Technical Training Synopsis

Hydratight as Approved Training Providers will ensure all personnel who are responsible for Bolted Joint Integrity, On-site Machining Using Portable Machine Tools and associated Joint Integrity Management activities are trained and assessed to Industry Best Practice.

Our training courses are fully documented and course content is available upon request.

Hydratight Training Instructors are competent in the courses that they deliver with industry specific experience and follow an internal Training Instructor and Assessor approval process verified by regional external qualifications where applicable.

Additional Training Courses are available specific to all Hydratight equipment, services and regions. Bespoke training courses can also be commissioned and delivered to suit our clients systems of work and/or equipment.
Index:

**ECITB (Engineering Construction Industry Training Board) Mechanical Joint Integrity (MJI) Approved Training & Technical Testing**

- MJ10 Hand Torque Bolted Connection Techniques .................................................. 3
- MJ18 Hydraulically Tension Bolted Connection Techniques ................................ 4
- MJ19 Hydraulically Torque Bolted Connection Techniques .................................... 5
- MJI Mechanical Joint Integrity Overview .................................................................. 6

**OLF (Norwegian Oil Industry Association) Approved Training**

- Flange Work OLF Guideline 118 ........................................................................... 7

**Hydratight/City & Guilds Accredited – Bolted Joint Integrity Training**

- Bolted Joint Integrity and Hand Tightening (Topside) ............................................... 8
- Bolted Joint Integrity and Hydraulic Tensioning (Topside) ....................................... 9
- Bolted Joint Integrity and Hydraulic Torque Tightening (Topside) ......................... 10
- Bolted Joint Integrity Advanced (Topside) .................................................................. 11
- Bolted Joint Integrity and Hydraulic Tensioning (Subsea) ....................................... 12
- Bolted Joint Integrity and Hydraulic Torque Tightening (Subsea) ......................... 13
- Disassembly of Bolted Connections by Nutsplitter .................................................... 14
- Disassembly of Bolted Connections by Flange Spreader ....................................... 15
- Ultrasonic Bolt Load Measurement ........................................................................ 16
- Morgrip Installation ................................................................................................. 17

**Hydratight/City & Guilds Accredited - On-Site Machining Practices Using Portable Tools Training**

- Basic Pipe-cutting and End Prepping .................................................................. 18
- Advanced Pipe Cutting, End Prepping and Weld Excavation ................................ 19
- Basic Flange Facing ................................................................................................. 20
- Advanced Flange Facing ......................................................................................... 21
- Exchanger Facing ...................................................................................................... 22
- Basic Drilling ............................................................................................................ 23
- Advanced Drilling ..................................................................................................... 24
- Milling ....................................................................................................................... 25
- 3D CNC Thread Milling GeniSYS 220 .................................................................. 26
Course Title:
- ECITB Mechanical Joint Integrity
  - MJI10 Hand Torque Bolted Connection Techniques

Related Courses
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - Bolted Joint Integrity and Hand Tightening (Topside)

Course Summary
- The ECITB offers a method of training and validating skills in the specialist critical bolting area. Training courses, Work Based Task Assignments and Technical Tests cover isolations, dismantling techniques, inspection of components, alignment techniques and clamp connectors as well as assembly and tightening techniques in specialist critical bolting. These short courses teach discrete, critical skills through approved training providers based on the ECITB Technical Training Standards.

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

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

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
- Safety Helmet
Course Title:
- ECITB Mechanical Joint Integrity
  - MJ18 Hydraulically Tensioned Bolted Connection Techniques

Related Courses
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - Bolted Joint Integrity and Hydraulic Tensioning (Topside)

Course Summary
- The ECITB offers a method of training and validating skills in the specialist critical bolting area. Training courses, Work Based Task Assignments and Technical Tests cover isolations, dismantling techniques, inspection of components, alignment techniques and clamp connectors as well as assembly and tightening techniques in specialist critical bolting. These short courses teach discrete, critical skills through approved training providers based on the ECITB Technical Training Standards.

Course Duration
- 1 Day
- 2.5 Day course when combined with MJ19

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
- Reinstate the work area after the assembly and tightening of bolted connections using hydraulic tensioning

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
- Safety Helmet
Course Title:
- ECITB Mechanical Joint Integrity
  - MJ19 Hydraulically Torque Bolted Connection Techniques

Related Courses
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - Bolted Joint Integrity and Hydraulic Torque Tightening (Topside)

Course Summary
- The ECITB offers a method of training and validating skills in the specialist critical bolting area. Training courses, Work Based Task Assignments and Technical Tests cover isolations, dismantling techniques, inspection of components, alignment techniques and clamp connectors as well as assembly and tightening techniques in specialist critical bolting. These short courses teach discrete, critical skills through approved training providers based on the ECITB Technical Training Standards.

Course Duration
- 1.5 Days
- 2.5 Day course when combined with MJ18

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
- Reinstate the workplace after the assembly and tightening of bolted connections using hydraulic torque equipment

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
- Safety Helmet
ECITB Mechanical Joint Integrity Overview:

The ECITB in collaboration with Step Change in Aberdeen has introduced a new method of training and validating skills in the specialist critical bolting area. TECSkills PF 10, 18 and 19 units were replaced on October 1st 2011 with approved training courses derived from the new ECITB Mechanical Joint Integrity technical training standards.

Logbooks have been replaced by work based task assignments and new ECITB Technical Tests introduced.

The new technical training standards cover isolations, dismantling techniques, inspection of components, alignment techniques and clamp connectors as well as assembly and tightening techniques in specialist critical bolting.

The new technical training standards are:

- **MJI 10 - Hand Torque Bolted Connections** - Dismantle, prepare and secure hand torque bolted connections.
- **MJI18 - Hydraulically Tension Bolted Connections** - Dismantling, assemble and tension bolted connections using hydraulic tensioning equipment.
- **MJI19 - Dismantling, Assembling and Tightening Bolted Connections** - Dismantle, assemble and tighten bolted connections using powered torque equipment.

ECITB Approved Courses:

The ECITB has approved four specific courses which are derived from the new technical training standards:

- **Hand Torque Bolted Connection Techniques (MJI10)** – 1 day duration.
- **Hydraulically Torque Bolted Connection Techniques (MJI 10 & 19)** – 1.5 days duration.
- **Hydraulically Tension Bolted Connection Techniques (MJI 18)** – 1 day duration.
- **Hydraulically Torque and Tension Bolted Connection Techniques (MJI 10, 18, 19)** – 2.5 days duration.

These courses are grant aided for ECITB registered employers.

Work Based Task Assignments:

A new approach to the workplace consolidation of knowledge has been developed; Work Based Task Assignments.

Each assignment lists the activities to be undertaken by the learner and validated by the supervisor.

Three work based task assignments have been approved by the ECITB:

- **Dismantle, Assemble and Hand Torque Bolted Connections**
- **Dismantle, Assemble and Hydraulically Tension Bolted Connections**
- **Dismantle, Assemble and Hydraulically Torque Bolted Connections**

The task assignments are normally completed between three to twelve months after the initial training course and the learner can then undertake an ECITB approved Technical Test.

Technical Tests:

Technical Testing with an associated ECITB certificate of achievement plays a key role in validating an Individual’s skill, ability and job knowledge in a specific task area.

Each test consists of a knowledge test and practical activity test against identified test criteria.

There are five ECITB approved Technical Tests covering the mechanical joint integrity:

- **TMJI10 Dismantle, Assemble and Hand Torque Flanged Joints** – 1.5 hours duration
- **TMJI11 Dismantle, Assemble and Hand Torque Clamp Connectors** – 1.5 hours duration
- **TMJI18 Dismantle, Assemble and Tensioning Bolted Connections (Hydraulic Tensioning)** – 1.5 hours duration
- **TMJI 19 Dismantle, Assemble and Hydraulically Torque Flanged Joints** – 1.5 hours duration
- **TMJI 20 Dismantle, Assemble and Hydraulically Torque Clamp Connector Joints** – 1.5 hours duration

These tests are grant aided for ECITB registered employers.
Course Title:

- OLF – The Norwegian Oil Industry Association
  - Flange Work OLF Guideline 118

Related Courses

- Hydratight/City & Guilds Bolted Joint Integrity
  - Bolted Joint Integrity and Hand Tightening (Topside)
  - Bolted Joint Integrity and Hydraulic Tensioning (Topside)
  - Bolted Joint Integrity and Hydraulic Torque Tightening (Topside)

Course Summary

- This course is part of OLF's industry requirements project to verify knowledge of preliminary work, planning, execution and documentation of assembling flanges by tensioning bolts on flange connections on high-pressure hydrocarbon process systems.
- The course is a combination of theory and practical application and concludes with a web-based exam, which takes about 1.5 hours to complete.

Course Duration

- 22.5 hours over 3 Days

Course Content

- This course addresses the most common work operations for flange work on ASME RF/FF, ASME RTJ, API, NCF5 Compact and Clamped connections. The course contains the following main topics:
  - Flanges and gaskets
  - Disassembly
  - Inspection
  - Alignment
  - Assembly
  - Follow-up inspections

Pre-requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermaker and engineering craftsman trades
- Mechanics, Industrial plumbers, Process technicians, Supervisors, Planners, Apprentices, Contractors' expert technicians who perform new installations and maintenance on pressure tanks, heat exchangers, valves and pipes (process installations) involving flange assemblies and braces.

PPE Requirements

- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:

- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT10 Bolted Joint Integrity and Hand Tightening (Topside)

Course Summary

- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and externally delivery with either City & Guilds or Hydratight certification.

Course Duration

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

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

Pre-requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements

- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:

- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT18 Bolted Joint Integrity and Hydraulic Tensioning (Topside)

Course Summary

- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration

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

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

Pre-requisites

- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements

- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT19 Bolted Joint Integrity and Hydraulic Torque Tightening (Topside)

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 1.5 Day
- 2.5 Day course option when combined with HT18

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-requirements
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT16 Bolted Joint Integrity and Hydraulic Tensioning (Subsea)

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 1 Day
- 2 Day course option when combined with HT17

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
- Demonstration of equipment
- Preparation of work area, application and equipment for the assembly and tightening of bolted connections using Subsea Bolt Tensioning equipment
- Preparation of materials for the assembly and tightening of bolted connections using Subsea Bolt Tensioning equipment
- Subsea Bolt Tensioning equipment safety
- Practical use of Subsea Bolt Tensioning equipment
- Practical use of Subsea ancillary operating equipment such as hydraulic down-line/hose reel stand/subsea control valves
- Tightening of Studbolts using Subsea Bolt Tensioning equipment
- Basic tool maintenance
- Reporting and Quality Assurance
- Training is conducted in a Topside training environment not in a simulated Diving Tank

Pre-requisites
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT17 Bolted Joint Integrity and Hydraulic Torque Tightening (Subsea)

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 1 Day
- 2 Day course option when combined with HT16

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
- Demonstration of equipment
- Preparation of work area, application and equipment for the assembly and tightening of bolted connections using Hydraulic Torque equipment
- Preparation of materials for the assembly and tightening of bolted connections using Hydraulic Torque equipment
- Subsea Hydraulic Torque equipment safety
- Practical use of Subsea Hydraulic Torque equipment
- Practical use of Subsea ancillary operating equipment such as hydraulic down-line/hose reel stand/subsea control valves
- Tightening of Studbolts using Subsea Hydraulic Torque equipment
- Basic tool maintenance
- Reporting and Quality Assurance
- Training is conducted in a Topside training environment not in a simulated Diving Tank

Pre-requisites
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT20 Bolted Joint Integrity Advanced

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 10 Days

Course Content
- An advanced Flange Management Training Programme delivered at our Training Academy under site simulated conditions and is aimed to provide a more in depth understanding of the whole Joint Integrity process including the flow of work during a shutdown or construction project and covers the areas listed below:
  - Site simulation
  - Disassembly and removal of pipe-work using torque, tension, nut-splitters and flange spreaders
  - ANSI raised face, RTJ, 4 bolt clamp, SPO Compact Flange and API bolted joints
  - Flange management
  - Use of permanent and temporary tagging systems
  - Use of Joint Integrity Data Management Systems
  - Permit to work and risk assessment
  - Working at height and manual handling
  - Lifting and slinging
  - Inspection and assembly of bolted connections
  - Pipeline alignment
  - Interpretation of drawings and work scope
  - Tightening via torque and tensioning systems
  - Reporting and quality assurance

Pre-requisites
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT14 Disassembly of Bolted Connections by Nutsplitter

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 0.5 Day
- 1 Day option when combined with HT15
- 2.5 Day option when combined with HT10, HT18, HT19 & HT15

Course Content
- Instruction and practice in observing health and safety requirements and approved working practices
- Joint breakout procedures
- Types of tools and methods
- Equipment component identification
- Equipment selection including torque wrench requirements
- Demonstration of equipment
- Preparation of work area, application and equipment for the disassembly of bolted connections using Nut splitting equipment
- Preparation of materials for the disassembly of bolted connections using Nut splitting equipment
- Nut splitting equipment safety
- Practical Joint breakout/disassembly using Nutsplitter tools and torque wrenches
- Basic tool maintenance

Pre- requisites
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Technical Training Synopsis 2013

Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT15 Disassembly of Bolted Connections by Flange Spreader

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 0.5 Day
- 1 Day option when combined with HT14
- 2.5 Day option when combined with HT10, HT18, HT19 & HT14

Course Content
- Instruction and practice in observing health and safety requirements and approved working practices
- Joint breakout procedures
- Types of tools and methods
- Equipment component identification
- Equipment selection
- Demonstration of equipment
- Preparation of work area, application and equipment for the disassembly of bolted connections using Flange Spreading equipment
- Preparation of materials for the disassembly of bolted connections using Flange Spreading equipment
- Flange Spreading equipment safety
- Practical Joint breakout/disassembly using Flange Spreading equipment
- Basic tool maintenance

Pre-requisites
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT23 Bolt Load Monitoring - Ultrasonic

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 5 Days

Course Content
- Instruction and practice in observing health and safety requirements and approved working practices
- Types of tools and methods
- Methods of Bolt Tightening
- Bolt Load and its effects
- Bolt Load Calculations
- Principles & Techniques of measuring bolt extension
- Equipment component identification
- Equipment selection
- Demonstration of equipment
- Equipment safety
- Practical Use of Equipment
- Retrieving and inputting data and on site calibrations.
- Use of both hydraulic torque and tensioning methods with ultrasonic load monitoring
- Reporting and Quality Assurance

Pre-requisites
- Candidates must prove attendance of an approved Bolted Joint Integrity Training course for both torque and bolt tensioning methods.
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited Bolted Joint Integrity
  - HT21 Basic Morgrip Installation

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 2 Days

Course Content
- Instruction and practice in observing health and safety requirements and approved working practices
- Overview of Morgrip connector types
- Overview of pipe cutting methods
- Equipment component identification
- Tightening methods
- Tightening of connectors by both hand torque and bolt tensioning methods
- Pipe inspection, measurement and seal size selection as per installation sheet
- Tightening equipment selection
- Instruction on the operation of a chart recorder [manual clockwork type]
- Connector integrity testing as per installation sheet
- Installation, test, strip down and rebuild 2” x 2000 series Morgrip coupling – Hand torque procedure
- Installation, test, strip down and rebuild 6” x 2000 series Morgrip coupling – 100% bolt tensioning procedure
- Completion of installation reports
- Reporting and Quality Assurance

Pre-requisites
- Candidates must prove attendance of an approved Bolted Joint Integrity Training course for both torque and bolt tensioning methods.
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices, instrument technicians and engineering craft trades who perform assembly and disassembly of bolted connections on pressure tanks, heat exchangers, valves and pipework.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
**Course Title:**
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT25 Basic Pipe-Cutting and End Prepping

**Course Summary**
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

**Course Duration**
- 2 Days

**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
  - Machining of various size diameters of pipework with differing wall thickness to include the use of various machine tools
  - Use of outside and internal bore mounted machines
  - Straight pipe cuts on pipework, all diameters and maximum wall thickness 2”/50mm.
  - Carry various end preps 37 degree profile, small compound bevel, small “J” prep.
  - Carry out match/counter bores operations
  - Carry out outside diameter machining of pipework
- Practical use of various tool slides, boring attachments and tooling to carry out additional prep/bore profiles:
  - Standard “V” prep
  - Multi angle “J” prep
  - Compound bevel “single point cutting”
  - Match/Counter bores
- Instruction and practice in the selection and grinding of:
  - Parting blades
  - Form tools
  - Single point cutting tools
  - Carbide index tip tools
- Reporting and Quality Assurance

**Pre-requisites**
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

**PPE Requirements**
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT26 Advanced Pipe-Cutting, End Prepping and Weld Excavation

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 4 Days

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
  - Machining of various size diameters of pipework with differing wall thickness to include the use of various machine tools
  - Straight pipe cuts on pipework, all diameters and wall thickness
  - Carry out match/counter bore.
  - Carry out multi angle “J” prep.
  - Carry out outside diameter machining of pipework.
  - 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:
  - Standard “V” prep
  - Multi angle “J” prep
  - Compound bevel “single point cutting”
  - Match/Counter bores
- Instruction and practice in the selection and grinding of:
  - Parting blades
  - Form tools
  - Single point cutting tools
- Overview of weld identification methods:
  - Weld etching (Acid method)
  - Magnetical Particle Testing (MPI) & Dye Penetration
- Reporting and Quality Assurance

Pre-requisites
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT27 Basic Flange Facing

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 2 Days

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
  - Machining of various size diameters of flanges to include the use of various machine tools
  - Flat and raised face applications
  - Inside and outside mount machine tools
  - Excluding exchanger channel or tubesheet applications
  - 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:
  - Single point cutting tools
  - Carbide index tip tools
- Reporting and Quality Assurance

Pre-requisites
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT28 Advanced Flange Facing

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 5 Days

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
  - Machining of various size diameters of flanges to include the use of various machine tools
  - Ring type joints and 4 bolt clamp/hub connections
  - Inside and outside mount machine tools
  - Various tool slides, boring attachments, back facing heads, extensions and tooling to carry out additional joint profiles
  - Instruction in the use of dial test indicator (DTI) outside micrometer, vernier callipers and depth micrometer
  - Instruction in the use of ball trammel groove/angle measuring equipment
  - Manufacturer technical data sheets
- Instruction and practice in the selection and grinding of:
  - Straight single point cutting tools
  - Right and left hand cranked single point cutting tools
  - Carbide index tip tools
- Reporting and Quality Assurance

Pre-requirements
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT29 Exchanger Facing

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 2 Days

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
  - Machining of various size diameters of exchangers to include the use of various machine tools
  - Joint face machining of exchanger shells, channel covers, channel ends, tube sheets, floating heads including back facing operations.
  - All joint profiles and sizes, using inside, outside and tube sheet mount machine tools
  - Mounting methods to include G-clamps, finger clamps, Rawl-bolts, adjusters & jacking screws
  - Instruction in the use of dial test indicator (DTI) outside micrometer, vernier callipers and depth micrometer
  - Various tool slides, boring attachments, back facing heads, extensions and tooling to carry out additional joint profiles
- Instruction and practice in the selection and grinding of:
  - Straight single point cutting tools
  - Right and left hand cranked single point cutting tools
  - Carbide index tip tools
- Reporting and Quality Assurance

Pre- requisites
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT30 Basic Drilling

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 1 Day

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
  - Drilling holes using both air and electric driven machine tools
  - Up to 2” diameter all depths.
  - Using straight shank, Morse taper shank drills/reamers, Granlund system, Morse taper extensions and boring attachments
  - Mounting methods to include:
    - Vee block & chain
    - Magbase
    - Vacuum suction pad
    - G clamps & Finger clamps
    - Bespoke applications
- Instruction and practice in the selection and grinding of:
  - Drills
  - Reamers
  - Granlund cutters
  - Granlund guide bushes
- Reporting and Quality Assurance

Pre-quisites
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT31 Advanced Drilling

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight's best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 2 Days

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
  - Drilling and tapping of holes using both air and electric driven machine tools
  - Greater than 2" diameter, all depths to include:
    - Drilling
    - Tapping
    - Stud removal
    - Thread picking
  - Using straight shank, Morse taper shank drills/reamers, Granlund system, Morse taper extensions tapping heads and boring attachments
  - Mounting methods to include:
    - Vee block & chain
    - Magbase
    - Vacuum suction pad
    - G clamps & Finger clamps
    - Bespoke applications
- Instruction and practice in the selection and grinding of:
  - Drills
  - Tapping drills
  - Reamers
  - Granlund cutters
  - Granlund guide bushes
  - Top hat guide bushes
- Reporting and Quality Assurance

Pre-requisites
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT32 Milling

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 2 Days

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
  - Use of milling rails on exchangers and motor/pump applications
  - Milling of exchanger pass partition bars on channel covers and tube sheets, fin fan applications and motor/pump pads.
  - All profiles and sizes, using air operated and electric driven milling rails, multi axis rails and key mill tools
  - Instruction in the use of dial test indicator (DTI), outside micrometer, vernier callipers, depth micrometer and laser alignment equipment.
  - Mounting methods to include:
    - Vee block & chain
    - Magbase
    - Vacuum suction pad
    - G clamps & Finger clamps
    - Bespoke applications
- Instruction and practice in the selection and grinding of:
  - Slot drills
  - End mills
  - Fly cutters
  - Carbide inserts
  - International tapers

Reporting and Quality Assurance

Pre-requisites
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet
Course Title:
- Hydratight/City & Guilds Accredited – On-site Machining Practices using Portable Machine Tools
  - HT33 3D CNC Thread Milling GeniSYS 220

Course Summary
- A suite of modular Joint Integrity courses based upon Hydratight’s best practice internal technician IMPACT competency assurance process externally accredited and audited for both internal and external delivery with either City & Guilds or Hydratight certification.

Course Duration
- 5 Days

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
  - Tooling and tool kit
  - Technical data, thread forms
  - Speeds and feeds
  - Transportation of the machine
  - Hole milling
  - Thread milling, metric and imperial sizes
  - Thread cleaning / refurbishment, pitch, form, depth
  - Fine boring, groove milling
  - Belt replacement and lead-screw replacement
  - Mounting methods to include:
    - Finger clamps
    - Bespoke applications
  - Motion Perfect software
- Instruction and practice in the selection of:
  - Slot drills
  - End mills
  - Fly cutters
  - Carbide inserts
  - International tapers
- Reporting and Quality Assurance

Pre-requisites
- Candidates must prove relevant previous machining experiences from a toolmaker, turner, fitter/turner
- Candidates must have a basic mechanical background preferably in pipe-fitting, mechanical fitting, mechanic, millwright, boilermakers, apprentices and engineering craft trades.

PPE Requirements
- Safety footwear
- Eye protection
- Coveralls
- Ear protection
- Gloves
- Safety Helmet