

BUREAU OF INDIAN STANDARDS

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भारतीय मानक
स्टेनलेस इस्पात की प्लेट, चदरें, तथा पत्तियाँ विशिष्ट -
(आई एस 6911 का तीसरा पुनरीक्षण)

Draft Indian Standard
STAINLESS STEEL PLATE, SHEET AND STRIP — SPECIFICATION
(Third revision of IS 6911)

ICS: 77.140.35

Alloy Steel and Forging Sectional Committee,
MTD 16

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Alloy Steels and Forgings Sectional Committee, MTD 16

FOREWORD

This Indian Standard (Third Revision) is to be adopted by the Bureau of Indian Standards, after the draft finalized by the Alloy Steels and Forgings Sectional Committee has been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1972 and subsequently revised in 1992 and 2017. While reviewing this standard in the light of experience gained in its usage, Committee felt that the standard should be revised to bring it in line with the present national and international practices in the field. The grades of stainless steels and their designations have been aligned and rationalized with the present industry needs and practices. This revision also incorporates 5 amendments issued to this standard.

In addition, following major modifications have been made:

- a) Clause **5.3** has been modified;
- b) Table 5 and Table 6 are deleted and other tables are renumbered;
- c) Clause **15.5**, different kinds of coating on surface of base metal have been added;
- d) Designation of steel have been updated as per Indian standard on code for designation of steel, wherever applicable;
- e) More grades have been added in Table 1, Table 3 & Table 4. A new class of steel, precipitation hardening steels has been added; and
- f) **Fig. 1** is added which informs about the measurement of camber.

This standard contains clauses that call for an agreement between the purchaser and the supplier. Such clauses are **4.2, 5.2, 8.1, 8.2, 9, 9.1.2, 10.5, 11.1, 12, 13, 14.1, 14.3, 15.3, 15.4, 15.5, 16, 17.2, 17.4, 18** and **20**.

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 : 2022 ‘Rules for rounding off numerical values (second revision)’. 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
(Third Revision)

1 SCOPE

1.1 This standard covers the requirements for stainless steel for 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 standards given below 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 agreement based on this standard are encouraged to investigate and possibility of applying the most recent edition of these standards:

<i>IS No.</i>	<i>Title</i>
IS 228	Methods of chemical analysis of steels (issued in various parts)
IS 1500 (Part 1) : 2019/ ISO 6506-3 : 2014	Metallic materials - Brinell hardness test: Part 1 test method (<i>fifth revision</i>)
IS 1501 (Part 1) : 2020/ ISO 6507-1 : 2018	Metallic Materials — Vickers Hardness Test Part 1 Test Method (<i>fifth revision</i>)
IS 1586 (Part 1) : 2018	Metallic materials - Rockwell hardness test: Part 1 test method (<i>fifth revision</i>)
IS 1599 : 2023/ ISO 7438 : 2020	Metallic materials — Bend test
IS 1608 : 2022/ ISO 6892-1 : 2019	Metallic materials - Tensile testing - Part 1 : Method of test at room temperature
IS 1762 (Part 1) : 1974	Code for designation of steels: Part 1 based on letter symbols (<i>first revision</i>)
IS 1956 (Part 4) : 2013	Glossary of terms relating to iron and steel: Part 4 flat products (<i>second revision</i>)

IS 5522 : 2014	Stainless steel sheets and strips for utensils - Specification (<i>third revision</i>)
IS 8910 : 2022/ ISO 404:2013	General technical delivery requirements for steel and steel products
IS 10175 : 2018/ ISO 20482:2013	Metallic materials - Sheet and strip - Erichsen cupping test (<i>third revision</i>)
IS 10461	Resistance to inter - Granular corrosion of austenitic stainless steels - Method for determination
(Part 1) : 1994	Corrosion test in nitric acid medium by measurement of loss in mass (Huey Test) (<i>first revision</i>)
(Part 2) : 1994	corrosion test in a sulphuric acid/copper sulphate medium in the presence of copper turnings (Monypenny Strauss Test) in the presence of copper turnings (Monypenny Strauss Test) (<i>first revision</i>)
IS 15997 : 2012	Low nickel austenitic stainless steel plate, sheet, and strip for utensils and kitchen appliances - Specification

3 TERMINOLOGY

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 either of the following:

- Chemical composition (applicable only for hot-rolled stainless steel);
- Chemical composition, Mechanical properties in the annealed condition; and
- Chemical composition and mechanical properties or 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:

- Designation of stainless steel;
- Form (plate, sheet or strip);
- Quantity (mass or number);
- Nominal dimensions — thickness, width and length (for cut lengths);
- Condition (hot rolled, cold rolled, annealed or any other treatment);
- Finish (in case of ground/polished or any other special finish to specify whether finish is required on one or both surfaces);
- Method of manufacture, if any specified;
- 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 a trimmed edge may be accepted with mutual agreement between the purchaser and the supplier.

5.3 The raw material used for manufacturing hot rolled coils/strips/sheets/plates shall conform to the requirements specified in IS 14650. Wherein cold rolled coils/strip/sheet is manufactured, the raw material is hot rolled coils/strips/sheets/plates and the same should conform to the requirements specified in this standard.

6 FREEDOM FROM DEFECTS

6.1 The material shall be of uniform quality consistent with 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

7.1.1 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).

7.1.2 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 refereeing 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 an 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

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

9.2.1 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.

9.2.2 At least one tensile test, one bend test (if 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 or 30HV between samples collected at both ends, tensile properties shall be determined on both the samples.

9.2.3 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 (part 1).

10.2 Hardness Test

The hardness test shall be performed by any one of the methods of IS 1500 (Part 1), IS 1501 (Part 1) and IS 1586 (Part 1).

10.3 Bend test

10.3.1 If required, shall be carried out in accordance with IS 1599. 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.

10.3.2 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**, **10.2** and **10.3** and shall conform to the requirements of Table 4. Wherever, mechanical properties for the grades not given in Table 4, this shall be as 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 5.

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 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 at least one side of the polished/ground finishes. The different surface finishes are indicated in Table 6. 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.

15.4 In case of modified texture/special finishes/chequered plates, as mutually agreed between supplier and the purchaser, the mechanical properties shall be checked on the base metal, as applicable.

15.5 Stainless steel plate, sheet and strip may also be supplied either in clad, laminated, coated, plated, varnished, enamelled, lacquered, painted or printed condition, or in other type of coating or cladding as agreed upon between the purchaser and the manufacturer. In such cases, the stainless steel used shall comply with the requirements of this standard.

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 7 to Table 17.

17.2 For specified thicknesses and width other than mentioned in Table 7 to Table 17, the tolerances shall be supplied on mutual agreement between manufacturer and the purchaser.

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

17.4 The shape of patterns and dimensions of bead(s) for chequered plates shall be mutually agreed to between the manufacturer and the purchaser.

18 PACKING

Material with suitable packing shall be provided by the manufacturer/supplier to prevent damages and deterioration in quality during storage, handling and 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 trademark 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 product(s) conforming to the requirements of this standard may be certified as per the Conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

20 MATERIAL TEST REPORT AND CERTIFICATION

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 1 Chemical Composition, Percent
(*Clauses 7.1, 7.2 and 14.1*)

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
i.	<i>Ferritic Steel:</i>												
1.	X04Cr13Al	405	0.08	1.00	1.00	0.60	11.50-14.50	-	0.030	0.040	-	-	Al : 0.10 - 0.30
2.	X02Cr11Ti	409	0.03	1.00	1.00	0.50	10.50-11.70	-	0.020	0.040	0.030	-	Ti : 6x (C+N) <i>min</i> - 0.50 <i>max</i> ; Nb : 0.17 <i>max</i>
3.	X02Cr12	409M	0.03	1.00	0.50-1.50	1.50	10.50-12.50	-	0.030	0.040	-	-	-
4.	X02Cr12Ti	409Ti1	0.03	1.00	1.00	0.50	10.50-11.70	-	0.020	0.040	0.030	-	Ti : 8x (C + N) <i>min</i> Ti : 0.15 - 0.50; Nb : 0.10 <i>max</i>
5.	X02Cr11TiNb	409Ti2	0.03	1.00	1.00	0.50	10.50-11.70	-	0.020	0.040	0.030	-	(Ti+Nb) : [0.08+8x(C+N)] <i>min</i> - 0.75 <i>max</i> ; Ti : 0.05 <i>min</i>
6.	X02Cr12Ni1Ti	409Ti3	0.03	1.00	1.00	0.50-1.00	10.50-11.70	-	0.030	0.040	0.030	-	Ti : 6x(C+N) <i>min</i> - 0.75 <i>max</i>
7.	X04Cr11Ti	409Ti4	0.08	1.00	1.00	0.60	10.50-11.75	-	0.030	0.040	-	-	Ti : 6x(C+N) <i>min</i> - 0.75 <i>max</i>
8.	X02Cr12Ti	409Ti5	0.03	1.00	1.00	0.60	10.50-11.75	-	0.030	0.040	-	-	Nb : 0.18 - 0.40; Ti : 0.05 - 0.20.
9.	X04Cr12	410S	0.08	1.00	1.00	0.60	11.50-13.50	-	0.030	0.040	-	-	-
10.	X02Cr13Nb	410S1	0.03	1.00	1.00	0.50	12.00-13.00	-	0.030	0.040	0.030	-	Nb : 9x(C+N) <i>min</i> - 0.60 <i>max</i>
11.	X02Cr12Ni1	410S2	0.04	1.00	1.00	0.60-1.10	10.50-12.50	-	0.030	0.045	0.10	-	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
12.	X04Cr14Ni2Mo1Ti	410S3	0.08	1.00	1.00	1.00-2.50	13.50-15.50	0.20-1.20	0.030	0.045	-	-	Ti : 0.30 - 0.50
13.	X05Cr12Mn1	410S4	0.09	0.50	1.00-2.50	-	11.00 – 13.50	-	0.030	0.040	-	-	(C+N) : 0.04 - 0.10
14.	X10Cr15	429	0.12	1.00	1.00	-	14.00-16.00	-	0.030	0.040	-	-	-
15.	X01Cr15Nb	429Nb	0.02	1.00	1.00	-	14.00-16.00	-	0.015	0.025	0.02	-	Nb : 0.20 - 0.60
16.	X07Cr17	430	0.12	1.00	1.00	0.75	16.00-18.00	-	0.030	0.040	-	-	-
17.	X02Cr18TiNb	430Ti	0.03	0.75	1.00	-	16.00-19.00	-	0.030	0.040	-	-	(Ti or Nb) : 0.10 - 1.00
18.	X02Cr17CuTiNbZr	430Ti1	0.025	1.00	1.00	-	16.00-20.00	-	0.030	0.040	0.025	0.30-0.80	Ti, Nb, Zr or combination thereof : 8x (C + N) - 0.80
19.	X06Cr17Mo1	434	0.12	1.00	1.00	-	16.00-18.00	0.75-1.25	0.030	0.040	-	-	-
20.	X06Cr17Mo1Nb	436	0.12	1.00	1.00	-	16.00-18.00	0.75-1.25	0.030	0.040	-	-	Nb : 5xC <i>min</i> - 0.80 <i>max</i>
21.	X02Cr18Mo2TiNbZr	436L	0.025	1.00	1.00	-	16.00-19.00	0.75-1.50	0.030	0.040	0.025	-	Ti, Nb, Zr or combination Thereof : 8(C + N) - 0.80
22.	X02Cr18Mo1TiNbZr	436L1	0.025	1.00	1.00	-	17.00-20.00	0.40-0.80	0.030	0.040	0.025	-	Ti, Nb, Zr or combination thereof 8(C + N) - 0.80
23.	X03Cr18Al4	436L2	0.05	1.50	1.00	-	16.00-19.00	-	0.030	0.040	-	-	Al : 3.00 – 4.80

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
24.	X02Cr18TiAl	439	0.03	1.00	1.00	0.50	17.00-19.00	-	0.030	0.040	0.030	-	Ti : [0.2+4(C+N)] <i>min</i> - 1.1 <i>max</i> ; Al : 0.15 <i>max</i>
25.	X02Cr18TiNbAl	439Ti1	0.03	1.00	1.00	0.50	17.00-19.00	-	0.030	0.040	0.030	-	(Ti+Nb) : [0.20+4x(C+N)] <i>min</i> - 0.75 <i>max</i> ; Al : 0.15 <i>max</i>
26.	X02Cr18TiNb	439Ti2	0.03	1.00	1.00	-	17.50-18.50	-	0.015	0.040	-	-	Ti : 0.10 - 0.60; Nb : [(0.3 + (3 x C))] <i>min</i>
27.	X02Cr19TiNb	441	0.03	1.00	1.00	1.00	17.50-19.50	-	0.030	0.040	0.030	-	Ti : 0.10 - 0.5 ; Nb : [0.3+(9xC)] <i>min</i> - 0.90 <i>max</i>
28.	X10Cr20	442	0.20	1.00	1.00	0.60	18.00-23.00	-	0.040	0.040	-	-	-
29.	X02Cr22CuTiNb	443	0.025	1.00	1.00	-	20.00-23.00	-	0.030	0.040	0.025	0.30-0.80	(Ti+Nb) : 8x(C+N) <i>min</i> – 0.80 <i>max</i>
30.	X01Cr18Mo2TiNb	444	0.025	1.00	1.00	1.00	17.50-19.50	1.75-2.50	0.030	0.040	0.035	-	(Ti+Nb) : [0.20+4x(C+N)] <i>min</i> , 0.80 <i>max</i>
31.	X02Cr21Al5	444S1	0.03	1.00	1.00	-	19.00-22.00	-	0.030	0.040	-	-	Al : 4.50 – 6.20
32.	X01Cr20CuNb	445	0.02	1.00	1.00	0.60	19.00-21.00	-	0.012	0.040	0.030	0.030-0.60	Nb : 10x(C+N) <i>min</i> - 0.80 <i>max</i>
33.	X02Cr22Mo1	445L1	0.025	1.00	1.00	-	21.00-24.00	0.70-1.50	0.030	0.040	0.025	-	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
34.	X02Cr22Mo2	445L2	0.025	1.00	1.00	-	21.00-24.00	1.50-2.50	0.030	0.040	0.025	-	-
35.	X06Cr24AlSi	446	0.12	0.70-1.40	1.00	-	23.00-26.00	-	0.015	0.040	-	-	Al : 1.20 - 1.70
36.	X10Cr25	446S1	0.20	1.00	1.50	0.75	23.00-27.00	-	0.030	0.040	0.25	-	-
37.	X03Cr26Mo1Ti	446S2	0.06	0.75	0.75	0.50	25.00-27.00	0.75-1.50	0.20	0.040	0.040	0.20	Ti : 0.20 - 1.00; Ti : 7x(C+N) <i>min</i>
38.	X01Cr26Mo1Nb	446S3	0.01	0.040	0.40	0.50	25.00-27.00	0.75-1.50	0.20	0.020	0.015	0.20	Nb : 0.05 - 0.20; (Ni+Cu) : 0.50 <i>max</i>
39.	X01Cr11Ni1	350	0.030	1.00	1.5	1.00	10.5-12.5	0.1-0.5	0.010	0.040	0.030	-	-
40.	X01Cr11Ni1Mn1	450	0.030	1.00	1.5	0.30-1.50	11.0-12.5	0.1-0.75	0.010	0.040	0.030	-	-
ii.	<i>Martensitic steels:</i>												
1.	X08Cr12	403	0.15	0.50	1.00	0.60	11.50-13.00	-	0.030	0.040	-	-	-
2.	X12Cr12	410	0.08-0.15	1.00	1.00	0.75	11.50-13.50	-	0.030	0.040	-	-	-
3.	X02Cr13Ni4Mn1Mo1	415	0.05	0.60	0.50-1.00	3.50-5.50	11.50-14.00	0.50-1.00	0.030	0.030	-	-	-
4.	X20Cr13	420 S1	0.16-0.25	1.00	1.00	1.00	12.00-14.00	-	0.030	0.040	-	-	-
5.	X30Cr13	420S2	0.26-0.35	1.00	1.00	1.00	12.00-14.00	-	0.030	0.040	-	-	-
6.	X40Cr13	420S3	0.35-0.45	1.00	1.00	1.00	12.50-14.00	-	0.030	0.040	-	-	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
7.	X46Cr14	420S4	0.43-0.50	1.00	1.00	-	12.50-14.50	-	0.015	0.040	-	-	-
8.	X65Cr14	420S5	0.58-0.70	1.00	1.00	-	12.50-14.50	-	0.015	0.040	-	-	-
9.	X38CrMo14	420S6	0.36 - 0.42	1.00	1.00	-	13.00-14.50	0.60-1.00	0.015	0.040	-	-	-
10.	X22Cr12Ni1Mn1Mo1V W	422	0.20-0.25	0.50	0.50-1.00	0.50-1.00	11.00-12.50	0.90-1.25	0.025	0.025	-	-	V : 0.20-0.30; W : 0.90-1.25
11.	X15Cr16Ni2	431	0.10-0.20	1.00	1.00	1.25-2.50	15.00-17.00	-	0.030	0.045	-	-	-
12.	X70Cr17	440 A	0.60-0.75	1.00	1.00	0.60	16.00-18.00	0.75	0.030	0.040	-	-	-
13.	X108Cr17Mo	440	0.95-1.20	1.00	1.00	0.50	16.00-18.00	0.75	0.030	0.045	-	-	-
iii	<i>Precipitation-hardening steels:</i>												
1.	X06Cr16Ni7Cu4Nb	630	0.07	0.70	1.50	3.00-5.00	15.00-17.00	0.60	0.030	0.040	-	3.00-5.00	Nb : 5 × C - 0.45
2.	X07Cr17Ni7Al	631	0.09	0.70	1.00	6.50-7.80	16.00-18.00	-	0.015	0.040	-	-	Al : 0.70-1.50
3.	X09Cr16Mo3MnN	633	0.07-0.11	0.50	0.50 - 1.25	4.00-5.00	16.00-17.00	2.50-3.20	0.030	0.040	0.07-0.13	-	-
iv.	<i>Austenitic steels:</i>												
1.	X10Cr17Mn6Ni4N	201	0.15	1.00	5.50-7.50	3.50-5.50	16.00-18.00	-	0.030	0.060	0.25	-	-
2.	X08Cr17Mn12Ni4	201 A	0.12	1.00	10.00-14.00	3.50-5.50	16.00-18.00	-	0.030	0.090	0.25	-	-
3.	X10Cr18Mn9Ni5	202	0.15	1.00	7.50-10.00	4.00-6.00	17.00-19.00	-	0.030	0.060	0.25	-	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4.	X08Cr15Mn10Cu2NiN	N1	0.12	0.75	8.50-10.50	1.00-2.00	14.50-16.00	-	0.030	0.80	0.08-0.20	1.50-2.50	-
5.	X08Cr16Mn8Cu3Ni2N	N2	0.10	1.0	6.50-9.00	1.50-3.50	15.50-17.00	-	0.030	0.70	0.10-0.25	2.00-4.00	-
6.	X07Cr17Mn7Ni5Cu2N	N3	0.09	0.75	6.00-8.00	4.00-6.00	16.00-17.50	-	0.030	0.70	0.05-0.15	1.50-2.50	-
7.	X06Cr15Mn10Cu2NiN ³⁾	N5	0.12	1.00	9.50-11.50	0.45-0.95	14.00-16.50	-	0.030	0.10	0.10-0.25	1.5-2.5	-
8.	X06Cr14Mn10Cu1NiN ³⁾	N6	0.12	1.00	9.25-11.50	0.25-0.95	13.50-16.00	-	0.030	0.10	0.10-0.25	1.0-2.0	
9.	X07Cr14Mn10CuNiN ³⁾	N7	0.14	1.00	9.00-11.50	0.20-0.95 ²⁾	13.50-16.00	-	0.030	0.10	0.10-0.25	0.4-0.8	-
10.	X02Cr17Mn6Ni4	201S	0.03	0.75	5.50-7.50	3.50-5.50	16.00-18.00	-	0.030	0.045	0.25	-	-
11.	X02Cr17Mn7Ni4N	201LN	0.03	0.75	6.40-7.50	4.00-5.00	16.00-17.50	-	0.015	0.045	0.10-0.25	1.00	-
12.	X10Cr16Mn5Ni5Si4N	201N	0.15	3.00-4.00	4.00-6.00	4.00-6.00	15.00-18.00	-	0.040	0.040	0.08-0.20	-	-
13.	X11Cr8Ni6Mn6N	202S1	0.07-0.15	0.50-1.00	5.00 - 1.00	5.00-7.50	6.50-8.50	-	0.015	0.030	0.020-0.30	-	-
14.	X02Cr16Mn8Ni2N	204	0.03	1.00	7.00-9.00	1.50-3.00	15.00-17.00	-	0.030	0.040	0.15-0.30	-	-
15.	X10Cr17Mn6Cu2Ni3N	204Cu1	0.12	1.00	5.00-7.00	2.00-4.00	17.00-18.00	-	0.030	0.045	0.10-0.25	1.50-3.50	-
16.	X05Cr17Mn4Cu2Ni5N	204Cu2	0.08	1.00	3.00-5.00	4.00-6.00	17.00-18.00	-	0.030	0.045	0.05-0.20	2.00-3.00	-
17.	X05Cr17Mn6Cu2Ni4N	204Cu3	0.08	1.00	5.50-7.50	3.50-5.50	17.00-18.00	-	0.030	0.045	1.50-3.50	-	-
18.	X05Cr19Mn8Ni6Mo2N	216S1	0.08	0.75	7.50-9.00	5.00-7.00	17.50-22.00	2.00-3.00	0.030	0.045	0.25-0.50	-	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
19.	X02Cr19Mn8Ni6Mo2N	216S2	0.03	0.75	7.50-9.00	5.00-7.00	17.50-22.00	2.00-3.00	0.030	0.045	0.25-0.50	-	-
20.	X 10Cr17Ni7	301	0.15	1.00	2.00	6.00-8.00	16.0-18.0	-	0.030	0.045	0.10	-	-
21.	X10Cr18Ni8	301 A	0.05-0.15	2.00	2.00	6.00-9.50	16.00-19.00	0.80	0.015	0.045	0.10	-	-
22.	X 02Cr17Ni7	301L	0.03	1.00	2.00	6.00-8.00	16.00-18.00	-	0.030	0.045	0.20	-	-
23.	X02Cr17Ni7N	301LN	0.03	1.00	2.00	6.00-8.00	16.00-18.00	-	0.030	0.045	0.07-0.20		-
24.	X 07Cr18Ni9	302	0.15	0.75	2.00	8.00-10.00	17.00-19.00	-	0.030	0.045	0.10		-
25.	X07Cr18Ni9S	303	0.10	1.00	2.00	8.00-10.00	17.00-19.00	-	0.15-0.35	0.045	0.10	1.00	-
26.	X06Cr19Ni9	304	0.07	0.75	2.00	8.00-10.50	17.50-19.50	-	0.030	0.045	0.10		-
27.	X02Cr19Ni10	304 L	0.03	0.75	2.00	8.00-12.00	17.50-19.50	-	0.030	0.045	0.10		-
28.	X07Cr19Ni9	304 H	0.04-0.10	0.75	2.00	8.00-10.50	18.00-20.00	-	0.030	0.045	-		-
29.	X02Cr19Ni10N	304LN	0.03	0.75	2.00	8.00-12.00	18.00-20.00	-	0.030	0.045	0.10 0.16	-	-
30.	X04Cr19Ni9N	304N	0.08	0.75	2.00	8.00-10.50	18.00-20.00	-	0.030	0.045	0.10 0.16	-	-
31.	X05Cr18Ni9Si1CeN	304Ce	0.04-0.06	1.00-2.00	0.80	9.00-10.00	18.00-19.00	-	0.030	0.045	0.12-0.18	-	Ce : 0.03-0.08
32.	X05Cr17Ni8Cu2	304Cu	0.08	1.00	2.00	7.00-9.00	16.00-18.00	-	0.030	0.045	-	1.50-3.00	-
33.	7 X05Cr18Ni9Cu2NbW	304CuW	0.08	1.00-2.00	2.00	8.00-10.50	17.50-19.50	-	0.030	0.045	0.10	1.50-2.50	Nb : 0.10-0.50; W : 0.20-0.80

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
34.	X04Cr16Ni8Cu	304Mn1	0.08	1.70	3.00	6.00-9.00	15.00-18.00	-	0.030	0.045	-	1.00-3.00	-
35.	X04Cr16Ni7MnCu	304Mn2	0.08	1.70	3.00-5.00	6.00-9.00	15.00-18.00	-	0.030	0.045	-	1.00-3.00	-
36.	X05Cr19Ni9N	304N2	0.08	0.75	2.00	8.00-10.50	18.00-20.00	-	0.030	0.045	0.16-0.30	-	-
37.	X08Cr16Ni13Nb	304Nb	0.04-0.10	0.30-0.60	1.50	12.00-14.00	15.00-17.00	-	0.015	0.035	-	-	Nb : 10 x C <i>min</i> - 1.20 <i>max</i>
38.	X06Cr18Ni12	305	0.12	0.75	2.00	10.50-13.00	17.00-19.00	-	0.030	0.045	-	-	-
39.	X04Cr19Ni10Cu3Mo	305 Cu	0.08	0.50-2.50	2.00	8.50-11.50	17.00-20.50	0.75-1.50	0.030	0.045	-	0.75-3.50	-
40.	X07Cr21Ni11Ce	308Ce	0.05-0.10	1.40-2.00	0.80	10.00 - 12.00	20.00-22.00	-	0.030	0.040	0.14-0.20	-	Ce : 0.03-0.08
41.	X15Cr24Ni13	309	0.20	1.50	2.00	11.00-15.00	22.00-25.00	-	0.030	0.045	-	-	-
42.	X 04Cr24Ni13	309S	0.08	0.75	2.00	12.00-15.00	22.00-24.00	-	0.030	0.045	-	-	-
43.	X15Cr20Ni12Si	309S1	0.20	1.50-2.50	2.00	11.00-13.00	19.00-21.00	-	0.015	0.045	0.11	-	-
44.	X07Cr23Ni13	309H	0.04-0.10	0.75	2.00	12.00-15.00	22.00-24.00	-	0.030	0.045	-	-	
45.	X05Cr23Ni14Nb	309Nb	0.08	0.75	2.00	12.0-16.0	22.0-24.0	-	0.030	0.045	-	-	Nb : 10xC <i>min</i> , 1.10 <i>max</i>
46.	X07Cr23Ni14Nb	309HNb	0.04-0.10	0.75	2.00	12.00-16.00	22.00-24.00	-	0.030	0.045	-	-	Nb : 10xC <i>min</i> , 1.10 <i>max</i>
47.	X15Cr25Ni20	310	0.25	2.50	2.00	18.00-21.00	24.00-26.00	-	0.030	0.045	-		-
48.	X04Cr25Ni20	310S	0.08	1.50	2.00	19.00-22.00	24.00-26.00	-	0.030	0.045	-	-	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
49.	X07Cr25Ni20	310H	0.04-0.10	0.75	2.00	19.00-22.00	24.00-26.00	-	0.030	0.045	-	-	-
50.	X15Cr25Ni21Si	310N	0.20	1.50-2.50	2.00	19.00-22.00	24.00-26.00	-	0.015	0.045	-	-	-
51.	X05Cr25Ni20Nb	310Nb	0.08	1.50	2.00	19.00-22.00	24.00-26.00	-	0.030	0.045	-	-	Nb : 10xC <i>min</i> , 1.10 <i>max</i>
52.	X07Cr25Ni20Nb	310HNb	0.04-0.10	0.75	2.00	19.00-22.00	24.00-26.00	-	0.030	0.045	-	-	Nb : 10xC <i>min</i> , 1.10 <i>max</i>
53.	X01Cr25Ni22Mo2N	310MoLN	0.02	0.50	2.00	20.50-23.50	24.00-26.00	1.60-2.60	0.010	0.030	0.09-0.15	-	-
54.	X01Cr20Ni18Mo6CuN	312	0.02	0.80	1.00	17.50-18.50	19.50-20.50	6.00-6.50	0.010	0.030	0.18-0.25	0.50-1.00	-
55.	X04Cr17Ni12Mo2	316	0.08	0.75	2.00	10.00-14.00	16.00-18.00	2.00-3.00	0.030	0.045	0.10	-	-
56.	X02Cr17Ni12Mo2	316 L	0.03	0.75	2.00	10.00-14.00	16.00-18.00	2.00-3.00	0.030	0.045	0.10	-	-
57.	X07Cr17Ni12Mo2	316H	0.04-0.10	0.75	2.00	10.00-14.00	16.00-18.00	2.00-3.00	0.030	0.045	-	-	-
58.	X02Cr17Ni12Mo2N	316LN	0.03	0.75	2.00	10.00-14.00	16.00-18.00	2.00-3.00	0.030	0.045	0.10-0.16	-	-
59.	X04Cr17Ni12Mo2Ti	316Ti	0.08	0.75	2.00	10.00-14.00	16.00-18.00	2.00-3.00	0.030	0.045	0.10		Ti : 5x (C + N) <i>min</i> — 0.70 <i>max</i>
60.	X05Cr17Ni12Mo2Nb	316Nb	0.08	0.75	2.00	10.00-14.00	16.00-18.00	2.00-3.00	0.030	0.045	0.10	-	Nb : 10xC <i>min</i> - 1.10 <i>max</i>
61.	X05Cr17Ni12Mo2N	316N1	0.08	0.75	2.00	10.00-14.00	16.00-18.00	2.00-3.00	0.030	0.045	0.10-0.16	-	-
62.	X02Cr20Ni9Mo1N	316N2	0.03	1.00	2.00	8.00-9.50	19.50-21.50	0.50-1.50	0.015	0.045	0.14-0.25	1.00	-
63.	X04Cr19Ni13Mo3	317	0.08	0.75	2.00	11.00-15.00	18.00-20.00	3.00-4.00	0.030	0.045	0.10	-	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
64.	X02Cr19Ni13Mo3	317L	0.03	0.75	2.00	11.00-15.00	18.00-20.00	3.00-4.00	0.030	0.045	0.10	-	-
65.	X02Cr19Ni16Mo4	317LM	0.03	0.75	2.00	13.50-17.50	18.00-20.00	4.00-5.00	0.030	0.045	0.20	-	-
66.	X02Cr18Ni16Mo4N	317LMN	0.03	0.75	2.00	13.50-17.50	17.00-20.00	4.00-5.00	0.030	0.045	0.10-0.20	-	-
67.	X02Cr18Ni15Mo4Cu3 N	317LCu	0.03	1.00	1.00	14.50-16.50	17.50-19.00	3.80-4.50	0.030	0.030	0.15-0.21	2.80-4.00	-
68.	X02Cr19Ni12Mo3N	317LN	0.03	0.75	2.00	11.00-15.00	18.00-20.00	3.00-4.00	0.030	0.045	0.10-0.22	-	-
69.	X02Cr23Ni25Mo5N	32053	0.03	1.00	1.00	24.00-26.00	22.00-24.00	5.00-6.00	0.010	0.030	0.17-0.22	-	-
70.	X04Cr18Ni10Ti	321	0.08	0.75	2.00	9.00-12.00	17.00-19.00	-	0.030	0.045	0.10		Ti : 5 x(C + N) <i>min</i> — 0.70 <i>max</i>
71.	X07Cr18Ni10Ti	321H	0.04-0.10	0.75	2.00	9.0-12.0	17.0-19.0	-	0.030	0.045	-	-	Ti : 4x(C+N) <i>min</i> , -0.70 <i>max</i>
72.	X01Cr24Ni22Mo7Mn3NCu	326	0.02	0.50	2.00-4.00	21.00-23.00	24.00-25.00	7.00-8.00	0.005	0.030	0.045-0.55	0.30-0.60	-
73.	X06Cr22Ni22Mo2TiAl	334	0.08	1.00	1.50	20.00-23.00	21.00-23.00	2.00-3.00	0.020	0.045	-	-	Al : 0.15-0.60; Ti : 0.15-0.60
74.	X02Cr24Ni17Mo4Mn6NNb	345	0.03	1.00	5.00-7.00	16.00-18.00	23.00-25.00	4.00-5.00	0.010	0.030	0.40-0.60	-	Nb : 0.10
75.	X04Cr18Ni10Nb	347	0.08	0.75	2.00	9.0-12.0	17.0-19.0	-	0.030	0.045	-		Nb : 10xC <i>min</i> – 1.00 <i>max</i>
76.	X07Cr18Ni10Nb	347H	0.04-0.10	0.75	2.00	9.00-13.00	17.00-19.00	-	0.030	0.045	-	-	Nb : 8xC <i>min</i> - 1.00 <i>max</i>
77.	X01Cr18Ni11NNb	347LN	0.005-0.020	1.00	2.00	9.00-13.00	17.00-19.00	-	0.030	0.045	0.06-0.10	-	Nb : 0.20-0.50 15xC <i>min</i>
78.	X05Cr18Ni11NbTaCo	348	0.08	0.75	2.00	9.00-13.00	17.00-19.00	-	0.030	0.045	-	-	(Nb+Ta)10 x C <i>min</i> , 1.00 <i>max</i> ; Ta 0.10 <i>max</i> ;

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
													Co 0.20 <i>max</i>
79.	X07Cr18Ni11NbTaCo	348H	0.04-0.10	0.75	2.00	9.00-13.00	17.00-19.00	-	0.030	0.045	-	-	(Nb+Ta) 8xC <i>min</i> , 1.00 <i>max</i> Ta 0.10 <i>max</i> ; Co 0.20 <i>max</i>
80.	X06Cr18Ni20Si5Cu2Mo	32615	0.07	4.80-6.00	2.00	19.00-22.00	16.50-19.50	0.30-1.50	0.03	0.045	-	1.50-2.50	-
81.	X02Cr14Ni16Si6MoCuAl	38815	0.03	5.5-6.50	2.00	15.00-17.00	13.00-15.00	0.75-1.50	0.02	0.040	-	0.75-150	Al: 0.30 <i>max</i>
82.	X02Cr21Ni25Cu	904L	0.02	1.00	2.00	23.00-28.00	19.00-23.00	4.00-5.00	0.035	0.045	0.10	1.00-2.00	-
83.	X01Cr20Ni25Mo6Cu	904LN	0.02	0.50	2.00	24.00-26.00	19.00-21.00	6.00-7.00	0.010	0.030	0.15-0.25	0.50-1.50	-
84.	X06Cr20Ni35Mo2Cu3Nb	8020	0.07	1.00	2.00	32.00-38.00	19.00-21.00	2.00-3.00	0.035	0.045	-	3.00-4.00	Nb: 8xC <i>min</i> - 1.00 <i>max</i>
85.	X02Cr21Ni25Mo5CuNb	8700	0.04	1.00	2.00	24.00-26.00	19.00-23.00	4.30-5.00	0.030	0.040	-	0.5	Nb :8xC <i>min</i> - 0.40 <i>max</i>
86.	X08Cr21Ni32CuFeAlTi	800	0.10	1.00	1.50	30.00-35.00	19.00-23.00	-	0.015	0.045	-	0.75	Fe: 39.5 <i>min</i> ; Al: 0.15-0.60; Ti: 0.15-0.60
87.	X07Cr21Ni33CuFeAlTi	800H	0.05-0.10	1.00	1.50	30.00-35.00	19.00-23.00	-	0.015	0.045	-	0.75	Fe: 39.5 <i>min</i> ; Al: 0.15-0.60; Ti: 0.15-0.60
88.	X08Cr21Ni33CuFeAlTi	8811	0.06-0.10	1.00	1.50	30.00-35.00	19.00-23.00	-	0.015	0.040	-	0.75	Fe: 39.5 <i>min</i> ; Al: 0.25-0.60; Ti: 0.25-0.60
v.	Duplex:												
1.	X02Cr22Ni5Mo3N	1803	0.03	1.00	2.00	4.50-6.50	21.00-23.00	2.50-3.50	0.020	0.030	0.08-0.20	-	-
2.	X02Cr21Mn3Ni2N	2011	0.03	1.00	2.00-3.00	1.00-2.00	20.50-23.50	0.10-1.00	0.020	0.040	0.15-0.27	0.50	-

Sl No.	Grade Designation	Numerical symbol ISS	C, <i>max</i>	Si, <i>max</i>	Mn	Ni	Cr	Mo	S, <i>max</i>	P, <i>max</i>	N	Cu	Other
	Letter Symbol (see IS 1762(Part 1))												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
3.	X03Cr20Mn3Ni1N	2012	0.05	0.80	2.00-4.00	0.80-1.58	19.00-20.50	0.10-0.60	0.005	0.040	0.16-0.26	1.00	-
4.	X03Cr20Ni3Mo1N	2031	0.05	0.80	2.50	2.00-4.00	19.00-22.00	0.60-1.40	0.005	0.040	0.14-0.24	1.00	-
5.	X02Cr21Mn5Ni2N	2101	0.04	1.00	4.00-6.00	1.35-1.70	21.00-22.00	0.10-0.80	0.030	0.040	0.20-0.25	0.10-0.80	-
6.	X 02Cr22Ni6Mo3N	2205	0.03	1.00	2.00	4.50-6.50	22.00-23.0	3.00-3.50	0.020	0.03	0.14-0.20	-	-
7.	X 02Cr23Ni4CuN	2304	0.03	1.00	2.50	3.00-5.50	21.50-24.50	0.05-0.60	0.030	0.040	0.05-0.20	0.05-0.60	-
8.	X02Cr23Ni4MoCu	2441	0.03	0.70	2.50-4.00	3.00-4.50	23.00-25.00	1.00-2.00	0.005	0.035	0.20-0.30	0.10-0.80	-
9.	X02Cr25Ni6Mo3 WN	2506	0.03	0.90	1.00	5.50-7.20	24.00-26.00	3.00-3.50	0.015	0.040	0.08-0.20	-	W: 0.05 -0.30
10.	X02Cr25Ni7Mo4CuN	2507	0.03	0.80	1.20	6.00-8.00	24.00-26.00	3.00-5.00	0.020	0.035	0.24-0.32	0.50	-
11.	X02Cr25Ni7Mo3CuW N	2760	0.03	1.00	1.00	6.0-8.0	24.00-26.00	3.00-4.00	0.010	0.030	0.20-0.30	0.50-1.00	W: 0.50-1.00

1) Maximum, unless range or minimum is indicated.
2) Stainless Steel may be supplied with Ni content 0.20-1.25, if agreed to between the manufacturer and the purchaser.
3) Stainless Steel grades are generally used for manufacturing welded tubing where appearance is needed.

NOTE — Incidental element — Elements not quoted in Table 1 shall not be intentionally added to stainless steel without the agreement of the purchaser, other than for the purpose of finishing the heat. All reasonable precautions shall be taken to prevent the addition from scrap or other materials used in manufacture of such elements which affect the hardenability, mechanical properties and applicability.

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 including	Upto and	
(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	10.50	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
(1)	(2)	(3)	(4)	(5)
		0.04	0.20	± 0.01
		0.20	0.50	+ 0.02
xii)	P	—	0.040	+ 0.005
		0.040	0.10	+ 0.010
xiii)	Ta	—	1.5	+ 0.05
xiv)	V	—	0.5	+ 0.03
		0.5	1.5	+ 0.05

Sl.No.	Element	Limits of Ladle Analysis as Shown in Table 1, <i>Percent</i>		Permissible Deviation ¹⁾ <i>Percent</i>
		Over including	Upto and	
xv)	W	—	1.0	+ 0.03
		1.0	2.0	$\pm$ 0.05
NOTE — Tolerance shall be mutually as agreed between the purchaser and the supplier for other alloying elements. ¹⁾ 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)

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
	Letter Symbol [see IS 1762 (Part 1)]	Numerical Symbol ISS							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	<i>Ferritic Steels</i>								
1.	X04Cr13Al	405	A	750 to 800	f, a				
2.	X02Cr11Ti	409	A	800 to 1050	w, a	-	-	-	-
3.	X02Cr12	409 M	A	700 to 820	f, w, a	-	-	-	-
4.	X02Cr12Ti	409Ti1	A	780 to 1050	w,a	-	-	-	-
5.	X02Cr11TiNb	409Ti2	A	780 to 1050	w,a	-	-	-	-
6.	X02Cr12Ni1Ti	409Ti3	A	780 to 1050	w,a	-	-	-	-
7.	X04Cr11Ti	409Ti4	A	780 to 1050	w,a	-	-	-	-
8.	X02Cr12Ti	409Ti5	A	780 to 1050	w,a	-	-	-	-
9.	X04Cr12	410S	A	700 to 850	f, w, a	-	-	-	-
10.	X02Cr13Nb	410S1	A	780 to 1050	w,a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
11.	X02Cr12Ni1	410S2	A	780 to 1050	w,a	-	-	-	-
12.	X04Cr14Ni2Mo 1Ti	410S3	A	800 to 1050	w,a	-	-	-	-
13.	X05Cr12Mn1	410S4	A	700 to 850	f,a	Q + T	900 – 1100	w, a, o	400 to 650
14.	X10Cr15	429	A	780 to 1050	w,a	-	-	-	-
15.	X01Cr15Nb	429Nb	A	800 to 1050	w,a	-	-	-	-
16.	X07Cr17	430	A	750 to 850	w, a				
17.	X02Cr18TiNb	430Ti	A	780 to 1050	w,a	-	-	-	-
18.	X02Cr17CuTiNb Zr	430J1	A	800 to 1050	w,a	-	-	-	-
19.	X06Cr17Mo1	434	A	780 to 850	w,a	-	-	-	-
20.	X06Cr17Mo1Nb	436	A	800 to 1050	w,a	-	-	-	-
21.	X02Cr18Mo2Ti NbZr	436L	A	800 to 1050	w,a	-	-	-	-
22.	X02Cr18Mo1Ti NbZr	436L1	A	800 to 1050	w,a	-	-	-	-
23.	X03Cr18Al4	436L2	-	-	-	-	-	-	-
24.	X02Cr18TiAl	439	A	800 to 1050	w, a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
25.	X02Cr18TiNbAl	439Ti1	A	780 to 1050	w,a	-	-	-	-
26.	X02Cr18TiNb	439Ti2	A	780 to 1050	w,a	-	-	-	-
27.	X02Cr19TiNb	441	A	780 to 1050	w,a	-	-	-	-
28.	X10Cr20	442	A	780 to 1050	w,a	-	-	-	-
29.	X02Cr22CuTiNb	443	A	800 to 1050	w,a	-	-	-	-
30.	X01Cr18Mo2Ti Nb	444	A	800 to 1050	w,a	-	-	-	-
31.	X02Cr21Al5	444S1	A	-	-	-	-	-	-
32.	X01Cr20CuNb	445	A	800 to 1050	w,a	-	-	-	-
33.	X02Cr22Mo1	445L1	A	800 to 1050	w,a	-	-	-	-
34.	X02Cr22Mo2	445L2	A	800 to 1050	w,a	-	-	-	-
35.	X06Cr24AlSi	446	A	800 to 860	w,a	-	-	-	-
36.	X10Cr25	446S1	A	780 to 850	w,a	-	-	-	-
37.	X03Cr26Mo1Ti	446S2	A	800 to 1050	w,a	-	-	-	-
38.	X01Cr26Mo1Nb	446S3	A	800 to 1050	w,a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing¹⁾	Symbols²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Temperature °C
39.	X01Cr11Ni1	350	-	-	-	-	-	-	-
40.	X01Cr11Ni1Mn1	450	-	-	-	-	-	-	-
ii) Martensitic Steel									
1.	X08Cr12	403	A	750 to 870	f,a	Q+T	950 to 1000	o,a	700 to 750
2.	X12Cr12	410	A1	700 to 780	f, a	Q+T	950 to 1 000	o, a	700 to 750
			A2	770 to 870	f, a	-	-	-	-
3.	X02Cr13Ni4Mn1Mo1	415	A	750 to 870	f,a	Q+T	950 to 1050	o,a	560 to 640
4.	X20Cr13	420 S1	A	770 to 870	f, a	Q+T	980 to 1 030	o, a	650 to 770
5.	X30Cr13	420S2	A	770 to 870	f, a	Q+T1	980to 1 030	o, a	630 to 700
						Q + T2	980 to 1 030	o, a	100 to 250
6.	X40Cr13	420S3	A	770 to 870	f, a	Q + T	1 000 to 1 050	o, a	100 to 250
7.	X46Cr14	420S4	A	730 to 790	f, a	Q + T	1000 to 1100	o, a	200 to 350
8.	X65Cr14	420S5	A	750 to 850	f, a	-	-	-	-
9.	X38CrMo14	420S6	-	-	-	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Temperature °C
10.	X22Cr12Ni1Mn1Mo1VW	422	A	750 to 870	f, a	Q+T	980 to 1030	o, a	650 to 770
11.	X15Cr16Ni2	431	A	750 to 800	f, a	Q+T	980 to 1 030	o, a	630 to 700
			S	620 to 670	f, a	-	-	-	-
12.	X70Cr17	440 A	A	800 to 900	f, a		1010 to 1070	o	150 to 400
13.	X108Cr17Mo	440	A	780 to 880	f, a	Q+T	1 000 to 1 030	o, a	100 to 250
iii) Precipitation-hardening steels									
1.	X06Cr16Ni7Cu4Nb	630	SA	-	-	-	-	-	-
2.	X07Cr17Ni7Al	631	SA	-	-	-	-	-	-
3.	X09Cr16Mo3MnN	633	A	915 to 950	W, a	Q	440-550	W	-
iv) Austenitic Steels									
1.	X10Cr17Mn6Ni4N	201	SA	1 000 to 1 120	w, a				
2.	X08Cr17Mn12Ni4	201 A	SA	1 000 to 1 120	w, a	-	-	-	-
3.	X10Cr18Mn9Ni5	202	SA	1 000 to 1 120	w, a	-	-	-	-
4.	X08Cr15Mn10Cu2NiN	N1	SA	950 to 1 120	w, a	-	-	-	-

I No.	Grade Designation	Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing¹⁾	Symbols²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
5.	X08Cr16Mn8Cu 3Ni2N	N2	SA	950 to 1 120	w, a	-	-	-
6.	X07Cr17Mn7Ni 5Cu2N	N3	SA	950 to 1 120	w, a	-	-	-
7.	X06Cr15Mn10C u2NiN ³⁾	N5	SA	950 to 1120	w,a	—	—	—
8.	X06Cr14Mn10C u1NiN ³⁾	N6	SA	950 to 1120	w,a	—	—	—
9.	X07Cr14Mn10C uNiN ³⁾	N7	SA	950 to 1120	w,a	—	—	—
10.	X02Cr17Mn6Ni 4	201S	SA	1 000 to 1 120	w, a	-	-	-
11.	X02Cr17Mn7Ni 4N	201LN	SA	1 000 to 1 120	w, a	-	-	-
12.	X10Cr16Mn5Ni 5Si4N	201N	SA	1 000 to 1 120	w, a	-	-	-
13.	X11Cr8Ni6Mn6 N	202S1	SA	1 000 to 1 120	w, a	-	-	-
14.	X02Cr16Mn8Ni 2N	204	SA	1 000 to 1 120	w, a	-	-	-
15.	X10Cr17Mn6Cu 2Ni3N	204Cu1	SA	1 000 to 1 120	w, a	-	-	-
16.	X05Cr17Mn4Cu 2Ni5N	204Cu2	SA	1 000 to 1 120	w, a	-	-	-
17.	X05Cr17Mn6Cu 2Ni4N	204Cu3	SA	1 000 to 1 120	w, a	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
18.	X05Cr19Mn8Ni 6Mo2N	216S1	SA	1 000 to 1 120	w, a	-	-	-	-
19.	X02Cr19Mn8Ni 6Mo2N	216S2	SA	1 000 to 1 120	w, a	-	-	-	-
20.	X 10Cr17Ni7	301	SA	1 000 to 1 120	w, a	-	-	-	-
21.	X10Cr18Ni8	301 A	SA	1 000 to 1 120	w, a	-	-	-	-
22.	X 02Cr17Ni7	301L	SA	1010 to 1090	w, a	-	-	-	-
23.	X02Cr17Ni7N	301LN	SA	1000 to 1120	w, a	-	-	-	-
24.	X 07Cr18Ni9	302	SA	1000 to 1120	w, a	-	-	-	-
25.	X07Cr18Ni9S	303	SA	1000 to 1100	w, a	-	-	-	-
26.	X06Cr19Ni9	304	SA	1 000 to 1 120	w, a	-	-	-	-
27.	X02Cr19Ni10	304 L	SA	1 000 to 1 120	w, a	-	-	-	-
28.	X07Cr19Ni9	304 H	SA	1 000 to 1 120	w, a	-	-	-	-
29.	X02Cr19Ni10N	304LN	SA	1 000 to 1 120	w, a	-	-	-	-
30.	X04Cr19Ni9N	304N	SA	1 000 to 1 120	w, a	-	-	-	-
31.	X05Cr18Ni9Si1 CeN	304Ce	SA	1 000 to 1 120	w, a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
32.	X05Cr17Ni8Cu2	304Cu	SA	1 000 to 1 120	w, a	-	-	-	-
33.	⁷ X05Cr18Ni9Cu2 NbW	304CuW	SA	1 000 to 1 120	w, a	-	-	-	-
34.	X04Cr16Ni8Cu	304Mn1	SA	1 000 to 1 120	w, a	-	-	-	-
35.	X04Cr16Ni7Mn Cu	304Mn2	SA	1 000 to 1 120	w, a	-	-	-	-
36.	X05Cr19Ni9N	304N2	SA	1 000 to 1 120	w, a	-	-	-	-
37.	X08Cr16Ni13Nb	304Nb	SA	1 000 to 1 120	w, a	-	-	-	-
38.	X06Cr18Ni12	305	SA	1 000 to 1 120	w, a	-	-	-	-
39.	X04Cr19Ni10Cu 3Mo	305 Cu	SA	1 000 to 1 120	w, a	-	-	-	-
40.	X07Cr21Ni11Ce	308Ce	SA	1 000 to 1 120	w, a	-	-	-	-
41.	X15Cr24Ni13	309	SA	1 000 to 1 120	w, a	-	-	-	-
42.	X 04Cr24Ni13	309S	SA	1 000 to 1 120	w, a	-	-	-	-
43.	X15Cr20Ni12Si	309S1	SA	1050 to 1150	w, a	-	-	-	-
44.	X07Cr23Ni13	309H	SA	1 000 to 1 120	w, a	-	-	-	-
45.	X05Cr23Ni14Nb	309Nb	SA	1 000 to 1 120	w, a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
46.	X07Cr23Ni14Nb	309HNb	SA	1 000 to 1 120	w, a	-	-	-	-
47.	X15Cr25Ni20	310	SA	1 000 to 1 120	w, a				
48.	X04Cr25Ni20	310S	SA	1 000 to 1 120	w, a	-	-	-	-
49.	X07Cr25Ni20	310H	SA	1 000 to 1 120	w, a	-	-	-	-
50.	X15Cr25Ni21Si	310N	SA	1 000 to 1 120	w, a	-	-	-	-
51.	X05Cr25Ni20Nb	310Nb	SA	1 000 to 1 120	w, a	-	-	-	-
52.	X07Cr25Ni20Nb	310HNb	SA	1 000 to 1 120	w, a	-	-	-	-
53.	X01Cr25Ni22M o2N	310MoLN	SA	1 000 to 1 120	w, a	-	-	-	-
54.	X01Cr20Ni18M o6CuN	312	SA	1 000 to 1 120	w, a	-	-	-	-
55.	X04Cr17Ni12M o2	316	SA	1 000 to 1 120	w, a	-	-	-	-
56.	X02Cr17Ni12M o2	316 L	SA	1 000 to 1 120	w, a	-	-	-	-
57.	X07Cr17Ni12M o2	316H	SA	1000 to 1 120	w, a	-	-	-	-
58.	X02Cr17Ni12M o2N	316LN	SA	1 000 to 1 120	w, a	-	-	-	-
59.	X04Cr17Ni12M o2Ti	316Ti	SA	1 000 to 1 120	w, a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
60.	X05Cr17Ni12Mo2Nb	316Nb	SA	1 000 to 1 120	w, a	-	-	-	-
61.	X05Cr17Ni12Mo2N	316N1	SA	1 000 to 1 120	w, a	-	-	-	-
62.	X02Cr20Ni9Mo1N	316N2	SA	1 000 to 1 120	w, a	-	-	-	-
63.	X04Cr19Ni13Mo3	317	SA	1 000 to 1 120	w, a	-	-	-	-
64.	X02Cr19Ni13Mo3	317L	SA	1 000 to 1 120	w, a	-	-	-	-
65.	X02Cr19Ni16Mo4	317LM	SA	1 000 to 1 120	w, a	-	-	-	-
66.	X02Cr18Ni16Mo4N	317LMN	SA	1 000 to 1 120	w, a	-	-	-	-
67.	X02Cr18Ni15Mo4Cu3 N	317LCu	SA	1 000 to 1 120	w, a	-	-	-	-
68.	X02Cr19Ni12Mo3N	317LN	SA	1 000 to 1 120	w, a	-	-	-	-
69.	X02Cr23Ni25Mo5N	S32053	SA	1080 to 1180	w, a	-	-	-	-
70.	X04Cr18Ni10Ti	321	SA	1 000 to 1 120	w, a	-	-	-	-
71.	X07Cr18Ni10Ti	321H	SA	1 000 to 1 120	w, a	-	-	-	-
72.	X01Cr24Ni22Mo7Mn3NCu	326	SA	1 000 to 1 120	w, a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
73.	X06Cr22Ni22M o2TiAl	334	SA	1 000 to 1 120	w, a	-	-	-	-
74.	X02Cr24Ni17M o4Mn6NNb	345	SA	1 000 to 1 120	w, a	-	-	-	-
75.	X04Cr18Ni10Nb	347	SA	1 000 to 1 120	w, a	-	-	-	-
76.	X07Cr18Ni10Nb	347H	SA	1 000 to 1 120	w, a	-	-	-	-
77.	X01Cr18Ni11N Nb	347LN	SA	1 000 to 1 120	w, a	-	-	-	-
78.	X05Cr18Ni11Nb TaCo	348	SA	1 000 to 1 120	w, a	-	-	-	-
79.	X07Cr18Ni11Nb TaCo	348H	SA	1 000 to 1 120	w, a	-	-	-	-
80.	X06Cr18Ni20Si 5Cu2Mo	S32615	SA	1040 min	w, a	-	-	-	-
81.	X02Cr14Ni16Si 6MoCuAl	S38815	SA	1040 min	w, a	-	-	-	-
82.	X02Cr21Ni25Cu	904L	SA	1095 min	w, a	-	-	-	-
83.	X01Cr20Ni25M o6Cu	904LN	SA	1100 min	w, a	-	-	-	-
84.	X06Cr20Ni35M o2Cu3Nb	N08020	SA	925 to 1010	w, a	-	-	-	-
85.	X02Cr21Ni25M o5CuNb	N08700	SA	1095 min	w, a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Temperature °C
86.	X08Cr21Ni32Cu FeAlTi	800(N08800)	-	-	-	-	-	-	-
87.	X07Cr21Ni33Cu FeAlTi	800H(N08810)	SA	1120 min	w, a	-	-	-	-
88.	X08Cr21Ni33Cu FeAlTi	N08811	SA	1150 min	w, a	-	-	-	-
v) Duplex									
1.	X02Cr22Ni5Mo 3N	1803	SA	1040 min	w, a	-	-	-	-
2.	X02Cr21Mn3Ni 2N	2011	SA	1010 min	w, a	-	-	-	-
3.	X03Cr20Mn3Ni 1N	2012	SA	1000 min	w, a	-	-	-	-
4.	X03Cr20Ni3Mo 1N	2031	SA	1000 min	w, a	-	-	-	-
5.	X02Cr21Mn5Ni 2N	2101	SA	1020 min	w, a	-	-	-	-
6.	X 02Cr22Ni6Mo3 N	2205	SA	1 040 <i>Min</i>	w, a	-	-	-	-
7.	X 02Cr23Ni4CuN	2304	SA	980 <i>Min</i>	w, a	-	-	-	-
8.	X02Cr23Ni4Mo Cu	2441	SA	1000 min	w, a	-	-	-	-
9.	X02Cr25Ni6Mo 3 WN	2506	SA	1020 — 1120	w, a	-	-	-	-

I No.	Grade Designation		Symbols*	Annealing or Softening Temperature °C	Quenching Media for Annealing or Soften-ing ¹⁾	Symbols ²⁾	Hardening Temperature °C	Quenching Media for Hardening	Tempering Tempera- ture °C
10.	X02Cr25Ni7Mo 4CuN	2507	SA	950 to 1 100	w, a	-	-	-	-
11.	X02Cr25Ni7Mo 3CuW N	2760	SA	1100 min	w, a	-	-	-	-

Table 4 Mechanical Properties in Annealed Condition

(Clauses 10.3.2 and 10.4)

Sl No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)
(i)	Ferritic Steel								
1.	X04Cr13Al	405	179	88	183	170	415	20	2a*
2.	X02Cr11Ti	409	179	88	183	170	380	20	a *
3.	X02Cr12	409 M	180	88	184	280	450	18	a*
4.	X02Cr12Ti	409Ti1	179	88	183	170	380	20	a*
5.	X02Cr11TiNb	409Ti2	179	88	183	170	380	20	a*
6.	X02Cr12Ni1Ti	409Ti3	197	92	201	275	415	20	a*
7.	X04Cr11Ti	409Ti4	162	80	165	175	360	22	a*
8.	X02Cr12Ti	409Ti5	162	80	165	175	360	25	a*
9.	X04Cr12	410S	183	89	187	205	415	22	a*

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
10.	X02Cr13Nb	410S1	—	80	165	205	380	22	a*
11.	X02Cr12Ni1	410S2	183	89	187	205	415	22	a*
12.	X04Cr14Ni2Mo1Ti	410S3	180	88	184	380	550	16	Not required
13.	X05Cr12Mn1	410S4	183	89	187	205	410	20	Not required
14.	X10Cr15	429	183	89	187	205	450	22	a*
15.	X01Cr15Nb	429Nb	-	89	187	210	380-560	25	a*
16.	X07Cr17	430	183	89	187	205	450	22	2a*
17.	X02Cr18TiNb	430Ti	183	88	187	175	360	22	a*
18.	X02Cr17CuTiNbZr	430Ti1	192	90	196	205	390	22	a*
19.	X06Cr17Mo1	434	--	89	187	240	450	22	a*
20.	X06Cr17Mo1Nb	436	—	89	187	240	450	22	a*
21.	X02Cr18Mo2TiNb Zr	436L	217	96	222	245	410	20	a*

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
22.	X02Cr18Mo1TiNb Zr	436L1	192	90	196	245	410	20	a*
23.	X03Cr18Al4	436L2	-	-	-	-	450	15	Not required
24.	X02Cr18TiAl	439	183	89	187	205	415	22	a *
25.	X02Cr18TiNbAl	439Ti1	183	89	187	205	415	22	a*
26.	X02Cr18TiNb	439Ti2	180	88	184	250	430	18	Not required
27.	X02Cr19TiNb	441	190	90	194	241	414	20	Not required
28.	X10Cr20	442	217	96	222	275	515	20	a*
29.	X02Cr22CuTiNb	443	187	90	191	205	390	22	Not required
30.	X01Cr18Mo2TiNb	444	217	96	222	275	415	20	a*
31.	X02Cr21Al5	444S1	-	-	-	-	490	15	Not required
32.	X01Cr20CuNb	445	—	83	167	205	427	22	a*
33.	X02Cr22Mo1	445L1	217	96	222	245	410	20	a*

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
34.	X02Cr22Mo2	445L2	217	96	222	245	410	20	a*
35.	X06Cr24AlSi	446	223	...	...	280	520 to 720	13	...
36.	X10Cr25	446S1	217	96	222	275	515	20	a*
37.	X03Cr26Mo1Ti	446S2	217	96	222	310	470	20	a*
38.	X01Cr26Mo1Nb	446S3	187	90	191	275	450	22	a*
39.	X01Cr11Ni1	350	-	-	-	350	450	22	2t
40.	X01Cr11Ni1Mn1	450	-	-	-	450	550	20	2.5t
(ii)	Martensitic Steel								
1.	X08Cr12	403	217	96	221	205	485	25	Not required
2.	X12Cr12	410	217	96	222	205	450	20	Not required
3.	X02Cr13Ni4Mn1Mo1	415	302	32 ^A	306	620	795	15	Not required
4.	X20Cr13	420 S1	225	95	232	-	700, <i>Max</i>	15	,Not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
5.	X30Cr13	420S2	235	97	241	-	740, <i>Max</i>	15	Not required
6.	X40Cr13	420S3	240	98	247	-	760, <i>Max</i>	12	Not required
7.	X46Cr14	420S4	245	99	-	...	780 max	12	Not required
8.	X65Cr14	420S5	265	...	...	...	840 Max	...	...
9.	X38CrMo14	420S6	-	-	-	-	-	-	-
10.	X22Cr12Ni1Mn1Mo1V W	422	248	24 ^A	252	---	--	--	Not required
11.	X15Cr16Ni2	431	285	29 ^A	295	-	-	-	Not required
12.	X70Cr17	440 A	255	25 ^A	269	245	590	15	...
13.	X108Cr17Mo	440	285	29 ^A	295	-	-	-	Not required
iii) Precipitation-hardening steels:									
1.	X06Cr16Ni7Cu4Nb	630	375	110	-	-	-	-	Not Required
2.	X07Cr17Ni7Al	631	192	103	-	380	1 040	20	Not Required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
3.	X09Cr16Mo3MnN	633	388	113	-	1 035	1 275	-	Not Required
Austenitic Steel									
1.	X10Cr17Mn6Ni4N	201	217	95	222	260	515	40	Not required
2.	X08Cr17Mn12Ni4	201 A	217	95	222	260	540	40	Not required
3.	X10Cr18Mn9Ni5	202	241	100	248	260	620	40	Not required
4.	X08Cr15Mn10Cu2Ni N	N1	241	100	248	345	650	40	Not required
5.	X08Cr16Mn8Cu3Ni2 N	N2	241	100	248	310	650	40	Not required
6.	X07Cr17Mn7Ni5Cu2 N	N3	241	100	248	275	600	40	Not required
7.	X06Cr15Mn10Cu2Ni N ³⁾	N5	241	100	248	350	700	40	Not required
8.	X06Cr14Mn10Cu1Ni N ³⁾	N6	241	100	248	375	750	40	Not required
9.	X07Cr14Mn10CuNi N ³⁾	N7	241	100	248	400	800	30	Not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
10.	X02Cr17Mn6Ni4	201S	217	95	222	260	655	40	Not required
11.	X02Cr17Mn7Ni4N	201LN	241	100	248	310	655	45	Not required
12.	X10Cr16Mn5Ni5Si4 N	201N	255	25 ^A	263	345	860	40	Not required
13.	X11Cr8Ni6Mn6N	202S1	-	-	-	340	750-950	35	Not required
14.	X02Cr16Mn8Ni2N	204	241	100	248	330	655	35	Not required
15.	X10Cr17Mn6Cu2Ni3 N	204Cu1	241	100	248	310	620	40	Not required
16.	X05Cr17Mn4Cu2Ni5 N	204Cu2	201	92	205	205	515	40	Not required
17.	X05Cr17Mn6Cu2Ni4 N	204Cu3	217	95	222	240	550	40	Not required
18.	a) X05Cr19Mn8Ni6 Mo2N	216S1*	241	100	248	415	690	40	Not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS							
			Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
	b) X05Cr19Mn8Ni6 Mo2N	216S1**	241	100	248	345	620	40	Not required
19.	a) X02Cr19Mn8Ni6 Mo2N	216S2*	241	100	248	415	690	40	Not required
	b) X02Cr19Mn8Ni6 Mo2N	216S2**	241	100	248	345	620	40	Not required
20.	X 10Cr17Ni7	301	217	95	222	205	515	40	Not required
21.	X10Cr18Ni8	301 A	...	...	...	230	500-750	40	Not required
22.	X 02Cr17Ni7	301L	241	100	248	220	550	45	Not required
23.	X02Cr17Ni7N	301LN	241	100	248	240	550	45	Not required
24.	X 07Cr18Ni9	302	201	92	205	205	515	40	Not required
25.	X07Cr18Ni9S	303	...	...	...	190	500- 700	35	...
26.	X06Cr19Ni9	304	201	92	205	205	515	40	Not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
27.	X02Cr19Ni10	304 L	201	92	205	170	485	40	Not required
28.	X 07Cr19Ni9	304 H	201	92	205	205	515	40	Not required
29.	X 02Cr19Ni10N	304LN	217	95	222	205	515	40	Not required
30.	X 04Cr19Ni9N	304N	217	95	222	240	550	30	Not required
31.	X05Cr18Ni9Si1CeN	304Ce	217	95	222	290	600	40	Not required
32.	X05Cr17Ni8Cu2	304Cu	187	90	191	155	450	45	Not required
33.	⁷ X05Cr18Ni9Cu2Nb W	304CuW	201	92	205	205	515	40	Not required
34.	X04Cr16Ni7Cu	304Mn1	178	90	182	155	450	40	Not required
35.	X04Cr16Ni7MnCu	304Mn2	178	90	182	155	450	40	Not required
36.	a)X05Cr19Ni9N	304N2*	241	100	248	345	620	30	Not required
	b)X05Cr19Ni9N	304N2**	241	100	248	275	585	30	Not required
37.	X08Cr16Ni13Nb	304Nb	--	--	--	200	510-690	35	--

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
38.	X06Cr18Ni12	305	183	88	187	170	485	40	Not required
39.	X04Cr19Ni10Cu3Mo	305 Cu	201	92	205	205	515	40	Not required
40.	X07Cr21Ni11Ce	308Ce	217	95	222	310	600	40	Not Required
41.	X15Cr24Ni13	309	217	95	222	210	490	40	Not required
42.	X 04Cr23Ni14	309S	217	95	222	205	515	40	Not required
43.	X8CrNiTi18-10	309S1	223	...	...	230	550 to 750	28	...
44.	X05Cr23Ni13	309H	217	95	222	205	515	40	Not required
45.	X05Cr23Ni13Nb	309Nb	217	95	222	205	515	40	Not required
46.	X07Cr23Ni13Nb	309HNb	217	95	222	205	515	40	Not required
47.	X20Cr25Ni20	310	217	95	222	210	490	40	Not required
48.	X 04Cr25Ni20	310S	217	95	222	205	515	40	Not required
49.	X07Cr25Ni20	310H	217	95	222	205	515	40	Not required
50.	X15Cr25Ni21Si	310N	223	--	228	230	550-750	28	-

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
51.	X05Cr25Ni20Nb	310Nb	217	95	222	205	515	40	Not required
52.	X07Cr25Ni20Nb	310HNb	217	95	222	205	515	40	Not required
53.	a)X01Cr25Ni21Mo2N	310MoLN (t≤6.35mm)	217	95	222	270	580	25	Not required
	b)X01Cr25Ni21Mo2N	310MoLN (t>6.35mm)	217	95	222	255	540	25	Not required
54.	a) X02Cr20Ni18Mo6CuN	312*	223	96	228	310	690	35	Not required
	b) X02Cr20Ni18Mo6CuN	312**	223	96	228	310	655	35	Not required
55.	X 04Cr17Ni12Mo2	316	217	95	222	205	515	40	Not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
56.	X 02Cr17Ni12Mo2	3016 L	217	95	222	170	485	40	Not required
57.	X 07Cr17Ni12Mo2	316H	217	95	222	205	515	40	Not required
58.	X 02Cr17Ni12Mo2N	316LN	217	95	222	205	515	40	Not required
59.	X 04Cr17Ni12Mo2Ti	316Ti	217	95	222	205	515	40	Not required
60.	X05Cr17Ni12Mo2Nb	316Nb	217	95	222	205	515	30	Not required
61.	X05Cr17Ni12Mo2N	316N1	217	95	222	240	550	35	Not required
62.	X02Cr20Ni9Mo1N	316N2	241	100	248	310	635	35	Not required
63.	X 04Cr19Ni13Mo3	317	217	95	222	205	515	35	Not required
64.	X 02Cr19Ni13Mo3	317L	217	95	222	205	515	40	Not required
65.	X02Cr19Ni14Mo4	317LM	217	95	222	205	515	40	Not required
66.	X02Cr18Ni14Mo4N	317LMN	223	96	228	240	550	40	Not required
67.	X02Cr18Ni15Mo4Cu 3 N	317LCu	217	96	222	245	550	35	Not required
68.	X02Cr19Ni12Mo3N	317LN	217	95	222	240	550	40	Not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
69.	X02Cr23Ni25Mo5 N	S32053	217	96		295	640	40	not required
70.	X 04Cr18Ni10Ti	321	217	95	222	205	515	40	Not required
71.	X07Cr18Ni10Ti	321H	217	95	222	205	515	40	Not required
72.	X02Cr24Ni22Mo7N	326	250	--	255	430	750	40	Not required
73.	X07Cr22Ni21Mo2Ti	334	—	—	-	205	515	40	Not required
74.	X02Cr24Ni17Mo4M n6 N	345	241	100	248	415	795	35	Not required
75.	X 04Cr18Ni10Nb	347	201	92	205	205	515	40	Not required
76.	X07Cr18Ni10Nb	347H	201	92	205	205	515	40	Not required
77.	X01Cr18Ni10NbN	347LN	201	92	205	205	515	40	Not required
78.	X05Cr18Ni10NbTa	348	201	92	205	205	515	40	Not required
79.	X07Cr18Ni10NbTa	348H	201	92	205	205	515	40	Not required
80.	X06Cr18Ni20Si5C u2Mo	S32615	...	...		220	550	25	not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
81.	X02Cr14Ni16Si6M oCuAl	S38815	...	...		255	540	30	not required
82.	X02Cr21Ni25Cu	904L	—	90	200	220	490	35	Not required
83.	X01Cr20Ni25Mo6Cu	904LN	--	--	--	295	650	35	Not required
84.	X06Cr20Ni35Mo2Cu 3Nb	N08020	217	95		240	550	30	not required
85.	X02Cr21Ni25Mo5Cu Nb	N08700	192	90		240	550	30	not required
86.	X08Cr21Ni32CuFe AlTi	N08800	...	...		205	520	30	not required
87.	X07Cr21Ni33CuFe AlTi	N08810	...	...		170	450	30	not required
88.	X08Cr21Ni33CuFe AlTi	N08811	...	...		170	450	30	not required
(iii) Duplex Steel									
1.	X02Cr22Ni5Mo3N	1803	293	31 ^A	303	450	620	25	Not required

SI No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
2.	a)X02Cr21Mn3Ni 2N	2011#	293	31 ^A	303	515	700	30	Not required
	b)X02Cr21Mn3Ni 2N	2011##	293	31 ^A	303	450	655	30	Not required
3.	a)X03Cr20Mn3Ni 1N	2012#	293	31 ^A	303	500	700	35	Not required
	b)X03Cr20Mn3Ni 1N	2012##	290	31 ^A	300	400	650	35	Not required
4.	a)X03Cr20Ni3Mo 1N	2031#	293	31 ^A	303	500	700	35	Not required
	b)X03Cr20Ni3Mo 1N	2031##	290	31 ^A	300	400	650	35	Not required
5.	a)X02Cr21Mn5Ni 2N	2101#	290	31 ^A	300	530	700	30	Not required
	b)X02Cr21Mn5Ni 2N	2101##	290	31 ^A	300	450	650	30	Not required

Sl No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
6.	X02Cr22Ni6Mo3N	2205	293	32 ^A	303	450	655	25	Not required
7.	X02Cr23Ni4CuN	2304	290	32 ^A	300	400	600	25	Not required
8.	a)X02Cr23Ni4MoCu	2441 (t<10 mm)	290	31 ^A	300	540	740	25	Not Required
	b)X02Cr23Ni4MoCu	2441 (t≥10 mm)	290	31 ^A	300	480	680	25	Not Required
9.	X02Cr25Ni7Mo4CuN	2507	310	32 ^A	321	550	795	15	Not required
10.	X02Cr25Ni6Mo3WN	2506	293	32	303	450	620	18	Not required
11.	X02Cr25Ni7Mo3CuWNP	2760	310	32 ^A	321	550	750	25	Not required

* - Sheet & Strip, ** - Plate, # - t ≤ 5.00 mm, ## - t > 5.00 mm, A – RC Scale, a* - thickness of the test piece.

NOTES

Sl No.	Grade Designation		Hardness, <i>Max</i>			Yield Strength <i>Min</i> , MPa 0.2 Percent Proof Stress	Tensile Strength <i>Min</i> , MPa	Elongation Percent <i>Min</i> 50 mm	Bend Test <i>Dma</i>
	Letter Symbol [see IS 1762 (Part I)]	Numeric al Symbol ISS	Brinell HBS/HBW	Rockwell HRB	Vickers Load (1 to 30 kg)				
1. Tensile test not required for thickness less than 0.3mm. 2. During the tensile testing for grades N5, N6 & N7, in case fracture takes place outside the gauge length, re-testing shall be done for the cases in which specified minimum elongation is not achieved. 3. Wherever, Mechanical properties for the grades not given in this table, this shall be as agreed to between the purchaser and manufacturer.									

Table 5 Cupping Test Result – Erichsen Values (Clause 11.3)		
Thickness, mm	Depth of Cup, <i>Min</i> <i>mm</i>	
	Austenitic	Ferritic
Up to 0.80	10.0	7.00
Over 0.80 and up to 1.25	11.0	8.00

Table 6 Surface Finish (Clause 15.1)			
Sl No.	Types of Finish Number	Description	Remarks
(1)	(2)	(3)	(4)
I.	Mill Finished		
i.	0	Hot rolled and/or 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.
ii.	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
iii.	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
iv.	2D	Cold rolled, annealed and descaled (pickled)	A dull, smooth and uniform surface finish most suited for deep drawing applications
v.	2B	Cold annealed descaled (pickled) rolled, and and skin passed	A smoother and brighter surface finish (as compared to 2D) most suitable for general applications
vi.	BA	Cold rolled, bright annealed in protective atmosphere	A cold rolled reflective surface finish. Suitable for applications demanding bright and lustrous surface

II. Polished Finishes			
i.	No. 3	Coarse grit 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
ii.	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
iii.	No. 6	Dull satin surface finish	A dull satin surface finish produced by tampico brush polishing. Suitable for architectural and ornamental applications where high lustre is not desirable
iv.	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.
v.	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

Table 7 Permissible Variation in Thickness of Hot Rolled Sheet and Plate
(Clause 17.1 and 17.2)

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 8 Permissible Variation in Thickness for Cold Rolled Sheet
(Clause 17.1 and 17.2)

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	± 0.25	± 0.20
viii.	From 2.00 to less than 2.50	± 0.20	± 0.25	± 0.30	± 0.25
ix.	From 2.50 to less than 3.00	± 0.25	± 0.30	± 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 9 Permissible Variation in Width and Length of Hot Rolled or Cold Rolled Sheet and Plates Produced by Machine Cutting
(Clause 17.1 and 17.2)

All Dimensions in millimetres.

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

Table 10 Permissible Variation in Width and Length of Hot Rolled Plate Produced by Arc Cutting

(Clause 17.1 and 17.2)
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	+0.4, -0	+0.6,-0	+1.0,-0	+2.0,-0	+2.0,-0
ii.	From 0.6 to less than 1.00	+0.5,-0	+0.6,0	+1.0,0	+2.0,-0	+2.0,-0
iii.	From 1.00 to less than 1.50	+0.6,-0	+0.8,0	+1.2,-0	+2.4,-0	+2.4,-0
iv.	From 1.50 to less than 2.50	+0.8,0	+1.0,0	+1.4,-0	+2.8,-0	+2.8,-0
v.	From 2.50 to less than 4.00	+0.8,0	+1.0,0	+1.6,-0	+3.2,-0	+3.2,-0
vi.	From 4.00 to less than 5.00	+1.0,0	+1.4,-0	+2.00,-0	+4.0,0	+4.0,0
NOTES: 1 For thicknesses of 5 mm and above, tolerances shall be agreed to between the purchaser and the manufacturer/seller. 2 Tolerance for the mill edge shall be as agreed to between the purchaser and the manufacturer/ seller.						

Table 11 Permissible Variation in Flatness ¹⁾ for Hot Rolled or Cold Rolled Sheet and Plates
(Clause 17.1 and 17.2)

All Dimensions in millimetres.

Sl No.	Width	Length	Maximum value of Flatness	
			<i>Un-stretched Condition</i>	<i>Stretched Condition</i>
(1)	(2)	(3)	(4)	(5)
i.	Up to and excluding 1 000	Upto and including 2 000 Over 2 000	15 20	3 6
ii.	1 000 and above	Upto and including 2 000 Over 2 000	20 20	6 6
¹⁾ Maximum deviation from a horizontal flat surface.				

Table 12 Permissible Variation in Thickness of Hot Rolled Strip
(Clause 17.1 and 17.2)

All Dimensions in millimetres.

Sl No.	Thickness	Tolerance on Thickness for Width				
		< 250	250 to < 500	500 to < 1 000	1 000 to < 1 250	1 250 < 2 000
(7)	(8)	(9)	(10)	(11)	(12)	(13)
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 less than 10.00	± 0.50	± 0.60	± 0.65	± 0.65	± 0.65

Table 13 Permissible Variation in Thickness for Cold Rolled Strip in Coil and Cut Length
(Clause 17.1 and 17.2)

All Dimensions in millimetres.

Sl No.	Thickness	Tolerance on Thickness for Width				
		< 250	250 to < 500	500 to < 1 000	1 000 to < 1 250	1 250 < 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 14 Permissible Variation in Width of Hot Rolled Strip of thickness up to and Including 5 mm

(Clause 17.1 and 17.2)

All Dimensions in millimetres.

Sl No.	Width	Tolerance on Thickness for 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 less than 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 15 Permissible Variation in Width of Cold Rolled Strip in Coils and Cut Length
(Clause 17.1 and 17.2)

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 agreed to between the purchaser and the manufacturer/seller.						
2 Tolerance for the mill edge shall be as agreed to between the purchaser and the manufacturer/ seller.						

Table 16 Permissible Variation in camber of Hot Rolled Strip¹⁾

(Clause 17.1 and 17.2)

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 less than 2 000	5
¹⁾ Application only in trim edge condition		

Table 17 Permissible Value of Camber for Cold Rolled Strip¹⁾

(Clause 17.1 and 17.2)

All Dimensions in millimetres.

Sl No.	Width	Maximum Value of Camber for any 2 000 mm length
(1)	(2)	(3)
i.	Less than 50	10
ii.	From 50 to less than 250	8
iii.	From 250 to less than 500	5
iv.	From 500 and over	5
¹⁾ Applicable only in trim edge condition		

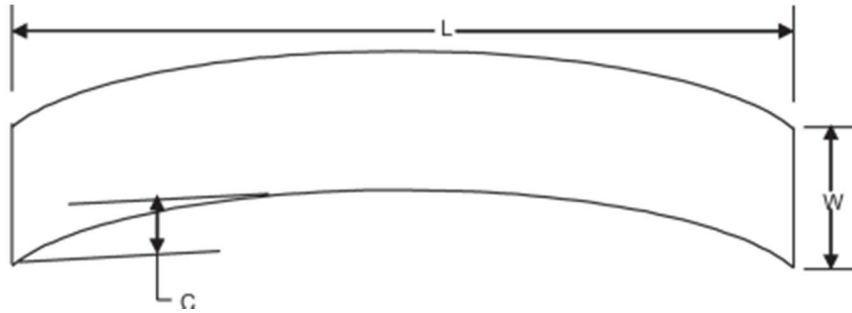


Fig. 1 Image to Determine Camber for Hot and Cold Rolled Strip

Where

C : Camber

W : Width

L : Length