Fiscal and Allocation Metering

Course Price

£2950

Course Description

The smallest error in the flow measurement of materials like oil, gas, or chemicals being transferred between a producer (supplier) and customer may cost a company millions of dollars in a year.

Custody Transfer takes place any time fluids are changing possession from one party to another e.g., from producer to pipeline, pipeline to plant, or pipeline to storage facility. Custody Transfer refers to any agreed metering condition in a sales contract between supplier while Fiscal Metering refers to metering of a commercial transaction that should comply with legal obligations and so in this case there is no discussion about the metering requirements.

The custody transfer system must generate detailed and indisputable cargo reports, based on accurate flow measurements and standardised calculations.

Custody and Fiscal transfer systems are more than just flow-meters and they represent a combination of highly engineered flow measurement systems for the intended application.

Custody and Fiscal transfer metering requires exceptional accuracy, repeatability while the applied methods and measuring result are auditable.

Requirements for permissible errors of custody transfer meters are recommended in International Standards like AGA, OIML and ISO.

This course introduces participants to a variety of flow measurement technologies that are used in custody transfer applications while the objective is to gain an understanding about how to achieve the requirements by means of differential pressure (DP) measurement, Turbine meters, Positive displacement meters, Coriolis flow measurement, Magnetic and Ultrasonic flow measurement.

Participants will gain the ability to determine if a metering system is fit for the purpose while other key learning objectives of this course include the understanding of the principles of Fluid Dynamics, Meter runs, Flow computers, related Quality systems, applied specification of Accuracy terms, Calibration and Proving systems.

Course Objectives

At the end of this course the delegates should be able to describe:

- Utilities required for fiscal flow metering
- The aim of Loss Control
- Fiscal metering station
- Fluid Dynamics – Liquids and Gases
- Energy conservation according to Bernoulli's Law
- The types of Flow Patterns and influence on flow measurements
- Flow measurement based on ? P measurement
- Flow meters for Oil & Gas : Turbine, Positive Displacement, Thermal Mass, Coriolis, Ultra Sonic, Vortex and EMF meter
- OIML classification of metering devices and recommendations for fiscal metering
- Applied Accuracy Terminology and manufacturer specification
- Applied Custody & Fiscal Metering contracts
- Moisture and HC Dew-point measurements
- Application of Process Gas Chromatography
- Heating Value Measurements
- Flow meter Calibration
- Proving and Validation
- Flow computer dedicated functions
- Application of International Metering Standards for Oil & Gas
- Multiphase Flow and Water Cut measurements

Who Should Attend

This short course is designed for all site personnel not limited to Instrument Technicians or Supervisory Engineers, Process engineers, Production engineers, Operators and Control room personnel dealing with fiscal, custody transfer and allocation flow metering.

Course Content

Day 1
Introduction to Fiscal and CT Metering

Learn about the Standard devices required for the metering system, the type of Sales Contracts, International applied Standards, CT practices, Functions fiscal metering system, Mutual Performance expectations, OIML requirements for accuracy and proving and validation issues
Loss Control & LACT

Understand the aim of Loss Control, the importance of representative fuel samples and Lease Automatic Custody Transfer
Applied Accuracy Terminology

Terms like Accuracy, Precision, Standard Deviation & Variance will be explained by clear examples to be able to correctly apply these indispensible terms like repeatability, variability, probability, STD,

Systematic Error,
Control Chart tool for Performance monitoring and verification

Fluid Dynamics

Fluid dynamics are the basics of flow measurements that may influence the accuracy of any flow measuring device
Parameters influencing the flow pattern like viscosity, Density, Reynolds number and Bernoulli's theorem describing the energy balances in a flowing fluid
Next to the latter also standard API Gravity Measurement and Oil Classification will be discussed

Day 2

Continuation – Fluid Dynamics

Since the stability of the Flow Pattern is of paramount importance special attention is paid to the types of possible disturbances to it like e.g. swirl flow and the methods to prevent it by application of flow straighteners and conditioners,
Other important issues will be discussed like cavitation and flashing, the phenomena of choked flow and gas compressibility

Principles of Gas Chromatography

Process Gas Chromatography is applied for the required analysis of a fluid composition as part of the flow metering, this subject will be discussed from the basic principles to the quantitation methods of the analysis results

Heating Value Measuring Methods

Pros and Cons of the different methods to determine the Heating Value of a Gas are discussed like Calorific Value measurements and the GC method using the "Du Long" equation

Moisture and HC Dew-Point Measurements

Next to the principles of Moisture analysis, the effects and risks like hydrate forming by the combination of Water (WDP) and Hydrocarbon Dew Point (HCDP) in Natural Gas will be clarified

Day 3

Applied types of Density measurements

During this day we focus on the different types of measuring methods to accurately measure actual density and specific gravity of a liquid and gas
Density verification methods

Standard Measurement Recommendations

Introduction to the OIML recommended best practices and requirements for fiscal metering and operation
OIML accuracy meter classification and permissible errors
API MPMS Chapter 5.8

Practical Case Example

Flow Metering using ? P

Since the ? P types of flow measurements are still widely applied this subject will be comprehensively discussed including its advantages and disadvantages compared to other flow measuring principles
The latter includes flow devices like Venturi, Nozzle and their particular applications
What is the actual effect of the Measurement Rangeability, Turn-Down Ratio in relation to the measurement accuracy?

Flow Metering that are applied based on other principles

What issues need to be considered before selection of any type of flow meter for the measurement Volumetric, Mass and Totalized Flow?
What are the other measuring principles, their significant advantages and disadvantages, interferences and typical applications for accurate flow measurements like PD meters, the Turbine flow meters, Transit time type Ultra Sonic flow-meters, Coriolis Mass Flow measurement, Thermal Mass flow, Electro Magnetic and Vortex?

Day 4

Standardised Gas Flow Metering standards

Introduction to the AGA applied terms and factors that are used in the different calculation equations for the main types of Gas flow measuring principles as indicated in the applied standards?
What are the reasons for application of a dedicated Flow Computer and what are the special functions like the standardized calculations and additional functions?

Fiscal Gas Metering Station Design

How is the recommend design of a NG fiscal metering station, which facilities are required and what are generally applied practices for installation?

Flow Calibration

What are the reasons for Flow Meter calibration and practical considerations?
What is the difference between Calibration and Proving?
What are the different types of flow meter calibration systems?
What are the issues concerning testing, calibration and presentation of proving data?
What alternative type of Turbine meter calibration is applied?
What are the trends and best practices?

Day 5

Metering Prover Systems

What are the main types of Prover systems and their specific reasons of application,
How is the way of operation of Tank provers, Piston provers, Displacement types prover, Bi-directional Pipe prover and Ball Prover
What are the reasons for application of a Master Meter system?
What are important general prover issues?

Multiphase Flow and Water Cut measurements

Why is MPF metering not suitable as CT / fiscal metering?
What are the three phase flow properties?
What is meant by “Water-Cut” and how is it measured?
What are the measuring principles for WC like absorption spectroscopy,
What are the applied three phase metering techniques?
What is meant by GVF and WC and what influences do they have on the performance?
Industrial types that will discussed are the developed MPF meters from Roxar, Daniel, Agar, Expro, Haimo, Framo / Schlumberger and Jiskoot.
Summary

CPD Unit

Continuing Professional Development

35 HOURS CPD