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Thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range –40 °C to +700 °C – Method for specifying

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Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages I to VI, pages 1 to 74, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 June 2023. It was prepared by Technical Committee B/540/7, *Thermal insulation for equipment and industrial applications.* A list of organizations represented on this committee can be obtained on request to its committee manager.

Supersession

This British Standard supersedes BS 5422:2009, which is withdrawn.

Information about this document

This is a full revision of the standard, and introduces the following principal changes.

- Tables have been revised with simplification in mind where possible. For example, higher thermal conductivity values for materials no longer supplied or very rarely used, have been removed. Thermal conductivity values in this edition are based on the most commonly used insulation materials at time of revision. All pipe sizes are indicated as “less than or equal to” values, which reduces the need for interpolation, and tends to increase the overall thermal efficiency of the targeted systems.
- Reaction to Fire is defined within this publication in terms of Euroclass, which is used in today’s Building Regulations documents and is the default in product marking. Euroclass Reaction to Fire gives a more comprehensive and clear definition of the behaviour of materials exposed to fire than the more limited legacy BS 476 based scope.
- The decision has been made to retain calculation methods on BS EN ISO 12241:2008, which have been superseded by those in BS EN ISO 12241:2022. An updated calculation tool is forecast for Q3 2023; the drafting panel agreed to minimize delays, publish this British Standard and put recalculations on hold for a later update.
- Table 7 and Table 9 are intentionally blank to preserve the existing table numbering. The table numbering is to be updated in a future revision.
- Enhanced insulation thicknesses have been captured from the legacy Energy Technology List/ Capital Allowances levels, and can be found in Table 15B, Table 16B, Table 17B, Table 18B, Table 19B, and Table 20B.
- District heating tables for secondary and tertiary systems have been added in Table 19C and Table 20C.
- Plastic pipes (single wall) are treated as having no insulative value of their own.
- In Wales, Approved Document L2A: New buildings other than dwellings and Approved Document L2B: Existing buildings other than dwellings were recently revised to a single volume - Approved Document L, Conservation of fuel and power; Volume 2: Buildings other than dwellings.

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Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the *Shorter Oxford English Dictionary* is used (e.g. "organization" rather than "organisation").

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0 Introduction

In any single application for pipework and equipment, thermal insulation material can perform a variety of functions simultaneously, including:

a) conserve energy for both cooled and heated systems;

b) retard freezing of contents;

c) control condensation on refrigerated, chilled or cold surfaces;

d) protect personnel from exposure to extremes of surface temperature;

e) control process or service temperatures; and

f) limit effects of system on indoor building temperature.

Even within the range listed, consideration should be given to sub-sectors of these functions.

For example, energy conservation can be driven by two distinct considerations. The first, and more traditional, reason for seeking energy saving is to save cost. The second, and more recent, reason for seeking energy saving is to minimize carbon dioxide emissions from the associated power source. Although any insulation measure has desired effects in both of these areas simultaneously, the extent of insulation that can be justified varies with the comparative costs of energy on the one hand, and alternative costs of carbon dioxide emission abatement on the other. Since thermal insulation of pipework and equipment represents one of the most cost-effective ways available of limiting carbon dioxide emissions, this standard highlights a series of thicknesses within its core tables, which have been calculated in accordance with environmental principles as outlined in Annex A.

Although the tables provided in this standard offer a simple method of determining the minimum thickness levels, their use requires the basic information outlined in Clause **4** and, in some cases, additional information may be required. This specific information is outlined in the clauses pertaining to specific applications.

Where information such as the thermal conductivity of the chosen insulation material does not conform to the categories highlighted in the relevant tables, it is possible to interpolate between either columns or rows where the margin of error is not likely to be critical. For greater accuracy, and where the application parameters differ from those covered within the scope of a Table (e.g. different ambient air temperature), the specifier should calculate from first principles by using methods set out in BS EN ISO 12241 and the Annexes to this standard.

The default values for use in relation to this standard are given in Annex B, the criteria used to establish the tables are summarized in Annex C, and the standard diameters of pipes considered are given in Annex D.

1 Scope

This British Standard describes a method for specifying requirements for thermal insulating materials on pipes, tanks, vessels, ductwork and equipment for certain defined applications and conditions within the temperature range –40 °C to +700 °C. It also specifies some physical requirements for the insulating materials. It is intended for use by designers, specifiers, contractors and manufacturers of thermal insulation.

This British Standard does not apply to pipelines that are embedded underground, nor does it refer to the insulation of building construction. However, the standard does apply to any pre-insulated pipework other than buried/underground pipework.

