Since the Netherlands adopted natural gas in the 1960s, DNV GL has been involved in the design and operation of natural gas metering stations. In 2013, DNV GL introduced a multiphase flow test loop, which is used to assess wet gas and multiphase flow meters. There should be no systematic measurement errors at your fiscal metering stations and measurement uncertainty should be minimal and affordable. DNV GL offers courses on fiscal metering of natural gas and wet gas metering to help you achieve these goals.

We have three different metering courses:
- A one day introductory course providing a broad overview of gas flow and gas quality metering principles in general
- A three day advanced training course providing in-depth insight into all aspects of fiscal metering and including a site visit to a large fiscal metering station
- A one day introductory course on wet gas metering and sales gas allocation, providing a modern overview of its capabilities and challenges.

The courses can be taken consecutively, as all three courses are scheduled in one week.

ENERGY ACADEMY

TRAINING COURSES ON FISCAL METERING OF NATURAL GAS AND WET GAS METERING

Best practices in design & operation of fiscal metering and gas production stations

Are you sure that ambient conditions at natural gas fiscal metering stations are not influencing your volume, temperature and pressure measurement? And do you know the causes of your unaccounted for gas? Find out how to design and operate your fiscal metering stations in order to minimise systematic errors. Learn how to judge whether the company that measures your natural gas is generating accurate data and push your gas balance to the equilibrium.
INTRODUCTORY COURSE IN FISCAL METERING OF NATURAL GAS

This course provides a good general overview of gas flow metering and gas quality metering principles, not at a detailed level (the three day course is available for this purpose), but more in related context.

Subjects
Basic gas concepts
- Introduction to fiscal metering systems, definitions
- Gas laws, concept of compressibility
- Measurement uncertainty, definitions and methods

Basic gas flow and gas quality principles
- Introduction to flow measurement technology
- Introduction to functionality and operation of gas chromatographs

ADVANCED TRAINING COURSE ON FISCAL METERING OF NATURAL GAS

This course helps you to design and operate accurate and reliable metering stations with low levels of measurement uncertainty. A meaningful assessment of measurement uncertainty requires your instruments to operate properly. Find out how to discriminate between negligible ‘noise’ in your instruments and systematic errors that require adjustment. Impurities in natural gas may cause such systematic errors, and possibly much larger errors than you might expect. We will give you examples that we have encountered, illustrating how large these errors may become, and show you how to avoid them. Calibration and adjustment are intended to reduce systematic errors, but may seem costly and time-consuming. You will learn how to optimise and speed up calibration and adjustment by using mobile reference tools and automation.

Your benefits
After attending this course, you will have gained both practical and theoretical knowledge of designing and operating fiscal metering systems for natural gas. You will understand the principles of designing and operating your fiscal metering stations in order to minimise systematic errors and how this will help you push your gas balance to equilibrium. You will be fully aware of the fact that designing an accurate measurement system not only requires sound knowledge of metering techniques, but also practical experience of do’s and don’ts. Errors in measurement data have direct financial implications, making this knowledge very valuable to you and your organisation.
Allocation of sales gas to the different producers is often based on measurement performed by wet gas flow meters. Wet gas flow meters in sales gas allocation systems therefore have direct financial implications. Wet gas flow measurement may be performed using dedicated wet gas multiphase flow meters or single phase flow meters with a correction algorithm. At DNV GL’s multiphase flow facility, these flow meters are tested and fundamental research is performed to better understand the physics behind wet gas flow metering. One of the DNV GL scientists working in this area of expertise is Dennis van Putten. He will explain the fundamentals of wet gas flows and the various metering technologies.

Subjects
Basic wet gas flow measurement concepts
- Introduction to wet gas flow and sales gas allocation
- Fundamentals of multiphase flow and wet gas flow
- Multiphase and wet gas flow measurement

Application and verification of wet gas flow meters
- Dry gas flow meters applied in wet gas
- Verification of wet gas flow meters in a multiphase flow test loop

Best practices in gas flow measurement
- Design and operating practices
- Calibration and traceability
- International standards & definitions in metrology
- Dynamic effects on turbine flow meters
- Consequences of contamination for flow meters
- Gas cleaning by filtering

Best practices in gas quality measurement
- Design and operating practices
- Sampling and calibration gases
- Analysis of trace components, such as sulphur and oxygen
- Water vapour and potential hydrocarbon liquid concentrations
- Monitoring of contractual parameters
- International standards
- Calibration and traceability

Metering policy
- Important drivers in design and operation of fiscal metering
- Recommended practice based on ISO 10012 “Management of metering”
- Metering system classification and its impact on metering design and calibrations
- Operational measurement uncertainty concepts and practices
- Gas balancing and unaccounted for gas
- Sources of piping acoustics, dynamic effects and their impact on metering

International standards and new developments
- Metering calibration at operational conditions
- Traceability to international standards
- Diagnostics of ultrasonic & turbine meters
- Flow Verification with clamp-on meters

Only applicable to training held in Groningen, the Netherlands:
- Site visit to a large fiscal metering station
- Site visit to DNV GL’s analytical laboratory, dry gas flow calibration laboratory and multiphase flow test loop

Responses from participants:
- “As a service engineer, I found the course very helpful”
- “A useful course. Being involved with fiscal metering, I now have a better understanding of the background behind why we do this”
- “I needed this training and knowledge to move smoothly through measurement problems, prepare solutions for clients and cooperate with engineers to develop best practices and products”
- “This course gives a good awareness of: applicable measurements (flow, pressure, temperature, composition), metering systems, necessary skills and organization structures”.

DNV GL - IN THE OIL AND GAS INDUSTRY

DNV GL is the leading technical advisor to the global oil and gas industry. We provide consistent, integrated services within technical and marine assurance and advisory, risk management and offshore classification, to enable safe, reliable and enhanced performance in projects and operations. Together with our partners, we drive the industry forward by developing best practices and standards. Our people combine industry expertise, multi-disciplinary skills and innovation to solve complex challenges for our customers.
Practical information

For whom?
These courses are very useful for those responsible for the maintenance of fiscal metering stations, including their calibration and adjustment. The courses are also beneficial to anyone who has to formulate functional requirements, produce or amend measurement manuals, define contractual measurement requirements or inspect fiscal metering and gas production stations.

We therefore recommend the courses to metering managers and metering engineers, design engineers, station operators, service staff and inspectors.

For the advanced training course, it is recommended that participants possess a basic knowledge of gas, gas flow metering and gas quality metering principles. If all this is relatively new ground, we recommend that you attend the introductory course as well.

The courses will be held in the Netherlands (Groningen), Dubai and Malaysia.

To encourage active participation, the number of participants is limited to 25. The courses may be cancelled or rescheduled if there are too few participants.

For more information:
Energy Academy
email: academy.energy@dnvgl.com
web: www.dnvgl.com/energy-academy
tel: +31 26 356 2954

Registration
For the following items, we refer to the registration form:
- Course dates
- Venue details
- Registration fee
- Payment & cancellation conditions
- Hotel accommodation

The registration fee includes course materials, lunches, two dinners (*), refreshments and the excursions (*) (**). Travel and hotel expenses are not included. Hotel accommodation can be arranged through DNV GL, but payment must be made directly to the hotel.

(*) = only applicable to the three day course.
(**) = only applicable to the three day course held in Groningen.

You will also receive hand-outs and a USB flash drive of all the lectures given as well as a record of completion.

Team of instructors
The courses will be provided by a team of DNV GL’s Gas Quality & Flow experts, led by Henk Riezebos, Aernout van den Heuvel, Bert Bierling and Dennis van Putten.

Language
The courses will be given in English.

For more information and to register, please visit: www.dnvgl.com/fiscal-metering-courses.