



PIPEWORK INSULATION

CU14



Contents

INTRODUCTION

General

Scope

Surfaces to be Insulated

Pumps, Turbines etc

Performance

Minimum Pipe Insulation Thickness

Physical Characteristics

Approved Types of Insulation

Other Materials

Piping Insulation

Medium Temperature Range

Items to be Insulated

Materials

High Temperature Range

Tower, Tank, Heat Exchanger etc., medium and high temperature insulation.

Temperature Ranges and Materials

Expansion Joints

Manholes, Branches, etc

Preparation of Vessels for Insulation

Application – Sectional Insulation

Finishes on Towers, Tanks, Heat Exchanger, etc

Manholes and Heat Exchanger Covers

Pipe Insulation – Low Temperature

Temperature Range

Items to be Insulated

Materials

Vapour Seals

Supporting Steelwork

Pipe Identification

Anti-Condensation Treatment For Process Water, Cooling Water Flow and

Return

Asbestos

Insulation of Stainless Steel Surfaces

Static Electricity



SECTION 2

Pipe Identification Bands



SECTION 3

Insulation Materials for Surface Finishes

Insulation Materials

Example

TYPES OF INSULATING MATERIALS

Table 'A'



INTRODUCTION

GENERAL

Scope

The insulation requirements shown herein indicate City University's preferred methods and apply to all Process equipment, and Utility pipelines. Other methods and materials may be used only after consultation with, and agreement by, the Company Engineer. Materials and the application of materials shall generally conform to the requirements of the following British Standards:-

TIMSA guidance for achieved compliance with part 1 of the building regulations

Surfaces to be insulated

Insulation shall be applied where it is necessary to:-

- Conserve energy by preventing the transfer of heat either to or from the equipment.
- Prevent climatic variations in temperature from affecting the operation of the plant.
- Protect personnel from injury through contact with hot equipment.
- Cold lines – to maintain temperature above dew point (internal mains only)
- Domestic Services - To prevent Cold water temperatures reaching levels that promote bacterial growth.

The contractor will furnish declared conductivity values together with proposed insulation thicknesses to demonstrate that these figures will not be exceeded.

Physical Characteristics

The following characteristics of the material shall comply with the following:

- The declared value of conductivity shall be expressed in $w/(mK)$ or $B.T.U.'s/sq.ft/hr/^{\circ}F/inch$ and shall be determined by a test carried out by the National Physical Laboratory or other approved authority. The apparent density and temperature range shall also be given.
- It shall be non-inflammable and free from any substances which might lead to spontaneous combustion in the presence of air etc.
- It shall be non-corrosive, odourless at operating temperatures and shall not contain substances which initiate the growth of moulds or support vermin.
- It shall not suffer permanent deterioration as a result of contact with moisture.
- Moulded slabs, sections, etc. shall be mechanically robust and capable of being transported and handled without undue breakage.
- Asbestos materials not acceptable.

Approved Types of Insulation



The following types of insulation are approved. Other materials should not be used without the previous written consent of the Company.

- For temperatures above 232°C (450°F) Calcium Silicant
- For temperatures up to 232°C (450°F) Calcium Silicate, Fibre Glass, or mineral wool.

Other Materials

Binding Wire

Shall be of 16 S.W.G. (0.064"). Soft annealed, galvanized iron / aluminium wire.

Wire Netting

Shall be 25mm mesh, 20 S.W.G. (0.036") hexagonal mesh, galvanized.

Sheet Metal Covering

Shall be 20 S.W.G. (0.036") aluminum sheet. Where the atmospheric conditions are such that aluminum sheets would be corroded, galvanized steel sheet is to be used.

Bands

Bands for holding on the sheet metal covering shall be of the same material as the sheets, but two gauges thicker (18 S.W.G. 0.048"). Bands shall be secured by means of P.K. self-tapping screws.



PIPING INSULATION – MEDIUM TEMPERATURES

Medium Temperature Range

For all processes where insulation is necessary and the temperature of the equipment lies between 20°C (68°F) and 232°C (450°F).

Items to be Insulated

All pipes and fittings shall be insulated. Flange and valve bodies on all steam lines shall be insulated, the flanges being provided with detachable insulating boxes. Glands and positioners are not to be lagged.

Steam Traced Lines

On steam traced lines the insulation shall be 50mm pipe size larger than the pipe to be insulated. The insulation thickness and type shall correspond to the temperature of the material flowing in the pipe and not to the temperature of the steam in the tracer line.

Materials

Materials should comply with the provisions stated above. The insulation shall, wherever practicable, be applied in the form of sections moulded to fit the various diameters of pipe, etc. Standard 1 metre sections are to be used, sections no less than 0.5m long will be accepted unless authorized by the Company.

Application – Sectional Insulation

The surfaces of the pipes, etc. to be insulated shall be thoroughly cleaned. The moulded sections shall be applied to the pipe in one or more layers with all joints broken. Each layer shall be secured with iron wire loops, spaced not more than 300mm (11 ¾") apart for pipes up to and including 150mm nominal diameter and 230mm (9") apart for larger sizes, care being taken to hammer the twisted ends into the insulation so as to leave a smooth surface. All joints, cavities and irregularities shall be filled-in using insulation of the same material as the sections.



TOWER, TANK, HEAT EXCHANGER ETC., MEDIUM AND HIGH TEMPERATURE INSULATION.

Expansion Joints

Provision must be made for the expansion of the equipment and expansion joints provided on all towers, etc.

Manholes, Branches, etc.

At the attachments to vessels of manholes, branches, etc. the insulation shall be terminated sufficiently clear to allow the attachments to be dismantled without damage to the insulation., see also item 2.2. Tell-tale holes in the reinforcement rings shall be fitted with a small weep line projecting clear of the lagging surface so as to prevent the leakage of any liquid into the space between the shell and the insulation.

Preparation of Vessels for Insulation

Adequate means shall be provided for securing the insulation to the vessels. In case of towers and similar equipment, support rings for the insulation shall be provided at 200mm - 300mm internals. Receivers and similar vessels shall have supporting rings or other means for securing the insulation to the vessel, particularly on the lower half, providing such means are acceptable to the CU Engineer responsible.

The ends of vessels and particularly the bottoms of towers etc. shall be adequately provided with clips etc, in order that the insulation can be firmly secured to the surface.

Application – Sectional Insulation

All blocks shall be laid with broken joints in all directions and shall be securely wire laced with 3mm diameter 7 strand galvanized binding cable on towers up to 3048mm diameter and 5mm diameter above 2048mm. Cables shall be spaced at 450mm centers on inside layers and 230mm on single and outer layers. All cavities and irregularities shall be filled with plastic insulation of the same material as the sections. After the blocks are placed and securely wired into position, they shall be covered with wire netting with all sides and ends securely laced to adjacent netting with wire.

Finishes on Towers, Tanks, Heat Exchanger, etc.

Towers and similar vessels shall be clad with aluminum sheeting.

Receiver, heat exchangers and similar horizontal vessels shall be covered with flat sheets of similar material.

Dished ends of towers and vessels shall be covered with flat sheets suitably tailored to fit the surface and firmly secured in position and to each other by selftapping rust proofed screws or other approved means.

All sheeting shall overlap at the joints by a minimum of 50mm so as to shed water and liquid. The sheeting shall be secured in position with bands of the same material adequately proportioned and tensioned by means of turn buckles or other approved means.



Every care must be taken to ensure that there is no possibility of either liquid or water draining into the insulation around manholes and branches where it shall be suitably weatherproofed or flashed.

Manholes and Heat Exchanger Covers

Manhole covers, heat exchanger covers, etc. shall, wherever practicable, be insulated with pre-fabricated detachable covers made of 18 S.W.G. galvanized iron sheet suitably lined. Alternatively, covers may be insulated with detachable blankets made from EKW 44 fibre glass cloth, joints to be sewn with fiberglass twine.



PIPE IDENTIFICATION

In order to facilitate the identification of pipework the final finish of the insulation should be suitable for the fixing of self adhesive identification bands and direction-of-flow strips. Details of the various colour codes and marking can be supplied separately if the nature of the work warrants inclusion of this work by the insulation contractor.

All pipework identification should be in accordance with HVCA TR/20 or approved CUL equivalent standard.

ASBESTOS

Thermal insulation materials and their finishes shall be completely asbestos free. Where any work is carried out on existing thermal insulation material or finish which contains asbestos in any form the Contractor's attention is drawn to his responsibilities under the provisions of Control of Asbestos Regulations 2006.

STATIC ELECTRICITY

In flameproof areas, each separate run of metallic insulation cladding must be bonded to earth in at least one place. The means of bonding may be to the earthed pipe run itself or to a recognized earth bonding point.

The Electrical inspectors must be advised of all new installations, to allow the continuity of bonding to be checked and results to be recorded.