OPITO APPROVED STANDARD

Offshore Oil & Gas Industry

Transformation Scheme

Instrumentation Program Training Standard
The content of this document was developed by OPITO.

Guidance and advice on this training standard is available by contacting:

OPITO
Minerva House
Bruntland Road
Portlethen
Aberdeen
AB12 4QL

Tel: 01224 787800
E: standards.management@opito.com

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INTRODUCTION

The Transformation Scheme has been designed to assist the oil and gas industry meet its needs for recruiting core crew technicians. It is intended to deliver a reliable stream of process and maintenance technicians to offset increased demand, natural attrition and redeployment outside the UKCS.

The scheme will attract skilled workers into the industry who have gained knowledge and experience in other industries. They will receive the appropriate training to develop their existing skills and provide a foundation of knowledge and practice which would lead to further training within the industry allowing them to become a skilled worker in the oil and gas industry. The training content has been aligned as far as possible to the underpinning knowledge and understanding for the SVQ Level 2 in Process Engineering Maintenance.

In order for the scheme to be delivered consistently between training sites the OPITO Transformation Program standards were developed. These standards outline the twelve week program and provide the essential delivery criteria to ensure that delegates can apply their core discipline within the industry after completing required safety courses.

GLOSSARY

DCS   Distributed control systems
ESD   Emergency Shut Down
PTW   Permit to work
SECTION A TRAINING PROGRAM

A.1 Target Group

This instrumentation training standard has been developed for skilled workers who wish to use their prior instrumentation maintenance/installation skills in the offshore oil and gas industry.

A.2 Candidate Prior Achievement

Candidates wishing entry into the Transformation Program for Instrumentation Training should be an experienced instrumentation technician (Industrial/Armed Forces) qualified to N/SVQ Level 2 or 3 or equivalent in Instrumentation Maintenance/Installation.

Candidates should have a sound knowledge and understanding of health and safety procedures and practices within the instrumentation installation/maintenance industry.
A.3 Training Outcomes

Following a series of explanations, demonstrations and opportunities to practice, candidates will be assessed against the standards relating to the following training outcomes.

On completion of this training, candidates will be able to describe the principles of:

Week 1
  a) The principles and safe practice of the science and technology which supports hydrocarbon process operations

Week 2
  a) The principles and safe practice associated with the safety-critical processing environment in which working and communicating effectively with others is a key part

Week 3
  a) The principles of operation of PLC systems

Week 4
  a) The principles of process control as applied to operational plant

Week 5
  a) Principles of Distributed control systems, TDC systems and PC based systems

Week 6
  a) The principles of utilising electrical and instrumentation equipment in hazardous areas including testing and fault finding techniques

Week 7
  a) Plant shutdown, gas compressor and surge control systems

Week 8
  a) The principles of operation of condition and vibration monitoring equipment

Week 9
  a) The principle of operation of fire and gas detection systems

Week 10
  a) The principle of operation of typical valves used within the industry

Week 11
  a) The operation of flow and fiscal metering equipment

Week 12
  a) Testing as applied onsite; using the permit to work system, risk assessments and isolation certificates

Continued...
A.4 Training Outcomes continued…

On completion of this training, candidates should provide evidence that they have knowledge and understanding of:

Week 1
a) The science and technology that underpins hydrocarbon exploration and exploitation
b) The properties and behaviours of hydrocarbons
c) The science and technology that underpins hydrocarbon movement, storage and processing

Week 2
a) The safe working practices implemented on oil and gas facilities

Week 3
a) The use and selection of PLC systems for instrumentation applications

Week 4
a) Set up, calibrate, and maintain controllers and intelligent instrumentation

Week 5
a) Familiarity with DCS, TDC 3000 and PC based systems

Week 6
a) The installation and inspection of Ex Protected Equipment and decide on the best method of protection for a given situation

Week 7
a) Working with process plant, ESD systems and surge control equipment

Week 8
a) Techniques for condition and vibration monitoring

Week 9
a) Operate, test, calibrate and fault find on fire and gas detection systems

Week 10
a) Application of valves including inspection, overhaul, repair and calibration

Week 11
a) Trouble shooting on flow and metering proving equipment

Week 12
a) Fault finding, isolation, removal and reinstatement of instrumentation equipment
b) Preparing a PTW, risk assessment and isolation certificate
A.4 Training Program

The training program outlined below will assist candidates to meet the stated learning outcomes.

In order to make efficient use of time and ensure effective learning, the three phases of overview, demonstration and practice should be integrated wherever practical. **Full use should be made of visual/audio-visual aids, computer based training, videos and course hand-out materials.** Contents in Appendix 1 must be covered prior to course commencement.

The understanding and practice of **Health and Safety** procedures is an **ESSENTIAL** element of this course and should be an **integral part of the delivery** of ALL course outcomes.

The requirement for an Integrated Safe System of Work process incorporating risk assessments, permits to work and other relevant safety procedures and documentation should be incorporated into all relevant course topics.

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**WEEK 1 INTRODUCTION TO THE OIL & GAS INDUSTRY**

Instructors will provide an overview of:

- a) The properties and behaviours of hydrocarbons
- b) The exploration and exploitation of hydrocarbons
- c) The movement and storage of hydrocarbons
- d) The processing of hydrocarbons

Candidates will demonstrate their knowledge and understanding of the practice and application of:

- a) The science and technology that underpins hydrocarbon exploration
- b) The science and technology that underpins hydrocarbon exploitation
- c) The properties and behaviour of hydrocarbons
- d) The science and technology that underpins hydrocarbon movement and storage
- e) The science and technology that underpins hydrocarbon processing

**A combination of 90% theory to 10% practical is suggested for the topics in week 1.**
WEEK 2  PROCESS VARIABLE MEASUREMENTS

Instructors will provide an overview of:

a) National/International legislation (e.g. Health & Safety at Work Act, Control of Substances Hazardous to Health, Prevention of Fire Explosion and Emergency Response, Design and Construction Regulations, Safety Case etc)
b) Local rules and regulations (e.g. Safe Operating Procedures)
c) Safe Systems of Work
d) Permit to work systems, safe isolation and other appropriate safety documentation
e) Electrical safety
f) Electricity at Work Regulations and how they are applied in the industry
g) I.E.E. Wiring Regulations and how they operate in the industry
h) Legislation-PFEER, DCR and Safety Case
i) Environmental management (including waste management)
j) Response to emergencies and critical situations
k) How to work effectively with colleagues
l) How to communicate effectively with others
m) Personal Protection Equipment (PPE)
n) Gas testing principles
o) Fire & Gas detection and protection
p) Hydrogen Sulphide H2S awareness
q) Working at height
r) Manual handling awareness
s) Noise awareness
t) Norm Low Specific Activity (LSA)/scale awareness

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Identify the relevant rules and regulations applicable to the processing working environment
b) How and when to access and refer to the relevant rules and regulations regarding health, safety and the processing working environment
c) How the relevant rules and regulations should be interpreted and applied to the different aspects of processing operations
d) What would be the impact of compliance and non-compliance with the rules and regulations relevant to the processing working environment
e) The principles of establishing and maintaining effective working relationships with colleagues and others
f) The establishment and maintenance of effective working relationships with colleagues and others
g) The principles of effective communication with colleagues and others
h) Effective communication with colleagues and others

A combination of 90% theory to 10% practical is suggested for the topics in week 2.
WEEK 3  PLC SYSTEMS

Instructors will provide an overview of:

a) PLC systems

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Application of PLC systems (e.g. ESD/Fire & Gas systems & Process Control)
   b) Management of software (e.g. back-ups, downloads)

A combination of 20% theory to 80% practical is suggested for the topics in Week 3.

WEEK 4  PROCESS CONTROL

Instructors will provide an overview of:

a) Process Control theory
   b) Algorithm types (e.g. 3-term controllers, hi-lo selectors, ratio controllers etc)
   c) Loop tuning
   d) Surge control systems
   e) Hart/Fieldbus Instruments

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Setting up, calibrating and fault finding on pneumatic and electronic controllers
   b) Working with surge control equipment
   c) Use of intelligent instrumentation

A combination of 30% theory to 70% practical is suggested for the topics in week 4.
WEEK 5  DISTRIBUTED CONTROL SYSTEMS (DCS)

Instructors will provide an overview of:

a) Distributed control systems  
b) TDC 3000 system  
c) PC based systems  
d) Digital to Analog Converters (DACs)  
e) Analog to Digital Converters (ADCs)  
f) Communication protocols (e.g. OPC and Modbus)

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Working with distributed control systems  
b) TDC 3000 familiarisation exercises  
c) Applications of PC based systems  
d) Applications of DACs & ADCs  
e) Management of software (back-ups, downloads etc)

A combination of 20% theory to 80% practical is suggested for this three day section.

WEEK 6  INSTRUMENTATION EQUIPMENT IN HAZARDOUS AREAS

Instructors will provide an overview of:

a) The principles of utilising instrumentation equipment in hazardous areas  
b) Wiring systems and glands  
c) Testing and isolation procedures

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) The use of Explosion Protected Equipment including:  
   • The standards, certificates and markings  
   • The installation, inspection and maintenance of the listed methods of protection  
     Ex d, E e, Ex N, Ex p, Ex i (ia, ib & ic), Ex o, Ex q, Ex m  

b) Implementing Health and Safety Procedures

A combination of 50% to 50% practical is suggested for the topics in week 6.
WEEK 7  ESD SYSTEMS

Instructors will provide an overview of:

a) ESD systems and principles
b) Plant shutdown systems
c) Wellhead control and hydraulic systems
d) Gas compressor management/control
e) Gas turbine control systems
f) Subsea telemetry and hydraulic systems

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Working with process plant ESD systems
b) Working with Cause & Effect charts

A combination of 70% theory to 30% practical is suggested for topics in week 7.

WEEK 8  CONDITION MONITORING

Instructors will provide an overview of:

a) Condition monitoring principles
b) Vibration monitoring principles & equipment
c) Maintenance and fault finding using vibration monitoring
d) Earthing arrangements

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Condition monitoring techniques
b) Vibration monitoring techniques

A combination of 40% theory to 60% practical is suggested for the topics in week 8.
WEEK 9  FIRE AND GAS DETECTION SYSTEMS

Instructors will provide an overview of:

a) Principles of Fire and Gas detection  
b) Fire and Gas detection systems  
c) Wet deluge, waterspray, CO2 & Halon systems  
d) HVAC control and principles

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Applications of Fire and Gas detection systems  
b) Maintenance of Fire and Gas detection systems

A combination of 40% theory to 60% practical is suggested for the topics in week 9.

WEEK 10  VALVES

Instructors will provide an overview of:

a) Valve types, accessories and equipment  
b) Stripping valves

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Valve applications  
b) Valve strip down, inspection, repair and calibration  
c) PSV calibration

A combination of 30% theory to 70% practical is suggested for the topics in week 10.
WEEK 11  FLOW AND FISCAL METERING EQUIPMENT

Instructors will provide an overview of:

a) The operation of flow meters and fiscal metering equipment

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Flow meter applications
b) Fiscal metering techniques

A combination of 80% theory to 20% practical is suggested for the topics in week 11.

WEEK 12  ON-SITE TESTING – FAULT FINDING

Instructors will provide an overview of:

a) On-site testing
b) The permit to work system
c) Using risk assessments and hazard identification
d) Using isolation certificates

Candidates will demonstrate their knowledge and understanding of the practice and application of:

a) Writing a PTW, risk assessment and an isolation certificate
b) Isolation of instruments
c) P&ID drawing familiarisation and loop drawing familiarisation
d) Removal of instruments
e) Reinstatement of instruments
f) Fault Finding techniques

A combination of 25% theory to 75% practical is suggested for the topics in week 12.
A.5  Duration of Training

It is recommended that the Transformation Program Instrumentation training has a duration of 12 weeks.

The total training day includes:

- contact time
- refreshment and meal breaks
- travel between training sites where applicable

Contact time for candidates should not run consecutively for more than 2 hours without a refreshment break. The total contact time per day shall not exceed 8 hours and the total training day shall not exceed 10 hours.

A.6  Assessment

Candidates attending this training and assessment program will be given a series of explanations and demonstrations which will identify what they are expected to know and do.

Following the theory and demonstration elements there will be written examinations and practical tests allowing candidates to demonstrate their knowledge and understanding of the requirements for the offshore instrument technician’s role.

Assessments should be carried out over the duration of the course and the total assessment time should not be more than 20% of the entire contact time allocation for the program.

All assessments should be conducted under controlled and supervised conditions. Training providers should have a policy and procedure in place for dealing with persons not meeting the stated learning outcomes.
SECTION B RESOURCES

B.1 Staff

In order for a training program to be delivered successfully it is necessary to have appropriate people in presenting and supporting roles.

Training staff will:

- Have appropriate knowledge & experience
- Be trained in instructional/assessment techniques and/or have proven instructing/teaching experience
- Be included in an ongoing training and development program, which ensures they are aware and knowledgeable of all changes to legislation and industry requirements

B.2 Trainer/Candidate Ratio

The following ratios show the maximum number of candidates that should be taught by one instructor in the different aspects of the course.

The ratio shown for theory sessions indicates the maximum number of candidates that should attend the course in any one session.

Theory 1 : 12
Demonstrations 1 : 12

NOTE: Training providers should consider reducing the Trainer/Candidate ratio for practical activities particularly where there is an increased risk of injury to persons when circuits and/or equipment is being operated and/or tested under energised conditions i.e. ‘LIVE’.

B.3 Facilities

To ensure proper presentation and demonstration the training provider should provide a work space that will not be used simultaneously for any other activity and which includes:

**Theory training** area(s) with sufficient room to allow candidates to participate fully in group theory or syndicate paper exercises. Each candidate should be afforded ample space to be comfortable when carrying out theoretical exercises.

**Practical training** area(s) with adequate floor space and work tops for each candidate to participate fully in practical demonstrations and exercises.

**Safety Requirements**: it is the responsibility of the **training provider** to ensure that the health and safety of candidates, staff and other personnel is maintained at all times.
B.4 Equipment & Reference Material

The following equipment and reference material is required to meet the stated content of the training course.

- Examples of instrument diagrams and drawings, a permit to work form, a risk assessment and an isolation certificate
- Measuring transducers & instrument loops
- Ex Equipment
- ESD systems
- Surge control equipment
- Condition and vibration monitors
- Fire and gas systems
- Variety of valves for dismantling
- Flow meters
- Fiscal meters

NOTE: Electrical supplies for use within the delivery and assessment of the course should be of an appropriate ‘safe’ value, be protected by RCDs and be under the control of the trainer who is the ONLY person authorised to energise circuits and equipment after ensuring that it is safe to do so. The electricity supplies used to energise circuits and equipment during the delivery and assessment of this course should be controlled in such a way that it is not possible for them to be energised by any unauthorised person.

Due to the variety of forms, records, plans, schedules etc. used offshore the examples used for training purposes may differ from those found onsite. Training examples should represent the range of documents available and should be as typical and current as possible.

All equipment must be maintained, and where appropriate, inspected and tested in accordance with current standards/legislation.
B.5 Registration and Certification

Successful candidates completing the 12 week course will be issued with an OPITO endorsed certificate for the Transformation Scheme – Instrumentation Program. The issue of a certificate indicates that the delegate has achieved a level of competence to enable him/her to become an offshore instrumentation technician under supervision for further installation specific training and development.

The issue of the certificate indicates that the candidate has achieved the level of training as defined by the oil and gas industry and approved by OPITO. The details of each delegate will be registered on Vantage, the industry’s central recording data base.

It is the responsibility of the training provider to issue the delegates with a certificate containing the following:

a) Establishment Name  
b) Full OPITO Course Title & registration Code  
c) Delegate's Name  
d) Course Dates  
e) Unique Certificate Number (UCN) – Refer to OPITO UCN Guidance doc. for details  
f) Itemised Module Titles  
g) Establishment Signatory

Each individual attending any OPITO approved course must complete a central register form. The forms must be returned by the training establishment to OPITO within one week of the training delivery.

Please note: New training providers (to OPITO) will be required to send both the original (paper) registration forms, and the electronic registration until notified otherwise by Central Register.
Appendix 1 OPITO Information

The topics listed below are to be delivered as part of the introduction to this course and included in the Lesson Plans/Instructor guides/Exercise Plans. Additional introduction topics may include training centre layout and alarms, emergency actions, first aid and domestic arrangements.

Mandatory OPITO Information:

a) Medical Fitness
b) Certification Periods
c) CR/Vantage (provided by OPITO)
d) OPITO Customer Service Statement (provided by OPITO)
e) The roles of employers and training providers (provided by OPITO)
f) What is OPITO’s role in industry? (provided by OPITO)
g) Current Global Network of training providers (provided by OPITO)
h) Emergency Response Framework (provided by OPITO – applicable for ER Training Providers)