0017.13 DPWH
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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

MAY 03 2012

DEPARTMENT ORDER)
)
No. 28)
Series of 2012 jpr 5/04/12)

SUBJECT : DPWH Standard Specification for Reflective Insulation, Item 1038

In line with the mandate of the Department of providing effective standards for application in the implementation of various infrastructure projects and in view of the need of setting standard specification for reflective insulation, the attached **DPWH Standard Specification for Reflective Insulation, Item 1038** is hereby prescribed, for the guidance and compliance of all concerned.

This specification shall form part of the revised edition of the DPWH Standard Specification (Volume III – Buildings, Ports and Harbors, Flood Control and Drainage Structure and Water Supply System)

This Order shall take effect immediately.

ROGELIO L. SINGSON
Secretary

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Encl.: As stated.

DPWH STANDARD SPECIFICATION FOR

ITEM 1038 – REFLECTIVE INSULATION

1038.1 Description

This item shall consist of furnishing all thermal insulation materials of one or more low emittance surfaces bounding one or more enclosed air spaces, tools and equipment, plant including labor required in undertaking the proper installation complete as shown on the Plans and in accordance with this Specification.

1038.2 Material Requirements

Reflective insulation materials shall consist of low emittance surface(s) with, or without, substrates and adhesives required to meet the specified thermal performance and physical properties.

Multiple layer reflective insulations shall be designed to attain the intended separation of layers in normal application. Such multiple layer insulation shall form an attachment flange suitable for stapling, or other means of attachment.

Insulation shall be furnished in dimensions to fit framing members, at spacings standard in the construction industry, or as specifically agreed upon between the producer and the buyer.

1038.2.1 Physical Properties Requirements

1038.2.1.1 Low emittance materials shall have a surface with an emittance of 0.1 or less, as determined in accordance with Subsection 1038.3.3.1.

1038.2.1.2 *Permeance*—If the reflective insulation is to serve as a vapor retarder, the permeance of the material shall not exceed one perm, as determined in accordance with Subsection 1038.3.3.2.

1038.2.1.3 *Surface Burning Characteristics*—Building code requirements specify flame spread and smoke development values determined in accordance with Subsection 1038.3.3.3, except as follows:

(*1*) Maximum surface burning characteristics shall not exceed 25 flame spread index and 50 smoke development index in either marine or inside plenum applications.

(*2*) Maximum surface burning characteristics shall not exceed 25 flame spread index and 450 smoke development index in exposed building applications or

other installations that may have specific requirements not covered by the National Building Code.

1038.2.1.4 *Humidity Resistance*—The laminates of the reflective insulation shall be tested in accordance with Subsection 1038.3.3.4. Three specimens shall be exposed. Shield the test specimens from condensate that may drip from the ceiling of the humidity chamber.

1038.2.1.4.1 The specimens shall be evaluated for visible corrosion and delamination. For purposes of corrosion evaluation, the outer 6.4 mm (0.25 in.) perimeter may be disregarded. No tested specimen shall exhibit visible crystalline deposits exceeding 2 % of the test area nor exhibit unaided delamination of layers.

1038.2.1.5 *Adhesive Performance*:

1038.2.1.5.1 *Bleeding*—Adhesives, when used, shall show no sign of bleeding when tested in accordance with the test procedure in ASTM C1224. Bleeding at cut edges may be disregarded. Bleeding or delamination, covering over 2 % of the specimen area, shall be cause for rejection.

1038.2.1.5.2 *Pliability*—Specimens tested in accordance with the test procedure in ASTM C1224 shall not show cracking or delamination.

1038.2.1.6 *Fungi Resistance*—Specimens shall not have growth greater than comparative item when tested in accordance with Subsection 1038.3.3.6. Use interpretation of results of ASTM Test Method C 1338.

1038.2.1.7 *Thermal Resistance*—Determine the thermal resistance in accordance with procedures in Subsection 1038.3.3.7. The results of the procedures shall indicate the R-value of the product, in the assembly tested.

1038.3 Construction Requirements

1038.3.1 Preparatory Work

1038.3.1.1 In areas where insulation is to be installed, components of the electrical system shall be in good condition. If the electrical

system is found to be faulty, proper inspection and repair shall be accomplished.

1038.3.1.2 Inspect the roof, walls, ceilings, and floors to identify areas where a previous or existing moisture problem has caused paint peeling, warpage, stain, visible fungus growth, rotting, or other structural damage.

1038.3.1.3 Do not install insulation in such areas until the Government has been informed, and these conditions have been corrected and their source(s) eliminated.

1038.3.1.4 Provide proper attic ventilation and the use of vapour retarders if required prior to installation in accordance with building requirements or practices. Install insulation in such a way as to ensure free movement of air through all vents.

1038.3.1.5 In the areas where insulation is to be installed, the applicator shall locate and plan for subsequent blocking around recessed lighting fixtures, motors, fans, blowers, heaters, flues, chimneys, and other heat-producing electrical or mechanical devices.

1038.3.1.5.1 Securely fasten blocking, such as wood, metal, or unfaced mineral wool batts, around all heat-producing devices to permanently maintain the clearances specified in 1038.3.1.5.2, 1038.3.1.5.3, or the exception in 1038.3.1.5.4. Install all required blocking at least as high as the height of the finished insulation and in a manner that ensures all devices that require maintenance or servicing remain accessible after the insulation is installed.

1038.3.1.5.2 Install blocking to provide a minimum 76 mm (3 in.) clearance around all sides of recessed lighting fixtures, unless such fixtures are approved for installation in direct contact with insulation, including fixture wiring compartments and ballasts and other heat-producing devices not covered with thermal insulation.

1038.3.1.5.3 The open area above heat producing devices must not be covered, unless they are specifically approved devices for operation when covered with thermal insulation.

1038.3.1.5.4 Install blocking around gas-fired appliances to provide the minimum clearances specified in Philippine National Standard (PNS). Install blocking around oil-fired appliances to provide the minimum clearances specified in PNS. Install blocking around masonry chimneys or masonry enclosing a flue to provide a minimum 50 mm (2 in.) clearance from the outside face of the masonry. Install blocking around vents, chimney, and vent connectors and chimneys other than masonry chimneys to provide the minimum clearances specified in National Building Code.

1038.3.2 Installation

1038.3.2.1 The insulation material shall be handled in accordance with manufacturer's instructions and should be kept free of extraneous materials. The materials should be kept dry and should not be in contact with the ground or other sources of water.

1038.3.2.2 Manufacturer's installation instructions and National Building Code shall be followed to ensure proper installation. The thermal performance of reflective insulation is based on the maintenance of a totally enclosed air space adjacent to the low emittance surface(s).

1038.3.2.3 The thermal performance of a reflective insulation depends upon adherence to manufacturer's spacing recommendations. When instructions for insulating undersize and oversize cavities is not provided the manufacturer shall be consulted.

1038.3.2.4 Damaged areas will result in loss of performance and shall be repaired with low emittance material(s). Minor damage such as rips, tears, or punctures shall be repaired with low emittance materials while larger damaged areas shall be replaced with new reflective insulation.

1038.3.2.5 The thermal performance of a reflective insulation may be reduced by a corrosive environment. Reflective insulations should not be installed in environments that are corrosive to the low emittance surface.

1038.3.2.6 The thermal performance of a reflective insulation may be adversely affected by materials such as dust, oil, or paint on the

surfaces. These materials shall be removed during installation taking care not to damage the insulation.

1038.3.2.7 Moisture will affect the thermal performance of the reflective insulation as long as it remains on the surface. Insulation shall be free of moisture at the time of installation.

1038.3.2.8 It is important that reflective insulation be fitted closely around all non-heat producing components and taped to eliminate gaps or voids through which air, dust, or water vapour might pass.

1038.3.3 Testing

1038.3.3.1 *Emittance*—The emittance of the product shall be tested in accordance with ASTM Test Method C 1371.

1038.3.3.2 *Permeance*—The permeance of the product shall be tested in accordance with ASTM Test Method E 96, Desiccant Method.

1038.3.3.3 *Surface Burning*—Surface burning characteristics shall be tested in accordance with ASTM Test Method E 84.

1038.3.3.4 *Humidity Resistance*—The humidity resistance of the product shall be tested in accordance with ASTM Test Method C 1258.

1038.3.3.5 *Adhesive Performance* – The adhesive performance shall be tested in accordance with the applicable requirements in ASTM C 1224.

1038.3.3.6 *Fungi Resistance*—The fungi resistance of the product shall be determined in accordance with Test Method C 1338.

1038.3.3.7 *Thermal Performance*—The thermal performance of reflective insulation shall be determined in accordance with the applicable requirements in ASTM Test Method C 1363.

1038.4 Method of Measurement

The work done under this Item shall be measured by actual area covered or installed with reflective insulation in square meters and accepted to the satisfaction of the Engineer/Architect.

1038.5 Basis of Payment

The area of reflective insulation in square meters as provided in Section 1038.4 shall be paid for at the unit bid or contract unit price which payment shall constitute full compensation including labor, materials, tools and incidents necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1038.2	Reflective Insulation	Square Meter

References:

1. DPWH Standard Specifications for Highways, Bridges and Airport, Volume II, 2004 Edition
2. National Building Code
3. American Society for Testing and Materials (ASTM)
4. Philippine National Standard (PNS)
5. Internet