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## General Instructions for Assembly of Tube Fittings and Adapters

1. Prior to installation, visually inspect all components for possible contamination, handling damage and presence of O-rings (if required).
2. Lubricate fitting threads and O-rings prior to assembly.
3. When installation of system plumbing requires orientation or alignment of fittings, preliminary installation should be performed with all connections hand tight to allow fit check of tubing or mating hose assemblies and to allow proper alignment of fittings.
4. Final tightening sequence for connections should be:
  - A) Port or bulkhead connections.
  - B) Tube/hose assembly connections.
  - C) Tube/hose support brackets and clamps.
5. If leakage occurs following system start up, disassemble and inspect for component damage, misalignment or missing O-rings.

## Tightening Methods

Two methods of final connection tightening are acceptable for tube fittings and adapters. These methods include:

- A) Specified Torque
- B) Flats From Finger Tight

**The preferred method is installation to specified torque with a torque wrench.**

**Note:** The flats from finger tight (F.F.F.T.) method was developed as a means of dealing with variations in effective torque caused by inconsistent lubricity or friction losses between various materials, thread surface finishes, plating or coatings, etc.

Currently, industry standards specify installation at specified torque, with lubricated threads, as the only acceptable method for component qualification testing. This method eliminates many of the variables associated with lubricity variations, "feel" for initial component seating, visual reference for installed "tightness" and the inherent lack of precision in measuring fractional "flats".

For these reasons, it is recommended that the torque method be used whenever practical for installation of hydraulic fittings. When the F.F.F.T. method must be used due to access restrictions or convenience, experienced installation personnel should be utilized.

**Note:** For applications involving stainless steel fittings or aluminum manifolds/housings, etc., there is an inherent tendency for threads and other mating surfaces to gall under assembly loading. To reduce the risk of damage, it is recommended that an appropriate lubricant be applied to these surfaces prior to assembly.

## Procedures

**Torque method:** Follow the procedures outlined in the following sections. Final installation torque values are as specified in the appropriate tables. **For reference purposes, it is acceptable to mark the seating position and final tightening position of the fitting (see F.F.F.T. procedure) for visual confirmation that proper assembly has been completed.**

**F.F.F.T. Method:** Procedures for the F.F.F.T. method are outlined in the sections pertaining to the various fitting configurations. Details of this method are described in the section **Method B**. Final tightening of the connection should follow the recommended values listed in Tables A2.

