INTERNATIONAL STANDARD

ISO 9076-2

First edition
2008-11-15

Thermal insulation — Mineral-wool loose-fill for horizontal applications in ventilated roof spaces —

Part 2: Principal responsibilities of installers

Isolation thermique — Fibres minérales en vrac pour applications horizontales dans les combles ventilées —

Partie 2: Principales responsabilités des installateurs

Reference number
ISO 9076-2:2008(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9076-2 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 3, *Thermal insulation products*.

ISO 9076 consists of the following parts, under the general title *Thermal insulation — Mineral-wool loose-fill for horizontal applications in ventilated roof spaces*:

— *Part 1: Material specification and test methods*

— *Part 2: Principal responsibilities of installers*

Introduction

This document specifies the principal responsibilities of installers, as these are common in all countries. It does not specify the application procedures or requirements of the installation, which can vary greatly from one construction to another, from one country to another, or from one jurisdiction in a country to another. This part of ISO 9076 does not conflict with local building codes or labour practices. This part of ISO 9076 serves to clearly delineate the principal responsibilities of the manufacturer of the thermal insulation, which are specified in the material specification, from the principal responsibilities of the installer listed in this document. Because of the uniqueness of the concept of principal responsibilities for the installer, the following general definitions in more than one form are given to assist in translation of the word to other languages. Specific definitions are given in Clause 3.

— Principal requirements:

1) Principal requirements are essential procedures that are common to all installations regardless of the construction of the building or the country in which the installation is to occur. Principal requirements can include instructions to carry out a policy statement (meet an objective) but do not necessarily provide a linear progression of steps or actions to be taken.

2) A document that provides methods that are necessary to use to accomplish the objective of producing a functional installation.

— Responsibility:

1) This is the condition of being accountable for your actions. Accepting responsibility for one’s actions means that the individual who commits an act is the one who is required to explain the act and accept any consequences.

2) This is the condition of being obliged to answer, as for one's actions, to an authority that can impose a penalty for failure.

Thermal insulation — Mineral-wool loose-fill for horizontal applications in ventilated roof spaces —

Part 2: Principal responsibilities of installers

1 Scope

This part of ISO 9076 specifies the principal responsibilities of the installers of mineral-wool loose-fill thermal insulation products for buildings. A product that is manufactured and packaged according to ISO 9076-1 and then installed in ventilated roof spaces as described in ISO 9774 is assured of having the properties declared by the manufacturer.

This part of ISO 9076 gives the principal responsibilities of the installer in the installation of the product, in the documentation of the installation and in the declaration that all requirements of this part of ISO 9076 have been met.

This part of ISO 9076 does not specify the fitness of the product for the intended use beyond those aspects relating to installation. Many aspects relating to the fitness for use are specified in government regulations. It is necessary that the installer ensure, when installing the product, that the product installed is suitable for the application, based on the government regulations and the manufacturer's recommendations.

The installer can be required to meet ancillary (additional) requirements specified in local regulations or by the customer.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7345, *Thermal insulation — Physical quantities and definitions*

ISO 9229, *Thermal insulation — Vocabulary*

ISO 9076-1, *Thermal insulation — Mineral-wool loose-fill for horizontal applications in ventilated roof spaces — Part 1: Material specification and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345 and ISO 9229 and the following apply.

3.1
application training
training provided by a manufacturer or by a training institute for which certification is provided

3.2
attic
roof space
loft space
enclosed space between the roof and ceiling

3.3
authority having jurisdiction
agency of the government or trade having responsibility for the safe and proper installation of thermal insulation

3.4
blowing wool
fibrous insulation material sub-divided into granules or pellets for application or installation by pneumatic equipment

[ISO 9229]

3.5
coverage
area provided by a package of loose-fill insulation when applied as per the manufacturer's instructions to achieve a declared thermal performance

[ISO 9229]

3.6
designation code
shift, production and/or date code used by the manufacturer to identify a particular product lot

3.7
declared thermal resistance
thermal resistance of the insulation declared by the manufacturer for a specific settled thickness, density, and mean temperature

NOTE The declared thermal resistance is expressed in square metre kelvins per watt.

3.8
equipment manufacturer
organization that manufactures or markets equipment designed to apply mineral-wool loose-fill thermal insulation

3.9
inspection authority
authority that has regulatory responsibility for enforcement

3.10
installed thickness
initial thickness at the time of installation necessary to provide the declared thickness after settlement

See **settled thickness** (3.18).

NOTE 1 The initial thickness is equal to or greater than the declared thickness, and it is necessary to take into account any settling after installation.

NOTE 2 The term "as-blown thickness" is also used.

3.11
installer
individual who has application training to install mineral-wool loose-fill thermal insulation in roof spaces, such that it conforms to the labelling on the package and other applicable requirements and regulations

3.12
loose-fill system
blowing machine and blowing hose required to install mineral-wool loose-fill insulation to the specifications given on the performance chart

3.13
manufacturer
organization that manufactures or markets mineral-wool loose-fill thermal insulation products and which is responsible for the packaging and labelling of the material and specifying the system for application

3.14
performance chart
table specifying the installed and settled thickness of insulation required to give tabulated values of thermal resistance and maximum area of attic surface covered by each bag

3.15
principal requirement
essential procedures that are common to all installations regardless of the construction of the building or the country in which the installation occurs

NOTE Principal requirements may include instructions to carry out a policy statement (meet an objective) but do not necessarily provide a linear progression of steps or actions to be taken. Methods that it is necessary to use to accomplish the objective of a functional installation are normally included.

3.16
R-value
thermal resistance of the insulation expressed in $m^2 \cdot K/W$ for a given settled thickness and density

NOTE 1 The R-value is expressed in square metre kelvins per watt.

NOTE 2 This term is defined for the convenience of installers who may use the term.

3.17
responsibility
condition of being accountable for your actions, accepting responsibility for one's actions, explaining the act, and answering to an authority and accepting any consequences or penalties

3.18
settled thickness
thickness declared by the manufacturer as that which provides the declared thermal resistance after settlement

3.19
settlement
decrease in the thickness of installed insulation with time

NOTE The settlement is expressed as a percentage of the initially installed thickness.

4 Symbols and abbreviated terms

R Thermal resistance, expressed in square metre kelvins per watt

R_{D10} Declared thermal resistance at the respective mean temperature, expressed in square metre kelvins per watt

R_{D23} Declared thermal resistance at the respective mean temperature, expressed in square metre kelvins per watt

5 General responsibilities of the installer

5.1 Installer training

The installer shall ensure that there is at least one employee present at the site who is trained in the following:

a) site inspection and preparation;

b) physical properties of the insulation materials;

c) use and maintenance of equipment;

d) manufacturer's installation requirements;

e) verification of the specific requirements in Clause 6;

f) material storage and handling;

g) installation procedures;

h) consumer (site) safety issues;

i) local applicable codes and regulations;

j) limitations of use;

k) related building science;

l) record keeping;

m) disposal of material waste;

n) installer safety.

5.2 Documentation obtained from the manufacturer

The installer shall obtain from the manufacturer of the mineral-wool loose-fill thermal insulation information that includes the following:

a) brand name, name of the manufacturer or suppler and identification of the manufacturing facility location;

b) type of insulation and its intended use;

c) instructions for installation of the product;

d) limitations for use of the product;

e) coverage chart for the product or the specified maximum area to be covered per package;

f) material safety data sheet;

g) transportation and storage requirements;

This information may be printed on the package.

5.3 Responsibility for health and safety

The installer shall have knowledge of related health and safety requirements specified by the local authority having jurisdiction, requirements of the appropriate regulatory bodies and relevant application-related recommendations of the manufacturer and shall conform to the requirements and recommendations.

5.4 Transportation and storage

The installer shall verify that the transport and storage of the insulation products is in accordance with the manufacturer's recommendations.

5.5 Verification of material compliance

The installer shall ensure that the package labels state that the material meets the requirements of this part of ISO 9076.

5.6 Suitability for installation

The installer shall verify that

— a checklist of possible defects and safety hazards has been created by the appropriate persons and is similar to the example in Annex C;

— the checklist has been applied to the area where the mineral-wool loose-fill is being installed;

— if any of the conditions on this checklist are not satisfied, they are brought to the attention of the appropriate person and are resolved before the product is installed;

— the areas of the building in which the product is being installed have been evaluated for suitability for the application of the product according to the building code, other governmental regulations, the manufacturer’s guidelines and the installer training courses.

5.7 Defects prior to installation

The installer shall ensure that the material is inspected before installation and that it is free from defects that can significantly affect its serviceability, including empty packaging. The installer shall ensure that the material being installed does not have any objectionable odour.

5.8 Authority having jurisdiction

The installer shall ensure that the labelling on the packages of material being installed indicates that the material meets the requirements of the authority having jurisdiction and that the installation is in accordance with applicable building codes and all local regulations.

5.9 Installer qualifications on-site

The installer shall ensure that the on-site supervisor carries proof of training in accordance with this part of ISO 9076 and with instructions given by the product manufacturer.

5.10 Equipment requirements

The installer shall ensure that the equipment being used for the installation is that specified by the material manufacturer and that the equipment is maintained in accordance with the equipment manufacturer’s instruction.

The installer shall ensure that the operating parameters used are those specified by the equipment manufacturer and that the equipment is adjusted in accordance with the equipment manufacturer’s

instructions using a recommended method for adjustment. The installer shall insure that equipment used has been approved for use in the installation of mineral-wool loose-fill thermal insulation.

5.11 Defects in installation

The installer shall ensure that the installation is inspected after installation and that it is free from defects that can significantly affect its serviceability, including empty packaging. The installer shall ensure that the material that is installed does not have any objectionable odour.

5.12 Documentation by the installer

The installer shall ensure that a job-site certificate is installed at the site and that the certificate states the following:

a) job site address;

b) date(s) product was installed;

c) name of the installer (license number or other designation, if applicable);

d) manufacturer's name and product name;

e) conformance of the product to this part of ISO 9076;

f) evidence of any third-party assessment where applicable;

g) actual number of bags installed;

h) net area insulated;

i) average installed thickness;

j) thermal resistance listed on the package that corresponds to the installed thickness;

k) conformance with this part of ISO 9076;

l) other information as indicated in the example in Annex B.

5.13 Maintenance of records

The installer and the installer's staff shall ensure that

— a job-site certificate similar to that in Annex B be signed and attached in a clearly visible location in the attic;

— a completed copy of the job-site certificate be filed in the installer's office for future reference;

— a record of the installation details for the installation be filed in the installer's office for future reference;

— the information is labelled such that it can be available for inspection for a period of seven years or in accordance with local regulations, whichever is longer.

6 Specific responsibilities related to performance

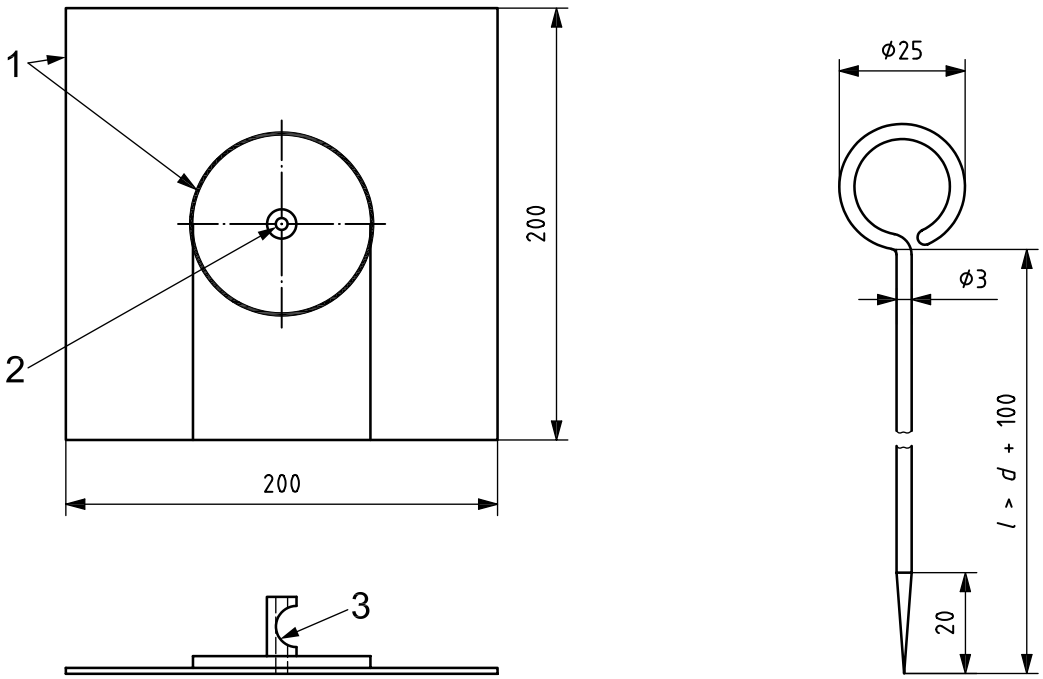
6.1 Thickness and control of installed thickness

The installer shall ensure that insulation installed has the minimum thickness required by the manufacturer on the coverage chart to provide the thermal resistance specified for installation or that it exceeds that thickness.

The installer shall ensure that the thickness of the installed insulation has been measured with a tape measure, a steel rule or the thickness gauge (as shown in Figure 1). The installer shall ensure that measurements are done in at least four different places (at least 4 m apart) for each 100 m^2 of area.

The installer shall ensure that measurements are done in the visually low (or thin) areas. The installer shall ensure that measured thickness is greater than the minimum installed thickness listed on the coverage chart for the specified thermal resistance.

Dimensions in millimetres



Key

1 rigid plate
2 hole with a diameter suitable for sliding the pin perpendicular to plate
3 thumb grip

Figure 1 — Depth gauge

Alternatively, the installer shall ensure that pre-marked “attic rulers” are installed or marks at the level of the surface of the insulation have been made on the structure in the attic at the appropriate heights. The installer shall install the insulation so that the thickness meets or exceeds the marks.

6.2 Coverage and calculation of coverage

The installer shall ensure that the number of bags of insulation specified by the manufacturer on the coverage chart for the desired thermal resistance is applied. The installer shall ensure that the coverage per bag shall not be greater than that declared by the manufacturer.

The installer shall ensure that the coverage of the packages of insulation has been calculated by dividing the total net area covered by the number of bags installed, that is, yielding the number of square metres per bag. The installer shall ensure that sufficient material has been installed so that the calculated coverage per package is not greater than the maximum coverage per bag declared by the manufacturer for the required thermal resistance.

6.3 Calculation of the number of bags installed

The installer shall ensure that the number of bags of insulation installed meets or exceeds the number required by the manufacturer's coverage chart for the area being covered and the required thermal resistance.

The installer shall ensure compliance with the manufacturer’s thermal resistance tables by

a) counting the number of bags of insulation product installed;

b) measuring the area and calculating the net area of attic insulated;

c) calculating the required number of bags of insulation from the performance chart for the desired thermal resistance;

d) confirming that the number of bags installed in the attic are equal to or greater than the required number.

6.4 Surface density

6.4.1 General

NOTE This is also designated by the deprecated term “mass per unit area.”

The installer shall ensure that the surface density of the product equals or exceeds that declared by the manufacturer.

6.4.2 Calculation of the surface density

The installer shall ensure that required mass per unit area (mass per area) is achieved by ensuring that, on average, a bag of insulation does not cover more area than that specified by the manufacturer.

The installer shall ensure that

— the surface density is calculated by dividing the total mass of product installed by the net area covered by the installation;

— the total mass of the product is obtained by multiplying the number of bags used times the bag mass.

In case of dispute, the installer shall ensure that

a) the insulation thickness is measured using a depth gauge;

b) a circular duct with a serrated edge (cookie cutter) enclosing an area of at least 0,10 m^2 is pressed through the insulation at the measured location;

c) the insulation inside the circular duct is collected and weighed;

d) the coverage is calculated by dividing the mass of the specimen by the area of the circular duct;

e) the surface density is calculated by dividing the mass by the enclosed area;

f) the installed thickness and surface density are equal to or greater than that specified by the manufacturer in the coverage chart.

Annex A
(normative)

Dispute-resolution measurements

A.1 Measurements for field audits

A.1.1 Determination of installed thickness using pin gauge (depth gauge) and plate

A.1.1.1 Apparatus

A.1.1.1.1 Pressure plate, of rigid plastic or other suitable material, 200 mm^2 and fitted with a suitable thumb grip.

The total mass of the plate and the grip shall be within the range of 75 g to 88 g so that it exerts a pressure of (20 $\pm$ 1,5) Pa.

In countries where a circular-plate depth gauge has been standard practice, that particular method is acceptable if the above depth gauge is not available. In those locations, the manufacturer shall supply a coverage chart similar to that in ISO 9076-1 that has thicknesses that have been derived using the circular-pin gauge.

A.1.1.1.2 Pin, of 3 mm diameter steel rod, with one end sharpened to a point, and of sufficient length to penetrate the full thickness of the insulation layer.

A.1.1.1.3 Metal ruler, graduated in millimetres to permit readings to 1,0 mm.

A.1.1.2 Procedure

Place the pressure plate on the designated measuring point, lowering it slowly.

Force the pin with a rotary motion vertically downward through the insulation layer to the surface below.

Grasp the pin firmly at the thumb grip and remove the pin and the plate. Measure the distance from the point of the pin to the plate. The distance is the thickness of the insulation layer at this point.

A.1.2 Determination of the surface density using a cutter method

In case of dispute, the surface density calculation shall be used.

Measure the installation thickness (depth) using a depth gauge and record the thickness.

Press through the insulation, at the measured location, a circular duct with a serrated edge (cookie cutter) enclosing an area of at least 0,10 m^2.

Collect and weigh the insulation inside the circular duct.

Calculate the surface density by dividing the mass of the specimen by the area of the circular duct.

Calculate the density by dividing the coverage by the thickness.

Repeat the measurement at one location for every 10 m^2 of applied insulation.

Annex B
(informative)

Information for job-site certificate

This annex provides an example form for information necessary for the installer to declare with respect to a job site associated with the records maintenance requirements specified in 5.6.

Contractor: Name Address Contact person Telephone Fax	**Installer:** Name Certification (if applicable)
Site: Address Type of building	**Product:** Insulation type Trade name Shift production code
Installation: Existing insulation (type and thickness, expressed in millimetres) R-value required Settled thickness, expressed in millimetres Installed thickness - additional, expressed in millimetres Net area insulated, expressed in square metres Number of bags installed	**Date of installation:** **Affirmation:** I declare that this information is correct **Installer's signature:**

Annex C
(informative)

Typical installer's checklist

This annex provides an example of an installer's checklist, of the type necessary to determine in partial fulfilment of the requirements specified in 5.13.

a) Determine if electrical wiring and fixtures are not suitable for covering with insulation.

b) Determine if there is evidence of moisture or water damage.

c) Determine if there is evidence of air leakage from the living space to the attic.

d) Determine if there is evidence of vermin inhabiting the space.

e) Determine if the roof and ceiling construction is at a stage that is unsuitable for application of the product. It is necessary that the insulation not be exposed to rain or snow coming in through the roof construction.

f) Determine if any measures are required to prevent ventilation air from entering the insulation.

g) Determine if there is inadequate air sealing off the attic from the living space.

h) Determine if there are any restrictions in the existing ventilation and provisions if there is a need for measures to ensure continued flow of attic ventilation.

i) Determine if the attic or loft area has inadequate ventilation according to local codes and good practice once the insulation is installed.

j) Determine if all parts of the attic or loft are inaccessible for installation of the product.

k) Determine if there are inadequate arrangements to prevent the insulation from reaching parts of the attic not intended to be insulated, e.g. chimneys, flues, recessed light fixtures, and soffits.

l) Determine if water pipes, ventilation ducts and storage tanks require measures to be taken to prevent condensation and freezing.

m) Determine if any existing thermal insulation is incompatible and in non-functional condition.

Bibliography

[1] ISO 9774, *Thermal insulation for building applications — Guidelines for selecting properties*

ICS 91.100.60

Price based on 12 pages