



Standard Practice for Estimation of Heat Savings by Adding Thermal Insulation to Bare Valves and Flanges¹

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1. Scope

1.1 The mathematical methods included in this practice provide a calculational procedure for estimating heat loss or heat savings when thermal insulation is added to bare valves and flanges.

1.2 Questions of applicability to real systems should be resolved by qualified personnel familiar with insulation systems design and analysis.

1.3 Estimated accuracy is limited by the following:

1.3.1 The range and quality of the physical property data for the insulation materials and system,

1.3.2 The accuracy of the methodology used in calculation of the bare valve and insulation surface areas, and the quality of workmanship, fabrication, and installation.

1.4 This procedure is considered applicable both for conventional-type insulation systems and for removable/reuseable covers. In both cases, for purposes of heat transfer calculations, the insulation system is assumed to be homogeneous.

1.5 This practice does not intend to establish the criteria required in the design of the equipment over which thermal insulation is used, nor does this practice establish or recommend the applicability of thermal insulation over all surfaces.

1.6 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.7 *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.*

¹ This practice is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.30 on Thermal Measurement.

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2. Referenced Documents

2.1 ASTM Standards:²

C168 Terminology Relating to Thermal Insulation

C450 Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging

C680 Practice for Estimate of the Heat Gain or Loss and the Surface Temperatures of Insulated Flat, Cylindrical, and Spherical Systems by Use of Computer Programs

C1695 Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service

2.2 ASTM Adjuncts:³

ADJC0450A Recommended Dimensional Standards for Fabrication of Thermal Insulating Fitting Covers for NPS Piping and Vessel Lagging

2.3 American National Standards Institute Standard:

ANSI B16.5 Fittings, Flanges, and Valves⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, refer to Terminology C168.

3.2 Symbols:

3.2.1 The following symbols are used in the development of the equations for this practice. Other symbols will be introduced and defined in the detailed description of the development. See Figs. 1 and 2.

A_B = outer surface area of the bare valve or flange (does not include the wheel and stem of the valve), ft² (m²).

A_I = surface area of the insulation cover over the valve or flange, ft² (m²).

C = distance from the center-line axis of the pipe (to which the valve is attached) to the uppermost position of the valve that is to be insulated (recommended to be below the gland seal), ft (m).

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from ASTM International Headquarters. Order Adjunct No. ADJADJC0450A. Original adjunct produced in 1976. Adjunct last revised in 2002.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.