ASME PTC 19.5-2004, “Flow Measurement” is now available. This Performance Test Code Supplement describes the techniques and methods of flow measurements required or recommended by the equipment Performance Test Codes.

PTC 19.5 is issued as an Addenda Performance Test Code because of its breadth. Thus, the Code will be kept up to date with every new development in flow metering as it is applicable to performance testing, rather than be on a 5-10 year republication cycle. This is critical for a Code for which technology may change very quickly.

PTC 19.5-2004 offers a major advancement in the development of orifice coefficient of discharge equations based on fluid dynamic theory. A new five-term equation was developed for orifice discharge coefficients that considers the non-dimensional geometric effects of the area ratio on flow in closed conduits, the boundary layer's effect on differential pressure measurement, and velocity profile effects as characterized by a linear perturbation in the velocity of approach factor. Hence, the Euler number is introduced into the equation for the discharge coefficient such that the discharge coefficient becomes a function of Reynolds number, area ratio, and Euler number. Prior to the 2004 edition of PTC 19.5, only the Reynolds number, diameter ratio, and tap loci were considered, and then only through curve-fitting to an equation driven almost entirely by statistics, rather than by fluid-dynamic theory.

It is shown that the calibration interpretation methodology introduced in PTC 19.5 for orifice metering, and reviewed for other types of differential pressure metering, reduces the uncertainty of calibrated differential pressure metering sections, even when used outside the calibration range.

All of the contents are state of the art in whichever chapter is referenced. Coverage includes:

- **Differential Pressure Class Meters**, including the General Equation for mass flow through a differential pressure class meter, Basic physical concepts used in the derivation of the general equation for mass, theoretical flow rate - Liquid, Gas, or Vapor as the flowing fluid, Discharge coefficient, C, and the Expansion factor for gases, Determining coefficient of discharge for differential pressure class meters, Thermal expansion/contraction of pipe and primary element, Selection and recommended use of differential pressure class meters, Procedure for sizing a differential pressure class meter, Flow calculation procedure, and Sample calculations, including interpretation and extrapolation of laboratory calibration data using the new discharge coefficient formulation.

- **Pulsating Flow Measurement** for orifices, nozzles, and turbine meters.

- **Flow Conditioning and Meter Installation Requirements** for differential pressure meters.

- **Sonic Flow Nozzles and Venturis** clearly explaining basic theoretical relationships, theoretical mass flow calculations, designs of sonic nozzles and Venturi nozzles, Coefficients of discharge, Installation, and Pressure and temperature measurements.

- **Flow Measurement by Velocity Traverse** covers Traverse measurement stations, Recommended installation requirements, Calibration requirements for sensors, Flow measurement procedures, and Flow computation, including examples.

- **Ultrasonic Flow Meters** covers Applications, Flow meter descriptions, Implementation, Operational limits, Error sources and their reduction, Examples of large (to-20ft) pipe field calibrations, Installation considerations, Meter factor determination and verification.

- **Electromagnetic Flow meters** covers their construction, calibration, and proper application.

- **Tracer Methods--Constant Rate Injection Method Using Non-Radioactive Chemicals** covers the constant-rate injection method, selection of tracer chemicals, fluorometric analysis, procedures and test setup. Also included are Radioactive Tracer Techniques For Measuring Water Flow Rate covering the same aforementioned areas.
• Mechanical Meters are fully explained with the newest calibration presentations and correlations of their performance under plant and field test conditions, which include Positive Displacement meters, Turbine meters, Turbine meter signal transducers and indicators, Calibration, Recommendations for use, Piping installations and the effects of disturbances.

The ASME Codes & Standards organization will welcome technical inquiries and code cases, as for all of our Performance Test Codes.

To order ASME PTC 19.5-2004, click here or to speak to an ASME customer service representative, call (800) THE-ASME or email at infocentral@asme.org.