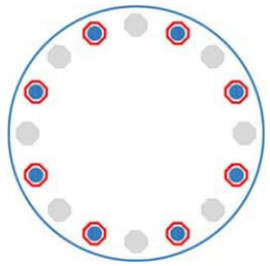
BOLTING MANAGEMENT PROCESS

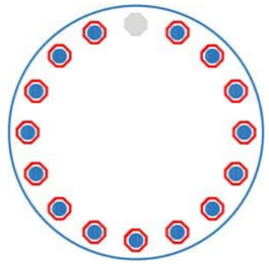
Not Isolated
Decon Phase (Steam/N2)
No Process



HALF BOLTING

- Half Bolting can only be performed on equipment that is depressured, idle, or undergoing preparatory type operations such as steaming, purging, cleaning or controlled depressuring. Half bolting cannot be performed while equipment is in full pressurized service.
- Half bolting shall only be performed by removing one bolt at a time in an alternating or staggering sequence until 1/2 of the bolts have been removed. Minimum of 8 Bolt Flange REQUIRED.
- Equipment which requires a Hot Work A Permit (i.e. cutting torch, grinder, etc.) shall not be used to perform half bolting. In such cases, bolt replacement should be conducted prior to half bolting.

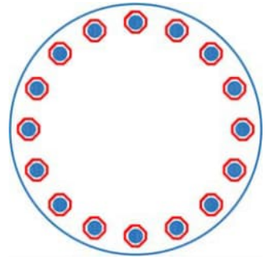
Live Equipment



BOLT REPLACEMENT

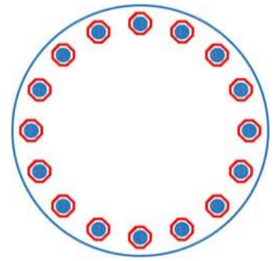
- Unless otherwise justified by an engineering and risk analysis, bolt replacement may only be performed when the operating pressure is equal to or less than 50% of the flange MAWP as determined by a mechanical engineer. Pressure reduction is not needed for non-hazardous service (e.g. air, water). Minimum 8 bolt flange required.
- Bolt replacement shall be performed by removing one bolt at a time and immediately replacing with one of equal size and rating, ensuring that each bolt is fully lubricated and tightened before proceeding to the next step.
- For bolts that are difficult to break loose, cold work removal techniques (i.e. hacksaw, nut splitter) shall be attempted before proceeding to hot work methods.
- If bolts must be removed via hot work methods (i.e. cutting torch, grinder, etc.) the following requirements will apply.

1. **CONTINUOUS ATMOSPHERIC MONITORING IS REQUIRED**
2. If equipment is not in service, Operations shall introduce a slight steam or nitrogen purge into the equipment to eliminate air in the equipment before hot work methods are initiated
3. Once bolt replacement has started, work must continue until completed.



LIVE TIGHTENING (HOT TORQUING / START-UP RETORQUE)

- Live Tightening (Hot Torquing) can be performed on live equipment with no leaks around the flange.
- This is performed in a star pattern.
- A Joint Job-site Visit (JJSV) must be performed prior to Live Tightening to determine the PPE requirements.
- Live Tightening is not considered invasive work and therefore RAM score is not necessary. However, if the flange is leaking then look at “Leaking Flange” directions in this guideline.
- Start-up Re-Torque is tightening all bolts on a joint while the unit is coming up to operating temperature in a circular pass until the nuts no longer turn.



LEAKING FLANGE

- If work needs to take place on a leaking flange, the following need to be performed / evaluated:

1. Must RAM Score as it is Invasive work
2. Evaluate temperature of product and surround metal
3. Evaluate the type of product by reviewing the SDS
4. Evaluate the pressure the equipment is under.
5. Evaluate the LEL to determine what type of work can proceed

- Bunker gear and fresh air may be required to perform this work
- Do not tighten bolts which have been exposed to HF Acid. For this case, consider bolt replacement utilizing the directions in this guideline.