COURSE OVERVIEW IE0340
Custody Transfer and Fiscal Metering

Course Title
Custody Transfer and Fiscal Metering

Course Date/Venue
Session 1: June 07-11, 2026/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE or, Online Virtual Training
Session 2: October 25-29, 2026/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE or, Online Virtual Training

Course Reference
IE0340

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

The course covers the concept of Metering & Custody Transfer System Operations. It is divided into 5 modules:-

Module 1: Accuracy & Process Measurement
This module covers basic definitions, such as viscosity, repeatability, cavitation etc.; flow profiles and the effects on measurement; volumetric and mass flow rate.

Accuracy is important in terms of uncertainty of measurement; calibration; technical specifications and process requirements.

Flow Measurement including orifice plate and DP transmitter; multi-beam ultrasonic flowmeter; Coriolis mass meter; turbine meters amongst others.

Level Measurement, traditional methods such as capacitance and hydrostatic techniques are covered together with more modern technologies such as ultrasonic and radar measurements.

Module 2: Custody Transfer & Fiscal Flow Metering
This module examines the requirements of OIML R117; the subject of Custody Transfer in detail terms; flow calibration, dynamic and static; types of calibration rigs and calibration systems plus prover systems.

Module 3: Terminal & Pipeline Systems

Included in this module are, terminal tank gauging; Lease Automatic Custody Transfer (LACT); sediment and water considerations; operational issues and associated equipment. Pipeline considerations including paraffin content; pipeline pressure and process characteristics. Truck custody transfer, marine and aviation, on-loading and off loading etc.

Module 4: Monitoring and Controlling Losses

Loss control systems – an applied approach – model based system; leak detection / leak testing. Case studies of marine applications; measurement surveys and measurement reports. Multi-phase flowmetering and applications.

Module 5: API Standards and Flowmeter Selection

API measurement standards and volume correction tables; temperature compensation; SG versus API gravity; net volume calculation exercise. Guidelines for flowmeter selection.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply proper knowledge and skills in metering and custody transfer system operations
- Identify the terminologies and classification of fluid mechanics and be aware of the accuracy requirements and specifications for custody measurement and loss control
- Discuss the different types, selection & installation of flow measurement and level measurement
- Aware of the basic overview of OIML Recommendation R117 including its requirements and operation
- Identify the various types of flow calibration and meter provers and discuss its application
- Explain in detail the different types, methods and techniques used in custody transfer and list the equipments used in its operation
- Discuss pipeline meter considerations employed for liquid petroleum products
- Employ leak detection for liquid petroleum products
- Gain in-depth knowledge on loss control system and illustrate proper monitoring and controlling production losses
- Discuss the API Standards as applied to basic custody measurement
- Identify the proper selection and cost consideration of flow meters

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of the major aspects of metering & custody transfer system operations for engineers and other technical staff who are in charge of custody measurement and loss control for petroleum products in oil/gas fields, gas plants, export facilities, refineries, marine terminals or bulk storage plants. Engineers, shift supervisors and other technical staff involved in meter proving and calibration will benefit from this course.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Virtual Training (If Applicable)

If this course is delivered online as a Virtual Training, the following limitations will be applicable:-

Certificates	Only soft copy certificates will be issued to participants through Haward's Portal. This includes Wallet Card Certificates if applicable
Training Materials	Only soft copy Training Materials (PDF format) will be issued to participant through the Virtual Training Platform
Training Methodology	80% of the program will be theory and 20% will be practical sessions, exercises, case studies, simulators or videos
Training Program	The training will be for 4 hours per day starting at 0930 and ending at 1330
H-STK Smart Training Kit	Not Applicable
Hands-on Practical Workshops	Not Applicable
Site Visit	Not Applicable
Simulators	Only software simulators will be used in the virtual courses. Hardware simulators are not applicable and will not be used in Virtual Training

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Fee

F2F Classroom: US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Online Virtual: US$ 2,750 per Delegate + **VAT**.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations:

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Pan Marave, PE, MSc, BEng, is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of extensive experience in **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise includes Safety Instrumented Systems (**SIS**), **Process Control, Instrumentation**, Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**); **DCS**, **SCADA** & **PLC**; **Measurement** (**Flow**, **Temperature**, **Pressure**); **Process Analyzers** & **Analytical Instrumentation**; **Process Control**, **Instrumentation** & **Safeguarding**; **Process Controller**, **Control Loop & Valve Tuning**; Industrial **Distribution Systems**; Industrial **Control & Control Systems**, Power Systems **Protection & Relaying**; **Earthing**, **Bonding**, **Grounding**, **Lightning & Surge Protection**; Electric Power **Substation** & **Systems**; Electrical Engineering Principles; **Motor Control Circuit**; **Electrical Fault Analysis**; Electrical Networks & Distribution **Cables**; **Circuit Breakers**, **Switchgears**, **Transformers**, **Hazardous Areas Classification** and **Detailed Engineering Drawings**, **Codes** & **Standards**. Furthermore, he is also well-versed in Microprocessors Structure, Lead Auditor (**ISO 9000:2000**), **ISO 9002**, Quality Assurance, and Projects & Contracts Management.

Presently, Mr. Marave is the **Technical Advisor** of **Chamber of Industry & Commerce** in Greece. Prior to this, he gained his thorough practical experience through several positions as the **Technical Instructor**, **Engineering Manager**, **Electronics & Instruments Head**, **Electrical**, **Electronics & Instruments Maintenance Superintendent**, **Assistant General Technical Manager** and **Engineering Supervisor** of various international companies such as the **Alumil** Mylonas, **Athens Papermill**, **Astropol** and the **Science Technical Education**.

Mr. Marave is a **Registered Professional Engineer** and has **Master** and **Bachelor** degrees in **Electrical Engineering** from the **Polytechnic Institute of New York** and **Pratt Institute of New York** (**USA**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and an active member of the **Technical Chamber** and the Institute of Electrical and Electronics Engineer (**IEEE**) in Greece. He has presented and delivered **numerous international** courses, conferences, trainings and workshops worldwide.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Introduction*** *Objectives of the Workshop • Workshop Content*
0900 – 0930	***Fluid Mechanics*** *Terminology • Flow Profiles • The Measurement of Flow • Flowmeter Classification*
0930 – 0945	*Break*
0945 – 1230	***Accuracy*** *Preview • Basic Requirements • Response • Uncertainty • Process Specification • Technical Specification • Accuracy Specifications*
1230 – 1245	*Break*
1245 – 1415	***Flow Measurement*** *Industrial Flowmeter Types • Basic Flow Theory • Differential Pressure Flowmeters • Oscillatory Flow Measurement • Positive Displacement Meters • Turbine Meters • Magnetic Flowmeters • Ultrasonic Flowmeters • Doppler Flowmeters • Vortex Shedding • Coriolis Meters • Flowmeter Selection*
1415 – 1420	***Video Presentation*** *Coriolis Mass Flowmeter*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0845	***Level Measurement*** *Main Types • Buoyancy Tape Systems • Hydrostatic Pressure • Ultrasonic Measurement • Radar Measurement • Vibration Switches • Electrical Measurement • Installation Considerations • Impact on the Control Loop • The Future*
0845 – 0930	***Video Presentation*** *Radar Level Measurement*
0930 – 0945	*Break*
0945 – 1030	***OIML Recommendation R117*** *Introduction • Scope • General Requirements • Field of Operation • Accuracy Classes • Case Example • API MPMS Chapter 5.8*
1030 – 1045	***Video Presentation*** *Ultrasonic Flowmeter*
1045– 1115	***Flow Calibration*** *General • Trends in Calibration • Types of Calibration Test Rigs • In Situ Calibration • Turbine Meters • Review*

1115– 1130	***Video Presentation*** *Flow Calibration*
1130 – 1230	***Meter Provers*** *Definitions • Main Types • Maintenance • Problems*
1230 – 1245	*Break*
1245 – 1420	***Proving of a Turbine Meter*** *Interactive Video Presentation*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0915	***Terminal Custody Transfer*** *Introduction • Methods of Tank Calibration • Tank Gauging Techniques Tank Management Systems*
0915 – 0930	***Video Presentation*** *Tank Gauging System*
0930 – 0945	*Break*
0945 – 1100	***Lease Automatic Custody Transfer*** *Introduction • System Requirements • Operation • Equipment • Conclusions • Appendix*
1100 – 1230	***Truck Custody Transfer*** *Introduction • Truck Types • Typical Equipment • Other Considerations • Performance • New Developments*
1230 – 1245	*Break*
1245 – 1420	***Pipeline Meter Considerations*** *Introduction • Flow in a Pipeline • Pipeline Installation Considerations • DP Transmitters • Multi-Port Averaging Pitot • Oscillatory Flow Measurement • Ultrasonic Flow Measurement • Mass Flow Measurement*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Leak Detection*** *Introduction • API 1130 • A Theoretical or Practical Approach • Real Time Transient Model • Practical Example • Results • Conclusions*
0930 – 0945	*Break*
0945– 1100	***Loss Control Systems*** *Introduction • Custody Transfer Sampling • Case Studies • Examples of Delivery Malpractice*
1100 – 1230	***Monitoring and Controlling Production Losses*** *Introduction • General • Types of Leaks • Meter Proving • Conclusions*
1230 – 1245	*Break*
1245 – 1415	***Multiphase Metering*** *Introduction to Multi-phase Flowmetering • Multi-phase Flow • Measurement Principles*

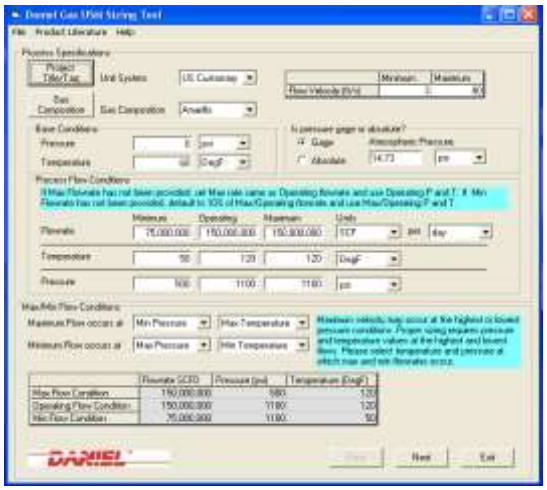
1415 – 1420	***Video Presentation*** *Multiphase Metering*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

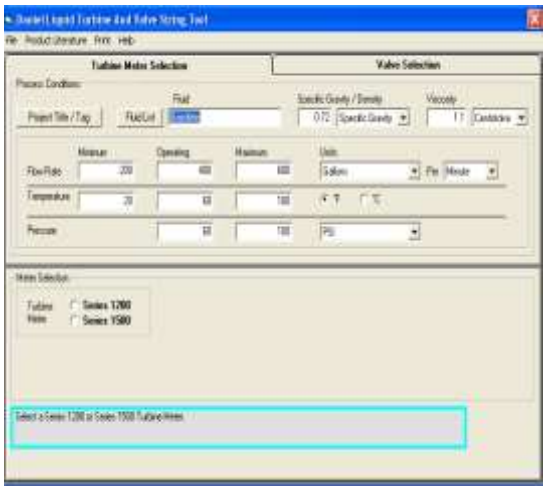
0730 – 0930	***API Standards*** *Introduction • API Gravity • Classification of Grades • Temperature Measurement • Measuring the Suspended S & W Content • Calculating Net Volume • Conclusions*
0930 – 0945	*Break*
0930 – 0945	***Flowmeter Selection and Costs*** *Initial Considerations • Meter Selection • Process Considerations • Cost Considerations*
0945 – 1100	***Case Study – Proving of LPG Meters*** *Introduction • Properties of LPG • Equipment • Benefits*
1100 – 1230	***Addendums*** *Ultrasonic Gas Flowmeter • Custody Transfer Contracts • Other Subjects*
1230 – 1245	*Break*
1245 – 1345	***Review & Wrap-up Session***
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulators (Hands-on Practical Sessions)

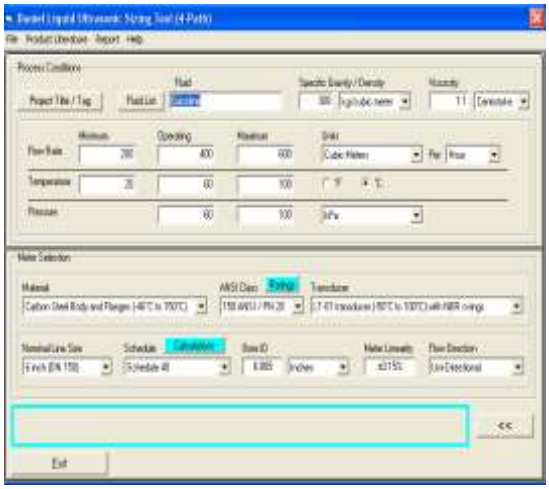
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art "Gas Ultrasonic Meter Sizing Tool", "Liquid Turbine Meter and Control Valve Sizing Tool", "Liquid Ultrasonic Meter Sizing Tool" and "Orifice Flow Calculator" simulators.



Gas Ultrasonic Meter (USM) Sizing Tool Simulator



Liquid Turbine Meter and Control Valve Sizing Tool Simulator



Liquid Ultrasonic Meter Sizing Tool Simulator

Orifice Flow Calculator Simulator

Course Coordinator

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