

HARCO

Ductile Iron Fittings for IPS-Size PVC Pipe

For Golf Course Irrigation Systems,
Commercial Turf Irrigation,
and Rural Water Systems



Fittings Designed for Ductility and Reliability

Harco's DI push-on joint fittings are designed to offer the best possible balance of strength, ductility, impact, and corrosion resistance. Fittings are manufactured for ASTM A536, Grade 65-45-12 ductile iron with a tensile strength of 65,000 psi. These fittings are designed for use on IPS PVC pipe and steel pipe in underground water mains, irrigation systems, and sewer force mains.

Harco Offers a Full Line of Top Quality Fittings

Ductile Iron fittings provide greater strength for underground PVC piping systems than either PVC or epoxy-coated steel fittings. Harco's DI fittings come in 2" through 12" diameters, and are available in tees, bends, reducers, plugs, service tees, flange adapters, wyes, and male thread by bell adapters. Our 28 different SEB (Small End Bell) reducers combine with 77 basic patterns to create over 800 possible configurations. Deep bell push-on joints allow quick and easy installation. They also provide extra room in the bells to allow for pipe movement always present in underground systems.

All the Strength You Need... and Then Some

Ductile iron is produced by adding magnesium alloy to molten iron. The magnesium causes the flake-form graphite to assume a spheroidal shape. This change in the carbon structure results in a far stronger, tougher ductile material than cast iron while retaining superior corrosion properties.

Harco fittings are pressure rated at 350 psi. They are cast of ductile iron with 65,000 psi tensile strength and a wall thickness of 0.31". The following chart illustrates how these fittings stack up against steel and PVC fittings. A Harco 6" x 6" tee withstood a pressure test of 3,000 psi without failure. This high strength capacity is vital in withstanding the critical cyclical surges and high mechanical stresses present in golf course irrigation systems. This high strength is especially important on systems utilizing the new computer controllers which can create additional surge pressures.

STRENGTH COMPARISON TABLE FOR 6" FITTINGS

MATERIAL	TENSILE STRENGTH	WALL THICKNESS	RELATIVE STRENGTH
PVC	7,000 psi	.36"	1
Epoxy-Coated Steel	49,000 psi	.08"	7
Ductile Iron	65,000 psi	.31"	9

Superior Corrosion Resistance Makes Ductile Cast Iron and Cast Iron Last and Last

Ductile cast iron is the standard underground material in the waterworks industry. In fact, one cast iron system has been in continuous use in a water supply line for over 345 years! Back in 1664, King Louis XIV of France ordered the construction of a cast iron pipe main extending fifteen miles from a pumping station at Marly-on-Seine to Versailles to supply water for the fountains and the town. That cast iron pipe is still functioning after more than 345 years of continuous service.

In ductile and cast iron, this corrosion resistance is created from a layer of insoluble graphite that is formed from initial corrosion that becomes a protective barrier against additional corrosion attack. This phenomenon is the reason that ductile iron and cast iron has such longevity in direct bury application in the majority of soils.

(Caution, The presence of highly corrosive soils or aggressive carried waters may require the use of protective measures, such as polyethylene encasement and/or epoxy coating. For those areas, Harco offers fusion bonded epoxy coatings and/or Ductile Iron Pipe Research Association (DIPRA) recommended polyethylene encasement.)

Harco's Patented Restraint Lug System Keeps Fittings Together (Patent No. 5,183,298)

Harco developed a special patented system of lugs and restraint rings. Restraint lugs designed to withstand over 10,000 pounds pull per lug are cast on the bells on the horizontal centerline of all fittings. The system provides positive restraint of Small End Bell (SEB) reducers, flange adapters and plugs to other fittings, and prevents separation of the assembled fittings.

The restraint rings are also designed to carry the extreme full load of a restrained plug at 350 psi pressure. Lugs allow fittings to be tied to valves and hydrants with the use of Harco restraint rods. Lugs on the bends provide pinch bar points for quick and easy push-on assembly.



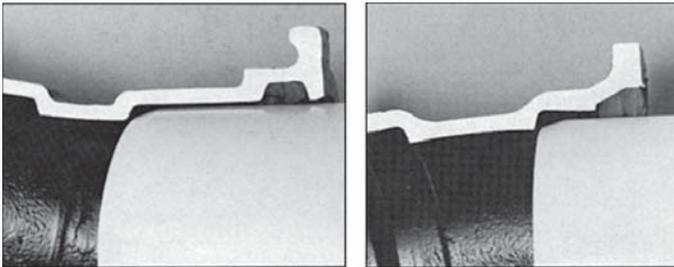
Spigot end of reducers insert into the bells of all other Harco fittings. Restraint rings "lock" reducers to main fitting.

Deep Bells with Gasketed Joints Simplify Installation and Eliminate Problems

Harco's push-on joint design provides for a deep socket bell to accommodate the expansion and contraction of a PVC piping system. The design incorporates a massive gasket in a square groove to prevent roll out and fish mouths. All fittings are designed to work directly on IPS size pipes — without the problems of using transition gaskets.

The push-on joint allows easy, all-weather installation for bottle-type joints every time. The joint assembles exactly like the pipe joints, eliminating all the potential errors that solvent cement voids, incorrect procedures, and inclement weather can cause.

The deep bell was designed in 1969 specifically for PVC pipe, with bell depths equal to pipe joint bell depths. The Harco joint is 2 to 4 times deeper behind the gasket than mechanical joints. The standard MJ joint was designed in 1930 specifically for iron pipe. It wasn't designed to handle the greater expansion and contraction of modern PVC pipe.



Harco Deep Bell vs. Mechanical Joint

The Harco joint is 2-4 times deeper than conventional mechanical joints to accommodate expansion and contraction and to prevent roll out and fish mouths.

Gaskets Are Made by Us to Meet Our Own High Standards

Harco manufactures its own gaskets to assure the highest quality and compatible tolerances for gaskets and bells. The gaskets are molded from SBR rubber and are the Chemidus "Z" style of gasket. These gaskets have been used trouble-free in hundreds of thousands of pipe and fitting joints since the mid-60's.

Modular Configurations Make Repairs Easier and Less Costly

Harco's patented system of 28 different SEB (Small End Bell) reducers combines with 77 basic patterns to create over 800 possible configurations for golf course irrigation systems. Restraint lugs on all fittings allow reducers to be positively attached to the basic fittings, so separation is never a concern. All configurations can either be assembled in the factory or in the field by contractors using standard fittings. This means your job won't be delayed waiting for special order fittings to be manufactured and shipped.

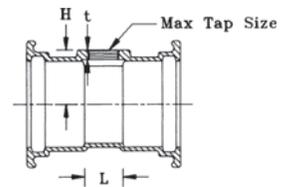
If a particular configuration doesn't get used, no problem. It can be disassembled into standard fittings for use elsewhere. This flexibility is a real plus for designers, contractors and suppliers because changes in the field become easier than ever. You can also reduce the stock you need on hand as well as long lead times for special order.



Shown is an assembled 3 x 2 x 3 tee. The 3 x 2 reducer is installed and restraint rings have been latched over the lugs to create an assembled fitting.

Install Services Easily with Harco Service Tees

Ductile iron service tees are the ideal solution for attaching services or irrigation swing joints onto the main. The gasketed joints of service tees provide added freedom for the service and protect the main line from service line or sprinkler head shocks. Harco service tees eliminate the variety of problems associated with incorrectly installed saddles and incorrect drilling procedures. Iron threads also provide large safety factors for installation — no more cracked PVC threaded fittings from overtorquing and improper assembly. By using a service tee, the main line pipe wall structural integrity is maintained, eliminating the combined stresses formed when a hole is drilled into the pipe.

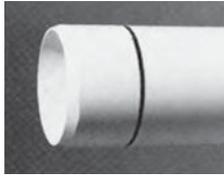


Service Tee - Gasket Joints on each end provide added degrees of freedom.

All Harco tapped tee outlets come furnished with female NPT threads in sizes you require.

Installation Instructions

1. Cut the pipe squarely and bevel the plain end of the pipe. Bevel should be approximately 15 degrees and $\frac{3}{4}$ " long. Remove any burrs and ridges on pipe. Measure the bell depth and mark the pipe for reference. In cold weather, allow $\frac{1}{2}$ " Clearance between end of pipe and bell stop, to allow for later pipe expansion. (See illustration.)
2. Clean all debris from the bell areas of the fitting. Check the position of the gasket so it's completely seated in the groove with no raised areas.
3. Lubricate the gasket and the plain end of the pipe with the lubricant supplied by the pipe manufacturer.
4. Align the pipe with the fitting and push together by hand or with pry bars on the end of the fitting with two pry bars using the lugs on the fitting. Insert until the reference line mark is even with the edge of the fitting bell.



Length from reference mark to end of pipe equal to "A" from Standard Bell Dimensions, less $\frac{1}{2}$ " to allow for expansion.

TABLE 1 - THRUST/100 TABLE (POUNDS PER 100 PSI)

SIZE	TEES, PLUGS	90° BENDS	45° BENDS	22½° BENDS
1½	284	401	217	111
2	363	513	278	141
2½	531	751	407	207
3	788	1,114	603	307
4	1,302	1,841	997	508
5	1,989	2,814	1,523	776
6	2,822	3,990	2,159	1,101
8	4,783	6,763	3,662	1,865
10	7,430	10,506	5,689	2,898
12	10,452	14,778	8,002	4,076

For reducers, subtract small opening plug thrust from large opening thrust to calculate thrust/100.

TABLE 2 - SOIL BEARING CAPACITY

SOIL TYPE	SAFE BEARING LOAD LBS PER SQ FT*
Soft Clay	1,000
Sand	2,000
Sand and Gravel	3,000
Sand and Gravel Cemented with Clay	4,000
Hard Pan	10,000

**Harco assumes no responsibility for the above load data. The engineer is responsible for determining safe bearing loads and when doubt exists, soil bearing tests should be specified. The bearing loads given are for horizontal thrusts when depth of cover exceeds 2 ft.*

Thrust Blocking

1. Provide poured concrete thrust blocks at all changes in size or direction. Bends, reducers, plugs, and the opposite side of tee branches all require thrust blocks.
2. The size of the thrust block is determined by the working pressure, the size and type of fitting, and the soil conditions at the job site. To calculate the area of contact with the soil, follow these steps:
3. Calculate the total thrust by selecting thrust/100 by size and type of fitting from Table 1 and multiplying thrust/100 by system pressure divided by 100.
4. Divide the total thrust by the bearing capacity of the soil in excavation (from Table 2) to determine the area (in square feet) of thrust block required to be in contact with the undisturbed soil.

Suggested Specification

Fittings shall be manufactured of ductile iron, Grade 65-45-12 in accordance with ASTM A536. Fittings shall have deep bell push-on joints with gaskets meeting ASTM F477. Fittings shall be HARCO DEEP BELL by The Harrington Corporation (HARCO Fittings) of Lynchburg, VA. Transition gaskets are not allowed.

The Harrington Corporation

P.O. Box 10335 • Lynchburg, VA 24506

Phone (434) 845-7094 • Fax (434) 845-8562

www.harcofittings.com • E-mail: sales@harcofittings.com