

TGL-14-R1-11
Building Materials: Thermal Insulation

1. Background

Installation of thermal insulation in buildings can help in energy conservation and minimize heat transfer; however, manufacturing of thermal insulation resulted in significant environmental impacts. For instance, these impacts include the utilization of natural resources and energy to transform sand into glass wool; use of CFCs as a foaming agent; and the generation of solid waste after end-use.

In order to be awarded with the green label certification for thermal insulation produced from fiber glass, the core materials used in production must be from glass cullet in order to conserve energy and reduce solid waste problems. For foam plastic thermal insulation, CFCs must not be used during production in order to prevent further depletion of ozone layer in the stratosphere as well as promoting recycling practices and conservation of oil reserves, which are the core raw material that provides energy in the production process.

2. Scope

This product certification is only applicable to glass wool and foam plastic thermal insulation for use in office, residential, commercial, and industrial buildings.

3. Definitions

Thermal insulation is a material or product that acts as a medium to reduce heat transfer between places of differing temperature.

Glass wool thermal insulation is produced from melted glass into fiber through blast method, centrifugal method, rod method, or pot method, which can be either from one method or mixed methods. A binding agent is added to the fibers to form glass wool board, glass wool pipe, or other shapes. Finally, it is optional to add appropriate additives on the surface to finish the production.

Foam plastic thermal insulation is a product containing mainly polymer of polystyrene, polyurethane foam, or polyethylene foam characterized by pipe or board shape structure. The closed-cell foam structure can prevent heat transfer and act as water vapor barrier.

Post-consumer waste is a type of waste produced by the end consumer or has already been used by the consumer.

Post-industrial waste is generated from the left over materials or as a by-product from production or processing in the factory before reaching consumers. This type of waste does not include wastes generated from the actual factory.

Total volatile organic compounds (TVOCs) refer to the sum of volatile organic compounds that elute between the retention times of n-hexane and n-hexadecane

or equivalent capillary chromatography (GC). TVOC is estimated based on toluene response factor¹.

4. Glass wool thermal insulation

4.1. General requirements

4.1.1. The product must be certified by the Thai Industrial Standard Institute for Glasswool or TISI 486.

4.1.2. The product must be certified by TISI, or passed the test of the Thai Industrial Standards (TIS) according to the particular requirements for product certification as shown in Table 1, or be certified with standards equivalent to national standard or higher than TISI standards, or be certified with international standards/other acceptable national standards such as ASTM or JIS.

Table 1 List of related Thai Industrial Standards

No.	Standard	Name of standard
1	487	Standard for Glasswool boards
2	488	Standard for Glasswool pipe

4.1.3. The manufacturing, transportation, and post-industrial waste disposal must comply with government acts and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions under the Ministry of Labor and Social Welfare.

4.2. Product-specific criteria

4.2.1. Use of glass cullets retrieved from post-consumer waste and/or post industrial waste in at least 80% of total glass wool weight, not including waste generated from the factory.

4.2.2. Acceptable chemicals*

4.2.2.1. Formaldehyde of no more than 0.05 ppm at 168 hours (7 days)

4.2.2.2. Total volatile organic compounds (TVOCs) from C₆-C₁₂ of no more than 0.5 milligram per cubic meter at 168 hours (7 days)

Note:* Criteria 4.2.2 will be enforced after formal announcement after 2 years.

4.2.3. Thermal insulation product should not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.

4.2.4. Packaging

¹ GREENGUARD Environment Institute, 2006-2008. Standard Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers

4.2.4.1. Plastic packaging must be symbolized according to TIS for recycled plastics under TIS 1310, ISO 1043, or ISO 11469.

4.2.4.2. Paper packaging

- Paper covering box surface, depending on the type of paper used, must be made from the Green Label certified paper (TGL-8) or passed the test according to specific requirements of the TGL-8.
- Corrugated paper must be made from the Green Label certified paper (TGL-8) or passed the test according to specific requirements of the TGL-8.

4.2.4.3. Color ink, pigments, or additives used in printing the label or printing on packaging must not contain heavy metals such as lead, mercury, cadmium, and chromium (+6) as well as its oxidized form. It is acceptable to have combined contamination of heavy metals per pigment on a dry basis of no more than 100 ppm.

4.2.5. Availability of product manuals or recommendations about appropriate handling and use as follows:

- 1) Product information
- 2) Transportation and storage
- 3) Product installation
- 4) Safe and efficient handling
- 5) Waste disposal

4.3. Verification procedure

4.3.1. The applicant must present the license issued by TISI according to TISI 486.

4.3.2. The applicant must present the license issued by TISI according to the product type, or submit a test report according to requirements of the TIS as shown in Table 1, or submit a test report according to international standards or equivalent.

4.3.3. The applicant must present reliable evidence that the manufacturing process, transportation, and post-industrial waste disposal complies with government acts and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions under the Ministry of Labor and Social Welfare.

4.3.4. The applicant must submit the formula for glass wool thermal insulation production, amount of bought and sold glass cutlets as raw materials, and methods for calculating percentage of glass cutlets weight as compared to finished product. This document must have the company stamp and signed by authorized person of the manufacturing company. (Requirement No. 4.2.1)

4.3.5. The applicant must submit a test report of formaldehyde according to ASTM D 5116 test methods (Standard Guide for Small Scale

Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products. American Society for Testing and Materials, West Conshohocken) and amount of total volatile organic compounds according to the ASTM D 5116 or equivalent methods. (Requirement No.4.2.2)

4.3.6. The applicant must submit a declaration letter, signed by the managing director or authorized person, to certify that the product does not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive. (Requirement No. 4.2.3)

4.3.7. The applicant must present reliable evidence that the finished product conform to the product specific criteria 4.2.4 with the following documents:

- For plastic packaging, a declaration letter, signed by the managing director or authorized person of the plastic packaging company, certify that the plastic packaging for the applied product is symbolized according to TIS 1310, ISO 1043 or ISO 11469. .
- For paper covering box surface, a license of the Green Label or a test report according to the specific criteria of the Thai Green Label.
- For corrugated paper, a license of the Green Label or a test report according to the specific criteria of the Thai Green Label.
- A test report of heavy metals in pigments for printing the label or printings on the packaging according to standard test method of ISO 3856-1 or ASTM D 3335 for lead; ISO 3856-4 or ASTM D 3335 for cadmium; ISO 3856-5 for chromium (VI) and ISO 3856-7 or ASTM D 3624 for mercury; or other equivalent standards.

5. The applicant must submit a manual or label according to product specific criteria
4.2.5. Foam plastic thermal insulation

5.1. General requirements

5.1.1. Polyethylene thermal insulation: product must be certified by TIS 1384 for polyethylene thermal insulation, or passed the test according to TIS 1384, or passed equivalent to or higher standard.

5.1.2. Polyurethane thermal insulation: product must pass the quality assessment according to ASTM C591: Standard Specification for Unfaced Preformed Rigid Cellular Poly-isocyanurate Thermal Insulation, or passed equivalent to or higher standard.

5.1.3. Polystyrene thermal insulation: product must pass the quality assessment according to ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; passed equivalent to or higher standard.

5.1.4. Manufacturing, transportation, and post-industrial waste disposal must comply with government acts and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions under the Ministry of Labor and Social Welfare.

5.2. Product-specific criteria

5.2.1. The percentage of post-consumer waste and/or post industrial waste must be at least 80% by weight of the finished product. However, waste generated from the factory is not included.

5.2.2. Use of CFCs, HCFCs, and HFCs are prohibited in production process.

5.2.3. No presence of carcinogens in group 1 (carcinogenic to humans) and group 2A (probably carcinogenic to humans) as classified by the International Agency for Research on Cancer (IARC).

5.2.4. Mixture of toxic substances in the product is prohibited. The following are prohibited toxic substances:

- R45 (may cause cancer)
- R46 (may cause heritable genetic damage)
- R48 (serious damage to health by prolonged exposure)
- R61 (may cause harm to the unborn child)
- R63 (possible risk of harm to unborn child)
- R68 (possible risk or irreversible effect)
- polybrominated biphenyls (PBB)
- polybrominated diphenyl ethers (PBDE)
- polyurethane using partial or complete organic halogenated substance according to RAL-UZ30a and hazardous substances list according to Annex I of Directive 67/548/EEC

5.2.5. Foaming agent or blowing agent for production must have ODP value equaled to 0 and Global Warming Potential (GWP) value of no more than 140 kilograms CO₂ over 100 years.

5.2.6. Foam plastic thermal insulation product must not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive.

5.2.7. Type of plastic used must be symbolized on the product according to TISI 1310 or ISO 1043 or ISO 11469.

5.2.8. Packaging

5.2.8.1. Plastic packaging must be symbolized according to TIS 1310, ISO 1043, or ISO 11469.

5.2.8.2. Paper packaging

- Paper covering box surface, depending on the type of paper used, must be made from the Green Label certified paper (TGL-8) or passed the test according to specific requirements of the TGL-8.
- Corrugated paper must be made from the Green Label certified paper (TGL-8) or passed the test according to specific requirements of the TGL-8.

5.2.8.3. Color ink, pigments, or additives used in printing the label or printing on packaging must not contain heavy metals such as lead, mercury, cadmium, and chromium (+6) as well as its oxidized form. It is acceptable to have combined contamination of heavy metals per pigment on a dry basis of no more than 100 ppm.

5.2.9. Availability of product manuals or recommendations about appropriate handling and use as follows:

- 1) Product information
- 2) Transportation and storage
- 3) Product installation
- 4) Safe and efficient handling
- 5) Waste disposal

5.3. Verification procedure

5.3.1. Polyethylene thermal insulation: the applicant must present the license issued by TISI, or a test report according to TIS 1384, or equivalent to or higher standard. (Requirement No. 5.1.1)

5.3.2. Polyurethane thermal insulation: the applicant must present evidence for passing the quality assessment according to ASTM C591: Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation, or equivalent to or higher standard. (Requirement No. 5.1.2)

5.3.3. Polystyrene thermal insulation: the applicant must present evidence for passing the quality assessment according to ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation, or equivalent to or higher standard. (Requirement No. 5.1.3)

5.3.4. The applicant must submit reliable evidence that the manufacturing process, transportation, and post-industrial waste disposal complies with government acts and regulations such as the Factory Act under the Ministry of Industry and the Ministerial Notification on Safety, Health, and Environment in Working Conditions for Workers under the Ministry of Labor and Social Welfare. (Requirement No. 5.1.1)

5.3.5. Foam plastic thermal insulation; the applicant must submit a document with percentage of post-consumer/post-industrial foam plastic used in production including calculation methods by weight as compared to the finished product. This document must have the company stamp and

signed by authorized person of the manufacturing company. (Requirement No. 5.2.1)

- 5.3.6. Foam plastic thermal insulation; the applicant must submit the production formula as well as provide list of chemical substances used in replacement of CFCs, HCFs, and HFCs. This document must have the company stamp and signed by authorized person of the manufacturing company. (Requirement No. 5.2.2)
- 5.3.7. Foam plastic thermal insulation; the applicant must submit a declaration letter, signed by the managing director or authorized person, to certify the non-use of prohibited carcinogens in group 1 (carcinogenic to humans) and group 2A (probably carcinogenic to humans) as classified by the International Agency for Research on Cancer (IARC). (Requirement No. 5.2.3)
- 5.3.8. Foam plastic thermal insulation; the applicant submit a declaration letter, signed by the managing director or authorized person, to certify the non-existent of toxic substances in the product. (Requirement No. 5.2.4)
- 5.3.9. The applicant must submit a declaration letter, signed by the managing director or authorized person, to certify that foaming agent or blowing agent has ODP value and GWP value. (Requirement No. 5.2.5)
- 5.3.10. The applicant must submit a declaration letter, signed by the managing director or authorized person, to that the foam plastic thermal insulation product does not have hazardous properties according to Hazardous Substance Act B.E. 2535, which are explosive, toxic, flammable, pathogenic, oxidizing and peroxide, radioactive, mutagenic and corrosive. (Requirement No. 5.2.6)
- 5.3.11. The applicant must provide a sample of foam plastic thermal insulation together with a declaration letter, signed by the managing director or authorized person, to certify the plastic used is symbolized. (Requirement No. 5.2.7)
- 5.3.12. Manufacturer must provide evidence for complying with product-specific criteria 5.2.8 as follows:
 - For plastic packaging, a declaration letter, signed by the managing director or authorized person of the plastic packaging company, certify that the plastic packaging for the applied product is symbolized according to TIS 1310, ISO 1043 or ISO 11469.
 - For paper covering box surface, a license of the Green Label or a test report according to the specific criteria of the Thai Green Label.
 - For corrugated paper, a license of the Green Label or a test report according to the specific criteria of the Thai Green Label.

- A test report of heavy metals in pigments for printing the label or printings on the packaging according to standard test method of ISO 3856-1 or ASTM D 3335 for lead; ISO 3856-4 or ASTM D 3335 for cadmium; ISO 3856-5 for chromium (VI) and ISO 3856-7 or ASTM D 3624 for mercury; or other equivalent standards.

5.3.13. Manufacturer must submit available manual or labels (Requirement No. 5.2.9)

NOTE: 1) Acceptable test results must come from the following laboratories:

- 1.1) Government laboratories, laboratories under government supervision with recognition by Section 5 or
 - 1.2) Certified private laboratories according to TISI general requirements for the competence of testing and calibration laboratories TISI 17025 (ISO/IEC 17025)
- 2) Test result should be within 1 year upon green label certificate application.