



# Standard Guide for Prefabricated Panel Insulation Systems for Ducts and Equipment Operating at Temperatures Above Ambient Air<sup>1</sup>

This standard is issued under the fixed designation C 1146; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This guide describes construction and installation of prefabricated panel insulation systems for vessels, ducts, and equipment operating at temperatures above ambient. Typical applications include, but are not limited to, power plant ducts, steam generating units, precipitators, bag houses, fans, refinery storage tanks, process vessels, and coke drums.

1.2 The insulation described herein is limited to systems consisting of insulating units specially designed to fit the surfaces to be insulated, and engineered for the service requirements.

1.3 Each insulation unit is a prefabricated construction typically comprised of insulation, an outer lagging to which the insulation is attached, an inner metal mesh and foil lining, and means for securing multiple units together in an assembly.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—When prefabricated panel systems are specified, Test Methods C 167, C 177, and C 1061, and Terminology C 168 should be considered.

## 2. Referenced Documents

### 2.1 ASTM Standards:

C 167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulation<sup>2</sup>

C 168 Terminology Relating to Thermal Insulating Materials<sup>2</sup>

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus<sup>2</sup>

C 1061 Test Method for Thermal Transmission Properties of Nonhomogeneous Insulation Panels Installed Vertically<sup>2</sup>

## 3. Terminology

### 3.1 Descriptions of Terms Specific to This Standard:

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee C-16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.40 on Insulation Systems.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.06.

3.1.1 *convection barriers*—barriers to air flow placed between the inner liner and the hot surface being insulated. These may be a combination of sheet metal and insulation material. Generally, these are required on vertical and inclined surfaces.

3.1.2 *flashing*—sheet metal of the same material as the lagging, used to cover openings in the insulation, such as corners and penetration.

3.1.3 *inner*—the innermost surface or cover of the prefabricated panel (closest to the hot surface). This may be composed of aluminum foil and metal mesh.

3.1.4 *insulation*—essentially homogenous insulation in which relevant properties are not a function of position within the material itself, but may be a function of such variables as time and temperature.

3.1.5 *lagging*—the outermost cover or sheet of the prefabricated panel (farthest from the hot surface), which performs a structural function as well as provides weather protection. The lagging is generally fabricated from corrugated, ribbed, or flat sheet.

3.1.6 *penetrations*—openings in a unit of insulation from the hot surface through to the cold surface.

3.1.7 *retaining devices*—metallic members passing through the insulation between the hot surface and the cold surface. Generally, pins, prongs, or other acceptable means used to hold the assembly together.

3.1.8 *support member*—straps, bars, or angles attached to the surface being insulated and to which the insulation units are attached.

3.1.9 *unit of insulation*—a single structurally-independent assembly typically consisting of lagging, inner liner, insulation, and retaining devices.

## 4. Significance and Use

4.1 The purpose of this guide is to ensure proper specification and installation of thermally and mechanically engineered units of prefabricated insulation panels. These panels are to be designed to:

4.1.1 Limit loss of heat from insulated surface.

4.1.2 Limit exposed surface temperatures for thermal protection of personnel.

4.1.3 Maintain temperatures of the insulated equipment at or above a specified minimum value required for the proper operation of the equipment.

4.1.4 Produce an assembly that provides allowance for