भारतीय मानक
Indian Standard

IS 6911 : 2017

स्टेनलैस इस्पात की प्लेट, चद्दरें तथा पत्तियाँ — विशिष्टि

(दूसरा पुनरीक्षण)

Stainless Steel Plate, Sheet and Strip — Specification

(Second Revision)

ICS 77.140.20; 77.140.50

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
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Alloy Steels and Forgings Sectional Committee, MTD 16

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Alloy Steels and Forgings Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1972 and subsequently revised in 1992. Keeping in view the manufacturing and trade practices followed in the country in this field, the main modifications made in this revision are as follows:

a) Twenty one new grades of stainless steel has been incorporated into the standard;
b) Corresponding properties of all the grades have been added in the standard;
c) Duplex stainless steel category has been included; and
d) Steel designation category based on numerical symbol in line with International practices has been included.

This standard contains clauses which call for an agreement between the purchaser and the supplier.

Such clauses are **4.2, 5.2, 8.1, 8.2, 9.0, 9.1.2, 10.5, 11.1, 13.1, 14.1, 14.3, 15.3, 16.1, 17.1, 18.1** and **20.1**.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

STAINLESS STEEL PLATE, SHEET AND STRIP — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard covers the requirements for stainless and commonly used heat resisting steel plate, sheet and strip.

1.2 The requirements of stainless steel sheets and strips for the manufacture of utensils have been covered in IS 5522 and IS 15997.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
228	Method for chemical analysis of steel (issued in various parts)
1500 (Part 1) : 2013	Metallic materials — Brinell hardness test: Part 1 Test method (*fourth revision*)
1501 (Part 1) : 2013	Metallic materials — Vickers hardness test: Part 1 Test method (*fourth revision*)
1586 (Part 1) : 2012	Metallic materials — Rockwell hardness test: Part 1 Test method (Scales A, B, C, D, E, F, G, H, K, N, T) (*fourth revision*)
1599 : 2012	Method for bend test (*second revision*)
1608 : 2005	Tensile testing of steel products (*first revision*)
1762 (Part 1) : 1974	Code for designation of steels : Part 1 Based on letter symbols (*first revision*)
1956 (Part 4) : 2013	Glossary of terms relating to iron and steel: Part 4 steel sheet and strip
5522 : 2014	Stainless steel sheets and strips for utensils (*second revision*)
8910 : 2010	General technical delivery requirements for steel and steel products
10175 : 2012	Modified erichsen cupping test for metallic sheet and strip
10461	Method for determination of resistance to intergranular corrosion of austeniti stainless steel:
(Part 1) : 1994	Corrosion tests in nitric acid medium by measurement of loss in mass (Huey Test)
(Part 2) : 1994	Part 2 Copper sulphate, sulphuric acid test (Monypenny Straus Test).
15997 : 2012	Low nickel austenitic stainless steel sheet and strip for utensils and kitchen appliances — Specification

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 1956 (Part 4) shall apply.

4 SUPPLY OF MATERIAL

4.1 General requirements relating to the supply or material shall be in accordance with IS 8910.

4.2 Steels covered by the standard shall be ordered and delivered on the basis of the following:

a) Chemical composition;
b) Chemical composition, and hardness and / or bend test in the annealed condition;
c) Chemical composition, hardness, tensile and bend test (when applicable) in the annealed condition; and
d) Chemical composition and mechanical properties in any other condition as agreed to between the purchaser and the supplier.

4.3 Information to be Given by the Purchaser

4.3.1 *Basis for Order*

While placing an order for the purchase of material covered by this standard, the purchaser should specify the following:

a) Designation of stainless steel;
b) Form (plate, sheet or strip);

c) Quantity (mass or number);
d) Nominal dimensions — thickness, width and length (for cut lengths);
e) Condition (hot rolled, cold rolled, annealed or any other treatment);
f) Finish (in case of ground/polished or any other special finish to specify whether finish is required on one or both surfaces):
g) Method of manufacture, if any specified;
h) Edge condition;
j) Test and test reports;
k) Any other special requirements including end use; and
m) Specific marking and packing requirements, if any.

5 MANUFACTURE

5.1 Unless otherwise agreed in order, the processes used in making the steel and the product are left to the discretion of the manufacturer. When so desired, the purchaser shall be informed of the steel making process.

5.2 Unless otherwise agreed to between the purchaser and the supplier and stated in the order, material shall be supplied with mill edge. Material with trimmed edge may be accepted with mutual agreement between the purchaser and the supplier.

6 FREEDOM FROM DEFECTS

6.1 The material shall be of uniform quality consistent with the good manufacturing and inspection practices. The steel shall not have defects of a nature or degree that will be detrimental to the intended end use.

6.2 Material of Zero (0) and No.1 finish may be supplied in ground condition, provided such grinding does not reduce the thickness and width at any point beyond the permissible variations in dimensions.

7 CHEMICAL COMPOSITION

7.1 Ladle Analysis

The chemical composition of the steel as determined on the ladle sample for each cast shall conform to the requirements of Table 1 (*see also* Note under Table 1).

The analysis of the steel shall be carried out according to IS 228 and its relevant parts or any other established instrumental/chemical method. In case of dispute the procedure given in IS 228 and its relevant parts shall be referee method.

7.2 Product Analysis

In case of product analysis, the permissible variation from the limits specified in Table 1 shall be as given in Table 2.

8 HEAT TREATMENT

8.1 Unless otherwise mutually agreed to between the purchaser and the supplier, the austenitic stainless steels shall be supplied in solution annealed and descaled condition.

8.2 The ferritic and martensitic stainless steels shall be supplied in annealed and descaled condition unless otherwise agreed between the purchaser and the supplier.

8.3 Martensitic stainless steels can subsequently be heat treated for use in hardened and tempered condition.

8.4 The recommended heat treatment for steels covered in this standard is given in Table 3.

9 SAMPLING

9.0 Unless otherwise agreed between the purchaser and the supplier, the sampling shall be as follows.

9.1 Chemical Analysis

9.1.1 Ladle analysis shall be supplied by the supplier.

9.1.2 If the product analysis is required by the purchaser, the sampling procedure for the product analysis shall be agreed to between the purchaser and the supplier.

9.2 Sampling for Mechanical Tests

In case of material annealed in coil form through continuous annealing lines, at least one sample shall be taken from each end of the coil for carrying out tests. Hardness test is to be carried out on samples collected from both ends. Hardness may be tested by either Brinell or Rockwell test method.

At least one tensile test, one bend test (when required) and Erichsen cupping test (If required) shall be carried out for each coil. In case, there is a difference in hardness by more than 5 HRB or 30 HBS/HBW between samples collected at both ends, tensile properties shall be determined on both the samples.

In case of material annealed in pieces, one tensile test, one bend test (when required) , one or more hardness tests and Erichsen cupping test (if required) shall be carried out on each 100 or less number or pieces of the same cast and same nominal thickness annealed as a lot or annealed continuously.

10 MECHANICAL PROPERTIES

10.1 Tensile Test

The tensile test shall be carried out in accordance with IS 1608.

Table 1 Chemical Composition, Percent
(*Clauses* 7.1 *and* 7.2)

Sl No.	Grade Designation	Numerical Symbol ISS	C *Max*	Si, *Max*	Mn	Ni	Cr	Mo	S, *Max*	P, *Max*	N	Others
	Letter Symbol [*see* IS 1762 (Part 1)]											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	*Ferritic Steels*											
1)	X 04Cr12Al	405	0.08, *Max*	1.00	1.00, *Max*	0.60, *Max*	11.5-14.5	–	0.030	0.040	–	Al 0.10-0.30
	X 07Cr17	430	0.12, *Max*	1.00	1.00, *Max*	0.75, *Max*	16.0-18.0	–	0.030	0.040	–	–
2)	X 02Cr12TiNb	409	0.030, *Max*	1.00	1.00, *Max*	0.50, *Max*	10.5–11.7	–	0.020	0.040	0.030, *Max*	Ti 6x (C+N), *Min* — 0.50 *Max*; Nb 0.17, *Max*
3)	X 02Cr12	409 M	0.030, *Max*	1.00	0.50-1.50	1.50, *Max*	10.5-12.5	–	0.030	0.040	–	–
4)	X 04Cr12	410 S	0.08, *Max*	1.00	1.00, *Max*	0.60, *Max*	11.5–13.5	–	0.030	0.040	–	–
5)	X 02Cr18Ti	439	0.030, *Max*	1.00	1.00, *Max*	0.50, *Max*	17.0-19.0	–	0.030	0.040	0.030, *Max*	Ti [0.2+4 (C+N)], *Min* — 1.1, *Max*; Al 0.15, *Max*
ii)	*Martensitic Steels*											
1)	X 12Cr12	410	0.08-0.15	1.00	1.00, *Max*	0.75, *Max*	11.5-13.5	–	0.030	0.040	–	–
2)	X 20Cr13	420 S1	0.16-0.25	1.00	1.00, *Max*	1.00, *Max*	12.0-14.0	–	0.030	0.040	–	–
3)	X 30Cr13	420 S2	0.26-0.35	1.00	1.00, *Max*	1.00, *Max*	12.0-14.0	–	0.030	0.040	–	–
4)	X 40Cr13	420 S3	0.35-0.45	1.00	1.00, *Max*	1.00, *Max*	12.5-14.0	–	0.030	0.040	–	–
5)	X 15Cr16Ni2	431	0.10-0.20	1.00	1.00, *Max*	1.25·2.50	15.0-17.0	–	0.030	0.045	–	–
6)	X 108Cr17Mo	440	0.95-1.20	1.00	1.00, *Max*	0.50, *Max*	16.0-18.0	0.75, *Max*	0.030	0.045	–	–
iii)	*Austenitic Steels*											
1)	X 10Cr17Mn6Ni4N20	201	0.15, *Max*	1.00	5.5-7.5	3.5·5.5	16.0-18.0	–	0.030	0.060	0.25, *Max*	–
2)	X 07Cr17Mn12Ni4	201 A	0.12, *Max*	1.00	10.0-14.0	3.5-5.5	16.0.18.0	–	0.030	0.090	0.25, *Max*	–
3)	X 10Cr18Mn9Ni5	202	0.15, *Max*	1.00	7.5-10.0	4.0·6.0	17.0-19.0	–	0.030	0.060	0.25, *Max*	–
4)	X 10Cr17Ni7	301	0.15, *Max*	1.00	2.00, *Max*	6.0-8.0	16.0-18.0	–	0.030	0.045	0.10, *Max*	–
5)	X 07Cr18Ni9	302	0.15, *Max*	0.75	2.00, *Max*	8.0-10.0	17.0-19.0	–	0.030	0.045	0.10, *Max*	–
6)	X 02Cr17Ni7	301 L	0.03, *Max*	1.00	2.00, *Max*	6.0-8.0	16.0-18.0	–	0.030	0.045	0.20, *Max*	–
7)	X02Cr17Ni7N	301 LN	0.03, *Max*	1.00	2.00, *Max*	6.0-8.0	16.0-18.0	–	0.030	0.045	0.07-0.20	
	X04Cr19Ni9	304 S1	0.07, *Max*	0.75	2.00, *Max*	8.0-10.5	17.5-19.5	–	0.030	0.045	0.10, *Max*	–
8)	X 02Cr19Ni10	304 S2	0.030, *Max*	0.75	2.00	8.0.12.0	17.5-19.5	–	0.030	0.045	0.10, *Max*	–
9)	X 07Cr19Ni9	304 H	0.04-0.10	0.75	2.00, *Max*	8.0-10.5	18.0-20.0	–	0.030	0.045	–	–
10)	X 02Cr19Ni10N	304 LN	0.030, *Max*	0.75	2.00, *Max*	8.0-12.0	18.0-20.0	–	0.030	0.045	0.10-0.16	–

Table 1 — (*Concluded*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
11)	X 04Cr19Ni9N	304 N	0.08, *Max*	0.75	2.00, *Max*	8.0-10.5	18.0-20.0	–	0.030	0.045	0.10-0.16	–
12)	X15Cr24Ni13	309	0.20, *Max*	1.5	2.00, *Max*	11.0-15.0	22.0-25.0	–	0.030	0.045		
13)	X 04Cr23Ni14	309 S	0.08, *Max*	0.75	2.00, *Max*	12.0-15.0	22.0-24.0	–	0.030	0.045	–	–
14)	X20Cr25Ni20	310	0.25, *Max*	2.50	2.00, *Max*	18.0-21.0	24.0-26.0		0.030	0.045		
15)	X 04Cr25Ni20	310 S	0.08, *Max*	1.50	2.00, *Max*	19.0-22.0	24.0-26.0	–	0.030	0.045	–	–
16)	X 04Cr17Ni12Mo2	316	0.08, *Max*	0.75	2.00, *Max*	10.0-14.0	16.0-18.0	2.0-3.0	0.030	0.045	0.10, *Max*	–
17)	X 02Cr17Ni12Mo2	316 L	0.030, *Max*	0.75	2.00, *Max*	10.0-14.0	16.0-18.0	2.0-3.0	0.030	0.045	0.10, *Max*	–
18)	X 07Cr17Ni12Mo2	316 H	0.04-0.10	0.75	2.00, *Max*	10.0-14.0	16.0-18.0	2.0-3.0	0.030	0.045	–	–
19)	X 02Cr17Ni12Mo2N	316 LN	0.030, *Max*	0.75	2.00, *Max*	10.0-14.0	16.0-18.0	2.0-3.0	0.030	0.045	0.10-0.16	–
20)	X 04Cr19Ni13Mo3	317	0.08, *Max*	0.75	2.00, *Max*	11.0-15.0	18.0-20.0	3.0-4.0	0.030	0.045	0.10	–
21)	X 02Cr19Ni13Mo3	317 L	0.030, *Max*	0.75	2.00, *Max*	11.0-15.0	18.0-20.0	3.0-4.0	0.030	0.045	0.10,, *Max*	–
22)	X 04Cr17Ni12Mo2Ti	316 Ti	0.08, *Max*	0.75	2.00, *Max*	10.0·14.0	16.0-18.0	2.0-3.0	0.030	0.045	0.10,, *Max*	Ti 5x (C + N), *Min* — 0.70, *Max*
23)	X 04Cr18Ni10Ti	321	0.08, *Max*	0.75	2.00, *Max*	9.0-12.0	17.0-19.0	–	0.030	0.045	0.10,, *Max*	Ti 5 x(C + N), *Min* — 0.70, *Max*
24)	X 04Cr18Ni10Nb	347	0.08, *Max*	0.75	2.00, *Max*	9.0-13.0	17.0-19.0	–	0.030	0.045	–	Nb 10xC — 1.00, *Max*
25)	X 10Cr15Mn9Cu2Ni1N	N1	0.12, *Max*	0.75	8.5-10.5	1.0-2.0	14.5-16.0	–	0.030	0.080	0.08-0.20	Cu 1.5-2.50
26)	X 8Cr16Mn8Cu2Ni2N	N2	0.10, *Max*	1.00	6.5-9.0	1.5-3.5	15.5-17.0	–	0.030	0.070	0.10-0.25	Cu 2.0-4.0
27)	X 8Cr16Mn7Cu2Ni4N	N3	0.09, *Max*	0.75	6.0-8.0	4.0-6.0	16.0-17.5	–	0.030	0.070	0.05-0.15	Cu 1.5-2.50
iv)	*Duplex*											
1)	X 02Cr22Ni6Mo3N	2205	0.030, *Max*	1.00	2.00, *Max*	4.5-6.5	22.0-23.0	3.0-3.5	0.020	0.03	0.14-0.20	
2)	X 02Cr23Ni4CuN	2304	0.030, *Max*	1.00	2.50, *Max*	3.0-5.5	21.5-24.5	0.05-0.6	0.030	0.04	0.05-0.20	Cu 0.05-0.60
3)	X 02Cr25Ni7Mo4CuN	2507	0.030, *Max*	0.80	1.20, *Max*	6.0-8.0	24.0-26.0	3.0-5.0	0.020	0.035	0.24- 0.32	Cu 0.50, *Max*

Constituent	*Limits, Percent,, Max*		
	Ferritic and Martensitic Steels	Austenitic Steels	
		Without Specified Molybdenum	With Specified Molybdenum
Titanium	—	0.10	0.10
Niobium	—	0.20	0.20
Molybdenum	0.30	0.70	—
Copper	0.30	0.50	0.70

Table 2 Permissible Variation Between Specified Analysis and Product Analysis
(*Clause* 7.2)

Sl No.	Element	Limits of Ladle Analysis as Shown in Table 1, Percent		Permissible Deviation[1)] Percent
		Over	Up to and Including	
(1)	(2)	(3)	(4)	(5)
i)	C	—	0.030	+ 0.005
		0.030	0.20	± 0.01
		0.20	0.60	± 0.02
		0.60	1.20	± 0.03
ii)	Si	—	1.0	+ 0.05
		—	1.0-2.5	± 0.10
iii)	Mn	—	1.0	+ 0:03
		1.0	2.5	± 0.04
		3.0	6.0	± 0.05
		6.0	10.0	± 0.06
		10.0	14.0	±.0.10
iv)	Al	—	0.30	+ 0.05
v)	Cr	10.0	15.0	± 0.15
		15.0	20.0	± 0.20
		20.0	30.0	± 0.25
vi)	Mo	—-	0.60	+ 0.03
		0.60	1.75	± 0.05
		1.75	3.0	± 0.10
vii)	Ni	—	1.0	+ 0.03
		1.0	5.0	± 0.07
		5.0	10.0	± 0.10
		10.0	20.0	± 0.15
		20.0	30.0	± 0.20
viii)	N	0.15	0.35	+ 0.02
ix)	Ti	—	1.0	+ 0.05
x)	Nb	—	1.2	+ 0.05
xi)	S	—	0.040	+ 0.005
		0.04	0.20	+ 0.01
		0.20	0.50	+ 0.02
xii)	P	—	0.040	+ 0.005
		0.040	0.10	+ 0.010

*The use of '+'means that in one cast the deviation may occur over the upper value or under the lower value of the specified range in the table but not both at the same time.

Table 3 Recommended Heat Treatment for Stainless Steels
(*Clauses* 8.4 *and* 14.2)

Sl No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Softening[1)]	Symbols[2)]	Hardening Temperature °C	Quenching Media for Hardening	Tempering Temperature °C
	Letter Symbol [*see* IS 1762 (Part 1)]	Numerical Symbol ISS							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	*Ferritic Steels*								
1)	X 04Cr12Al	405	A	750 to 800	f, a				
2)	X 07Cr17	430	A	750 to 850	w, a				
3)	X 02Cr12TiNb	409	A	800 to 1050	w, a	-	-	-	-
4)	X 02Cr18Ti	439	SA	800 to 1050	w, a	-	-	-	-
5)	X 02Cr12Ni	409 M	A	700 to 820	f, w, a	-	-	-	-
6)	X 04Cr12	410 S	A	700 to 850	f, w, a	-	-	-	-
ii)	*Martensitic Steels*								
1)	X 12Cr12	410	A1	700 to 780	f, a	Q+T	950 to 1 000	o, a	700 to 750
			A2	770 to 870	f, a				
2)	X 20Cr13	420 S1	A	770 to 870	f, a	Q+T	980 to 1 030	o, a	650 to 770
3)	X 30Cr13	420 S2	A	770 to 870	f, a	Q+T1	980 to 1 030	o, a	630 to 700
						Q + T2	980 to 1 030	o, a	100 to 250
4)	X40Cr13	420 S3	A	770 to 870	f, a	Q + T	1 000 to 1 050	o, a	100 to 250
5)	X 15Cr16Ni2	431	A	750 to 800	f, a	Q+T	980 to 1 030	o, a	630 to 700
			S	620 to 670	f, a				
6)	X 108Cr17Mo	440	A	780 to 880	f, a	Q+T	1 000 to 1 030		100 to 250
iii)	*Austenitic Steels*								
1)	X 10Cr17Mn16Ni4N20	201	SA	1 000 to 1 120	w, a				
2)	X 07Cr17Mn12Ni4	201 A	SA	1 000 to 1 120	w, a	-	-	-	-
3)	X 10Cr18Mn9Ni5	202	SA	1 000 to 1 120	w, a	-	-	-	-
4)	X 10Cr17Ni7	301	SA	1 000 to 1 120	w, a	-	-	-	-
5)	X 02Cr17Ni7	301 L	SA	1 000 to 1 120	w, a	-	-	-	-
6)	X 02Cr17Ni7N	301 LN	SA	1 000 to 1 120	w, a	-	-	-	-
7)	X 07Cr18Ni9	302	SA	1 000 to 1 120	w, a	-	-	-	-
8)	X 04Cr19Ni9	304 S1	SA	1 000 to I 120	w, a	-	-	-	-
9)	X 02Cr19Ni10	304 S2	SA	1 000 to 1 120	w, a	-	-	-	-
10)	X 07Cr19Ni9	304 H	SA	1 000 to 1 120	w, a	-	-	-	-
11)	X 02Cr19Ni10N	304 LN	SA	1 000 to 1 12 0	w, a	-	-	-	-
12)	X 04Cr19Ni9N	304 N	SA	1 000 to 1 120	w, a	-	-	-	-
13)	X15Cr24Ni13	309	SA	1 000 to 1 120	w, a	-	-	-	-
14)	X 04Cr23Ni14	309 S	SA	1 000 to 1 120	w, a	-	-	-	-
15)	X20Cr25Ni20	310	SA	1 000 to 1 120	w, a				
16)	X 04Cr25Ni20	310 S	SA	1 000 to 1 120	w, a	-	-	-	-
17)	X 04Cr17Ni12M02	316	SA	1 000 to 1 120	w, a	-	-	-	-
18)	X 02Cr17Nil2Mo2	316 L	SA	1 000 to 1 120	w, a	-	-	-	-
19)	X 07Cr17Ni12Mo2	316 H	SA	1000 to 1 120	w, a	-	-	-	-
20)	X 02Cr17Ni12Mo N	316 LN	SA	1 000 to 1 120	w, a	-	-	-	-
21)	X 04Cr19Ni13Mo3	317	SA	1 000 to 1 120	w, a	-	-	-	-

Table 3 — (*Concluded*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
22)	X 02Cr19Ni13Mo3	317 L	SA	1 000 to 1 120	w, a	-	-	-	-
23)	X 04Cr17Ni12Mo2Ti	316 Ti	SA	1 000 to 1 120	w, a	-	-	-	-
24)	X 04Cr18Ni10Ti	321	SA	1 000 to 1 120	w, a	-	-	-	-
25)	X 04Cr18Ni10Nb	347	SA	1 000 to 1 120	w, a	-	-	-	-
26)	X10Cr15Mn9Cu2Ni1N	N1	SA	950 to 1 100	w, a	-	-	-	-
27)	X8Cr16Mn8Cu2Ni2N	N2	SA	950 to 1 100	w, a	-	-	-	-
28)	X8Cr16Mn7Cu2Ni4N	N3	SA	950 to 1 100	w, a	-	-	-	-
iv)	*Duplex*								
1)	X 02Cr22Ni6Mo3N	2205	SA	1 040, *Min*	w, a	-	-	-	-
2)	X 02Cr23Ni4CuN	2304	SA	980, *Min*	w, a	-	-	-	-
3)	X 02Cr25Ni7Mo4CuN	2507	SA	950 to 1 100	w, a	-	-	-	-

[1] f = furnace, a = air, o = oil, and w = water.

[2] SA = Solution Annealing, A = Annealing, Q = Quenching, T = Tempering, and S = Softening.
Austenitic Stainless Steels 200 and 300 series needs to be rapidly cooled during Quenching.

10.2 Hardness Test

The hardness test shall be carried out in accordance with IS 1500 (Part 1), IS 1501 (Part 1) and IS 1586 (Part 1).

10.3 Bend test, if required, shall be carried out in accordance with IS 1599.

10.3.1 Bend test piece shall be cut so that the axis of the bend is parallel to the direction of rolling, that is, the longer, axis of the test piece shall be at 90° to the direction of rolling.

The test piece shall be bent cold through 180° around a mandrel with diameter Dma as given in Table 4. The test piece shall be deemed to have passed the test, if the outer convex surface is free from cracks.

10.4 The material supplied in annealed condition and tested as per **10.1** shall conform to the requirements of Table 4.

Indicative hardness values for martensitic stainless steels (cutlery steels) after suiTable heat treatments are given in Table 5.

10.5 If agreed to between the purchaser and the supplier material can be supplied in cold rolled (work hardened) condition with higher strength and hardness characteristics.

Mechanical properties for certain work hardened austenitic grades of stainless steels shall be in accordance with Table 6 or any other value mutually agreed to between the purchaser and the supplier.

11 ERICHSEN CUPPING TEST

11.1 Subject to agreement between the purchaser and the supplier, one Erichsen cupping test shall be carried out for annealed material in accordance with IS 10175 and the sample plan shall be given in **9.2**.

11.2 Where sheets of more than one thickness are rolled from the same cast and heat treated in one lot, one additional cupping test shall be made for each thickness of sheet.

11.3 Cupping test shall be applicable for material to be used for deep drawing and extra deep drawing applications up to a thickness of 1.25 mm. The minimum Erichsen values shall be as given in Table 7.

12 CORROSION RESISTANCE

If required by the purchaser, the material shall be tested for corrosion resistance as specified in IS 10461 (Part 1) and IS 10461 (Part 2).

13 OTHER TESTS

Any test, other than those specified in this standard, may be conducted subject to mutual agreement between the purchaser and the supplier.

14 RETESTS

14.1 Retests for Chemical Analysis

If the results of the chemical analysis do not conform to the requirements given in Table 1 and Tables 2; unless otherwise agreed to between the purchaser and the supplier, two new samples shall be taken on different pieces from the same cast. Should the two analysis satisfy the requirements, the lot represented shall be accepted. If either of the samples fails, the material shall be taken as not complying with this standard.

14.2 Retest for Mechanical Properties

Should any of the original test pieces fail to satisfy the

Table 4 Mechanical Properties in Annealed Condition

(*Clauses* 10.3.1 *and* 10.4)

Sl No.	Grade Designation		Hardness, *Max*		Yield Strength *Min*, MPa 0.2% Proof Stress	Tensile Strength *Min,* MPa	Elongation % *Min* 50 mm	Bend Test DMA
	Letter Symbol [*see* IS 1762 (Part I)]	Numerical Symbol ISS	Brinell HBS/HBW	Rockwell HRB				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	X04Cr12Al	405	179	88	170	415	20	2a*
ii)	X07Cr17	430	183	89	205	450	22	2a*
iii)	X12Cr12	410	217	96	205	450	20	Not required
iv)	X20Cr13	420 S1	225	95	—	700, *Max*	15	Not required
v)	X30Cr13	420 S2	235	97	—	740, *Max*	15	Not required
vi)	X40Cr13	420 S3	240	98	—	760, *Max*	12	Not required
vii)	X15Cr16Ni2	409	285	29[A]	—	—	—	Not required
viii)	X10Cr17Mn6Ni4N20	409 M	217	95	260	515	40	Not required
ix)	X07Cr17Mn12Ni4	410 S	217	95	260	540	40	Not required
x)	X10Cr18Mn9Ni5	431	241	100	260	620	40	Not required
xi)	X10Cr15Mn9Cu2Ni1N	201	241	100	345	650	40	Not required
xii)	X8Cr16Mn8Cu2Ni2N	201 A	241	100	310	650	40	Not required
xiii)	X8Cr16Mn7Cu2Ni4N	202	241	100	275	600	40	Not required
xiv)	X10Cr17Ni7	N1	217	95	205	515	40	Not required
xv)	X02Cr17Ni7	N2	241	100	220	550	45	Not required
xvi)	X02Cr17Ni7N	N3	241	100	240	550	45	Not required
xvii)	X07Cr18Ni9	301	201	92	205	515	40	Not required
xviii)	X04Cr19Ni9	301 L	201	92	205	515	40	Not required
xix)	X02Cr19Ni10	301 LN	201	92	170	485	40	Not required
xx)	X07Cr19Ni9	302	201	92	205	515	40	Not required
xxi)	X02Cr19Ni10N	304 S1	217	95	205	515	40	Not required
xxii)	X04Cr19Ni9N	304 S2	217	95	240	550	30	Not required
xxiii)	X15Cr24Ni13	304 H	217	95	210	490	40	Not required
xxiv)	X04Cr23Ni14	304 LN	217	95	205	515	40	Not required
xxv)	X20Cr25Ni20	304 N	217	95	210	490	40	Not required
xxvi)	X04Cr25Ni20	309	217	95	205	515	40	Not required
xxvii)	X04Cr17Ni12Mo2	309 S	217	95	205	515	40	Not required
xxviii)	X02Cr17Ni12Mo2	310	217	95	170	485	40	Not required
xxix)	X04Cr17Ni12Mo2Ti	310 S	217	95	205	515	40	Not required
xxx)	X07Cr17Ni12Mo2	316	217	95	205	515	40	Not required
xxxi)	X02Cr17Ni12Mo2N	316 L	217	95	205	515	40	Not required
xxxii)	X04Cr19Ni13Mo3	316 Ti	217	95	205	515	35	Not required
xxxiii)	X02Cr19Ni13Mo3	316 H	217	95	205	515	40	Not required
xxxiv)	X04Cr18Ni10Ti	316 LN	217	95	205	515	40	Not required
xxxv)	X04Cr18Ni10Nb	317	201	92	205	515	40	Not required
xxxvi)	X02Cr12TiNb	317 L	179	88	170	380	20	a*
xxxvii)	X02Cr12	321	180	88	280	450	18	a*
xxxviii)	X04Cr12	347	183	89	205	415	22	a*
xxxix)	X02Cr18Ti	439	183	89	205	415	22	a*
xl)	X02Cr22Ni6Mo3N	2205	293	32*	450	655	25	Not required
xli)	X02Cr23Ni4CuN	2304	290	32[A]	400	600	25	Not required
xlii)	X02Cr25Ni7Mo4CuN	2507	310	34[A]	550	795	15	Not required

a * = thickness of the test piece.

Table 5 Hardness Values for Cutlery Steels
(*Clause* 10.4)

Sl No.	Grade Designation		Annealed HBS/ HBW, *Max*	Quenched and Tempered Hardness, *Min*	
	Letter Symbol [*See* ISS IS 1762 (Part 1)]	Numerical Symbol		HV	HRC
(1)	(2)	(3)	(4)	(5)	(6)
i)	X30Cr13	420 S2	241	500	49
ii)	X40Cr13 X108Cr	420 S3	255	515	50
iii)	17Mo	440	285	660	58

requirements of the mechanical tests specified in Table 3, two more samples shall be selected from the same lot for testing in respect of each failure. Should the test pieces from both the additional samples pass, the material represented by the test samples shall be deemed to comply with the requirements of the particular test. Should either of the retests fail to meet the specified requirements, the material shall be taken as not complying with this standard except that the manufacturer may reheat-treat (not more than twice) the material represented and resubmit samples for testing.

14.3 Any other retest may be carried out as per mutual agreement between the purchaser and the supplier.

15 SURFACE FINISH

15.1 The material shall be supplied in one of the standard finishes on both surfaces for mill finishes and one of both for polished/ground finishes, The different surface finishes are indicated in Table 8. Finish No. 0, 1, CR, 2D, 2B and BA are classified as mill finishes. Finish No. 3, 4, 6, 7 and 8 are produced by mechanical polishing and are classified as polished finishes. Some of .these standard finishes may not be available on certain rolled products.

15.2 Finish No. 8 is not applicable to austenitic steel stabilized with titanium or niobium,

15.3 Any other finish may be supplied as per mutual agreement between the purchaser and the manufacturer/ supplier.

16 INSPECTION

Unless otherwise agreed, inspection of material shall be carried out by the manufacturer/supplier to ensure conformity to purchaser specification. Inspection of the material by the purchaser's representative at the manufacturing unit shall be allowed if agreed to between the purchaser and the manufacturer/supplier as part of the purchase order.

17 DIMENSIONS AND TOLERANCES

17.1 Unless otherwise agreed the dimensional tolerance for Stainless steel plates, sheets and strips shall be as laid down in Table 9 to Table 19.

17.2 Thickness shall be measured at distance of 20 mm from the edge for mill edges and 15 mm from the edge for trimmed edges.

18 PACKING

18.1 Material with suitable packing shall be provided by the manufacturer/supplier to prevent damages and deterioration in quality during storage, handling and

Table 6 Mechanical Properties of Austenitic Steels in Work Hardened Condition
(*Clause* 10.5)

Sl No.	Grade Designation		0.2% Proof Stress, *Min*	Tensile Strength MPa *Min*	Elongation on GL= $5.65\sqrt{S_0}$ *Min,* Percent	Applicable to Maximum Thickness mm
	Letter Symbol Thickness [*see* IS 1762 (Part 1)]	Numerical Symbol ISS				
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	X04Cr19Ni9	304 S1	490	830	12	2.8
			740	1 030	8	2.4
			910	1 180	7	1.8
			960	1 270	3	1.4
ii)	X07Cr18Ni9	302	490	830	12	2.8
			740	1 030	9	2.4
iii)	X10Cr17Ni7	301	490	830	25	3.3
			740	1 030	10	2.9
			910	1180	5	2.4
			960	1270	4	2.3
iv)	X10Cr17Mn 6Ni4N20					
		201	490	830	20	3.3
			740	1 030	10	2.9
			910	1 180	7	2.4
			980	1 270	4	2.3

Table 7 Cupping Test Results - Erichsen Values
(*Clause* 11.3)

Thickness, mm	**Depth of Cup**, *Min* mm	
	Austenitic	Ferritic
Up to 0.80	10.0	7.00
Over 0.80 and Up to 1.25	11.0	8.00

transport. The exact method of packing and weight of each packet shall be mutually agreed to between the purchaser and the supplier.

19 MARKING

19.1 Every package shall be legibly marked with paint or any other marking system showing the name or trade-mark of manufacturer, weight, thickness, size, steel designation and the cast number or identification marks by which the material may be traced to the cast or casts from which they are made.

19.2 The material may also be marked with the BIS Certification Mark. The details are available with the Bureau of Indian Standards.

Table 8 Surface Finish
(*Clause* 15.1)

Type of Finish/ Number	**Description**	**Remarks**	**Type of Finish/ Number**	**Description**	**Remarks**
Mill Finishes			Polished Finishes		
0	Hot rolled, annealed without descaling (pickling)	Suitable only for certain heat resisting applications where surface is not important, presence of scale impairs resistance to corrosion. Surface inspection is not practicable and fool proof	No. 3	Coarse girt polished surface finish	A uniform polished surface finish obtained with coarse abrasives of 100-120 grit on one or both surfaces. Suitable for use as a finish polished surface such as for paneling or any other application requiring such surface finish
No. 1	Hot rolled, annealed and descaled (pickled)	Plates and sheets generally used for industrial application where heat and corrosion resistance is more important and smoothness and uniformity of finish are not important. Repair grinding marks may be present in local areas	No. 4	Standard polished surface finish	A standard uniform polished surface finish produced with abrasives of 120-150 grit size and the finish is finer than No. 3 finish. Suitable for general purpose polished finish used for annealing, appliances, equipment and architectural applications
CR	Cold rolled finish	This finish is obtained by cold rolling of annealed and descaled or bright annealed product to get higher strength and hardness. The appearance and strength characteristics depend on amount of cold reduction. Suitable for applications involving higher strength characteristics and where formability is not important	No. 6	Dull stain surface finish	A dull satin surface finish produced by tampico brush polishing. Suitable for architectural and ornamental applications where high lustre is not desirable
2D	Cold rolled, annealed and descaled (pickled)	A dull, smooth and uniform surface finish most suited for deep drawing applications	No. 7	Polished reflective surface finish	A polished surface finishes with high degree of reflectivity produced by buffing finely ground surface without ensuring complete removal of grit marks. Suitable for architectural and ornamental applications
2B	Cold rolled, annealed and descaled (pickled) and skin passed	A smoother and brighter surface finish (as compared to 2D) most suitable for general applications	No. 8	Mirror finish	A bright, highly reflective surface finish with a high degree of image clarity produced by polishing with successive finer grit polish followed by buffing with very fine polishing compounds. This finish is used for applications requiring highly reflective surfaces like in press plates, mirrors
BA	Cold rolled, bright annealed in protective atmosphere	A cold rolled reflective surface finish. Suitable for applications demanding bright and lustrous surface			

19.3 BIS Certification Marking

The fittings may also be marked with the Standard Mark.

19.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

20 MATERIAL TEST REPORT AND CERTIFICATION

20.1 A report of the results of all the tests required by the purchase specification shall be supplied by the manufacturer/supplier to the purchaser, if mutually agreed. The test report shall include manufacturer's certification for conformity to the purchase specification.

Table 9 Permissible Variations in Thickness of Hot Rolled Sheet and Plate
(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Thickness	Tolerance on Thickness for Width			
		< 1 000	1 000 to < 1 250	1 250 to < 1 600	1 600 to ≤ 2 000
(1)	(2)	(3)	(4)	(5)	(6)
i)	From 1.00 to less than 1.50	±0.15	±0.15	±0.20	±0.25
ii)	From 1.50 to less than 2.00	±0.20	±0.20	±0.25	±0.30
iii)	From 2.00 to less than 2.50	±0.20	±0.25	±0.30	±0.35
iv)	From 2.50 to less than 3.00	±0.25	±0.30	±0.30	±0.40
v)	From 3.00 to less than 4.00	±0.30	±0.30	±0.35	±0.45
vi)	From 4.00 to less than 5.00	±0.40	±0.40	±0.45	±0.60
vii)	From 5.00 to less than 6.00	±0.50	±0.50	±0.55	±0.70
viii)	From 6.00 to less than 8.00	±0.60	±0.60	±0.60	±0.75
ix)	From 8.00 to less than 10.00	±0.65	±0.65	±0.65	±0.80
x)	From 10.00 to less than 16.00	±0.70	±0.70	±0.70	±0.85
xi)	From 16.00 to less than 25.00	±0.80	±0.80	±0.80	±0.95
xii)	From 25.00 to less than 40.00	±0.90	±0.90	±0.90	±1.10
xiii)	From 40.00 to less than 50.00	±1.00	±1.00	±1.00	±1.20
xiv)	From 50.00 to less than 75.00	±1.20	±1.20	±1.40	±1.40

Table 10 Permissible Variations in Thickness for Cold Rolled Sheets
(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Thickness	Tolerance on Thickness for Width			
		< 1 000	1 000 to < 1 250	1 250 to < 1 600	1 600 to ≤ 2 000
(1)	(2)	(3)	(4)	(5)	(6)
i)	From 0.20 to less than 0.30	±0.04	±0.04	—	—
ii)	From 0.30 to less than 0.40	±0.05	±0.05	±0.05	—
iii)	From 0.40 to less than 0.60	±0.08	±0.08	±0.08	—
iv)	From 0.60 to less than 0.80	±0.10	±0.10	±0.10	—
v)	From 0.80 to less than 1.25	±0.12	±0.15	±0.15	±0.15
vi)	From 1.25 to less than 1.50	±0.13	±0.15	±0.20	±0.20
vii)	From 1.50 to less than 2.00	±0.15	±0.20	±0.20	±0.20
viii)	From 2.00 to less than 2.50	±0.20	±0.20	±0.25	±0.25
ix)	From 2.50 to less than 3.00	±0.25	±0.25	±0.30	±0.30
x)	From 3.00 to less than 4.00		±0.30	±0.35	±0.35
xi)	From 4.00 to less than 5.00	±0.35	±0.35	±0.40	±0.40

Table 11 Permissible Variation in Width and Length of Hot Rolled or Cold Rolled Sheet and Plate Produced by Machine Cutting

(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Thickness	Tolerance on Width		Tolerance on Length	
		Trimmed Edge	Mill Edge	≤ 3 000 mm	> 3 000 mm
(1)	(2)	(3)	(4)	(5)	(6)
i)	Less than 10	+5 –0	+30 –0	+10 –0	+(0.005 × L) –0
ii)	From 10 up to and including 25	+10 –0	+30 – 0	+15 –0	+(0.005 × L) –0

Table 12 Permissible Variation in Width and Length of Hot Rolled Plate Produced by Arc Cutting

(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Thickness	Tolerance on Width	Tolerance on Length
i) ii)	Up to and Including 50	+30 –0	+30 –0

Table 13 Permissible Variation in Flatness[1)] for Hot Rolled or Cold Rolled Sheet and Plate

(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Width	Length	Maximum Value of Flatness	
			Unstretched Condition	*Stretched Condition*
(1)	(2)	(3)	(4)	(5)
i)	Up to and excluding 1 000	Up to and including 2 000 Over 2 000	15 20	3 6
ii)	1 000 and above	Up to and including 2 000	20	6
		Over 2 000	20	6

[1)] Maximum deviation from a horizontal flat surface.

Table 14 Permissible Variations in Thickness of Hot Rolled Strip

(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Thickness	Tolerance on Width				
		<250	250 to <500	500 to <1 000	1 000 to < 1 250	1 250 to < 2 000
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	From 1.00 to less than 1.50	±0.12	±0.12	±0.15	±0.15	±0.15
ii)	From 1.50 to less than 2.00	±0.15	±0.18	±0.20	±0.20	±0.20
iii)	From 2.00 to less than 2.50	±0.16	±0.18	±0.20	±0.25	±0.25
iv)	From 2.50 to less than 3.00	±0.18	±0.20	±0.25	±0.30	±0.30
v)	From 3.00 to less than 4.00	±0.20	±0.25	±0.30	±0.30	±0.35
vi)	From 4.00 to less than 5.00	±0.25	±0.30	±0.40	±0.40	±0.40
vii)	From 5.00 to less than 6.00	±0.30	±0.40	±0.50	±0.50	±0.55
viii)	From 6.00 to less than 8.00	±0.40	±0.50	±0.60	±0.60	±0.60
ix)	From 8.00 to upto 10.00	±0.50	±0.60	±0.65	±0.65	±0.65

Table 15 Permissible Variations in Thickness for Cold Rolled Strip in Coils and Cut Length
(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Thickness	Tolerance on Width				
		< 250	250 to < 500	500 to < 1 000	1 000 to < 1 250	1 250 to ≤ 2 000
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Less than 0.15	±0.02	—	—	—	—
ii)	From 0.15 to less than 0.25	±0.03	±0.03	—	—	—
iii)	From 0.25 to less than 0.40	±0.03	±0.04	±0.04	±0.04	±0.04
iv)	From 0.40 to less than 0.60	±0.04	±0.04	±0.05	±0.05	±0.05
v)	From 0.60 to less than 0.80	±0.05	±0.06	±0.07	±0.07	±0.07
vi)	From 0.80 to less than 1.00	±0.06	±0.07	±0.08	±0.08	±0.08
vii)	From 1.00 to less than 1.25	±0.07	±0.08	±0.08	±0.09	±0.09
viii)	From 1.25 to less than 1.50	±0.08	±0.09	±0.10	±0.10	±0.10
ix)	From 1.50 to less than 2.00	±0.09	±0.11	±0.12	±0.12	±0.12
x)	From 2.00 to less than 2.50	±0.10	±0.12	±0.15	±0.15	±0.15
xi)	From 2.50 to less than 3.00	±0.12	±0.15	±0.20	±0.20	±0.25
xii)	From 3.00 to less than 4.00	±0.15	±0.17	±0.20	±0.25	±0.35
xiii)	From 4.00 to less than 5.00	±0.20	±0.22	±0.25	±0.30	±0.40

NOTE — For thicknesses of 5 mm and above, tolerances shall be as agreed to between the purchaser and the manufacturer/seller.

Table 16 Permissible Variation in Width ofHot Rolled Strip of thickness up to andIncluding 5 mm
(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Width	Tolerance on Width			
		Mill Edge[1)]		Cut Edge	
		Plus	Minus	Plus	Minus
(1)	(2)	(3)	(4)	(5)	(6)
i)	Less than 250	5	0	5	0
ii)	From 250 to less than 500	20	0	5	0
iii)	From 500 to less than 1 000	30	0	10	0
iv)	From 1 000 to 2 000	35	0	10	0

[1)] Values other than this might be acceptable based on mutual agreement between the purchaser and the manufacturer.

Table 17 Permissible Variations in Width of Cold Rolled Strip in Coils and Cut Length
(*Clause* 17.1)

All dimensions in millimetres.

Sl No.	Thickness	Tolerance on Width				
		<250	250 to <500	500 to <1 000	1 000 to <1 250	1 250 to ≤ 2 000
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Less than 0.6	±0.20	±0.30	±0.50	±1.00	±1.00
ii)	From 0.6 to less than 1.00	±0.25	±0.30	±0.50	±1.00	±1.00
iii)	From 1.00 to less than 1.50	±0.30	±0.40	±0.60	±1.20	±1.20
iv)	From 1.50 to less than 2.50	±0.40	±0.50	±0.70	±1.40	±1.40
v)	From 2.50 to less than 4.00	±0.40	±0.50	±0.80	±1.60	±1.60
vi)	From 4.00 to less than 5.00	±0.50	±0.70	±1.00	±2.00	±2.00

NOTES
1 For thicknesses of 5 mm and above, tolerances shall be as agreed to between the purchaser and the manufacturer/the seller.
2 Tolerance for the mill edge shall be as agreed to between the purchaser and the manufacturer/seller.

Table 18 Permissible Values of Camber for Hot Rolled Strip[1)]

(*Clause* 17.1)

All dimensions in millimetres.

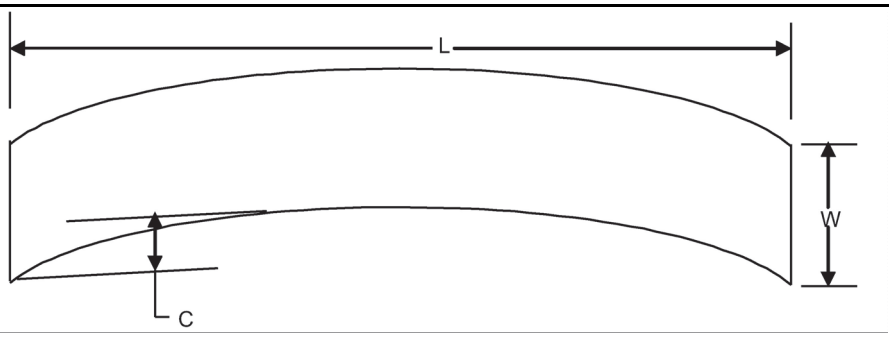
Sl No.	Width	Maximum Value of Camber for Any 2 000 mm Length
(1)	(2)	(3)
i)	Less Than 250	10
ii)	From 250 to less than 500	8
iii)	From 500 to less than 1 000	5
iv)	From 1 000 to 1 500	5

[1)] Applicable only in trim edge condition.

Table 19 Permissible Values of Camber for Cold Rolled Strip

(*Clause* 17.1)

All dimensions in millimetres.



Sl No.	Width	Maximum Value of Camber for any 2 000 mm Length
(1)	(2)	(3)
i)	Greater than 50	10
ii)	Less than 250	8
iii)	From 250 to less than 500	5
iv)	From 500 and over	5

NOTE — Applicable only in Trim Edge condition.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc No.: MTD 16 (10790).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

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