NZS/BS 5422:1990

Method for specifying thermal insulating materials on pipes, ductwork and equipment (in the temperature range -40 degrees C to +700 degrees C)

This British Standard BS 5422;1990 has been adopted by the Standards Council of New Zealand for use in New Zealand, pursuant to the provisions of the Standards Act 1988.

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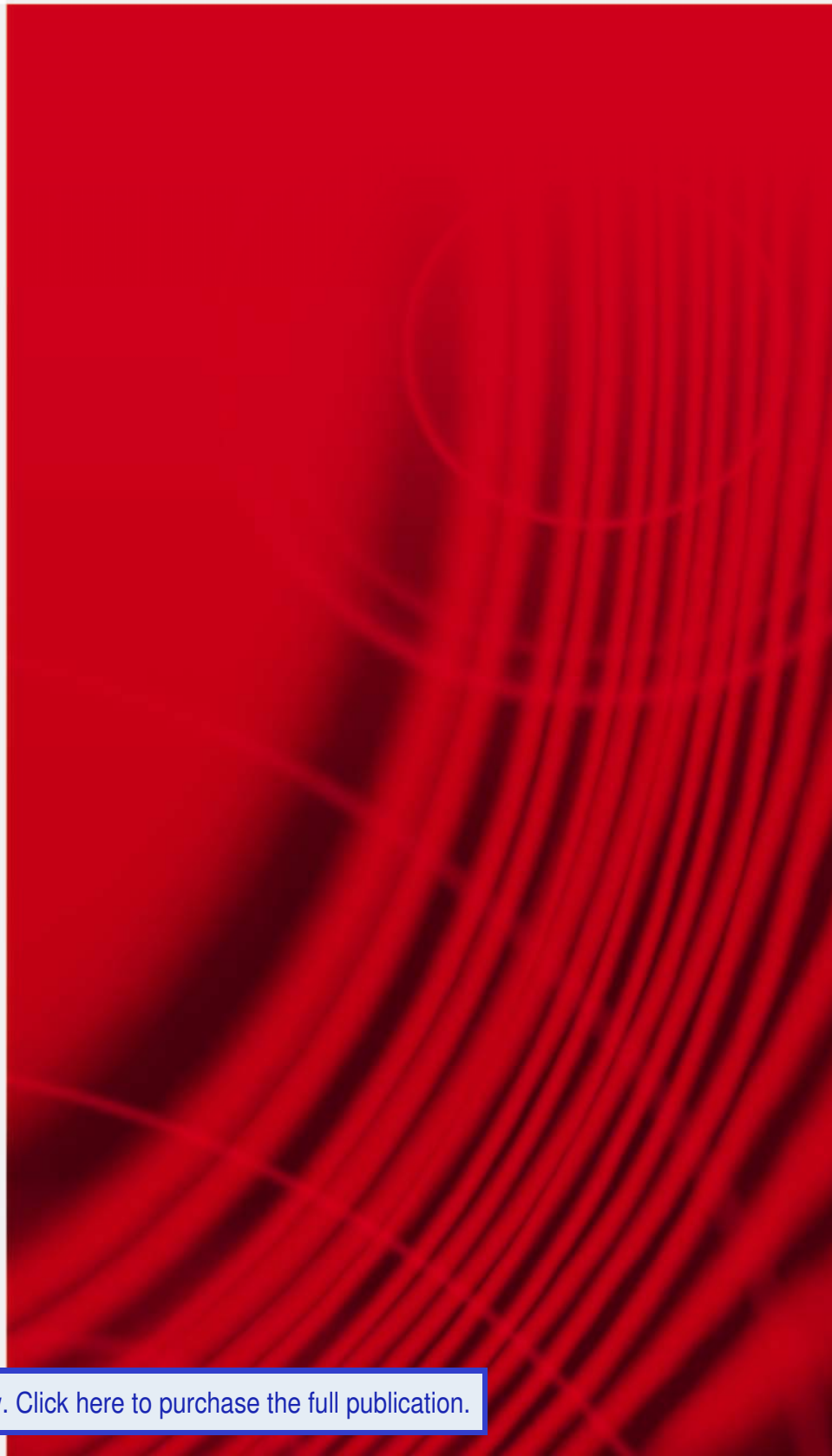

BRITISH STANDARD

BS 5422 : 1990

UDC 699.86 : 678.073 : 62-462 : 66.043.2 : 621.315.671

Method for specifying

Thermal insulating materials on pipes, ductwork and equipment (in the temperature range − 40 °C to + 700 °C)

Matériaux d'isolation thermique des tuyaux, conduites et matériels (plage de température comprise entre − 40 °C et + 700 °C)
Méthode de spécification

Anforderungen für Isolierwerkstoffe für Rohre, Leitungskanäle und Zubehör im Temperaturbereich von − 40 °C bis + 700 °C

Contents

Foreword

This British Standard has been prepared under the direction of the Refrigeration, Heating and Air Conditioning Standards Policy Committee and it supersedes BS 5422 : 1977, which is withdrawn.

The general format of the 1977 edition has been retained but the distinction between industrial, commercial and domestic uses has been set out in greater detail, with domestic applications covered in a new section.

All the tables of thickness have been revised, using current and projected costs of material, labour and fuel. All tables, other than those relating to protection against condensation or freezing, are in terms of economic thickness where the total cost of the installation is balanced against heat loss over a given period. The assumptions on which the tables have been prepared are given in each case; methods of calculation are given in appendices to allow for thicknesses to be determined for conditions other than those appropriate to the tables.

Thicknesses are given for a range of thermal conductivities appropriate to the usual materials used for the application; thicknesses for intermediate thermal conductivities and pipe sizes may be deduced by interpolation. For the choice of type of insulating material and suitable methods of application, reference should be made to BS 5970.

Unless otherwise stated, the temperature of the surface to be insulated is taken to be the temperature of the fluid inside the pipe, duct or vessel.

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

Section 1. General

1 Scope

This British Standard describes a method for specifying requirements for thermal insulating materials on pipes, ductwork and equipment for certain defined applications and conditions within the temperature range -40 °C to +700 °C. It also specifies physical requirements for the insulating materials.

Appendices A to H give information on the relevant calculations. Appendix J gives outside diameters of steel, copper and thermoplastics pipe. Appendix K gives fuel comparison costs.

This British Standard does not apply to pipelines that are embedded underground, nor does it refer to the insulation of buildings and structures.

Section two relates to the general use of thermal insulating materials and it covers physical characteristics of general applicability, thermal conductivity, temperature limitations and tests.

Section three is on refrigeration applications and it relates to the insulation of pipes, ducts, tanks, etc. containing fluid at temperatures from 0 °C to -40 °C. It includes references to vapour barriers.

Section four relates to services of chilled water from 0 °C to +10 °C and of cold water above +10 °C. Minimum thicknesses are recommended to prevent condensation and protect against freezing. It includes references to vapour barriers.

Section five covers economic thicknesses of insulation for central heating, hot water services and warm-air ductwork, and recommends minimum thicknesses to prevent condensation on chilled-air ductwork.

Section six gives economic thicknesses for central heating and hot water services and recommends minimum thicknesses to protect against freezing of cold water systems.

Section seven gives economic thicknesses for process pipework and equipment up to +700 °C, with tables of corresponding heat losses. References to thicknesses based on other criteria are included.

NOTE. 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 definitions given in BS 874 and BS 3533 apply together with the following.

2.1 evaluation period

The time (in operating hours) over which the cost of heat loss from the insulated surfaces is to be calculated.

2.2 thickness of insulation

The thickness of insulating material only, excluding any protective finish or covering composition.

2.3 economic thickness

The thickness of insulation that gives a minimum total cost over a chosen evaluation period.

2.4 incremental cost

The cost per unit volume of an increment of insulation.

NOTE. See **E.3.1.**

2.5 cold water

The water delivered from the mains or natural supply.

2.6 chilled water

Water after processing through a cooling plant (0 °C to +10 °C).

2.7 finishing materials

All materials used to cover the insulation whether preapplied or applied on site.

2.8 preapplied covering

The surfacing material applied by the insulation supplier.

3 General information to be supplied by the purchaser

The purchaser shall provide the following information in his enquiry, to enable the insulation requirements to be assessed by the contractor or supplier.

(a) Type of insulating material required and the form in which the material is to be provided, and whether any portions are to be specially fabricated for ease of removal.

(b) Type of finish required.

(c) Dimensions of items to be insulated.

NOTE. Unless dimensions are adequately detailed in drawings, information is required relating to surface dimensions of flat or large curved areas, external diameters and internal diameters (bores) of pipes, lengths of each size of pipe, numbers and shapes of bends, numbers and types of fittings (valves, flanges, tees, etc.) and space available for insulation especially at flanges and valves.

(d) Nature of surfaces that are to be insulated and an indication of surfaces for which care is needed and of any specific chemical requirement for the insulation and finish.

(e) Location of plant, i.e. whether the plant to be insulated is indoors, outdoors but protected from the weather, outdoors exposed to the weather or carried in ventilated ducts or open trenches.

(f) Temperature conditions, i.e. the normal operating temperature, the extreme temperature if other than the normal operating temperature, any fluctuating temperatures and the duration of extreme or fluctuating temperatures.

(g) Surrounding atmospheric conditions, including special note of abnormally high or low temperatures, high humidity, flammable conditions, potentially corrosive atmospheres, etc.

(h) Special service requirements.

Any special service requirements additional to those given in the appropriate section shall be notified to the contractor.

NOTE. The additional special requirements could include requirements for the following:

(1) resistance to compression;

(2) resistance to fire;

(3) vibration conditions;

(4) exposure to mechanical damage;

(5) the presence of corrosive fluid;

(6) resistance of surface to ingress of oils and flammable liquids.

(i) Bases on which thickness is to be determined.

NOTE. Some factors that may determine thickness are as follows:

(a) economic thickness;

(b) specified heat gain or loss per unit dimension or relative to the complete system;

(c) specified temperature on the outer surface of the insulation or finish, e.g. for the protection of personnel (see BS 5970);

(d) specified conditions of fluid at the point of delivery, taking into account the rate of flow;

(e) special thickness requirements;

(f) maintenance of the temperature of a bulk of static fluid over a specific period;

(g) prevention of freezing of the fluid in the system.