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Specification for Steels for fired and unfired pressure vessels. Plates

Part 3. Corrosion and heat resisting steels. Imperial units

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Foreword

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

The previous edition of BS 1501-6, 'Steels for use in the chemical, petroleum and allied industries', was specifically related to steels for use in the chemical and petroleum industry, but the scope of this revision has been widened and the standard now relates to steels for all fired and unfired pressure vessels. In consequence, it incorporates requirements for the steels previously covered by BS 1633 which has been withdrawn.

To provide greater flexibility, it has been decided, in revising BS 1501-6, to publish the individual specifications for the different product forms under separate covers which retain the existing numbering system for the standards except that the parts of BS 1501 now relate to plates and the previously unused number BS 1502, has been allocated to sections and bars. The separate publications for the different product forms will be as follows:

- BS 1501. Plates.
- BS 1502. Sections and bars (other than bolting material).
- BS 1503. Forgings.
- BS 1504. Castings.
- BS 1506. Bars for bolting material.
- BS 1505 has not been allocated to a specific steel product.

In view of the change to the metric system it has been decided to allocate the following part numbers to BS 1501:

- Part 1. Carbon and carbon manganese steel plates. Imperial units.
 - Part 2. Alloy steel plates. Imperial units.
 - Part 3. Corrosion and heat resisting steel plates. Imperial units.
 - Part 4. Carbon and carbon manganese steel plates. Metric units.
 - Part 5. Alloy steel plates. Metric units.
 - Part 6. Corrosion and heat resisting steel plates. Metric units.
- It is intended that Parts 1, 2 and 3 will be withdrawn as soon as practicable.

In preparing this revision which completes the series of three Parts in imperial units (commencing with Part 1 issued in 1964) full account has been taken of the agreements reached in the preparation of the International Code for Stationary Boilers by Technical Committee 11 of the International Organization for Standardization. In consequence, elevated temperature proof stress properties for the steels have been specified where appropriate. Provision has been made for the supply of these steels either with the elevated temperature proof stress properties certified on a statistical basis, or demonstrated by actual representative hot tensile tests on samples taken from the plates (see Section 1). In the cases of steels for which 1.0% offset values are used as the design criteria, additional values at 0.2% offset are listed in Appendix B. Individual material specifications for a range of stainless steels and nickel steels are included in Section 2. In addition individual material specifications for a number of recently developed high proof stress stainless steels are included in Section 3. In this revision the designations used are as described in J/D 6290, 'New designation system for stainless steels'.

Certain of the grades are specified in such a way as to have superior stress rupture properties relative to those of the other grades of the same type and to be particularly suitable for service at temperatures above 550 °C approximately, though at some sacrifice of strength at lower temperatures. Data on the stress rupture properties of these grades are given in Appendix A and may be relied upon for design purposes.

Appendix C gives guidance regarding the influence of fabrication and heat treatment on the mechanical properties of the plates.

NOTE. Where metric equivalents are stated, the figures in imperial 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'.

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British Standard Specification for Steels for fired and unfired pressure vessels. Plates

Part 3. Corrosion and heat resisting steels. Imperial units

1. General requirements

1.1 Scope

1.1.1 This British Standard specifies requirements for corrosion and heat resisting steel plates for fired and unfired pressure vessels. Individual material specifications for a range of standard materials are included in Section 2, and specifications covering high proof stress corrosion and heat resisting steels in Section 3.

Provision has been made for the supply of material to meet different combinations of service conditions and the plates can be supplied:

- (1) to specified room temperature* properties only;
- (2) to specified room temperature and elevated temperature proof stress properties;
- (3) to specified low temperature impact properties in the case of the ferritic stainless steels.

1.1.2 A thickness limitation is included where appropriate. Thicker plates can be supplied to these specifications by agreement between the manufacturer and the purchaser but in such cases some adjustment of the mechanical properties may be involved.

1.1.3 The austenitic and nickel steels in Section 2 are not notch sensitive at temperatures down to -196°C and it has not been considered necessary to include low temperature impact properties for these steels.

The high proof stress steels in Section 3 are a recent development and their suitability for use is not as fully established for service down to -196°C as for the steels in Section 2. If required, the low temperature impact properties may be agreed between the purchaser and the manufacturer.

1.1.4 The suffix 'A' relates to material supplied to specified room temperature tensile properties only. Steels supplied to specified elevated temperature proof stress properties shall be designated by the suffix 'B'.

Material having specified low temperature impact properties shall be designated by the suffix 'LT' followed by a number representing the temperature of the test in degrees Celsius ($^{\circ}\text{C}$) below zero.

Examples of designations are:

- (1) BS 1501-316S12, stainless steel plates supplied to specified room temperature properties only shall be coded as BS 1501-316S12A.
- (2) BS 1501-347S17, stainless steel plates supplied to specified room temperature and elevated temperature proof stress properties shall be coded as BS 1501-347S17B.
- (3) BS 1501-460S52, stainless steel plates supplied to specified room temperature properties and impact properties at -70°C shall be coded as BS 1501-460S52A LT 70.

NOTE. The titles of the British Standards referred to in this standard are given on the inside back cover.

* In case of dispute, room temperature shall be taken as 20°C .

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1.2 Information to be supplied by the purchaser

The following information shall be stated on the enquiry and order:

- (1) The material specification in Section 2 or 3 with which the plates shall comply.
- (2) The heat treatment condition in which the material is to be supplied, if different from that stated in the material specification in Section 2 or 3.

NOTE. In the case of nickel steel NA 15, one of the two alternative conditions of supply as detailed in Section 2 shall be stated.

(3) If plates having specified elevated temperature proof stress properties are required the order shall state the temperature at which the proof stress property is required which, unless otherwise agreed with the manufacturer, shall be one of those tabulated in the relevant material specification*.

(4) If plates having specified impact properties are required, the order shall state the temperature at which the impact tests are to be performed which shall be one of those tabulated in the relevant material specification*.

(5) If relevant, whether the intercrystalline corrosion test is required (see 1.11.5).

(6) Whether the plates are to be inspected during manufacture and tested in the presence of the purchaser's representative (see 1.10.1.1).

1.3 General

The steel shall comply with the requirements specified in this section and with the appropriate requirements specified in Section 2 or 3.

1.4 Steelmaking process

Unless otherwise specified in the relevant material specification in Section 2, the steel shall be made by an electric process.

1.5 Chemical composition

1.5.1 Ladle analysis. The chemical composition of the steel as determined by ladle analysis shall comply with the relevant material specification in Section 2 or 3.

1.5.2 Permitted deviations on product analysis. The permitted deviations of any analysis of the product from the specified composition are given in Table 1. 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.

1.5.3 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 amounts given in Table 2 shall be considered as incidental.

1.6 Freedom from defects

The plates shall be free from harmful defects.

Slight surface imperfections may, however, be removed by mechanical means provided that after such treatment the plates comply with the requirements of 1.9. Defects shall not be repaired by welding except by agreement with the purchaser.

* Only those plates for which specified high temperature properties or impact properties are listed in the relevant material specifications may be so ordered. By agreement certain materials can be supplied with both specified elevated temperature and impact properties.

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Table 1. Permitted deviations from the specified composition

Element	When the maximum of the specified range is:	Permissible deviation from the specified composition
C	% Up to and including 0.03 over 0.03 up to and including 0.25	% 0.005 0.01
Si	Up to and including 1.0	0.06
Mn	Up to and including 1.0 over 1.0 up to and including 2.0	0.03 0.04
Ni	Over 5.0 up to and including 10.0 over 10.0 up to and including 20.0 over 20.0	0.10 0.15 0.20
Cr	Over 10.0 up to and including 15.0 over 15.0 up to and including 20.0 over 20.0	0.15 0.20 0.25
Mo	Up to and including 1.0 over 1.0 up to and including 2.0 over 2.0 up to and including 3.0 over 3.0	0.03 0.05 0.08 0.10
Ti	All ranges	0.05
Nb	All ranges	0.05
Al	Specified maximum up to and including 0.30	0.05
Cu	Over 1.0 up to and including 10.0	0.05
N	Up to and including 0.25	0.02
S	Specified maximum up to 0.030	0.003
P	Specified maximum up to 0.045	0.004

The samples shall be selected in accordance with BS 1837.

Table 2. Percentages of incidental elements

Element	Non-austenitic steels	Austenitic steels			
		Without specified molybdenum		With specified molybdenum	
		Unstabilized	Stabilized	Unstabilized	Stabilized
Ti	%	%	%	%	%
Nb	—	0.10	—	0.10	—
Mo	—	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.

1.7 Heat treatment

Unless otherwise stated on the enquiry and order the plates shall be heat treated as required by the relevant material specification in Section 2 or 3.

1.8 Surface finish

Unless otherwise stated on the enquiry and order, the plates shall be supplied descaled.

1.9 Margins of manufacture

1.9.1 Thickness tolerances—general. Except as provided in 1.9.2, no plate shall be under the specified thickness at any point, nor shall it exceed the specified thickness by more than $7\frac{1}{2}\%$ of the specified thickness. The thickness shall be measured not less than $\frac{3}{8}$ in from any cut edge or 1 in from a mill edge.

1.9.2 Thickness tolerances—locally reduced plate. Should any plate be reduced locally below the specified thickness, such plate may be accepted as complying with the requirements of this British Standard provided that:

- (1) its thickness has not been reduced by more than $2\frac{1}{2}\%$.
- (2) in all other respects it is satisfactory and the purchaser is satisfied that, though locally reduced in thickness, it would, by virtue of its actual mechanical properties and any design factors, fully meet the strength requirements of the application standard (e.g. BS 1515 Part 2);
- (3) the purchaser is furnished with a test report and a sketch indicating the location and thickness of the reduced areas.

1.9.3 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 m)	$- 0$ $(- 0)$ $+ \frac{1}{2}$ in $(+ 12.5 \text{ mm})$
Over 10 ft, up to and including 20 ft (6 m)	$- 0$ $(- 0)$ $+ 1$ in $(+ 25 \text{ mm})$
Over 20 ft	$- 0$ $(- 0)$ $+ 1\frac{1}{4}$ in $(+ 32 \text{ mm})$

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

1.10 Number, selection, preparation and heat treatment of test samples

1.10.1 Selection of test samples

1.10.1.1 Unless otherwise agreed and stated on the enquiry and order, the test samples shall be selected by the manufacturer. If stated on the enquiry and order (see 1.2.1(6)) the tests shall be performed in the presence of the purchaser or his representative.

1.10.1.2 Unless the relevant material specification states otherwise for plates up to and including $2\frac{1}{2}$ tons ($2\frac{1}{2}$ tonnes) as rolled, a sample shall be taken from one end only of each plate. For plates weighing over $2\frac{1}{2}$ tons as rolled, one sample shall be taken from each end of each plate.

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1.10.1.3 The samples shall be taken from the ends of the plates, midway between the centre and one edge, and shall be adequate to provide tensile test pieces, which shall be cut transverse to the direction of final rolling, and impact test pieces, if required, which may be cut either parallel or transverse to the direction of final rolling (see also 1.10.2.4 and 1.14).

1.10.2 Preparation of test pieces

1.10.2.1 Room temperature tensile tests. Unless the relevant material specification states otherwise, one test piece for the room temperature tensile test required by the material specification shall be prepared from each test sample.

1.10.2.2 Elevated temperature tensile tests. If material is required hot-tested, one test piece shall be prepared from each of two plates in each 25 tons (25 tonnes) or part thereof from the same cast, and, if heat treated, subjected to the same nominal heat treatment. The test pieces shall be cut from positions on the samples adjacent to the room temperature tensile test pieces and for thick plates the distance of the axis of the test piece from one face shall be as nearly as possible equal to one-quarter of the thickness of the plate.

1.10.2.3 Impact tests. If required, three impact test pieces to represent each plate shall be prepared in accordance with BS 131 Part 2.

The specified impact properties relate to test pieces cut parallel to the direction of final rolling. The manufacturer may however cut the test pieces either parallel or transverse to the direction of final rolling. The notch shall be cut perpendicular to the original surface of the plate (see Fig. 1).

For material between 0.40 in (10 mm) and 0.25 in (6.3 mm) thick, one of the subsidiary standard impact test pieces specified in BS 131 may be used. Impact tests are not normally required for material less than 0.25 in thick.

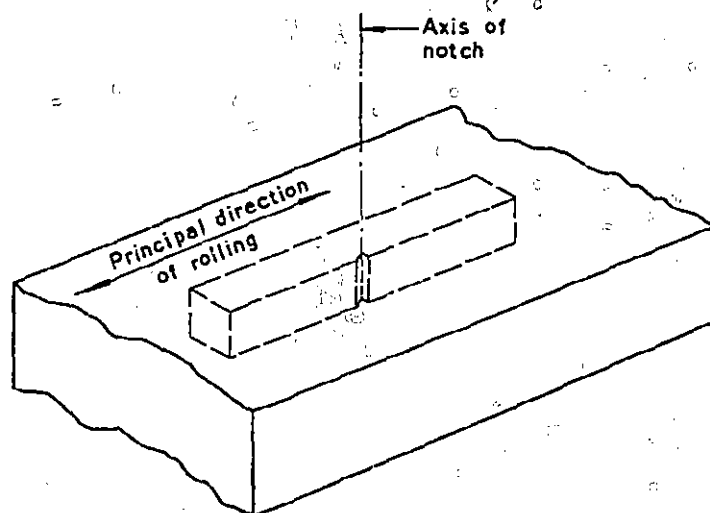


Fig. 1. Location of impact test piece

1.10.3 Heat treatment of test samples. The test samples shall not be given any further heat treatment after separation from the plates they represent.

1.11 Mechanical tests

1.11.1 Tensile tests at room temperatures. Tensile tests at room temperature shall be performed and the proof stress shall be determined in accordance with BS 18 Part 2.

Either a machined round test piece having a gauge length of $L_0 = 5.65\sqrt{S_0}$ or a rectangular section test piece having a gauge length of $L_0 = 2$ in (51 mm) shall be used. (S_0 = original cross-sectional area.)

The proof stress may be determined as a total elongation proof stress except in cases of dispute when the offset proof stress shall be measured.

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1.11.2 Tensile tests at elevated temperatures. Tensile tests at elevated temperatures shall be performed in accordance with BS 3688 Part 1.

The tests shall be made at the temperature stated on the enquiry and order; this shall be selected by the purchaser from those tabulated in the relevant material specification in Section 2 or 3. By special arrangement between the manufacturer and the purchaser tests at more than one temperature may be agreed.

1.11.3 Impact tests. The impact tests shall be performed in accordance with BS 131 Part 2.

The impact tests shall be made at the temperature stated on the enquiry and order; this shall be selected by the purchaser from those tabulated in the relevant material specification in Section 2 or 3. By special arrangement between the manufacturer and the purchaser tests at more than one temperature may be agreed.

1.11.4 Hardness tests. If required by the material specification, hardness tests shall be performed in accordance with BS 240 Part 1.

1.11.5 Intercrystalline corrosion test for austenitic steels. If specified in the relevant material specification and required by the purchaser, a special bend test shall be carried out as follows:

Each bend test piece shall be not larger than $\frac{1}{2}$ in (12 mm) diameter or thickness and, unless otherwise specified, before being tested shall be heated 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 hours in a boiling solution having the following composition:

- 111 g copper sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)
- 98 g sulphuric acid (relative density 1.84)
- made up to 1 litre with distilled water.

Precautions shall be taken during the boiling to prevent concentration of the solution due to evaporation. After this preparation each test piece shall be capable of being bent without cracking through 90° round a radius equal to 3 times the diameter or thickness of the test piece. The test piece passes the test provided the outer convex surface remains free of cracks.

NOTE. For nickel steels NA 15 and NA 16, if an intercrystalline corrosion test is required by the enquiry and order, the conditions of the test shall be agreed between the supplier and the purchaser.

1.12 Mechanical properties at room temperature

The mechanical properties obtained from the test pieces selected and prepared in accordance with 1.10, and tested in accordance with 1.11, shall comply with the requirements of the relevant material specification in Section 2 or 3.

1.13 Mechanical properties at elevated temperatures

1.13.1 If required by the order, elevated temperature tests shall be made at the temperature specified by the purchaser on samples selected and prepared in accordance with 1.10 and tested in accordance with 1.11.

The plates in the batch represented by these tests may be used to meet more than one order, provided the orders are for plates of the same material specification in the same heat-treatment condition and hot-tested at the same temperature.

1.13.2 The plates in the batch represented by these tests shall be deemed to comply with this British Standard provided the test results meet the requirements of either 1.13.2.1, 1.13.2.2 or 1.13.2.3.

1.13.2.1 If the results of both the tests to represent the batch comply with the requirements of the relevant material specification. All the plates in the batch having a room temperature proof stress* equal to or greater than the lowest room temperature proof stress* of the plates selected to represent the batch shall be deemed to comply with this standard. In addition, any plate in the batch having a lower room temperature proof stress* shall also be deemed to comply provided the product of its room temperature proof stress* and the hot proof ratio† determined on the hot-tested pieces exceeds the specified elevated temperature proof stress by not less than 0.2 tonf/in² (3 N/mm²).

* In the case of steels BS 1501-403S17, -405S17 and -460S52, the criterion is room temperature tensile strength.

† For the austenitic steels the hot proof ratio = $\frac{\text{elevated temperature proof stress}}{\text{room temperature proof stress}}$, and for the ferritic steels BS 1501-403S17,

-405S17 and for maraging steel, -460S52, the hot proof ratio = $\frac{\text{elevated temperature proof stress}}{\text{room temperature tensile strength}}$

If the two plates hot-tested give different values the lower value shall be used.

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1.13.2.2 *If the results of one of the tests to represent the batch fails to meet the requirements of the relevant material specification.* Any plate in the batch for which the product of its room temperature tensile strength and the hot proof ratio* determined on the samples tested exceeds the minimum elevated temperature proof stress specified in the relevant material specification by not less than 0.5 tonf/in² (7.8 N/mm²) shall be deemed to comply with the requirements of this standard.

1.13.2.3 *If the results of both the tests to represent the batch fail to meet the requirements of the relevant material specification.* Every plate in the batch shall be considered on the basis of the requirements of 1.13.2.2 and all plates not meeting those requirements shall be deemed not to comply with this standard. The remainder of the batch shall then be resubmitted for hot testing in accordance with the appropriate requirements of 1.10 and 1.13.

1.14 Impact properties

The impact properties obtained from standard test pieces (10 mm square) selected and prepared in accordance with 1.10 and tested in accordance with 1.11 shall average not less than the average value stated in the relevant material specification, and no single test piece shall give a value less than 75% of the specified minimum average value.

For subsidiary standard test pieces, the values to be obtained shall be agreed between the manufacturer and the purchaser.

1.15 Retests

1.15.1 **Room temperature tensile and bend tests.** Should a test piece not fulfil the test requirements, two additional tests shall be made on test pieces from samples taken from the plate represented. Should either of these additional tests fail, the plate represented shall be deemed not to comply with the requirements of this British Standard.

1.15.2 **Elevated temperature tensile tests.** Should a plate not comply with the relevant requirements of the material specification when tested in accordance with 1.13.1 and assessed in accordance with 1.13.2.2 and 1.13.2.3 two additional elevated temperature tests shall be made on test pieces taken from the same plate. Should either of these additional tests fail, the plate represented shall be deemed not to comply with the requirements of this British Standard.

1.15.3 **Impact tests.** If the average of the three impact tests equals or exceeds the specified minimum average value but one test piece fails to give the specified minimum individual value, two more impact test pieces shall be cut from the same plate and retested. If both these pieces give not less than the specified minimum average value, the material represented shall be deemed to comply with the requirements of this British Standard.

If the average of the three impact tests fails to attain the specified minimum average value, or if two of the tests fall below the specified minimum individual value, the material represented shall be deemed not to comply with the requirements of this British Standard.

1.15.4 **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.

1.16 Marking

Each plate as delivered shall be legibly marked with the manufacturer's name or trade mark and with numbers or other identification marks by which it can be traced to the cast of steel from which it was made. Hard stamping is not permitted except on the edges of plates in which case scroll stamps shall be used. In addition the plates shall be marked with the number of this British Standard and the appropriate designation (see 1.1.4). A line of paint shall encircle the numbers or other identification marks. Paint containing lead, zinc, copper or tin shall not be used.

NOTE. Attention is drawn to the certification facilities offered by BSI; see the inside back cover of this standard.

* For the austenitic steels the hot proof ratio = $\frac{\text{elevated temperature proof stress}}{\text{room temperature proof stress}}$, and for the ferritic steels BS 1501-403S17, -405S17 and for maraging steel, -460S52, the hot proof ratio = $\frac{\text{elevated temperature proof stress}}{\text{room temperature tensile strength}}$

If the two plates hot-tested give different values the lower value shall be used.

1.17 Manufacturer's certificate

The manufacturer of the plates shall supply a certificate stating:

- (1) the reference number of each plate;
- (2) the individual material specification with which the plate complies;
- (3) the ladle analysis in respect of all specified elements;
- (4) the room temperature mechanical properties obtained;
- (5) details of the heat treatment;
- (6) for material suffixed 'B', the temperature at which the tests were made, and the proof stress values obtained;
- (7) for material having specified impact properties, the temperature at which the impact tests were made, the type of test piece and the results obtained.

The manufacturer's certificate shall be signed by the person responsible for the supervision of the inspection and testing of the plates.

1.18 Delivery

No material shall be despatched from the manufacturer's works until it has been tested and complies with, or has been certified as complying with, all the tests and requirements of this standard applicable to the material ordered.

1.19 Defects revealed after delivery

In the event of material proving defective during subsequent manufacturing operations such material shall be regarded as not complying with the requirements of this British Standard notwithstanding any previous certificate of satisfactory testing, provided the material has not been improperly treated after delivery.

1.20 Inspection

The purchaser or his representative shall have access at all reasonable times to that part of the manufacturer's works engaged on the order; he shall be at liberty to inspect the manufacture at any stage and to witness the required tests. If the material is to be inspected and tested in the presence of the purchaser's representative this shall be stated on the enquiry and order.

1.21 Testing facilities

The manufacturer shall supply the material required for testing and shall furnish and prepare the necessary test pieces and supply the labour and appliances for such testing as may be carried out on his premises in accordance with this British Standard. Failing facilities at his own works, the manufacturer shall arrange for the test to be carried out elsewhere.

2. Specific requirements for general series corrosion and heat resisting steel plates

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403S17
405S17

Ferritic 13% chromium steels
(up to 2 in (51 mm) thick)

Chemical composition

The ladle analysis shall comply with the appropriate following requirements:

Chemical composition

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

Conditions of supply

Unless otherwise agreed and stated on the enquiry and order, all plates shall be supplied heat treated as follows:

Furnace cooled, or air cooled from a temperature within the range 700 °C to 780 °C.

Mechanical properties at room temperature

The mechanical properties obtained from test pieces selected, prepared and tested in accordance with the requirements of Section 1 shall comply with the appropriate following requirements:

Mechanical properties at room temperature

Property	403S17 and 405S17
Tensile strength, tonf/in ² (N/mm ² = MPa) min. min.	27.0 (420)
0.2 % proof stress, tonf/in ² (N/mm ² = MPa) min. min.	13.0 (200)
Elongation, %, min. for $L_0 = 5.65\sqrt{S_0}$ $L_0 = 2$ in (51 mm)	20 20
Typical hardness values, HB (for information only) min. max.	121 183

Mechanical properties at elevated temperatures

If plates having specified elevated temperature properties are ordered the manufacturer shall test the material in accordance with the requirements of 1.13 at the temperature stated on the order, in which case the 0.2 % proof stress value obtained shall comply with the appropriate following requirements:

Mechanical properties at elevated temperatures

Steel	Minimum 0.2 % proof stress, tonf/in ² (N/mm ² = MPa), at a temperature, °C, of:									
	100	150	200	250	300	350	400	450	500	550
403S17 and 405S17	10.1 (156)	9.1 (141)	8.6 (133)	8.3 (128)	8.1 (125)	7.8 (120)	7.4 (114)	6.7 (103)	6.0 (93)	5.1 (79)

Impact properties

If plates having specified impact properties are required by the order, the average values obtained from test pieces selected, prepared and tested in accordance with the requirements of Section 1 shall comply with the following requirement, and no individual value shall be less than 75% of the average value (see 1.14).

Charpy V-notch impact test

For steels 403S17 and 405S17

Temperature °C	Impact test values, ft lbf (J), minimum average of three
RT*	15 (20.3)

* RT = room temperature. In case of dispute, room temperature shall be taken as 20 °C.