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**Rigid cellular plastics — Spray-applied  
polyurethane foam for thermal  
insulation —**

**Part 2:  
Application**

**iTeh STANDARD PREVIEW**  
*Plastiques alvéolaires rigides — Mousse de polyuréthane projetée  
pour l'isolation thermique —  
Partie 2: Application*  
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ISO 8873-2:2007

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## 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 8873-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 10, *Cellular plastics*.

This first edition of ISO 8873-2, together with ISO 8873-1 and ISO 8873-3, cancels and replaces ISO 8873:1987, which has been technically revised.

ISO 8873 consists of the following parts, under the general title *Rigid cellular plastics — Spray-applied polyurethane foam for thermal insulation*:

— Part 1: *Material specifications*

— Part 2: *Application*

— Part 3: *Test methods*

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## Introduction

Spray polyurethane foam for thermal insulation is made by combining two liquid components on the project site to manufacture a product. As the manufactured product is what provides the physical and thermal properties desired by the user, it only becomes spray polyurethane foam when it is installed. As such, an International Standard for the application and installation is required.

This part of ISO 8873 outlines the obligations for the installer of the liquid components that produce the actual material.

ISO 8873-1 outlines obligations for the manufacturers of spray polyurethane foam liquid components.

ISO 8873-3 provides test methods which have not previously been specified in International Standards.

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# Rigid cellular plastics — Spray-applied polyurethane foam for thermal insulation —

## Part 2: Application

**WARNING** — Persons using this document should be familiar with normal laboratory practice, if applicable. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory requirements.

### 1 Scope

This part of ISO 8873 outlines requirements for the application of rigid cellular plastic spray polyurethane foam for thermal insulation. The primary application of the material is for use as thermal insulation. Spray polyurethane foam can also be used as the air barrier material which forms part of an air barrier assembly in buildings. Under specific application conditions, the material can be used in vapour barrier applications in a building assembly (details of the conditions can be obtained from the manufacturer). The application requirements are for the installation of spray polyurethane foam whether applied on a building site or in a prefabrication (manufacturing) facility.

This part of ISO 8873 can be used for non-building applications when agreed to by the supplier and the purchaser.

The requirements include obligations for the manufacturer, the contractor and the installer. The requirements include the selection of chemical components, application requirements, quality control and documentation of the application, limitations for the application and requirements for safety and for disposal of associated waste material and packaging.

Installation of spray polyurethane foam for thermal insulation, according to this part of ISO 8873 requires the use of materials and/or equipment that could be hazardous (see Warning).

### 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 8873-1, *Rigid cellular plastics — Spray-applied polyurethane foam for thermal insulation — Part 1: Material specifications*

ISO/IEC 17024, *Conformity assessment — General requirements for bodies operating certification of persons*

### 3 Terms and definitions

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.

**3.1 authority having jurisdiction**  
officer or officers having authority, under appropriate regulatory instruments, to exercise enforcement

**3.2 apprentice installer**  
individual who applies spray polyurethane foam on the job site, under the direct supervision of a spray polyurethane installer

**3.3 certification organization**  
impartial body possessing the necessary competence and reliability to operate a certification system in accordance with ISO/IEC 17024, in which the interests of all parties concerned with the functioning of the system are represented

**3.4 equipment manufacturer**  
manufacturer of equipment designed for spray-application of rigid polyurethane cellular plastic thermal insulation

**3.5 in-situ thermal insulation**  
thermal insulation product produced or taking its final form at the site of application and which achieves its properties after installation

**3.6 site quality assurance programme**  
quality assurance programme (QAP) based upon quality standards, which ties the chemical system components manufacturer (supplier), the contractor and the installer together for the installation of spray polyurethane foam

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NOTE 1 The QAP should outline the responsibilities and obligations of each of the three parties. The QAP should outline the training and certification requirements for each of the three parties and should include a site inspection of the installation of spray polyurethane foam.

NOTE 2 ISO 9001 and ISO 12576-2 are examples of quality standards.

**3.7 spray polyurethane foam**  
rigid cellular plastic material with substantially closed cell structure based on polyurethanes, which is foamed *in situ* by the catalysed reaction of polyisocyanates and polyhydroxyl compounds, expanded with blowing agents

**3.8 spray polyurethane foam contractor**  
individual, organization or corporation who is responsible for all requirements and obligations for the installation of the product

**3.9 spray polyurethane foam installer**  
individual or worker who applies the chemical components by mixing and spraying them to form the rigid cellular plastic spray polyurethane foam product

NOTE The installer is responsible for the actual installation and site requirements identified by the manufacturer and/or this part of ISO 8873 for application of the product. The installer should be trained and qualified as having



demonstrated the required knowledge for proper application of the product by a certification organization (CO). The installer should follow the requirements for installation and the obligations for installers identified by the manufacturer and this part of ISO 8873.

### 3.10

#### spray polyurethane foam system manufacturer

manufacturer/supplier of the liquid chemical components, polyisocyanates and polyhydroxyl blends containing also flame retardants, blowing agent and catalysts (system), which are designed to be mixed and sprayed to form rigid polyurethane foam insulation material *in situ*

## 4 Requirements

### 4.1 Manufacturer

The manufacturer (supplier)

- a) shall produce material that meets the requirements of ISO 8873-1,
- b) shall mark and label the shipping containers to declare that the material meets the requirements of ISO 8873-1,
- c) shall declare the certification organization that is responsible for delivering the site quality assurance programme for their product, and
- d) shall ensure that the material is installed by a spray polyurethane foam contractor using a spray polyurethane foam installer in accordance with this part of ISO 8873 and the instructions given by the chemical manufacturer.

### 4.2 Spray polyurethane foam contractor

The spray polyurethane foam contractor

- a) shall produce material that meets the requirements of ISO 8873-1 and shall comply with all requirements of this part of ISO 8873;
- b) shall select the material that is appropriate for the installation;
- c) shall procure material which complies with ISO 8873-1 from a spray polyurethane foam system manufacturer;
- d) shall verify, through the use of drum labels or other documentation, that the material received complies with ISO 8873-1;
- e) shall have at least one trained and certification organization approved spray polyurethane foam installer on each job site during the application of the spray polyurethane foam thermal insulation;
- f) shall be responsible for all aspects of the installation of the material; all regulations shall be complied with during the installation of the material; the completed application shall comply with all appropriate regulations such as building codes;
- g) shall ensure that the spray polyurethane foam installer has successfully completed a training course approved by the manufacturer and the certification organization; the spray polyurethane foam installer shall successfully complete the training and have obtained certification as a spray polyurethane foam installer;
- h) shall provide the spray polyurethane foam installer with proper equipment to install spray polyurethane foam; equipment may include, but is not limited to, transfer pumps, a proportioner unit, hoses, hose heaters, spray guns, compressors and generators;

## ISO 8873-2:2007(E)

- i) shall provide, or ensure that the spray polyurethane foam installer has, proper personnel protection, which shall include a positive fresh-air-supplied full-face respirator; other protection includes head protection, eye protection, ear protection, body protection, hand protection and foot protection;
- j) shall provide, on each job site, a test kit meeting the requirements outlined in Annex K for use by the spray polyurethane foam installer to conduct the testing required for thermal insulation in accordance with this part of ISO 8873;
- k) shall ensure that the spray polyurethane foam installer conducts the daily testing;
- l) shall ensure that the installer completes daily work records in accordance with the site quality assurance programme; this daily work record shall contain
  - information on the job site, date and material used,
  - name of the installer and certification number,
  - application conditions and environmental conditions,
  - results of the testing completed on site,
  - whether the material complies with ISO 8873-1,
  - whether the project required isolation and ventilation, and
  - whether the material used has been evaluated by a third party,
- m) shall supply the installer with all the forms required; the daily work record shall be completed at the beginning of each day, each time a material batch is changed, and when the job site is changed within a given day;
- n) shall keep the daily work records for a period of seven years; these records shall be made available upon request, within a reasonable time, to the manufacturer or the certification organization; the minimum information required for a daily work record is shown in Annex H;
- o) shall provide a job site declaration form containing the minimum information outlined in Annex I to the customer within 30 days of completion of the project;
- p) shall ensure that the spray polyurethane foam installer follows the site quality assurance programme developed by the certification organization; a copy of the site quality assurance programme shall be made available upon request;
- q) shall maintain the installation equipment in proper working order;
- r) where a separate contractor is responsible for the thermal barrier installation and when the authority having jurisdiction requires a thermal barrier for that application, the spray polyurethane foam contractor shall notify the building owner or the owner's representative in writing of the requirement for a thermal barrier and the flammability hazard, which could exist until such time that the foam is covered.

### 4.3 Spray polyurethane foam installer

The installer

- a) shall produce material that meets the requirements of ISO 8873-1 in accordance with this part of ISO 8873, the instructions provided by the spray polyurethane foam system manufacturer and the spray polyurethane foam contractor;

- b) shall confirm, using drum labels or other documentation, that the liquid chemicals to be used on site have been declared by the manufacturer to comply with ISO 8873-1 before commencing installation;
- c) shall be responsible for the on-site installation of the material, safe handling and storage of the material, proper isolation of the spray area, warning signs when spraying is in progress, site housekeeping, and their own personal and the crew's health and safety; the spray polyurethane foam installer shall wear proper personnel protection, which includes head protection, eye protection, a positive fresh-air-supplied full-face respirator, ear protection, body protection, hand protection and foot protection in compliance with regulations;
- d) shall successfully complete a training course approved by the manufacturer and the designated certification organization; the installer shall obtain certification from the designated certification organization as a spray polyurethane foam installer; a recommended training outline is shown in Annex J;
- e) shall follow all operating instructions for the equipment provided by the equipment manufacturer; this equipment may include, but is not limited to, transfer pumps, a proportioner unit, hoses, hose heaters, guns, compressors and generators; the installer shall follow instructions from the equipment manufacturer for the operation, maintenance and cleaning of the equipment used for installation; the spray polyurethane foam installer shall follow all safety procedures required by the equipment manufacturer;
- f) shall verify, through a material label, that the material on site has been declared by the manufacturer to comply with ISO 8873-1;
- g) shall verify that the substrate has been properly prepared;
- h) shall verify that the environmental conditions are within the range approved by the spray polyurethane foam system manufacturer;
- i) shall set the equipment to the proper operating parameters;
- j) shall install the material in accordance with this part of ISO 8873 and the manufacturer's instructions;
- k) shall comply with all requirements of the site quality assurance programme provided by the certification organization;
- l) shall apply the spray polyurethane foam so that the surface is reasonably smooth and of consistent thickness;
- m) shall exercise an ongoing visual and physical quality control check throughout the spray application to ensure proper adhesion to the substrate and proper quality of the spray polyurethane foam;
- n) shall check with a depth gauge (see Figure 1) the thickness of the the applied foam on a continual basis and shall provide the minimum thickness specified by the owner;
- o) shall conduct density, adhesion, cohesion and substrate verification at the beginning of each day, each time a material batch is changed, and when the job site is changed within a given day;
- p) shall complete daily work records in accordance with the site quality assurance programme; this daily work record shall contain
- information on the job site (see Annex D), date and material used,
  - name of the installer and certification number,
  - application conditions and environmental conditions,
  - results of the testing completed on site,
  - whether the material complies with ISO 8873-1,

- whether project required isolation and ventilation, and
  - whether the material used has been evaluated by a third party;
- q) shall at the end of each working day, remove all waste from the construction site and dispose of it in a safe and proper manner, in accordance with local, provincial and federal requirements;
- r) shall, in cases where an apprentice installer is applying the material, ensure that the apprentice is under the direct supervision of the spray polyurethane foam installer who has the responsibility for the application.

The daily work record shall be completed at the beginning of each day, each time a material batch is changed, and when the job site is changed within a given day; the minimum information required for a daily work record is shown in Annex H.

#### 4.4 Apprentice installer

The apprentice installer

- a) shall only install spray polyurethane foam thermal insulation under the direct and constant supervision of a spray polyurethane foam installer,
- b) shall be required to meet all the same requirements as a spray polyurethane foam installer when installing spray polyurethane foam, and
- c) shall wear proper personnel protection, which includes head protection, eye protection, a positive fresh-air-supplied full-face respirator, ear protection, body protection, hand protection and foot protection in compliance with regulations.

#### 4.5 Material

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The spray polyurethane foam system, when stored in accordance with the chemical manufacturer's instructions, properly mixed and spray applied as required in 4.3, and within the shelf life of the chemicals as declared by the manufacturer, shall produce a finished product that meets the requirements of the ISO 8873-1.

Application requirements, which will affect the performance of the finished product, shall be considered when choosing the chemical components (see Annex B).

When installed as given in 4.3, the spray polyurethane foam shall not present a health hazard to the potential occupants, nor shall the cured insulation have any residual odour.

#### 4.6 Equipment

The chemical components shall be mixed and sprayed with a commercially available spray gun and a fixed-ratio, positive-displacement proportioning unit, specially designed for the application of spray polyurethane foam. The manufacturer shall recommend appropriate equipment to be used.

Operation, maintenance, safety and cleaning procedures detailed in the equipment manufacturer's manual shall be strictly followed.

#### 4.7 Installation

Special applications which require properties in addition to those specified in this part of ISO 8873 shall be agreed upon by the interested parties prior to commencement of the installation.

Prior to application, a test shall be run to ensure that proper equipment settings have been selected. Consideration shall be given to reactivity, spray pattern, adhesion to substrate and the appearance of the spray polyurethane foam to ensure that each of these properties meets the requirements specified by the

spray polyurethane foam system manufacturer. The spray polyurethane foam installer shall confirm that the density of the installed material meets the minimum density declared by the spray polyurethane foam system manufacturer.

The spray polyurethane foam system shall be applied in passes to a clean, dry and sound substrate, prepared in accordance with Annex A. The thickness of the insulation shall be ascertained by using a thickness gauge as shown in Figure 1. Successive passes shall overlap to ensure a smooth surface, free of ridges.

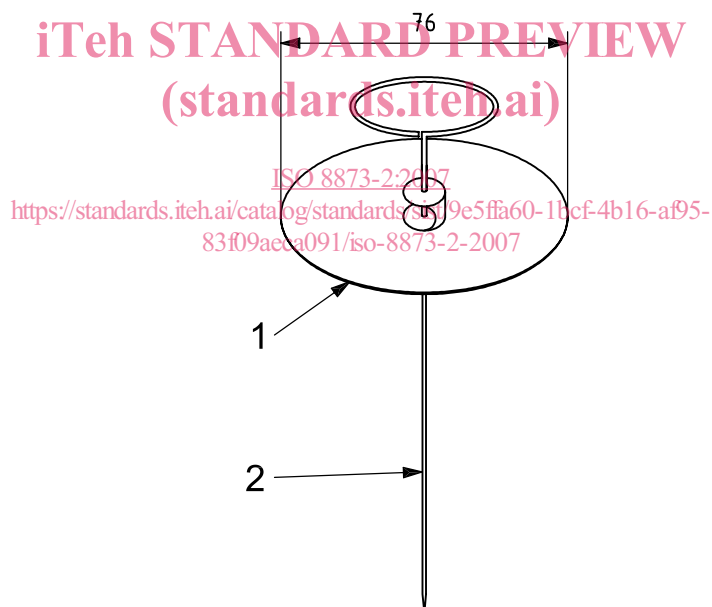
Each pass should not be less than 15 mm thick because of the possibility of reduced foaming, which adversely affects the adhesion to the substrate. Each pass should not be more than 50 mm thick to avoid elongated cell formation and to minimize the possibility of stress cracking. When several passes are required, allow for cooling of the foam to prevent scorching.

In any interior building installations, where required by the authority having jurisdiction, a thermal barrier shall cover the interior side of spray polyurethane foam for fire protection.

In permanently exposed exterior installations, coatings or coverings are necessary for protection from ultraviolet degradation. Coatings or coverings shall meet the requirements as specified by the application.

Adverse ambient environmental conditions can produce condensation on the substrate. If necessary, the spray polyurethane foam installer shall confirm this through dew point temperatures. Additional climatic factors which affect the installation of spray polyurethane foam are outlined in Annex C.

Dimension in millimetres



#### Key

- 1 transparent plastic disc and sleeve weighing  $10\text{ g} \pm 0,1\text{ g}$ ; disc approx. 2 mm thick
- 2 stainless-steel pin, of 3 mm diameter, minimum length 100 mm, tapered to a sharp point

Figure 1 — Depth gauge