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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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The following BSI reference relates to the work on this standard: Committee reference PVE/1

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Pressure Vessel Standards Committee (PVE/—) to Technical Committee PVE/1, upon which the following bodies were represented:

Associated Offices Technical Committee
Association of Consulting Engineers
British Chemical Engineering Contractors' Association
British Compressed Gases Association
British Gas Corporation
British Steel Industry
Electricity Supply Industry in England and Wales
Energy Industries Council
Engineering Equipment and Materials Users' Association
Health and Safety Executive
Independent Engineering Insurers' Committee
Institution of Chemical Engineers
Institution of Gas Engineers
Liquefied Petroleum Gas Industry Technical Association (UK)
Process Plant Association
Water-tube Boilermakers' Association
Welding Institute

Amendments issued since publication

Amd. No.	Date of issue	Text affected

BS 5500 : 1985 Unfired fusion welded pressure vessels

Enquiry Cases — Introduction

In accordance with the provisions of clause 1.2, the publication of Enquiry Cases will be notified in *BSI News* and will be made available for inclusion in the ring-binder in a separate section following the text of the specification and the appendices.

The table below is for recording cases as they are published and included in the binder, and for noting their subsequent routing.

In general, cases will be extant, as adjuncts to the standard and open to public comment, until the text of the standard is amended to incorporate the substance of particular cases. This will be done in the course of the normal updating procedure and each case so dealt with will be recorded on the final page of the relevant amendment.

When an enquiry case is superseded by amended text to the standard, it will be removed from the list in the subsequent amendment or when a new edition of the standard is published and only those remaining extant, as described above, will be referred to. Consequently, the numerical sequence of enquiry case numbers in the first column will not be continuous because of these omissions.

Enquiry Case No.	Date of publication	Subject of the Enquiry Case	Subsequent Enquiry Case routing (e.g. incorporated into BS 5500)	Date of subsequent action
5500/15	November 1979	Vessels under external pressure: permissible design stresses		
5500/17	November 1979	Split ring flanges		
5500/18	December 1979	Design stresses for ASTM A106B tubes (equivalent to BS 3602-410)		
5500/19	December 1979	Maximum stress at a cylinder/nozzle junction due to application of internal pressure		
5500/20	December 1979	Pressure vessels designed for low pressure but having excess as-built thickness		
5500/24	May 1980	Compensation for openings in vessels subject to external pressure		
5500/25	May 1980	Specification of hot properties for steel		
5500/29	December 1980	Derivation of design strength values from actual, rather than specified, material properties		
5500/31	May 1981	Interpretation of the term 'significant general yielding'		
5500/33	August 1981	Verification of shape of vessels subject to external pressure		Page 4 reissued April 1983
5500/34	September 1981	Longitudinal compressive stress limit for pressure vessels		

Enquiry Case No.	Date of publication	Subject of the Enquiry Case	Subsequent Enquiry Case routing (e.g. incorporated into BS 5500)	Date of subsequent action
5500/36	September 1981	Loose flanges split across a diameter and keyed into the back of a component		
5500/38	June 1982	The use of austenitic stainless steel tube to ASTM A312		
5500/39	June 1982	Jacketed construction: blocking ring/jacket attachment using fillet welds		
5500/40	June 1982	Reduction of area in all weld tensile test		
5500/41	June 1982	Vessels fabricated in Ni-Fe-Cr-Mo-Cu alloy NA16		
5500/42	December 1982	Recommended values for design stresses for BS 3692 grade 8.8 bolting material		
5500/44	December 1982	Limits of applicability of **3.5.4.2** to openings in vessel ends		
5500/45	May 1983	Design of reverse flange/flat cover combinations under internal pressure		Page 3 reissued April 1984
5500/46	May 1983	Set-in branches with added compensation rings		
5500/47	May 1983	Construction categories		
5500/49	September 1983	Integrity of construction categories		
5500/52	April 1984	Vessels under external pressure: simplified calculations		
5500/53	April 1984	Supports and mounting for horizontal vessels		
5500/54	May 1984	Bolted flat end plates		
5500/55	May 1984	Design stresses for ASTM A182, A240 and A312 materials		
5500/56	May 1984	Table 5.7 (1) Minimum through-thickness dimension		
5500/57	May 1984	ASTM A333 Gr 6 steels with restricted maximum carbon content		
5500/58	May 1984	Bolted flanges complying with ANSI B16.5		
5500/59	October 1984	Non-destructive testing requirements in the cases of assembled components and following the repair of a defect		
5500/60	October 1984	Value of stress f_t to be used to calculate test pressure where time-dependent design strengths are applicable		

Acknowledgements

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Figure G.2(29) was originally published as Fig. 2 on page 21 of WRC Bulletin 90 September 1963

Figure G.2(30) was originally published as Fig. 3 on page 21 of WRC Bulletin 90 September 1963

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Figure G.2(32) was originally published as Fig. 8 on page 24 of WRC Bulletin 90 September 1963

Figure G.2(33) was originally published as Fig. 9 on page 25 of WRC Bulletin 90 September 1963

Figure G.2(34) was originally published as Fig. 10 on page 25 of WRC Bulletin 90 September 1963

Figure G.2(35) was originally published as Fig. 11 on page 26 of WRC Bulletin 90 September 1963

Figure G.2(36) was originally published as Fig. 12 on page 26 of WRC Bulletin 90 September 1963

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BS 5500 : 1985

Issue 1, January 1985

Summary of pages

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Foreword

This British Standard has been prepared under the direction of the Pressure Vessel Standards Committee. It is a new edition of the 1982 version and incorporates all technical changes up to and including Amendment No. 3 (April 1984) associated with that version. The proposals in ISO/DIS 2694 'Pressure vessels', drafted by Technical Committee 11 of the International Organization for Standardization (ISO), have been taken into account where considered appropriate.

NOTE. Some of the figures in this standard have been taken from ISO/DIS 2694 and employ the comma as the decimal marker; normal BSI practice is to use the full point.

BS 5500, which covers pressure vessels manufactured from carbon, ferritic alloy and austenitic steels, and from aluminium, replaced the following standards:

BS 1500 Fusion welded pressure vessels for general purposes
Part 1 Carbon and low alloy steels
Part 3 Aluminium

BS 1515 Fusion welded pressure vessels for use in the chemical, petroleum and allied industries
Part 1 Carbon and ferritic alloy steels
Part 2 Austenitic stainless steel

The previous editions stated the intention of integrating into one British Standard the requirements for design, manufacture, testing and inspection of fusion welded pressure vessels. It is still intended to keep under review the question of publishing appropriate supplements covering other types of pressure vessels, for some of which separate British Standards currently exist. In the meantime, by agreement between the parties concerned, this standard may be used where applicable in place of other British Standards. If there is sufficient demand from industry, the standard will also be extended to cover other non-ferrous materials.

The format adopted to facilitate amendments to the text and the incorporation of supplements covering other types of vessels and materials in the previous editions, has been retained.

The requirements of this standard vary considerably depending upon the thickness and type of material to be used. When this combination is such as will permit satisfactory fabrication by relatively straightforward processes, spot non-destructive testing is permitted without any penalty in design thickness; in certain cases visual inspection only is permitted with an appropriate penalty on design thickness.

The strengths that may be assumed for design purposes of materials covered by current British Standards are individually specified in table 2.3. The concept of design strength tables, as used in BS 1500, has been reintroduced because of the difficulty of specifying in any other way appropriate design strengths for materials and product forms covered by a variety of standard specifications which have been revised to line up with relevant ISO material standards. Appropriate modifications to the tables and to appendix K are incorporated, these being concerned with the coverage of the types and ranges of material in the revised standards rather than with significant changes to the presently permitted strength levels which, except in the creep range, are generally consistent with those permitted by BS 1515.

A significant departure from pressure vessel standards prior to BS 5500 is that design strengths in the creep range are given for a range of design lifetimes that may be extended, on expiry, on the basis of periodic 'fitness-for-continued-service reviews' based on inspection and consideration of actual load-temperature history. This approach recognizes the limitations inherent in any simple design method for vessels operating in the creep range and also provides a flexible basis that may be used in cases where the design strength values which have been derived from ISO data, are significantly different from those used with success in the past.

Specific requirements for these reviews are not given in this standard because they require development and will be covered by other standards publications for the periodic inspection of pressure vessels.

Recommendations covering aspects requiring further consideration in particular cases are given in the appendices. The British Standards Institution will be pleased to receive constructive proposals based on experience or research that may lead to improvements in these appendices.

As with the previous editions, it is intended to keep this standard up to date by the issue from time to time of replacement pages, or additional pages where necessary. Each replacement or added page will carry an issue number (with date) indicating its relationship to the original standard, the pages of which are marked 'Issue 1'. For example,

Issue 1 will indicate an original page or one that has been added to the original standard and has not been amended since insertion;

Issue 2 will indicate a first revision of either an original page or an added page;

Issue 3 will indicate either an original page revised for the second time since publication or an added page revised for the second time since insertion.

Side-lining on replacement pages will indicate that changes of technical or reference significance have been made at that point.

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British Standard Specification for

Unfired fusion welded pressure vessels

Section one. General

1.1 Scope

This British Standard specifies requirements for the design, construction, inspection, testing and certification of unfired fusion welded pressure vessels. The materials of construction are defined in section two. 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, and supports, brackets or other attachments directly welded to the pressure containing shell.

This standard applies only to 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:

(a) that specific responsibilities may be delegated at the discretion of the Inspecting Authority or Organization; or

(b) in the case of vessels for the manufacturer's own use and not for re-sale.

The vessels covered by this standard shall be made only by the manufacturers who can satisfy the Inspecting Authority or Organization that they are competent and suitably equipped to fulfil the appropriate requirements of this standard. (See also asterisked footnote.)

This standard does not cover the following.

(a) Storage tanks designed for the storage of liquids at near atmospheric pressures, i.e. where the pressure additional to that due to the hydrostatic head does not exceed 140 mbar† above or 6 mbar below atmospheric pressure in accordance with such standards as BS 799, BS 2594, BS 2654, BS 4741, BS 5387.

Low pressure, above ground storage tanks which have a single vertical axis of revolution designed for the storage of liquids at a pressure not exceeding 1 bar†.

(b) Vessels in which the stresses calculated in accordance with the equations given in section three of this standard are less than 10 % of the design stress permitted by section three.

(c) Strip wound compound or other special designs of vessels which may be appropriate for very high pressures.

(d) Transport vessels, i.e. vessels used for transport of contents under pressure.

(e) Vessels for specific applications which are covered by standards listed in the *BSI Catalogue*.

Manufacturing techniques of glassed steel vessels may require special design considerations subject to the limits imposed by the method of construction and which should have the agreement of the Inspecting Authority.

1.2 Interpretation

If any ambiguity be found or doubt arise as to the meaning or effect of any part of this standard or as to whether anything ought to be done or omitted to be done in order that this standard should be complied with in full, the question shall be referred to the Pressure Vessels Technical Committee (PVE/1) of the British Standards Institution, whose interpretation of the requirements of this standard upon the matter at issue shall be given free of charge and shall be final and conclusive. Parties adopting this standard for the purposes of any contract shall be deemed to adopt this provision unless they expressly exclude it or else import an arbitration provision in terms extending to interpretation of this standard. However, this provision is limited to questions of interpretation and does not confer upon the committee any power, duty or authority to adjudicate upon the contractual rights or duties of any person under a contract except in so far as they may necessarily be affected by the interpretation arrived at by the committee.

Findings or rulings of the committee upon all enquiries, including matters of interpretation, which are of sufficient importance that both enquiries and replies be made public as soon as possible will be published in an enquiry-reply form for inclusion in the BS 5500 ring binder as Enquiry Cases. Their availability will be notified in *BSI News*.

After taking into account any public comment thereon, Enquiry Cases may be incorporated, as appropriate, into the standard as amendments which will form part of the next convenient annual updating.

1.3 References

The titles of the publications referred to in this standard are listed on the last page.

1.4 Definitions

For the purposes of this British Standard the following definitions apply.

1.4.1 purchaser. The organization or individual who buys the finished pressure vessel for its own use or as an agent for the owner.

* A national scheme to provide assurance that vessels are manufactured in conformity with this British Standard without the necessity for a purchaser specifically to commission the competent Inspection Authority is operated by the Pressure Vessels Quality Assurance Board under the aegis of the Institution of Mechanical Engineers. Manufacturers holding a valid PVQAB Certificate of Authorization relating to the manufacture of pressure vessels to the relevant construction categories defined in this standard may also be deemed to be competent and suitably equipped for this purpose.

† 1 mbar = 10^2 N/m^2 = 100 Pa.

1 bar = 10^5 N/m^2 = 0.1 N/mm^2 = 100 kPa.