

## **Tee Design Information and Branch Outlet End Options**

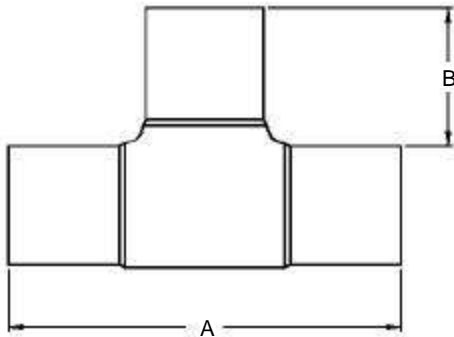
The linetee is a pipe component (fitting) that has a single branch outlet pipe equal in diameter to that of the main. The reducing-tee's branch outlet is of a diameter less than that of the main. Each tee side-outlet branch is at right angles (90 degrees) to the main.

Molded tees are fully pressure rated. Unreinforced fabricated tees have a reduced WPR, based solely on geometry. Three-piece mitered tees are usually "externally" reinforced to recapture some of the derating due to the hole in the main; this is accomplished by using the next lower DR (heavier wall) pipe. Reducing-tees are reinforced using massive branch saddles, such that the branch reinforcement surrounding the hole offsets the loss of "hoop" due to the hole. Reducing-tees made with the massive branch-saddle are fully pressure rated. The branch saddle reinforcement mass and its placement are calculated per ASME B31.3, Appendix H, Paragraph #304.3.3.

**Tee Outlet End Options** are: butt-end, flanged and MJ-anchor. Tees larger than 18" diameter should (strongly recommended) be shipped with flanged or MJ-anchor ends to facilitate mechanical assembly in the field without imposing undue lifting stress or strain on the fitting as it is positioned in the trench and connected to the pipe-run. Long runs of pipe (fused to the Tee) lifted / lowered into the trench can place undue stress/strain on the tee fitting

For a tee to achieve full pressure rating it must pass a quick burst test equal to that of the pipe. (attach a length of pipe equal to approx. 6 pipe diameters and then perform an ASTM D1599 quick-burst test) when the fitting survives and the attached pipe bursts, the fitting is as strong or stronger than the pipe. Tees with insufficient reinforcement will rupture before the attached pipe. Tees that survive the quick burst test have a safety factor and stress longevity equal to that of the pipe.

Derating or rerating of a tee WPR is a function of geometry and stress intensification factors at the hole in the main. Please refer to the engineering information presented earlier in the catalog section on Branch-Saddles.



## IPS & DIPS Molded Line Tee

Fully Pressure Rated for DR Ordered  
(Dimensions in Inches)

### IPS Molded Line Tee

| IPS Size | A     | B    | SDR   | Weight (lbs) |
|----------|-------|------|-------|--------------|
| 3/4"     | 6.12  | 2.54 | 11    | 0.5          |
| 1"       | 6.38  | 2.54 | 11    | 0.5          |
| 1-1/4"   | 6.76  | 2.55 | 11    | 1            |
| 1-1/2"   | 8.50  | 3.30 | 11    | 1            |
| 2"       | 9.00  | 3.31 | 9-11  | 2            |
| 3"       | 10.26 | 3.38 | 9-17  | 3            |
| 4"       | 11.20 | 3.35 | 9-17  | 4            |
| 6"       | 18.00 | 5.69 | 9-17  | 15           |
| 8"       | 24.00 | 7.69 | 11-17 | 30           |

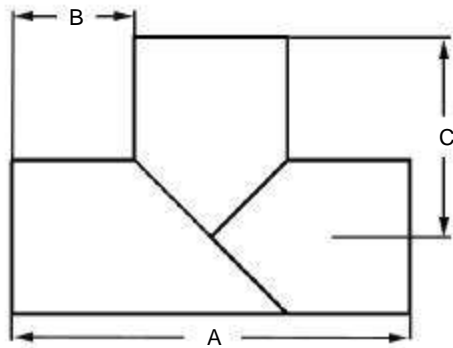
### DIPS Molded Line Tee

| DIPS Size | A     | B    | SDR | Weight (lbs) |
|-----------|-------|------|-----|--------------|
| 4"        | 15.63 | 5.42 | 11  | 6            |
| 6"        | 19.34 | 6.22 | 11  | 16           |
| 8"        | 23.15 | 7.06 | 11  | 30           |

Other sizes and DR's not listed are available - Call For Quick Quote

Hydrotesting for compliance with AWWA C906 fitting requirements add 15% (i.e., 1.15 multiplier).

# INDEPENDENT PIPE PRODUCTS



## IPS Fabricated Line Tee (Dimensions in Inches)

| IPS Size | A    | B    | C    | SDR | WPR | Weight (lbs) |
|----------|------|------|------|-----|-----|--------------|
| 4"       | 16.5 | 6.0  | 8.3  | 7   | 200 | 8            |
|          |      |      |      | 9   | 160 | 7            |
|          |      |      |      | 11  | 128 | 6            |
| 6"       | 18.6 | 6.0  | 9.3  | 7   | 200 | 19           |
|          |      |      |      | 9   | 160 | 15           |
|          |      |      |      | 11  | 128 | 13           |
| 8"       | 24.6 | 8.0  | 12.3 | 7   | 200 | 42           |
|          |      |      |      | 9   | 160 | 34           |
|          |      |      |      | 11  | 128 | 28           |
|          |      |      |      | 17  | 80  | 20           |
| 10"      | 26.8 | 8.0  | 13.4 | 7   | 200 | 70           |
|          |      |      |      | 9   | 160 | 57           |
|          |      |      |      | 11  | 128 | 46           |
|          |      |      |      | 17  | 80  | 32           |
| 12"      | 28.8 | 8.0  | 14.4 | 7   | 200 | 105          |
|          |      |      |      | 9   | 160 | 85           |
|          |      |      |      | 11  | 128 | 72           |
|          |      |      |      | 17  | 80  | 48           |
| 14"      | 32.0 | 9.0  | 16.0 | 7   | 200 | 140          |
|          |      |      |      | 9   | 160 | 112          |
|          |      |      |      | 11  | 128 | 93           |
|          |      |      |      | 17  | 80  | 63           |
| 16"      | 34.0 | 9.0  | 17.0 | 7   | 200 | 204          |
|          |      |      |      | 9   | 160 | 166          |
|          |      |      |      | 11  | 128 | 137          |
|          |      |      |      | 17  | 80  | 92           |
| 18"      | 38.0 | 10.0 | 19.0 | 7   | 200 | 283          |
|          |      |      |      | 9   | 160 | 231          |
|          |      |      |      | 11  | 128 | 194          |
|          |      |      |      | 17  | 80  | 131          |

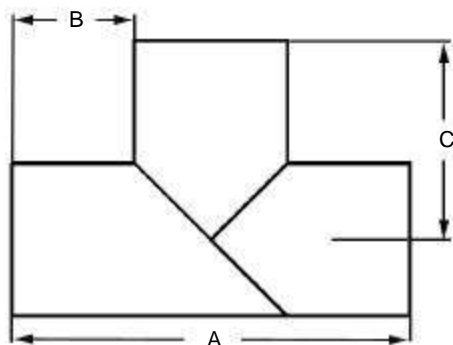
### • IPS Line Tee's Continued Next Page •

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

WPR represents the long term hydrostatic pressure capacity of the fabricated tee with a 1.5:1 safety factor. To achieve a 2:1 safety factor like that of the straight pipe the WPR will be reduced.

# INDEPENDENT PIPE PRODUCTS



## IPS Fabricated Line Tee (continued) (Dimensions in Inches)

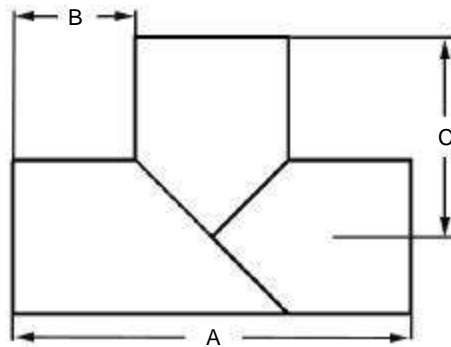
| IPS Size | A    | B    | C    | SDR  | WPR | Weight (lbs) |
|----------|------|------|------|------|-----|--------------|
| 20"      | 40.0 | 10.0 | 20.0 | 7    | 200 | 368          |
|          |      |      |      | 9    | 160 | 297          |
|          |      |      |      | 11   | 128 | 247          |
|          |      |      |      | 17   | 80  | 167          |
| 22"      | 46.0 | 12.0 | 23.0 | 7    | 200 | 506          |
|          |      |      |      | 9    | 160 | 409          |
|          |      |      |      | 11   | 128 | 343          |
|          |      |      |      | 17   | 80  | 231          |
| 24"      | 48.0 | 12.0 | 24.0 | 7    | 200 | 983          |
|          |      |      |      | 9    | 160 | 507          |
|          |      |      |      | 11   | 128 | 422          |
|          |      |      |      | 17   | 80  | 286          |
| 26"      | 54.0 | 14.0 | 27.0 | 9    | 160 | 686          |
|          |      |      |      | 11   | 128 | 577          |
|          |      |      |      | 17   | 80  | 390          |
| 28"      | 56.0 | 14.0 | 28.0 | 9    | 160 | 821          |
|          |      |      |      | 11   | 128 | 689          |
|          |      |      |      | 17   | 80  | 457          |
| 30"      | 58.0 | 14.0 | 29.0 | 11   | 128 | 816          |
|          |      |      |      | 17   | 80  | 552          |
| 32"      | 60.0 | 14.0 | 30.0 | 11   | 128 | 957          |
|          |      |      |      | 17   | 80  | 643          |
| 34"      | 74.0 | 20.0 | 50.0 | 11   | 128 | 1454         |
|          |      |      |      | 17   | 80  | 977          |
| 36"      | 76.0 | 20.0 | 51.0 | 11   | 128 | 1676         |
|          |      |      |      | 17   | 80  | 1128         |
| 42"      | 82.0 | 20.0 | 54.0 | 17   | 80  | 1633         |
|          |      |      |      | 21   | 65  | 1331         |
| 48"      | 88.0 | 20.0 | 57.0 | 21   | 65  | 1736         |
|          |      |      |      | 26   | 50  | 1413         |
| 54"      | 94.0 | 20.0 | 60.0 | 26   | 50  | 2026         |
|          |      |      |      | 32.5 | 40  | 1628         |

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

WPR represents the long term hydrostatic pressure capacity of the fabricated tee with a 1.5:1 safety factor. To achieve a 2:1 safety factor like that of the straight pipe the WPR will be reduced.

# INDEPENDENT PIPE PRODUCTS



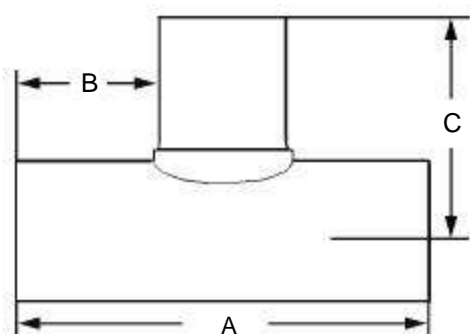
## DIPS Fabricated Line Tee (Dimensions in Inches)

| DIPS Size | A    | B    | C    | SDR | WPR | Weight (lbs) |
|-----------|------|------|------|-----|-----|--------------|
| 4"        | 16.8 | 6.0  | 8.4  | 9   | 160 | 9            |
|           |      |      |      | 11  | 128 | 7            |
|           |      |      |      | 17  | 80  | 5            |
| 6"        | 18.9 | 6.0  | 9.5  | 9   | 160 | 18           |
|           |      |      |      | 11  | 128 | 15           |
|           |      |      |      | 17  | 80  | 10           |
| 8"        | 25.0 | 8.0  | 12.5 | 9   | 160 | 37           |
|           |      |      |      | 11  | 128 | 34           |
|           |      |      |      | 17  | 80  | 23           |
| 10"       | 27.1 | 8.0  | 13.6 | 9   | 160 | 62           |
|           |      |      |      | 11  | 128 | 51           |
|           |      |      |      | 17  | 80  | 37           |
| 12"       | 29.2 | 8.0  | 14.6 | 9   | 160 | 93           |
|           |      |      |      | 11  | 128 | 78           |
|           |      |      |      | 17  | 80  | 54           |
| 14"       | 33.3 | 9.0  | 16.7 | 9   | 160 | 150          |
|           |      |      |      | 11  | 128 | 124          |
|           |      |      |      | 17  | 80  | 84           |
| 16"       | 35.4 | 9.0  | 17.7 | 9   | 160 | 205          |
|           |      |      |      | 11  | 128 | 175          |
|           |      |      |      | 17  | 80  | 115          |
| 18"       | 39.5 | 10.0 | 19.8 | 9   | 160 | 286          |
|           |      |      |      | 11  | 128 | 236          |
|           |      |      |      | 17  | 80  | 159          |
| 20"       | 41.6 | 10.0 | 20.8 | 9   | 160 | 359          |
|           |      |      |      | 11  | 128 | 302          |
|           |      |      |      | 17  | 80  | 206          |
| 24"       | 49.8 | 12.0 | 24.9 | 9   | 160 | 612          |
|           |      |      |      | 11  | 128 | 516          |
|           |      |      |      | 17  | 80  | 348          |
| 30"       | 60.0 | 14.0 | 30.0 | 11  | 128 | 963          |
|           |      |      |      | 17  | 80  | 647          |

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

WPR represents the long term hydrostatic pressure capacity of the fabricated tee with a 1.5:1 safety factor. To achieve a 2:1 safety factor like that of the straight pipe the WPR will be reduced.



## IPS Branch Saddle Reducing Tee Full Pressure Rated

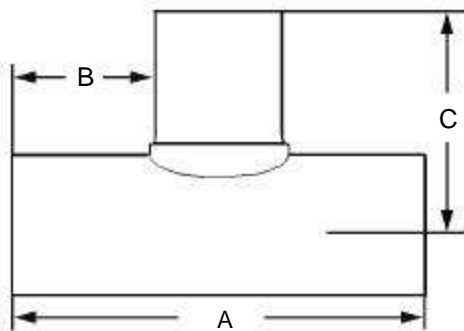
(Dimensions in Inches)

| IPS Size | A    | B    | C    | DR | Working Pressure | Weight (lbs) |
|----------|------|------|------|----|------------------|--------------|
| 4 x 2    | 18.0 | 7.2  | 11.3 | 11 | 160              | 5            |
| 6 x 2    | 18.0 | 7.2  | 12.3 | 11 | 160              | 12           |
| 8 x 2    | 18.0 | 7.2  | 13.3 | 11 | 160              | 19           |
| 10 x 2   | 18.0 | 7.2  | 14.4 | 11 | 160              | 28           |
| 12 x 2   | 20.0 | 8.2  | 15.4 | 11 | 160              | 39           |
| 4 x 3    | 18.0 | 6.7  | 12.3 | 11 | 160              | 5            |
| 6 x 3    | 18.0 | 6.7  | 13.3 | 11 | 160              | 12           |
| 6 x 4    | 19.0 | 6.2  | 13.3 | 11 | 160              | 13           |
| 8 x 4    | 19.0 | 6.2  | 14.3 | 11 | 160              | 20           |
| 10 x 4   | 19.0 | 6.2  | 15.4 | 11 | 160              | 29           |
| 12 x 4   | 23.0 | 8.2  | 16.4 | 11 | 160              | 41           |
| 8 x 6    | 21.0 | 6.2  | 14.3 | 11 | 160              | 26           |
| 10 x 6   | 21.0 | 6.2  | 15.4 | 11 | 160              | 35           |
| 12 x 6   | 24.0 | 7.7  | 16.4 | 11 | 160              | 46           |
| 14 x 6   | 24.0 | 7.7  | 17.0 | 11 | 160              | 53           |
| 16 x 6   | 29.0 | 10.2 | 18.0 | 11 | 160              | 96           |
| 10 x 8   | 24.0 | 6.2  | 24.4 | 11 | 160              | 44           |
| 12 x 8   | 28.0 | 8.2  | 25.4 | 11 | 160              | 73           |
| 12 x 10  | 30.0 | 8.6  | 26.4 | 11 | 160              | 85           |
| 14 x 10  | 30.0 | 8.6  | 27.0 | 11 | 160              | 95           |
| 16 x 10  | 34.0 | 10.6 | 28.0 | 11 | 160              | 116          |
| 14 x 12  | 32.0 | 8.5  | 29.0 | 11 | 160              | 117          |
| 16 x 12  | 36.0 | 10.5 | 30.0 | 11 | 160              | 138          |

Fully pressure rated reducing tees are available with outlet sizes 3/4" to 24" IPS.

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



## DIPS Branch Saddle Reducing Tee Full Pressure Rated

(Dimensions in Inches)

| DIPS Size | A  | B    | C    | DR | Working Pressure | Weight (lbs) |
|-----------|----|------|------|----|------------------|--------------|
| 6 x 4     | 19 | 6.2  | 13.5 | 11 | 160              | 18           |
| 8 x 4     | 19 | 6.2  | 14.5 | 11 | 160              | 25           |
| 10 x 4    | 19 | 6.2  | 15.6 | 11 | 160              | 35           |
| 12 x 4    | 23 | 8.2  | 16.6 | 11 | 160              | 46           |
| 8 x 6     | 21 | 6.2  | 14.5 | 11 | 160              | 33           |
| 10 x 6    | 21 | 6.2  | 15.6 | 11 | 160              | 43           |
| 12 x 6    | 24 | 7.7  | 16.6 | 11 | 160              | 54           |
| 14 x 6    | 24 | 7.7  | 17.7 | 11 | 160              | 59           |
| 16 x 6    | 29 | 10.2 | 18.7 | 11 | 160              | 118          |
| 10 x 8    | 24 | 6.2  | 24.6 | 11 | 160              | 55           |
| 12 x 8    | 28 | 8.2  | 25.6 | 11 | 160              | 86           |
| 12 x 10   | 30 | 8.6  | 26.6 | 11 | 160              | 104          |
| 14 x 10   | 30 | 8.6  | 27.7 | 11 | 160              | 111          |
| 16 x 10   | 34 | 10.6 | 28.7 | 11 | 160              | 148          |
| 14 x 12   | 32 | 8.5  | 29.7 | 11 | 160              | 133          |
| 16 x 12   | 36 | 10.5 | 30.7 | 11 | 160              | 170          |

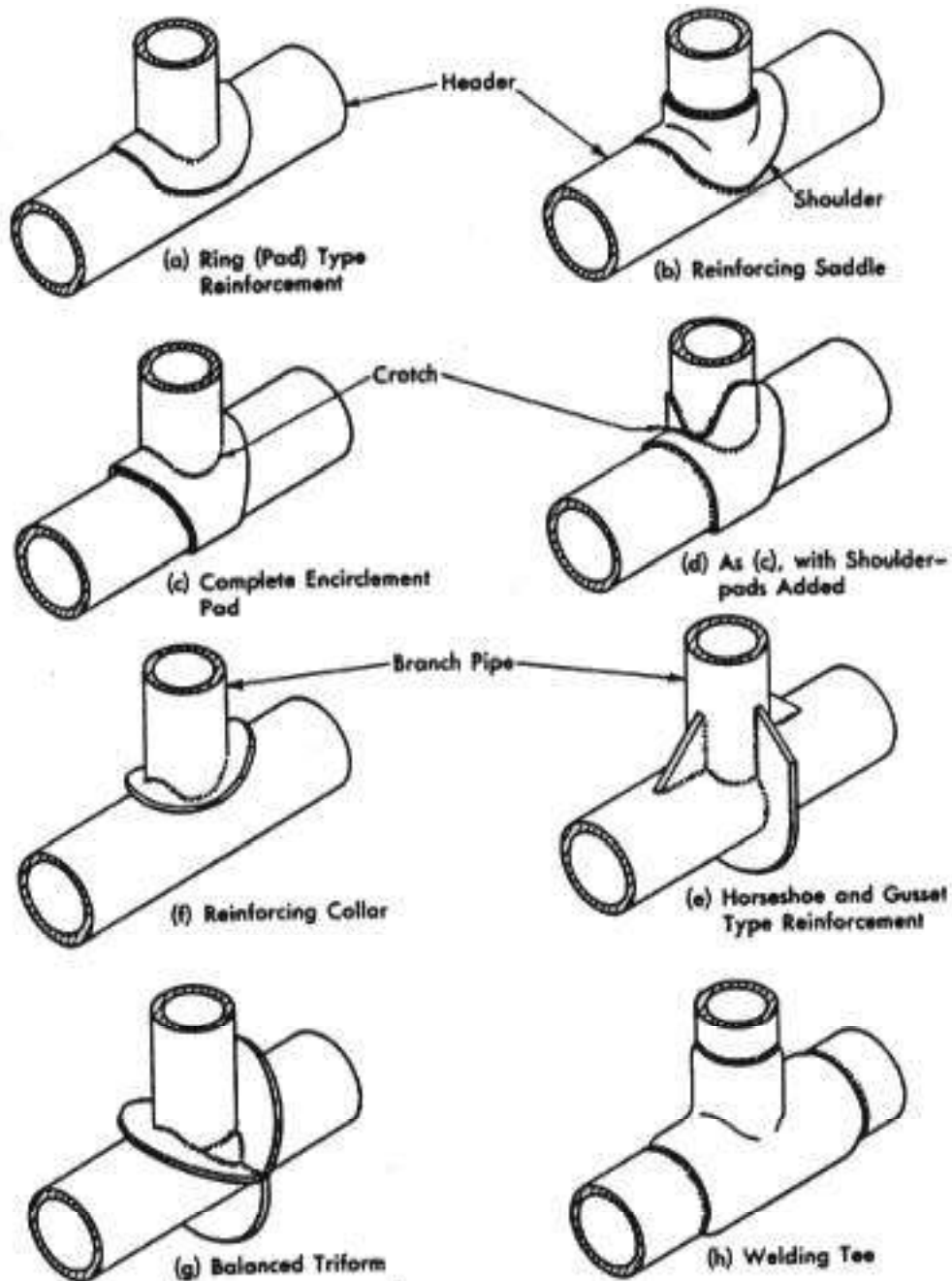
Fully pressure rated reducing tees are available with outlet sizes 4" to 20" DIPS.

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

## Full Pressure, Branch Outlet Reinforcement Designs

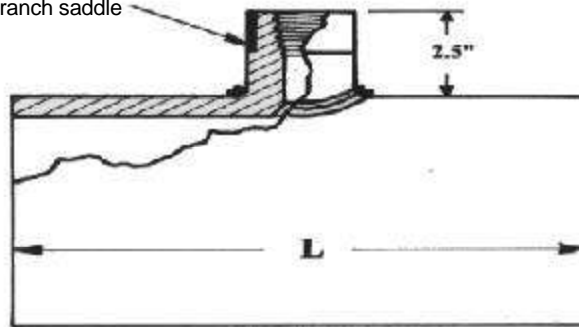
(Reference: "Design of Piping Systems" by the W. M. Kellogg Company)





## Tapped Tees IPS & DIPS Main Size (Dimensions in Inches)

Stainless steel reinforcing collar on OD  
Threads cut in ID of PE branch saddle



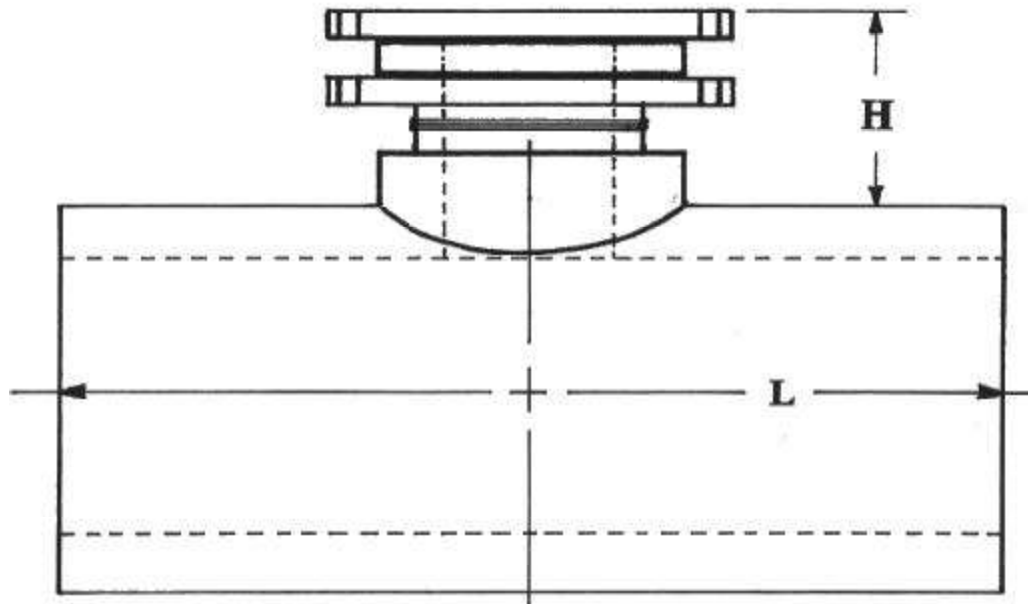
The industry open needs a threaded hole to mount a pressure gage or air release valve or flow-monitor or temperature sensor, etc. This fitting is offered in 2" NPT (which may be bushed down to 1" NPT and smaller) on all pipe sizes (IPS & DIPS). This fitting is fully pressure rated to the pipe main DR and its WPR.

| Nominal Size<br>IPS & DIPS | L  | DR | WPR<br>(psi) | Weight<br>(lbs) |
|----------------------------|----|----|--------------|-----------------|
| 4 "                        | 12 | 11 | 160          | 5               |
| 6 "                        | 12 | 11 | 160          | 11              |
| 8 "                        | 12 | 11 | 160          | 15              |
| 10 "                       | 15 | 11 | 160          | 22              |
| 12 "                       | 15 | 11 | 160          | 29              |
| 14 "                       | 18 | 11 | 160          | 44              |
| 16 "                       | 20 | 11 | 160          | 63              |
| 18 "                       | 24 | 11 | 160          | 91              |
| 20 "                       | 24 | 11 | 160          | 111             |
| 24 "                       | 24 | 11 | 160          | 157             |
| 28 " IPS                   | 30 | 11 | 160          | 227             |
| 30 "                       | 30 | 11 | 160          | 294             |
| 36 " IPS                   | 36 | 17 | 100          | 302             |

For larger diameter pipe mains or other pipe main DR's, call for a Quick Quote on price and delivery.

## Inspection Tee Kit

(Dimensions in Inches)



The inspection tee is used on many transmission and distribution pipelines. It offers the owner an opening to the interior of the pipeline for the purpose of inspection or simple access for mechanical equipment or people when the pipeline is large in diameter. The KIT includes the native branch saddle, the low height flange adapter fused to the branch-saddle with the metal back up ring (captured in-between) and blind flange. The bolts are not included in the kit. The assembly is saddle-fused to a sufficient long section of pipe main to provide for field fusion. The following inspection tee kits are engineered. Call for a Quick Quote on the particular main size and inspection tee outlet combination needed for the project.

**4" Inspection Tee Kit x 6" to 54" main**  
**6" Inspection Tee Kit x 8" to 54" main**  
**8" Inspection Tee Kit x 10" to 54" main**  
**10" Inspection Tee Kit x 12" to 54" main**  
**12" Inspection Tee Kit x 14" to 54" main**  
**18" Inspection Tee Kit x 20" to 54" main**  
**24" Inspection Tee Kit x 28" to 54" main**

## Elbow Design Information and End Options

The design basis for forge-molded elbows and fabricated segment elbows is well known. A 90 degree elbow is one-fourth of a torus (doughnut). The wedge removed from the straight pipe to make a miter-curve causes a force imbalance within the elbow. The ell tries to straighten out, sort of like a kink in a pressurized fire-hose. The ell must be derated or extra mass added to maintain the same pressure rating as the pipe itself. The heat-fusion welds are a focus point for the bending stress trying to straighten the ell. Continuous bend pipe without mitered fusion joints offer a higher pressure rating because there is no stress intensification factor (SIF) (i.e., no joints). Forge molded ells offer the same tight radius, no fusion joint flow turbulence, no miter joint stress intensification, and full pressure rating. Fabricated miter-ells have about the same radius of curvature, 4 turbulence amplifying fusion joints close together, and must be re-rated for WPR. The END OPTIONS for elbows include butt-end, flanged, and DIMJA.

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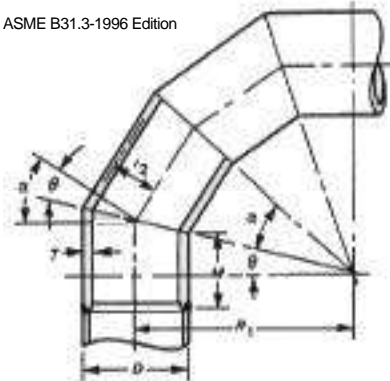


FIG. 304.23 NOMENCLATURE FOR MITER BENDS

The following nomenclature is used in the equations for pressure design of straight pipe.  
tm = minimum required thickness, including mechanical, corrosion, and erosion allowances

t = pressure design thickness, as calculated in accordance with para. 304.1.2 for internal pressure or as determined in accordance with para. 304.1.3 for external pressure

c = the sum of the mechanical allowances (thread or groove depth) plus corrosion and erosion allowance". For threaded components, the nominal thread depth (dimension h of ASME B1.20.1, or equivalent) shall apply. For machined surfaces or grooves where the tolerance is not specified, the tolerance shall be assumed to be 0.5 mm (0.02 in.) in addition to the specified depth of the cut.

T = pipe wall thickness (measured or minimum per purchase specification)

d = inside diameter of pipe. For pressure design calculation, the inside diameter of the pipe is the maximum value allowable under the purchase specification.

P = internal design gage pressure

D = outside diameter of pipe as listed in tables of standards or specifications or as measured

E = quality factor from Table A-1A or A-1B

S = stress value for material from Table A-1

Y = coefficient from Table 304.1.1, valid for  $t < D/6$  and for materials shown. The value of Y may be interpolated for intermediate temperatures. For  $t \geq D/6$ .

$$Y = \frac{d + 2c}{D + d + 2c}$$

Multiple Miter Bends. The maximum allowable internal pressure shall be the lesser value calculated from Eqs. (4a) and (4b). These equations are not applicable when  $\theta$  exceeds 22.5 deg.

$$P_m = \frac{SE(T-c)}{r_2} \left( \frac{T-c}{(T-c) + 0.643 \tan \theta \sqrt{r_2(T-c)}} \right) \quad (4a)$$

$$P_m = \frac{SE(T-c)}{r_2} \left( \frac{R_1 - r_2}{R_1 - 0.5r_2} \right) \quad (4b)$$

(b) Single Miter Bends

(1) The maximum allowable internal pressure for a single miter bend with angle  $\alpha$  not greater than 22.5 deg. shall be calculated by Eq. (4a).

(2) The maximum allowable internal pressure for a single miter bend with angle  $\alpha$  greater than 22.5 deg. shall be calculated by Eq. (4c):

$$P_m = \frac{SE(T-c)}{r_2} \left( \frac{T-c}{(T-c) + 1.25 \tan \theta \sqrt{r_2(T-c)}} \right) \quad (4c)$$

c) The miter pipe wall thickness T used in Eqs. (4a), (4b), and (4c) shall extend a distance not less than M from the inside crotch of the end miter welds where

M = the larger of  $2.5(r_2 T)^{0.5}$  or  $\tan \theta (R_1 - r_2)$

The length of taper at the end of the miter pipe may be included in the distance M.

(d) The following nomenclature is used in Eqs. (4a), (4b), and (4c) for the pressure design of miter bends:

c = same as defined in para. 304.1.1

E = same as defined in para. 304.1.1

$P_m$  = maximum allowable internal pressure for miter bends

$r_2$  = mean radius of pipe using nominal wall T

$R_1$  = effective radius of miter bend, defined as the shortest distance from the pipe centerline to the intersection of the planes of adjacent miter joints

S = same as defined in para. 304.1.1

T = miter pipe wall thickness (measured or minimum per purchase specification)

$\theta$  = angle of miter cut

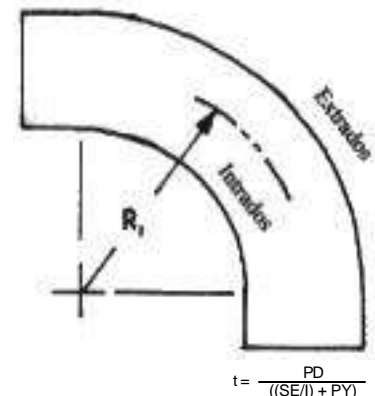
$\alpha$  = angle of change in direction at miter joint  
=  $2\theta$

For compliance with this Code, the value of  $R_1$  shall be not less than that given by Eq. (5):

$$R_1 = \frac{A}{\tan \theta} + \frac{D}{2} \quad (5)$$

where A has the following empirical values:  
for U.S. customary units:

$$\frac{(T-c), \text{ in.}}{\begin{matrix} \leq 0.5 \\ 0.5 < (T-c) < 0.88 \\ \geq 0.88 \end{matrix}} \quad \frac{A}{\begin{matrix} 1.0 \\ 2(T-c) \\ [2(T-c)/3] + 1.17 \end{matrix}}$$



$$t = \frac{PD}{((SE/I) + PY)}$$

where at the intrados (inside bend radius)

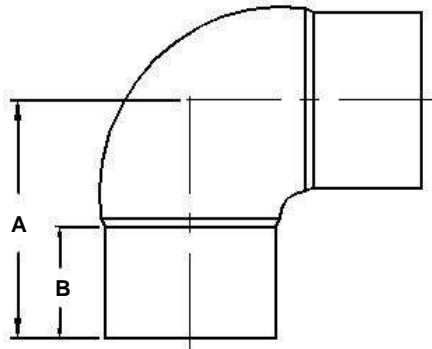
$$I = \frac{4(R/D) - 1}{4(R/D) - 2}$$

where at the extrados (outside bend radius)

$$I = \frac{4(R/D) - 1}{4(R/D) - 2}$$

and at the sidewall on the bend centerline radius,  
I = 1.0.

$R_1$  = centerline radius of bend or elbow



## IPS & DIPS Molded 90° Elbow

Fully Pressure Rated for DR Ordered  
(Dimensions in Inches)

### IPS Molded 90's

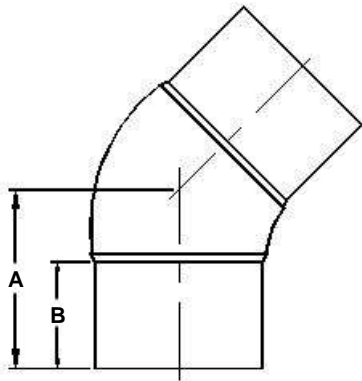
| IPS Size | A     | B     | SDR   | Weight (lbs) |
|----------|-------|-------|-------|--------------|
| 3/4"     | 4.00  | 2.625 | 9-11  | 0.5          |
| 1"       | 4.00  | 2.625 | 9-11  | 0.5          |
| 1-1/4"   | 4.00  | 2.625 | 9-11  | 0.5          |
| 1-1/2"   | 4.00  | 2.625 | 9-11  | 0.5          |
| 2"       | 4.50  | 2.500 | 9-11  | 1            |
| 3"       | 5.13  | 3.000 | 9-17  | 2            |
| 4"       | 5.75  | 3.000 | 9-17  | 3            |
| 6"       | 9.00  | 4.380 | 9-17  | 9            |
| 8"       | 12.00 | 6.000 | 11-17 | 22           |

### DIPS Molded 90's

| DIPS Size | A     | B    | SDR | Weight (lbs) |
|-----------|-------|------|-----|--------------|
| 4"        | 7.82  | 3.88 | 11  | 4            |
| 6"        | 9.67  | 4.50 | 11  | 11           |
| 8"        | 11.58 | 5.17 | 11  | 20           |

Other sizes and DR's not listed are available - Call For Quick Quote

Hydrotesting for compliance with AWWA C906 fitting requirements add 15% (i.e., 1.15 multiplier).



## IPS & DIPS Molded 45° Elbow

Fully Pressure Rated for DR Ordered  
(Dimensions in Inches)

### IPS Molded 45's

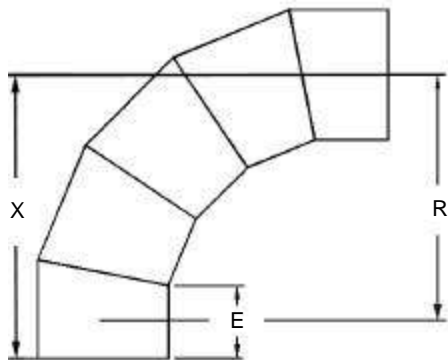
| IPS Size | A     | B    | SDR   | Weight (lbs) |
|----------|-------|------|-------|--------------|
| 3/4"     | 2.28  | 2.05 | 11    | 0.5          |
| 1"       | 2.48  | 2.17 | 11    | 0.5          |
| 1-1/4"   | 2.83  | 2.44 | 11    | 0.5          |
| 1-1/2"   | 3.07  | 2.64 | 11    | 0.5          |
| 2"       | 3.23  | 2.64 | 11    | 1.5          |
| 3"       | 5.00  | 3.13 | 9-17  | 2            |
| 4"       | 5.00  | 3.13 | 9-17  | 3            |
| 6"       | 8.45  | 4.38 | 9-17  | 7            |
| 8"       | 11.00 | 6.00 | 11-17 | 21           |

### DIPS Molded 45's

| DIPS Size | A    | B    | SDR | Weight (lbs) |
|-----------|------|------|-----|--------------|
| 4"        | 6.05 | 3.88 | 11  | 4            |
| 6"        | 7.16 | 4.50 | 11  | 10           |
| 8"        | 8.32 | 5.17 | 11  | 15           |

Other sizes and DR's not listed are available - Call For Quick Quote

Hydrotesting for compliance with AWWA C906 fitting requirements add 15% (i.e., 1.15 multiplier).



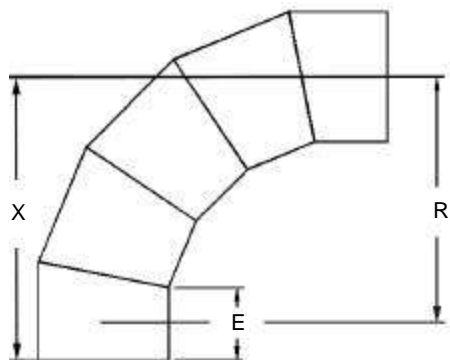
## IPS 90° 5 Segment Elbow Fabricated (1/4 Bend) (Dimensions in Inches)

| IPS Size | R/D Ratio | R    | X    | E   | SDR   | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|-----|-------|-----------|--------------|
| 2"       | 5.4       | 12.7 | 14.4 | 4.0 | 7     | 200       | 2            |
|          |           |      |      |     | 9     | 160       | 2            |
|          |           |      |      |     | 11&17 | 128/80    | 1.5          |
| 3"       | 3.8       | 13.2 | 15.0 | 4.0 | 7     | 200       | 5            |
|          |           |      |      |     | 9     | 160       | 4            |
|          |           |      |      |     | 11&17 | 128/80    | 4            |
| 4"       | 3.0       | 13.7 | 15.5 | 4.0 | 7     | 200       | 9            |
|          |           |      |      |     | 9     | 160       | 8            |
|          |           |      |      |     | 11&17 | 128/80    | 7            |
| 6"       | 2.2       | 14.7 | 18.5 | 6.0 | 7     | 200       | 22           |
|          |           |      |      |     | 9     | 160       | 18           |
|          |           |      |      |     | 11&17 | 128/80    | 15           |
| 8"       | 1.8       | 16.0 | 20.2 | 6.5 | 7     | 200       | 40           |
|          |           |      |      |     | 9     | 160       | 32           |
|          |           |      |      |     | 11    | 128       | 27           |
|          |           |      |      |     | 17    | 80        | 19           |
| 10"      | 1.6       | 17.0 | 21.2 | 6.5 | 7     | 200       | 64           |
|          |           |      |      |     | 9     | 160       | 53           |
|          |           |      |      |     | 11    | 128       | 43           |
|          |           |      |      |     | 17    | 80        | 30           |
| 12"      | 1.5       | 19.1 | 24.6 | 8.0 | 7     | 200       | 103          |
|          |           |      |      |     | 9     | 160       | 84           |
|          |           |      |      |     | 11    | 128       | 72           |
|          |           |      |      |     | 17    | 80        | 46           |
| 14"      | 1.5       | 21.0 | 26.2 | 8.0 | 7     | 200       | 132          |
|          |           |      |      |     | 9     | 160       | 106          |
|          |           |      |      |     | 11    | 128       | 88           |
|          |           |      |      |     | 17    | 80        | 60           |
| 16"      | 1.5       | 24.0 | 28.8 | 8.0 | 7     | 200       | 185          |
|          |           |      |      |     | 9     | 160       | 151          |
|          |           |      |      |     | 11    | 128       | 125          |
|          |           |      |      |     | 17    | 80        | 84           |
| 18"      | 1.5       | 27.0 | 31.4 | 8.0 | 7     | 200       | 254          |
|          |           |      |      |     | 9     | 160       | 207          |
|          |           |      |      |     | 11    | 128       | 174          |
|          |           |      |      |     | 17    | 80        | 118          |

**• IPS 5 Segment 90's Continued Next Page •**

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



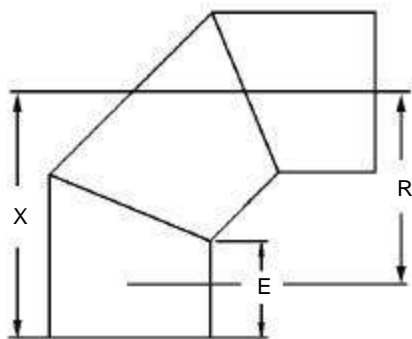
**IPS 90°  
5 Segment Elbow  
Fabricated (1/4 Bend)  
(continued)  
(Dimensions in Inches)**

| IPS Size | R/D Ratio | R    | X    | E    | SDR  | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|------|------|-----------|--------------|
| 20"      | 1.5       | 30.0 | 34.0 | 8.0  | 7    | 200       | 335          |
|          |           |      |      |      | 9    | 160       | 270          |
|          |           |      |      |      | 11   | 128       | 225          |
|          |           |      |      |      | 17   | 80        | 153          |
| 22"      | 1.5       | 33.0 | 36.6 | 8.0  | 7    | 200       | 430          |
|          |           |      |      |      | 9    | 160       | 347          |
|          |           |      |      |      | 11   | 128       | 292          |
|          |           |      |      |      | 17   | 80        | 196          |
| 24"      | 1.5       | 36.0 | 39.2 | 8.0  | 7    | 200       | 538          |
|          |           |      |      |      | 9    | 160       | 437          |
|          |           |      |      |      | 11   | 128       | 364          |
|          |           |      |      |      | 17   | 80        | 247          |
| 26"      | 1.5       | 39.0 | 43.8 | 10.0 | 9    | 160       | 517          |
|          |           |      |      |      | 11   | 128       | 485          |
|          |           |      |      |      | 17   | 80        | 328          |
| 28"      | 1.5       | 42.0 | 46.4 | 10.0 | 9    | 160       | 699          |
|          |           |      |      |      | 11   | 128       | 587          |
|          |           |      |      |      | 17   | 80        | 390          |
| 30"      | 1.5       | 45.0 | 49.0 | 10.0 | 11   | 128       | 714          |
|          |           |      |      |      | 17   | 80        | 483          |
| 32"      | 1.5       | 48.0 | 51.6 | 10.0 | 11   | 128       | 847          |
|          |           |      |      |      | 17   | 80        | 570          |
| 34"      | 1.5       | 51.0 | 54.3 | 10.0 | 11   | 128       | 996          |
|          |           |      |      |      | 17   | 80        | 668          |
| 36"      | 1.5       | 54.0 | 56.8 | 10.0 | 11   | 128       | 1176         |
|          |           |      |      |      | 17   | 80        | 792          |
| 42"      | 1.5       | 63.0 | 68.2 | 16.0 | 17   | 80        | 1215         |
|          |           |      |      |      | 21   | 65        | 990          |
| 48"      | 1.5       | 72.0 | 78.4 | 16.0 | 21   | 65        | 1402         |
|          |           |      |      |      | 26   | 50        | 1140         |
| 54"      | 1.5       | 81.0 | 86.3 | 16.0 | 26   | 50        | 1788         |
|          |           |      |      |      | 32.5 | 40        | 1436         |

**Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote**

**Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.**

# INDEPENDENT PIPE PRODUCTS



## IPS 90° 3 Segment Elbow Fabricated (1/4 Bend) (Dimensions in Inches)

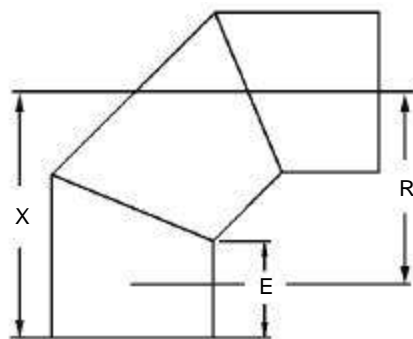
| IPS Size | R/D Ratio | R    | X    | E   | SDR   | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|-----|-------|-----------|--------------|
| 4"       | 1.5       | 6.8  | 10.9 | 6.0 | 7     | 200       | 7            |
|          |           |      |      |     | 9     | 160       | 6            |
|          |           |      |      |     | 11&17 | 128/80    | 5            |
|          |           |      |      |     |       |           |              |
| 6"       | 1.5       | 10.0 | 13.2 | 6.0 | 7     | 200       | 16           |
|          |           |      |      |     | 9     | 160       | 13           |
|          |           |      |      |     | 11&17 | 128/80    | 11           |
|          |           |      |      |     |       |           |              |
| 8"       | 1.25      | 10.7 | 14.6 | 6.5 | 7     | 200       | 29           |
|          |           |      |      |     | 9     | 160       | 23           |
|          |           |      |      |     | 11    | 128       | 20           |
|          |           |      |      |     | 17    | 80        | 14           |
| 10"      | 1.25      | 13.5 | 16.6 | 6.5 | 7     | 200       | 51           |
|          |           |      |      |     | 9     | 160       | 42           |
|          |           |      |      |     | 11    | 128       | 34           |
|          |           |      |      |     | 17    | 80        | 24           |
| 12"      | 1.25      | 16.0 | 20.0 | 8.0 | 7     | 200       | 84           |
|          |           |      |      |     | 9     | 160       | 68           |
|          |           |      |      |     | 11    | 128       | 57           |
|          |           |      |      |     | 17    | 80        | 39           |
| 14"      | 1.05      | 14.5 | 19.4 | 8.0 | 7     | 200       | 99           |
|          |           |      |      |     | 9     | 160       | 80           |
|          |           |      |      |     | 11    | 128       | 66           |
|          |           |      |      |     | 17    | 80        | 45           |
| 16"      | 1.05      | 16.8 | 21.2 | 8.0 | 7     | 200       | 138          |
|          |           |      |      |     | 9     | 160       | 112          |
|          |           |      |      |     | 11    | 128       | 93           |
|          |           |      |      |     | 17    | 80        | 63           |
| 18"      | 1.02      | 18.4 | 22.5 | 8.0 | 7     | 200       | 184          |
|          |           |      |      |     | 9     | 160       | 150          |
|          |           |      |      |     | 11    | 128       | 126          |
|          |           |      |      |     | 17    | 80        | 85           |
| 20"      | 1.02      | 20.4 | 24.1 | 8.0 | 7     | 200       | 241          |
|          |           |      |      |     | 9     | 160       | 196          |
|          |           |      |      |     | 11    | 128       | 162          |
|          |           |      |      |     | 17    | 80        | 111          |

### • IPS 3 Segment 90's Continued Next Page •

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



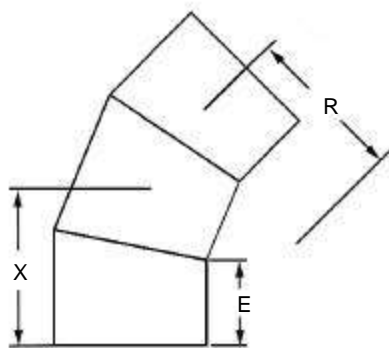


**IPS 90°  
3 Segment Elbow  
Fabricated (1/4 Bend)  
(continued)  
(Dimensions in Inches)**

| IPS Size | R/D Ratio | R    | X    | E    | SDR  | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|------|------|-----------|--------------|
| 22"      | 1.02      | 22.4 | 25.7 | 8.0  | 7    | 200       | 308          |
|          |           |      |      |      | 9    | 160       | 251          |
|          |           |      |      |      | 11   | 128       | 209          |
|          |           |      |      |      | 17   | 80        | 141          |
| 24"      | 1.02      | 24.5 | 27.3 | 8.0  | 7    | 200       | 394          |
|          |           |      |      |      | 9    | 160       | 320          |
|          |           |      |      |      | 11   | 128       | 267          |
|          |           |      |      |      | 17   | 80        | 181          |
| 26"      | 1.02      | 26.5 | 30.9 | 10.0 | 9    | 160       | 421          |
|          |           |      |      |      | 11   | 128       | 354          |
|          |           |      |      |      | 17   | 80        | 239          |
| 28"      | 1.02      | 28.5 | 32.5 | 10.0 | 9    | 160       | 509          |
|          |           |      |      |      | 11   | 128       | 427          |
|          |           |      |      |      | 17   | 80        | 283          |
| 30"      | 1.02      | 30.5 | 34.1 | 10.0 | 11   | 128       | 510          |
|          |           |      |      |      | 17   | 80        | 345          |
| 32"      | 1.20      | 38.0 | 38.9 | 10.0 | 11   | 128       | 738          |
|          |           |      |      |      | 17   | 80        | 496          |
| 34"      | 1.20      | 41.0 | 41.0 | 10.0 | 11   | 128       | 871          |
|          |           |      |      |      | 17   | 80        | 585          |
| 36"      | 1.20      | 43.0 | 42.6 | 10.0 | 11   | 128       | 1019         |
|          |           |      |      |      | 17   | 80        | 686          |
| 42"      | 1.20      | 50.0 | 54.0 | 16.0 | 17   | 80        | 1050         |
|          |           |      |      |      | 21   | 65        | 856          |
| 48"      | 1.20      | 58.0 | 59.9 | 16.0 | 21   | 65        | 1208         |
|          |           |      |      |      | 26   | 50        | 984          |
| 54"      | 1.20      | 64.0 | 64.7 | 16.0 | 26   | 50        | 1401         |
|          |           |      |      |      | 32.5 | 40        | 1126         |

**Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote**

**Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.**



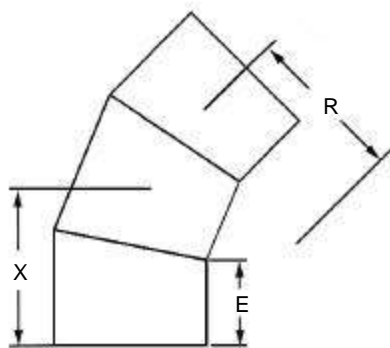
## IPS 45° 3 Segment Elbow Fabricated (1/8 Bend) (Dimensions in Inches)

| IPS Size | R/D Ratio | R    | X    | E   | SDR   | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|-----|-------|-----------|--------------|
| 2"       | 5.4       | 12.7 | 6.6  | 4.0 | 7     | 200       | 1.5          |
|          |           |      |      |     | 9     | 160       | 1            |
|          |           |      |      |     | 11&17 | 128/80    | 1            |
| 3"       | 3.8       | 13.2 | 6.8  | 4.0 | 7     | 200       | 3            |
|          |           |      |      |     | 9     | 160       | 2            |
|          |           |      |      |     | 11&17 | 128/80    | 2            |
| 4"       | 3.0       | 13.7 | 7.0  | 4.0 | 7     | 200       | 6            |
|          |           |      |      |     | 9     | 160       | 5            |
|          |           |      |      |     | 11&17 | 128/80    | 4            |
| 6"       | 2.2       | 14.7 | 9.4  | 6.0 | 7     | 200       | 1            |
|          |           |      |      |     | 9     | 160       | 11           |
|          |           |      |      |     | 11&17 | 128/80    | 9            |
| 8"       | 1.8       | 16.0 | 10.3 | 6.5 | 7     | 200       | 24           |
|          |           |      |      |     | 9     | 160       | 19           |
|          |           |      |      |     | 11    | 128       | 16           |
|          |           |      |      |     | 17    | 80        | 12           |
| 10"      | 1.6       | 17.0 | 10.7 | 8.0 | 7     | 200       | 39           |
|          |           |      |      |     | 9     | 160       | 32           |
|          |           |      |      |     | 11    | 128       | 26           |
|          |           |      |      |     | 17    | 80        | 18           |
| 12"      | 1.5       | 19.1 | 12.8 | 8.0 | 7     | 200       | 62           |
|          |           |      |      |     | 9     | 160       | 51           |
|          |           |      |      |     | 11    | 128       | 43           |
|          |           |      |      |     | 17    | 80        | 29           |
| 14"      | 1.5       | 21.0 | 13.2 | 8.0 | 7     | 200       | 79           |
|          |           |      |      |     | 9     | 160       | 64           |
|          |           |      |      |     | 11    | 128       | 53           |
|          |           |      |      |     | 17    | 80        | 36           |
| 16"      | 1.5       | 24.0 | 14.0 | 8.0 | 7     | 200       | 112          |
|          |           |      |      |     | 9     | 160       | 91           |
|          |           |      |      |     | 11    | 128       | 76           |
|          |           |      |      |     | 17    | 80        | 51           |
| 18"      | 1.5       | 27.0 | 14.7 | 8.0 | 7     | 200       | 146          |
|          |           |      |      |     | 9     | 160       | 119          |
|          |           |      |      |     | 11    | 128       | 101          |
|          |           |      |      |     | 17    | 80        | 68           |

**• IPS 3 Segment 45's Continued Next Page •**

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

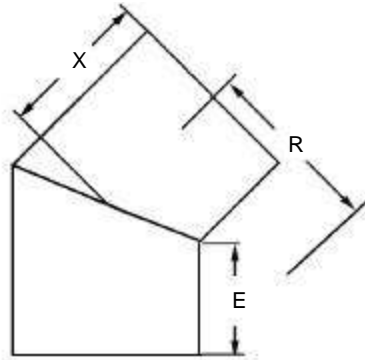


**IPS 45°  
3 Segment Elbow  
Fabricated (1/8 Bend)  
(continued)  
(Dimensions in Inches)**

| IPS Size | R/D Ratio | R    | E | X    | E    | SDR  | WPR (psi) | Weight (lbs) |
|----------|-----------|------|---|------|------|------|-----------|--------------|
| 20 "     | 1.5       | 30.0 |   | 15.5 | 8.0  | 7    | 200       | 187          |
|          |           |      |   |      |      | 9    | 160       | 151          |
|          |           |      |   |      |      | 11   | 128       | 126          |
|          |           |      |   |      |      | 17   | 80        | 86           |
| 22 "     | 1.5       | 33.0 |   | 16.3 | 8.0  | 7    | 200       | 243          |
|          |           |      |   |      |      | 9    | 160       | 197          |
|          |           |      |   |      |      | 11   | 128       | 165          |
|          |           |      |   |      |      | 17   | 80        | 111          |
| 24 "     | 1.5       | 36.0 |   | 17.0 | 8.0  | 7    | 200       | 298          |
|          |           |      |   |      |      | 9    | 160       | 24           |
|          |           |      |   |      |      | 11   | 128       | 202          |
|          |           |      |   |      |      | 17   | 80        | 137          |
| 26 "     | 1.5       | 39.0 |   | 19.7 | 10.0 | 9    | 160       | 330          |
|          |           |      |   |      |      | 11   | 128       | 277          |
|          |           |      |   |      |      | 17   | 80        | 187          |
| 28 "     | 1.5       | 42.0 |   | 20.5 | 10.0 | 9    | 160       | 393          |
|          |           |      |   |      |      | 11   | 128       | 329          |
|          |           |      |   |      |      | 17   | 80        | 218          |
| 30 "     | 1.5       | 45.0 |   | 21.2 | 10.0 | 11   | 128       | 388          |
|          |           |      |   |      |      | 17   | 80        | 262          |
| 32 "     | 1.5       | 48.0 |   | 22.0 | 10.0 | 11   | 128       | 464          |
|          |           |      |   |      |      | 17   | 80        | 312          |
| 34 "     | 1.5       | 51.0 |   | 22.7 | 10.0 | 11   | 128       | 537          |
|          |           |      |   |      |      | 17   | 80        | 361          |
| 36 "     | 1.5       | 54.0 |   | 23.5 | 10.0 | 11   | 128       | 618          |
|          |           |      |   |      |      | 17   | 80        | 416          |
| 42 "     | 1.5       | 63.0 |   | 31.2 | 16.0 | 17   | 80        | 621          |
|          |           |      |   |      |      | 21   | 65        | 506          |
| 48 "     | 1.5       | 72.0 |   | 34.0 | 16.0 | 21   | 65        | 700          |
|          |           |      |   |      |      | 26   | 50        | 570          |
| 54 "     | 1.5       | 81.0 |   | 36.2 | 16.0 | 26   | 50        | 954          |
|          |           |      |   |      |      | 32.5 | 40        | 766          |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



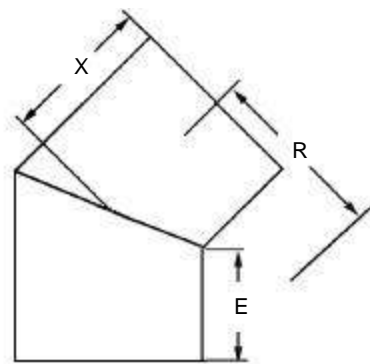
## IPS 45° 2 Segment Elbow Fabricated (1/8 Bend) (Dimensions in Inches)

| IPS Size | R/D Ratio | R    | X    | E   | SDR   | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|-----|-------|-----------|--------------|
| 4"       | 1.5       | 6.8  | 6.9  | 6.0 | 7     | 200       | 3.5          |
|          |           |      |      |     | 9     | 160       | 3            |
|          |           |      |      |     | 11&17 | 128/80    | 2.5          |
| 6"       | 1.5       | 10.0 | 7.4  | 6.0 | 7     | 200       | 8            |
|          |           |      |      |     | 9     | 160       | 7            |
|          |           |      |      |     | 11&17 | 128/80    | 6            |
| 8"       | 1.25      | 10.7 | 8.3  | 6.5 | 7     | 200       | 19           |
|          |           |      |      |     | 9     | 160       | 15           |
|          |           |      |      |     | 11    | 128       | 13           |
|          |           |      |      |     | 17    | 80        | 9            |
| 10"      | 1.25      | 13.5 | 8.7  | 6.5 | 7     | 200       | 31           |
|          |           |      |      |     | 9     | 160       | 26           |
|          |           |      |      |     | 11    | 128       | 21           |
|          |           |      |      |     | 17    | 80        | 15           |
| 12"      | 1.25      | 16.0 | 10.6 | 8.0 | 7     | 200       | 52           |
|          |           |      |      |     | 9     | 160       | 42           |
|          |           |      |      |     | 11    | 128       | 35           |
|          |           |      |      |     | 17    | 80        | 24           |
| 14"      | 1.05      | 14.5 | 10.9 | 8.0 | 7     | 200       | 66           |
|          |           |      |      |     | 9     | 160       | 53           |
|          |           |      |      |     | 11    | 128       | 44           |
|          |           |      |      |     | 17    | 80        | 30           |
| 16"      | 1.05      | 16.8 | 11.3 | 8.0 | 7     | 200       | 86           |
|          |           |      |      |     | 9     | 160       | 70           |
|          |           |      |      |     | 11    | 128       | 58           |
|          |           |      |      |     | 17    | 80        | 39           |
| 18"      | 1.05      | 18.4 | 11.7 | 8.0 | 7     | 200       | 114          |
|          |           |      |      |     | 9     | 160       | 93           |
|          |           |      |      |     | 11    | 128       | 78           |
|          |           |      |      |     | 17    | 80        | 53           |
| 20"      | 1.02      | 20.4 | 12.1 | 8.0 | 7     | 200       | 148          |
|          |           |      |      |     | 9     | 160       | 119          |
|          |           |      |      |     | 11    | 128       | 99           |
|          |           |      |      |     | 17    | 80        | 67           |

### • IPS 2 Segment 45's Continued Next Page •

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

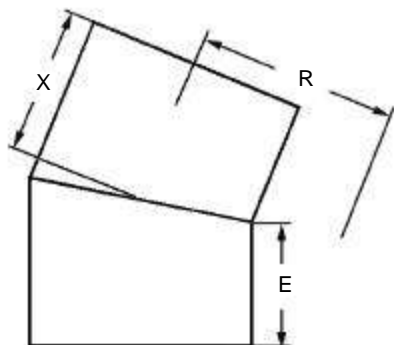


**IPS 45°  
2 Segment Elbow  
Fabricated (1/8 Bend)  
(continued)  
(Dimensions in Inches)**

| IPS Size | R/D Ratio | R    | X    | E    | SDR  | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|------|------|-----------|--------------|
| 22"      | 1.02      | 22.4 | 12.6 | 8.0  | 7    | 200       | 178          |
|          |           |      |      |      | 9    | 160       | 144          |
|          |           |      |      |      | 11   | 128       | 121          |
|          |           |      |      |      | 17   | 80        | 82           |
| 24"      | 1.02      | 24.5 | 13.0 | 8.0  | 7    | 200       | 221          |
|          |           |      |      |      | 9    | 160       | 180          |
|          |           |      |      |      | 11   | 128       | 151          |
|          |           |      |      |      | 17   | 80        | 101          |
| 26"      | 1.02      | 26.5 | 15.4 | 10.0 | 9    | 160       | 247          |
|          |           |      |      |      | 11   | 128       | 208          |
|          |           |      |      |      | 17   | 80        | 141          |
| 28"      | 1.02      | 28.5 | 15.8 | 10.0 | 9    | 160       | 297          |
|          |           |      |      |      | 11   | 128       | 249          |
|          |           |      |      |      | 17   | 80        | 165          |
| 30"      | 1.02      | 30.5 | 16.2 | 10.0 | 11   | 128       | 286          |
|          |           |      |      |      | 17   | 80        | 193          |
| 32"      | 1.20      | 38.0 | 16.6 | 10.0 | 11   | 128       | 331          |
|          |           |      |      |      | 17   | 80        | 224          |
| 34"      | 1.20      | 41.0 | 17.0 | 10.0 | 11   | 128       | 383          |
|          |           |      |      |      | 17   | 80        | 257          |
| 36"      | 1.20      | 43.0 | 17.5 | 10.0 | 11   | 128       | 441          |
|          |           |      |      |      | 17   | 80        | 296          |
| 42"      | 1.20      | 50.0 | 24.7 | 16.0 | 17   | 80        | 432          |
|          |           |      |      |      | 21   | 65        | 352          |
| 48"      | 1.20      | 58.0 | 25.9 | 16.0 | 21   | 65        | 478          |
|          |           |      |      |      | 26   | 50        | 389          |
| 54"      | 1.20      | 64.0 | 27.2 | 16.0 | 26   | 50        | 538          |
|          |           |      |      |      | 32.5 | 40        | 432          |

**Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote**

**Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.**



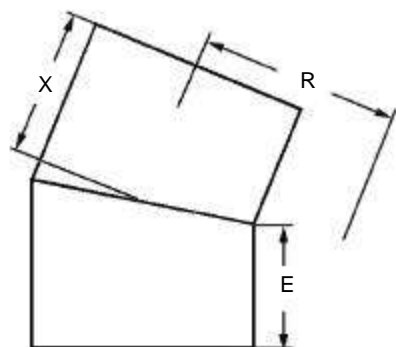
## IPS 22.5° 2 Segment Elbow Fabricated (1/16 Bend) (Dimensions in Inches)

| IPS Size | R/D Ratio | R    | X   | E   | SDR   | WPR (psi) | Weight (lbs) |
|----------|-----------|------|-----|-----|-------|-----------|--------------|
| 2"       | 5.4       | 12.7 | 4.3 | 4.0 | 7     | 200       | 1            |
|          |           |      |     |     | 9     | 160       | 1            |
|          |           |      |     |     | 11&17 | 128/80    | 1            |
| 3"       | 3.8       | 13.2 | 4.4 | 4.0 | 7     | 200       | 2            |
|          |           |      |     |     | 9     | 160       | 2            |
|          |           |      |     |     | 11&17 | 128/80    | 1.5          |
| 4"       | 3.0       | 13.7 | 4.5 | 4.0 | 7     | 200       | 3.5          |
|          |           |      |     |     | 9     | 160       | 3            |
|          |           |      |     |     | 11&17 | 128/80    | 2.5          |
| 6"       | 2.2       | 14.7 | 6.7 | 6.0 | 7     | 200       | 9            |
|          |           |      |     |     | 9     | 160       | 7            |
|          |           |      |     |     | 11&17 | 128/80    | 6            |
| 8"       | 1.8       | 16.0 | 7.4 | 6.5 | 7     | 200       | 16           |
|          |           |      |     |     | 9     | 160       | 13           |
|          |           |      |     |     | 11    | 128       | 11           |
|          |           |      |     |     | 17    | 80        | 9            |
| 10"      | 1.6       | 17.0 | 7.6 | 6.5 | 7     | 200       | 26           |
|          |           |      |     |     | 9     | 160       | 21           |
|          |           |      |     |     | 11    | 128       | 17           |
|          |           |      |     |     | 17    | 80        | 12           |
| 12"      | 1.5       | 19.1 | 9.3 | 8.0 | 7     | 200       | 43           |
|          |           |      |     |     | 9     | 160       | 35           |
|          |           |      |     |     | 11    | 128       | 31           |
|          |           |      |     |     | 17    | 80        | 20           |
| 14"      | 1.5       | 21.0 | 9.4 | 8.0 | 7     | 200       | 53           |
|          |           |      |     |     | 9     | 160       | 42           |
|          |           |      |     |     | 11    | 128       | 35           |
|          |           |      |     |     | 17    | 80        | 24           |
| 16"      | 1.5       | 24.0 | 9.6 | 8.0 | 7     | 200       | 73           |
|          |           |      |     |     | 9     | 160       | 61           |
|          |           |      |     |     | 11    | 128       | 49           |
|          |           |      |     |     | 17    | 80        | 33           |
| 18"      | 1.5       | 27.0 | 9.8 | 8.0 | 7     | 200       | 92           |
|          |           |      |     |     | 9     | 160       | 75           |
|          |           |      |     |     | 11    | 128       | 63           |
|          |           |      |     |     | 17    | 80        | 43           |

• IPS 2 Segment 22.5's Continued Next Page •

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



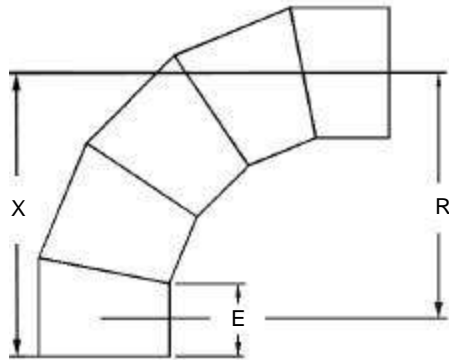
## IPS 22.5° 2 Segment Elbow Fabricated (1/16 Bend) (continued) (Dimensions in Inches)

| IPS Size | R/D Ratio | R    | X    | E    | SDR  | WPR (psi) | Weight (lbs) |
|----------|-----------|------|------|------|------|-----------|--------------|
| 20"      | 1.5       | 30.0 | 10.0 | 8.0  | 7    | 200       | 114          |
|          |           |      |      |      | 9    | 160       | 92           |
|          |           |      |      |      | 11   | 128       | 77           |
|          |           |      |      |      | 17   | 80        | 52           |
| 22"      | 1.5       | 33.0 | 10.2 | 8.0  | 7    | 200       | 146          |
|          |           |      |      |      | 9    | 160       | 118          |
|          |           |      |      |      | 11   | 128       | 99           |
|          |           |      |      |      | 17   | 80        | 67           |
| 24"      | 1.5       | 36.0 | 10.4 | 8.0  | 7    | 200       | 173          |
|          |           |      |      |      | 9    | 160       | 141          |
|          |           |      |      |      | 11   | 128       | 117          |
|          |           |      |      |      | 17   | 80        | 79           |
| 26"      | 1.5       | 39.0 | 12.6 | 10.0 | 9    | 160       | 201          |
|          |           |      |      |      | 11   | 128       | 170          |
|          |           |      |      |      | 17   | 80        | 116          |
| 28"      | 1.5       | 42.0 | 12.8 | 10.0 | 9    | 160       | 233          |
|          |           |      |      |      | 11   | 128       | 196          |
|          |           |      |      |      | 17   | 80        | 130          |
| 30"      | 1.5       | 45.0 | 13.0 | 10.0 | 11   | 128       | 224          |
|          |           |      |      |      | 17   | 80        | 152          |
| 32"      | 1.5       | 48.0 | 13.2 | 10.0 | 11   | 128       | 267          |
|          |           |      |      |      | 17   | 80        | 179          |
| 34"      | 1.5       | 51.0 | 13.4 | 10.0 | 11   | 128       | 301          |
|          |           |      |      |      | 17   | 80        | 203          |
| 36"      | 1.5       | 54.0 | 13.6 | 10.0 | 11   | 128       | 338          |
|          |           |      |      |      | 17   | 80        | 227          |
| 42"      | 1.5       | 63.0 | 20.2 | 16.0 | 17   | 80        | 324          |
|          |           |      |      |      | 21   | 65        | 264          |
| 48"      | 1.5       | 72.0 | 20.8 | 16.0 | 21   | 65        | 350          |
|          |           |      |      |      | 26   | 50        | 285          |
| 54"      | 1.5       | 81.0 | 21.4 | 16.0 | 26   | 50        | 537          |
|          |           |      |      |      | 32.5 | 40        | 431          |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

# INDEPENDENT PIPE PRODUCTS



## DIPS 90° 5 Segment Elbow Fabricated (1/4 Bend) (Dimensions in Inches)

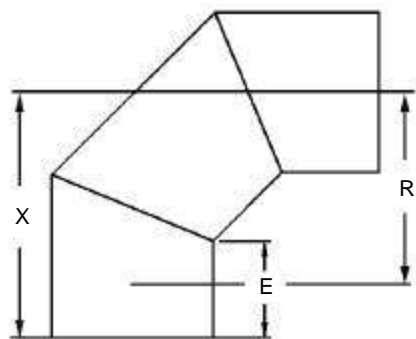
| DIPS Size | R/D Ratio | R    | X    | E    | SDR | WPR | Weight (lbs) |
|-----------|-----------|------|------|------|-----|-----|--------------|
| 4"        | 2.9       | 14.0 | 17.7 | 6.0  | 9   | 160 | 11           |
|           |           |      |      |      | 11  | 128 | 9            |
|           |           |      |      |      | 17  | 80  | 5            |
| 6"        | 2.2       | 15.0 | 18.7 | 6.0  | 9   | 160 | 21           |
|           |           |      |      |      | 11  | 128 | 17           |
|           |           |      |      |      | 17  | 80  | 12           |
| 8"        | 1.8       | 16.2 | 20.4 | 6.5  | 9   | 160 | 35           |
|           |           |      |      |      | 11  | 128 | 32           |
|           |           |      |      |      | 17  | 80  | 25           |
| 10"       | 1.6       | 17.2 | 21.4 | 6.5  | 9   | 160 | 56           |
|           |           |      |      |      | 11  | 128 | 47           |
|           |           |      |      |      | 17  | 80  | 33           |
| 12"       | 1.5       | 19.8 | 25.2 | 8.0  | 9   | 160 | 94           |
|           |           |      |      |      | 11  | 128 | 78           |
|           |           |      |      |      | 17  | 80  | 55           |
| 14"       | 1.5       | 23.0 | 28.0 | 8.0  | 9   | 160 | 134          |
|           |           |      |      |      | 11  | 128 | 114          |
|           |           |      |      |      | 17  | 80  | 76           |
| 16"       | 1.5       | 26.1 | 30.6 | 8.0  | 9   | 160 | 187          |
|           |           |      |      |      | 11  | 128 | 161          |
|           |           |      |      |      | 17  | 80  | 106          |
| 18"       | 1.5       | 29.3 | 33.4 | 8.0  | 9   | 160 | 256          |
|           |           |      |      |      | 11  | 128 | 211          |
|           |           |      |      |      | 17  | 80  | 142          |
| 20"       | 1.5       | 32.4 | 36.1 | 8.0  | 9   | 160 | 328          |
|           |           |      |      |      | 11  | 128 | 276          |
|           |           |      |      |      | 17  | 80  | 187          |
| 24"       | 1.5       | 38.7 | 41.6 | 8.0  | 9   | 160 | 531          |
|           |           |      |      |      | 11  | 128 | 449          |
|           |           |      |      |      | 17  | 80  | 301          |
| 30"       | 1.5       | 48.0 | 51.6 | 10.0 | 11  | 128 | 847          |
|           |           |      |      |      | 17  | 80  | 570          |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



# INDEPENDENT PIPE PRODUCTS



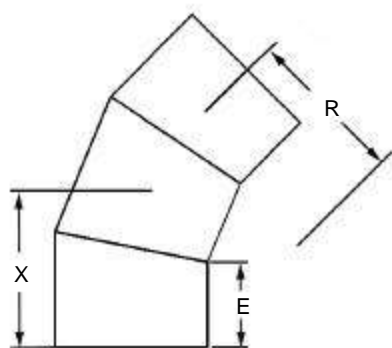
## DIPS 90° 3 Segment Elbows Fabricated (1/4 Bend) (Dimensions in Inches)

| DIPS Size | R/D Ratio | R    | X    | E    | SDR | WPR | Weight (lbs) |
|-----------|-----------|------|------|------|-----|-----|--------------|
| 4"        | 1.5       | 7.2  | 11.2 | 6.0  | 9   | 160 | 8            |
|           |           |      |      |      | 11  | 128 | 6            |
|           |           |      |      |      | 17  | 80  | 4            |
| 6"        | 1.5       | 10.4 | 13.5 | 6.0  | 9   | 160 | 16           |
|           |           |      |      |      | 11  | 128 | 13           |
|           |           |      |      |      | 17  | 80  | 9            |
| 8"        | 1.25      | 11.3 | 15.0 | 6.5  | 9   | 160 | 27           |
|           |           |      |      |      | 11  | 128 | 24           |
|           |           |      |      |      | 17  | 80  | 17           |
| 10"       | 1.25      | 13.9 | 16.9 | 6.5  | 9   | 160 | 44           |
|           |           |      |      |      | 11  | 128 | 37           |
|           |           |      |      |      | 17  | 80  | 26           |
| 12"       | 1.25      | 16.5 | 20.4 | 8.0  | 9   | 160 | 75           |
|           |           |      |      |      | 11  | 128 | 62           |
|           |           |      |      |      | 17  | 80  | 44           |
| 14"       | 1.05      | 16.1 | 20.6 | 8.0  | 9   | 160 | 103          |
|           |           |      |      |      | 11  | 128 | 85           |
|           |           |      |      |      | 17  | 80  | 58           |
| 16"       | 1.05      | 18.3 | 22.3 | 8.0  | 9   | 160 | 141          |
|           |           |      |      |      | 11  | 128 | 119          |
|           |           |      |      |      | 17  | 80  | 78           |
| 18"       | 1.02      | 19.9 | 23.7 | 8.0  | 9   | 160 | 187          |
|           |           |      |      |      | 11  | 128 | 155          |
|           |           |      |      |      | 17  | 80  | 104          |
| 20"       | 1.02      | 22.0 | 25.4 | 8.0  | 9   | 160 | 239          |
|           |           |      |      |      | 11  | 128 | 206          |
|           |           |      |      |      | 17  | 80  | 137          |
| 24"       | 1.02      | 26.3 | 28.8 | 8.0  | 9   | 160 | 378          |
|           |           |      |      |      | 11  | 128 | 321          |
|           |           |      |      |      | 17  | 80  | 215          |
| 30"       | 1.20      | 38.0 | 38.9 | 10.0 | 11  | 128 | 731          |
|           |           |      |      |      | 17  | 80  | 492          |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

# INDEPENDENT PIPE PRODUCTS



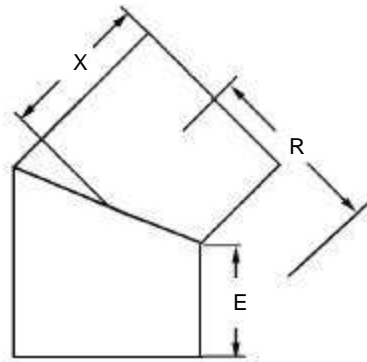
## DIPS 45° 3 Segment Elbows Fabricated (1/8 Bend) (Dimensions in Inches)

| DIPS Size | R/D Ratio | R    | X    | E    | SDR | WPR | Weight (lbs) |
|-----------|-----------|------|------|------|-----|-----|--------------|
| 4"        | 2.9       | 14.0 | 9.1  | 6.0  | 9   | 160 | 6            |
|           |           |      |      |      | 11  | 128 | 4.5          |
|           |           |      |      |      | 17  | 80  | 3            |
| 6"        | 2.2       | 15.0 | 9.4  | 6.0  | 9   | 160 | 13           |
|           |           |      |      |      | 11  | 128 | 11           |
|           |           |      |      |      | 17  | 80  | 7            |
| 8"        | 1.8       | 16.2 | 10.4 | 6.5  | 9   | 160 | 21           |
|           |           |      |      |      | 11  | 128 | 19           |
|           |           |      |      |      | 17  | 80  | 14           |
| 10"       | 1.6       | 17.2 | 10.8 | 6.5  | 9   | 160 | 34           |
|           |           |      |      |      | 11  | 128 | 28           |
|           |           |      |      |      | 17  | 80  | 20           |
| 12"       | 1.5       | 19.8 | 13.0 | 8.0  | 9   | 160 | 58           |
|           |           |      |      |      | 11  | 128 | 48           |
|           |           |      |      |      | 17  | 80  | 34           |
| 14"       | 1.5       | 23.0 | 13.8 | 8.0  | 9   | 160 | 80           |
|           |           |      |      |      | 11  | 128 | 66           |
|           |           |      |      |      | 17  | 80  | 45           |
| 16"       | 1.5       | 26.1 | 14.5 | 8.0  | 9   | 160 | 111          |
|           |           |      |      |      | 11  | 128 | 95           |
|           |           |      |      |      | 17  | 80  | 62           |
| 18"       | 1.5       | 29.3 | 15.3 | 8.0  | 9   | 160 | 146          |
|           |           |      |      |      | 11  | 128 | 121          |
|           |           |      |      |      | 17  | 80  | 81           |
| 20"       | 1.5       | 32.4 | 16.1 | 8.0  | 9   | 160 | 183          |
|           |           |      |      |      | 11  | 128 | 154          |
|           |           |      |      |      | 17  | 80  | 105          |
| 24"       | 1.5       | 38.7 | 17.7 | 8.0  | 9   | 160 | 288          |
|           |           |      |      |      | 11  | 128 | 243          |
|           |           |      |      |      | 17  | 80  | 163          |
| 30"       | 1.5       | 48.0 | 22.0 | 10.0 | 11  | 128 | 464          |
|           |           |      |      |      | 17  | 80  | 312          |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

# INDEPENDENT PIPE PRODUCTS



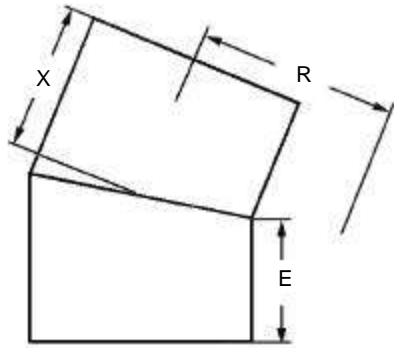
## DIPS 45° 2 Segment Elbows Fabricated (1/16 Bend) (Dimensions in Inches)

| DIPS Size | R/D Ratio | R    | X    | E    | SDR | WPR | Weight (lbs) |
|-----------|-----------|------|------|------|-----|-----|--------------|
| 4"        | 1.5       | 7.2  | 7.0  | 6.0  | 9   | 160 | 5            |
|           |           |      |      |      | 11  | 128 | 4            |
|           |           |      |      |      | 17  | 80  | 3            |
| 6"        | 1.5       | 10.4 | 7.4  | 6.0  | 9   | 160 | 10           |
|           |           |      |      |      | 11  | 128 | 8            |
|           |           |      |      |      | 17  | 80  | 6            |
| 8"        | 1.25      | 11.3 | 8.4  | 6.5  | 9   | 160 | 17           |
|           |           |      |      |      | 11  | 128 | 15           |
|           |           |      |      |      | 17  | 80  | 11           |
| 10"       | 1.25      | 13.9 | 8.8  | 6.5  | 9   | 160 | 27           |
|           |           |      |      |      | 11  | 128 | 25           |
|           |           |      |      |      | 17  | 80  | 16           |
| 12"       | 1.25      | 16.5 | 10.7 | 8.0  | 9   | 160 | 46           |
|           |           |      |      |      | 11  | 128 | 38           |
|           |           |      |      |      | 17  | 80  | 27           |
| 14"       | 1.05      | 16.1 | 11.2 | 8.0  | 9   | 160 | 64           |
|           |           |      |      |      | 11  | 128 | 53           |
|           |           |      |      |      | 17  | 80  | 36           |
| 16"       | 1.05      | 18.3 | 11.6 | 8.0  | 9   | 160 | 86           |
|           |           |      |      |      | 11  | 128 | 74           |
|           |           |      |      |      | 17  | 80  | 48           |
| 18"       | 1.02      | 19.9 | 12.0 | 8.0  | 9   | 160 | 109          |
|           |           |      |      |      | 11  | 128 | 90           |
|           |           |      |      |      | 17  | 80  | 61           |
| 20"       | 1.02      | 22.0 | 12.5 | 8.0  | 9   | 160 | 139          |
|           |           |      |      |      | 11  | 128 | 117          |
|           |           |      |      |      | 17  | 80  | 79           |
| 24"       | 1.02      | 26.3 | 13.3 | 8.0  | 9   | 160 | 207          |
|           |           |      |      |      | 11  | 128 | 175          |
|           |           |      |      |      | 17  | 80  | 117          |
| 30"       | 1.20      | 38.0 | 16.6 | 10.0 | 11  | 128 | 336          |
|           |           |      |      |      | 17  | 80  | 226          |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

# INDEPENDENT PIPE PRODUCTS



## DIPS 22.5° 2 Segment Elbows Fabricated (1/16 Bend)

| DIPS Size | R/D Ratio | R    | X    | E    | SDR | WPR | Weight (lbs) |
|-----------|-----------|------|------|------|-----|-----|--------------|
| 4"        | 2.9       | 14.0 | 6.5  | 6.0  | 9   | 160 | 4            |
|           |           |      |      |      | 11  | 128 | 3            |
|           |           |      |      |      | 17  | 80  | 2            |
| 6"        | 2.2       | 15.0 | 6.7  | 6.0  | 9   | 160 | 9            |
|           |           |      |      |      | 11  | 128 | 7            |
|           |           |      |      |      | 17  | 80  | 5            |
| 8"        | 1.8       | 16.2 | 7.4  | 6.5  | 9   | 160 | 14           |
|           |           |      |      |      | 11  | 128 | 13           |
|           |           |      |      |      | 17  | 80  | 10           |
| 10"       | 1.6       | 17.2 | 7.6  | 6.5  | 9   | 160 | 24           |
|           |           |      |      |      | 11  | 128 | 20           |
|           |           |      |      |      | 17  | 80  | 14           |
| 12"       | 1.5       | 19.8 | 9.3  | 8.0  | 9   | 160 | 39           |
|           |           |      |      |      | 11  | 128 | 32           |
|           |           |      |      |      | 17  | 80  | 23           |
| 14"       | 1.5       | 23.0 | 9.5  | 8.0  | 9   | 160 | 56           |
|           |           |      |      |      | 11  | 128 | 45           |
|           |           |      |      |      | 17  | 80  | 31           |
| 16"       | 1.5       | 26.1 | 9.7  | 8.0  | 9   | 160 | 69           |
|           |           |      |      |      | 11  | 128 | 60           |
|           |           |      |      |      | 17  | 80  | 39           |
| 18"       | 1.5       | 29.3 | 9.9  | 8.0  | 9   | 160 | 89           |
|           |           |      |      |      | 11  | 128 | 73           |
|           |           |      |      |      | 17  | 80  | 50           |
| 20"       | 1.5       | 32.4 | 10.2 | 8.0  | 9   | 160 | 114          |
|           |           |      |      |      | 11  | 128 | 96           |
|           |           |      |      |      | 17  | 80  | 65           |
| 24"       | 1.5       | 38.7 | 10.6 | 8.0  | 9   | 160 | 162          |
|           |           |      |      |      | 11  | 128 | 137          |
|           |           |      |      |      | 17  | 80  | 92           |
| 30"       | 1.5       | 48.0 | 13.2 | 10.0 | 11  | 128 | 267          |
|           |           |      |      |      | 17  | 80  | 179          |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

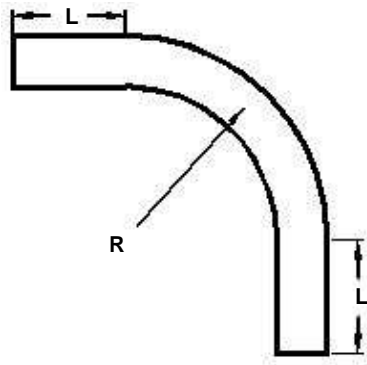
## Information on Forge Molded Elbows (Sweep Elbows)

Polyethylene Pipe can be thermally treated to reach its malleable forming temperature. With uniform temperature across the wall section, the pipe can then be heated into a new shape within a mold. The pipe is forge-molded into an elbow configuration without fusion joints. The old memory of the straight pipe is "killed" and the pipe assumes a new elbow memory.

This technology has been available for several decades throughout the world, especially in Europe and Australia. These nations use forge-molded ells almost exclusively. They use few injection molded ells except in process piping within chemical plants. Forge-molded ells offer the following advantages.

- The forge-molded ells have no fusion joints and thus are hydraulically smoother than fabricated ells with their multiple heat-fusion beads that amplify turbulence and pressure drop through the elbow.
- The radius of curvature is more gentle than fabricated or molded fittings, thus further decreasing the pressure drop through the ell compared to injection molded or fabricated ells.
- The forge-molded ell is made from extruded pipe so the heat-fusion bead is uniform and easy to visually inspect and qualify.
- The forge-molded ells are fully pressure rated. These ells have 30 years of historical performance qualifying them against pressure rupture in the same DR as the pipe main.
- There are no miter fusion joints to act as the focus of intensified stress. The Stress Intensification Factor (SIF) for forge molded ells is 1.0. The SIP for miter-fab ells is about 1.5. The forged molded ell is a lower stressed part because of its continuous, smooth, uniform curvature.
- The 3:1 R/D ratio provides more mass in the fitting to keep stresses lower. It uses about the same area as a fab fitting, requiring the same size trench - no larger.
- The installation "looks" a lot better with smooth curvatures.
- **This elbow fitting system is different from others previously sold in the USA. Try it. You'll like it. It's new and better.**

# INDEPENDENT PIPE PRODUCTS



## IPS Forge Molded 90° Sweep Elbows

(Dimensions in Inches)

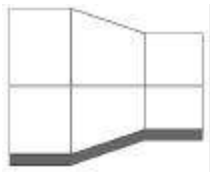
| IPS Size | R/D Ratio | R    | L<br>end segment | SDR | WPR | Weight<br>(lbs) |
|----------|-----------|------|------------------|-----|-----|-----------------|
| 2"       | 4.1       | 9.75 | 6.0              | 11  | 160 | 2               |
| 3"       | 3.0       | 10.5 | 6.0              | 11  | 160 | 4               |
| 4"       | 3.0       | 13.5 | 6.0              | 11  | 160 | 7               |
| 6"       | 3.0       | 19.9 | 7.0              | 11  | 160 | 20              |
| 8"       | 2.8       | 24.5 | 10.0             | 11  | 160 | 44              |
| 10"      | 3.0       | 32.2 | 11.0             | 11  | 160 | 85              |
| 12"      | 3.0       | 38.3 | 13.0             | 11  | 160 | 138             |
| 14"      | 2.8       | 38.9 | 13.0             | 11  | 160 | 169             |

Other sizes, DR's and custom radius ell's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

## Concentric Reducer Design Information

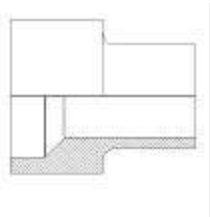
Concentric reducers provide an in-line conical transition between pressurized pipes of differing diameters. A reducer may be a single standard diameter change (i.e., 6" x 4") or a multiple diameter change (i.e., 8" x 2"). The pipes do not have a "brain" and do not recognize what the outside configuration of the reducer looks like. The pipe flow is only affected by the inside diameter conical transition configuration. Hence, the inside diameter conical transition can be axially moved and externally re-configured to provide for more economical reducer fittings as follows. **All three designs have the same ID flow shape, but the "Compact" and "Low Cost Compact" cost savings are passed onto you!**



Higher Cost Reducer

The "**Traditional**" reducer has three sections:

1. Large end to clamp for heat butt-fusion.
2. Conical transition section.
3. Small end to clamp for heat butt-fusion.

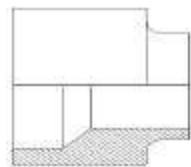


Economical "Compact" Reducer

The "**Compact**" reducer has two sections:

1. Large end to hold for heat butt-fusion.
2. Small end to hold for heat butt-fusion.

Note: The same conical transition zone has been moved forward within the reducer.



"Low Cost Compact" Reducer

The "**Low Cost Compact**" reducer has one section. This reducer is held on the large end and heat-fused to the large pipe. The assembly is moved to the other fusion machine jaws and the small end is heat fused to the small pipe. Note: The same conical transition zone is kept within the fitting.

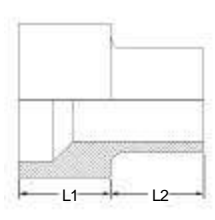
# INDEPENDENT PIPE PRODUCTS



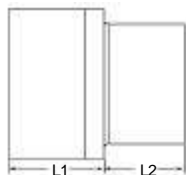
## IPS Reducers

Pressure Rated for DR Ordered  
(Dimensions in Inches)

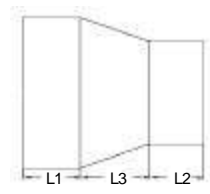
**STYLE A**  
"compact"



**STYLE B**  
"fabricated"



**STYLE C**  
"traditional"



| Nominal Size  | DR      | Style | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | Weight (lbs) |
|---------------|---------|-------|----------------|----------------|----------------|--------------|
| 1-1/2 x 1-1/4 | 9-11    | A     | 2.00           | 2.00           | -              | 1            |
| 2 x 1         | 11      | C     | 2.49           | 2.88           | 0.94           | 1            |
| 2 x 1-1/4     | 9-11    | C     | 3.25           | 2.56           | 0.63           | 1            |
| 2 x 1-1/2     | 9-11    | C     | 2.50           | 2.72           | 0.78           | 1            |
| 3 x 2         | 9-17    | C     | 2.88           | 2.50           | 1.13           | 1            |
| 4 x 2         | 9-17    | C     | 2.75           | 2.75           | 1.35           | 1            |
| 4 x 3         | 9-17    | C     | 3.00           | 2.50           | 0.88           | 1            |
| 6 x 3         | 11-17   | C     | 5.14           | 3.94           | 2.34           | 2            |
| 6 x 4         | 9-17    | A     | 4.00           | 4.00           | -              | 3            |
| 8 x 4         | 11-17   | A*2   | 8.00           | 8.00           | -              | 9            |
| 8 x 6         | 9-17    | A     | 4.00           | 4.00           | -              | 6            |
| 10 x 6        | 11-17   | A     | 6.00           | 4.00           | -              | 12           |
| 10 x 8        | 9-17    | A     | 6.00           | 4.00           | -              | 13           |
| 12 x 8        | 11-17   | A     | 6.00           | 6.00           | -              | 19           |
| 12 x 10       | 9-17    | A     | 6.00           | 6.00           | -              | 20           |
| 14 x 10       | 11-17   | A     | 7.00           | 7.00           | -              | 26           |
| 14 x 12       | 9-32.5  | A     | 7.00           | 7.00           | -              | 28           |
| 16 x 12       | 9-32.5  | A*2   | 14.00          | 14.00          | -              | 64           |
| 16 x 14       | 9-32.5  | A     | 7.00           | 7.00           | -              | 36           |
| 18 x 16       | 11-32.5 | A     | 7.00           | 7.00           | -              | 47           |
| 20 x 18       | 11-32.5 | A     | 7.00           | 7.00           | -              | 56           |
| 22 x 20       | 11-32.5 | A     | 8.00           | 8.00           | -              | 69           |
| 24 x 22       | 11-32.5 | A     | 9.00           | 9.00           | -              | 84           |

A\*2 indicates two style A reducers joined using butt fusion.

Other sizes, styles, and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

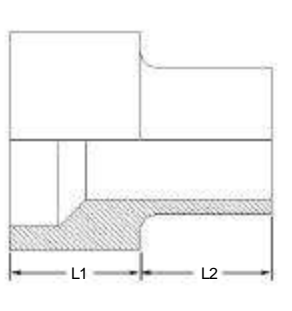


## DIPS Reducers

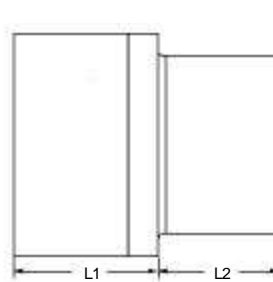
### Ductile Iron Pipe Sizes

Pressure Rated for DR Ordered  
(Dimensions in Inches)

**STYLE A**  
"compact"



**STYLE B**  
"fabricated"



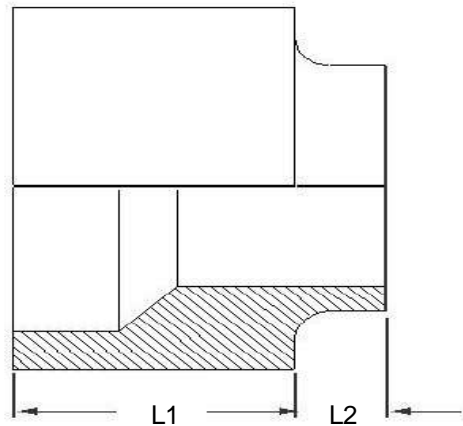
| DIPS<br>Nominal<br>Size | DR      | Style | L <sub>1</sub> | L <sub>2</sub> | Weight<br>(lbs) |
|-------------------------|---------|-------|----------------|----------------|-----------------|
| 4 x 3                   | 11-17   | A     | 3.00           | 3.00           | 2               |
| 6 x 4                   | 11-17   | A     | 3.00           | 3.00           | 3               |
| 8 x 6                   | 11-32.5 | A     | 5.00           | 5.00           | 8               |
| 10 x 8                  | 11-32.5 | A     | 6.00           | 6.00           | 15              |
| 12 x 10                 | 11-32.5 | A     | 6.00           | 6.00           | 21              |
| 14 x 12                 | 11-32.5 | A     | 7.00           | 7.00           | 33              |
| 16 x 14                 | 11-32.5 | A     | 7.00           | 7.00           | 43              |
| 18 x 16                 | 11-32.5 | A     | 7.00           | 7.00           | 52              |
| 20 x 18                 | 11-32.5 | A     | 14.00          | 11.00          | 96              |
| 24 x 20                 | 11-32.5 | B     | 14.00          | 11.00          | 129             |

Other sizes, styles, and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

## IPS "Low Cost Compact" Reducers

Pressure Rated for DR Ordered



**Note: Available in  
quantities of 15  
or more only.**

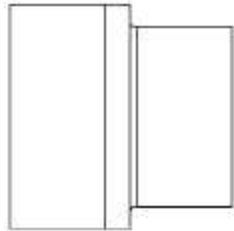
| Nominal Size | L <sub>1</sub> | L <sub>2</sub> |
|--------------|----------------|----------------|
| 8" x 6"      | 6"             | 2"             |
| 10" x 8"     | 6"             | 2"             |
| 12" x 10"    | 6"             | 2"             |
| 14" x 12"    | 7"             | 2"             |
| 16" x 14"    | 7"             | 2"             |
| 18" x 16"    | 7"             | 2"             |

**Call  
For  
Quick  
Quote**

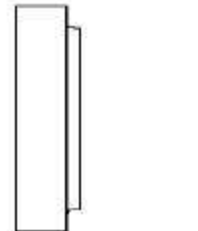
- NOTE:**
- Clamp the reducer into the fusion machine using the large end only.
  - Fuse one end to the pipeline first.
  - Reposition the fused assembly in the fusion machine; re-clamp large OD.
  - Fuse the other end to its matching size pipe.
  - VIP: Insure the fusion machine inserts for both pipe diameters are available and will fit the on-site fusion machine.

## Multi-Stage IPS or DIPS Concentric Reducers

Pressure Rated for DR Ordered



**Full Length Option**  
(reducer center w/ pups)



**Reducer Center Only**  
(may require stub end holder)

Multistage pipe reducers connect pipes of measurably different diameters. Instead of using a 12" x 10" fused to a 10" x 8" fused to an 8" x 10" reducer assembly, we fabricate a custom 12" x 6" reducer as a single component. This greatly saves on part cost and fusion cost! The following is a partial listing of our capabilities:

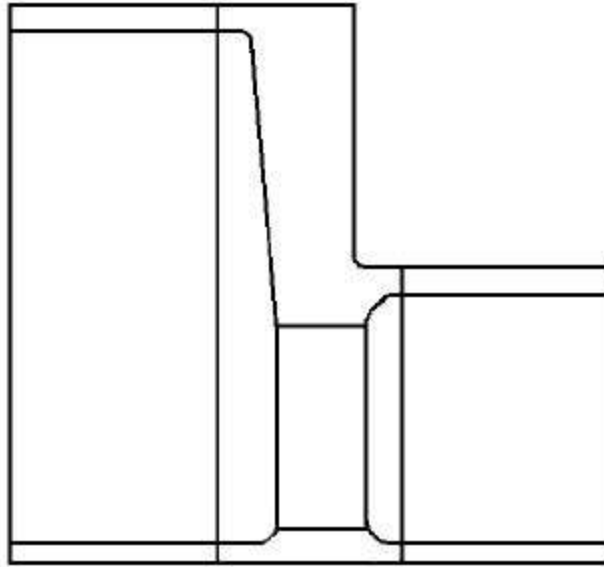
### Call for a Quick-Quote

|           |           |           |           |           |                   |
|-----------|-----------|-----------|-----------|-----------|-------------------|
| 24" x 20" | 24" x 18" | 24" x 16" | 24" x 14" | 24" x 12" | 24" x 10"         |
| 24" x 8"  | 24" x 6"  | 24" x 4"  | 24" x 3"  | 24" x 2"  |                   |
| 22" x 18" | 22" x 16" | 22" x 14" | 22" x 12" | 22" x 10" | 22" x 8"          |
| 22" x 6"  | 22" x 4"  | 22" x 3"  | 22" x 2"  |           |                   |
| 20" x 16" | 20" x 14" | 20" x 12" | 20" x 10" | 20" x 8"  | 20" x 6"          |
| 20" x 4"  | 20" x 3"  | 20" x 2"  |           |           |                   |
| 18" x 14" | 18" x 12" | 18" x 10" | 18" x 8"  | 18" x 6"  | 18" x 4"          |
| 18" x 3"  | 18" x 2"  |           |           |           |                   |
| 16" x 12" | 16" x 10" | 16" x 8"  | 16" x 6"  | 16" x 4"  | 16" x 3" 16" x 2" |
| 14" x 10" | 14" x 8"  | 14" x 6"  | 14" x 4"  | 14" x 3"  | 14" x 2"          |
| 12" x 8"  | 12" x 6"  | 12" x 4"  | 12" x 3"  | 12" x 2"  |                   |
| 10" x 6"  | 10" x 4"  | 10" x 3"  | 10" x 2"  |           |                   |
| 8" x 4"   | 8" x 3"   | 8" x 2"   |           |           |                   |
| 6" x 3"   | 6" x 2"   |           |           |           |                   |
| 4" x 2"   | 4" x 1.5" | 4" x 1"   | 4" x 3/4" |           |                   |
| 3" x 1.5" | 3" x 1"   | 3" x 3/4" |           |           |                   |
| 2" x 1.5" | 2" x 1"   | 2" x 3/4" |           |           |                   |

**For larger sizes and size combinations, call for a Quick Quote**

## IPS or DIPS Eccentric Reducers

Pressure ratings will vary depending on specifications



Many gravity flow and drainage pipelines require a uniform line and grade. To achieve this, the engineers and designers specify eccentric reducers. This keeps the pipe invert at the same level or slope along the pipeline length.

Based on the permutation and combination of possible diameters, eccentric reducers are quoted for each inquiry or project. These fittings are quite popular for gravity flow sewers with multiple lateral sewer inlets or outlets.

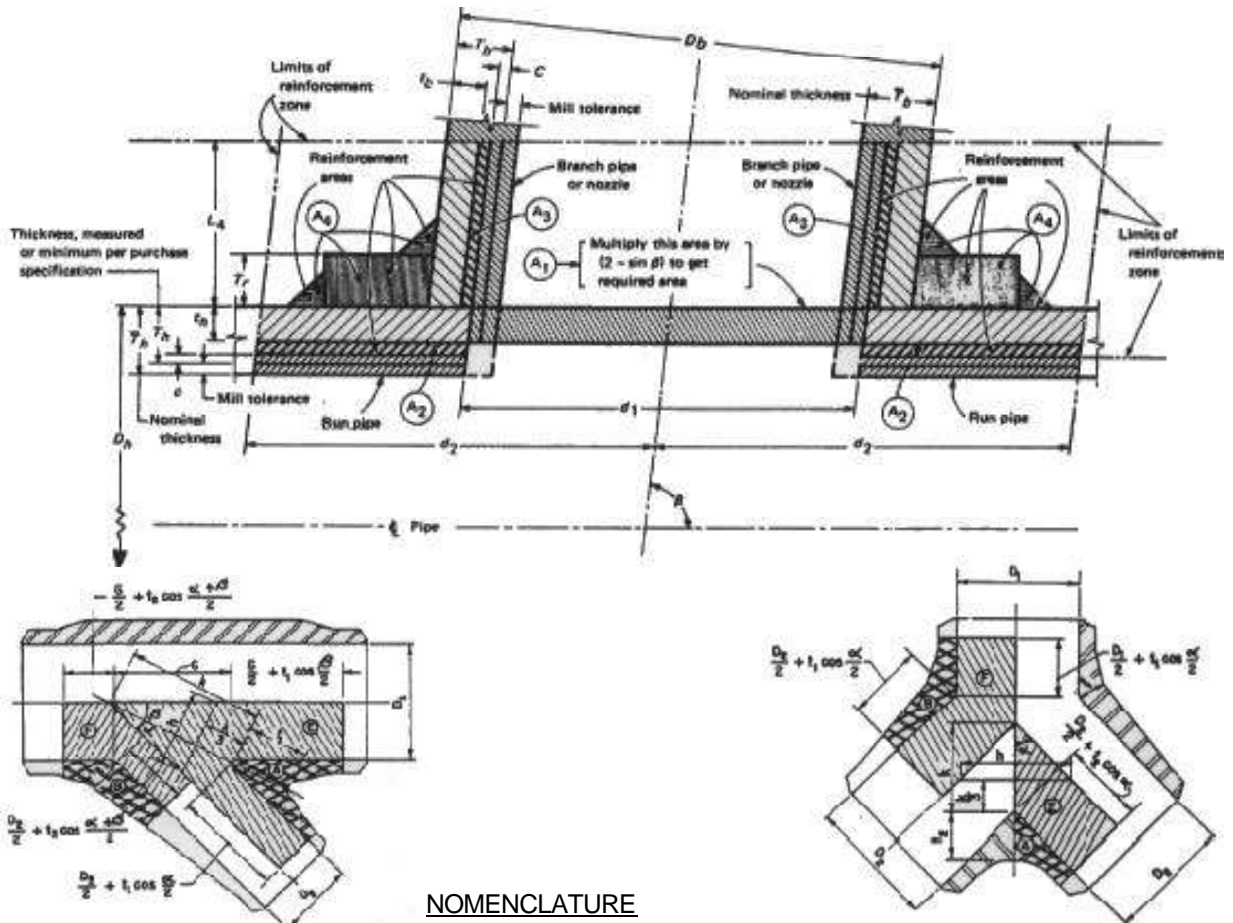
**Call for a Quick Quote on your project needs.**

## Lateral Wye Design Information and End Options

The intersection of the branch into the main produces an elliptical hole (oval). The hoop of the pipe main is more severely breached than a line tee with its circular hole. The derating of the wye is based on geometry and the stress intensification at the intersection joint.

As the angle goes from a 90° tee to a 60° to 45° to 30° wye, the derating factor becomes more severe as the loss in "hoop" increases accordingly. The loss in pressure capacity or the reinforcement necessary to keep full pressure rating is determined in ASME B31.3, Paragraph #304.3.3, which includes the "beta" angle of the wye. The pressure capacity of an unreinforced 45° lateral wye using a 2:1 safety factor is about 45% of the pressure rating of the straight pipe used for its fabrication.

End options available are whatever may be required for the project, such as butt-end, flanged, DIMJA, etc.



### NOMENCLATURE

$$S_A \geq \frac{p(E + \frac{1}{2}A)}{A}$$

$$S_B \geq \frac{p(F + \frac{1}{2}B)}{A}$$

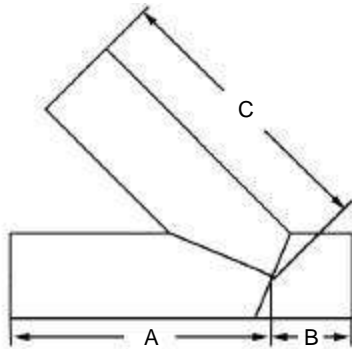
45° LATERAL WYE

- A, B - METAL AREA, (sq. in.)
- D1, D2 - INSIDE DIAMETER OF FITTINGS, (in.)
- E, F - INDICATED PRESSURE AREA, (sq. in.)
- G, h, k - INDICATED LENGTHS, (in.)
- P - DESIGN PRESSURE, AT DESIGN TEMPERATURE, (psi)
- $S_A, S_B$  - ALLOWABLE STRESS AT DESIGN TEMPERATURE, (psi)
- $t_1, t_2$  - INDICATED METAL THICKNESS, (in.)
- $t_3$  - AVERAGE METAL THICKNESS OF FLAT SURFACE, (in.)
- $\alpha, \beta$  - INDICATED ANGLES

$$S_A \geq \frac{p(E + \frac{1}{2}A)}{A}$$

$$S_B \geq \frac{p(F + \frac{1}{2}B)}{A}$$

45° TRUE WYE



## IPS Fabricated 45° Lateral Wye Unreinforced

(Dimensions in Inches)

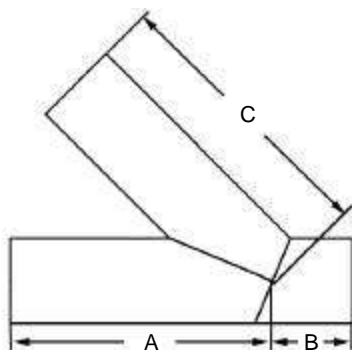
| IPS Size | A    | B    | C    | SDR | WPR<br>(psi) | Weight<br>(lbs) |
|----------|------|------|------|-----|--------------|-----------------|
| 2"       | 18.0 | 6.0  | 14.0 | 7   | 200          | 3               |
|          |      |      |      | 9   | 160          | 2               |
|          |      |      |      | 11  | 128          | 2               |
| 3"       | 18.0 | 7.0  | 14.0 | 7   | 200          | 7               |
|          |      |      |      | 9   | 160          | 6               |
|          |      |      |      | 11  | 128          | 5               |
| 4"       | 22.0 | 7.0  | 22.0 | 7   | 200          | 16              |
|          |      |      |      | 9   | 160          | 14              |
|          |      |      |      | 11  | 128          | 12              |
| 6"       | 28.0 | 7.0  | 28.0 | 7   | 200          | 42              |
|          |      |      |      | 9   | 160          | 33              |
|          |      |      |      | 11  | 128          | 30              |
| 8"       | 30.0 | 8.0  | 30.0 | 7   | 200          | 74              |
|          |      |      |      | 9   | 160          | 59              |
|          |      |      |      | 11  | 128          | 51              |
| 10"      | 31.0 | 8.0  | 31.0 | 7   | 200          | 119             |
|          |      |      |      | 9   | 160          | 98              |
|          |      |      |      | 11  | 128          | 79              |
|          |      |      |      | 17  | 80           | 55              |
| 12"      | 33.0 | 11.0 | 33.0 | 7   | 200          | 181             |
|          |      |      |      | 9   | 160          | 148             |
|          |      |      |      | 11  | 128          | 124             |
|          |      |      |      | 17  | 80           | 84              |
| 14"      | 42.0 | 11.0 | 42.0 | 7   | 200          | 271             |
|          |      |      |      | 9   | 160          | 217             |
|          |      |      |      | 11  | 128          | 181             |
|          |      |      |      | 17  | 80           | 123             |
| 16"      | 44.0 | 13.0 | 44.0 | 7   | 200          | 383             |
|          |      |      |      | 9   | 160          | 311             |
|          |      |      |      | 11  | 128          | 258             |
|          |      |      |      | 17  | 80           | 174             |
| 18"      | 57.0 | 14.0 | 57.0 | 7   | 200          | 605             |
|          |      |      |      | 9   | 160          | 493             |
|          |      |      |      | 11  | 128          | 415             |
|          |      |      |      | 17  | 80           | 280             |

• IPS 45° Lateral Wyes Continued Next Page •

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

WPR represents the long term hydrostatic pressure capacity of the fabricated wye with a 1.5:1 safety factor. To achieve a 2:1 safety factor like that of the straight pipe the WPR will be reduced.



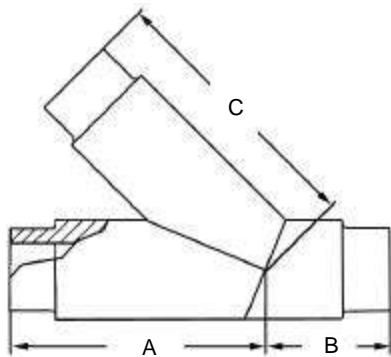
## IPS Fabricated 45° Lateral Wye Unreinforced (continued) (Dimensions in Inches)

| IPS Size | A     | B    | C     | SDR  | WPR (psi) | Weight (lbs) |
|----------|-------|------|-------|------|-----------|--------------|
| 20"      | 65.0  | 14.0 | 65.0  | 7    | 200       | 838          |
|          |       |      |       | 9    | 160       | 675          |
|          |       |      |       | 11   | 128       | 563          |
|          |       |      |       | 17   | 80        | 382          |
| 22"      | 67.0  | 14.0 | 67.0  | 7    | 200       | 1044         |
|          |       |      |       | 9    | 160       | 845          |
|          |       |      |       | 11   | 128       | 710          |
|          |       |      |       | 17   | 80        | 477          |
| 24"      | 69.0  | 15.0 | 69.0  | 7    | 200       | 1272         |
|          |       |      |       | 9    | 160       | 1033         |
|          |       |      |       | 11   | 128       | 861          |
|          |       |      |       | 17   | 80        | 583          |
| 26"      | 70.0  | 17.0 | 70.0  | 9    | 100       | 1272         |
|          |       |      |       | 11   | 80        | 1071         |
|          |       |      |       | 17   | 50        | 723          |
| 28"      | 71.0  | 18.0 | 71.0  | 9    | 100       | 1495         |
|          |       |      |       | 11   | 80        | 1256         |
|          |       |      |       | 17   | 50        | 832          |
| 30"      | 90.0  | 18.0 | 90.0  | 11   | 80        | 1759         |
|          |       |      |       | 17   | 50        | 1191         |
| 32"      | 91.0  | 19.0 | 91.0  | 11   | 80        | 2030         |
|          |       |      |       | 17   | 50        | 1365         |
| 34"      | 93.0  | 20.0 | 93.0  | 11   | 80        | 2344         |
|          |       |      |       | 17   | 50        | 1575         |
| 36"      | 95.0  | 20.0 | 95.0  | 11   | 80        | 2683         |
|          |       |      |       | 17   | 50        | 1807         |
| 42"      | 109.0 | 25.0 | 109.0 | 17   | 50        | 2835         |
|          |       |      |       | 21   | 40        | 2310         |
| 48"      | 113.0 | 26.0 | 113.0 | 21   | 40        | 3045         |
|          |       |      |       | 26   | 32        | 2479         |
| 54"      | 118.0 | 29.0 | 118.0 | 26   | 32        | 3412         |
|          |       |      |       | 32.5 | 25        | 2742         |

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

WPR represents the long term hydrostatic pressure capacity of the fabricated wye with a 1.5:1 safety factor. To achieve a 2:1 safety factor like that of the straight pipe the WPR will be reduced.



## IPS Fabricated 45° Lateral Wye Full Pressure Reinforced (Dimensions in Inches)

These wyes offer a full pressure rating without restricting the ID flow or lowering the fitting WPR safety factor!

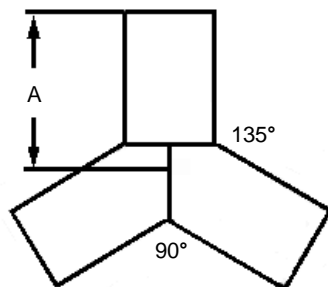
| IPS Size | A    | B    | C    | SDR | WPR (psi) | Weight (lbs) |
|----------|------|------|------|-----|-----------|--------------|
| 4 "      | 20.0 | 12.0 | 21.0 | 11  | 160       | 26           |
| 6 "      | 28.0 | 14.0 | 28.0 | 11  | 160       | 53           |
| 8 "      | 31.0 | 16.0 | 31.0 | 11  | 160       | 84           |
| 10 "     | 33.0 | 16.0 | 35.0 | 11  | 160       | 122          |
| 12 "     | 36.0 | 16.0 | 36.0 | 11  | 160       | 141          |
| 14 "     | 40.0 | 28.0 | 45.0 | 11  | 160       | 242          |
| 16 "     | 42.0 | 28.0 | 46.0 | 11  | 160       | 344          |
| 18 "     | 44.0 | 28.0 | 48.0 | 11  | 160       | 526          |
| 20 "     | 72.0 | 36.0 | 72.0 | 11  | 160       | 709          |
| 22 "     | 72.0 | 36.0 | 72.0 | 11  | 160       | 867          |
| 24 "     | 72.0 | 36.0 | 72.0 | 11  | 160       | 1048         |

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



# INDEPENDENT PIPE PRODUCTS



## IPS Fabricated True Equal Wye Unreinforced

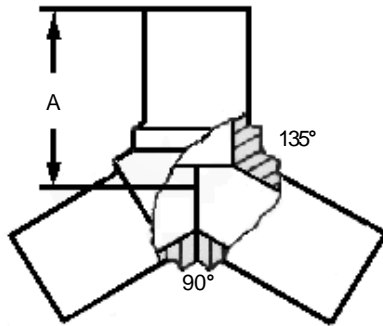
(Dimensions in Inches)

| IPS Size | A    | SDR | WPR (psi) | Weight (lbs) |
|----------|------|-----|-----------|--------------|
| 4 "      | 9.0  | 11  | 128       | 6            |
| 6 "      | 12.0 | 11  | 128       | 17           |
| 8 "      | 16.0 | 11  | 128       | 36           |
| 10 "     | 20.0 | 11  | 128       | 69           |
| 12 "     | 24.0 | 11  | 128       | 115          |
| 14 "     | 28.0 | 11  | 80        | 161          |
| 16 "     | 32.0 | 11  | 80        | 246          |
| 18 "     | 36.0 | 11  | 80        | 348          |
| 20 "     | 40.0 | 11  | 80        | 475          |
| 22 "     | 44.0 | 11  | 80        | 631          |
| 24 "     | 48.0 | 11  | 80        | 816          |

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

WPR represents the long term hydrostatic pressure capacity of the fabricated tee with a 1.5:1 safety factor. To achieve a 2:1 safety factor like that of the straight pipe the WPR will be reduced.



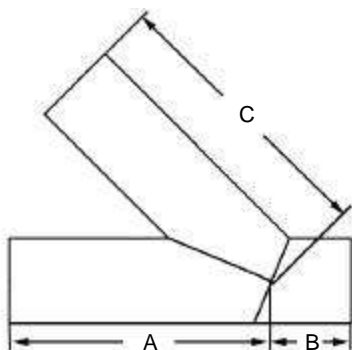
## IPS Fabricated True Equal Wye Full Pressure Reinforced (Dimensions in Inches)

These wyes offer a full pressure rating without restricting the ID flow or lowering the fitting WPR safety factor!

| IPS Size | A    | SDR | WPR (psi) | Weight (lbs) |
|----------|------|-----|-----------|--------------|
| 4"       | 9.0  | 11  | 160       | 8            |
| 6"       | 12.0 | 11  | 160       | 19           |
| 8"       | 16.0 | 11  | 160       | 43           |
| 10"      | 20.0 | 11  | 160       | 83           |
| 12"      | 24.0 | 11  | 160       | 138          |
| 14"      | 28.0 | 11  | 160       | 193          |
| 16"      | 32.0 | 11  | 160       | 296          |
| 18"      | 36.0 | 11  | 160       | 418          |
| 20"      | 40.0 | 11  | 160       | 571          |
| 22"      | 44.0 | 11  | 160       | 757          |
| 24"      | 48.0 | 11  | 160       | 979          |

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



## DIPS Fabricated 45° Lateral Wye Unreinforced

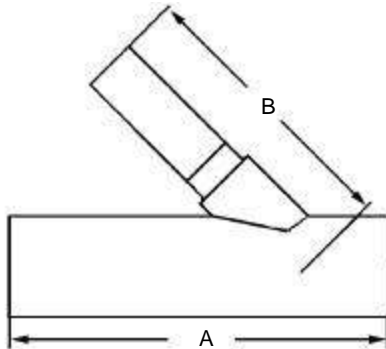
(Dimensions in Inches)

| DIPS Size | A    | B    | C    | SDR | WPR (psi) | Weight (lbs) |
|-----------|------|------|------|-----|-----------|--------------|
| 4"        | 22.0 | 7.0  | 22.0 | 9   | 160       | 16           |
|           |      |      |      | 11  | 128       | 11           |
|           |      |      |      | 17  | 80        | 7            |
| 6"        | 28.0 | 7.0  | 28.0 | 9   | 160       | 35           |
|           |      |      |      | 11  | 128       | 29           |
|           |      |      |      | 17  | 80        | 17           |
| 8"        | 30.0 | 8.0  | 30.0 | 9   | 160       | 60           |
|           |      |      |      | 11  | 128       | 54           |
|           |      |      |      | 17  | 80        | 38           |
| 10"       | 31.0 | 8.0  | 31.0 | 9   | 160       | 97           |
|           |      |      |      | 11  | 128       | 78           |
|           |      |      |      | 17  | 80        | 56           |
| 12"       | 33.0 | 11.0 | 33.0 | 9   | 160       | 155          |
|           |      |      |      | 11  | 128       | 124          |
|           |      |      |      | 17  | 80        | 87           |
| 14"       | 42.0 | 11.0 | 42.0 | 9   | 160       | 241          |
|           |      |      |      | 11  | 128       | 203          |
|           |      |      |      | 17  | 80        | 135          |
| 16"       | 44.0 | 13.0 | 44.0 | 9   | 160       | 334          |
|           |      |      |      | 11  | 128       | 286          |
|           |      |      |      | 17  | 80        | 191          |
| 18"       | 57.0 | 14.0 | 57.0 | 9   | 160       | 542          |
|           |      |      |      | 11  | 128       | 442          |
|           |      |      |      | 17  | 80        | 306          |
| 20"       | 65.0 | 14.0 | 65.0 | 9   | 160       | 747          |
|           |      |      |      | 11  | 128       | 609          |
|           |      |      |      | 17  | 80        | 414          |
| 24"       | 69.0 | 15.0 | 69.0 | 9   | 160       | 1096         |
|           |      |      |      | 11  | 128       | 926          |
|           |      |      |      | 17  | 80        | 622          |
| 30"       | 91.0 | 19.0 | 91.0 | 11  | 80        | 1840         |
|           |      |      |      | 17  | 50        | 1238         |

Other sizes and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

WPR represents the long term hydrostatic pressure capacity of the fabricated wye with a 1.5:1 safety factor. To achieve a 2:1 safety factor like that of the straight pipe the WPR will be reduced.



## IPS Branch Saddle 45° Lateral Reducing Wye Full Pressure Rated (Dimensions in Inches)

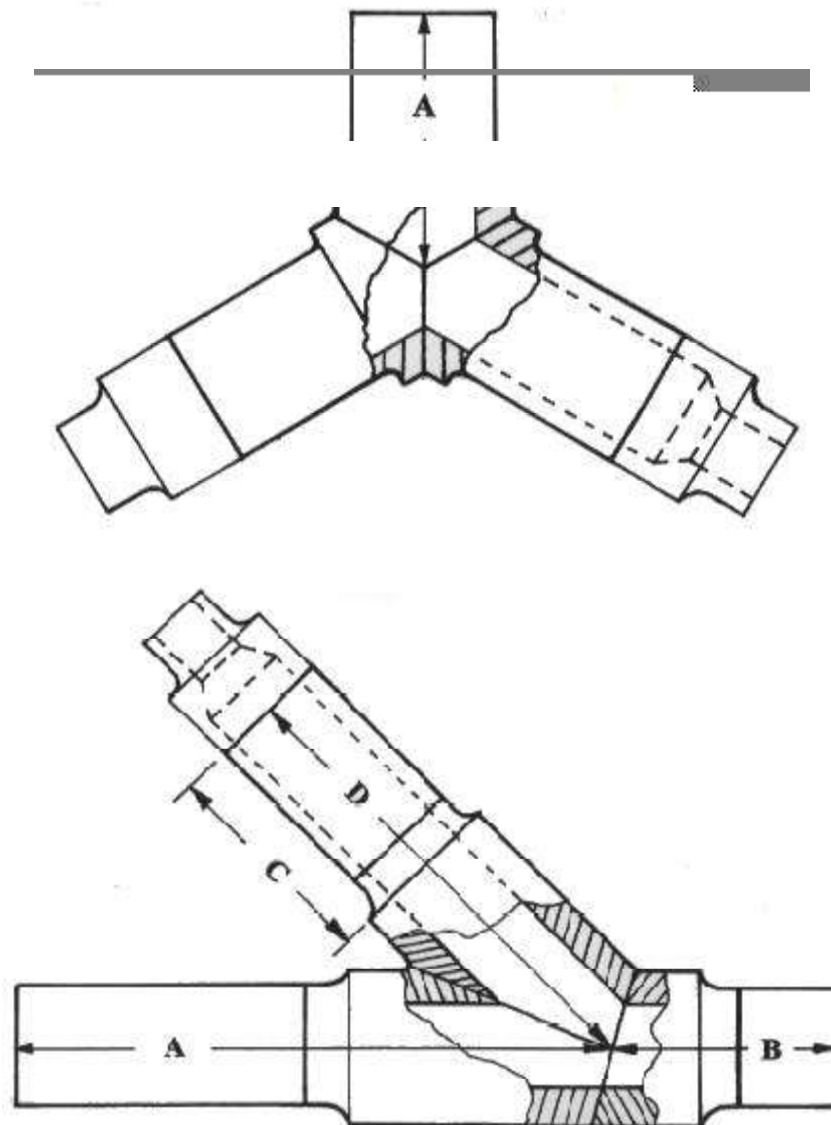
| IPS Size | A    | B    | SDR | WPR | Weight (lbs) |
|----------|------|------|-----|-----|--------------|
| 8 x 4    | 38.0 | 30.0 | 11  | 160 | 37           |
| 10 x 4   | 39.0 | 31.0 | 11  | 160 | 51           |
| 12 x 4   | 44.0 | 33.0 | 11  | 160 | 87           |
| 10 x 6   | 39.0 | 31.0 | 11  | 160 | 72           |
| 12 x 6   | 44.0 | 33.0 | 11  | 160 | 96           |
| 14 x 6   | 53.0 | 42.0 | 11  | 160 | 129          |
| 12 x 8   | 44.0 | 33.0 | 11  | 160 | 109          |
| 14 x 8   | 53.0 | 42.0 | 11  | 160 | 143          |

**Other sizes and DR's not listed are available - Call For Quick Quote**

**Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.**

## Reducing Outlet Wyes

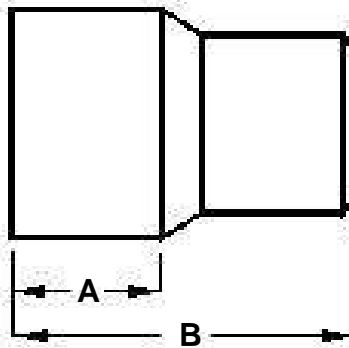
Due to the complexity of the concave/convex elliptical (oval) heater plates required to make unreinforced or poly-reinforced reducing outlet wyes, it is standard practice to add a compact reducer to the outlet branch of the line-size wye in order to provide a reduced outlet branch. Call for a Quick Quote on the reduced outlet wye fabrications. Refer to the sketches below for design illustrations:



## IPS Molded End Caps 3/4" - 8"

Pressure Rated for DR Listed

(Dimensions in Inches)



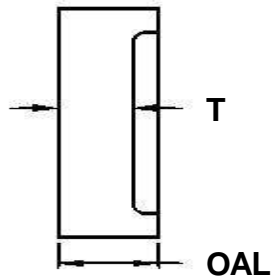
| Nominal Size | DR | A     | B (OAL) | Weight (lbs) |
|--------------|----|-------|---------|--------------|
| 3/4"         | 11 | -     | 2.040   | 0.5          |
| 1"           | 11 | -     | 2.209   | 0.5          |
| 1-1/4"       | 11 | -     | 3.250   | 0.5          |
| 1-1/2"       | 11 | -     | 2.580   | 0.5          |
| 2"           | 11 | 3.125 | 7.000   | 1            |
| 3"           | 11 | 2.875 | 7.125   | 1            |
| 4"           | 11 | 3.000 | 7.750   | 2            |
| 6"           | 11 | 3.000 | 9.000   | 4            |
| 8"           | 11 | 4.000 | 11.125  | 7            |

• See Next Page For Larger End Caps 10" - 54" •

Other sizes and DR's not listed are available - Call For Quick Quote

Hydrotesting for compliance with AWWA C906 fitting requirements add 15% (i.e., 1.15 multiplier).

# INDEPENDENT PIPE PRODUCTS



## IPS Machined End Caps 10" - 54"

Pressure Rated for DR Listed

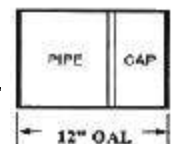
(Dimensions in Inches)

| Nominal Size | DR                   | T            | OAL          | Weight (lbs) |
|--------------|----------------------|--------------|--------------|--------------|
| 10"          | 11-32.5              | 2.62         | 4.00         | 15           |
| 12"          | 11-32.5              | 3.00         | 4.00         | 17           |
| 14"          | 11-32.5              | 3.00         | 4.00         | 19           |
| 16"          | 11<br>17-32.5        | 3.38<br>2.87 | 5.00<br>4.00 | 32<br>24     |
| 18"          | 11<br>17-32.5        | 3.80<br>3.22 | 5.00<br>4.00 | 41<br>30     |
| 20"          | 11 - 21<br>26 - 32.5 | 4.20<br>3.00 | 5.00<br>4.00 | 50<br>37     |
| 22"          | 11-21<br>26-32.5     | 4.32<br>3.30 | 5.00<br>4.00 | 75<br>45     |
| 24"          | 11-21<br>26-32.5     | 5.06<br>3.72 | 6.00<br>5.00 | 89<br>68     |
| 26"          | 10 PSI Only          | 3.00         | 4.00         | 62           |
| 28"          | 10 PSI Only          | 3.00         | 4.00         | 72           |
| 30"          | 10 PSI Only          | 3.00         | 4.00         | 83           |
| 32"          | 10 PSI Only          | 3.00         | 4.00         | 94           |
| 34"          | 10 PSI Only          | 3.00         | 4.00         | 106          |
| 36"          | 10 PSI Only          | 3.00         | 4.00         | 115          |
| 40"          | 10 PSI Only          | 3.00         | 4.00         | 142          |
| 42"          | 10 PSI Only          | 3.00         | 4.00         | 157          |
| 48"          | 10 PSI Only          | 3.00         | 4.00         | 205          |
| 54"          | 10 PSI Only          | 3.00         | 4.00         | 253          |

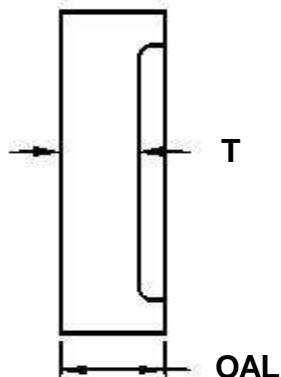
Other sizes, pressure ratings, and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

Field fusion of machined end caps may require the use of a stub end holder. Sufficient length of pipe may be fused to end cap to eliminate the use of a stub end holder. Call for a Quick Quote on this fabricated option.



# INDEPENDENT PIPE PRODUCTS



## DIPS Machined End Caps

Pressure Rated for DR Listed

(Dimensions in Inches)

| Nominal Size | DR      | T    | OAL  | Weight (lbs) |
|--------------|---------|------|------|--------------|
| 4 "          | 11-21   | 1.00 | 3.00 | 2            |
| 6 "          | 11-21   | 1.50 | 3.00 | 4            |
| 8 "          | 11-21   | 2.00 | 3.00 | 6            |
| 10 "         | 11-21   | 2.40 | 4.00 | 12           |
| 12 "         | 11-21   | 2.80 | 4.00 | 18           |
| 14 "         | 11-21   | 3.30 | 4.00 | 30           |
| 16 "         | 11-21   | 3.68 | 5.00 | 38           |
| 18 "         | 11-21   | 4.12 | 5.00 | 48           |
| 20 "         | 11- 3.5 | 4.60 | 6.00 | 98           |
|              | 15.5-21 | 4.00 | 5.00 | 70           |
| 24 "         | 11-15.5 | 5.07 | 6.00 | 114          |
|              | 17-21   | 4.32 | 5.00 | 94           |

Other sizes, pressure ratings, and DR's not listed are available - Call For Quick Quote

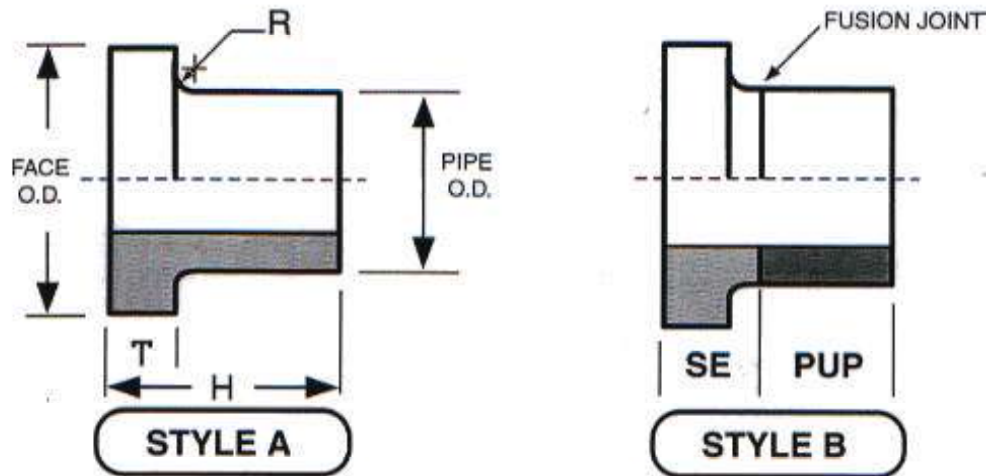
Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

Field fusion of machined end caps may require the use of a stub end holder. Sufficient length of pipe may be fused to end cap to eliminate the use of a stub end holder. Call for a Quick Quote on this fabricated option.



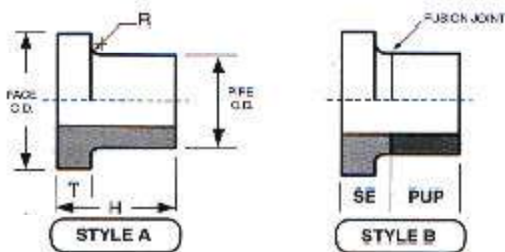


## Flange Adapter Design Information



- HDPE Pipe Grade Material: PE 3408
- Material Cell Class #345464C
- "T" must be at least 1.25 times pipe wall thickness for full pressure rating.
- One bolt length is used for each pipe diameter for all DR's. "T" is constant using DR-11 (or lowest available DR by size)
- The face diameter fits inside bolt-circle to promote alignment and concentricity, with sealing.
- "H" must be long enough to allow butt-fusion in all applicable fusion machines, size on size or larger. Consult fusion machine manufacturers for their required minimum length.
- "R" must be matched to the radius of the metal back up ring.
- Corrosion protected convoluted Ductile Iron back up rings are recommended.
- OD dimensions and tolerances machined in compliance with specifications of ASTM F714.
- Flange adapter wall thickness is 10% thicker than pipe to accommodate pipe end toe-in and out-of-roundness, while assuring virtually 100% butt-fusion contact.
- Flange adapters may be fused to same DR and to one standard DR higher (i.e., DR-17 to DR-21)

# INDEPENDENT PIPE PRODUCTS



## IPS Flange Adapters

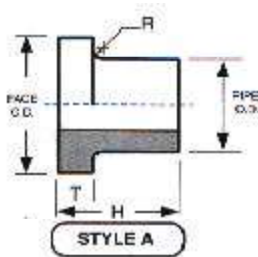
Pressure Rated for DR Ordered  
(Dimensions in Inches)

| Nominal Size | H (OAL)     | T            | Face Diameter | R (Radius) | Style | DR             | Weight (lbs) |
|--------------|-------------|--------------|---------------|------------|-------|----------------|--------------|
| 3/4"         | 4.0         | 0.20         | 2.000         | 1/4        | A     | 7-11           | .1           |
| 1"           | 4.0         | 0.21         | 2.375         | 1/4        | A     | 7-11           | .1           |
| 1-1/4"       | 4.0         | 0.25         | 2.750         | 1/4        | A     | 7-11           | .2           |
| 1-1/2"       | 4.0         | 0.30         | 3.125         | 1/4        | A     | 7-11           | .2           |
| 2"           | 5.5         | 0.39         | 3.900         | 1/4        | A     | 7-9<br>11-17   | 1<br>1       |
| 3"           | 6.0         | 0.63         | 5.000         | 1/4        | A     | 7-9<br>11-32.5 | 2<br>2       |
| 4"           | 6.0         | 0.75         | 6.600         | 3/8        | A     | 7-9<br>11-32.5 | 3<br>3       |
| 5"           | 6.0         | 0.75         | 7.500         | 3/8        | A     | 7-9<br>11-32.5 | 4<br>4       |
| 6"           | 8.0         | 1.13<br>1.00 | 8.500         | 3/8        | A     | 7-9<br>11-32.5 | 8<br>7       |
| 8"           | 9.0<br>11.0 | 1.44<br>1.00 | 10.630        | 3/8        | A     | 7-9<br>11-32.5 | 11<br>10     |
| 10"          | 9.0<br>12.0 | 2.00<br>1.25 | 12.750        | 3/8        | A     | 7-9<br>11-32.5 | 19<br>18     |
| 12"          | 11.0        | 2.30<br>1.50 | 15.000        | 3/8        | A     | 7-9<br>11-32.5 | 25<br>24     |
| 14"          | 11.0        | 1.60         | 17.500        | 1/2        | A     | 11-32.5        | 40           |
| 16"          | 12.0        | 1.80         | 20.000        | 1/2        | A     | 11-32.5        | 60           |
| 18"          | 12.0        | 2.00         | 21.120        | 1/2        | A     | 11-32.5        | 64           |

• IPS Flange Adapters Continued Next Page •

Other sizes, styles, and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



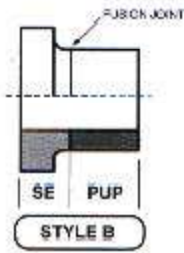
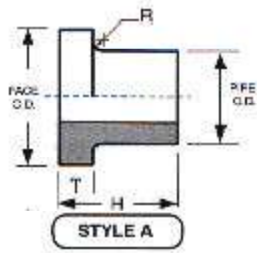
## IPS Flange Adapters (continued)

Pressure Rated for DR Ordered  
(Dimensions in Inches)

| Nominal Size | H (OAL) | T            | Face Diameter | R (Radius) | Style | DR            | Weight (lbs) |
|--------------|---------|--------------|---------------|------------|-------|---------------|--------------|
| 20"          | 12.0    | 2.50         | 23.5          | 1/2        | A     | 11-32.5       | 66           |
| 22"          | 12.0    | 2.50         | 25.6          | 1/2        | A     | 11-32.5       | 68           |
| 24"          | 14.0    | 2.70         | 28.0          | 1/2        | A     | 11-32.5       | 79           |
| 26"          | 14.0    | 2.95<br>1.91 | 30.0          | 1/2        | A     | 11<br>17-32.5 | 117<br>87    |
| 28"          | 14.0    | 3.18<br>2.06 | 32.3          | 1/2        | A     | 11<br>17-32.5 | 129<br>90    |
| 30"          | 14.0    | 3.41<br>2.21 | 34.3          | 1/2        | A     | 11<br>17-32.5 | 134<br>98    |
| 32"          | 14.0    | 2.35         | 36.5          | 1/2        | A     | 17-32.5       | 106          |
| 34"          | 14.0    | 2.50         | 38.5          | 1/2        | A     | 17-32.5       | 135          |
| 36"          | 14.0    | 2.65         | 40.8          | 1/2        | A     | 17-32.5       | 141          |
| 42"          | 21.0    | 2.60         | 47.5          | 1/2        | A     | 21-32.5       | 152          |
| 48"          | 21.0    | 2.60         | 54.0          | 3/4        | A     | 26-32.5       | 170          |
| 54"          | 21.0    | 2.60         | 60.0          | 3/4        | A     | 26-32.5       | 230          |

Other sizes, styles, and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.



## DIPS Flange Adapters

### Ductile Iron Pipe Sizes

Pressure Rated for DR Ordered

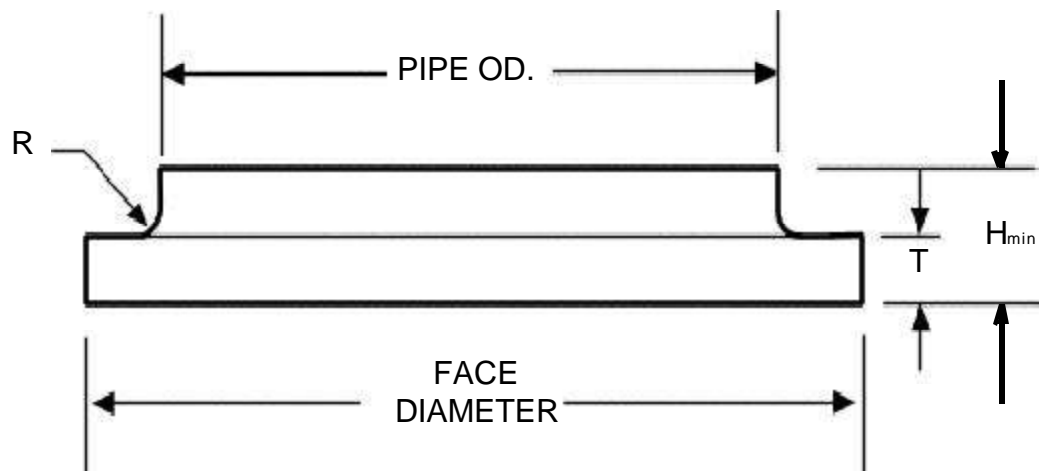
(Dimensions in Inches)

| Nominal Size | H (OAL) | T    | Face Diameter | R (Radius) | Style | DR      | Weight (lbs) |
|--------------|---------|------|---------------|------------|-------|---------|--------------|
| 3"           | 6.0     | 0.45 | 5.000         | 7/16       | A     | 11-32.5 | 2            |
| 4"           | 6.0     | 0.55 | 6.625         | 7/16       | A     | 11-32.5 | 3            |
| 6"           | 8.0     | 0.78 | 8.625         | 7/16       | A     | 11-32.5 | 4            |
| 8"           | 9.0     | 1.03 | 10.750        | 7/16       | A     | 11-32.5 | 6            |
| 10"          | 9.0     | 1.26 | 12.750        | 7/16       | A     | 11-32.5 | 10           |
| 12"          | 11.0    | 1.50 | 15.000        | 7/16       | A     | 11-32.5 | 17           |
| 14"          | 11.0    | 1.74 | 17.500        | 7/16       | A     | 11-32.5 | 28           |
| 16"          | 12.0    | 1.60 | 20.000        | 7/16       | A     | 11-32.5 | 35           |
| 18"          | 12.0    | 2.22 | 21.500        | 7/16       | A     | 11-32.5 | 46           |
| 20"          | 12.0    | 2.46 | 23.600        | 7/16       | A     | 11-32.5 | 55           |
| 24"          | 14.0    | 2.93 | 27.800        | 7/16       | A     | 11-32.5 | 81           |
| 30"          | 14.0    | 3.64 | 34.300        | 7/16       | A     | 11-32.5 | 114          |

Other sizes, styles, and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

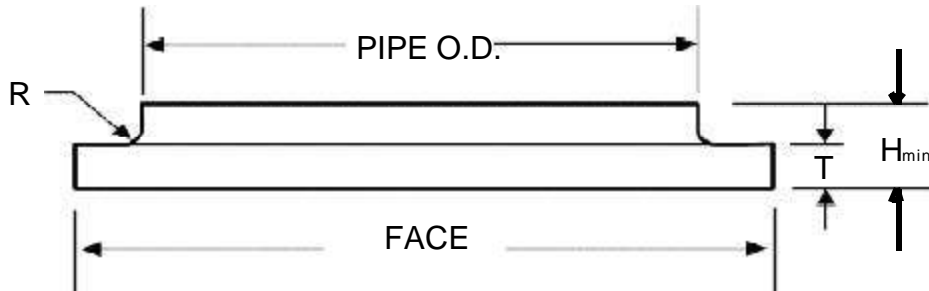
## Flange Stub End Design Information



- Fusion machine stub-end holders required for field fusion.
- One bolt length is used for each pipe diameter for all DR's. "T" is constant using DR-11 (or lowest available DR. by size)
- The face diameter fits inside bolt-circle to promote alignment and concentricity while providing a proper seal.
- "H" must be long enough to allow butt-fusion in all applicable fusion machines, size on size or larger. Consult fusion machine manufacturers for their required minimum length.
- "R" must be matched to the radius of the metal back up ring.
- Corrosion protected convoluted Ductile Iron back up rings are recommended.
- OD dimensions and tolerances machined in compliance with specifications of ASTM F714.
- Flange adapter wall thickness is 10% thicker than pipe to accommodate pipe end toe-in and out of roundness, while assuring virtually 100% butt fusion contact.
- Stub-ends may be fused to the same DR and to one standard DR higher (i.e., DR-17 to DR-21).

## IPS Flange Stub Ends

Pressure Rated for DR Ordered  
(Dimensions in Inches)



| Nominal Size | H (OAL)    | T            | Face Diameter | R (Radius) | DR            | Weight (lbs) |
|--------------|------------|--------------|---------------|------------|---------------|--------------|
| 14"          | 4.0        | 1.60         | 17.50         | 1/2        | 11-32.5       | 32           |
| 16"          | 4.0        | 1.80         | 20.00         | 1/2        | 11-32.5       | 44           |
| 18"          | 4.0        | 2.00         | 21.12         | 1/2        | 11-32.5       | 48           |
| 20"          | 4.0        | 2.25         | 23.50         | 1/2        | 11-32.5       | 53           |
| 22"          | 4.0        | 2.50         | 25.60         | 1/2        | 11-32.5       | 62           |
| 24"          | 4.0        | 2.70         | 28.00         | 1/2        | 11-32.5       | 74           |
| 26"          | 4.0        | 2.95<br>1.91 | 30.00         | 1/2        | 11<br>17-32.5 | 36<br>28     |
| 28"          | 4.8<br>4.0 | 3.18<br>2.21 | 32.30         | 1/2        | 11<br>17-32.5 | 44<br>34     |
| 30"          | 5.0<br>4.0 | 3.41<br>2.21 | 34.30         | 1/2        | 11<br>17-32.5 | 53<br>42     |
| 32"          | 4.0        | 2.35         | 36.50         | 1/2        | 17-32.5       | 51           |
| 34"          | 4.0        | 2.50         | 38.50         | 1/2        | 17-32.5       | 59           |
| 36"          | 4.0        | 2.65         | 40.80         | 1/2        | 17-32.5       | 67           |
| 42"          | 4.5        | 3.09         | 47.50         | 1/2        | 17-32.5       | 82           |
| 48"          | 4.5        | 2.60         | 54.00         | 3/4        | 26-32.5       | 87           |
| 54"          | 4.5        | 2.60         | 60.00         | 3/4        | 26-32.5       | 152          |

Other sizes, styles, and DR's not listed are available - Call For Quick Quote

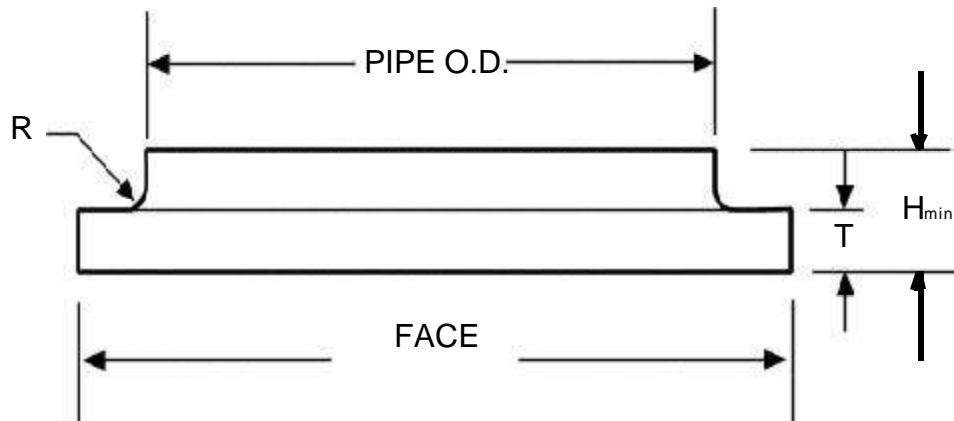
Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

## DIPS Flange Stub Ends

### Ductile Iron Pipe Sizes

Pressure Rated for DR Ordered

(Dimensions in Inches)

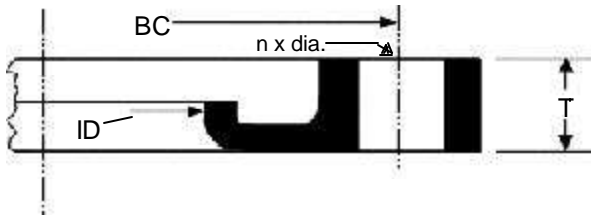


| Nominal Size | H (OAL) | T    | Face Diameter | R (Radius) | DR      | Weight (lbs) |
|--------------|---------|------|---------------|------------|---------|--------------|
| 14"          | 4.0     | 1.60 | 17.5          | 7/16       | 11-32.5 | 18           |
| 16"          | 4.0     | 1.60 | 20.0          | 7/16       | 11-32.5 | 24           |
| 18"          | 4.0     | 2.22 | 21.5          | 7/16       | 11-32.5 | 27           |
| 20"          | 4.0     | 2.46 | 23.6          | 7/16       | 11-32.5 | 33           |
| 24"          | 4.5     | 2.93 | 27.8          | 7/16       | 11-32.5 | 46           |
| 30"          | 5.0     | 3.64 | 34.3          | 7/16       | 11-32.5 | 110          |

Other sizes, styles, and DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

## IPS Ductile Iron Back-Up Rings (Dimensions in Inches)



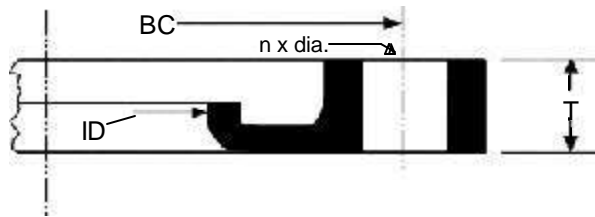
For other pressure ratings, Stainless Steel, Epoxy Coated, or Glass Reinforced PP Encapsulated - Call For Quick Quote

| Nominal Size | OD    | ID    | BC    | # dia x holes | T    | WPR (psi) | Weight (lbs) |
|--------------|-------|-------|-------|---------------|------|-----------|--------------|
| 3/4"         | 3.88  | 1.11  | 2.75  | 4 x 5/8       | 0.50 | 267       | 1            |
| 1"           | 4.25  | 1.38  | 3.13  | 4 x 5/8       | 0.56 | 267       | 1            |
| 1-1/4"       | 4.63  | 1.72  | 3.50  | 4 x 5/8       | 0.63 | 267       | 2            |
| 1-1/2"       | 5.00  | 1.97  | 3.88  | 4 x 5/8       | 0.69 | 267       | 2            |
| 2"           | 6.00  | 2.63  | 4.75  | 4 x 3/4       | 0.75 | 267       | 3            |
| 3"           | 7.50  | 3.75  | 6.00  | 4 x 3/4       | 0.94 | 267       | 4            |
| 4"           | 9.00  | 4.75  | 7.50  | 8 x 3/4       | 0.94 | 267       | 5            |
| 5"           | 10.00 | 5.69  | 8.50  | 8 x 7/8       | 0.94 | 267       | 6            |
| 6"           | 11.00 | 6.88  | 9.50  | 8 x 7/8       | 1.00 | 267       | 7            |
| 8"           | 13.50 | 8.88  | 11.75 | 8 x 7/8       | 1.12 | 267       | 11           |
| 10"          | 16.00 | 11.00 | 14.25 | 12 x 1        | 1.19 | 267       | 16           |
| 12"          | 19.00 | 13.13 | 17.00 | 12 x 1        | 1.50 | 267       | 23           |
| 14"          | 21.00 | 14.18 | 18.75 | 12 x 1-1/8    | 1.38 | 160       | 30           |
| 16"          | 23.50 | 16.19 | 21.25 | 16 x 1-1/8    | 1.44 | 160       | 39           |
| 18"          | 25.00 | 18.38 | 22.75 | 16 x 1-1/4    | 1.60 | 160       | 45           |
| 20"          | 27.50 | 20.38 | 25.00 | 20 x 1-1/4    | 2.06 | 160       | 61           |
| 22"          | 29.50 | 22.38 | 27.25 | 20 x 1-3/8    | 2.13 | 200       | 72           |
| 24"          | 32.00 | 24.38 | 29.50 | 20 x 1-3/8    | 1.88 | 160       | 76           |
| 26"          | 34.25 | 26.38 | 31.75 | 24 x 1-3/8    | 2.38 | 160       | 104          |
| 28"          | 36.50 | 28.38 | 34.00 | 28 x 1-3/8    | 2.50 | 160       | 116          |
| 30"          | 38.75 | 30.38 | 36.00 | 28 x 1-3/8    | 2.50 | 128       | 143          |
| 32"          | 41.75 | 32.38 | 38.50 | 28 x 1-5/8    | 2.63 | 128       | 168          |
| 34"          | 43.75 | 34.38 | 40.50 | 32 x 1-5/8    | 2.69 | 100       | 181          |
| 36"          | 46.00 | 36.38 | 42.75 | 32 x 1-5/8    | 2.75 | 100       | 196          |
| 40"          | 50.75 | 39.75 | 47.25 | 36 x 1-5/8    | 3.00 | 89        | 341          |
| 42"          | 53.00 | 42.38 | 49.50 | 36 x 1-5/8    | 3.00 | 80        | 277          |
| 48"          | 59.50 | 48.50 | 56.00 | 44 x 1-5/8    | 3.50 | 64        | 332          |
| 54"          | 66.25 | 54.62 | 62.75 | 44 x 1-7/8    | 3.75 | 64        | 464          |

**WPR (working pressure rating) is for free-floating rings on HDPE flange adapters and includes a 2:1 safety factor. These are cast convoluted ductile-iron metal back up rings with 150# bolt-hole pattern; coated w/Red-Oxide primer; the material is in compliance with ASTM A536 GR 65/45/12.**



## DIPS Ductile Iron Back-Up Rings Ductile Iron Pipe Sizes (Dimensions in Inches)



For other pressure ratings, stainless steel,  
or epoxy coated - Call For Quick Quote

| Nominal Size | OD    | ID    | BC    | # dia<br>x<br>holes holes | T    | WPR<br>(psi) | Weight<br>(lbs) |
|--------------|-------|-------|-------|---------------------------|------|--------------|-----------------|
| 4"           | 9.00  | 4.90  | 7.50  | 8 x 3/4                   | 0.94 | 267          | 5               |
| 6"           | 11.00 | 7.00  | 9.50  | 8 x 7/8                   | 1.00 | 267          | 7               |
| 8"           | 13.50 | 9.13  | 11.75 | 8 x 7/8                   | 1.12 | 267          | 11              |
| 10"          | 16.00 | 11.25 | 14.25 | 12 x 1                    | 1.19 | 267          | 15              |
| 12"          | 19.00 | 13.37 | 17.00 | 12 x 1                    | 1.50 | 267          | 25              |
| 14"          | 21.00 | 15.48 | 18.75 | 12 x 1-1/8                | 1.63 | 267          | 36              |
| 16"          | 23.50 | 17.59 | 21.25 | 16 x 1-1/8                | 1.88 | 267          | 48              |
| 18"          | 25.00 | 19.70 | 22.75 | 16 x 1-1/4                | 1.75 | 200          | 48              |
| 20"          | 27.50 | 21.85 | 25.00 | 20 x 1-1/4                | 2.06 | 200          | 61              |
| 24"          | 32.00 | 26.05 | 29.50 | 20 x 1-3/8                | 2.13 | 200          | 91              |
| 30"          | 38.75 | 32.25 | 36.00 | 28 x 1-3/8                | 2.65 | 128          | 145             |

WPR (working pressure rating) is for free-floating rings on HDPE flange adapters and includes a 2:1 safety factor. These are cast convoluted ductile-iron metal back up rings with 150# bolt-hole pattern; coated w/Blue-Oxide primer; the material is in compliance with ASTM A536 GR 65/45/12.

The sealing-face surface area of "DIPS" flange adapters is less than "IPS" flange adapters. While "IPS" flanges seldom use gaskets, a higher level of performance is being required from the "DIPS" flanges. Independent Pipe Product flanges are designed with a thicker flange face to compensate; but GASKETS are strongly recommended for long-term, leakproof service. (See the GASKET page of this section)

## IPS and DIPS "Full-Face" Gaskets for Flange Adapters

(For Potable-Water, Fire-Water, and Sewer Force-Main Pipelines)

*Note: Larger sizes are  
multiple piece*



Full Face Gasket

Good capable gaskets are **required** on DIPS HDPE flanges and on IPS HDPE flanges bolted to other pipe materials. IPS PE to PE flange sets may or may not require gaskets depending on the operating pressure and diameter. Lower pressure PE to PE flanges have sealed well without gaskets; however, today's higher working-pressure-ratings on large diameter IPS pipe flanges need gaskets to provide the best long-term seal. These gaskets work best at 1/16" thick. The "Full-Face" design gives the best opportunity to hold, seat and seal the flange.

| Nominal<br>Size | OD    | BC    | # dia<br>x<br>holes holes | Garlock<br># 3000   | Klinger<br># C-4401 |
|-----------------|-------|-------|---------------------------|---|---------------------|
| 2"              | 6.00  | 4.75  | 4 x 3/4                   | <p>--Call For Quote--</p> <p>Due to gaskets being cut per order, gaskets are priced per each inquiry.</p> <p>--Call For Quote--</p> |                     |
| 3"              | 7.50  | 6.00  | 4 x 3/4                   |   |                     |
| 4"              | 9.00  | 7.50  | 8 x 3/4                   |   |                     |
| 6"              | 11.00 | 9.50  | 8 x 7/8                   |   |                     |
| 8"              | 13.50 | 11.75 | 8 x 7/8                   |   |                     |
| 10"             | 16.00 | 14.25 | 12 x 1                    |   |                     |
| 12"             | 19.00 | 17.00 | 12 x 1                    |   |                     |
| 14"             | 21.00 | 18.75 | 12 x 1-1/8                |   |                     |
| 16"             | 23.50 | 21.25 | 16 x 1-1/8                |   |                     |
| 18"             | 25.00 | 22.75 | 16 x 1-1/4                |   |                     |
| 20"             | 27.50 | 25.00 | 20 x 1-1/4                |   |                     |
| 22"             | 29.50 | 27.25 | 20 x 1-3/8                |   |                     |
| 24"             | 32.00 | 29.50 | 20 x 1-3/8                |   |                     |
| 26"             | 34.25 | 31.75 | 24 x 1-3/8                |   |                     |
| 28"             | 36.50 | 34.00 | 28 x 1-3/8                |   |                     |
| 30"             | 38.75 | 36.00 | 28 x 1-3/8                |   |                     |
| 32"             | 41.75 | 38.50 | 28 x 1-5/8                |   |                     |
| 34"             | 43.75 | 40.50 | 32 x 1-5/8                |   |                     |
| 36"             | 46.00 | 42.75 | 32 x 1-5/8                |   |                     |
| 42"             | 53.00 | 49.50 | 36 x 1-5/8                |   |                     |
| 48"             | 59.50 | 56.00 | 44 x 1-5/8                |   |                     |
| 54"             | 66.25 | 62.75 | 44 x 1-7/8                |   |                     |

These gaskets are cut per order. No "returns" or cancellations accepted once the gaskets are cut.  
(FOB Grand Prairie, TX)



## High Pressure Steel Blind Flanges IPS and DIPS AWWA C207 Class D

(Dimensions in Inches)

| Nominal Size | OD    | BC    | # dia<br>x<br>holes holes | T     | WPR<br>(psi) | Weight<br>(lbs) |
|--------------|-------|-------|---------------------------|-------|--------------|-----------------|
| 2"           | 6.00  | 4.75  | 4 x 3/4                   | 0.625 | 175          | 5               |
| 3"           | 7.50  | 6.00  | 4 x 3/4                   | 0.625 | 175          | 8               |
| 4"           | 9.00  | 7.50  | 8 x 3/4                   | 0.625 | 175          | 12              |
| 6"           | 11.00 | 9.50  | 8 x 7/8                   | 0.688 | 175          | 18              |
| 8"           | 13.50 | 11.75 | 8 x 7/8                   | 0.688 | 175          | 27              |
| 10"          | 16.00 | 14.25 | 12 x 1                    | 0.688 | 175          | 38              |
| 12"          | 19.00 | 17.00 | 12 x 1                    | 0.812 | 175          | 63              |
| 14"          | 21.00 | 18.75 | 12 x 1-1/8                | 0.938 | 150          | 89              |
| 16"          | 23.50 | 21.25 | 16 x 1-1/8                | 1.000 | 150          | 118             |
| 18"          | 25.00 | 22.75 | 16 x 1-1/4                | 1.062 | 150          | 140             |
| 20"          | 27.50 | 25.00 | 20 x 1-1/4                | 1.125 | 150          | 181             |
| 22"          | 29.50 | 27.25 | 20 x 1-3/8                | 1.188 | 150          | 213             |
| 24"          | 32.00 | 29.50 | 20 x 1-3/8                | 1.250 | 150          | 275             |
| 30"          | 38.75 | 36.00 | 28 x 1-3/8                | 1.375 | 150          | 444             |
| 36"          | 46.00 | 42.75 | 32 x 1-5/8                | 1.625 | 150          | 735             |
| 42"          | 53.00 | 49.50 | 36 x 1-5/8                | 1.750 | 150          | 1085            |
| 48"          | 59.50 | 56.00 | 44 x 1-5/8                | 1.750 | 150          | 1369            |

For other sizes not listed or pressure ratings, call for a Quick-Quote.

Description: An AWWA C207 cross-section, A36 steel plate, with Red-Oxide primer, to match ANSIB16.5 150# bolt-hole pattern.

## HDPE Blind Flanges IPS and DIPS (Dimensions in Inches)



| N o m i n a l<br>S i z e | D i a m e t e r<br>O f F l a n g e | 1 " T h i c k<br>W e i g h t (l b s) | 2 " T h i c k<br>W e i g h t (l b s) |
|--------------------------|------------------------------------|--------------------------------------|--------------------------------------|
| 2 "                      | 6 . 0 0                            | 1                                    | 2                                    |
| 3 "                      | 7 . 5 0                            | 2                                    | 4                                    |
| 4 "                      | 9 . 0 0                            | 3                                    | 6                                    |
| 6 "                      | 1 1 . 0 0                          | 4                                    | 8                                    |
| 8 "                      | 1 3 . 5 0                          | 5                                    | 1 0                                  |
| 1 0 "                    | 1 6 . 0 0                          | 7                                    | 1 4                                  |
| 1 2 "                    | 1 9 . 0 0                          | 1 0                                  | 2 0                                  |
| 1 4 "                    | 2 1 . 0 0                          | 1 2                                  | 2 4                                  |
| 1 6 "                    | 2 3 . 5 0                          | 1 5                                  | 3 0                                  |
| 1 8 "                    | 2 5 . 0 0                          | 1 8                                  | 3 6                                  |
| 2 0 "                    | 2 7 . 5 0                          | 2 1                                  | 4 2                                  |
| 2 2 "                    | 2 9 . 5 0                          | 2 4                                  | 4 8                                  |
| 2 4 "                    | 3 2 . 0 0                          | 2 8                                  | 5 6                                  |

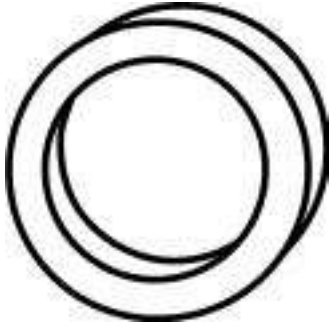
**Also available manufactured from PVC material - Call For Quick Quote**

These blind flanges are ordinarily used for closure or night-capping of flanged pipes. They are NOT fully pressure rated. Without the use of a metal back up blind flange, the HDPE flange may leak between bolt-holes at moderate pressures.

## Butterfly Valve Spacers

### IPS or DIPS

(Dimensions in Inches)



As the butterfly valve wafer rotates, it will hit the ID of the standard Flange-Adapter. Independent Pipe Products can machine custom Flange-Adapters to avoid using spacers and provide for full butterfly-valve operating (see next page). Valve spacers are used to offset the standard HDPE flange face to provide for full wafer rotation, when customized flanges have not been ordered. Be sure to double check the standard spacer thickness is sufficient for the exact butterfly valve being used, by doing a simple dimensional layout.

| Nominal Size | OD    | ID    | W P R (psi) | Thickness |
|--------------|-------|-------|-------------|-----------|
| 2 "          | 3.90  | 2.40  | 160         | 1.0       |
| 3 "          | 5.00  | 3.50  | 160         | 1.0       |
| 4 "          | 6.60  | 4.50  | 160         | 1.5       |
| 6 "          | 8.50  | 6.63  | 160         | 2.0       |
| 8 "          | 10.63 | 8.63  | 160         | 2.0       |
| 10 "         | 12.75 | 10.50 | 160         | 2.0       |
| 12 "         | 15.00 | 12.70 | 160         | 2.0       |
| 14 "         | 17.50 | 14.00 | 160         | 2.0       |
| 16 "         | 20.00 | 17.00 | 130         | 2.0       |
| 18 "         | 21.12 | 18.00 | 130         | 2.5       |
| 20 "         | 23.50 | 20.00 | 130         | 2.5       |
| 22 "         | 25.60 | 21.90 | 130         | 2.5       |
| 24 "         | 28.00 | 24.00 | 120         | 2.5       |

**For larger diameter valve-spacers - Call For Quick Quote**

**Refer to next page for modified flange adapters that avoid use of spacer rings.**

For larger valve spacers the following information is needed: width of valve from face to face, diameter of butterfly wafer and the location of the butterfly wafer stem (center stem or otherwise).

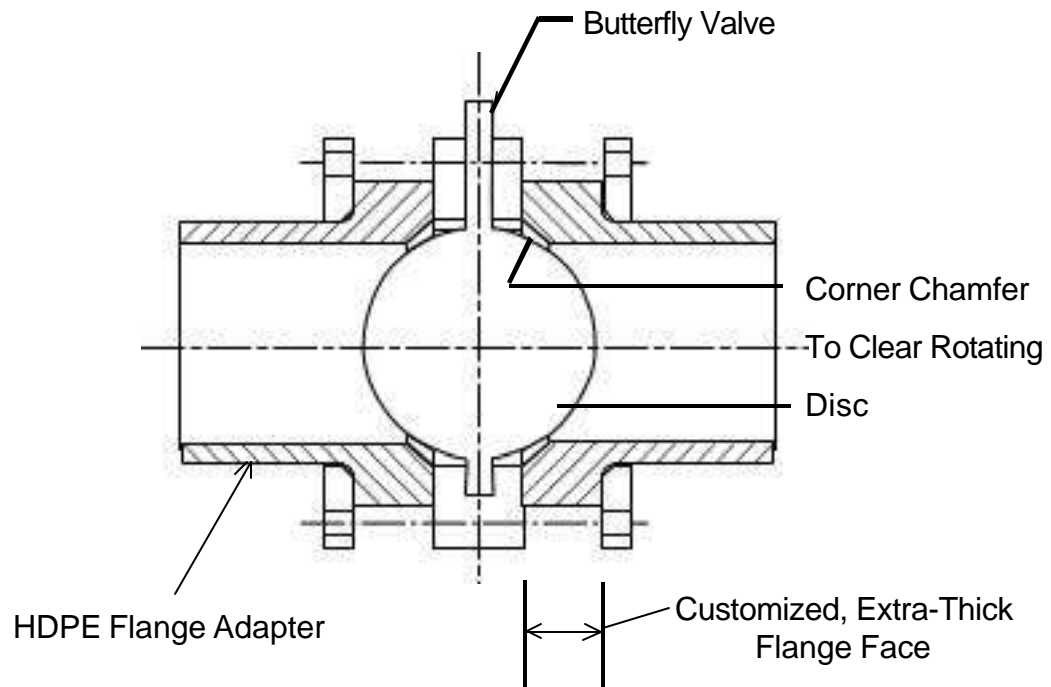
All non-stock fabricated fittings are produced to order and are noncancelable and nonreturnable.

Hydrotesting for compliance with AWWA C906 fitting requirements add 15% (i.e., 1.15 multiplier).

## Butterfly Valve Flange Adapter Design Information

When the butterfly valve disc rotates, it can hit the ID edge of the standard flange adapter. In the past, valve spacer rings have been used. Today, Independent Pipe Products can make and deliver a modified, one-piece flange adapter with an integral, extra-thick flange face internally machined to allow full disc opening.

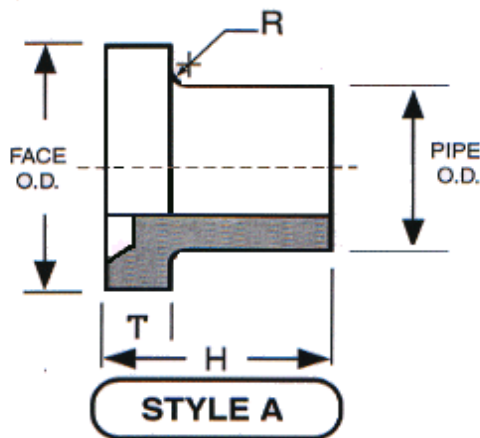
Included on the following page is design data and pricing for IPPI's standard Butterfly Flange Adapters 4" through 12" IPS. For sizes not listed please call for the design, quote, and delivery.



Design Data Needed: Disc diameter, valve width face to face and stem location.

## IPS & DIPS Butterfly Flange Adapters

Pressure Rated for DR Ordered  
(Dimensions in Inches)



| Nominal Size | H (OAL) | T    | Face Diameter | R (Radius) | Style | DR      | Weight (lbs) |
|--------------|---------|------|---------------|------------|-------|---------|--------------|
| 4"           | 6.50    | 1.25 | 6.625         | 3/8        | A     | 11-32.5 | 5            |
| 6"           | 8.50    | 1.50 | 8.625         | 3/8        | A     | 11-32.5 | 6            |
| 8"           | 9.50    | 1.75 | 10.750        | 3/8        | A     | 11-32.5 | 8            |
| 10"          | 9.50    | 2.00 | 12.750        | 3/8        | A     | 11-32.5 | 12           |
| 12"          | 11.50   | 2.25 | 15.000        | 3/8        | A     | 11-32.5 | 19           |

Larger sizes and other DR's not listed are available - Call For Quick Quote

Sizes 24" and smaller meet AWWA C906 fitting requirements, sizes 26" and larger are quoted per fitting.

For larger butterfly flange adapters the following information is needed: width of valve from face to face, diameter of butterfly wafer, and the location of the b.f.v. wafer stem (center stem or otherwise).

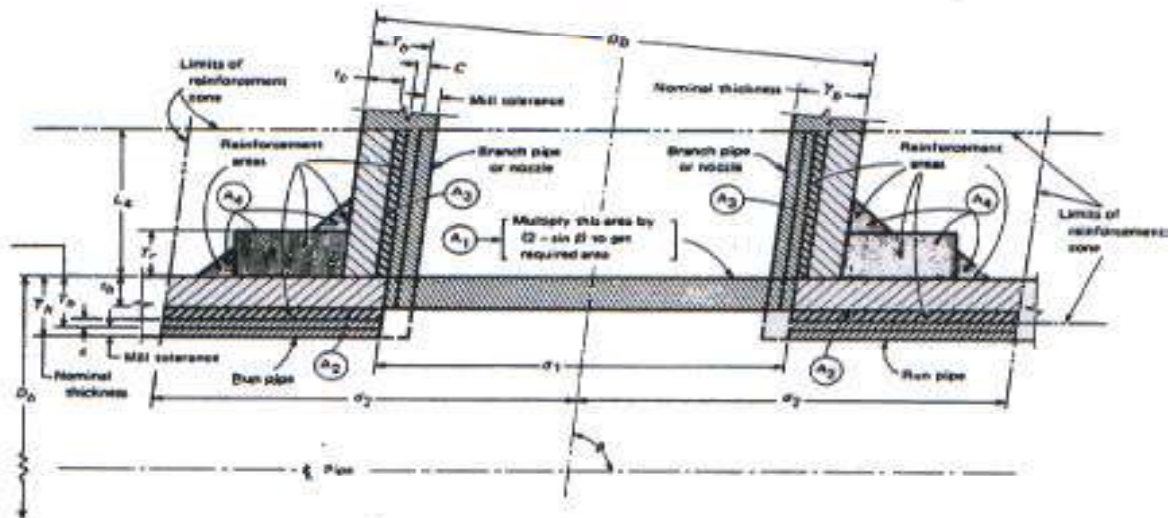
## Branch Saddle Design Information

### Fully Pressure-Rated Branch-Saddle Fittings

A pipe having a branch outlet connection is weakened by the opening that must be made in it. Unless the wall thickness of the pipe is sufficiently in excess of that required to sustain the full pressure, it is necessary to provide added reinforcement. The amount of added reinforcement required to sustain the pressure is governed by the area replacement method. Basically, the volume of the pipe-wall coupon from the hole for the branch is replaced by added volume and mass in critical zones around the branch outlet. This methodology is detailed in ASME Code for Pressure Piping B31.3 "Process Piping" section #304.3.2 and #304.3.3. Where the 800 psi hoop-stress of the branch outlet and the 800 psi hoop-stress of the main pipe meet at the joint intersection, extra material must be added to reduce the intensified stress in the joint to the allowable 800 psi long term stress.

#### BRANCH CONNECTION NOMENCLATURE

ASME B31.3-1996 Edition



Tests conducted on non-reinforced branch connections proves that the branch outlets in line tees and reducing tees are generally reduced in strength by about 45% depending on the ratio of the pipe diameters.

Pressure Reduction Ratios in Percent for Unreinforced Intersections\*

|     | 1"  | 1½" | 2"  | 2½" | 3" | 4" | 6" | 8" | 10" | 12" | 14" | 16" | 18" | 20" | 24" |
|-----|-----|-----|-----|-----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| 1"  | 100 |     |     |     |    |    |    |    |     |     |     |     |     |     |     |
| 1½" | 100 | 100 |     |     |    |    |    |    |     |     |     |     |     |     |     |
| 2"  | 100 | 100 | 89  |     |    |    |    |    |     |     |     |     |     |     |     |
| 2½" | 80  | 71  | 67  | 66  |    |    |    |    |     |     |     |     |     |     |     |
| 3"  | 77  | 69  | 65  | 64  | 63 |    |    |    |     |     |     |     |     |     |     |
| 4"  | 100 | 65  | 62  | 61  | 61 | 59 |    |    |     |     |     |     |     |     |     |
| 6"  | 100 | 100 | 100 | 58  | 57 | 56 | 58 |    |     |     |     |     |     |     |     |
| 8"  | 100 | 100 | 100 | 56  | 55 | 54 | 56 | 55 |     |     |     |     |     |     |     |
| 10" | 100 | 100 | 100 | 56  | 55 | 54 | 56 | 55 | 55  |     |     |     |     |     |     |
| 12" | 100 | 100 | 100 | 56  | 55 | 55 | 57 | 56 | 55  | 55  |     |     |     |     |     |
| 14" | 100 | 100 | 100 | 56  | 55 | 54 | 57 | 56 | 55  | 54  | 54  |     |     |     |     |
| 16" | 100 | 100 | 100 | 56  | 55 | 55 | 57 | 56 | 56  | 55  | 54  | 54  |     |     |     |
| 18" | 100 | 100 | 100 | 56  | 55 | 55 | 57 | 56 | 55  | 55  | 54  | 53  | 53  |     |     |
| 20" | 100 | 100 | 100 | 56  | 55 | 55 | 57 | 56 | 56  | 55  | 55  | 54  | 53  | 53  |     |
| 24" | 100 | 100 | 100 | 56  | 55 | 55 | 57 | 56 | 56  | 55  | 55  | 54  | 53  | 53  | 52  |

\*Based on the Code for Pressure Piping, ASA B31.1 for: standard weight pipe with 0.1 corrosion allowance: leg of Fillet weld = ¼"

for branches 4" or smaller, and 3/8" for larger branch sizes.



## Branch Saddle Heater Plate Information

Most common branch saddles are produced by machining a branch of a molded tee. Their reinforcement is meant for that size on size tee! It was not engineered to meet all reducing outlet tee design combinations. For example, using the area or volume replacement method of ASMEB31.3 for reinforcement, the borehole mass drilled from a 24" DR-11 pipe wall for a 2" outlet, is about 6.5 cubic inches. The muff area around the 2" tee-type branch-saddle is not nearly 6.5 cu. in. Thus the 2" tee-type branch-saddle on a 24 " DR-11 pipe is not fully pressure rated. The muff reinforcement of the 2" branch saddle has sufficient mass on it to fully pressure-rate 3" x 2", 4" x 2" and 6" x 2" reducing tee. Above 6" mains, the 2" saddle reinforcement does not fully replace the mass of the pipe wall removed for the outlet hole. Each branch saddle reinforcement should be reviewed for its capacity to replace the mass of the hole drilled through the specified pipe-main in order to maintain a full working pressure rating.

The Massive Branch Saddles (MBS) of the DIPS sizes are engineered to cover a wide range of reducing outlets through 24" DIPS pipe mains. The mass of the base reinforcement exceeds the mass of the hole cut from the main to which it will be fused. Thus the full pressure rating is preserved.

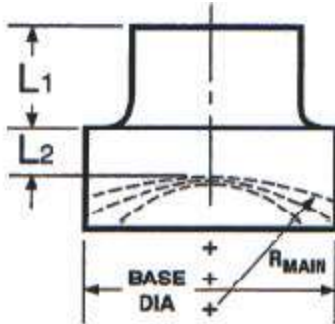
Most contractors wish to use the same heater plates that they now have. This is accomplished by jumping one base size or diameter compared to the outlet diameter, starting with the 4" outlets. For example, to fuse on a 4" DIPS outlet, investigate using the 6" IPS or 6" DIPS concave/convex heater plate set. To fuse on an 8" DIPS outlet, investigate using a 10" IPS or 8" DIPS heater plate set. Contact your fusion equipment manufacturer to record below, the following Heater Plate Sets that apply for your fusion machine:

| IPS<br>(Reduced Port: Reduced ID) |         |         |               | DIPS<br>(Full Port: Full Full-ID) |         |         |            |
|-----------------------------------|---------|---------|---------------|-----------------------------------|---------|---------|------------|
| IPS-Size                          | Base OD | Base ID | Htr.PI. Set # | Htr. Pl. Set#                     | Base OD | Base ID | DIPS-Size  |
| 2"(2.38)                          | 2.6"    | 1.90"   | #             | #                                 | ***     | ***     | ***        |
| 3"(3.50)                          | 3.9"    | 2.75"   | #             | #                                 | ***     | ***     | ***        |
| 4"(4.50)                          | 4.8"    | 3.40"   | #             | #                                 | 6.6"    | 3.90"   | 4"(4.80)   |
| 6"(6.63)                          | 7.3"    | 5.20"   | #             | #                                 | 8.63"   | 5.62"   | 6"(6.90)   |
| 8"(8.63)                          | 9.4"    | 7.06"   | #             | #                                 | 11.50"  | 7.38"   | 8"(9.05)   |
| 10"(10.75)                        | 11.5"   | 8.80"   | #             | #                                 | 13.80"  | 9.04"   | 10"(11.10) |
| 12"(12.75)                        | 13.8"   | 10.43"  | #             | #                                 | 16.00"  | 10.75"  | 12"(13.20) |
| *****                             | **      | **      |               | #                                 | 18.00"  | 12.51"  | 14"(15.30) |
| *****                             | **      | **      |               | #                                 | 20.00"  | 14.17"  | 16"(17.40) |
| *****                             | **      | **      |               | #                                 | 22.00"  | 15.93"  | 18"(19.50) |
| *****                             | **      | **      |               | #                                 | 24.00"  | 17.59"  | 20"(21.60) |
| *****                             | **      | **      |               | #                                 | 28.00"  | 21.00"  | 24"(25.80) |

**"IPS" Massive Branch Saddles designed for full bore, full pressure rating for all main & outlet combinations are available. Call for a Quote.**

## IPS Branch Saddles

(Dimensions in Inches)



- "Blank" branch saddles stocked in DR-11.
- Branch saddle "blank" machined per order to radius of pipe main size; and re-bored to DR.
- Branch saddles can be machined to main sizes up to 63".
- Purchaser must determine that concave/convex heater plate adapters are available to complete the saddle fusion.

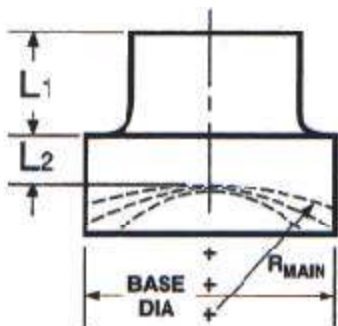
| Outlet Size | Main Size Range               | DR | L1 | L2  | Base Diameter | Weight (lbs) |
|-------------|-------------------------------|----|----|-----|---------------|--------------|
| 2" IPS      | 3 - 12<br>14 - 34<br>36 - 54  | 11 | 3" | 0.2 | 2.6           | 1            |
| 3" IPS      | 4 - 12<br>14 - 34<br>36 - 54  | 11 | 3" | 0.5 | 3.9           | 1            |
| 4" IPS      | 6 - 12<br>14 - 34<br>36 - 54  | 11 | 3" | 0.5 | 4.8           | 2            |
| 6" IPS      | 8 - 12<br>14 - 34<br>36 - 54  | 11 | 3" | 0.8 | 7.3           | 4            |
| 8" IPS      | 10 - 12<br>14 - 34<br>36 - 54 | 11 | 6" | 0.8 | 9.4           | 9            |
| 10" IPS     | 12<br>14 - 34<br>36 - 54      | 11 | 6" | 1.0 | 11.5          | 16           |
| 12" IPS     | 14 - 34<br>36 - 54            | 11 | 8" | 1.0 | 13.8          | 32           |

**Order information needed:**  
**IPS Outlet & DR x Exact Main Diameter**

IPS branch saddles meet AWWA C906 fitting requirements.

## DIPS Branch Saddles

(Dimensions in Inches)

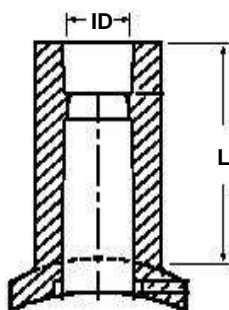


- "Blank" branch saddles stocked in DR-11.
- Branch saddle "blank" machined per order to radius of pipe main size; and re-bored to DR.
- Branch saddles can be machined thru 54" main size.
- Purchaser must determine that concave/convex heater plate adapters are available to complete the saddle fusion.

| Outlet Size | Main Size Range               | DR | L1 | L2  | Base Diameter | Weight (lbs) |
|-------------|-------------------------------|----|----|-----|---------------|--------------|
| 2" IPS      | 3 - 12<br>14 - 34<br>36 - 54  | 11 | 3  | 0.2 | 2.6           | 1            |
| 3" IPS/DIPS | 4 - 12<br>14 - 34<br>36 - 54  | 11 | 3  | 0.5 | 3.9           | 1            |
| 4" DIPS     | 6 - 12<br>14 - 34<br>36 - 54  | 11 | 4  | 1.0 | 6.6           | 4            |
| 6" DIPS     | 8 - 12<br>14 - 34<br>36 - 54  | 11 | 5  | 1.5 | 8.6           | 9            |
| 8" DIPS     | 10 - 12<br>14 - 34<br>36 - 54 | 11 | 6  | 1.5 | 11.5          | 17           |
| 10" DIPS    | 12<br>14 - 34<br>36 - 54      | 11 | 8  | 2.0 | 13.8          | 31           |
| 12" DIPS    | 14 - 34<br>36 - 54            | 11 | 10 | 2.0 | 16.0          | 47           |

**Order information needed:**  
**DIPS Outlet & DR x Exact Main Diameter**

DIPS branch saddles meet AWWA C906 fitting requirements.

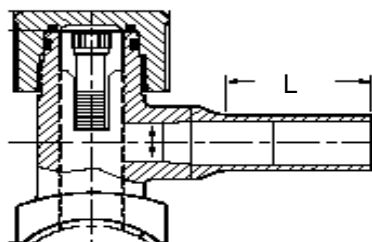


## IPS Service Saddles Rectangular Base

(Dimensions in Inches)

| Size                          | DR | L    | ID                      | Base Size<br>(rectangular) | Weight<br>(lbs) |
|-------------------------------|----|------|-------------------------|----------------------------|-----------------|
| 1-1/4 x 3/4<br>1-1/4 x 1      | 9  | 2.75 | 0.780<br>0.875          | 2.44" x 2.00"              | 0.2             |
| 1-1/2 x 3/4<br>1-1/2 x 1      | 9  | 2.75 | 0.780<br>0.875          | 2.44" x 2.00"              | 0.2             |
| 2 x 3/4<br>2 x 1<br>2 x 1-1/4 | 9  | 2.75 | 0.780<br>0.875<br>1.125 | 2.44" x 2.00"              | 0.2             |
| 3 x 3/4<br>3 x 1<br>3 x 1-1/4 | 9  | 2.75 | 0.780<br>0.875          | 2.44" x 2.00"              | 0.2             |
| 4 x 3/4<br>4 x 1<br>4 x 1-1/4 | 9  | 2.75 | 0.780<br>0.875          | 2.44" x 2.00"              | 0.2             |
| 6 x 1<br>6 x 1-1/4            | 9  | 2.75 | 0.875<br>1.125          | 2.44" x 2.00"              | 0.2             |
| 8 x 1                         | 9  | 2.75 | 0.875                   | 2.44" x 2.00"              | 0.1             |

**Many other service saddles are available including larger outlets, other radius and "high volume service saddles" - Call For Quick Quote.**



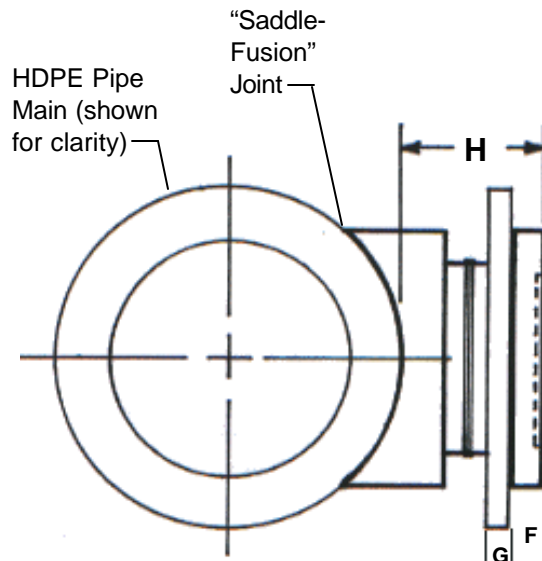
## IPS Self-Tapping Tees Rectangular Base

(Dimensions in Inches)

| Size               | DR | L            | ID           | Base Size<br>(rectangular) | Weight<br>(lbs) |
|--------------------|----|--------------|--------------|----------------------------|-----------------|
| 1-1/4 x 1          | 9  | 2.56         | 0.95         | 1.94 x 2.50                | 1               |
| 1-1/2 x 1          | 9  | 2.56         | 0.95         | 1.94 x 2.50                | 1               |
| 2 x 1<br>2 x 1-1/4 | 9  | 2.56<br>2.50 | 0.95<br>0.94 | 1.94 x 2.50                | 1               |
| 3 x 1<br>3 x 1-1/4 | 9  | 2.56<br>2.50 | 0.95<br>.094 | 1.94 x 2.50                | 1               |
| 4 x 1<br>4 x 1-1/4 | 9  | 2.56<br>2.50 | 0.95<br>0.94 | 1.94 x 2.50                | 1               |
| 6 x 1<br>6 x 1-1/4 | 9  | 2.56<br>2.50 | 0.95<br>0.94 | 1.94 x 2.50                | 1               |
| 8 x 1<br>8 x 1-1/4 | 9  | 2.56<br>2.50 | 0.95<br>0.94 | 1.94 x 2.50                | 1               |

Many other tapping tees are available including larger outlets, other radius, and “high volume tapping tees” - Call For Quick Quote.

## IPS & DIPS Tapping Sleeve / Saddle Assembly Full Pressure Rated - MSS SP-60 & AWWA C906 Compliant



The normal method of field tapping a mainline is to apply a tapping saddle and tap through the tapping valve into the main, remove the cutter and coupon and close the valve. It is advantageous to fabricate a branch saddle fused to a flange adapter with a one-piece metal back up ring captured between, this has been done for years. These "wet-tap" assemblies are fabricated to minimize the vertical height from the pipe crown to the flange face. This assembly complies with **MSS SP-60**, the Standard Practice of the MSS (Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.). These assemblies are engineered to accept tapping valves, whereas

ordinary flanges will not accept tapping valves. The assembly consists of a custom-engineered branch saddle fused to a customized flange adapter with a centered back up ring. Tapping Sleeve / Saddles are nominally fused to the main pipe on the horizontal.

| Outlet Size | Main Size Range               | G (Back Up Ring) | F (Flange Face) | H (Height) | D R | W P R (psi) |
|-------------|-------------------------------|------------------|-----------------|------------|-----|-------------|
| 4 "         | 6 - 12<br>14 - 34<br>36 - 54  | 0.94             | 1.00            | 8.50       | 11  | 160         |
| 6 "         | 8 - 12<br>14 - 34<br>36 - 54  | 1.00             | 1.25            | 8.50       | 11  | 160         |
| 8 "         | 10 - 12<br>14 - 34<br>36 - 54 | 1.12             | 1.50            | 9.00       | 11  | 160         |
| 10 "        | 12<br>14 - 34<br>36 - 54      | 1.19             | 2.00            | 10.50      | 11  | 160         |
| 12 "        | 14 - 34<br>36 - 54            | 1.50             | 2.25            | 10.50      | 11  | 160         |

See next page for information on cutter sizes for taps.

### CAUTION:

Insure that the field fusion equipment has adapters to hold the assembly with sufficient clearance opening and closure stroke to complete fusion.

User supplied longer bolts may be required to accept flange face and metal back up ring.

## Cutter Sizes for Taps

For line-size branch outlets, the proper cutter diameter for HDPE taps is accepted to be as large as 75% to 90% of the inside diameter of the pipe main. Note: The cutter must fit through the branch. It is acceptable to use a hole-cutter whose metal OD is up to at least 75% of the ID of the HDPE main pipe, but no larger than 90% of the HDPE main ID. Obviously, the cutter can be smaller for smaller branch-outlets.

Some users want the "maximum" diameter opening, thinking that it will maximize the water volume throughput and minimize the pressure loss through the fitting. A detailed examination of the numbers reveals the following:

Using a portal outlet cutter hole diameter that is nominally 87% of the ID of the pipe main, a detailed examination of the pressure loss through the "orifice" of the cut hole was done. The results confirmed that the pressure loss was negligible, almost insignificant. The pressure loss was equal to about 3 diameters of extra pipe length.

The pressure loss was less than 0.010 psi....1/100 th of one psi.

A full copy of the detailed report is available upon request.

Using the cutter size range of up to **75% to 90% of the HDPE main pipe ID**, the user can choose a cutter diameter that fits through the branch to provide good flow at minimum pressure loss and avoid tapping problems.

**Note:** When using **line-size metal tapping sleeves**, the cutter OD should be smaller, usually about **75%** of the pipe main inside diameter to avoid cutting through the spring line of the HDPE pipe main and not allowing the removal of the HDPE pipe coupon. The cutter OD should not be as large as the ID of the HDPE pipe main so that when the coupon is removed, it will retract freely within the cutter.

In all cases, the cutter OD **must** be slightly smaller in diameter than the HDPE pipe-main ID!!