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BSI Group
389 Chiswick High Road
London, W4 4AL
United Kingdom

T: +44 20 845 086 9001
F: +44 20 8996 7400
cservices@bsigroup.com
bsigroup.com

British Standards Limited
Registered in England no: 07864997
Registered address: 389 Chiswick High Road
London, W4 4AL, United Kingdom

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SPECIFICATION FOR STEEL PLATE SHEET & STRIP

Part 4. Stainless and heat resisting plate, sheet and strip

BRITISH STANDARDS INSTITUTION

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SPECIFICATION FOR

STEEL PLATE, SHEET & STRIP

Part 4. Stainless and heat resisting plate, sheet and strip

BS 1449 : Part 4 : 1967

Price 20/- net

BRITISH STANDARDS INSTITUTION

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BRITISH STANDARDS HOUSE, 2 PARK ST., LONDON, W.1

TELEGRAMS: STANDARDS LONDON W1 TELEPHONE: 01-629 9000

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THIS BRITISH STANDARD, having been approved by the Iron and Steel Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 29 December, 1967.

First published, August, 1948.
First revision, January, 1956.
Second revision, December, 1967.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, price 15s. The BS Yearbook may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

BS 18. Methods for tensile testing of metals.
BS 240. Method for Brinell hardness test.
BS 427. Method for Vickers hardness test.
BS 1639. Methods for bend testing of metals.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee reference ISE/10/5. Draft for comment D65/14770.

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CO-OPERATING ORGANIZATIONS

The Iron and Steel Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

*Alloy Steels Association
Board of Trade
British Cast Iron Research Association
British Constructional Steelwork Association
British Electrical and Allied Manufacturers' Association
*British Iron and Steel Federation
British Ironfounders' Association
British Mechanical Engineering Federation
*British Railways Board
British Steel Castings Research Association
Council of Ironfoundry Associations
Council of Iron Producers
Crown Agents for Oversea Governments and Administrations
*Engineering Equipment Users' Association
Federation of Civil Engineering Contractors
Institute of British Foundrymen
Institute of Iron and Steel Wire Manufacturers
Institute of Marine Engineers
Institution of Civil Engineers
Institution of Mechanical Engineers (Automobile Division)
Institution of Production Engineers
Institution of Structural Engineers
Iron and Steel Board
Iron and Steel Institute
Joint Iron Council
Lloyd's Register of Shipping
Ministry of Defence, Army Department
Ministry of Defence, Navy Department
Ministry of Labour (H.M. Factory Inspectorate)
National Association of Drop Forgers and Stampers
National Physical Laboratory (Ministry of Technology)
Oil Companies Materials Association
Royal Institute of British Architects
Shipbuilding Employers' Federation
Society of British Aerospace Companies Ltd.
*Society of Motor Manufacturers and Traders Ltd.
Stainless Steel Development Association

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Cold Rolled Sections Association
Dairy Engineers Association
Federation of Manufacturers of Construction Equipment
Institute of Sheet Metal Engineering
Institution of Engineering Inspection
Institution of Production Engineers
London Transport Board
Ministry of Technology
Precision Bolt and Nut Institute
Stainless Steel Fabricators Association of Great Britain
An individual Company

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BRITISH STANDARD SPECIFICATION FOR

STEEL PLATE, SHEET AND STRIP

Part 4. Stainless and heat resisting plate, sheet and strip

FOREWORD

This revised British Standard has been prepared under the authority of the Iron and Steel Industry Standards Committee.

The previous edition of BS 1449 was issued as one comprehensive standard dealing with all forms of material, including stainless and heat resisting steels, and all methods of production.

To provide for changes in the methods of production and to introduce more detailed information, particularly concerning methods of manufacture and the tolerances to be expected from each of the types of plate, sheet and strip in common production, it has been decided to issue this revision in the following separate parts:

Part 1A. Carbon steel plate and coil, rolled by the continuous process.
Part 1B. Carbon steel sheet and coil, rolled by the continuous process.
Part 2A. Carbon steel plate, rolled by the non-continuous process.
Part 2B. Carbon steel sheet, rolled by the non-continuous process.
Part 3A. Hot rolled mild and carbon steel strip.
Part 3B. Cold rolled mild and carbon steel strip.
Part 4. Stainless and heat resisting plate, sheet and strip.

In preparing this part of the revision of BS 1449, the opportunity has been taken to introduce details of the surface finishes in which stainless and heat-resisting steel plate, sheet and strip are supplied. Dimensional tolerances for plate, sheet and strip material have also been included.

Data is included in Appendix A on the recommended softening temperatures for the grades of steel specified.

NOTE. Where metric equivalents are stated the figures in British units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on the tables in BS 350, 'Conversion factors and tables'.

SPECIFICATION

1. GENERAL REQUIREMENTS

1.1 SCOPE

This part of BS 1449 applies to stainless and heat resisting steel plate from 0·1181 in (3 mm) up to 0·50 in (12·7 mm) thick, sheet up to 0·118 in (under 3 mm) thick, and strip.

1.2 GENERAL

The material shall comply with the appropriate requirements of this Section and of Section 2.

1.3 INFORMATION TO BE SUPPLIED BY THE PURCHASER

The following information shall be stated on the enquiry or order or both:

(1) The material specification in Section 2 with which the material shall comply.

(2) The condition in which the material is to be supplied, if different from that required by the individual material specification, or if alternative conditions of supply are given in the specification.

(3) The condition in which the material is to be tested. If alternative mechanical property requirements are specified the order shall also state which properties are to be determined.

(4) Whether the proof stress is to be determined.

(5) If relevant, whether the intercrystalline corrosion test is required (see 1.10.4).

(6) The surface finish required on each face of the material (see 1.6).

(7) In the case of strip the type of edge required (see 1.7).

(8) Whether the ladle analysis or the results of the mechanical test, or both, are required (see 1.15).

NOTE. Information regarding manipulation or ultimate service conditions to which the material will be subjected is of assistance to the manufacturer in order that the most suitable material is supplied. It is particularly advisable to inform the manufacturer if the material is to be electro-polished.

(9) Whether any special identification of the material is required.

1.4 STEEL MAKING PROCESS

The steel shall be made by an electric process.

1.5 FREEDOM FROM DEFECTS

The finished material shall be free from harmful defects.

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1.6 SURFACE FINISH

1.6.1 The standard finishes listed in Table 1 relate to material as supplied. Nos. 0, 1, 2D, 2B and 2A are produced during manufacture, and are classified together as *mill finishes*. Nos. 3, 4 and 8 are produced by mechanical polishing, and are classified together as *polished finishes*.

1.6.2 Some of these standard finishes may not be available on certain rolled products. Furthermore, material may be supplied with different standard finishes on its two faces although only certain combinations are possible. The finish required on each face should therefore be stated on the order. Where appropriate the finishes are applicable to martensitic steels in the hardened and tempered condition.

1.6.3 For metallurgical reasons, No. 8 finish is not applicable to austenitic stainless steels stabilized with titanium or niobium.

TABLE 1. SURFACE FINISHES

Finish No.	Description	Notes
	Mill finishes	
NOTE. For material supplied with mill finishes, unless otherwise agreed, only one side is inspected to the required finish and this side is marked with the manufacturer's brand.		
0	Hot rolled and softened but not descaled	Suitable only for certain heat resisting applications, as the presence of oxide scale impairs resistance to corrosion. Surface inspection is not practicable.
1	Hot rolled, softened and descaled	Generally used when smoothness and uniformity of finish are not important; grinding marks may be present in local areas.
2D	Cold rolled, softened and descaled	A uniform matt finish.
2B	Cold rolled, softened, descaled, and lightly rolled on polished rolls	A smooth finish for general applications, brighter than finish No. 2D.
2A	Bright annealed	A cold rolled reflective finish retained through annealing.
	Polished finishes	
3A	Ground	A uniform finish generally obtained with 80–100 grit size and not usually applied to thicknesses less than 0·104 in (2·6 mm).
3B	Brush	A semi-dull finish generally applied to a 2D, 2B or 2A surface. Produced by using a bristle type brush and a suitable polishing compound or by similar means. This finish is applied to thicknesses less than 0·104 in (2·6 mm).
4	Polished with fine grit	The final polishing, generally with abrasives of 150 grit size gives an unidirectional texture, not highly reflective, which is suitable for general purposes.
8	Mirror polished	A bright reflective finish with a high degree of image clarity. Produced by polishing with successively finer grits followed by buffing with very fine polishing compounds. Plate with this finish is generally supplied with a No. 3 finish on the reverse face.

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1.7 EDGES

Unless otherwise agreed between the manufacturer and the purchaser and stated on the order, plate and sheet shall be supplied with sheared edges, and strip with rotary sheared edges.

1.8 CHEMICAL COMPOSITION

1.8.1 Permitted deviations. The chemical composition of the steel as determined by ladle analysis shall comply with the relevant material specification. The permitted deviations of any analysis of the product from the specified composition are given in Table 2. These deviations, other than when maxima only are specified, apply either above or below the specified limits of the range, but not both above and below for the same element from different sample products from the same cast. When maxima only are specified the deviations are positive only.

TABLE 2. PERMITTED DEVIATIONS FROM THE SPECIFIED COMPOSITION

	When the max. of the specified range is:	Permissible deviation from the specified composition
	%	%
C	Up to and including 0·03	0·005
	over 0·03 up to and including 0·25	0·01
Mn	Up to and including 1·0	0·03
	over 1·0 up to and including 2·0	0·04
Si	Up to and including 1·0	0·05
Ni	Over 5·0 up to and including 10·0	0·10
	over 10·0 up to and including 20·0	0·15
	over 20·0	0·20
Cr	Over 10·0 up to and including 15·0	0·15
	over 15·0 up to and including 20·0	0·20
	over 20·0	0·25
Mo	Up to and including 1·0	0·03
	over 1·0 up to and including 2·0	0·05
	over 2·0 up to and including 3·0	0·08
	over 3·0	0·10
Ti	All ranges	0·05
Nb	All ranges	0·05
Al	Specified max. up to and including 0·30	0·05
S	Specified max. up to 0·030	0·003
P	Specified max. up to 0·040	0·004

1.8.2 Incidental elements. Elements not quoted in the relevant specification shall not be intentionally added to the 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 of such elements from scrap or other materials used in manufacture.

Percentages of elements up to the following amounts shall be considered as incidental.

TABLE 2A. PERCENTAGES OF INCIDENTAL ELEMENTS

	Non-austenitic steels	Austenitic steels			
		Without specified molybdenum		With specified molybdenum	
		Unstabilized	Stabilized	Unstabilized	Stabilized
	%	%	%	%	%
Ti	—	0·10	—	0·10	—
Nb	—	0·20	—	0·20	—
Mo	0·30	0·70	0·70	—	—
Cu	0·30	0·50	0·50	0·70	0·70

For special applications the purchaser, by agreement with the supplier, may specify a maximum content for one or more incidental elements or may require the amount of such elements to be stated in the certificate of analysis, or both.

1.9 NUMBER, SELECTION AND PREPARATION OF TEST SAMPLES

1.9.1 Selection of test samples. For plates, one test sample shall be selected from each cast. The sample shall be taken from one end of the plate, midway between the centre and one edge.

For sheet produced in coil and for strip, one test sample shall be selected from each cast. For sheets produced individually, not less than 2% shall be tested and not less than one per cast.

1.9.2 Preparation of test pieces. One test piece for the tensile test or one test piece for the bend test, as appropriate, shall be prepared from the test samples selected in accordance with 1.9.1.

In the case of plate, tensile test pieces shall be cut transverse to the direction of final rolling except for material below a width of 12 in (0·3 m) for which a longitudinal test piece shall be used.

In the case of sheet and strip of sufficient width, bend test pieces shall be cut crosswise from the sample. Strip of insufficient width shall have the bend test pieces cut longitudinally from the sample. In each case the sample shall be not

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less than 1½ in (38·1 mm) wide and shall be of the full thickness of the material. The rough edge or arris caused by cutting may be removed and the corners slightly radiused by filing, grinding or machining but the test piece shall receive no further preparation.

1.10 MECHANICAL TESTS

1.10.1 Tensile tests. Tensile tests shall be performed in accordance with BS 18*. The elongation shall be determined at the manufacturer's option, on a gauge length of either 2 in (50·8 mm) or $5{\cdot}65\sqrt{S_o}$. The rate of straining of the tensile test piece shall be as follows:

If the proof stress is to be determined, the rate of increase of stress shall be not more than 0·6 tonf/in²/s from a stress of approximately 3 tonf/in² until the proof stress is reached.

In the plastic range the strain rate shall be not more than ½ in/min (12·7 mm/min). If the proof stress is not to be determined, the strain rate in the elastic range may be as high as that for the plastic range.

Should a test piece break outside the middle third of its gauge length, resulting in an elongation below the specified value, the test may, at the manufacturer's option, be discarded and another test made from the same material.

1.10.2 Bend tests. The test piece shall, at room temperature, be bent in accordance with the requirements of Section 2 of BS 1639 : 1964†, through the specified angle to the specified internal radius (optionally round a former). The test piece passes the test provided the outer convex surface remains free of cracks.

1.10.3 Hardness test. If required by the material specification Brinell hardness tests shall be performed in accordance with BS 240‡ and Vickers hardness tests shall be performed in accordance with BS 427§.

One hardness test shall be made on each plate or coil, and on not less than 2% of the sheets produced individually.

1.10.4 Intercrystalline corrosion test. If required by the relevant material specification and by the purchaser, a special bend test shall be made as follows:

A bend test piece shall be prepared in accordance with 1.9.1 and, unless otherwise specified in the relevant material specification, shall be sensitized before being tested, by heating at a temperature of 650°C (1200°F) for the time specified in the relevant material specification and cooled in air. It shall then be immersed for 72 h in a boiling solution having the following composition:

111 g copper sulphate ($CuSO_4.5H_2O$),
98 g sulphuric acid (sp.gr. 1·84),
made up to 1 litre with distilled water.

*BS 18, 'Methods for tensile testing of metals'.
†BS 1639, 'Methods for bend testing of metals'.
‡BS 240, 'Method for Brinell hardness test'.
§BS 427, Method for Vickers hardness test'.

Precautions shall be taken during the boiling to prevent concentration of the solution due to evaporation. After this preparation each test piece shall be bent through 90°, round a radius equal to three times the diameter or thickness of the test piece. The test piece passes the test provided the outer convex surface remains free of cracks.

1.11 RETESTS

Should any of the original test pieces not fulfil the test requirements, two additional tests shall be made, one of which shall be taken from the material from which the original test sample was taken, unless that item has been withdrawn by the manufacturer. Should either of these additional tests fail, the material represented shall be deemed not to comply with the requirements of this British Standard.

1.12 RE-HEAT TREATMENT

The manufacturer shall have the right to heat-treat or re-heat-treat any material, including material already found not to fulfil the test requirements, and resubmit it for testing.

1.13 INSPECTION

The purchaser or his representative shall have reasonable access to the works of the manufacturer for the purpose of inspection. If such inspection is to be carried out, this shall be stated on the enquiry and order.

1.14 TESTING FACILITIES

The manufacturer shall supply the material for testing and shall furnish and prepare the necessary test pieces and supply labour and appliances for such testing as may be made on his premises in accordance with this British Standard. Failing facilities at his own works for making the prescribed tests, the manufacturer shall have the tests made elsewhere.

1.15 MANUFACTURERS' STATEMENT

The manufacturer shall state that the material supplied meets the relevant requirements of this British Standard.

If required by the order the manufacturer shall also report:

(1) the ladle analysis of the material or
(2) the results of the mechanical tests, or both.

1.16 TOLERANCES ON DIMENSIONS OF PLATE

1.16.1 Thickness. Unless otherwise agreed between the manufacturer and the purchaser the thickness of plate material at any point shall not depart from the ordered thickness by more than ± 5%.

The thickness shall be measured at any point on any plate not less than ⅝ in (15·8 mm) from any cut edge or 1 in (25·4 mm) from a mill edge.

If agreed between the manufacturer and the purchaser the plus and minus tolerance may be varied within the total tolerance of 10%.

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1.16.2 Length and width. Unless otherwise agreed between the manufacturer and the purchaser the tolerances on length and width of plates shall be as stated in Table 3.

TABLE 3. TOLERANCES ON LENGTH AND WIDTH OF PLATES

Specified length or width	Tolerance	
Up to and including 10 ft (3·05 m)	− 0 + ½ in	(− 0) (+ 12·7 mm)
Over 10 ft up to and including 20 ft (6·1 m)	− 0 + 1 in	(− 0) (+ 25·4 mm)
Over 20 ft	− 0 + 1¼ in	(− 0) (+ 31·7 mm)

1.16.3 Flatness. If special standards of flatness are required they shall bc agreed between the manufacturer and the purchaser.

1.17 TOLERANCES ON DIMENSIONS OF SHEET AND STRIP

Unless otherwise agreed between the manufacturer and the purchaser, the following tolerances shall apply. Tolerances for thicknesses and widths not stated in Tables 4 and 5 shall be agreed between the manufacturer and the purchaser.

(1) *Thickness.* The tolerances on thickness for sheet and strip shall be as stated in Table 4.

If agreed between the manufacturer and purchaser that the strip is to be cut from sheet, the initial sheet tolerance shall apply.

TABLE 4. TOLERANCES ON THICKNESS OF SHEET AND STRIP

Nominal thickness		Tolerance for widths of:				
		Up to 15 in		Over 15 in up to and including 40 in	Over 40 in up to and including 60 in	Over 60 in up to and including 72 in
Over	Up to and including	Hot rolled	Cold rolled			
in	in	in	in	in	in	in
—	0·016	—	± 0·001*	—	—	—
0·016	0·018	—	± 0·001	+ 0·001* − 0·002*	+ 0·003 − 0·004	—
0·018	0·020	—	± 0·001	± 0·002*	+ 0·004	—
0·020	0·022	—	± 0·001	+ 0·002* − 0·003*	± 0·004	—
0·022	0·032	—	+ 0·001 − 0·002	+ 0·002* − 0·003*	± 0·004	—
0·032	0·036	—	+ 0·001 − 0·002	+ 0·002* − 0·003*	+ 0·004 − 0·005	+ 0·005 − 0·006
0·036	0·040	—	± 0·002	± 0·003*	+ 0·004 − 0·005	± 0·006
0·040	0·048	—	± 0·002	+ 0·003* − 0·004*	± 0·005	± 0·006
0·048	0·056	—	± 0·002	+ 0·003* − 0·004*	+ 0·005 − 0·006	+ 0·006 − 0·007
0·056	0·064	+ 0·003 − 0·004	± 0·002	+ 0·003 − 0·004	± 0·006	± 0·007
0·064	0·072	+ 0·003 − 0·004	+ 0·002 − 0·003	+ 0·003 − 0·004	± 0·006	± 0·007
0·072	0·080	± 0·004	+ 0·002 − 0·003	+ 0·004	+ 0·006 − 0·007	+ 0·007 − 0·008
0·080	0·092	± 0·005	+ 0·002 − 0·003	± 0·005	± 0·007	± 0·008
0·092	0·104	± 0·005	± 0·003	± 0·005	± 0·007	± 0·008
0·104	0·118	± 0·005	± 0·003	± 0·005	+ 0·007 − 0·008	+ 0·008 − 0·009
0·118†	0·128†	± 0·005	+ 0·003 − 0·004	± 0·005	—	—
0·128†	0·144†	± 0·006	+ 0·003 − 0·004	± 0·006	—	—
0·144†	0·160†	± 0·006	± 0·004	± 0·006	—	—
0·160†	0·176†	± 0·007	± 0·004	± 0·007	—	—

NOTE. 1 in = 25·4 mm.
*Applicable only to cold rolled sheet.
†Applicable to strip up to and including 24 in wide.

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(2) *Length and width of sheets.* The tolerance on the length and width of resheared sheet up to 10 ft (3·05 m) long and 6 ft (1·83 m) wide shall be:

+ the thickness of the sheet but not less than 1/16 in (1·6 mm)
− 0

Tolerances for sheet over 10 ft long and sheet up to 10 ft long, not resheared, shall be agreed between the manufacturer and the purchaser.

(3) *Width of strip.* The tolerances on the width of strip shall be as stated in Table 5.

TABLE 5. TOLERANCES ON WIDTH OF STRIP

Nominal width	Nominal thickness	Tolerance
		in
Up to and including 6 in (152 mm)	Less than 0·064 in (1·63 mm)	± 0·005
	0·064 in up to and including 3/16 in (4·76 mm)	± 0·0075
Over 6 in up to and including 15 in (381 mm)	Less than 0·064 in	± 0·0075
	0·06 in up to and including 3/16 in	± 0·012

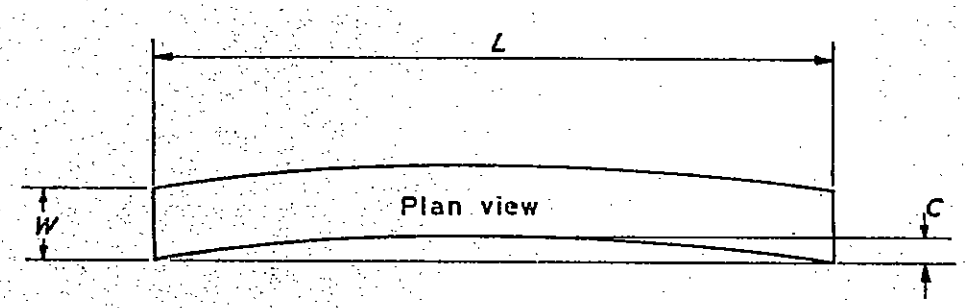
NOTE. 1 in = 25·4 mm.

(4) *Length of strip in cut lengths.* The tolerance on the length of strip supplied in cut lengths up to 10 ft (3·05 m) shall be:

+ 1 % of the length but not less than 1/16 in (1·6 mm)
− 0

Tolerances for lengths over 10 ft (3·05 m) shall be agreed between the manufacturer and the purchaser.

(5) *Edge camber of strip.* The edge camber (edge bow) i.e. the lateral departure of the edge from a straight line forming a chord (see Fig. 1) shall not exceed ¼ in in any 10 ft run (6·3 mm in any 3 m run).



W = Width of strip
L = Length of strip
C = Edge camber

Fig. 1. Edge camber of strip

(6) *Flatness.* If special standards of flatness are required they shall be agreed between the manufacturer and the purchaser.

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2. SPECIFIC REQUIREMENTS

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TABLE 6. TABLE OF PAGE REFERENCES, THE En STEELS REPLACED AND NEAREST A.I.S.I. STEELS

Steel No.	Page reference		En steel replaced	Nearest A.I.S.I. steel	Type
	Plate	Sheet and strip			
301S21	—	44	New grade	301	CrNi 17/7
302S25	—	48	58A	302	CrNi 18/9, 0·12C
304S12	26	46	New grade	304L	CrNi 18/10, 0·03C
304S15	26	—	58E	304	CrNi 18/9, 0·06C
304S16	—	46	58E	304	CrNi 18/10, 0·06C
305S19	—	48	New grade	305	CrNi 18/11, 0·10C
309S24	34	58	New grade	309	CrNi 23/14
310S24	34	58	New grade	310	CrNi 24/20
312S24	34	58	New grade	—	CrNi 24/17
315S16	—	52	58H	—	CrNiMo 17/10/1½
316S12	30	54	New grade	316L	CrNiMo 17/12/2½, 0·03C
316S16	30	54	58J	316	CrNiMo 17/11/2½, 0·07C
317S16	32	56	New grade	317	CrNiMo 18/13/3½
320S17	30	54	58J	—	CrNiMo 17/12/2½ + Ti
321S12	28	50	58B&C	321	CrNi 18/9/Ti
347S17	28	50	58F&G	347	CrNi 18/9/Nb
403S17	22	38	New grade	403	13 Cr, 0·08C
405S17	22	38	New grade	405	13 Cr, 0·08C + Al
410S21	24	40	56A	410	13 Cr, 0·12C
420S45	—	42	56D	—	13 Cr, 0·32C
430S15	—	43	60	430	17 Cr
432S19	—	43	New grade	—	17 Cr + Mo
442S19	—	43	61	442	20 Cr

TABLE 7. SPECIFIED COMPOSITIONS OF PLATES

Steel No.	C	Si	Mn	Ni	Cr	Mo	Ti	Nb	Al	S max.	P max.
	%	%	%	%	%	%	%	%	%	%	%
403S17*	0·08 max.	0·80 max.	1·00 max.	0·50 max.	12·0/14·0	—	—	—	—	0·030	0·040
405S17*	0·08 max.	0·80 max.	1·00 max.	0·50 max.	12·0/14·0	—	—	—	0·10/0·30	0·030	0·040
410S21*	0·09/0·15	0·80 max.	1·00 max.	1·00 max.	11·5/13·5	—	—	—	—	0·030	0·040
304S12*	0·03 max.	0·20/1·00	0·50/2·00	9·0/12·0	17·5/19·0	—	—	—	—	0·030	0·040
304S15*	0·06 max.	0·20/1·00	0·50/2·00	8·0/11·0	17·5/19·0	—	—	—	—	0·030	0·040
321S12*	0·08 max.	0·20/1·00	0·50/2·00	9·0/12·0	17·0/19·0	—	5C/0·70	—	—	0·030	0·040
347S17*	0·08 max.	0·20/1·00	0·50/2·00	9·0/12·0	17·0/19·0	—	—	10C/1·00	—	0·030	0·040
316S12*	0·03 max.	0·20/1·00	0·50/2·00	11·0/14·0	16·5/18·5	2·25/3·00	—	—	—	0·030	0·040
316S16*	0·07 max.	0·20/1·00	0·50/2·00	10·0/13·0	16·5/18·5	2·25/3·00	—	—	—	0·030	0·040
320S17*	0·08 max.	0·20/1·00	0·50/2·00	11·0/14·0	16·5/18·5	2·25/3·00	4C/0·60	—	—	0·030	0·040
317S16*	0·06 max.	0·20/1·00	0·50/2·00	12·0/15·0	17·5/19·5	3·00/4·00	—	—	—	0·030	0·040
309S24*	0·15 max.	0·20/1·00	0·50/2·00	13·0/16·0	22·0/25·0	—	—	—	—	0·030	0·040
312S24*	0·15 max.	0·20/1·00	0·50/2·00	16·0 19·0	23·0/26·0	—	—	—	—	0·030	0·040
310S24*	0·15 max.	0·20/1·00	0·50/2·00	19·0/22·0	23·0/26·0	—	—	—	—	0·030	0·040

*These compositions apply also to sheet and strip (see Table 8).

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403S17 and 405S17—PLATE

Chemical composition. The steels shall contain:

Element	403S17		405S17	
	% min.	% max.	% min.	% max.
Carbon	—	0·08	—	0·08
Silicon	—	0·80	—	0·80
Manganese	—	1·00	—	1·00
Nickel	—	0·50	—	0·50
Chromium	12·0	14·0	12·0	14·0
Aluminium	—	—	0·10	0·30
Sulphur	—	0·030	—	0·030
Phosphorus	—	0·040	—	0·040

Condition of supply. The material shall be supplied in the softened condition (see Appendix A), unless otherwise stated on the order.

Mechanical properties. The mechanical properties obtained from test pieces selected, prepared and tested in accordance with the requirements of 1.9, 1.10 and 1.11 shall be as follows:

Grade	403S17 405S17
Tensile strength	
tonf/in² min.	27
kgf/mm² min.	43
0·2% Proof stress (when specifically ordered)	
tonf/in² min.	16
kgf/mm² min.	25
Yield stress	
tonf/in² min.	18
kgf/mm² min.	28
Elongation	
% min. $L_o = 2$ in (50·8 mm)	22
% min. $L_o = 5{\cdot}65\sqrt{S_o}$	20
Hardness	
HB max.	170

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