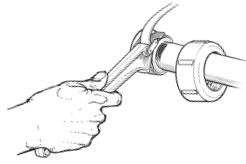


STEP 3

Wrench Make Up - Threaded pipe and valve components must always be installed using commercially available strap wrenches. Do not use conventional pipe wrenches, which can cause damage to plastic piping materials. Apply wrench make-up of no more than 1 to 2 turns beyond finger-tight thread engagement. Care must be taken in final positioning so as to avoid the need to "Back-up" the wrench assembly.



FLANGED INSERTS

Once a flange is attached to the pipe or valve, the method of joining two flanges are as follows:

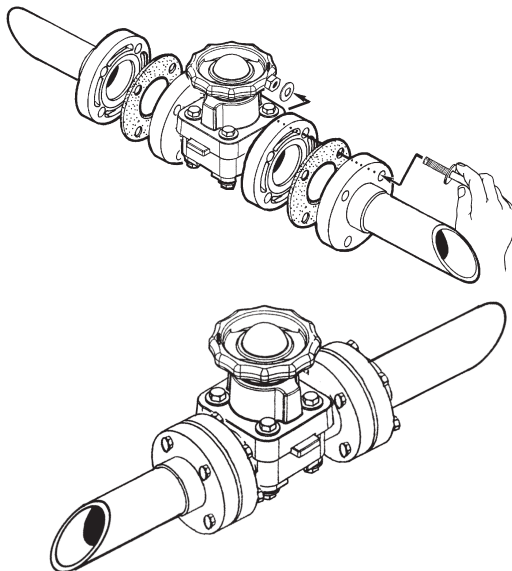
STEP 1

Use of well lubricated bolts & flat washers are required. Use an anti-seize lubricant such as IMS Cooper Flake.



STEP 2

With a 1/8" gasket having a shore "A" durometer of approximately 60 in place, align the bolt holes of the mating flanges by rotating the ring into position. Insert all bolts, washers, and nuts.



Tighten the nuts by hand until they are snug.

AT THIS TIME, BE SURE THAT THE FLANGE AND GASKET SURFACES ARE FLUSH AND SQUARELY ALIGNED.

CRITICAL INFORMATION



FLANGE BOLT TORQUES	
Valve Size	Torque Value
1/2" to 1-1/2"	12 ft. lbs.
2" to 4"	25 ft. lbs.
6" to 8"	40 ft. lbs.

STEP 3

Tighten Bolts - Establish a uniform pressure over the flange face by tightening the bolts in 5 ft. lbs. Increments following a 180° opposing sequence as shown in the table above. Care must be taken to avoid "BENDING" the flange when joining a Spears® flange together. DO NOT USE BOLTS TO BRING TOGETHER IMPROPERLY MATED FLANGES.

PRECAUTIONS AND WARNINGS

CAUTION: The system must be designed and installed so as not to pull the components in any direction. Pipe system must be cut and installed in such a manner as to avoid all stress loads associated with bending, pulling, or shifting. All piping systems must be supported.

CAUTION: BEFORE THE VALVE IS CYCLED, all dirt, sand, grit or other material shall be flushed from the system. This is to prevent scarring of internal components; e.g. ball, cup, wedge, seats, etc.

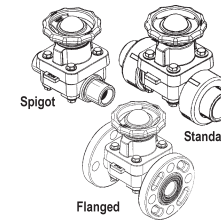
WARNING: System should not be operated or flushed out at flow velocities greater than 5 feet per second.

All air must be bled from the system during the initial fluid fill. Pressure testing of the system must not be made until all solvent cement joints have properly cured. Initial pressure testing must be made at approximately 10% of the system hydrostatic pressure rating to identify potential problems prior to testing at higher pressures.



Diaphragm Valve Installation Instructions

DV-3A-0106



These instructions cover general installation for all Spears® PVC, CPVC & PP Diaphragm Valves. All applicable instructions & procedures should be read thoroughly before starting. Suitability of the intended service application should be determined prior to installation. Plastic piping systems should be engineered, installed, operated & maintained in accordance with accepted standards & procedures for plastic piping systems.

SPECIAL INSTALLATION INFORMATION

True Union type diaphragm valves use removable end connectors. To avoid problems, NEVER ASSEMBLE THE JOINT TO THE END CONNECTORS WHILE THEY ARE ATTACHED TO THE VALVE CARTRIDGE.

IMPORTANT: Read Precautions & Warnings for all Valve Installations at the end of these instructions. It is absolutely necessary that all design, installation, operation & maintenance personnel be trained in proper handling, installation & precautions for installation & use of plastic piping systems before starting.

LUBRICATION WARNING: Some Lubricants, including vegetable oils, are known to cause stress cracking in thermoplastic materials. Formulation changes by lubricant manufacturers may alter compatibility of previously acceptable materials and are beyond our control. Lubricants are not required for installation of Spears® Valves.

CRITICAL INFORMATION

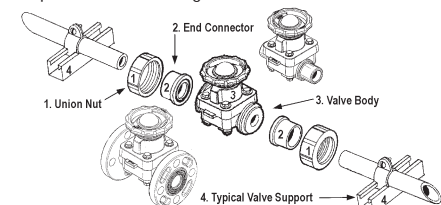
VALVE BONNET BOLT TORQUE CHECK: Valve and elastomer diaphragm materials generally "relax" after initial assembly and a quick check of bonnet bolt torque should be made prior to field installation. Bonnet bolts should be evenly tightened to the following specifications using an opposing sequence.

Bonnet Bolt Torque by Valve Size

Size	Torque (in-lbs.)	Size	Torque (in-lbs.)
1/2"	50	2"	170
3/4"	50	2-1/2"	125
1"	80	3"	125
1-1/4"	140	4"	125
1-1/2"	140	6" & 8"	125

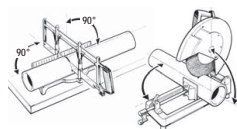
INSTALLATION INSTRUCTIONS FOR SOLVENT WELDING APPLICATIONS

Remove Union Nuts (1) and End Connectors (2) from the Valve Body (3) - (instructions apply to spigot and flanged valves). All components should be removed from packaging & exposed to the installation environment for a minimum of 1 hour to thermally balance the components. Wipe clean and match all components to their assigned identification numbers.



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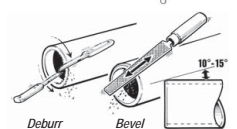
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STEP 1

Pipe Preparation - Prepare connecting pipes as required. Pipe ends must be cut square at 90° using a wheel type cutter or a saw and miter box.

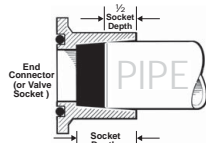
Regardless of the cutting method used, burrs will be created, which must be removed. All pipe ends should be beveled at 10° to 15°. A deburring tool is recommended, however a file may be used in its place as shown.



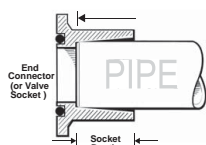
STEP 2

Wipe away all loose dirt & moisture from the pipes & components with a clean dry cloth. For True Union Valves, slide Union Nuts (1) over pipe ends where each End Connector Socket is to be installed, being sure that the Union Nut threads will be facing the Valve body.

FULL INTERFERENCE FIT



NET FIT



STEP 3

Check the Joint Interference fit between the pipe and the End Connector Socket (or fitting socket for spigot end). An Interference Fit is necessary for proper fusion of the joint. To check, lightly insert the End Connector Socket over the prepared pipe ends. **DO NOT FORCE THE SOCKET ONTO THE PIPE.**

Interference must occur between ½ the Socket depth (FULL INTERFERENCE) and the Socket bottom (NET FIT). Do not use components which do not properly mate.

Make sure that the face of each End Connector Socket is at a square 90° angle with the pipe end on True Union Valves.

True Union End Connector Socket O-rings must be free of any signs of dirt & debris. Clean as necessary. If O-rings must be removed, clean all surfaces and re-install by pressing the O-ring evenly into its retaining groove, being sure to avoid any wrinkles or creation of an uneven sealing surface.

Note: Steps 4 through 6 apply to spigot end valves with spigot end being "pipe" and mating fitting being "end connector."

STEP 4

Primer is necessary to penetrate & soften both pipe and End Connector Socket surfaces in order for the solvent cement to properly bond.

Using a brush or applicator size no less than 1/2 the pipe diameter, apply a liberal coat of primer with a circular, scrubbing motion to the inside socket of the End Connector until the surface is softened and semi-fluid. This will occur in 5 to 15 seconds depending on size and temperature.



Apply primer to the outside of pipe ends in the same manner extending application area to slightly beyond the insertion depth of the End Connector Socket. Apply a second coat to both pipe and socket.

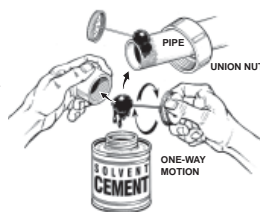
Check the penetration and softening by scraping the primed surfaces. A few thousandths of the semi-fluid surface should easily be removed.

REPEAT PRIMER APPLICATION IF NECESSARY.

THE MOST FREQUENT CAUSE OF JOINT FAILURE IS INADEQUATE PRIMER PENETRATION AND SOFTENING OF BONDING SURFACES DURING THE WELDING OPERATION. TAKE EXTRA CARE THAT NO SOLVENTS ARE ALLOWED TO COME IN CONTACT WITH THE BALL OR OTHER INTERNAL VALVE COMPONENTS.

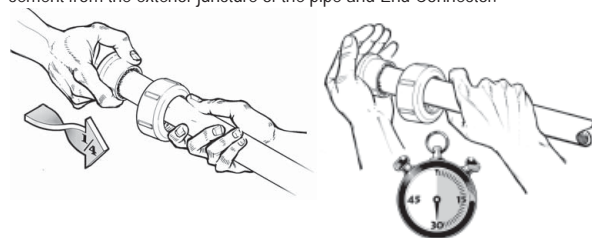
STEP 5

Solvent Cement must be applied IMMEDIATELY to the primed surfaces before the primer dries, in an alternating 3-coat application. Using a brush or applicator no less than ½ the pipe diameter, apply a liberal coat of solvent cement to the primed pipe surfaces. Next, apply a light to medium coat to the End Connector Socket primed surface. If a "NET FIT" was experienced during the dry fit check (See Step 3) then apply an additional liberal coat again to the pipe surface.



STEP 6

Immediately following the application of solvent cement, and before it begins to set, insert the End Connector Socket over the pipe end, push with a 1/4 twisting motion to evenly distribute the solvent cement within the joint. A full bead of solvent cement should form around the circumference of the joint. Hold joint together for approximately 30 seconds to make sure that the End Connector Socket does not back off of pipe. Use a cloth to remove any excess cement from the exterior juncture of the pipe and End Connector.



Repeat STEP 6 to attach opposite end connector to pipe and branch on 3-Way Valves.

Allow joint to cure according to solvent cement manufacturer's instructions.

STEP 7

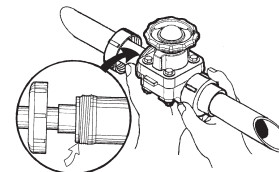
Attach True Union Valve Body to End Connector Socket and begin to tighten Union Nut.

DO NOT USE ANY TYPE OF THREAD SEALANTS. "HAND TIGHTEN ONLY."

BE SURE THAT THE FACE OF THE END CONNECTOR SOCKET IS SQUARELY ALIGNED (FLUSH) WITH THE VALVE BODY AND IS FLUSH AGAINST THE O-RING.

Attach final Union Nut to Valve Body.

DO NOT USE THE REMAINING UNION NUT TO DRAW TOGETHER ANY GAPS BETWEEN THE END CONNECTOR AND THE VALVE BODY.



STEP 8

Pressure test the system only after all solvent cement joints have fully cured. If any leaks are found at End Connectors during pressure check, use a strap wrench to tighten Union Nut 1/4 turn to stop the leak.

DO NOT OVER TIGHTEN AS DAMAGE MAY OCCUR.

THREADED CONNECTION

WARNING: SOME PIPE JOINT COMPOUNDS OR TEFLON PASTES MAY CONTAIN SUBSTANCES THAT COULD CAUSE STRESS CRACKING TO PLASTIC. TRANSITIONS TO METAL PIPE REQUIRE THOROUGH CLEANING AND DEGREASING TO REMOVE ANY PIPE THREAD CUTTING OIL.

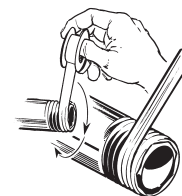


RECOMMENDED SEALANT:

Spears® Manufacturing Company highly recommends the use of Spears® BLUE 75™ thread sealant, which has been tested for compatibility with Spears® products. Please follow the sealant Manufacturers' Application/Installation instructions. Choice of another appropriate thread sealant is at the discretion of the installer.

IF A TAPE SEALANT IS USED:

1. Use TFE tape no less than 25 mil thick.
2. Initial wrap must fully cover the thread end.
3. Wrap clockwise with standard pipe threads.
4. Use only 2-3 wraps of tape.

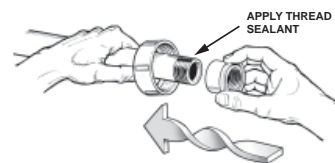


STEP 1

Apply Joint Sealant - Threaded connections require application of a quality grade thread sealant to seal and lubricate the joint assembly. Sealants must only be applied to male pipe threads.

STEP 2

Assemble Joint - 1 to 2 turns beyond "FINGER TIGHT" are generally all that is required to make a sound plastic threaded connection.



Unnecessary OVERTIGHTENING will cause damage to both pipe and valve. Follow Step 7 and Step 8 from Solvent Welding Instructions.