

Technical Training Synopsis



Hydratight will ensure all personnel who are responsible for the assembly of bolted connections on critical service pressurized systems are trained and assessed in line with the procedures detailed within EN1591-:2013.

Our training programmes follow a four stage model for achieving and managing the competence of individuals involved in Joint Integrity Assurance™ activities and particularly those expected to undertake these duties in the workplace.

A blended learning approach is delivered, accommodating a full range of learning styles via a combination of technical theory, hands-on practical exercises and interactive online knowledge testing.



Hydratight is a leading and preferred training provider to major operators, contractors and training management service companies due to our extensive field service experience, subject matter expertise in Joint Integrity Assurance™ and the occupational experience of our Training Instructors.

Key benefits to learners and employers include the achievement of industry recognised and transferrable certification via a highly commended training provider, reducing risk, increasing safety and preventing the loss of containment.



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EN1591-4 Overview:

The competence of bolting technicians is a key factor in the safe operation of a system containing pressurised bolted connections and in the achievement of the highest performance from a pressurised bolted connection.

Design codes for pressurised bolted connections such as **EN 1591-1** require controlled bolt tightening activities to be performed by competent bolting technicians in order to meet the specified bolt load tolerances required and, where appropriate, achieve the specified tightness requirement.

Training and competence, experience and knowledge are however often confused with each other.

- Training is no guarantor of competence.
- Experience is no guarantor of knowledge and understanding.
- Training, experience, and assessment of the ability to apply knowledge are all required to achieve competence.

The essential elements that have to be acquired to achieve competency are:

- Theoretical knowledge combined with practical experience gained on site or by simulated workshop activities.
- Assessment by a competent assessor to verify that the required knowledge, skill and ability has been gained and can be applied in accordance with an operating procedure.

EN 1591-4:2013 - Flanges and their joints. Qualification of personnel competency in the assembly of the bolted connections of critical service pressurized systems was published on 31st August 2013.

This European Standard applies to all personnel who dismantle, assemble and tighten bolted joints on pressurised systems in critical service.

Modular training programs and evaluation process to determine competence as listed below:

1. Foundation Level (Manual torque tightening)
2. Bolt tensioning
3. Hydraulic torque tightening
4. Heat exchangers & pressure vessels
5. Flanges made of brittle materials
6. Bolt load measurement
7. Compact flanges
8. Clamp connectors
9. Special connectors
10. Small bore tubing connections



Route to Competence:

Individuals who have received documented practical and theoretical training as part of an apprenticeship or similar craft based training can proceed directly to assessment. A failed assessment will require the individual to attend training prior to re-assessment.

Individuals who have acquired skills only by on the job practical learning shall undergo training prior to assessment.

Competence assessment consists of two parts:

- Theoretical question paper
- Practical assessment

Trainer and Assessor must be different people.

Experience:

Experience period is not defined within the standard. Hydratight recommends that a period of workplace experience is completed and recorded after training and assessment is attended within 3 to 12 months of training.

Maintenance of Qualifications:

Maintenance and renewal of each qualification is required every 5 years.

Certification:

Training certification is issued upon successful completion of training.

Competence certification begins on the date that the competency examinations have been passed.

Competence certification is then valid for 5 years provided the below conditions are fulfilled:

- There shall be no interruption in bolted flange work for a period exceeding 6 months.
- There are no specific reasons to question the ability, skill or knowledge of the bolting technician.
- **Note:** If either of the above conditions are not met, the certification shall be withdrawn.

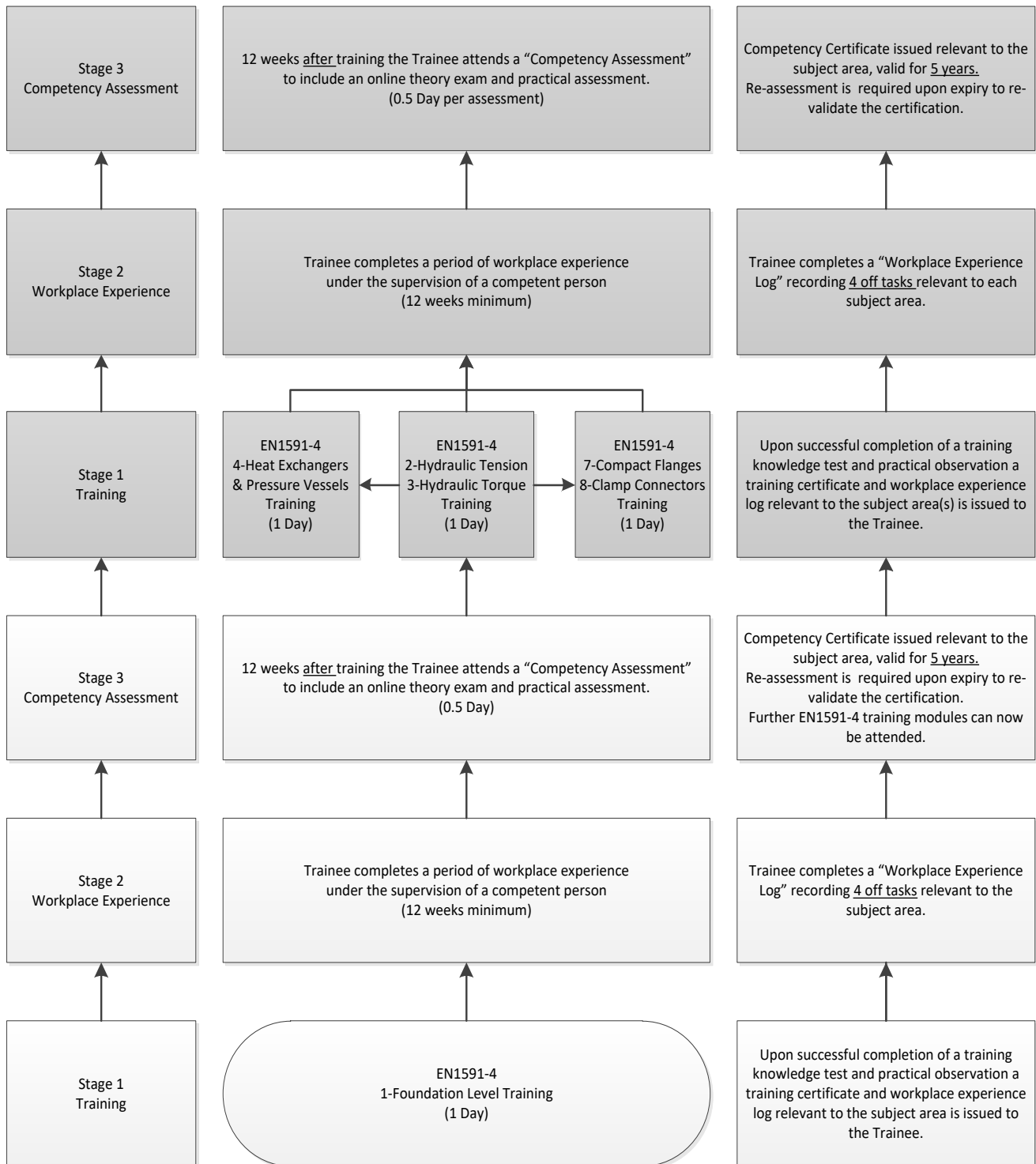
Certification to this European Standard provides an attestation of general competency in accordance with the stated syllabi and assessments.

Certification to this European Standard does not represent an authorisation to operate, since this remains the responsibility of the employer, and the certified person may require additional specialised knowledge of employer-specific procedures, processes and equipment.

Pre-requisites:

Foundation Level competency is required before attendance of additional training courses.

EN1591-4 Route to Competency Flowchart:



Training Course Synopsis

Course Title:

- EN1591-4 Flanges and their Joints - Foundation Level (1)

Course Summary

- Published on 31st August 2013 this European Standard applies to all personnel who dismantle, assemble and tighten bolted joints on pressurised systems in critical service.
- Modular training programs and evaluation process to determine competence in the areas detailed below.
- Foundation Level competency is required before attendance of additional training courses.
- Hydratight recommends that a period of workplace experience is completed after training and assessment is attended within 3 to 12 months of training.

Certification

- Hydratight EN1591-4 Training Certification
- Hydratight EN1591-4 Certificates of Competency - 5 years validity

Course Duration

- 1 Day

Course Content

- Types of bolted connections
- Functionality of gaskets
- Types of gaskets and their relative features
- Relationship between bolt elongation (strain), bolt load and gasket stress
- Common causes of the failure of gasketed bolted connections
- Bolt load loss and implications
- Applied and residual bolt loads
- General health and safety precautions
- Safe joint disassembly
- Seal face preparation
- Identification of defects and faults
- Face alignment and gap uniformity
- Gasket storage, handling, preparation and placement
- Effect of thread friction on load when using torque tightening
- Importance of using the specified thread lubricant
- Bolt tightening methods and their relative accuracies
- The need for bolt tightening patterns
- Bolt tightening patterns
- Tightness level
- Requirement to meet a specific class of tightness
- Manual torque tightening
- Maintenance and calibration of manual torque wrenches
- Requirements for hydraulic torquing and tensioning
- Confirming that joint can return to service
- Recording of work carried out
- Reporting of variance or irregularity
- Emission monitoring and leakage management

Pre- requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting , mechanic, millwright, boilermaker and engineering craftsman trades

PPE Requirements

- Safety footwear & coveralls
- Eye & ear protection
- Gloves

Training Course Synopsis

Course Title:

- EN1591-4 Flanges and their Joints – Hydraulic Tension Tightening (2)

Course Summary

- Published on 31st August 2013 this European Standard applies to all personnel who dismantle, assemble and tighten bolted joints on pressurised systems in critical service.
- Modular training programs and evaluation process to determine competence in the areas detailed below.
- Foundation Level competency is required before attendance of additional training courses.
- Hydratight recommends that a period of workplace experience is completed after training and assessment is attended within 3 to 12 months of training.

Certification

- Hydratight EN1591-4 Training Certification
- Hydratight EN1591-4 Certificates of Competency - 5 years validity

Course Duration

- 1 Day

Course Content

- Permanently installed hydraulic tensioning nuts
- Fundamentals of hydraulic tensioning
- Understanding when to use hydraulic tensioning equipment
- Types of hydraulic tensioners
- Methods of hydraulic tensioning
- Maintenance of pump and hydraulic tensioner
- Calibration of hydraulic tensioners
- Hose configuration
- Methods of calculating correct bolt load and associated formulae
- Understanding gross load/residual bolt load
- Number of hydraulic tensioners, percentage cover and effect on load loss
- Hydraulic tensioning pressure/load conversion
- Hydraulic tensioning procedures
- Hydraulic tensioning tightening patterns
- Tool fit and clearance issues
- Bolt coatings and their effect on thread security in both nut and puller sleeve

Pre- requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermaker and engineering craftsman trades

PPE Requirements

- Safety footwear & coveralls
- Eye & ear protection
- Gloves

Training Course Synopsis

Course Title:

- EN1591-4 Flanges and their Joints – Hydraulic Torque Tightening (3)

Course Summary

- Published on 31st August 2013 this European Standard applies to all personnel who dismantle, assemble and tighten bolted joints on pressurised systems in critical service.
- Modular training programs and evaluation process to determine competence in the areas detailed below.
- Foundation Level competency is required before attendance of additional training courses.
- Hydratight recommends that a period of workplace experience is completed after training and assessment is attended within 3 to 12 months of training.

Certification

- Hydratight EN1591-4 Training Certification
- Hydratight EN1591-4 Certificates of Competency - 5 years validity

Course Duration

- 1 Day

Course Content

- Safe use and handling of hydraulic hoses
- Correct socket usage, wear/damage of sockets
- Risk of pressure injection injuries – avoidance and action
- Good working practices to avoid finger/hand pinch points
- Safe use of a backing wrench
- Types of hydraulic torque wrenches
- Selection of tool pressures to provide required torque for a particular tool
- Use of single and multiple tools to tighten a joint
- Numbering of bolts when single and multiple tools are used
- Understanding when to use hydraulic torque equipment
- Fundamentals of hydraulic torqueing
- Tool fit and clearance issues
- Identifying good reaction points
- Torque tightening patterns
- Importance of lubrication and control of friction
- Effects of bolt coatings

Pre- requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting , mechanic, millwright, boilermaker and engineering craftsman trades

PPE Requirements

- Safety footwear & coveralls
- Eye & ear protection
- Gloves

Training Course Synopsis

Course Title:

- EN1591-4 Flanges and their Joints – Heat Exchangers & Pressure Vessels (4)

Course Summary

- Published on 31st August 2013 this European Standard applies to all personnel who dismantle, assemble and tighten bolted joints on pressurised systems in critical service.
- Modular training programs and evaluation process to determine competence in the areas detailed below.
- Foundation Level competency is required before attendance of additional training courses.
- Hydratight recommends that a period of workplace experience is completed after training and assessment is attended within 3 to 12 months of training.

Certification

- Hydratight EN1591-4 Training Certification
- Hydratight EN1591-4 Certificates of Competency - 5 years validity

Course Duration

- 1 Day

Course Content

- Types of exchanger/TEMA designations
- Interaction of seals during assembly
- Gasket types
- Confined gaskets
- Handling and storage of gaskets
- Bolting load requirements
- Joint configuration and terminology
- Flange surface inspection
- Gap measurement
- Bundle and channel orientation
- Damage risks
- Tube sheet considerations
- Tightening shoulder type bolts
- Alignment of primary and secondary seals prior to tightening
- Tightening method preference relative to bolt length and tool access

Pre- requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting , mechanic, millwright, boilermaker and engineering craftsman trades

PPE Requirements

- Safety footwear & coveralls
- Eye & ear protection
- Gloves

Training Course Synopsis

Course Title:

- EN1591-4 Flanges and their Joints – Compact Flanges (7)

Course Summary

- Published on 31st August 2013 this European Standard applies to all personnel who dismantle, assemble and tighten bolted joints on pressurised systems in critical service.
- Modular training programs and evaluation process to determine competence in the areas detailed below.
- Foundation Level competency is required before attendance of additional training courses.
- Hydratight recommends that a period of workplace experience is completed after training and assessment is attended within 3 to 12 months of training.

Certification

- Hydratight EN1591-4 Training Certification
- Hydratight EN1591-4 Certificates of Competency - 5 years validity

Course Duration

- 0.5 Day

Course Content

- Compact flange types
- Assembly requirements for each type of compact flange
- Identification of seal ring types and materials
- Bolt load determination
- Tightening methods
- Tightening patterns
- Inspection of components pre-assembly
- Inspection of flange post assembly
- Gap measurement
- Safe disassembly of compact flanges

Pre- requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting , mechanic, millwright, boilermaker and engineering craftsman trades

PPE Requirements

- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves

Training Course Synopsis

Course Title:

- EN1591-4 Flanges and their Joints – Clamp Connectors (8)

Course Summary

- Published on 31st August 2013 this European Standard applies to all personnel who dismantle, assemble and tighten bolted joints on pressurised systems in critical service.
- Modular training programs and evaluation process to determine competence in the areas detailed below.
- Foundation Level competency is required before attendance of additional training courses.
- Hydratight recommends that a period of workplace experience is completed after training and assessment is attended within 3 to 12 months of training.

Certification

- Hydratight EN1591-4 Training Certification
- Hydratight EN1591-4 Certificates of Competency - 5 years validity

Course Duration

- 0.5 Day

Course Content

- Clamp connector types
- Assembly requirements for each type of connector
- Identification of seal rings and materials
- Bolt stress and bolt load determination
- Tightening method
- Tightening patterns
- Inspection of components pre-assembly
- Inspection of connectors post assembly
- Safe disassembly of clamp connectors

Pre- requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting , mechanic, millwright, boilermaker and engineering craftsman trades

PPE Requirements

- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves