

# Process Measurement Instrumentation

API RECOMMENDED PRACTICE 551  
FIRST EDITION, MAY 1993

REAFFIRMED, FEBRUARY 2007



AMERICAN PETROLEUM INSTITUTE

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**Manufacturing, Distribution and Marketing Department**

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## FOREWORD

The procedures for installation of the instruments covered in this recommended practice are based on experience with and evaluation of many installations. They represent the installation practices that yield the most consistently accurate results and have proved to be practical and safe.

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Suggested revisions are invited and should be submitted to the director of the Manufacturing, Distribution and Marketing Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

## IMPORTANT INFORMATION CONCERNING USE OF ASBESTOS OR ALTERNATIVE MATERIALS

Asbestos is specified or referenced for certain components of the equipment described in some API standards. It has been of extreme usefulness in minimizing fire hazards associated with petroleum processing. It has also been a universal sealing material, compatible with most refining fluid services.

Certain serious adverse health effects are associated with asbestos, among them the serious and often fatal diseases of lung cancer, asbestosis, and mesothelioma (a cancer of the chest and abdominal linings). The degree of exposure to asbestos varies with the product and the work practices involved.

Consult the most recent edition of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, Occupational Safety and Health Standard for Asbestos, Tremolite, Anthophyllite, and Actinolite, 29 *Code of Federal Regulations* Section 1910.1001; the U.S. Environmental Protection Agency, National Emission Standard for Asbestos, 40 *Code of Federal Regulations* Sections 61.140 through 61.156; and the U.S. Environmental Protection Agency (EPA) rule on labeling requirements and phased banning of asbestos products, published at 54 *Federal Register* 29460 (July 12, 1989).

There are currently in use and under development a number of substitute materials to replace asbestos in certain applications. Manufacturers and users are encouraged to develop and use effective substitute materials that can meet the specifications for, and operating requirements of, the equipment to which they would apply.

SAFETY AND HEALTH INFORMATION WITH RESPECT TO PARTICULAR PRODUCTS OR MATERIALS CAN BE OBTAINED FROM THE EMPLOYER, THE MANUFACTURER OR SUPPLIER OF THAT PRODUCT OR MATERIAL, OR THE MATERIAL SAFETY DATA SHEET.

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# Process Measurement Instrumentation

## SECTION 1—GENERAL

### 1.1 Scope

The material in Sections 2–6 was previously presented in several sections of Part 1 of API Recommended Practice 550, which is now out of print:

- a. Section 2—API Recommended Practice 550, Part I, Section 1, “Flow.”
- b. Section 3—API Recommended Practice 550, Part I, Section 2, “Level.”
- c. Section 4—API Recommended Practice 550, Part I, Section 4, “Pressure.”
- d. Section 5—API Recommended Practice 550, Part I, Section 3, “Temperature.”
- e. Section 6—API Recommended Practice 550, Part I, Section 8, “Seals, Purges, and Winterizing.”

The procedures for installation of the instruments covered in this recommended practice are based on experience with and evaluation of many installations. They represent the installation practices that yield the most consistently accurate results and have proved to be practical and safe.

Process and environmental protection is covered in a general fashion in Section 6. Where required, specific instances of process and environmental protection are covered in Sections 2–5.

Tank gauging is outside the scope of Section 3. The applicable publication is referenced in that section.

Where appropriate, installation drawings, cautionary notes, and explanations are included. Details and piping that are typically covered in piping standards have been omitted from most installation drawings.

### 1.2 Reference Publications

The latest edition or revision of the following standards, codes, and specifications shall, to the extent specified, form a part of this recommended practice:

- ANSI<sup>1</sup>  
M 796.1 *Temperature Measurement: Thermocouples*
- API  
RP 550 *Manual on Installation of Refinery Instruments and Control Systems, Part I, “Process Instrumentation and Control,”* Section 7, “Transmission Systems” (out of print)
- RP 550 *Manual on Installation of Refinery Instruments and Control Systems, Part III, “Fired*

- Heaters and Inert Gas Generators” (out of print)
- RP 552 *Signal Transmitters and Associated Supplies* (in press)
- RP 554 *Control Centers, Instrumentation, and Control Systems* (in press)
- RP 555 *Process Analyzers* (in press)
- Std 606 *Compact Carbon Steel Gate Valves—Extended Body*
- Publ 2218 *Fireproofing Practices in Petroleum and Petrochemical Processing Plants*
- RP 2350 *Overfill Protection for Petroleum Storage Tanks*
- Std 254 *Method of Gaging Petroleum and Petroleum Products*
- Manuals: *Petroleum Measurement Standards*, Chapter 4, “Proving Systems”; Chapter 5, “Metering”; Chapter 6, “Metering Assemblies”; Chapter 7, “Temperature Determination”; Chapter 14, “Natural Gas Fluids Measurement,” Section 3, “Concentric, Square-Edged Orifice Meters,” Part 1, “General Equations and Uncertainty Guidelines”; Chapter 18, “Custody Transfer”
- ASME<sup>2</sup>  
B16.5 *Pipe Flanges and Flanged Fittings*
- PTC 19.3 *Performance Test Code—Temperature Measurement*
- ASTM<sup>3</sup>  
STP 470B *Manual on the Use of Thermocouples in Temperature Measurement*
- NFPA<sup>4</sup>  
70 *National Electrical Code*

<sup>1</sup>American National Standards Institute, 11 West 42nd Street, New York, New York 10036.

<sup>2</sup>American Society of Mechanical Engineers, 22 Law Drive, Box 2300, Fairfield, New Jersey 07007-2300.

<sup>3</sup>American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

<sup>4</sup>National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, Massachusetts 02269-9101.