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SPECIFICATION FOR
**FUSION WELDED
PRESSURE VESSELS**

FOR USE IN THE CHEMICAL,
PETROLEUM AND ALLIED INDUSTRIES

*As altered,
November
1967*

Part 1. Carbon and Ferritic Alloy Steels

B.S. 1515 : Part 1 : 1965

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BRITISH STANDARDS INSTITUTION

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THIS BRITISH STANDARD, having been approved by the Chemical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 24th March, 1965.

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 5000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, which may be purchased from BSI Sales Department. It may also be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

- B.S. 10. Flanges and bolting for pipes, valves and fittings.
- B.S. 21. Pipe threads.
- B.S. 131. Methods for notched bar tests.
- B.S. 427. Method for Vickers hardness test.
- B.S. 449. The use of structural steel in building (incorporating B.S. Code of Practice CP 113).
- B.S. 499. Glossary of terms (with symbols) relating to the welding and cutting of metals.
- B.S. 709. Methods of testing fusion welds, welded joints and weld metal (applicable to the electric arc welding of steel).
- B.S. 759. Valves, gauges and other safety fittings for application to land boilers and to piping installations for and in connection with land boilers.
- B.S. 903. Methods of testing vulcanized rubber.
Part A7. Determination of hardness.
- B.S. 970. Wrought steels in the form of bars, billets and forgings, up to 6 in ruling section, for automobile and general engineering purposes.
- B.S. 1113. Water-tube boilers.
- B.S. 1123. Safety valves, gauges and other safety fittings for air receivers and compressed air installations.
- B.S. 1500. Fusion welded pressure vessels for general purposes.
Part 1. Carbon and low alloy steels.
- B.S. 1501. Steels for use in the chemical, petroleum and allied industries. Plates, sections and bars.
- B.S. 1503. Steels for use in the chemical, petroleum and allied industries. Forgings.
- B.S. 1504. Steels for use in the chemical, petroleum and allied industries. Castings.
- B.S. 1506. Steels for use in the chemical, petroleum and allied industries. Bars for bolting material.
- B.S. 1510. Steels for use in the chemical, petroleum and allied industries (Low temperature supplementary requirements to B.S. 1501–1506).
- B.S. 1560. Steel pipe flanges and flanged fittings (nominal sizes ½ in to 24 in) for the petroleum industry.
- B.S. 1719. Classification, coding and marking of covered electrodes for metal-arc welding.
Part 1. Classification and coding.
- B.S. 1750. Bolting for the petroleum industry.
- B.S. 1806. Dimensions of toroidal sealing rings ('O' seals and their housings).
- B.S. 1966. Domed ends for tanks and pressure vessels.
- B.S. 2561. Forged steel pipe fittings screwed with API thread for the petroleum industry.
- B.S. 2600. General recommendations for the radiographic examination of fusion welded butt joints in steel.
- B.S. 2633. Class I arc welding of ferritic steel pipework for carrying fluids.
- B.S. 2910. General recommendations for the radiographic examination of fusion welded circumferential butt joints in steel pipes.
- B.S. 2915. Domed metallic bursting discs and bursting disc assemblies.
- B.S. 3059. Steel boiler and superheater tubes.
- B.S. 3602. Steel pipes and tubes for pressure purposes. Carbon steel: high duties.
- B.S. 3604. Steel pipes and tubes for pressure purposes. Low and medium alloy steel.
- CP 3. Chapter 5. Loading.
- CP 114. Structural use of reinforced concrete in buildings.

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 B.S.I. references relate to the work on this standard:
Committee references CHE/19, CHE/19/-/1, CHE/19/-/1/2 Draft for comment D 62/8670

CO-OPERATING ORGANIZATIONS

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

- | | |
|----------------------------------------------------|-----------------------------------------|
| *Association of British Chemical Manufacturers | Glass Manufacturers' Federation |
| Association of Consulting Engineers | Institute of Petroleum |
| Board of Trade | *Institution of Chemical Engineers |
| *British Chemical Plant Manufacturers' Association | Institution of Gas Engineers |
| Coke Oven Managers' Association | Institution of Structural Engineers |
| *Engineering Equipment Users' Association | *Ministry of Transport |
| Gas Council | *United Kingdom Atomic Energy Authority |

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 standard:

- | | |
|------------------------------------------------------------------------------------|------------------------------------------------|
| Aluminium Federation | Food Manufacturers Federation |
| Associated Offices Technical Committee | Imperial College of Science and Technology |
| Association of Shell Boiler Makers | Institute of Refrigeration |
| British Iron and Steel Federation | Institute of Welding |
| British Welding Research Association | Institution of Mechanical Engineers |
| Copper Development Association | Lloyd's Register of Shipping |
| Council of British Manufacturers of Petroleum Equipment | Ministry of Labour (H.M. Factory Inspectorate) |
| Department of Scientific and Industrial Research | Oil Companies Materials Association |
| —National Engineering Laboratory | Tank and Industrial Plant Association |
| Electricity Council, the Generating Board and the Area Boards in England and Wales | Water-tube Boilermakers Association |
| Engineer Surveyors Association | Manufacturers of Pressure Vessel materials |
| | Manufacturers of Pressure Vessels |

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BRITISH STANDARD SPECIFICATION FOR FUSION WELDED PRESSURE VESSELS FOR USE IN THE CHEMICAL, PETROLEUM AND ALLIED INDUSTRIES

Part 1. Carbon and Ferritic Alloy Steels

FOREWORD

This British Standard has been prepared under the authority of the Chemical Engineering Industry Standards Committee as a result of requests from users who wish to use a standard permitting higher design stresses than are allowed in B.S. 1500, 'Fusion welded pressure vessels for general purposes', Part 1, 'Carbon and low alloy steels'. It is expressly pointed out, however, that this standard is not a simple alternative to B.S. 1500, Part 1 providing identical coverage with an up-grading of design stresses (see Clause 1.1).

*As altered,
November
1967*

It has not been possible at this time to give firm design stress values at elevated temperatures for all the materials of construction but recommended values are given in Appendix G for guidance, pending further information from the steel industry.

NOTE 1. Approximate conversions into British or metric units are given in Appendix E. Where more exact values are required, reference should be made to the tables of conversion contained in B.S. 350, 'Conversion factors and tables'. Attention is drawn to B.S. 2856, 'Precise conversion of inch and metric sizes on engineering drawings'.

NOTE 2. In place of the customary, but incorrect, use of the pound as a unit of force, the unit called a pound force (abbreviation lbf) has been used in this standard. It is that force which, when acting on a body of mass one pound, gives it an acceleration equal to that of standard gravity. The unit of ton-force is used similarly.

SPECIFICATION

SECTION ONE : GENERAL

1.1. SCOPE. This British Standard covers the design, construction, inspection, testing and certification of unfired fusion welded pressure vessels of carbon and ferritic alloy steels utilizing higher design stresses than those permitted by B.S. 1500, 'Fusion welded pressure vessels for general purposes', Part 1, 'Carbon and low alloy steels'. The term 'pressure vessel' as used in this standard includes branches up to the point of connection to the connecting piping by bolting, screwing or welding.

This standard applies only to unfired fusion welded pressure vessels manufactured under the survey of a competent engineering inspection authority or organization. The intent of this requirement may be regarded as satisfied where inspection is carried out by competent personnel of a separate engineering inspection department maintained by the purchaser of the vessel. An inspection department maintained by the manufacturer does not satisfy this requirement except in the case of vessels for the manufacturer's own use and not for resale.

Upon satisfactory completion of the vessel the organization(s) responsible for design, construction and inspection, shall jointly certify that the design satisfies the

requirements of this standard and that the vessel has been so constructed and tested.

It is implicit that the vessels covered by this standard shall be made only by manufacturers who can satisfy the inspecting authority or organization that they are competent and suitably equipped to fulfil all the requirements of this standard.

This standard does not apply to vessels with a shell thickness less than $\frac{1}{4}$ inch or exceeding $\frac{1}{4}$ of the internal diameter.

Vessels for the transport of liquids and gases and for nuclear applications may be subject to special regulations.

The design of vessels lined with vitreous enamel requires special consideration and such designs are not covered by this standard.

Where the words 'purchaser' and 'manufacturer' occur in the text they shall be taken to include representatives of the purchaser and manufacturer and of the appointed inspecting authority or organization.

When a vessel may be subjected to frequent variations in pressure or temperature the effect of fatigue may require consideration (see Subclause 3.1.4.2 and Appendix B).

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