, mm		On width	Tolerance, mm		
Over	Up to & Including		On thickness		
			6 to 13	Over 13 to 25 including	Over 25 to 50 including
--	50	± 1.0	± 0.5	± 0.8	± 1.0
50	100	± 2.0	± 0.5	± 1.0	± 1.5
100	150	± 3.0	---	---	± 2.0

5.2.3 Straightness:

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

6.0 MANUFACTURE:

Material shall be manufactured from fully killed steel.



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7.0 FREEDOM FROM DEFECTS :

The bars shall be sound, straight and free from internal and surface defects such as seams, laps, cracks or any other defects which may impair the end use.

Bars shall be free from twists and bends.

8.0 HEAT TREATMENT :

The bars shall be normalised at a temperature of 830 - 860°C

9.0 CHEMICAL COMPOSITION :

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

Element	<u>Melt analysis, percent</u>		Permissible Variation, percent
	Min.	Max.	
Carbon	0.35	0.45	± 0.02
Silicon	0.10	0.35	± 0.03
Manganese	0.60	0.90	± 0.04
Sulphur	---	0.035	+ 0.005
Phosphorus	---	0.035	+0.005

10.0 TEST SAMPLES :

10.1 One sample shall be taken from each melt for chemical analysis.

10.2 One sample shall be taken from each heat treatment batch for testing of mechanical properties. Test pieces for mechanical tests shall be taken in the longitudinal direction of the piece.

10.3 For ruling section upto & including 40mm, the test piece shall be machined coaxially from the test bars. For ruling section above 40mm the longitudinal axis shall be atleast 12.5 mm from surface of the test bars.

Test methods for determining mechanical properties shall be as per IS:1608 (For tensile test).

11.0 MECHANICAL PROPERTIES (IN NORMALISED CONDITION) :

Mechanical properties of the material shall be as follows:

Tensile strength : 580 - 680 N/mm²

Yield strength : 320 N/mm², min

Elongation on 5.65 √So : 18%, min.

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12.0 ULTRASONIC TEST:

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

12.2 **Optional tests:** If specified on order, each bar > 40 to 100mm shall be tested ultrasonically in accordance with BHEL standard AA 085 01 18 to ensure freedom from internal defects and the norms of acceptance shall be as per category 2.

13.0 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 102 08; Rev. No. 07: Hot rolled /forged carbon steel bars, Gr.:40 Normalised
 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, mechanical tests & Ultrasonic test.

14.0 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 of 50 mm and above shall be stamped with AA 102 08, melt no, BHEL order no, at one end or on the end face.

Bars below 50mm 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 102 08 : Hot Rolled / Forged Carbon Steel Bars, 40C8-Normalised.
 BHEL Order No.
 Consignment/Identification No.
 Melt No.
 Size and Weight.
 Supplier's Name.

15.0 REFERRED STANDARDS (Latest Publications Including amendments):

1. IS : 1570 Part II	2. IS : 1608	3. IS : 3739	4. AA 085 01 18
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CORPORATE PURCHASING SPECIFICATION

AA10501

Rev No. 14

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1.5% NICKEL-CHROMIUM-MOLYBDENUM HOT ROLLED/FORGED STEEL BARS- H & T

1.0 GENERAL:

This specification governs the quality requirements of 1.5% Nickel-Chromium-Molybdenum Hot rolled/forged Steel Bars, Gr: 40Ni6Cr4Mo3 in Hardened and Tempered condition.

2.0 APPLICATION:

For the manufacture of bolts, studs and various components of machines.

3.0 CONDITION OF DELIVERY:

Hot Rolled / Forged; Hardened and tempered.

Note: Sizes up to 100mm in hot rolled
>100 to 180mm in hot rolled or forged
above 180mm in forged

The ends of bars shall be reasonably square and true.

The bars shall be supplied in straight lengths without twists and bends.

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: 5517 – 1993 Gr: 40Ni6Cr4Mo3, Type: J
Hardened & Tempered

Steels for Hardening and Tempering -
Specification

5.0 DIMENSIONS AND TOLERANCES:

5.1 Sizes: Bars shall be supplied to the dimensions specified on the order.

5.1.1 Length: Unless otherwise specified, hot rolled bars shall be supplied in 3 to 6 metres length or in multiples with maximum 10%, shorts down to 1 metre.

Forged bars shall be supplied in lengths of 1.5 to 3.0 metres

Revisions:

Revised as per email dt 18.12.08 from Shri Gopal Bhatt from Bhopal.

APPROVED:

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC(S&GPS)

Rev No.14

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Dt:

Year:2020

HEP, Bhopal

Corp.R&D

April, 1977

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Rev No. 14

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5.2 Tolerance:

5.2.1 Hot rolled bars: The bars shall not vary from specified diameter or distance across flats by more than $\pm 2\frac{1}{2}$ %.

5.2.2 Forged bars: The tolerance on the forged bars shall be as follows.

<u>Diameter, mm</u>	<u>Tolerance, mm</u>
50 mm to 175 mm	+ 8.0 mm
Above 175 mm	+ 12.5 mm

Note: (Hot rolled & forged bars).

Insignificant surface defects in the form of dent and ripple marks are permissible provided their depth does not exceed half the tolerance on each size.

6.0 MANUFACTURE:

Material shall be manufactured from fully killed steel.

7.0 HEAT TREATMENT:

The recommended heat treatment is as follows:

Harden in oil / water from a temperature of 830 – 850°C.

Temper at a suitable temperature between 550 – 660°C.

8.0 FREEDOM FROM DEFECTS:

The bars shall be sound, straight and free from internal and surface defects, such as seams, laps, cracks or any other defects which may impair the end use.

9.0 CHEMICAL COMPOSITION:

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

Element	Melt analysis percent		Permissible variation, percent, in product analysis
	Min.	Max.	
Carbon	0.35	0.45	± 0.02
Silicon	0.10	0.35	± 0.03
Manganese	0.40	0.70	± 0.04
Nickel	1.25	1.75	± 0.05
Chromium	0.90	1.30	± 0.05
Molybdenum	0.20	0.35	± 0.03
Sulphur	---	0.035	+ 0.005
Phosphorus	---	0.035	+ 0.005

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10.0 TEST SAMPLES:																																						
10.1 One sample shall be taken from each melt for chemical analysis.																																						
10.2 One sample shall be taken from each heat treatment batch for testing of mechanical properties. Test pieces for mechanical tests shall be taken in the longitudinal direction of the piece. For ruling section up to & including 40mm, the test piece shall be machined coaxially from the test bars. For ruling section above 40mm the longitudinal axis shall be at least 12.5 mm from surface of the test bars. Test methods for determining mechanical properties shall be as per IS: 1598 (For IZOD impact test)/IS: 1757 (For impact test in ISO-V Charpy) and IS: 1608 (For tensile test) or any other reputed International Standard.																																						
10.3 For ruling section above 200mm, tensile test samples can be taken in tangential or transverse direction.																																						
11.0 MECHANICAL PROPERTIES (In Hardened and Tempered Condition):																																						
<table><tr><th>Ruling section, mm</th><th>Tensile strength, N/mm²</th><th>0.2%/PS/YS N/mm² min</th><th>%E 5.65√S₀ min</th><th>* IZOD impact J, min</th><th>Hardness ** BHN</th></tr><tr><td>up to 30</td><td>1200, min</td><td>1000</td><td>10</td><td>30 (25)</td><td>360 – 420</td></tr><tr><td>> 30 to = 63</td><td>1100 – 1250</td><td>880</td><td>11</td><td>41 (35)</td><td>330 – 390</td></tr><tr><td>> 63 to = 100</td><td>1000 – 1150</td><td>800</td><td>13</td><td>48 (42)</td><td>300 – 350</td></tr><tr><td>>100 to = 150</td><td>900 – 1050</td><td>700</td><td>15</td><td>55 (50)</td><td>270 – 300</td></tr><tr><td>>150</td><td>800 – 950</td><td>600</td><td>16</td><td>55 (50)</td><td>240 – 285</td></tr></table> * Average of 3 samples applicable for sizes above 16 mm ruling section only. Values in bracket are in ISO - V Charpy. ** Hardness shall be reported for information only.			Ruling section, mm	Tensile strength, N/mm ²	0.2%/PS/YS N/mm ² min	%E 5.65√S ₀ min	* IZOD impact J, min	Hardness ** BHN	up to 30	1200, min	1000	10	30 (25)	360 – 420	> 30 to = 63	1100 – 1250	880	11	41 (35)	330 – 390	> 63 to = 100	1000 – 1150	800	13	48 (42)	300 – 350	>100 to = 150	900 – 1050	700	15	55 (50)	270 – 300	>150	800 – 950	600	16	55 (50)	240 – 285
Ruling section, mm	Tensile strength, N/mm ²	0.2%/PS/YS N/mm ² min	%E 5.65√S ₀ min	* IZOD impact J, min	Hardness ** BHN																																	
up to 30	1200, min	1000	10	30 (25)	360 – 420																																	
> 30 to = 63	1100 – 1250	880	11	41 (35)	330 – 390																																	
> 63 to = 100	1000 – 1150	800	13	48 (42)	300 – 350																																	
>100 to = 150	900 – 1050	700	15	55 (50)	270 – 300																																	
>150	800 – 950	600	16	55 (50)	240 – 285																																	
12.0 ULTRASONIC TEST:																																						
12.1 Each bar above 100 mm shall be tested ultrasonically in accordance with BHEL standard AA0850118 to ensure freedom from internal defects. The norms of acceptance shall be as per category 2 of the above standard.																																						
12.2 Optional tests: If specified on order, each bar > 40 to 100 mm shall be tested ultrasonically in accordance with BHEL standard AA0850118 to ensure freedom from internal defects and the norms of acceptance shall be as per category 2.																																						

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13.0 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 dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

BHEL References:

AA10501, Rev.No.14: 1.5% Nickel-Chromium-Molybdenum Hot Rolled/Forged Steel Bars- H&T
BHEL order No,

Supplier's References:

Name:

Identification No:

Melt No:

Details of heat treatment:

Result of Tests:

Dimensional inspection.

Results of chemical analysis, mechanical and & Ultrasonic tests.

14.0 PACKING AND MARKING

The bars shall be suitably packed in bundles to prevent corrosion and damage during transit.

Each bar equal to or greater than 50 mm in diameter or of equivalent cross sectional area shall be stamped with 'AA10501' and melt number on the side near the end or on the face.

Bars below 50 mm 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:

AA10501: 1.5% Nickel-Chromium-Molybdenum Hot Rolled/Forged Steel Bars- H & T.

BHEL Order No.:

Consignment/Identification No.:

Melt No.:

Size and Weight:

Supplier's Name:

15.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 1598

2. IS: 1608

3. IS: 1757

4. IS: 5517

5. AA0850118



CORPORATE STANDARD

AA7153106

Rev No.05

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NUTS, CASTLE, HEXAGON, PRODUCT Gr.A, COARSE PITCH, STEEL, PROPERTY CLASS 4 (M12 – M36)

1.0 DESIGNATION:

A Product Gr:A, hexagon, steel castle nut, thread M12, coarse pitch and conforming to property class 4 shall be designated as:

1.1 On Drawings:

- i) Material specification column : AA7153106
- ii) Description Column : NUT CSL HEX A M12-4

1.2 On Indents: Nut Castle Hex A M12-4: AA7153106

1.3 For issuing enquiries and on purchase orders:

While issuing enquiries and purchase orders, delete BHEL standard number from the above description and add the information given under clause 2.0

2.0 COMPLIANCE WITH STANDARDS:

2.1 Dimensions, Tolerances & General Requirements

As per IS:2232-1967

2.2 Mechanical properties:

To conform to property Class 4, as specified in table 5 & 6 of IS:1367, Part-6

2.3 Threads

Pitch – coarse to IS:4218, Part-2

Tolerance quality – Medium

Tolerance class – 6H

2.4 Identification Marking: As stated in clause 9 of IS:1367, Part-6

2.5 Surface Discontinuity: As per IS:1367, Part-10

2.6 Finish: Plated as specified in BHEL order.

Revisions:
Clause No. 31.2 of MOM of MRC-F

APPROVED:
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC(F)

Rev No.05

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Dt:

Year:2019

HPEP, Hyderabad

Corp.R&D

January 1977

AA7153106

Rev. No.05

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CORPORATE STANDARD**3.0 NOTE:**

- 3.1** For screw threads, general (Metric) refer BHEL standard AA0231800
- 3.2** For tolerance grade, position and class refer to BHEL standard AA0230201
- 3.3** Nuts to this standard would be un-plated, divisions wishing to have plated screws would have to get them plated.
- 3.4** Weights given in this standard are for general reference only and are not meant for commercial transactions.
- 3.5** When fasteners are to be tested with in BHEL, the sampling and acceptance plan shall be as per IS:1367, Part 17

4.0 REFERRED STANDARDS (Latest publications including amendment):

- | | | |
|--------------------------|--------------|------------------|
| 1) IS:1367 Pt 6, 10 & 17 | 2) IS:2232 | 3) IS:4218, Pt 2 |
| 4) AA0230201 | 5) AA0231800 | |

EXPLANATORY NOTE**The following changes have been made in the revision:**

- Clause 2.1, Reaffirmation year 2006 is added.
- Clauses 2.2 & 2.3 year of referred standards is removed.
- Clauses 2.5 & 2.6 are added.
- Clause 4.0, IS:1367, Part-10 is added.
- Figure-1 and Table-1 are modified as per IS:2232-1967, Reaffirmed 2006
- Clause 2.4 renumbered as 2.6



CORPORATE STANDARD

AA7153106

Rev. No.05

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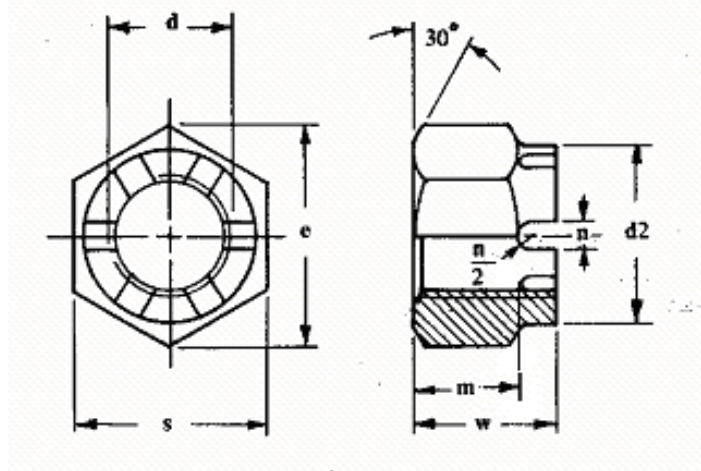


Fig. 1

TABLE-1

All dimensions in 'mm'

Thread Size d	Across Flats	Thickness		Castellated Portion Dia	Slot Width	Sub code
	s	w h14	m h15	d ₂ h14	n H14	Weight
	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	
M12	19.00	15.00	10.00	17.00	3.80	014
	18.67	14.57	8.42	16.57	3.50	18.2
M16	24.00	19.00	13.00	22.00	4.80	022
	23.67	18.48	12.30	21.46	4.50	35.31
M20	30.00	22.00	16.00	28.00	4.80	030*
	29.67	21.48	15.30	27.48	4.50	67.97
M24	36.00	27.00	19.00	34.00	5.80	049
	35.33	26.48	18.16	33.38	5.50	118.94
M30	46.00	33.00	24.00	42.00	7.36	057
	45.38	32.38	23.16	41.38	7.00	243.70
M36	55.00	38.00	29.00	50.00	7.36	065
	54.26	37.38	28.16	49.38	7.00	412.43

Note:

- Corporate sub code numbers are shown above.
- Weights have been shown in kg per 1000 Nos.

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WASHERS, SPRING LOCK, SINGLE COIL, RECTANGULAR SECTION, TYPE - A (WITH BENT ENDS) STEEL

1 DESIGNATION

A single coil, rectangular section, spring lock washer, Type-A (with bent ends) for right hand threads, of nominal size 5 mm, and made of steel shall be designated as:

1.1 On Drawings

- i) Material specification column: AA7164001
- ii) Description column: WASHER SPRING LOCK SC A 5-ST

1.2 On Indents

Washer Spring Lock A 5- AA7164001

1.3 For issuing enquiries and on purchase orders

While issuing enquiries and purchase orders, delete the corporate standard No, from the above description and add the information given under clause 2.

2 COMPLIANCE WITH STANDARDS

2.1 Dimensions, Tolerances & General Requirements

To IS 3063-1994, Type A (Table-1A) Reaffirmed 2010

2.2 Material

Spring steel Gr. 3 to Gr.6 as specified in IS 4072

2.3 Heat Treatment and Hardness

Spring Lock washer after coiling shall be suitably heat treated, so as to result in the finished washer having a hardness in the range of 430 - 530 HV

2.4 Finish

As specified in BHEL order.

Revisions: As per clause 33.5.a) of MOM of MRC-Fasteners			APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC (F)		
Rev. No. 05	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue
Dt: 14-03-2016	Dt:	Year:	HPEP, Hyderabad	Corp. R&D	01-04-1993

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3 NOTE

- 3.1 For washers spring lock (Type-B) refer corporate standard AA7164002.
- 3.2 Lock washers to this standard would be un-plated, divisions wishing to have plated washers would have to get them plated.
- 3.3 Weights given in this standard are for general reference only and are not meant for commercial transactions.
- 3.4 When the fasteners are to be tested within BHEL, the following sampling plan shall be followed for physical properties.

LOT SIZE	SAMPLE SIZE	ACCEPTANCE No.
Up to 1000	5	0
1001 – 3000	8	0
3001 - 10000	13	0
10000 – 35000	20	0
Over 35000	32	1

4 Referred Standards (Latest Publications including amendments)

- 1) AA7164002
- 2) IS 4072

EXPLANATORY NOTE

The following changes have been made in this revision:

- Clause 2.1, year of Reaffirmation of **IS** changed as IS 3063-1994, Reaffirmed 2010



CORPORATE STANDARD

AA7164001

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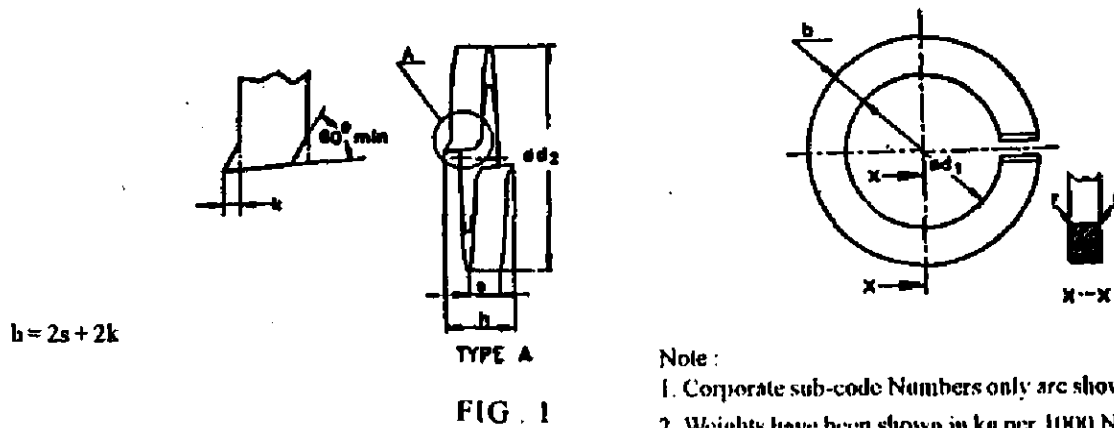


Table 1

All dimensions are in 'mm'

Nom. size	Internal Diameter d_1		Outside Dia d_2 Max.	Width b		Thickness s		Radius r Nom.	Bent End k^*	For Bolt Nut or Screw Size	Sub code	Weight
	Basic	Tol. +		Basic	Tol. ±	Basic	Tol. ±					
2	2.1	0.3	4.4	0.9	0.1	0.5	0.1	0.1	-	M2		0.033
2.2	2.3	0.3	4.8	1.0	0.1	0.6	0.1	0.1	-	M2.2		0.050
2.5	2.6	0.3	5.1	1.0	0.1	0.6	0.1	0.1	-	M2.5		0.052
3.0	3.1	0.3	6.2	1.3	0.1	0.8	0.1	0.2	0.15	M3	014	0.11
4.0	4.1	0.3	7.6	1.5	0.1	0.9	0.1	0.2	0.15	M4	022	0.18
5.0	5.1	0.3	9.2	1.8	0.1	1.2	0.1	0.2	0.15	M5	030	0.36
6.0	6.1	0.4	11.8	2.5	0.15	1.6	0.1	0.3	0.2	M6	049	0.83
8.0	8.1	0.4	14.8	3.0	0.15	2.0	0.1	0.5	0.3	M8	057	1.60
10.0	10.2	0.5	18.1	3.5	0.2	2.2	0.15	0.5	0.3	M10	065	2.53
12.0	12.2	0.5	21.1	4.0	0.2	2.5	0.15	1.0	0.4	M12	073	3.82
16.0	16.2	0.8	27.4	5.0	0.2	3.5	0.2	1.0	0.4	M16	081	8.91
20.0	20.2	1.0	33.6	6.0	0.2	4.0	0.2	1.0	0.4	M20	090	15.2
24.0	24.5	1.0	40.0	7.0	0.25	5.0	0.2	1.6	0.5	M24	103	26.2
30.0	30.5	1.2	48.2	8.0	0.25	6.0	0.2	1.6	0.8	M30	111	44.3
36.0	36.5	1.2	58.2	10.0	0.25	6.0	0.2	1.6	0.8	M36		67.3
42.0	42.5	1.2	68.2	12.0	0.25	7.0	0.25	2.0	0.8	M42		111
48.0	49.0	1.5	75.0	12.0	0.25	7.0	0.25	2.0	0.8	M48		123
52.0	53.0	1.5	83.0	14.0	0.25	8.0	0.25	2.0	1	M52		182
56.0	57.0	1.5	87.0	14.0	0.25	8.0	0.25	2.0	1	M56		193
60.0	61.0	1.5	91.0	14.0	0.25	8.0	0.25	2.0	1	M60		203
64.0	65.0	1.5	95.0	14.0	0.25	8.0	0.25	2.0	1	M64	120	218

The bend "k" shall be made on the last length of the washer circumference without any sharp angle.

	CORPORATE STANDARD	AA7164002
		Rev. No. 06
		PAGE 1 of 3

WASHERS, SPRING LOCK, SINGLE COIL, RECTANGULAR SECTION, TYPE-B (WITH FLAT ENDS), STEEL

1.0 DESIGNATION

A single coil, rectangular section, spring lock washer, Type-B (with flat ends) for right hand threads, of nominal size 5 mm, and made of steel shall be designated as

1.1 On Drawings

- i) Material specification column - AA7164002
- ii) Description column - WASHER SPRING LOCK SC B5 – St

1.2 On Indents

Washer Spring Lock B5; AA7164002

1.3 For issuing enquiries and on purchase orders

While issuing enquiries and purchase orders, delete the BHEL Standard No. from the above description and add the information given under clause 2.0

2.0 COMPLIANCE WITH STANDARDS

2.1 Dimensions, Tolerances and General Requirements

To IS: 3063-1994, Reaffirmed 2010 Type-B (Table – 1A)

2.2 Material

Spring steel Gr.3 to Gr.6, as specified in IS: 4072

2.3 Heat Treatment and Hardness

Spring washer after coiling shall be suitably heat treated, so as to result in the finished washer having hardness in the range of 430-530 HV

2.4 Finish

Unplated.

Revisions: As per clause 32.2 of MOM of MRC-F			APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC (F)		
Rev. No. 06	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue
Dt: 06-09-2014	Dt:	Year:	HPEP, Hyderabad	Corp. R&D	01-01-1977

AA7164002

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CORPORATE STANDARD**3.0 NOTE**

- 3.1** For washers spring lock, Type-A refer BHEL Corporate Standard AA7164001
- 3.2** Lock washers to this standard would be unplated, divisions wishing to have plated washers would have to get them plated.
- 3.3** Weights given in this standard are for general reference only and are not meant for commercial transactions.
- 3.4** When the fasteners are to be tested within BHEL, the following sampling and acceptance plan based on IS: 6821 (Table-1) shall be followed as detailed below for physical properties.

Lot Size	Sample Size	Acceptance No.
Up to 1000	5	0
1001-3000	8	0
3001-10000	13	0
10001-35000	20	0
Over 35000	32	1

4.0 Referred standards (Latest Publications including Amendments)

- 1) IS: 4072
- 2) AA7164001
- 3) IS: 6821



CORPORATE STANDARD

AA7164002

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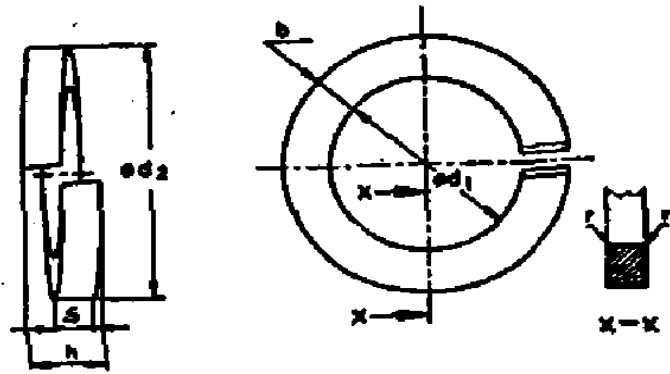


FIG-1

Note:

- 1) Corporate sub code numbers only are shown in Table-1
- 2) Weights have been shown in kg per 1000 Nos.

TABLE-1

All dimensions are in 'mm'

Nom size	Internal Dia. d_1		Outside Dia. d_2	Width b		Thickness s		Radius r	For Bolt, Nut or Screw size	Sub-Code	Weight
	Basic	Tol +	Max.	Basic	Tol $\pm$	Basic	Tol $\pm$	Nom.			
2	2.1	0.3	4.4	0.9	0.1	0.5	0.1	0.1	M2		0.033
2.2	2.3	0.3	4.8	1.0	0.1	0.6	0.1	0.1	M2.2		0.050
2.5	2.6	0.3	5.1	1.0	0.1	0.6	0.1	0.1	M2.5		0.053
3.0	3.1	0.3	6.2	1.3	0.1	0.8	0.1	0.2	M3	010	0.11
4.0	4.1	0.3	7.6	1.5	0.1	0.9	0.1	0.2	M4	029	0.18
5.0	5.1	0.3	9.2	1.8	0.1	1.2	0.1	0.2	M5	037	0.36
6.0	6.1	0.4	11.8	2.5	0.15	1.6	0.1	0.3	M6	045	0.83
8.0	8.1	0.4	14.8	3.0	0.15	2.0	0.1	0.5	M8	053	1.60
10.0	10.2	0.5	18.1	3.5	0.2	2.2	0.15	0.5	M10	061	2.53
12.0	12.2	0.5	21.1	4.0	0.2	2.5	0.15	1.0	M12	070	3.82
16.0	16.2	0.8	27.4	5.0	0.2	3.5	0.2	1.0	M16	088	8.91
20.0	20.2	1.0	33.6	6.0	0.2	4.0	0.2	1.0	M20	096	15.2
24.0	24.5	1.0	40.0	7.0	0.25	5.0	0.2	1.6	M24	100	26.2
30.0	30.5	1.2	48.2	8.0	0.25	6.0	0.2	1.6	M30	118	44.3
36.0	36.5	1.2	58.2	10.0	0.25	6.0	0.2	1.6	M36	126	67.3
42.0	42.5	1.2	68.2	12.0	0.25	7.0	0.25	2.0	M42		111
48.0	49.0	1.5	75.0	12.0	0.25	7.0	0.25	2.0	M48		123
52.0	53.0	1.5	83.0	14.0	0.25	8.0	0.25	2.0	M52		182
56.0	57.0	1.5	87.0	14.0	0.25	8.0	0.25	2.0	M56		193
60.0	61.0	1.5	91.0	14.0	0.25	8.0	0.25	2.0	M60		203
64.0	65.0	1.5	95.0	14.0	0.25	8.0	0.25	2.0	M64		218



CORPORATE STANDARD

AA7171089

Rev. No. 07

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PINS, SPLIT, STEEL

1 DESIGNATION

A split pin of nominal size 5mm, nominal length 50mm and made of steel shall designated as:

1.1 On drawings

- i) Material specification column : AA7171089
- ii) Description column : PIN SPLIT 5 X 50 – ST

1.2 On indents

Pin split 5 x 50: AA7171089

1.3 For issuing enquiries and on purchase orders

While issuing enquiries and purchase orders, delete BHEL standard number from the above description and add the information given under clause 2.

2 COMPLIANCE WITH STANDARDS

2.1 Dimensions, Tolerances and General requirements

As per IS 549: 2005, Table-1.

2.2 Material

Half round mild steel wire, as per IS 10794.

2.3 Finish

The end of each leg shall be bevelled and shall free from burrs. The eyes shall be as round in shape as possible and shall bend into the legs without sharp notches.

Revisions: Clause 2.1

APPROVED:

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC (Fasteners)

Rev. No. 07	Amd. No.	Reaffirmed	Prepared EDN, Bangalore	Issued Corp. R&D	Dt. of 1 st Issue 01-01-1977
Dt: 18-03-2022	Dt:	Year:			

AA7171089

Rev. No. 07

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CORPORATE STANDARD**3 NOTE**

3.1 Length and diameter combination (refer Table-1 on page 3 of 3) between the bold lines should only be used.

3.2 Nominal length (L) is the distance from underside of the eye to the extreme end of the short leg.

3.3 Nominal size is the diameter of the hole for receiving the split pin.

3.4 Weights given in this standard are for general reference only and are not meant for commercial transactions.

3.5 When fasteners are to be tested with in BHEL, sampling and acceptance plan as per IS 6821, Table-2 shall be followed for physical properties:

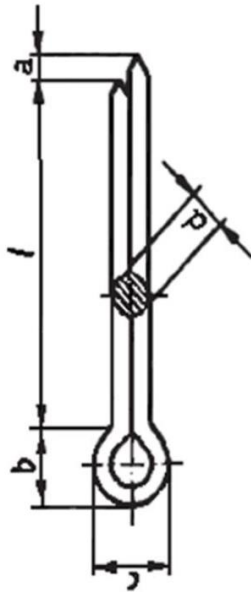
LOT SIZE	SAMPLE SIZE	ACCEPTANCE No
Upto 1000	5	0
1001 – 3000	8	0
3001 – 10000	13	0
10001 – 35000	20	0
Over 35000	32	1

4 REFERRED STANDARDS (Latest publications including amendments):

- 1) IS 549
- 2) IS 6821
- 3) IS 10794



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2) Weights have been shown in kg/1000 Nos.

Table - 1	All dimensions are in mm
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[illegible]