Joint Integrity and Flange Management Training Program per ASME PCC-1-2022

Alpha Industrial Services (AIS) is subsidiary of Alpha Group Company, Thailand's Steam and Fluid Control Solutions leader since 1984. Our goal is to maintain the joint integrity of your plant production to ensure productivity and safety. We believe that all leaks can be avoided, and this is achieved through our certified technical leadership, training, and innovation.

Our Training program meets the criteria detailed in the ASME PCC-1: 2022 standard for Pressure Boundary Bolted Flange Joint Assembly. Key benefits to learners and employers include the achievement of industry-recognized certification via a highly commended training organization, reducing risk, increasing safety, and preventing the loss of containment.

We ensure that every job is performed entirely without compromise every time. Our AIS team is committed to delivering projects right the first time and safely every time, reducing risk and eliminating expensive rework. This approach is applied to integrity assurance and across our extensive range of services, such as online leak sealing, on-site machining, pipe cold cut/beveling, and a certified training course per ASME PCC-1: 2022.

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In the training, Bolter individual will learn to inspect, assemble, disassemble and tighten bolted joints in an effective and safe manner and demonstrate his / her capabilities in Fundamentals, Piping Endorsement, Powered Equipment Endorsement, Heat Exchanger Endorsement and Special Joint Endorsement. Training and Assessment Method are conducted with class room and practical demonstration.

How to qualified:

Individuals with current Nonmandatory Appendix A training certificates or legacy training / qualification certificates may use the classroom and practical examinations to complete or update their qualification certification.

Certification:

Satisfactory completion of ASME PCC-1: 2022 training is recognized by award of an AIS “Training Certificate” which proves trained status only and not qualification or competence.

Successful completion of ASME PCC-1: 2022 academic and practical examinations is recognized by award of an AIS “Qualification Certificate” which is valid for 3 years.

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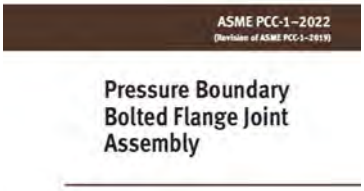
Module 1: Describe of ASME PCC-1: 2022 (1.5 HOURS)

- Introduction to Bolting
- Bolting Principles
- Threaded Fasteners
- Bolt Forces
- Preload and Clamping Load
- Bolting Concepts
- Tension and Compression
- PCC-1 Development and Guidelines
- PCC-1 Summary & Assessment



Module 2: Flange Fastener and Gaskets (3 HOURS)

- The Primary Components of a Bolted Flange Joint
- Forces Acting on a Joint Under Pressure
- The Bolt Load Range
- Flange Identification and Standards
- Flange Misalignment
- Excessive Flange Rotation,
- Tightening piping joints on Pressure Relief devices
- Flange Surface Defects, Flange Surface Finish
- How Bolts Create Tension
- Bolt History
- Thread Terminology
- Coarse and Fine Threads
- Bolts, Studs, and Nuts Terminology
- Bolt Strength Grades
- Nut Strength
- Washers
- Conical Spring Washers (Bellevile)
- Gasket Seal
- The Proper Gasket
- Gasket Material
- Metallic and Semi-Metallic Gaskets
- Kammprofile Gasket

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- RTJ Gaskets
- RTJ Gasket Installation Tips
- Spiral Wound Gaskets
- PTFE Gaskets
- Compressed Sheet Gaskets
- Rubber Gaskets
- Double Jacket (DJ) Gaskets
- Insulating Gaskets and Kits
- Gasket Failure Examples
- Installing the Gasket
- Pressure Relief devices - Piping Specific
- Shaft Alignment
- Nozzle Loads
- Inspection hold point for blockage of relief path
- Restraining Cold Set Spring Hangers
- Flange Fastener and Gaskets Summary & Assessment




Module 3: Torque, Tension, Bolt Loosening, Corrosion, Galling, and Seizing (3 HOURS)

- Torque Tightening
- Clamp Force from Load
- Applying Torque
- Torque is Easy to Measure
- Torque and Bolt Yield
- Factors Affecting Torque
- Bolt Diameter
- Bolt Strength
- Bolt Condition
- Lubrication
- Coefficient of Friction
- Calculating Torque
- Using the Torque Chart
- Direct Tensioning Methods and Measurements
- Hydraulic Tensioning
- Hydraulic Tensioning: Advantages and Disadvantages
- Hydraulic Tensioning:



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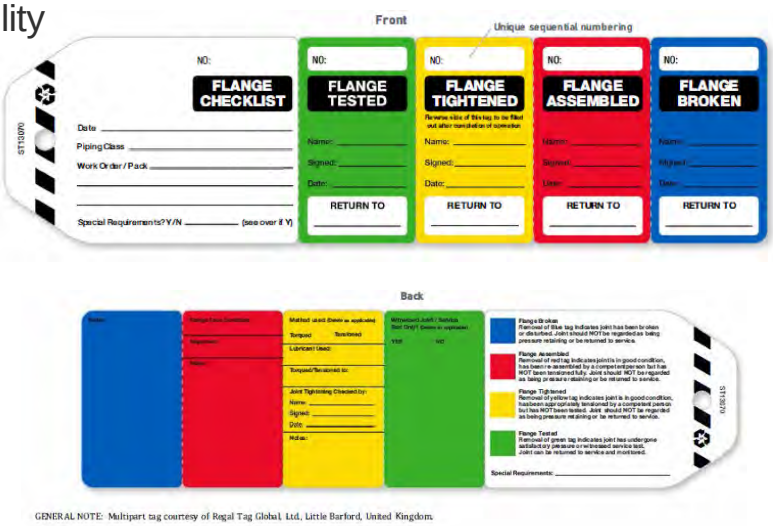
Safety Considerations

- Heat Tensioning
- Load Indicating Bolts
- Direct Tensioning Measurement
- Ultrasonic Elongation Measurement
- Other Methods of Measuring Load
- Bolting Patterns
- Bolt Interdependency
- Method of Tightening
- Gradual Tightening
- Simultaneous Multi Bolt Tightening
- Disassembly Procedure
- Records: 1. Joint Tagging
- Records: 2. Multi-Part Joint Tagging
- Records: 3. Flange Management System
- Bolt Self-Loosening: Overview
- Bolt Self-Loosening: Common Causes
- Initial Under-Tightening
- Initial Over-Tightening
- Vibration and Shear Movement
- Misalignment and Joint Instability
- Component Creep
- Elastic Interaction (Lack of Chase Passes)
- Thermal Change
- Bolt Self-Loosening: Solutions
- Solutions for Problem Joints
- Corrosion, Galling, and Seizing: Overview
- Corrosion
- Corrosion: Solutions
- Galling and Seizing
- Galling and Seizing: Solutions
- Torque, Tension, Bolt Loosening,
- Corrosion, Galling, Seizing Summary & Assessment



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Module 4: Planning, Safety, Torque, Tension Tools (3 HOURS)

- The Importance of Bolting Safety
- Bolting Hazards and Risks
- Bolting Safety in Three Key Areas
- Planning and Preparation
- Why Plan and Prepare?
- Make a Plan
- Use a Pre-Job Checklist
- Communicate
- Tool Handling
- Bolting Tools
- Manual Torque Tools
- Types of Manual Torque Wrenches
- Manual Torque Wrenches
- Manual Torque Multipliers
- Pneumatic Tools
- Hydraulic Wrenches
- Low Profile Wrenches
- Hydraulic Torque Wrenches
- Hydraulic Tensioners
- Summary & Assessment.

Module 5: Final Examination (1.5 HOURS)

Upon completion of the 4 Modules, learners will need to submit an application to enroll in the Final Exam. In the application, a professional reference is required to complete a form which verifies applicant's completion of at least 6 months of work experience in bolted joint assembly. Once the application is approved, the candidate will be enrolled in the Final Exam which consists 60 to 75 multiple choice questions. A passing grade of at least 90% is required to qualify for the hands-on training and skills assessment. Candidates are allowed multiple attempts to pass the Exam. There is no limit on the number of times to re-take the Exam.

Module 6: Hand On (3 HOURS)

Working both individually and in small groups, learners will:

• Observe and practice proper procedures as modeled by the instructor

• Perform the key competencies required in each exercise within expected tolerances

• Be able to explain the technical principles underlying the practical competencies

Agenda:

- Administrative Check-in
- Safety/PPE Discussion
- Torque/Load Measurement
- Gasket Identification/Analysis
- Manual Torquing Demonstration
- Hydraulic Torque Tool Review
- Hydraulic Torquing Demonstration
- Pneumatic Torque Tool Operation
- Tensioner Operation
- Q&A, Evaluations, Feedback

Course Conclusion

Module 1: Describe of ASME PCC-1: 2022

Module 2: Flange Fastener and Gaskets

Module 3: Torque, Tension, Bolt Loosening, Corrosion, Galling, and Seizing

Module 4: Planning, Safety, Torque, Tension Tools

Module 5: Final Examination

Module 6: Hand On

Qualification & Certificate (AIS Certificate, Each Class approx. 6 - 10 persons)

1. **Bolting Assembler / Inspector (2 days)**
   Torque Equipment
   a) Fundamental understanding in Module 1 – Module 4.
   b) Pass examination of Module 5 by 90% of 60 multiple choice questions.
   c) Perform and understanding of Module 6 with supervisor.

2. **Bolting Engineer & Supervisor (3 days)**
   Torque Equipment
   a) Fundamental understanding in Module 1 – Module 4 and lead to the Bolter.
   b) Pass examination of Module 5 by 90% of 75 multiple choice questions.
   c) Perform and understanding of Module 6 without supervisor.

3. **Bolting Assembler / Inspector (3 days)**
   Torque / Tension Equipment
   a) Fundamental understanding in Module 1 – Module 4.
   b) Pass examination of Module 5 by 90% of 60 multiple choice questions.
   c) Perform and understanding of Module 6 with supervisor.

4. **Bolting Engineer & Supervisor (4 days)**
   Torque / Tension Equipment
   a) Fundamental understanding in Module 1 – Module 4 and lead to the Bolter.
   b) Pass examination of Module 5 by 90% of 75 multiple choice questions.
   c) Perform and understanding of Module 6 without supervisor

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