

Specification for

Expansion vessels using an internal diaphragm, for unvented hot water supply systems

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Refrigeration, Heating and Air Conditioning Standards Policy Committee (RHE/-) to Technical Committee RHE/7, upon which the following bodies were represented:

- Associated Offices Technical Committee
- Association of Consulting Engineers
- Association of Manufacturers of Domestic Unvented Supply Systems Equipment (MODUSSE)
- British Marine Equipment Council
- Building Services Research and Information Association
- Chartered Institution of Building Services Engineers
- Heating and Ventilating Contractors' Association
- Hevac Association
- Institute of Domestic Heating and Environmental Engineers
- Sealed System Equipment Association
- Waterheater Manufacturers' Association

This British Standard, having been prepared under the direction of the Refrigeration, Heating and Air Conditioning Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 May 1990

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First published December 1981
Second edition May 1990

The following BSI references relate to the work on this standard:
Committee reference RHE/7
Draft for comment 87/77155 DC

ISBN 0 580 17887 0

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This revision of BS 6144, which has been prepared under the direction of the Refrigeration, Heating and Air Conditioning Standards Policy Committee, supersedes BS 6144:1981, which is withdrawn. In this revision, maximum working pressure grades have been discontinued and provision for clench ring design and construction has been introduced.

In an unvented hot water supply system, allowance has to be made to accommodate the increased volume of contained water resulting from an increase of temperature. Change in volume is directly related to change in temperature and can be calculated for given conditions. Since gases are compressible, it is possible to use a vessel filled with air/gas, connected to the system, to accommodate the water volume increase by compressing the air/gas. The system pressure thus increases as the gas is compressed. To prevent mixing, a flexible diaphragm is fitted in the expansion vessel to act as a permanent barrier between the gas and the system water. It is common practice, initially, to pressurize the air/gas side of the expansion vessel with air or nitrogen.

NOTE An unvented hot water supply system is a system that does not have an open vent connection to a storage vessel. In this context the terms unvented and sealed are synonymous, but the latter is used more for heating systems.

BS 4814 is a companion standard for expansion vessels for water heating systems.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification of product conformity with this British Standard based on testing and continuing surveillance, which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750.

Enquiries as to the availability of third party certification schemes will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies the manufacture and testing of steel expansion vessels, having an internal diaphragm and which are intended for use in systems where the heated fluid is potable water.

This British Standard specifies expansion vessels suitable for any maximum working pressure of up to 10 bar.¹⁾

NOTE 1 In this standard, all pressures are gauge pressures unless otherwise stated.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

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

2.1

diaphragm (or membrane)

the flexible means by which the chamber of an expansion vessel is partitioned to maintain separation between the expanding hot water and the gas or air which in consequence becomes compressed

2.2

maximum vessel temperature

the maximum temperature at which the vessel may be allowed to operate continuously

2.3

maximum vessel working pressure

the maximum pressure that the vessel may be allowed to contain in operation

2.4

charging pressure

the initial pressure to which the gas side of the vessel is charged

2.5

total vessel volume

the volume occupied by gas when the vessel is empty of water

3 Design and construction

3.1 General

Expansion vessel manufacturers shall clearly state upon the vessel any limitations in the maximum working pressure.

3.2 Effect of materials on water quality

When used under the conditions for which they are designed, all materials in contact with or likely to come into contact with potable water, including any linings that may be necessary to protect the vessel against corrosion shall:

- a) not constitute a toxic hazard;
- b) not support microbial growth;
- c) not give rise to unpleasant taste or odour, cloudiness or discoloration of the water.

Concentrations of substances, chemicals and biological agents leached from materials in contact with potable water, and measurements of the relevant organoleptic/physical parameters shall not exceed the maximum values recommended by the World Health Organization in its publication "Guidelines for drinking water quality" Volume 1 "Recommendations" or as required by the EEC Council Directive of 15 July 1980 relating to the quality of water intended for human consumption, whichever in each case is the more stringent.

NOTE 1 Requirements for the testing of non-metallic materials in these respects are set out in the UK Water Fittings Byelaws Scheme Information and Guidance Note No. 5-01-02.

NOTE 2 Pending the determination of suitable means of characterizing the toxicity of leachates from materials in contact with potable water, listed materials and chemicals approved by the Department of the Environment Committee on Chemicals and Materials of Construction for use in Public Water Supply and Swimming Pools are considered free from toxic hazard for the purposes of compliance with this subclause.

NOTE 3 Products manufactured for installation and use in the United Kingdom which are verified and listed under the UK Water Fittings Byelaws Scheme, administered by the Water Research Centre, are deemed to satisfy the requirements detailed in this subclause.

3.3 Vessel

The vessel shall be constructed of steel plate, sheet or strip suitable for the process of manufacture, which has a minimum tensile strength of 275 N/mm², and which complies with BS 1501-1. Deep-drawn vessels shall be constructed from material complying with BS 1449-1 or BS 1449-2.

NOTE All materials should be capable of verification to the steel makers' test certificates.

The internal surface of the vessel shall be smooth and clean, and all internal edges shall be rounded off.

The external surface of a carbon steel vessel shall be stove enamelled.

Openings in the vessel in excess of 51 mm diameter shall be compensated in accordance with clause 33 of BS 5169:1975.

Vessels having welded seams shall be made in accordance with BS 5135.

¹⁾ 1 bar = 10⁵N/m² = 10⁵ Pa.