

Measurement Systems (Instructor-Led Training)

Course Description

This course introduces the basics of gas chromatography to technicians new to the natural gas industry. It covers basic operating theory, providing background necessary for installation and operation of industrial field gas chromatographs.

Course Prerequisites

- GTA Web-Based Training
 - Core WBT
 - Statistics and Uncertainty
 - Gas Properties I
 - o Gas Properties II
 - Basics of Gas Chromatography I
 - Basics of Gas Chromatography II
- GTA Instructor-Led Training
 - Measurement Systems
 - Instrumentation Systems

Course Objectives

Upon completion of this course, the student will have received instruction designed to assist him/her in the following:

- Explain why accurate gas flow measurement is necessary.
- Describe the components of a gas measurement system.



Course Outline

- 1. Measurement Purpose
 - a. Accurate Gas Flow Measurement
 - b. Electronic flow computers
 - c. Audit
 - d. Primary Device Orifice
 - e. Error Propagation Uncertainty
 - f. System Balance
- 2. Measurement System Components
 - a. Influence of piping design on gas measurements.
 - b. Flow Profile and Disturbances
 - c. Pulsations
 - d. Sensors Flow Measurement
 - e. Differential Pressure Meters
 - f. Orifice Meter
 - g. Turbine Meters
 - h. Positive Displacement Meters
 - i. Diaphragm Meters
 - j. Coriolis Meter
 - k. Pitot Tube Meters
 - I. Vortex Meter
 - m. Cone Meter
 - n. Ultrasonic Meter
 - o. Flow, Pressure, and Temperature Sensors and Transmitters
 - p. Sensor Module
 - q. Capacitive Differential Pressure Sensor
 - r. Piezoresistive Absolute Pressure Sensor
 - s. Process Temperature
 - t. Sensor Microprocessor and Flow/Output Microprocessor
 - u. Pressure Transmitters



- v. Temperature Sensors and Transmitters
- w. Measurement Errors
- x. Role of the Gas Flow Computer in Gas Measurement
- y. Gas Flow Calculations with EFC Equipment
- z. Remote Terminal Unit (RTU) and Components
- aa. Gas Chromatograph

Recommended Resources

- GTA Measurement Systems Participant Guide
- GTA Measurement Systems Instructor Presentation.
- AGA Reports 3, 5, 7, 8, 9, 10, GPA Standards 2145, 2166, and API MPMS Chapter 14.1.
- Internet sites and textbooks related to industrial measurement systems.