



## Proper Use & Installation Of Valve and Fitting Union Connections

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TECHNOLOGY UPDATE

Union connections provide a removable joint that allows assembly and disassembly for temporary connections or installation of piping, valves and other equipment that may need to be removed from a system for servicing or replacement. While simple in operation, understanding a few details will further assure satisfactory performance of plastic union connections.

### Union Function Basics

**Sealing Mechanism** - An internal O-ring is the sealing mechanism for a union connection. This seals in two ways. On initial installation, the O-ring must be compressed enough to effect a seal between the mating surfaces of the Body and End Connector components. This is accomplished by tightening the Union Nut. Secondly, as pressure increases, the O-ring moves with the fluid using the pressure to create a tighter seal, blocking fluid medium from escaping between the mating components. This seal remains effective as long as there is sufficient compression on the O-ring and will be compromised only when an operational situation causes loss of compression.

**Tightening** – Tightening is only required to sufficiently compress the O-ring. Many suitable union connections can be made with hand tightening of the Union Nut and an additional 1/4-turn of the nut with a strap wrench. However, care should be taken to avoid over tightening! Additional stress imposed can potentially damage components. The necessity for additional tightening is generally an indication of other problems within the system or union connection itself.

### Typical Connection Problems

**System Misalignment** - Failure to adequately seal a union connection is frequently attributable to misalignment in system components, where the nut is used to forcibly draw together the End Connector and Body Components. Misalignment may not allow even compression of the O-ring and results in loss of sealing. Additional tightening applies undue stress to the threaded components that can potentially lead to fracturing.

**Dirt & Debris** – An often-overlooked problem, the simple presence of sand, dirt and debris on the O-ring or mating surface can easily prevent proper sealing. Such can also cause difficulty in tightening the nut if threads are clogged.

**Damage to O-ring or Mating Surfaces** – Much like the effect of debris, damage to the O-ring or union components can prevent sealing by either not allowing proper compression or creating a leak-path under the O-ring seal.

**Lubricant Use** - Certain lubricants are stress-cracking agents that can induce premature failure of components, especially the nut, under normal tightening stress loads. A properly installed union connection should not require lubrication to assemble. The perceived necessity of a lubricant is also indicative of other problems.

**Significant Temperature Variations** – Significant changes in either fluid or ambient temperatures, including sun exposure, can result in stretching of thermoplastic nuts. This “relaxing” in turn reduces O-ring compression that can require additional tightening after initial installation.

# Essential Installation Instructions

## Preparation Checks

- Check that pipe ends are properly prepared for solvent cement or threaded installation of End Connectors.
- Check that system has adequate free movement for final assembly of Union Connection without misalignment or need to “draw together” any gaps.
- Check that valves and system have adequate support.

## Install End Connectors

- Always remove Union Nut & End Connectors from valve for installation.
- Slide Union Nut onto pipe BEFORE installing End Connector.
- Spears® uses a retained (press-fit) O-ring on the End Connector. Check that the O-ring is in place and pressed evenly into the groove without bumps or ripples.
- Solvent cement or thread End Connector to pipe as applicable. Allow to cure prior to further assembly or valve installation.

## Install Union Connection

- Make sure that the face of the End Connector is squarely aligned with the face of the body and flush against the O-ring. **DO NOT USE UNION NUTS TO DRAW TOGETHER ANY GAPS OR TO CORRECT SYSTEM MISALIGNMENT.**
- Support assembly and thread Union Nut onto Body.
- Tighten Nut **HAND TIGHT ONLY.**
- **DO NOT** use metal pipe wrenches.

## Adjustments After Pressure Tests

- If any leaks are detected during system pressure test, disconnect Union and check for noted problems; then reinstall. If problem persists, tighten Union Nut *no more than* an additional 1/16-turn. Use **ONLY** strap wrenches. Apply a reference mark to the nut and body as an index to avoid over tightening. Tightening must not exceed the following maximum torque values:

### Maximum Union Nut Torque (in.-lbs)

Union Size (in.)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
Torque (in.-lbs.)	58	83	95	122	170	190	269	560	583	912

## WARNINGS:

- **DO NOT USE LUBRICANTS OR THREAD SEALANTS ON UNION NUTS.**
- **DO NOT USE UNION NUTS TO DRAW TOGETHER ANY GAPS OR TO CORRECT SYSTEM MISALIGNMENT.**
- **DO NOT SUPPORT EQUIPMENT OR SYSTEM COMPONENTS FROM A UNION CONNECTION.**
- **DO NOT USE ANY METAL WRENCHES. USE ONLY STRAP WRENCHES.**

### ***Not For Use With Compressed Air or Gas***

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