PROCESS INDUSTRY PRACTICES

**TECHNICAL REVISION**
*July 2019*

***Insulation***

# PIP INEG1000
# Insulation Design Guide

PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determinations concerning fitness for purpose and particular matters or application of the Practice to particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

This Practice is subject to revision at any time.



**PRINTING HISTORY**

| | | | | | |
|---|---|---|---|---|---|
| *December 1997* | *Issued* | *July 2007* | *Editorial Revision* | *July 2019* | *Technical Revision* |
| *April 1999* | *Complete Revision* | *October 2010* | *Reaffirmation with Editorial Revision* | | |
| *October 2005* | *Complete Revision* | *December 2017* | *Complete Revision* | | |

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## Data Forms

**INEG1000-D001** – Documentation Requirements Sheet

*The following data forms shall be part of this Practice only if indicated on the purchaser's completed Documentation Requirements Sheet.*

**INEG1000-D002** – Hot Service Insulation Design Parameters

**INEG1000-D003** – Cold Service Insulation Design Parameters

# 1. Scope

This Practice provides guidance for the design of insulation systems. This Practice describes the types of insulation systems that are indicated by the type code on the Piping and Instrumentation Diagrams (P&IDs), data sheets, and other design documents. This Practice provides guidance on insulation design criteria, insulation materials, extent of insulation, determination of insulation thickness, and insulation material properties.

# 2. References

Applicable parts of the following Practices, industry codes and standards, and references shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles will be used herein where appropriate.

## 2.1 Process Industry Practices (PIP)

- PIP CTSE1000 – *Application of External Coatings*
- PIP INSC1000 –*Cold Service Insulation Materials and Installation Specification*
- PIP INSH1000 – *Hot Service Insulation Materials and Installation Specification*
- PIP INSR1000 – *Installation of Flexible, Removable/Reusable Insulation Covers for Hot Insulation Service*

## 2.2 Industry Codes and Standards

- American Petroleum Institute (API)
  - API 521 – *Pressure-Relieving and Depressuring Systems*
  - API 2001 – *Fire Protection in Refineries*
  - API RP 2218 – *Fireproofing Practices in Petroleum and Petrochemical Processing Plants*
- American Society of Testing and Materials (ASTM)
  - ASTM C240 – *Standard Test Methods of Testing Cellular Glass Insulation Block*
  - ASTM C547 – *Standard Specification for Mineral Fiber Pipe Insulation*
  - ASTM C552 – *Standard Specification for Cellular Glass Thermal Insulation*
  - ASTM C680 – *Standard 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*
  - ASTM C800 – *Standard Specification for Fibrous Glass Blanket Insulation (Aircraft Type)*
  - ASTM C871 – *Standard Test Methods for Chemical Analysis of Thermal Insulation Materials for Leachable Chloride, Fluoride, Silicate, and Sodium Ions*
  - ASTM C1055 – *Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries*
  - ASTM C1104 – *Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation*
  - ASTM C1696 – *Standard Guide for Industrial Thermal Insulation Systems*