

OIL & GAS METERING AND MEASUREMENT TECHNIQUES

PRD059

COURSE DESCRIPTION

This course encompasses methods and techniques for accurately measuring crude oil and gas products. It provides insight into the principles of operation of primary dynamic meters and custody transfer metering used in metering skids, including Orifice, PD, turbine, Coriolis, and ultrasonic flow meters. Additionally, it covers secondary measurements such as pressure and temperature transmitters, necessary for precise flow measurement. The course also delves into flow computer operation, utilizing various types, and understanding PD proving using tools like bi-directional pipe provers. Furthermore, it aims to equip participants with the skills to operate accurate and reliable metering stations with minimal measurement uncertainty, including validation system implementation.

COURSE OBJECTIVES

By the end of this training course, participants will be able to:

- Understand fiscal metering principles.
- Learn flow metering basics.
- Understand the theory and use of electronic flow computers, including calculation, verification, and configuration.
- Learn about the architecture of flow management systems and the installation and calibration of secondary instrumentation such as pressure transmitters (PT), temperature transmitters (TT), and densitometers.
- Understand different meter types (Coriolis, ultrasonic, turbine, PD, orifice plates, etc.), their principles of operation, and calibration methods.
- Learn about the theory, use, selection, and calibration of various flow meters including Orifice, PD, turbine, Coriolis, and ultrasonic flow meters.
- Understand the theory, use, and calibration of different types of displacement and volumetric provers (pipe provers, compact prover, master meter), including the water draw method.
- Learn about the operation and maintenance overview of GC (gas chromatography) analyzers.
- Understand API and other internationally accepted standards in the field.

WHO SHOULD ATTEND

- Metering Technicians
- Maintenance Technicians
- Maintenance Engineers
- Operators

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Introduction and Fundamentals

- HSE induction about the facility
- Course registration formalities
- Pre-Assessment
- Course Introduction
- Overview of the definitions and terminology that will be used in the course.
- Overview of the regulations and standards relevant to the design and operation of a liquid hydrocarbon metering station including API MPMS, ISO
- Measurement and traceability including SI Base and Derived Units

2. Field Measuring Points and System Architecture

- Typical oil field measuring points
 - Water or gas injection
 - Storage tank
 - Test separator
- System Architecture and Basic Operation
- Flow Measurement Using Electronic Metering Systems
- Computer systems in a fiscal metering station.
- Typical Stream, supervisory & Prover computer systems
- Simulation / DEMO for Flow Computers Flow Computers summit 8800 Flow Computers
- Typical Reporting
- Exercise (2)

3. Metering Technologies and Selection Criteria

- Theory of operation, use and selection of Orifice
 - Flow Profiles
 - Orifice Types and installations
 - Flow straighteners and conditioners
- Turbine Meters
- Educational Videos on Orifice & Turbine flow meters
- Theory of operation, use and selection of Ultrasonic
 - Fixed and Clamp-on Ultrasonic flow meters
 - Multipath ultrasonic flow meters

- Theory of operation, use and selection of Mass including Coriolis Flow meters
 - Mass flow meters concept
 - Coriolis effect and principle of operation
- Educational Videos on Ultrasonic Flow Meters & Mass Flow Meters
- Case Study (1)

4. Fiscal Metering and Calibration Techniques

- Review of previous topics
- Introduction to Fiscal Metering
- Metering of hydrocarbon for custody transfer
- Fiscal measurement / Custody Transfer
- Typical measurement scheme
- System design considerations and an overview of the physical layout and design of a metering station.
- Gas Pipeline Metering Stations Fundamentals
- Theory of operation, use and selection of Positive displacement meters
- Introduction to Proving and Meter Calibration Techniques
 - Factors affecting meter & provers performance
 - Meter Provers for oil Flow Metering
- Educational Videos
- Exercise (2)

5. Gas Chromatography and Validation Procedures

- Review of previous topics
- On-line gas chromatograph (GC)
- On-line gas chromatograph installation
- Parameters to measure in analyzers
- Sample conditioning overview and troubleshooting
- Validation for metering system and equipment's overview
- Auditing and troubleshooting
- Final test
- Course Survey
- End of course ceremony including distribution of training certificates and giveaways

REFERENCE STANDARDS

API 2540, ISO 6978, and IEC 60511