

Technical Note 804 - Conduit In Casing Capacity

Conduit In Casing Capacity

Polyethylene casing and conduit are used in the communications and electrical industry to protect optical fibers and cables. A casing is typically a larger conduit that houses one or more smaller conduits or innerducts that contain the optical fibers or cables. The casing DR is determined from application requirements such as pull-in installation tensile load, earth load, live load, grout pressure, etc. See the *Performance Pipe Engineering Manual*, ASTM F 1962 and other industry standards and publications.

To determine the number of smaller conduits or innerducts that may be placed within a casing, first, the effective inside diameter of the casing is determined. Then the number of like-size smaller conduits that can be installed within the casing with adequate clearance for installation is determined. Filling the casing completely is usually not permitted. Installation clearance is required for compact conduit bundles, and for loose bundles, typically no more than 60% of the effective inside diameter of the casing is utilized.

Tables 6 and 7 indicate the capacities of selected casing sizes for compact and loose bundles of selected conduit (innerduct) sizes.

Casing Effective Inside Diameter

Casing effective inside diameter, C_{EID} , is determined by deducting wall thickness and other diameter factors from the outside diameter of the casing. Wall thickness is specified as a minimum; therefore, actual wall thickness will be greater. And where the casing has internal ribs, the depth of internal rib projection into the inside diameter must be taken into account.

When conduit or casing is coiled, it will become oval to an extent. With larger 2" IPS and 3" IPS sizes, coiled conduit may be up to about 7% oval. Larger 4" IPS, 5" IPS and 6" IPS coiled conduit sizes may be as much as 20% oval. **To correct ovality to 7% or less in these larger sizes, coiled conduit must be field processed during installation through rerounding and straightening equipment.** For sizes smaller than 2" IPS and straight lengths, ovality is generally not significant.

Earthloads and live loads will also cause the casing to deflect or become oval. In this Technical Note, 7% ovality is assumed for all casing sizes. Formulas 1 and 2 may be used to determine the casing effective inside diameter, C_{EID} , and were used to develop the values in Tables 1 and 2.

For smooth ID casing:

$$C_{EID} = D - (2.2t + 0.07 D) \quad (1)$$

For ribbed ID casing:

$$C_{EID} = D - (2.2t + 0.07 D + 0.08) \quad (2)$$

Where C_{EID} = Casing effective inside diameter, in.
 D = Casing nominal outside diameter, in.
 t = Casing minimum wall thickness, in.

See Tables 1 and 2 for approximate casing effective inside diameters, C_{EID} , for smooth ID and ribbed ID, IPS outside diameter, DR and Schedule 40 and 80 casing. *Please refer to DriscoPlex™ 3100 and DriscoPlex™ 3200 Dimension Sheets for the availability of specific casing sizes.*

NOTICE. This publication is intended for use as a guide to support the designer of piping systems. It is not intended to be used as installation instructions, and should not be used in place of the advice of a professional engineer. Performance Pipe has made every reasonable effort to ensure the accuracy of this publication, but it may not provide all necessary information, particularly with respect to special or unusual applications. This publication may be changed from time to time without notice. Contact Performance Pipe to determine if you have the most current edition.

OD		DR 9		DR 11		DR 13.5		DR 15.5		DR 17	
		Smooth	Ribbed	Smooth	Ribbed	Smooth	Ribbed	Smooth	Ribbed	Smooth	Ribbed
4.500	C_{EID}	3.085	3.005	3.285	3.205	3.452	3.372	3.546	3.466	3.603	3.523
	D_{Bmax}	2.468	2.404	2.628	2.564	2.761	2.697	2.837	2.773	2.882	2.818
5.563	C_{EID}	3.814	3.734	4.061	3.981	4.267	4.187			4.454	4.374
	D_{Bmax}	3.051	2.987	3.249	3.185	3.414	3.350			3.563	3.499
6.625	C_{EID}	4.542	4.462	4.836	4.756	5.082	5.002			5.304	5.224
	D_{Bmax}	3.633	3.569	3.869	3.805	4.065	4.001			4.243	4.179
8.625	C_{EID}	5.913		6.296						6.905	
	D_{Bmax}	4.730		5.037						5.524	
10.750	C_{EID}	7.370		7.848						8.606	
	D_{Bmax}	5.896		6.278						6.885	
12.750	C_{EID}	8.741		9.308						10.208	
	D_{Bmax}	6.993		7.446						8.166	
14.000	C_{EID}	9.598		10.220						11.208	
	D_{Bmax}	7.678		8.176						8.967	
16.000	C_{EID}	10.969		11.680						12.809	
	D_{Bmax}	8.775		9.344						10.248	
18.000	C_{EID}	12.340		13.140						14.411	
	D_{Bmax}	9.872		10.512						11.528	
20.000	C_{EID}	13.711		14.600						16.012	
	D_{Bmax}	10.969		11.680						12.809	
22.000	C_{EID}	15.082		16.060						17.613	
	D_{Bmax}	12.066		12.848						14.090	
24.000	C_{EID}	16.453		17.520						19.214	
	D_{Bmax}	13.163		14.016						15.371	

† This table shows all IPS-DR sizes of DRISCOPEX™ 3100 and DRISCOPEX™ 3200 conduit; however, not every size is available as DRISCOPEX™ 3100 or as DRISCOPEX™ 3200 conduit. Consult product dimension sheets for specific product availability. ◇ Values based on $D_{Bmax} = 0.8 \times C_{EID}$.

Table 2 IPS Sch 40 & 80 Size Casing – Effective ID, C_{EID} , & Maximum Conduit Bundle Diameter, D_{Bmax} ◇

OD		Schedule 40		Schedule 80	
		Smooth	Ribbed	Smooth	Ribbed
4.500	C_{EID}	3.664	3.584	3.444	3.364
	D_{Bmax}	2.931	2.867	2.755	2.691
5.563†	C_{EID}	4.606	4.526	4.349	4.269
	D_{Bmax}	3.685	3.621	3.479	3.415
6.625	C_{EID}	5.545	5.465	5.211	5.131
	D_{Bmax}	4.436	4.372	4.169	4.105
8.625	C_{EID}	7.313			
	D_{Bmax}	5.850			
10.750	C_{EID}	9.195			
	D_{Bmax}	7.356			
12.750	C_{EID}	10.964			
	D_{Bmax}	8.771			

† DRISCOPEX™ 3100 conduit sizes only. ◇ Values based on $D_{Bmax} = 0.8 \times C_{EID}$.

Compact Conduit Bundles

For a compact conduit bundle, the shape of the bundle is dependent on its core of one, two, three, or four conduits, around which there are additional layers of conduits. See Figure 1.

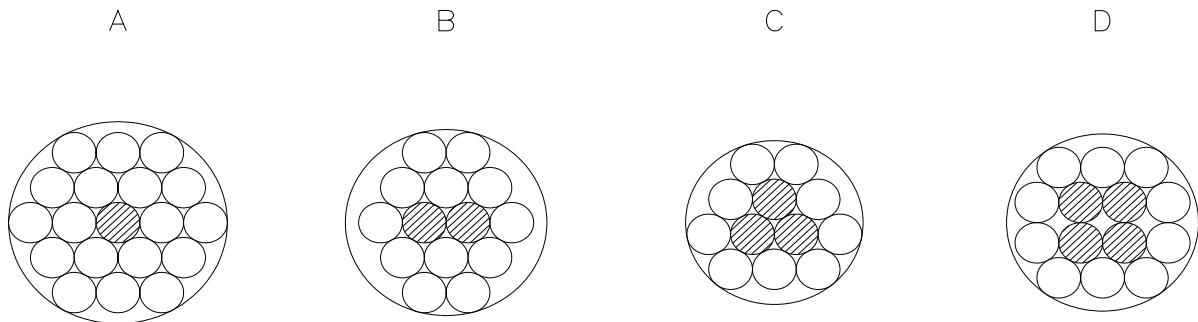


Figure 1 Compact Conduit Bundle Configurations

The diameter of a compact conduit bundle is the diameter of a circle that circumscribes the bundle. Table 3 may be used to determine the maximum diameter of a compact conduit bundle. Find the desired number of conduits in the left side of Table 3, then the corresponding bundle diameter formula in the right side. Using the desired individual conduit diameter, d , and the appropriate bundle diameter formula, determine the bundle diameter, D_B . All of the conduits in the bundle must be the same diameter.

Table 3 Numbers of Conduits and Bundle Diameters for Compact Conduit Bundles

Number of Layers Over Core	Core Pattern (Figure 1)				Core Pattern (Figure 1)			
	A	B	C	D	A	B	C	D
	Number of Conduits in Bundle				Formula for Conduit Bundle Diameter			
0	1	2	3	4	$D_B = d$	$D_B = 2d$	$D_B = 2.155d$	$D_B = 2.414d$
1	5 to 7†	8 to 10	11 to 12	13 to 14	$D_B = 3d$	$D_B = 4d$	$D_B = 4.055d$	$D_B = 4.386d$
2	15 to 19	20 to 24	25 to 27	28 to 30	$D_B = 5d$	$D_B = 6d$	$D_B = 6.033d$	$D_B = 6.379d$
3	31 to 37	38 to 44	45 to 48	49 to 52	$D_B = 7d$	$D_B = 8d$	$D_B = 8.024d$	$D_B = 8.375d$
4	53 to 61	62 to 70	71 to 75	76 to 80	$D_B = 9d$	$D_B = 10d$	$D_B = 10.018d$	$D_B = 10.373d$
5	81 to 91	92 to 102	103 to 108	109 to 114	$D_B = 11d$	$D_B = 12d$	$D_B = 12.015d$	$D_B = 12.372d$

† The highest number is a compact bundle with a complete outer layer. ‡ D_B = bundle diameter for conduits of "d" diameter.

To ensure that a compact conduit bundle can be pulled through the casing, a clearance of at least 20% is recommended between the casing effective ID and the diameter of the conduit bundle.

$$D_{B \max} \leq 0.8 \times C_{EID} \quad (3)$$

In Formula (3), $D_{B \max}$ is the maximum permissible diameter of the compact conduit bundle. See Tables 1 and 2 for maximum conduit bundle diameters for smooth ID and ribbed ID, IPS outside diameter, DR and Schedule 40 and 80 conduits. Please refer to DriscoPlex™ 3100 and DriscoPlex™ 3200 Conduit Dimension Sheets for the availability of specific conduit sizes.

¹ Machinery's Handbook, Erik Oberg & F. D. Jones, Seventeenth Edition, Industrial Press, Inc., New York, NY 10016, 1966.

To determine if a compact conduit bundle may be installed within the casing, the bundle diameter, D_B , from Table 3 must not exceed the Table 1 or 2 maximum conduit bundle diameter, D_{Bmax} , for the casing.

$$D_B \leq D_{Bmax} \quad (4)$$

Loose Conduit Bundles

The Figure 1 illustrations show that the conduits in the bundle do not occupy all of the space within the bundle diameter. Analysis shows that for multiple conduit bundles, the conduits occupy about 2/3 of the area encompassed by the bundle diameter.

When installing a loose bundle of smaller conduits within a casing, a casing fill percentage may be specified. That is, the area occupied by the internal conduits is limited to a percentage of the casing ID area.

Formula 5 may be used to calculate the number of internal conduits in a loose bundle that may be placed within a casing when all internal conduits are the same diameter.

$$n_x = 0.666717 f_L \frac{C_{EID}^2}{d^2} \quad (5)$$

Where n_x = Number of internal conduits (rounded to the nearest integer) where "x" is the casing fill limit
 C_{EID} = Casing effective inside diameter, in (Tables 1 and 2)
 f_L = Casing fill factor
 d = OD of Internal conduit, in. (DriscoPlex™ 3100 and DriscoPlex™ 3200 Dimension Sheets)

Casing fill is typically limited to about 60%, but occasionally, it may be desirable to maximize the number of conduits in the casing. To ensure that the conduits will fit within the casing, a minimum 20% clearance to the casing effective ID, C_{EID} , is recommended.

Table 4 Casing Fill Factor

Casing Fill Percentage	Casing Fill Factor
60	0.60
Maximum	0.80

EXAMPLE: For an 8" IPS DR 11 casing, how many DriscoPlex™ 3100 1-1/2" IPS conduits can be in a loose bundle when the casing fill is limited to about 60%? What is the maximum number of conduits?

SOLUTION: From Table 1, C_{EID} = 6.296 in. for 8" IPS DR 11. From the DriscoPlex™ 3100 Dimension Sheet, d = 1.900 in. for 1-1/2" IPS.

Therefore,

$$n_{60} = 0.666717 \times 0.60 \times \frac{(6.296)^2}{(1.900)^2}$$

$$n_{60} = 4.39 \approx 4$$

$$n_{MAX} = 0.666717 \times 0.80 \times \frac{(6.296)^2}{(1.900)^2}$$

$$n_{MAX} = 5.86 \approx 6$$

At about 60% casing fill, the loose bundle would be four (4) 1-1/2" IPS conduits.

At maximum casing fill, the loose bundle would be six (6) 1-1/2" IPS conduits.

Table 5 Bundle Diameters, D_B , for Compact Conduit Bundles

1-1/4" IPS Conduit (1.660" OD)		Bundle Diameter, D_B , in					
Number of Layers Over Core		0	1	2	3	4	5
Maximum Number of Conduits in Bundle		A = 1 B = 2 C = 3 D = 4	A = 17 B = 10 C = 12 D = 14	A = 19 B = 24 C = 27 D = 30	A = 37 B = 44 C = 48 D = 52	A = 61 B = 70 C = 75 D = 80	A = 91 B = 102 C = 108 D = 114
Conduit Bundle Configuration	A	1.660	4.980	8.300	11.620	14.940	18.260
	B	3.320	6.640	9.960	13.280	16.600	19.920
	C	2.083	6.731	10.015	13.313	16.630	19.945
	D	4.007	7.281	10.589	13.903	17.219	20.538
1-1/2" IPS Conduit (1.900" OD)		Bundle Diameter, D_B , in					
Number of Layers Over Core		0	1	2	3	4	5
Maximum Number of Conduits in Bundle		A = 1 B = 2 C = 3 D = 4	A = 17 B = 10 C = 12 D = 14	A = 19 B = 24 C = 27 D = 30	A = 37 B = 44 C = 48 D = 52	A = 61 B = 70 C = 75 D = 80	A = 91 B = 102 C = 108 D = 114
Conduit Bundle Configuration	A	1.900	5.700	9.500	13.300	17.100	20.900
	B	3.800	7.600	11.400	15.200	19.000	22.800
	C	2.385	7.705	11.463	15.238	19.034	22.829
	D	4.587	8.333	12.120	15.913	19.709	23.507
2" IPS Conduit (2.375" OD)		Bundle Diameter, D_B , in					
Number of Layers Over Core		0	1	2	3	4	5
Maximum Number of Conduits in Bundle		A = 1 B = 2 C = 3 D = 4	A = 17 B = 10 C = 12 D = 14	A = 19 B = 24 C = 27 D = 30	A = 37 B = 44 C = 48 D = 52	A = 61 B = 70 C = 75 D = 80	A = 91 B = 102 C = 108 D = 114
Conduit Bundle Configuration	A	2.375	7.125	11.875	16.625	21.375	26.125
	B	4.750	9.500	14.250	19.000	23.750	28.500
	C	2.981	9.631	14.328	19.048	23.793	28.536
	D	5.733	10.417	15.150	19.891	24.636	29.384

Table 6 Capacities of Casings for Compact Conduit Bundles

		DR 9		DR 11		DR 17	
		Smooth	Ribbed	Smooth	Ribbed	Smooth	Ribbed
4" IPS Casing (4.500" OD)	Maximum Conduit Bundle Diameter, <i>D_{Bmax}</i> , in.	2.468	2.404	2.628	2.568	2.882	2.818
	1-1/4" IPS Conduit (1.660" OD)	3C0†	3C0	3C0	3C0	3C0	3C0
	1-1/2" IPS Conduit (1.900" OD)	3C0	3C0	3C0	3C0	3C0	3C0
	2" IPS Conduit (2.375" OD)	1A0	1A0	1A0	1A0	1A0	1A0
5" IPS Casing (5.563" OD)	Maximum Conduit Bundle Diameter, <i>D_{Bmax}</i> , in.	3.051	2.987	3.249	3.185	3.563	3.499
	1-1/4" IPS Conduit (1.660" OD)	3C0	3C0	3C0	3C0	3C0	3C0
	1-1/2" IPS Conduit (1.900" OD)	3C0	3C0	3C0	3C0	3C0	3C0
	2" IPS Conduit (2.375" OD)	3C0	3C0	3C0	3C0	3C0	3C0
6" IPS Casing (6.625" OD)	Maximum Conduit Bundle Diameter, <i>D_{Bmax}</i> , in.	3.633	3.569	3.869	3.805	4.243	4.179
	1-1/4" IPS Conduit (1.660" OD)	3C0	3C0	3C0	3C0	4D0	4D0
	1-1/2" IPS Conduit (1.900" OD)	3C0	3C0	3C0	3C0	3C0	3C0
	2" IPS Conduit (2.375" OD)	3C0	3C0	3C0	3C0	3C0	3C0
8" IPS Casing (8.625" OD)	Maximum Conduit Bundle Diameter, <i>D_{Bmax}</i> , in.	4.730	◇	5.037	◇	5.524	◇
	1-1/4" IPS Conduit (1.660" OD)	4D0†		7A1		7A1	
	1-1/2" IPS Conduit (1.900" OD)	4D0		4D0		4D0	
	2" IPS Conduit (2.375" OD)	3C0		3C0		3C0	
10" IPS Casing (10.750" OD)	Maximum Conduit Bundle Diameter, <i>D_{Bmax}</i> , in.	5.896		6.278		6.885	
	1-1/4" IPS Conduit (1.660" OD)	7A1		7A1		10B1	
	1-1/2" IPS Conduit (1.900" OD)	7A1		7A1		7A1	
	2" IPS Conduit (2.375" OD)	4D0		4D0		4D0	
12" IPS Casing (12.750" OD)	Maximum Conduit Bundle Diameter, <i>D_{Bmax}</i> , in.	6.993		7.446		8.166	
	1-1/4" IPS Conduit (1.660" OD)	12C1		14D1		14D1	
	1-1/2" IPS Conduit (1.900" OD)	7A1		7A1		12C1	
	2" IPS Conduit (2.375" OD)	4D0		7A1		7A1	
14" IPS Casing (14.000" OD)	Maximum Conduit Bundle Diameter, <i>D_{Bmax}</i> , in.	7.678		8.176		8.967	
	1-1/4" IPS Conduit (1.660" OD)	14D1		14D1		19A2	
	1-1/2" IPS Conduit (1.900" OD)	10B1		12C1		14D1	
	2" IPS Conduit (2.375" OD)	7A1		7A1		7A1	

†[#][X][#] where [#] = Maximum number of conduits in bundle; [X] = Compact Bundle Configuration (A, B, C, or D per Table 3 & Figure 1; and [#] = Number of layers over core (Table 3). ◇ Internal ribs not available for casing sizes above 6" IPS.

Table 6 Capacities of Casings for Compact Conduit Bundles (continued)

		DR 9		DR 11		DR 17	
		Smooth	Ribbed	Smooth	Ribbed	Smooth	Ribbed
16" IPS Casing (16.000" OD)	<i>Maximum Conduit Bundle Diameter, D_{bmax}, in.</i>	8.775	◇	9.344	◇	10.248	◇
	<i>1-1/4" IPS Conduit (1.660" OD)</i>	19A2†		19A2		27C2	
	<i>1-1/2" IPS Conduit (1.900" OD)</i>	14D1		14D1		19A2	
	<i>2" IPS Conduit (2.375" OD)</i>	7A1		7A1		12C1	
18" IPS Casing (18.000" OD)	<i>Maximum Conduit Bundle Diameter, D_{bmax}, in.</i>	9.872		10.512		11.528	
	<i>1-1/4" IPS Conduit (1.660" OD)</i>	24B2		27C2		30D2	
	<i>1-1/2" IPS Conduit (1.900" OD)</i>	10A2		19A2		27C2	
	<i>2" IPS Conduit (2.375" OD)</i>	12C1		14D1		14D1	
20" IPS Casing (20.000" OD)	<i>Maximum Conduit Bundle Diameter, D_{bmax}, in.</i>	10.969		11.680		12.809	
	<i>1-1/4" IPS Conduit (1.660" OD)</i>	30D2		37A3		37A3	
	<i>1-1/2" IPS Conduit (1.900" OD)</i>	19A2		27C2		30D2	
	<i>2" IPS Conduit (2.375" OD)</i>	14D1		14D1		19A2	
22" IPS Casing (22.000" OD)	<i>Maximum Conduit Bundle Diameter, D_{bmax}, in.</i>	12.066		12.848		14.090	
	<i>1-1/4" IPS Conduit (1.660" OD)</i>	37A3		37A3		52D3	
	<i>1-1/2" IPS Conduit (1.900" OD)</i>	27C2		30D2		37A3	
	<i>2" IPS Conduit (2.375" OD)</i>	19A2		19A2		19A2	
24" IPS Casing (24.000" OD)	<i>Maximum Conduit Bundle Diameter, D_{bmax}, in.</i>	13.163		14.016		15.371	
	<i>1-1/4" IPS Conduit (1.660" OD)</i>	37A3		52D3		61A4	
	<i>1-1/2" IPS Conduit (1.900" OD)</i>	30D2		37A3		44B3	
	<i>2" IPS Conduit (2.375" OD)</i>	19A2		19A2		30D2	

†[#][X][#] where [#] = Maximum number of conduits in bundle; [X] = Compact Bundle Configuration (A, B, C, or D per Table 3 & Figure 1; and [#] = Number of layers over core (Table 3). ◇ Internal ribs not available for casing sizes above 6" IPS.

Table 7 Loose Bundle Capacities of Casings at About 60%, n_{60} , and Maximum, n_{MAX} , Casing Fill

		DR 9 Casing				DR 11 Casing				DR 17 Casing			
		n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}
		Smooth		Ribbed		Smooth		Ribbed		Smooth		Ribbed	
4" IPS Casing	Casing,	3.085	3.085	3.005	3.005	3.285	3.285	3.205	3.205	3.603	3.603	3.523	3.523
	1-1/4" IPS Conduit	1	2	1	2	2	2	1	2	2	3	2	2
	1-1/2" IPS Conduit	1	1	1	1	1	2	1	2	1	2	1	2
	2" IPS	1	1	1	1	1	1	1	1	1	1	1	1
5" IPS Casing	Casing,	3.795	3.795	3.715	3.715	4.041	4.041	3.961	3.961	4.432	4.432	4.352	4.352
	1-1/4" IPS Conduit	2	3	2	3	2	3	2	3	3	4	3	4
	1-1/2" IPS Conduit	2	2	2	2	2	2	2	2	2	3	2	3
	2" IPS	1	1	1	1	1	2	1	1	1	2	1	2
6" IPS Casing	Casing,	4.542	4.542	4.462	4.462	4.836	4.836	4.756	4.756	5.304	5.304	5.224	5.224
	1-1/4" IPS Conduit	3	4	3	4	3	5	3	4	4	5	4	5
	1-1/2" IPS Conduit	2	3	2	3	3	3	3	3	3	4	3	4
	2" IPS	1	2	1	2	2	2	2	2	2	3	2	3
8" IPS Casing	Casing,	5.913	5.913	◇	◇	6.296	6.296	◇	◇	6.905	6.905	◇	◇
	1-1/4" IPS Conduit	5	7			6	8			7	9		
	1-1/2" IPS Conduit	4	5			4	6			5	7		
	2" IPS	2	3			3	4			3	5		
10" IPS Casing	Casing,	7.370	7.370			7.848	7.848			8.606	8.606		
	1-1/4" IPS Conduit	8	11			9	12			11	12		
	1-1/2" IPS Conduit	6	8			7	9			8	9		
	2" IPS	4	5			4	6			5	6		
12" IPS Casing	Casing,	8.741	8.741			9.308	9.308			10.208	10.208		
	1-1/4" IPS Conduit	11	15			13	17			15	20		
	1-1/2" IPS Conduit	8	11			10	13			12	15		
	2" IPS	5	7			6	8			7	10		

◇ Internal ribs not available for casing sizes above 6" IPS.

Table 7 Loose Bundle Capacities of Casings at About 60%, n_{60} , and Maximum, n_{MAX} , Casing Fill (cont.)

		DR 9 Casing				DR 11 Casing				DR 17 Casing			
		n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}	n_{60}	n_{MAX}
		Smooth		Ribbed		Smooth		Ribbed		Smooth		Ribbed	
14" IPS Casing	Casing, C_{EID} , in.	9.598	9.598	◇	◇	10.220	10.220	◇	◇	11.208	11.208	◇	◇
	1-1/4" IPS Conduit	13	18			15	20			18	24		
	1-1/2" IPS Conduit	10	14			12	15			14	19		
	2" IPS Conduit	7	9			7	10			9	12		
16" IPS Casing	Casing, C_{EID} , in.	10.969	10.969			11.680	11.680			12.809	12.809		
	1-1/4" IPS Conduit	17	23			20	26			24	26		
	1-1/2" IPS Conduit	13	18			15	20			18	20		
	2" IPS Conduit	9	11			10	13			12	13		
18" IPS Casing	Casing, C_{EID} , in.	12.340	12.340			13.140	13.140			14.411	14.411		
	1-1/4" IPS Conduit	22	29			25	33			30	40		
	1-1/2" IPS Conduit	17	22			19	26			23	31		
	2" IPS Conduit	11	14			12	16			15	20		
20" IPS Casing	Casing, C_{EID} , in.	13.711	13.711			14.600	14.600			16.012	16.012		
	1-1/4" IPS Conduit	27	36			31	41			37	50		
	1-1/2" IPS Conduit	21	28			24	31			28	38		
	2" IPS Conduit	13	18			15	20			18	24		
22" IPS Casing	Casing, C_{EID} , in.	15.082	15.082			16.060	16.060			17.613	17.613		
	1-1/4" IPS Conduit	33	44			37	50			45	60		
	1-1/2" IPS Conduit	25	34			29	38			34	46		
	2" IPS Conduit	16	22			18	24			22	29		
24" IPS Casing	Casing, C_{EID} , in.	16.453	16.453			17.520	17.520			19.214	19.214		
	1-1/4" IPS Conduit	39	52			45	59			54	71		
	1-1/2" IPS Conduit	30	40			34	45			41	55		
	2" IPS Conduit	19	26			22	29			26	35		

◇ Internal ribs not available for casing sizes above 6" IPS.