

MC136

Developing Effective Bolted Flange Joint Assembly Procedures Using ASME PCC-1

Day 1

- Scope & Introduction of ASME PCC-1
- Assembly fundamentals
 - Cleaning and examination of flange and fastener contact surfaces
 - Alignment of flanged joints
 - Installation of gasket
 - Lubrication of “working” surfaces
 - Installation of bolts
 - Check for proper bolt/nut specification and adequate length
 - Numbering of bolts
 - Numbering of bolts when a single tool and multiple tools are used
 - Tightening of bolts
 - Tightening method/load control techniques
 - Bolt elongation (bolt stretch) determination
 - Tightening method/load control technique selection (example)
 - Start-up retorque
 - Tightening sequence
 - Single or multiple tool usage
 - Measurement of gaps
 - Target torque determination
 - Adjustments to obtain final target torque for different prestress levels
 - Joint pressure and tightness testing
 - Records/documentation requirements
 - Joint disassembly
- Review of Appendices
 - Appendix A - Training and qualification of bolted joint assembly personnel
 - Scope/background, qualification program overview
 - Requirements for Qualified Bolting Specialists, Qualified Senior Bolting Specialists, and Qualified Bolting Specialist Instructors
 - Qualifications and experience
 - Training curriculum
 1. Training of fundamentals and additional training required to obtain supplemental qualifications
 2. Practical demonstrations and examination
 3. Duties
 4. Maintenance and renewal of qualifications
 - Quality assurance
 - Scope and qualification manual

- Procedures for quality control
- Program effectiveness

Day 2

- Review of appendices (continued)

Appendix B - Description of common terms for tightening and gaskets

Appendix C - Recommended gasket contact surface finish for various gasket types

Appendix D - Guidelines for allowable gasket contact surface flatness and defect depth

Appendix E - Flange joint alignment guidelines

Appendix F - Alternatives to Legacy tightening sequence/pattern

- Modified Legacy pattern
- Quadrant pattern/star or circular sequence
- Circular pattern
- Simultaneous Multi-bolt Legacy pattern
- Simultaneous Multi-bolt quadrant pattern

Appendix G - Use of contractors specializing in bolting services

Appendix H - Bolt root and tensile stress areas

Appendix I - Elastic Interaction during tightening

Appendix J - Calculation of target torque

Appendix K - Nut factor calculation of target torque

Appendix L - ASME B16.5 flange bolting information

Appendix M - Washer usage guidance and purchase specification for through-hardened washers

Appendix N - Definitions, commentary, and guidelines on the reuse of bolts

Appendix O - Assembly bolt stress determination

- Introduction, scope and cautions
- Assembly bolt stress selection
- Review of the Simple and Joint Component approaches
- Required information
- Determining the appropriate bolt stress
- Example calculation
- Determining flange limits by elastic or finite element analysis

Appendix P - Guidance on troubleshooting flanged joint leakage incidents

- Investigative and diagnostic evaluation guide
- Checklist of flange design and acceptable practice considerations
- Leakage problems and potential solutions