



Hydratight – Integrity Assurance Series

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Course Title

- Hydratight Integrity Assurance
 - o **HT10 Flange Joint Integrity and Hand Torque Tightening**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 1 Day
- 1.5 Day course option when combined with HT19
- 2.5 Day course option when combined with HT18 & HT19

Class Size

- Maximum 6 delegates

Course Content

- Types of flanges
- Behaviour of studbolts when tightened
- The importance of the correct residual bolt load
- Sealing and Mechanical Joints
- Gaskets, seal rings and surface finishes
- The correct assembly of flange and 4-bolt clamp components
- Effects of misalignment
- Torque tightening theory
- Equipment safety
- Component identification
- Practical use of equipment hand torque equipment
- Joint breakout/disassembly using hand torque wrenches
- Tool maintenance



Course Title:

- Hydratight Integrity Assurance
 - o **HT18 Flange Joint Integrity and Hydraulic Bolt Tensioning**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 1 Day
- 2.5 Day course option when combined with HT10 & 19

Class Size

- Maximum 6 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Behaviour of Studbolts when tightened
- Sealing and mechanical joints
- Gaskets for sealing applications
- Gaskets and seal ring types
- Types of bolted flange and clamped connections
- The importance of correct residual bolt load
- Effects of misalignment
- Inspection and surface finish requirements
- The correct assembly and disassembly of bolted flanged and clamped connections
- Equipment component identification
- Practical use of bolt tensioning equipment
- Joint breakout/disassembly using bolt tensioning equipment
- Basic Tool maintenance



Course Title:

- Hydratight Integrity Assurance
 - o **HT19 Flange Joint Integrity and Hydraulic Torque Tightening**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 1 Day
- 1.5 Days when combined with HT19
- 2.5 Day course option when combined with HT18

Class Size

- Maximum 6 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Behaviour of Studbolts when tightened
- Sealing and mechanical joints
- Gaskets for sealing applications
- Gaskets and seal ring types
- Types of bolted flange and clamped connections
- The importance of correct residual bolt load
- Effects of misalignment
- Inspection and surface finish requirements
- The correct assembly and disassembly of bolted flanged and clamped connections
- Equipment component identification
- Practical use of hydraulic torque equipment
- Joint breakout/disassembly using hydraulic torque equipment
- Basic tool maintenance

Pre- requisites

- Completion of HT10 Flange Joint Integrity and Hand Torque Tightening training.



Course Title:

- Hydratight Integrity Assurance
 - o **HT11 Clamp Joint Integrity & Hand Torque Tightening**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 0.5 Day
- 1 Day course option when combined with HT12

Class Size

- Maximum 6 delegates

Course Content

- Safe working practices
 - o Regulations
 - o Risk assessment and permit to work
- Prepare work area and equipment for clamp connector bolted joint integrity operations
 - o Specifications
 - o Types of equipment
 - o Components and materials
 - o Safety arrangements
 - o Equipment and material preparation
- Perform clamp connector bolted joint integrity operations
 - o Disassembly, inspection, alignment, assembly and tightening using hand torque tightening equipment.
 - o Quality assurance
- Reinstate work area upon completion of clamp connector bolted joint integrity operations
 - o Reinstate work area
 - o Material and equipment storage
 - o Documentation

Pre-requisites

- Completion of HT10 Flange Joint Integrity and Hand Torque Tightening training.



Course Title:

- Hydratight Integrity Assurance
 - o **HT12 Clamp Joint Integrity & Hydraulic Torque Tightening**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 0.5 Day
- 1 Day course option when combined with HT11

Class Size

- Maximum 6 delegates

Course Content

- Safe working practices
 - o Regulations
 - o Risk assessment and permit to work
- Prepare work area and equipment for clamp connector bolted joint integrity operations
 - o Specifications
 - o Types of equipment
 - o Components and materials
 - o Safety arrangements
 - o Equipment and material preparation
- Perform clamp connector bolted joint integrity operations
 - o Disassembly, inspection, alignment, assembly and tightening using hydraulic torque tightening equipment.
 - o Quality assurance
- Reinstate work area upon completion of clamp connector bolted joint integrity operations
 - o Reinstate work area
 - o Material and equipment storage
 - o Documentation

Pre-requisites

- Completion of HT19 Flange Joint Integrity and Hydraulic Torque Tightening training.



Hydratight Integrity Assurance Series - eLearning Courses



Introduction to Bolted Joint Integrity



Introduction to Torque Tightening



Introduction to Bolt Tensioning



Introduction to Bolted Joint Integrity - Combo

Hydratight Integrity Assurance courses can be followed up with hands-on practical instructor led training for individuals who are required to carry out bolted joint integrity tasks in the workplace.

These courses cover the health, safety, quality and technical knowledge learning objectives relevant to the disassembly, inspection, assembly and tightening of flange and clamp connections.

Introduction to Bolted Joint Integrity completion is a pre-requisite prior to enrolment on torque tightening and/or bolt tensioning courses and application for hands-on practical training.

Contact eLearning@hydratight.com to enrol on Hydratight Academy Integrity Assurance eLearning courses and local delivery options for follow up hands-on practical training

**Course Title:**

- Hydratight On-Site Machining
 - o **HT25 Basic Pipe-Cutting and End Prepping**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 2 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment
 - o Machining of various size diameters of pipework with differing wall thickness to include the use of various machine tools
 - o Use of outside and internal bore mounted machines
 - o Straight pipe cuts on pipework, all diameters and maximum wall thickness 2"/50mm.
 - o Carry various end preps 37-degree profile, small compound bevel, small "J" prep.
 - o Carry out match/counter bores operations
 - o Carry out outside diameter machining of pipework
- Practical use of various tool slides, boring attachments and tooling to carry out additional prep/bore profiles:
 - o Standard "V" prep
 - o Multi angle "J" prep
 - o Compound bevel "single point cutting"
 - o Match/Counter bores
- Instruction and practice in the selection and grinding of:
 - o Parting blades
 - o Form tools
 - o Single point cutting tools
 - o Carbide index tip tools
- Reporting and Quality Assurance

Pre-requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner

**Course Title:**

- Hydratight On-Site Machining
 - o **HT26 Advanced Pipe-Cutting, End Prepping and Weld Excavation**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 4 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment
 - o Machining of various size diameters of pipework with differing wall thickness to include the use of various machine tools
 - o Straight pipe cuts on pipework, all diameters and wall thickness
 - o Carry out match/counter bore.
 - o Carry out multi angle "J" prep.
 - o Carry out outside diameter machining of pipework.
 - o Single and multi-angle weld excavation, all diameters and wall thickness including removal of heat affected zone (HAZ)
- Practical use of various tool slides, boring attachments and tooling to carry out additional prep/counter bore/excavation profiles:
 - o Standard "V" prep
 - o Multi angle "J" prep
 - o Compound bevel "single point cutting"
 - o Match/Counter bores
- Instruction and practice in the selection and grinding of:
 - o Parting blades
 - o Form tools
 - o Single point cutting tools
- Overview of weld identification methods:
 - o Weld etching (Acid method)
 - o Magnetic Particle Testing (MPI) & Dye Penetration
- Reporting and Quality Assurance

Pre-requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner
- HT25 – Basic Pipe Cutting and End Prepping



Course Title:

- Hydratight On-Site Machining
 - o **HT27 Basic Flange Facing**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 2 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment
 - o Machining of various size diameters of flanges to include the use of various machine tools
 - o Flat and raised face applications
 - o Inside and outside mount machine tools
 - o Excluding exchanger channel or tubesheet applications
 - o Instruction in the use of dial test indicator (DTI)
- Overview of various tool slides, boring attachments and tooling to carry out additional profiles:
- Instruction and practice in the selection and grinding of:
 - o Single point cutting tools
 - o Carbide index tip tools
- Reporting and Quality Assurance

Pre- requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner

**Course Title:**

- Hydratight On-Site Machining
 - o **HT28 Advanced Joint Facing**

Course Summary

- A portfolio of modular Joint Integrity courses based upon Hydratight's best practice internal Competency Assurance Management System with Hydratight certification.

Certification

- Hydratight Certification
- Training Certificates – 3 years validity
- Qualification Certificates - 3 years validity

Course Duration

- 3 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment
 - o Machining of various size diameters of flanges to include the use of various machine tools
 - o Ring type joints and 4 bolt clamp/hub connections
 - o Inside and outside mount machine tools
 - o Various tool slides, boring attachments, back facing heads, extensions and tooling to carry out additional joint profiles
 - o Instruction in the use of dial test indicator (DTI) outside micrometer, vernier callipers and depth micrometer
 - o Instruction in the use of ball trammel groove/angle measuring equipment
 - o Manufacturer technical data sheets
- Instruction and practice in the selection and grinding of:
 - o Straight single point cutting tools
 - o Right and left hand cranked single point cutting tools
 - o Carbide index tip tools
- Reporting and Quality Assurance

Pre-requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner
- HT27 - Basic Flange Facing



Course Title:

- ECITB Mechanical Joint Integrity
 - o **MJI10 Hand Torque Bolted Connection Techniques**

Course Summary

- One of three modular mechanical joint integrity training courses derived from ECITB technical training standards covering isolation, dismantling techniques, component inspection, alignment, assembly and hand torque tightening of flanged and clamped connections delivered by an ECITB Approved Training Provider and Tutor.

Certification

- ECITB Training and Technical Test Certification
- Training Certificates - 12 months validity for technical test application purposes
- Technical Test Certificates - 3 years validity

Course Duration

- 1 Day
- 1.5 Day course when combined with MJI19
- 2.5 Day course when combined with MJI18 & MJI19

Class Size

- Maximum 6 delegates

Course Content

- This unit specifies the skilled performance expected of persons trained to dismantle, inspect, prepare, assemble and tighten flanged and clamp connector pipe joints using hand torque equipment
- Health and Safety
- Instruction and practice in observing health and safety requirements and approved working practices.
- Prepare work areas for the preparation and tightening of flanged and clamp connector pipe joints
- Prepare equipment for the preparation and tightening of flanged and clamp connector pipe joints
- Prepare materials for the preparation and tightening of flanged and clamp connector pipe joints
- Dismantle, inspect, prepare, assemble and tighten flanged and clamp connector pipe joints
- Reinstate the work area after the preparation and tightening of flanged and clamp connector pipe joints

Related Technical Tests

- TMJI10 Dismantle, Assemble and Hand Torque Flanged Joints
- TMJI11 Dismantle, Assemble and Hand Torque Clamp Connectors



Course Title:

- ECITB Mechanical Joint Integrity
 - o **MJI18 Hydraulically Tension Bolted Connection Techniques**

Course Summary

- One of three modular mechanical joint integrity training courses derived from ECITB technical training standards covering isolation, dismantling techniques, component inspection, alignment, assembly and hydraulic bolt tensioning of flanged connections delivered by an ECITB Approved Training Provider and Tutor.

Certification

- ECITB Training and Technical Test Certification
- Training Certificates - 12 months validity for technical test application purposes
- Technical Test Certificates - 3 years validity

Course Duration

- 1 Day
- 2.5 Day course when combined with MJI19

Class Size

- Maximum 6 delegates

Course Content

- This unit specifies the skilled performance expected of persons trained to dismantle, inspect, prepare, assemble and tighten bolted connections using hydraulic tensioning equipment.
- Health and Safety
- Instruction and practice in observing health and safety requirements and approved working practices
- Prepare work area for the assembly and tightening of bolted connections using hydraulic tensioning equipment
- Prepare equipment for the assembly and tightening of bolted connections using hydraulic tensioning equipment
- Prepare materials for the assembly and tightening of bolted connections using hydraulic tensioning equipment
- Assemble bolted connections
- Tighten bolts using hydraulic tensioning equipment
- Check integrity of assembled bolted connection
- Reinststate the work area after the assembly and tightening of bolted connections using hydraulic tensioning

Related Technical Test

- TMJI18 Dismantle, Assemble and Tensioning Bolted Connections



Course Title:

- ECITB Mechanical Joint Integrity
 - o **MJI19 Hydraulically Torque Bolted Connection Techniques**

Course Summary

- One of three modular mechanical joint integrity training courses derived from ECITB technical training standards covering isolation, dismantling techniques, component inspection, alignment, assembly and hydraulic torque tightening of flanged and clamped connections delivered by an ECITB Approved Training Provider and Tutor.

Certification

- ECITB Training and Technical Test Certification
- Training Certificates - 12 months validity for technical test application purposes
- Technical Test Certificates - 3 years validity

Course Duration

- 1 Day (Valid MJI10 training certificate within 12 months or TMJI10 technical test certificate required)
- 1.5 Days course when combined with MJI10
- 2.5 Day course when combined with MJI18

Class Size

- Maximum 6 delegates

Course Content

- This unit specifies the skilled performance expected of persons trained to dismantle, inspect, prepare, assemble and tighten flanged and clamp connector pipe joints using hydraulic torque equipment.
- Health and Safety
- Instruction and practice in observing health and safety requirements and approved working practices.
- Prepare work area for the assembly and tightening of bolted connections using hydraulic torque equipment
- Prepare equipment for the assembly and tightening of bolted connections using hydraulic torque equipment
- Prepare materials for the assembly and tightening of bolted connections using hydraulic torque equipment
- Assemble bolted connections
- Tighten bolts using hydraulic torque equipment
- Check integrity of assembled bolted connection
- Reinststate the workplace after the assembly and tightening of bolted connections using hydraulic torque equipment

Related Technical Tests

- TMJI19 Dismantle, Assemble and Hydraulically Torque Flanged Joints
- TMJI20 Dismantle, Assemble and Hydraulically Torque Clamp Connector Joints



ECITB Mechanical Joint Integrity eLearning Courses



Hand Torque Bolted Connection Techniques (MJ10E)



Hydraulically Tension Bolted Connection Techniques (MJ18E)



Hydraulically Torque Bolted Connection Techniques (MJ10/19E)



Hydraulically Torque & Tension Bolted Connection Techniques (MJ10/18/19E)

ECITB approved MJIE eLearning courses can be completed as a refresher training option up to 4 weeks before attendance of technical testing or within 4 weeks prior to attending MJIB blended learning practical training.

These courses are derived from the ECITB mechanical joint integrity technical training standards and cover the learning objectives and key learning points relevant to the disassembly, inspection, assembly and tightening of flange and clamp connections.

Contact eLearning@hydratight.com to enrol on Hydratight Academy ECITB MJIE eLearning courses and local delivery options for blended learning practical training.



Course Title:

- ECITB On-Site Machining
 - o **OSM 01 – On-Site Cutting and Weld Preparation**

Course Summary

- One of five modular on-site machining training courses derived from ECITB technical training standards covering in-situ machining techniques in cutting and weld preparation of pipework using portable machine tools delivered by an ECITB Approved Training Provider and Tutor.

Certification

- ECITB Training and Technical Test Certification
- Training Certificates - 12 months validity for technical test application purposes
- Technical Test Certificates - 3 years validity

Course Duration

- 2 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment to include:
 - o Machining of various size diameters of pipework with differing wall thickness to include the use of various machine tools
 - o Straight pipe cuts on pipework, all diameters and wall thickness
 - o Carry out match/counter bore operations
 - o Carry various end preps single, multi angle and “J” prep.
 - o Carry out outside diameter machining of pipework
- Practical use of various tool slides, boring attachments and tooling to carry out additional prep/counter bore/excavation profiles:
 - o Standard “V” prep
 - o Multi angle “J” prep
 - o Compound bevel “single point cutting”
 - o Match/Counter bores
- Instruction and practice in the selection and grinding of:
 - o Parting blades
 - o Form tools
 - o Single point cutting tools
- Reporting and Quality Assurance

Pre- requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner

Related Technical Test

- TOSM 01 - On-Site Cutting and Weld Preparation

**Course Title:**

- ECITB On-Site Machining
 - o **OSM 02 – On-Site Joint Face Machining – Full & Raised Face Flanges**

Course Summary

- One of five modular on-site machining training courses derived from ECITB technical training standards covering in-situ machining techniques in facing of flat and raised face flange joints using portable machine tools delivered by an ECITB Approved Training Provider and Tutor.

Certification

- ECITB Training and Technical Test Certification
- Training Certificates - 12 months validity for technical test application purposes
- Technical Test Certificates - 3 years validity

Course Duration

- 2 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Interpretation of manufacturer technical data sheets
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment to include:
 - o Machining of various size diameter flanges to include the use of various machine tools
 - o Cutting, boring and forming processes
 - o Flat and raised face applications
 - o Back facing operations
 - o Internal and external mount machine tools
 - o Internal and external collets and hubs
 - o Measuring devices to include, dial test indicator, micrometers and vernier calipers
- Overview of various tool slides, boring attachments and tooling to carry out additional profiles including:
 - o Internal and external diameters
 - o Shoulders, faces and chamfers
- Instruction and practice in the selection and grinding of:
 - o Single point cutting tools
 - o Carbide index tip tools
- Reporting and Quality Assurance

Pre-requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner

Related Technical Test

- TOSM 02 - On-Site Joint Face Machining – Full & Raised Face Flanges



Course Title:

- ECITB On-Site Machining
 - o **OSM 04 - On-Site Milling**

Course Summary

- One of five modular on-site machining training courses derived from ECITB technical training standards covering in-situ machining techniques in milling of pump bed applications using portable machine tools delivered by an ECITB Approved Training Provider and Tutor.

Certification

- ECITB Training and Technical Test Certification
- Training Certificates - 12 months validity for technical test application purposes
- Technical Test Certificates - 3 years validity

Course Duration

- 2 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Interpretation of manufacturer technical data sheets
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment to include:
 - o Milling of surfaces using air, hydraulic and electric driven milling beds, multi axis rails and key mill tools to include:
 - Pump motor beds and shafts
 - o Cutting tools and ancillary equipment to include:
 - Slot drills and end mills
 - Face mills and fly cutters
 - International tapers
 - o Mounting methods to include:
 - Chucks, clamps and vices
 - Vee block and chain
 - Magnetic and vacuum chucks
 - G clamps, rack clamps and finger clamps
 - Welding
 - o Measuring devices to include, dial test indicator, micrometers, Vernier calipers, Go/No Go gauges, slip gauges and shims
- Instruction and practice in the selection and grinding of:
 - o Slot drills
 - o End mills
 - o Fly cutters
 - o Carbide inserts
- Reporting and Quality Assurance

Pre-requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner

Related Technical Test

- TOSM 04 - On-Site Milling



Course Title:

- ECITB On-Site Machining
 - o **OSM 05 - On-Site Joint Face Machining – RTJ Flanges & Clamp Connector Hubs**

Course Summary

- One of five modular on-site machining training courses derived from ECITB technical training standards covering in-situ machining techniques in facing of ring type joint flange, clamp connector hub sealing faces using portable machine tools delivered by an ECITB Approved Training Provider and Tutor.

Certification

- ECITB Training and Technical Test Certification
- Training Certificates - 12 months validity for technical test application purposes
- Technical Test Certificates - 3 years validity

Course Duration

- 3 Days

Class Size

- Maximum 4 delegates

Course Content

- Instruction and practice in observing health and safety requirements and approved working practices
- Equipment safety and safety valve operation
- Types of tools and methods
- Inspection, measurement and drawing interpretation
- Interpretation of manufacturer technical data sheets
- Equipment component identification
- Equipment and cutting tool selection
- Basic tool maintenance
- Practical Use of Equipment to include:
 - o Machining of various size diameter connections to include the use of various machine tools
 - o Cutting, boring and forming processes
 - o Ring type joint flanges and clamp connector hub sealing faces
 - o Internal and external mount machine tools
 - o Measuring devices to include, dial test indicator, micrometers, Vernier calipers, shoulder Vernier caliper, Vernier bevel protractor, ball trammels and bows
- Overview of various tool slides, boring attachments, back facing heads, extensions and tooling to carry out additional joint profiles including:
 - o Internal and external diameters
 - o Shoulders, faces and chamfers
 - o Radii, grooves and tapers
- Instruction and practice in the selection and grinding of:
 - o Straight single point cutting tools
 - o Right and left hand cranked single point cutting tools
 - o Carbide index tip tools
- Reporting and Quality Assurance

Pre-requisites

- Preferred relevant previous machining as a toolmaker, turner, fitter/turner
- OSM 02 - On-Site Joint Face Machining – Full & Raised Face Flanges

Related Technical Test

- TOSM 05 - On-Site Joint Face Machining – RTJ Flanges & Clamp Connector Hubs



Course Title:

- ASME PCC-1 Appendix A
 - o **Training of Fundamentals & Piping**

Course Summary

- This course is one of four standard training modules as specified within the ASME PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint Assembly and its Appendix A specific to the training, qualification, and certification of joint assembly personnel.
- The course will deliver a thorough understanding of bolted flange joint disassembly, assembly and tightening techniques using hand torque tightening equipment.

Certification

- Hydratight Certification
- Training Certificates – Open validity
- Qualification Certificates – 3 years validity

Course Duration

- 2 Days

Class Size

- Maximum 6 delegates

Course Content

- General health & safety precautions
- General personal joint assembly equipment requirements
- The principles of bolt elongation, bolt load, and gasket stress
- Functionality of gasket and seal
- Gasket types and their limitations
- Bolt types and their limitations
- Identification of correct joint components
- Manual torque joint tightening
- The importance of using the specified lubricant
- Techniques used for load control
- Calibration and maintenance of bolt tightening equipment
- Inspection and reporting defects or faults
- Procedure for preparing a joint for closure
- Gasket handling, preparation, and installation
- Sources of information on joint assembly
- Safe joint disassembly and assembly
- Joint assembly procedures
- Ensuring correct use of additional joint components
- Importance of joint quality assurance procedures, certification, and records
- Joint disassembly
- Assembly technique and gasket recognition in relation to flange-face type
- Tightening piping joints connecting to rotating equipment and pressure relief devices
- Tightening piping joints on and around piping expansion joints and spring hangers with cold-set
- Importance of alignment and gap uniformity
- Selecting the target bolt assembly load and appropriate bolt tightening tooling



Course Title:

- ASME PCC-1 Appendix A
 - o **Powered Equipment Supplemental Qualification**

Course Summary

- This course is one of four standard training modules as specified within the ASME PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint Assembly and its Appendix A specific to the training, qualification, and certification of joint assembly personnel.
- The course will deliver a thorough understanding of bolted flange joint disassembly, assembly and tightening techniques using hydraulic torque and bolt tensioning equipment.

Certification

- Hydratight Certification
- Training Certificates – Open validity
- Qualification Certificates – 3 years validity

Course Duration

- 1 Day

Class Size

- Maximum 6 delegates

Course Content

- General health & safety precautions
 - o Safety and securing of high-pressure fluids, fittings, and hoses during operation
 - o Placement and removal of backup wrench under high loads
 - o Pinch points relative to hydraulic or pneumatic torque equipment and backup wrenches
- General personal joint assembly equipment requirements
- Hydraulic and pneumatic torque joint tightening
 - o Working parts of hydraulic and pneumatic torque equipment
 - o Working parts of a hydraulic pump and hydraulic/pneumatic regulator
 - o Troubleshooting hydraulic wrench, hose, hose connections, and pump failures
 - o Method of setting target torque
 - o Method of using a hydraulic torque wrench
 - o Single-point tightening versus simultaneous multiple point tightening, and influence on the assembly procedure
- Joint tightening using tensioning equipment
 - o Working parts of a hydraulic bolt tensioner
 - o Working parts of a hydraulic pump and hydraulic regulator
 - o Method of setting correct bolt load (formulas for calculating the target bolt load) for the number of tools in relation to the number of bolts in the joint)
 - o Method of using a hydraulic bolt tensioner
 - o Troubleshooting of tensioner, hose, hose connections, and pump failures
 - o Use of a single tensioner versus simultaneous use of multiple tensioners and the influence of each on the assembly procedure
- Calibration and maintenance of hydraulic bolt-tightening equipment
- Selecting appropriate bolt-tightening tooling
 - o Acceptable methods in relation to bolt size



Course Title:

- ASME PCC-1 Appendix A
 - o **Heat Exchanger Supplemental Qualification**

Course Summary

- This course is one of four standard training modules as specified within the ASME PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint Assembly and its Appendix A specific to the training, qualification, and certification of joint assembly personnel.
- The course will deliver a thorough understanding of heat exchanger joint disassembly, assembly and tightening techniques using hydraulic torque and bolt tensioning equipment.

Certification

- Hydratight Certification
- Training Certificates – Open validity
- Qualification Certificates – 3 years validity

Course Duration

- 1 Day

Class Size

- Maximum 6 delegates

Course Content

- General health & safety precautions
 - o Safety and securing of high-pressure fluids, fittings, and hoses during operation
 - o Placement and removal of backup wrench under high loads
 - o Pinch points relative to hydraulic or pneumatic torque equipment and backup wrenches
- General personal joint assembly equipment requirements
- Hydraulic and pneumatic torque joint tightening
- Joint tightening using tensioning equipment
- Selecting appropriate bolt-tightening tooling
- Types of exchangers [Tubular Exchanger Manufacturers Association (TEMA) designations] and their joints
 - o Joint configurations, terminology, and locations
 - o Gasket configurations for the different types of joints
 - o Measurement of final joint gaps as a measure of success
- Bundle pushing and considerations for assembly
 - o Bundle and channel orientation to align piping and pass-partition groove(s)
 - o Risks during pushing (damage to the flange-face or shell gasket)
- Tubesheet joint considerations, shell side gasket damage, and recompression of shell side gaskets on tube-sheet joints
 - o Second gasket compression (more assembly passes may be required)
 - o Risks if the shell side gasket seal is broken when the channel is removed (if bundle is not being pulled)
 - o Inspection of pass-partition surfaces (pass-partition flush with flange facing)
 - o Consideration of tightening shoulder-type bolts from both sides
 - o Gasket pass-partition alignment
- Breechlock exchangers
 - o General sealing configuration of Breechlock exchangers and special procedures for assembly of Breechlock (manufacturer's instructions)



Course Title:

- ASME PCC-1 Appendix A
 - o **Special Joint Supplemental Qualification**

Course Summary

- This course is one of four standard training modules as specified within the ASME PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint Assembly and its Appendix A specific to the training, qualification, and certification of joint assembly personnel.
- The course will deliver a thorough understanding of clamp connectors and compact flange special joint disassembly, assembly and tightening techniques using hand, hydraulic torque and bolt tensioning equipment.

Certification

- Hydratight Certification
- Training Certificates – Open validity
- Qualification Certificates – 3 years validity

Course Duration

- 1 Day

Class Size

- Maximum 6 delegates

Course Content

- General health & safety precautions
- General personal joint assembly equipment requirements
- Functionality of gasket and seal
- Seal surface preparation
- Gasket types and their limitations
- Gasket handling, preparation, and installation
- Identification of correct joint components
- Selecting appropriate bolt tightening tooling
- Safe joint disassembly and assembly
- Inspection and reporting defects or faults
- Importance of alignment and gap uniformity
- Joint assembly procedures
- Assembly technique and gasket recognition in relation to face type
- Procedure for preparing a joint for closure
- Selecting the target bolt assembly load
- Manual torque joint tightening
- Hydraulic and pneumatic torque joint tightening
- Joint tightening using tensioning equipment
- Importance of joint quality assurance procedures, certification, and records



ASME PCC-1 Appendix A – Introduction eLearning Courses



Training of Fundamentals & Piping



Powered Equipment Supplemental Training



Heat Exchanger Supplemental Training



Special Joint Supplemental Training

Hydratight certified ASME PCC-1 introduction eLearning courses are derived from our Appendix A instructor led classroom courses and are suited to individuals who wish to complete refresher training or pre-learning prior to enrolment on our full training and qualification program.

These courses cover the health, safety, quality and technical knowledge learning objectives relevant to the disassembly, inspection, assembly and tightening of bolted flange and clamp joint assemblies.

Contact eLearning@hydratight.com to enrol on Hydratight Academy ASME PCC-1 Appendix A eLearning courses.