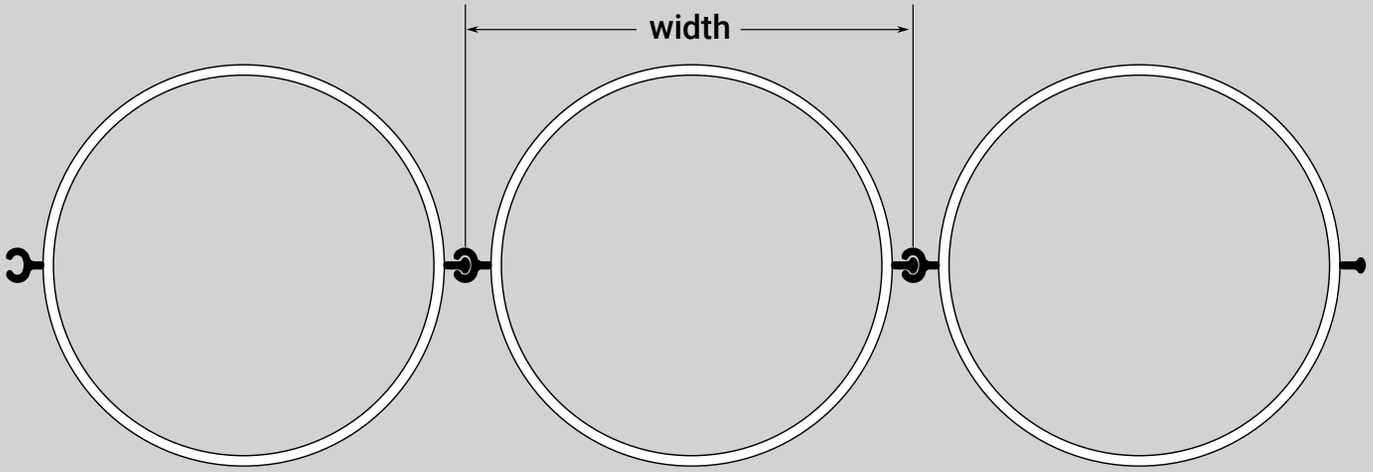
O-Pile®

Predictable, Quantifiable Retaining Wall System for All Soil Conditions

O-Pile systems are available for immediate shipment. These are examples from an endless variety of possible O-Pile. Please configure your own system on O-Pile.com.



NAMING CONVENTION:

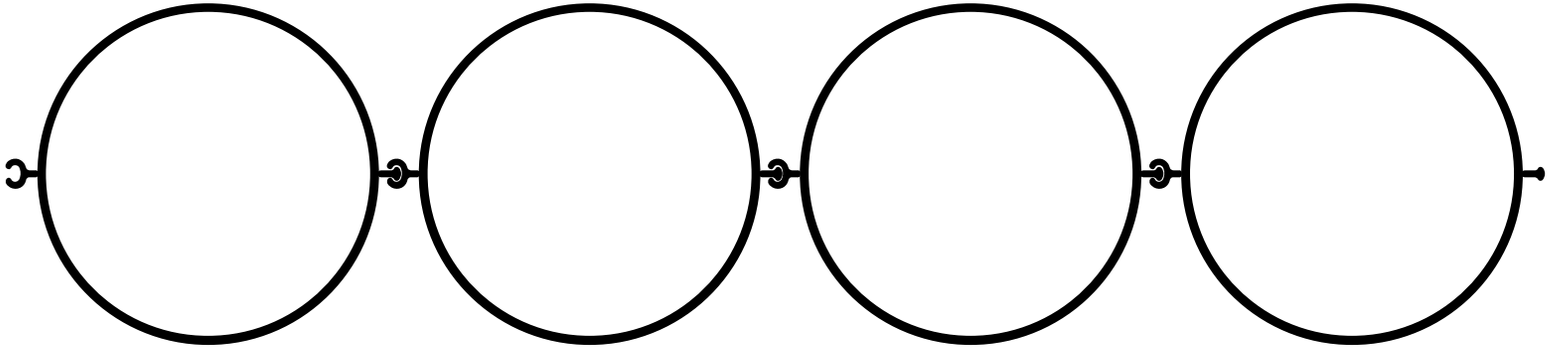
12-3456 *

- DTH (down the hole), and can be drilled through solid rock or any other surface.
- Section width in mm
- Section Modulus in $cm^3/m \div 100$

Sheet Pile LLC is the owner and assignee of numerous patents and trademarks related to the O-Pile® system, including, but not limited to, United States Patent Nos. 8,088,469, 8,323,765, and 7,935,406.

Contiguous Sheet Pile: O-Pile®

O-Pile is a pipe or tube section with attached connectors so that one entire section can be driven into the next to form a continuous steel wall with a similar load-bearing element, sometimes with varying diameters of pipes/tubes.



O-Pile is a dynamic, cost-effective, contiguous pipe-to-pipe system that allows you to drive predictably into pure rock, if necessary, as well as dial in your corrosion and bending moment needs separately. O-Pile is versatile and readily available, as you can use your local pipe plant or supply—no need to bring the majority of the steel from Luxembourg anymore.

Whether you're driving into pure rock or building a port or both, as your engineering partner, we will help you pick from a wide array of O-Pile systems to ensure you meet your specific project needs.

Key Advantages

- Stronger, more efficient, more durable.
- Faster and more cost-effective alternative to heavy Z-sheet pile or combined sheet pile utilizing pipes or beams and slurry, secant, continuous concrete walls, and other conventional concrete constructions.
- Can be configured to corrosion-tolerance requirements.
- Can be specified by bending moment because of the wide variety of steel grades available in X70 or above, which is higher than what is available with hot-rolled sections.
- Can be built from locally available or locally produced pipes rather than expensive imported steel piles.
- Powered by the ball and socket interlock for maximum strength, flexibility, and compatibility.

Bending Moment Capacity (BMC)

The best measure of strength to compare steel sheet pile systems is bending moment capacity, which incorporates section modulus and steel grade into one number independent of lifespan or safety factor. Thus, a higher grade of steel results in a stronger wall for less weight.

O-Pile systems typically have a higher strength-to-weight ratio compared to very heavy Z or combined sheet pile walls as they can be made using high strength coiled steel that exceeds the capabilities of hot-rolled sheet pile, allowing for a much larger bending moment capacity. For example, O-Pile is available in X70 steel to provide 70,000 yield strength, whereas hot-rolled sheet pile is limited to less than 65,000 and typically uses steel with a yield strength of 50,000. Steel grade has a marked impact on the structural resistance of the pile wall. Also, selecting a stronger steel grade such as X70 or X80 often allows using piles of smaller diameter or wall thickness.

Strong Connection

WOM/WOF® connectors on O-Pile systems have superior interlock strength. The high pullout resistance of the WOM/WOF ball and socket connection is more than four times stronger than Larssen interlocking hot-rolled sheet pile (20 kips/inch 3418 kN/m vs. 5 kips/inch 801 kN/m).

Positional Flexibility

Each WOF/WOM connection provides ~20° of rotation to ease placement.

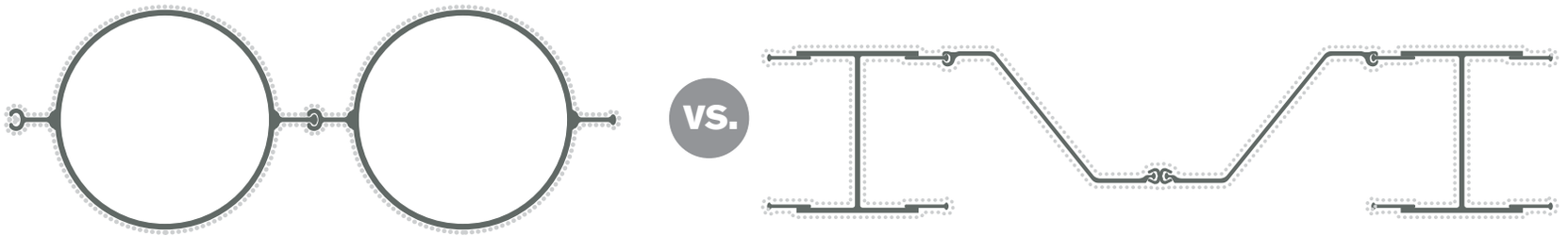
Unmatched Strength

High-capacity O-Pile systems achieve strength by increasing pipe diameter. This minimizes weight gain per square foot (or square meter) and radically improves strength-to-weight ratio efficiency.

Because of its circular geometry the surcharge and lateral load-bearing capacity is significantly higher than standard U- or Z-type sheet pile or combined wall systems of similar weight.

Superior Geometry for Durability

O-Pile saves costs over combined, Z- and U-sheet pile with easier application of corrosion protection compared to other geometries, and by having a minimized exposed surface:



Furthermore, the interior of the pipe can be sealed off (capped or filled) from oxygen infiltration to avoid corrosion on the inside surface. Also, concrete can be poured inside the O-Pile itself, thus further increasing strength while preventing oxidation or corrosion on the interior surface. This contrasts with a combined sheet pile system, which has all of its surface faces exposed to corrosive elements.

O-Pile: Double Pipe Thickness

Double pipe thickness allows you to dial-in the specified thickness to meet your specific structural load and durability needs to ensure overall safety. Thickness can be increased specifically at the splash- and low-water zones for increased durability via “sacrificial thickness,” where the sheet pile experiences the greatest corrosive effect. For example, with a spliced 100' pipe, the thickness of the upper 20' of pipe can be engineered for corrosion allowance, while the bottom 80' is specified to meet load-bearing needs.

Ease of Installation

The O-Pile pipe sheet pile system is supported throughout their installation, whereas combined sheet pile systems are not. The installation of the O-Pile section is similar to driving PZ™ in a basic two frame template. At no stage is there an O-Pile entirely unsupported throughout its length as it is driven to grade. Each section is supported by adjacent section(s) with a small lead ahead of the rest, ensuring accurate wall alignment.

O-Pile: DTH (Down-the-Hole)

O-Pile: DTH utilizes state-of-the-art down the hole drilling techniques that allow driving into any ground or rock strata. The O-Pile: DTH Pile is installed with the centric drilling method using ring bits of a larger diameter than standard bits. The ring bit drills a hole larger than the pile to accommodate the WOF/WOM connectors. Pipe diameters from 16" (323 mm) to 54" can be installed using O-Pile: DTH.

O-Pile: DTH systems can be driven into environments where the rock strata exceeds 120 megapascals or other difficult environments at levels of productivity not achieved before by using the state-of-the-art DTH drilling technique. DTH drilling has been used in post-glacial soils of Norway, boulders of Sweden, granite of Finland, deep bedrock of Hong Kong, through heavy structures in Macau or a tunnel in Virginia.

Development of new DTH techniques, especially the introduction of new air control bits, is making DTH drilling safer and more environmentally friendly than ever before. Using DTH in urban areas and in sensitive ground is now possible; plus, there is no danger of overdrilling or air escaping, which could otherwise cause settlements to existing structures.

For more information on the down-the-whole (DTH) method, please go to www.opile.com/dth.

Flexibility

Flexibility with O-Pile systems works in two ways: the flexibility within the ball and socket interlock, and the flexibility offered by the pipes: interlocks can be added to make any angle along the radius of the pipe.

Both options allow for the centerline or driving line to turn, whether to avoid obstructions or just to conform to the designed wall shape without requiring in-the-field custom fabrication, cutting, or welding.

Please go to the O-Pile tool at O-Pile.com to configure your specific O-Pile system and to view recently installed projects. Call or text us at 866.666.7453 or +1.512.243.1228 for technical assistance about the O-Pile system.

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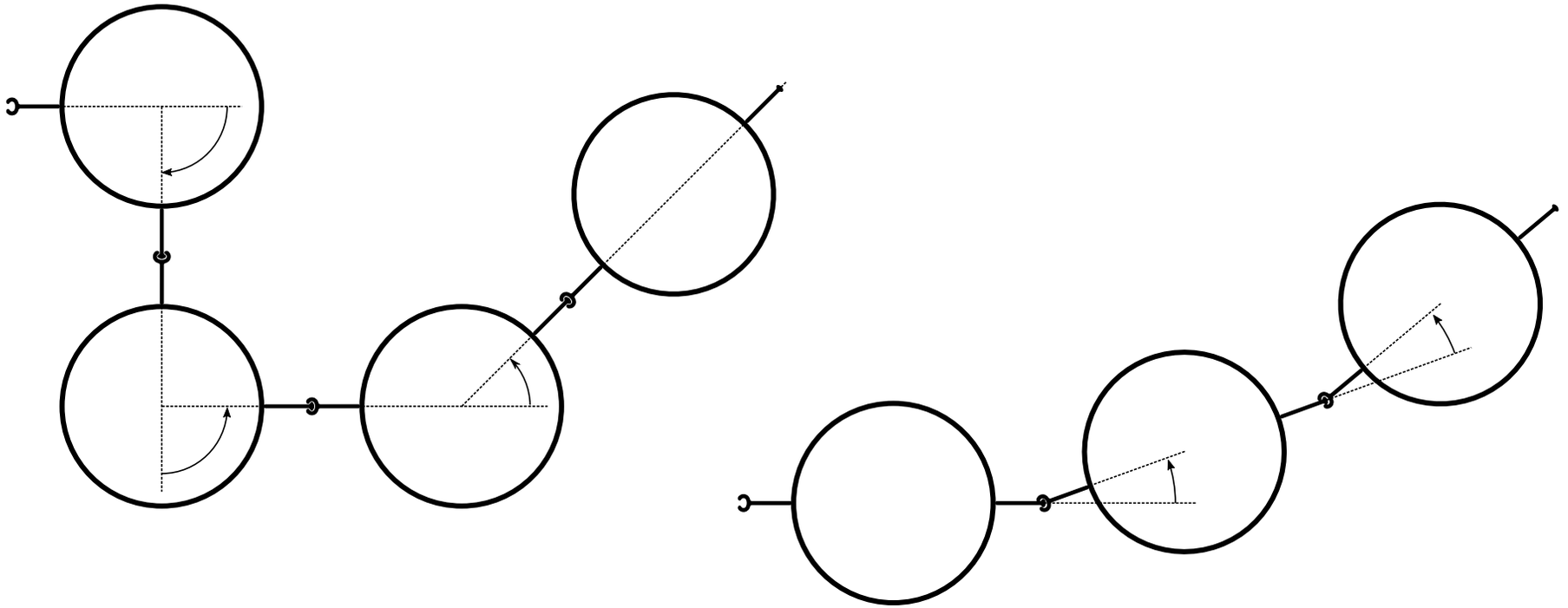

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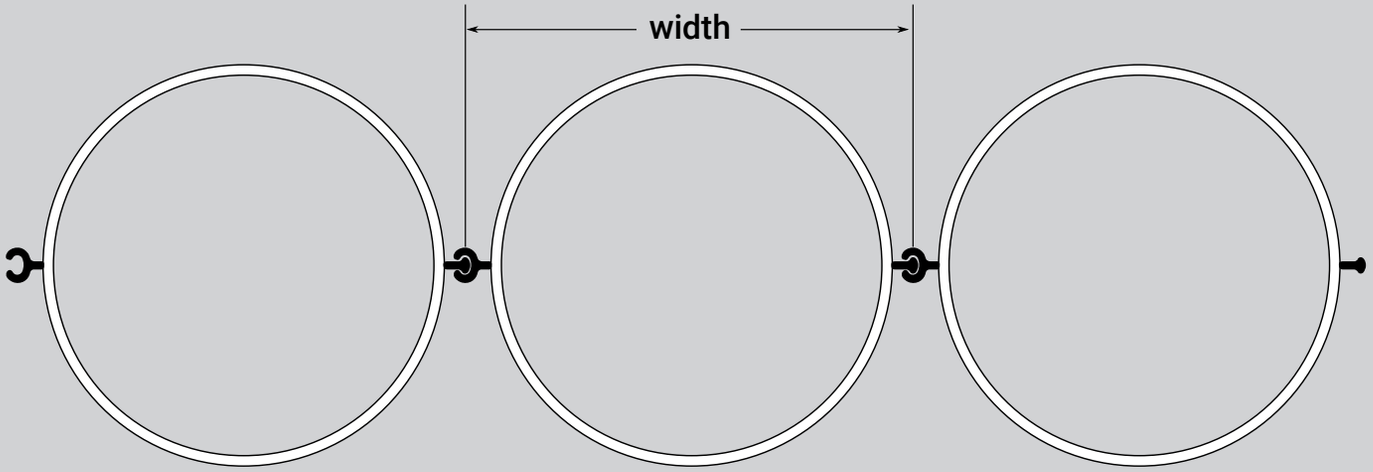

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexi-bility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
31 - 741	20 508	0.472 12	29.17 741	56.9 3060	46.2 225.7	48.1 234.9	50 244.1	20 3418	±20°	0.472 12	20 508	569.2 77,720	241.6 1074.7	289 1285.5	314.1 1397.2	248.7 1106.1	300.2 1335.4	337.8 1502.6
31 - 470*	16 406	0.472 12	18.52 470	56.4 3031	54.7 266.9	55.9 273.1	57.2 279.4	20 3418	±20°	0.472 12	16 406	451 61,590	236.8 1053.2	283.7 1261.9	308.6 1372.5	243.8 1084.2	294.8 1311.3	332 1476.9
32 - 843	24 610	0.375 9.5	33.17 843	58.6 3150	39.2 191.5	40.9 199.6	42.5 207.7	20 3418	±20°	0.472 12	24 610	703.1 96,010	248.1 1103.5	296.9 1320.6	322.7 1435.6	255.4 1135.8	308.4 1371.9	347.1 1544.1
32 - 572*	20 508	0.375 9.5	22.52 572	59.4 3192	45.1 220.1	46.1 225.3	47.2 230.4	20 3418	±20°	0.472 12	20 508	593.8 81,080	249 1107.5	298.4 1327.5	324.6 1444	256.3 1140.3	310.1 1379.5	349.4 1554
32 - 470*	16 406	0.5 12.7	18.52 470	59.4 3191	57.5 280.9	58.8 287.1	60.1 293.4	20 3418	±20°	0.472 12	16 406	474.8 64,840	249.2 1108.3	298.6 1328.1	324.7 1444.5	256.5 1141	310.2 1380.1	349.4 1554.4
33 - 741	20 508	0.5 12.7	29.17 741	60 3225	48.5 236.9	50.4 246.1	52.3 255.3	20 3418	±20°	0.472 12	20 508	599.8 81,910	254.4 1131.6	304.3 1353.7	330.8 1471.4	261.8 1164.6	316.1 1406.3	355.8 1582.5
34 - 572*	20 508	0.394 10	22.52 572	62.2 3342	47.1 230.1	48.2 235.3	49.2 240.4	20 3418	±20°	0.472 12	20 508	621.6 84,880	260.6 1159.1	312.3 1389.4	339.8 1511.4	268.3 1193.4	324.6 1443.9	365.7 1626.5
35 - 521*	18 457	0.472 12	20.52 521	65 3495	55.2 269.7	56.4 275.3	57.6 281	20 3418	±20°	0.472 12	18 457	585.1 79,900	272.6 1212.6	326.7 1453.4	355.4 1581	280.7 1248.4	339.6 1510.4	382.5 1701.4
35 - 470*	16 406	0.551 14	18.52 470	64.8 3483	62.8 306.8	64.1 313	65.4 319.3	20 3418	±20°	0.472 12	16 406	518.3 70,780	271.8 1209.1	325.8 1449	354.3 1576.2	279.8 1244.8	338.5 1505.8	381.3 1696.1
36 - 936	24 610	0.472 12	36.83 936	65.7 3530	44.7 218.3	46.7 228	48.7 237.8	20 3418	±20°	0.472 12	24 610	788 107,600	277.6 1234.8	332.3 1478	361.3 1607	285.7 1271	345.2 1535.6	388.6 1728.6
36 - 623*	22 559	0.375 9.5	24.52 623	66.3 3565	45.3 221.3	46.3 226.1	47.3 230.8	20 3418	±20°	0.472 12	22 559	729.4 99,610	277.8 1235.6	333 1481.3	362.3 1611.5	286 1272.2	346.1 1539.4	389.9 1734.3
37 - 521*	18 457	0.5 12.7	20.52 521	68.5 3682	58.2 284	59.3 289.7	60.5 295.3	20 3418	±20°	0.472 12	18 457	616.4 84,170	287.1 1277	344.1 1530.6	374.3 1665.1	295.6 1314.7	357.6 1590.6	402.8 1791.9
38 - 936	24 610	0.5 12.7	36.83 936	69.2 3723	46.9 229.1	48.9 238.8	50.9 248.6	20 3418	±20°	0.472 12	24 610	831 113,480	292.5 1301.3	350.2 1557.8	380.8 1693.8	301.1 1339.4	363.9 1618.5	409.6 1822.1
38 - 623*	22 559	0.394 10	24.52 623	69.4 3733	47.4 231.5	48.4 236.2	49.3 240.9	20 3418	±20°	0.472 12	22 559	763.8 104,310	290.8 1293.6	348.6 1550.8	379.3 1687.2	299.4 1331.8	362.3 1611.7	408.2 1815.8
39 - 1088	30 762	0.375 9.5	42.83 1088	71.6 3847	38.4 187.6	40.2 196	41.9 204.4	20 3418	±20°	0.472 12	30 762	1073.2 146,560	301.6 1341.5	361.2 1606.6	392.8 1747.1	310.4 1380.9	375.3 1669.3	422.6 1879.7
39 - 470*	16 406	0.625 15.9	18.52 470	72.4 3894	70.4 343.8	71.7 350	73 356.3	20 3418	±20°	0.472 12	16 406	579.5 79,130	303.7 1350.9	364 1619.1	396 1761.3	312.7 1390.8	378.3 1682.6	426.1 1895.4

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexi-bility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
40 - 674*	24 610	0.375 9.5	26.52 674	73.3 3939	45.5 222.4	46.4 226.7	47.3 231.1	20 3418	±20°	0.472 12	24 610	879.2 120,070	306.7 1364.1	367.7 1635.6	400 1779.5	315.8 1404.5	382.1 1699.8	430.6 1915.2
40 - 843	24 610	0.472 12	33.17 843	72.9 3920	48 234.1	49.6 242.2	51.3 250.3	20 3418	±20°	0.472 12	24 610	874.9 119,470	307.7 1368.9	368.5 1639	400.6 1782.1	316.8 1409.1	382.8 1702.9	431 1917.2
40 - 572*	20 508	0.472 12	22.52 572	73.7 3962	55.7 272	56.8 277.2	57.8 282.3	20 3418	±20°	0.472 12	20 508	737 100,650	308.7 1373	370.1 1646.1	402.6 1790.8	317.8 1413.7	384.6 1710.7	433.3 1927.3
41 - 521*	18 457	0.551 14	20.52 521	74.8 4024	63.6 310.5	64.8 316.2	65.9 321.8	20 3418	±20°	0.472 12	18 457	673.6 91,990	313.6 1394.8	375.9 1672	408.9 1819	322.8 1436.1	390.6 1737.6	440.1 1957.6
42 - 674*	24 610	0.394 10	26.52 674	76.7 4126	47.6 232.6	48.5 237	49.4 241.3	20 3418	±20°	0.472 12	24 610	920.9 125,760	321.1 1428.4	385.1 1712.8	418.9 1863.5	330.6 1470.8	400.2 1780.1	450.9 2005.7
42 - 843	24 610	0.5 12.7	33.17 843	76.9 4134	50.4 246.1	52.1 254.2	53.7 262.3	20 3418	±20°	0.472 12	24 610	922.7 126,000	324.3 1442.7	388.4 1727.6	422.3 1878.6	333.9 1485.1	403.5 1795	454.3 2021
42 - 572*	20 508	0.5 12.7	22.52 572	77.7 4176	58.7 286.6	59.8 291.8	60.8 296.9	20 3418	±20°	0.472 12	20 508	776.8 106,070	325.2 1446.7	389.9 1734.4	424.2 1887	334.9 1489.5	405.2 1802.5	456.6 2030.8
43 - 995	30 762	0.375 9.5	39.17 995	78.2 4206	40.6 198.2	42 205	43.4 211.9	20 3418	±20°	0.472 12	30 762	1173.5 160,250	329.4 1465	394.5 1754.9	429.1 1908.6	339 1508.2	409.9 1823.5	461.6 2053.5
44 - 470*	16 406	0.709 18	18.52 470	80.8 4346	78.9 385.3	80.2 391.5	81.5 397.8	20 3418	±20°	0.472 12	16 406	646.6 88,300	338.7 1506.4	406 1805.8	441.6 1964.5	348.7 1551	421.9 1876.7	475.3 2114.2
45 - 623*	22 559	0.472 12	24.52 623	82.4 4431	56.1 274	57.1 278.7	58 283.4	20 3418	±20°	0.472 12	22 559	906.7 123,820	344.9 1534.2	413.6 1839.6	450 2001.5	355.1 1579.7	429.8 1911.9	484.3 2154.2
46 - 936	24 610	0.625 15.9	36.83 936	85.2 4581	56.9 277.7	58.9 287.5	60.9 297.2	20 3418	±20°	0.472 12	24 610	1022.4 139,620	359 1596.9	430 1912.6	467.6 2079.9	369.6 1643.9	446.8 1987.3	503.1 2237.8
46 - 572*	20 508	0.551 14	22.52 572	85 4568	64.2 313.6	65.3 318.7	66.3 323.9	20 3418	±20°	0.472 12	20 508	849.6 116,020	355.6 1581.7	426.4 1896.5	463.9 2063.4	366.1 1628.6	443.1 1971	499.2 2220.7
46 - 521*	18 457	0.625 15.9	20.52 521	83.8 4506	71.4 348.4	72.5 354.1	73.7 359.7	20 3418	±20°	0.472 12	18 457	754.3 103,010	350.9 1561.1	420.7 1871.6	457.7 2036.1	361.3 1607.3	437.3 1945	492.6 2191.4
46 - 470*	16 406	0.75 19	18.52 470	84.9 4563	83.1 405.6	84.4 411.9	85.6 418.1	20 3418	±20°	0.472 12	16 406	679 92,720	355.5 1581.4	426.2 1895.8	463.6 2062.4	366 1628.2	442.9 1970.1	499 2219.6
47 - 623*	22 559	0.5 12.7	24.52 623	86.9 4672	59.2 288.8	60.1 293.5	61.1 298.2	20 3418	±20°	0.472 12	22 559	955.9 130,540	363.6 1617.2	436 1939.2	474.3 2109.9	374.3 1665.1	453.1 2015.4	510.5 2270.9
48 - 1088	30 762	0.472 12	42.83 1088	89.3 4799	46.9 229.2	48.6 237.5	50.4 245.9	20 3418	±20°	0.472 12	30 762	1338.8 182,830	375.4 1669.7	449.7 2000.4	489.1 2175.7	386.4 1718.9	467.3 2078.7	526.3 2341.1

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48 - 470*	16 406	0.787 20	18.52 470	88.5 4757	86.8 423.9	88.1 430.2	89.4 436.4	20 3418	±20°	0.472 12	16 406	707.8 96,650	370.5 1648.1	444.2 1975.8	483.2 2149.5	381.5 1696.9	461.6 2053.3	520.1 2313.3
49 - 1240	36 914	0.375 9.5	48.83 1240	90.9 4888	39.6 193.4	41.1 200.8	42.6 208.1	20 3418	±20°	0.472 12	36 914	1636.6 223,500	381.9 1698.8	457.7 2035.8	497.8 2214.4	393.2 1748.9	475.6 2115.5	535.7 2382.8
50 - 674*	24 610	0.472 12	26.52 674	91.2 4902	56.5 275.6	57.4 280	58.2 284.4	20 3418	±20°	0.472 12	24 610	1094.1 149,410	381.3 1696	457.2 2033.9	497.5 2213	392.6 1746.3	475.2 2113.8	535.5 2381.9
51 - 826*	30 762	0.375 9.5	32.52 826	94.2 5066	46 224.7	46.7 228.2	47.5 231.8	20 3418	±20°	0.472 12	30 762	1413.4 193,010	393.8 1751.5	472.2 2100.7	513.9 2285.8	405.4 1803.4	490.8 2183.3	553.1 2460.4
51 - 1088	30 762	0.5 12.7	42.83 1088	94.2 5064	49.3 240.9	51 249.2	52.8 257.6	20 3418	±20°	0.472 12	30 762	1413 192,960	396 1761.3	474.4 2110.4	516 2295.4	407.6 1813.2	493 2193	555.3 2469.9
51 - 843	24 610	0.625 15.9	33.17 843	94.6 5086	61.5 300.1	63.1 308.2	64.8 316.3	20 3418	±20°	0.472 12	24 610	1135.2 155,030	398.1 1771	476.9 2121.5	518.7 2307.3	409.9 1823.2	495.6 2204.5	558.1 2482.6
51 - 521*	18 457	0.709 18	20.52 521	93.7 5037	80.1 391	81.2 396.6	82.4 402.3	20 3418	±20°	0.472 12	18 457	843.3 115,160	392.1 1744.2	470.2 2091.4	511.5 2275.3	403.7 1795.9	488.6 2173.5	550.5 2448.9
52 - 674*	24 610	0.5 12.7	26.52 674	96.2 5170	59.5 290.6	60.4 295	61.3 299.4	20 3418	±20°	0.472 12	24 610	1153.9 157,580	402 1788.4	482.2 2144.7	524.6 2333.6	414 1841.4	501.1 2229	564.7 2511.7
52 - 623*	22 559	0.551 14	24.52 623	95.1 5114	64.8 316.2	65.7 320.9	66.7 325.6	20 3418	±20°	0.472 12	22 559	1046.4 142,890	397.8 1769.6	477.1 2122	519 2308.9	409.6 1822	495.8 2205.5	558.7 2485.1
52 - 572*	20 508	0.625 15.9	22.52 572	95.3 5122	72.2 352.3	73.2 357.4	74.2 362.5	20 3418	±20°	0.472 12	20 508	952.6 130,090	398.5 1772.7	477.9 2125.7	519.9 2312.8	410.3 1825.2	496.6 2209.2	559.6 2489.2
53 - 1147	36 914	0.375 9.5	45.17 1147	98.3 5285	41.6 203.1	42.8 209	44 214.9	20 3418	±20°	0.472 12	36 914	1769.3 241,610	412.5 1834.9	494.4 2199.2	537.8 2392.2	424.7 1889.1	513.8 2285.4	578.7 2574.4
53 - 995	30 762	0.472 12	39.17 995	97.6 5247	49.9 243.6	51.3 250.5	52.7 257.3	20 3418	±20°	0.472 12	30 762	1463.9 199,910	410 1823.9	491.3 2185.5	534.4 2377.2	422.1 1877.7	510.6 2271.1	575.1 2558
53 - 521*	18 457	0.75 19	20.52 521	98.5 5294	84.4 411.9	85.5 417.5	86.7 423.1	20 3418	±20°	0.472 12	18 457	886.2 121,020	412 1832.7	494 2197.5	537.5 2390.9	424.2 1887	513.4 2283.9	578.5 2573.3
54 - 826*	30 762	0.394 10	32.52 826	98.7 5309	48.2 235.2	48.9 238.8	49.6 242.3	20 3418	±20°	0.472 12	30 762	1481.1 202,250	412.6 1835.1	494.8 2201	538.4 2395	424.8 1889.6	514.3 2287.6	579.6 2578
54 - 1088	30 762	0.529 13.4	42.83 1088	99.4 5343	51.8 253.1	53.6 261.5	55.3 269.9	20 3418	±20°	0.472 12	30 762	1490.6 203,550	417.5 1857.1	500.3 2225.4	544.2 2420.6	429.8 1912	519.9 2312.5	585.6 2604.7
55 - 936	24 610	0.75 19	36.83 936	100.6 5411	66.7 325.8	68.7 335.6	70.7 345.3	20 3418	±20°	0.472 12	24 610	1207.7 164,920	423.3 1883	507.1 2255.9	551.6 2453.5	435.8 1938.5	527 2344.1	593.5 2640

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexibility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
56 - 995	30 762	0.5 12.7	39.17 995	103 5538	52.5 256.4	53.9 263.3	55.3 270.1	20 3418	±20°	0.472 12	30 762	1545 210,980	432.6 1924.1	518.4 2305.8	563.8 2508.1	445.3 1980.9	538.7 2396.1	606.7 2698.9
56 - 521*	18 457	0.787 20	20.52 521	102.7 5523	88.2 430.7	89.4 436.3	90.5 441.9	20 3418	±20°	0.472 12	18 457	924.6 126,260	429.8 1911.6	515.3 2292.2	560.7 2494	442.5 1968.3	535.6 2382.3	603.4 2684.3
57 - 1088	30 762	0.563 14.3	42.83 1088	105.4 5666	54.8 267.5	56.5 275.9	58.2 284.3	20 3418	±20°	0.472 12	30 762	1580.9 215,890	442.6 1968.8	530.4 2359.4	576.9 2566.4	455.7 2026.9	551.2 2451.8	620.8 2761.7
57 - 674*	24 610	0.551 14	26.52 674	105.3 5662	65.2 318.4	66.1 322.7	67 327.1	20 3418	±20°	0.472 12	24 610	1263.8 172,590	440.2 1958.1	528 2348.4	574.4 2555.3	453.3 2016.2	548.7 2440.8	618.3 2750.4
58 - 623*	22 559	0.625 15.9	24.52 623	106.8 5740	72.8 355.5	73.8 360.2	74.7 364.9	20 3418	±20°	0.472 12	22 559	1174.5 160,380	446.3 1985.4	535.3 2381.1	582.4 2590.8	459.6 2044.3	556.3 2474.7	626.9 2788.6
58 - 572*	20 508	0.709 18	22.52 572	106.6 5734	81 395.7	82.1 400.8	83.2 406	20 3418	±20°	0.472 12	20 508	1066.5 145,640	446 1983.7	534.8 2378.9	581.9 2588.4	459.2 2042.6	555.8 2472.4	626.3 2786
59 - 995	30 762	0.529 13.4	39.17 995	108.7 5842	55.3 269.8	56.7 276.7	58.1 283.5	20 3418	±20°	0.472 12	30 762	1629.8 222,570	456.1 2028.9	546.6 2431.5	594.6 2645	469.6 2088.8	568 2526.8	639.9 2846.3
61 - 1240	36 914	0.465 11.8	48.83 1240	111.9 6016	47.9 234	49.4 241.4	50.9 248.7	20 3418	±20°	0.472 12	36 914	2014.1 275,050	469.3 2087.5	562.5 2502.2	611.9 2722	483.2 2149.2	584.6 2600.3	658.5 2929.3
61 - 843	24 610	0.75 19	33.17 843	111.7 6008	72.4 353.5	74.1 361.6	75.7 369.7	20 3418	±20°	0.472 12	24 610	1340.9 183,110	469.5 2088.6	562.6 2502.7	612 2722.1	483.4 2150.3	584.6 2600.7	658.5 2929.2
61 - 572*	20 508	0.75 19	22.52 572	112.2 6030	85.4 417	86.5 422.1	87.5 427.3	20 3418	±20°	0.472 12	20 508	1121.6 153,170	468.9 2085.9	562.4 2501.6	611.9 2721.8	482.8 2147.8	584.5 2599.9	658.6 2929.6
62 - 978*	36 914	0.375 9.5	38.52 978	115.3 6197	46.3 226.3	47 229.3	47.6 232.3	20 3418	±20°	0.472 12	36 914	2074.7 283,320	481.2 2140.6	577.3 2567.8	628.2 2794.2	495.5 2204.2	600 2668.9	676.2 3007.8
62 - 1240	36 914	0.472 12	48.83 1240	113.6 6108	48.6 237.4	50.1 244.7	51.6 252.1	20 3418	±20°	0.472 12	36 914	2045.1 279,280	476.4 2119.4	571.1 2540.4	621.3 2763.6	490.5 2182	593.5 2640.1	668.6 2974.2
62 - 995	30 762	0.563 14.3	39.17 995	115.2 6196	58.5 285.6	59.9 292.4	61.3 299.3	20 3418	±20°	0.472 12	30 762	1728.6 236,060	483.6 2151	579.6 2578	630.4 2804.4	497.8 2214.5	602.3 2679.1	678.5 3018
63 - 1088	30 762	0.625 15.9	42.83 1088	116.3 6251	60.1 293.6	61.9 302	63.6 310.4	20 3418	±20°	0.472 12	30 762	1744.1 238,170	487.9 2170.4	584.8 2601.3	636.1 2829.6	502.3 2234.5	607.7 2703.2	684.6 3045.1
63 - 572*	20 508	0.787 20	22.52 572	117.1 6295	89.3 436.2	90.4 441.4	91.4 446.5	20 3418	±20°	0.472 12	20 508	1170.9 159,900	489.5 2177.2	587 2611.1	638.7 2841.1	504 2241.8	610.1 2713.8	687.5 3058
64 - 826*	30 762	0.472 12	32.52 826	117.6 6320	57.2 279.4	58 282.9	58.7 286.5	20 3418	±20°	0.472 12	30 762	1763.2 240,780	490.9 2183.7	588.9 2619.4	640.8 2850.3	505.5 2248.6	612 2722.5	689.7 3068.1

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexibility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
64 - 674*	24 610	0.625 15.9	26.52 674	118.3 6361	73.4 358.2	74.2 362.5	75.2 366.9	20 3418	±20°	0.472 12	24 610	1419.8 193,890	494.4 2199	592.9 2637.5	645.2 2869.9	509 2264.3	616.3 2741.2	694.5 3089.1
65 - 978*	36 914	0.394 10	38.52 978	120.8 6496	48.5 237	49.2 240	49.8 243	20 3418	±20°	0.472 12	36 914	2174.8 296,980	504.4 2243.6	605.1 2691.4	658.4 2928.8	519.4 2310.3	628.9 2797.4	708.8 3152.7
65 - 1240	36 914	0.5 12.7	48.83 1240	120 6450	51.2 249.7	52.7 257.1	54.2 264.5	20 3418	±20°	0.472 12	36 914	2159.4 294,880	502.9 2237	602.9 2681.6	655.8 2917.3	517.8 2303.2	626.5 2786.9	705.8 3139.6
65 - 623*	22 559	0.709 18	24.52 623	119.7 6434	81.8 399.6	82.8 404.3	83.8 409.1	20 3418	±20°	0.472 12	22 559	1316.4 179,760	500.1 2224.6	599.8 2668	652.6 2903.1	514.9 2290.6	623.4 2773	702.5 3124.8
66 - 1147	36 914	0.465 11.8	45.17 1147	121 6503	50.6 246.9	51.8 252.9	53 258.8	20 3418	±20°	0.472 12	36 914	2177.4 297,340	507 2255.1	607.8 2703.4	661.2 2941	522 2321.8	631.6 2809.5	711.6 3165.2
67 - 1147	36 914	0.472 12	45.17 1147	122.8 6603	51.3 250.6	52.5 256.5	53.8 262.4	20 3418	±20°	0.472 12	36 914	2210.8 301,910	514.7 2289.5	617 2744.8	671.3 2986	529.9 2357.3	641.3 2852.5	722.4 3213.6
67 - 826*	30 762	0.5 12.7	32.52 826	124.1 6670	60.4 294.8	61.1 298.4	61.8 301.9	20 3418	±20°	0.472 12	30 762	1860.9 254,120	518.1 2304.4	621.4 2764.2	676.2 3007.9	533.4 2372.9	645.9 2873	727.9 3237.8
68 - 623*	22 559	0.75 19	24.52 623	125.9 6771	86.3 421.3	87.3 426	88.2 430.8	20 3418	±20°	0.472 12	22 559	1385.2 189,170	526.2 2340.6	631.1 2807.3	686.7 3054.6	541.8 2410	655.9 2917.7	739.2 3287.9
69 - 995	30 762	0.625 15.9	39.17 995	127.1 6835	64.3 314.1	65.7 321	67.1 327.8	20 3418	±20°	0.472 12	30 762	1907 260,420	533.1 2371.4	639 2842.6	695.2 3092.3	548.9 2441.5	664.1 2954	748.1 3327.8
70 - 1342	40 1016	0.472 12	52.83 1342	130.2 6998	49.5 241.8	50.9 248.6	52.3 255.4	20 3418	±20°	0.472 12	40 1016	2603.1 355,480	545.1 2424.9	653.6 2907.3	711.1 3163	561.3 2496.7	679.2 3021.4	765.3 3404.2
70 - 1147	36 914	0.5 12.7	45.17 1147	129.7 6972	54.1 263.9	55.3 269.9	56.5 275.8	20 3418	±20°	0.472 12	36 914	2334.4 318,780	543.3 2416.8	651.4 2897.4	708.6 3152.2	559.4 2488.3	676.9 3011.1	762.7 3392.5
71 - 826*	30 762	0.529 13.4	32.52 826	130.9 7036	63.7 311	64.4 314.5	65.2 318.1	20 3418	±20°	0.472 12	30 762	1963.1 268,080	546.4 2430.7	655.5 2915.7	713.3 3172.8	562.7 2502.9	681.3 3030.5	767.8 3415.4
71 - 623*	22 559	0.787 20	24.52 623	131.5 7072	90.3 440.9	91.3 445.6	92.2 450.3	20 3418	±20°	0.472 12	22 559	1446.8 197,580	549.5 2444.4	659.1 2931.8	717.2 3190.1	565.8 2516.9	685 3047.1	772 3433.8
72 - 674*	24 610	0.709 18	26.52 674	132.7 7137	82.5 403	83.4 407.3	84.3 411.7	20 3418	±20°	0.472 12	24 610	1592.9 217,530	554.5 2466.4	665.1 2958.4	723.7 3219.1	570.9 2539.6	691.2 3074.8	779 3465.1
74 - 1342	40 1016	0.5 12.7	52.83 1342	137.5 7390	52.1 254.6	53.5 261.4	54.9 268.2	20 3418	±20°	0.472 12	40 1016	2749.2 375,430	575.6 2560.3	690.1 3069.8	750.8 3339.8	592.6 2636.1	717.2 3190.3	808.1 3594.6
74 - 826*	30 762	0.551 14	32.52 826	136.1 7315	66.2 323.3	67 326.9	67.7 330.5	20 3418	±20°	0.472 12	30 762	2040.8 278,690	568 2526.8	681.4 3031	741.5 3298.3	584.9 2601.8	708.2 3150.3	798.2 3550.4

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexi-bility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
75 - 1393	42 1067	0.472 12	54.83 1393	138.5 7446	49.9 243.8	51.3 250.3	52.6 256.9	20 3418	±20°	0.472 12	42 1067	2908.4 397,160	579.8 2579	695.2 3092.3	756.3 3364.4	597 2655.4	722.5 3213.8	814 3621
75 - 826*	30 762	0.563 14.3	32.52 826	138.8 7463	67.6 329.9	68.3 333.5	69 337	20 3418	±20°	0.472 12	30 762	2082.1 284,330	579.5 2577.8	695.2 3092.2	756.5 3364.9	596.7 2654.3	722.5 3214	814.3 3622.1
75 - 1088	30 762	0.75 19	42.83 1088	137.8 7407	70.9 346	72.6 354.4	74.3 362.7	20 3418	±20°	0.472 12	30 762	2066.6 282,220	577.5 2568.9	692.3 3079.5	753.1 3350.1	594.6 2644.9	719.5 3200.3	810.5 3605.4
76 - 1249	40 1016	0.472 12	49.17 1249	139.8 7518	52.1 254.3	53.2 259.7	54.3 265.2	20 3418	±20°	0.472 12	40 1016	2796.9 381,940	585.4 2604	701.9 3122.3	763.7 3397	602.7 2681.1	729.5 3244.9	821.9 3656.2
76 - 674*	24 610	0.75 19	26.52 674	139.8 7514	87 425	87.9 429.3	88.8 433.7	20 3418	±20°	0.472 12	24 610	1677.1 229,020	583.7 2596.4	700.1 3114.3	761.8 3388.8	601 2673.4	727.7 3236.8	820 3647.8
77 - 978*	36 914	0.465 11.8	38.52 978	141.8 7626	56.9 277.7	57.5 280.7	58.1 283.7	20 3418	±20°	0.472 12	36 914	2553.3 348,670	592 2633.4	710.2 3159.1	772.8 3437.8	609.6 2711.6	738.2 3283.6	831.9 3700.7
78 - 978*	36 914	0.472 12	38.52 978	144 7743	57.8 282	58.4 285	59 288	20 3418	±20°	0.472 12	36 914	2592.5 354,030	601.1 2673.8	721.1 3207.6	784.7 3490.6	619 2753.2	749.5 3333.9	844.7 3757.5
79 - 1444	44 1118	0.472 12	56.83 1444	146.9 7896	50.3 245.6	51.6 251.9	52.9 258.3	20 3418	±20°	0.472 12	44 1118	3231.2 441,250	614.6 2733.9	737 3278.3	801.8 3566.8	632.8 2814.9	765.9 3407.1	863 3839
79 - 1393	42 1067	0.5 12.7	54.83 1393	146.3 7865	52.6 256.7	53.9 263.2	55.3 269.8	20 3418	±20°	0.472 12	42 1067	3071.9 419,500	612.2 2723.4	734.1 3265.5	798.7 3552.9	630.4 2804.1	763 3393.8	859.7 3824
79 - 674*	24 610	0.787 20	26.52 674	146 7851	91.1 444.8	92 449.2	92.9 453.5	20 3418	±20°	0.472 12	24 610	1752.4 239,300	609.8 2712.7	731.5 3253.9	796 3540.7	628 2793.2	760.3 3382	856.8 3811.3
80 - 1300	42 1067	0.472 12	51.17 1300	148.4 7979	52.4 255.9	53.5 261.1	54.6 266.4	20 3418	±20°	0.472 12	42 1067	3116.4 425,580	621 2762.1	744.6 3312.2	810.1 3603.7	639.4 2844	773.9 3442.3	872 3878.7
80 - 1249	40 1016	0.5 12.7	49.17 1249	147.7 7941	54.9 268	56 273.4	57.1 278.9	20 3418	±20°	0.472 12	40 1016	2953.9 403,380	618.1 2749.5	741.2 3296.9	806.4 3587	636.4 2831	770.3 3426.4	867.9 3860.7
80 - 1240	36 914	0.625 15.9	48.83 1240	148.4 7978	62.6 305.7	64.1 313	65.6 320.4	20 3418	±20°	0.472 12	36 914	2671 364,750	621.3 2763.9	745 3313.9	810.5 3605.4	639.8 2845.7	774.2 3444	872.3 3880.3
81 - 995	30 762	0.75 19	39.17 995	150.6 8099	76.1 371.3	77.5 378.2	78.9 385	20 3418	±20°	0.472 12	30 762	2259.7 308,590	631.1 2807.2	756.6 3365.5	823.1 3661.4	649.8 2890.3	786.3 3497.6	885.9 3940.6
82 - 978*	36 914	0.5 12.7	38.52 978	152.1 8176	61 297.7	61.6 300.7	62.2 303.7	20 3418	±20°	0.472 12	36 914	2737.4 373,820	634.6 2823	761.4 3386.7	828.5 3685.4	653.5 2906.9	791.3 3520	891.9 3967.2
83 - 826*	30 762	0.625 15.9	32.52 826	153.1 8233	74.6 364.3	75.4 367.9	76.1 371.4	20 3418	±20°	0.472 12	30 762	2297 313,680	639.2 2843.3	766.8 3410.8	834.4 3711.6	658.2 2927.8	797 3545.1	898.2 3995.4

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexi-bility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
84 - 1444	44 1118	0.5 12.7	56.83 1444	155.2 8341	53 258.7	54.3 265	55.6 271.3	20 3418	±20°	0.472 12	44 1118	3413.2 466,100	649.1 2887.2	778.4 3462.3	846.9 3767.1	668.3 2972.8	808.9 3598.4	911.5 4054.6
85 - 1351	44 1118	0.472 12	53.17 1351	157 8440	52.7 257.4	53.8 262.4	54.8 267.5	20 3418	±20°	0.472 12	44 1118	3453.6 471,630	656.6 2920.8	787.4 3502.6	856.8 3811	676.1 3007.4	818.4 3640.3	922.2 4102
85 - 1300	42 1067	0.5 12.7	51.17 1300	156.8 8427	55.2 269.7	56.3 275	57.4 280.2	20 3418	±20°	0.472 12	42 1067	3291.7 449,510	655.7 2916.8	786.3 3497.8	855.6 3805.7	675.2 3003.3	817.2 3635.2	920.9 4096.2
87 - 1080*	40 1016	0.472 12	42.52 1080	161.7 8695	58 283.3	58.6 286	59.1 288.7	20 3418	±20°	0.472 12	40 1016	3234.4 441,680	674.7 3001.3	809.5 3600.7	880.9 3918.4	694.8 3090.5	841.4 3742.6	948.3 4218.1
87 - 1147	36 914	0.625 15.9	45.17 1147	160.4 8624	66.4 324.4	67.7 330.3	68.9 336.3	20 3418	±20°	0.472 12	36 914	2887.5 394,310	671.3 2986.3	805 3580.8	875.8 3896	691.2 3074.8	836.6 3721.5	942.7 4193.2
89 - 1545	48 1219	0.472 12	60.83 1545	163.7 8803	51 248.9	52.2 254.8	53.4 260.7	20 3418	±20°	0.472 12	48 1219	3929.6 536,620	684.7 3045.6	821.1 3652.5	893.4 3974.2	705 3136	853.4 3796.2	961.6 4277.6
90 - 1351	44 1118	0.5 12.7	53.17 1351	165.8 8915	55.6 271.4	56.6 276.4	57.6 281.4	20 3418	±20°	0.472 12	44 1118	3648.2 498,200	693.5 3084.7	831.6 3699.3	904.9 4025.1	714 3176.2	864.3 3844.8	974 4332.4
90 - 978*	36 914	0.551 14	38.52 978	166.9 8975	66.9 326.8	67.5 329.8	68.2 332.8	20 3418	±20°	0.472 12	36 914	3004.7 410,320	696.5 3098.2	835.6 3716.9	909.3 4044.8	717.2 3190.3	868.5 3863.3	978.9 4354.2
92 - 1131*	42 1067	0.472 12	44.52 1131	170.6 9171	58.1 283.8	58.7 286.4	59.2 289	20 3418	±20°	0.472 12	42 1067	3582 489,160	711.6 3165.2	853.7 3797.5	929 4132.6	732.7 3259.3	887.3 3947.1	1000.1 4448.7
92 - 1080*	40 1016	0.5 12.7	42.52 1080	170.8 9183	61.3 299.1	61.8 301.8	62.4 304.6	20 3418	±20°	0.472 12	40 1016	3416 466,480	712.5 3169.5	854.9 3802.6	930.3 4138.2	733.7 3263.8	888.5 3952.4	1001.4 4454.7
92 - 1342	40 1016	0.625 15.9	52.83 1342	170.2 9151	63.9 312.2	65.3 319	66.7 325.8	20 3418	±20°	0.472 12	40 1016	3404.2 464,880	712 3167.3	853.9 3798.2	929 4132.6	733.2 3261.2	887.4 3947.5	1000 4448
93 - 1545	48 1219	0.5 12.7	60.83 1545	173 9300	53.7 262.3	54.9 268.2	56.1 274.1	20 3418	±20°	0.472 12	48 1219	4151.6 566,940	723.2 3217.1	867.4 3858.3	943.8 4198.1	744.7 3312.6	901.5 4010	1015.8 4518.7
93 - 826*	30 762	0.709 18	32.52 826	172.2 9257	84.1 410.5	84.8 414.1	85.5 417.6	20 3418	±20°	0.472 12	30 762	2582.6 352,680	718.5 3196.2	862 3834.3	938 4172.5	739.9 3291.1	895.9 3985.3	1009.8 4491.6
94 - 1452	48 1219	0.472 12	57.17 1452	174.2 9367	53.3 260.1	54.2 264.8	55.2 269.5	20 3418	±20°	0.472 12	48 1219	4181.2 570,980	728.2 3239.4	873.4 3885.2	950.4 4227.4	749.9 3335.6	907.8 4038	1023 4550.3
95 - 1240	36 914	0.75 19	48.83 1240	176.2 9474	74 361.2	75.5 368.5	77 375.9	20 3418	±20°	0.472 12	36 914	3171.8 433,130	737.2 3279.5	884.1 3932.6	961.9 4278.7	759.1 3376.7	918.8 4087.1	1035.3 4605.2
97 - 1131*	42 1067	0.5 12.7	44.52 1131	180.2 9686	61.4 299.8	61.9 302.4	62.5 305	20 3418	±20°	0.472 12	42 1067	3783.5 516,670	751.5 3343	901.7 4010.8	981.2 4364.8	773.9 3442.4	937.2 4168.8	1056.3 4698.7

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexibility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
98 - 1393	42 1067	0.625 15.9	54.83 1393	181.2 9743	64.5 315.1	65.9 321.6	67.2 328.2	20 3418	±20°	0.472 12	42 1067	3805.6 519,680	757.8 3370.8	908.8 4042.5	988.8 4398.5	780.3 3470.8	944.5 4201.5	1064.3 4734.4
98 - 826*	30 762	0.75 19	32.52 826	181.5 9756	88.7 433.2	89.5 436.8	90.2 440.4	20 3418	±20°	0.472 12	30 762	2721.9 371,700	757.2 3368.2	908.4 4040.8	988.5 4397.3	779.7 3468.4	944.2 4200	1064.1 4733.6
99 - 1452	48 1219	0.5 12.7	57.17 1452	184.1 9896	56.2 274.3	57.1 279	58.1 283.7	20 3418	±20°	0.472 12	48 1219	4417.5 603,250	769.3 3421.9	922.6 4104.1	1003.9 4465.7	792.1 3523.4	958.9 4265.6	1080.6 4806.8
99 - 1249	40 1016	0.625 15.9	49.17 1249	182.9 9832	67.6 329.9	68.7 335.3	69.8 340.8	20 3418	±20°	0.472 12	40 1016	3657.7 499,490	764.7 3401.7	917.1 4079.5	997.9 4438.8	787.4 3502.6	953.2 4239.9	1074.1 4777.7
101 - 1080*	40 1016	0.551 14	42.52 1080	187.6 10,084	67.3 328.5	67.8 331.2	68.4 333.9	20 3418	±20°	0.472 12	40 1016	3751.1 512,250	782.4 3480.1	938.6 4175.3	1021.5 4543.8	805.6 3583.6	975.6 4339.8	1099.6 4891.4
102 - 1698	54 1372	0.472 12	66.83 1698	189.2 10,174	51.8 253.1	53 258.5	54 263.9	20 3418	±20°	0.472 12	54 1372	5109.5 697,740	790.8 3517.4	948.4 4218.9	1032 4590.6	814.2 3621.8	985.8 4384.8	1110.9 4941.4
102 - 978*	36 914	0.625 15.9	38.52 978	188.1 10,114	75.5 368.6	76.1 371.6	76.7 374.6	20 3418	±20°	0.472 12	36 914	3386.1 462,400	784.8 3490.9	941.5 4188.2	1024.6 4557.7	808.1 3594.7	978.6 4353.1	1103 4906.3
103 - 1147	36 914	0.75 19	45.17 1147	190.5 10,241	78.7 384.4	80 390.4	81.2 396.3	20 3418	±20°	0.472 12	36 914	3428.8 468,230	796.6 3543.7	955.4 4249.7	1039.5 4623.9	820.3 3648.8	992.9 4416.8	1118.9 4976.9
103 - 826*	30 762	0.787 20	32.52 826	189.8 10,204	92.9 453.7	93.7 457.3	94.4 460.9	20 3418	±20°	0.472 12	30 762	2846.8 388,760	791.9 3522.7	950.1 4226.1	1033.9 4598.9	815.5 3627.4	987.5 4392.6	1113 4950.6
104 - 1444	44 1118	0.625 15.9	56.83 1444	192.3 10,337	65.1 317.7	66.4 324.1	67.7 330.4	20 3418	±20°	0.472 12	44 1118	4230.1 577,660	803.8 3575.4	964 4288.1	1048.9 4665.8	827.6 3681.5	1001.9 4456.8	1129 5022.2
105 - 1300	42 1067	0.625 15.9	51.17 1300	194.2 10,440	68 332.3	69.1 337.5	70.2 342.8	20 3418	±20°	0.472 12	42 1067	4077.8 556,860	811.7 3610.6	973.5 4330.4	1059.3 4711.8	835.8 3717.7	1011.8 4500.7	1140.2 5071.7
107 - 1131*	42 1067	0.551 14	44.52 1131	197.9 10,639	67.4 329.2	68 331.8	68.5 334.4	20 3418	±20°	0.472 12	42 1067	4155.5 567,460	825.3 3671.3	990.2 4404.8	1077.6 4793.5	849.9 3780.5	1029.2 4578.3	1160.1 5160.3
108 - 1605	54 1372	0.472 12	63.17 1605	200.2 10,764	54 263.5	54.8 267.7	55.7 272	20 3418	±20°	0.472 12	54 1372	5405.6 738,180	836.3 3720.1	1003.2 4462.2	1091.6 4855.6	861.2 3830.6	1042.6 4637.8	1175 5226.6
109 - 1342	40 1016	0.75 19	52.83 1342	202.3 10,878	75.7 369.4	77 376.2	78.4 383	20 3418	±20°	0.472 12	40 1016	4046.7 552,610	845.9 3762.7	1014.5 4512.6	1103.8 4910.1	871 3874.3	1054.4 4690.1	1188.1 5285.1
111 - 1351	44 1118	0.625 15.9	53.17 1351	205.5 11,049	68.5 334.5	69.5 339.5	70.6 344.6	20 3418	±20°	0.472 12	44 1118	4521.3 617,430	858.8 3820.3	1030.1 4582	1120.8 4985.8	884.3 3933.6	1070.6 4762.3	1206.5 5366.6
114 - 1080*	40 1016	0.625 15.9	42.52 1080	211.5 11,371	75.9 370.7	76.5 373.4	77 376.2	20 3418	±20°	0.472 12	40 1016	4229.9 577,620	882.1 3923.8	1058.3 4707.7	1151.7 5123.2	908.3 4040.5	1100 4893.2	1239.9 5515.2

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexibility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
114 - 978*	36 914	0.709 18	38.52 978	211.8 11,387	85.2 415.7	85.8 418.7	86.4 421.7	20 3418	±20°	0.472 12	36 914	3812.5 520,620	883.5 3929.9	1060 4715	1153.5 5131.1	909.8 4046.8	1101.7 4900.8	1241.8 5523.6
116 - 1850	60 1524	0.472 12	72.83 1850	215 11,556	52.6 256.7	53.6 261.6	54.6 266.5	20 3418	±20°	0.472 12	60 1524	6448.4 880,580	897.7 3993	1076.8 4789.8	1171.7 5212.1	924.3 4111.6	1119.2 4978.3	1261.3 5610.4
116 - 1545	48 1219	0.625 15.9	60.83 1545	214.5 11,534	66.1 322.6	67.3 328.5	68.5 334.4	20 3418	±20°	0.472 12	48 1219	5149 703,140	896.4 3987.3	1075.2 4782.5	1169.9 5204	923 4105.7	1117.4 4970.7	1259.3 5601.6
116 - 1393	42 1067	0.75 19	54.83 1393	215.5 11,587	76.4 373.1	77.8 379.6	79.1 386.2	20 3418	±20°	0.472 12	42 1067	4525.8 618,040	900.7 4006.5	1080.3 4805.3	1175.5 5228.7	927.4 4125.4	1122.8 4994.4	1265.2 5628.1
117 - 1249	40 1016	0.75 19	49.17 1249	217.4 11,688	80.2 391.4	81.3 396.8	82.4 402.3	20 3418	±20°	0.472 12	40 1016	4348 593,750	908.5 4041.4	1089.7 4847.2	1185.7 5274.2	935.5 4161.3	1132.6 5037.8	1276.3 5677.1
120 - 1131*	42 1067	0.625 15.9	44.52 1131	223.2 12,000	76.1 371.6	76.6 374.2	77.2 376.8	20 3418	±20°	0.472 12	42 1067	4687.1 640,060	930.8 4140.5	1116.8 4967.8	1215.4 5406.3	958.5 4263.6	1160.8 5163.6	1308.4 5820
121 - 978*	36 914	0.75 19	38.52 978	223.4 12,010	89.9 438.9	90.5 441.9	91.1 444.9	20 3418	±20°	0.472 12	36 914	4020.9 549,090	931.7 4144.5	1117.9 4972.5	1216.5 5411.4	959.4 4267.8	1161.9 5168.5	1309.6 5825.4
122 - 1757	60 1524	0.472 12	69.17 1757	226.3 12,168	54.5 266.3	55.3 270.2	56.1 274.1	20 3418	±20°	0.472 12	60 1524	6789.6 927,190	945 4203.4	1133.6 5042.3	1233.5 5486.9	973 4328.2	1178.2 5240.8	1327.8 5906.4
123 - 1452	48 1219	0.625 15.9	57.17 1452	228.3 12,273	69.3 338.5	70.3 343.2	71.2 347.9	20 3418	±20°	0.472 12	48 1219	5478.7 748,160	953.5 4241.4	1143.7 5087.5	1244.5 5536	981.8 4367.3	1188.7 5287.8	1339.6 5959.1
123 - 1444	44 1118	0.75 19	56.83 1444	228.8 12,299	77.1 376.5	78.4 382.8	79.7 389.1	20 3418	±20°	0.472 12	44 1118	5032.8 687,270	955.8 4251.6	1146.4 5099.6	1247.5 5549	984.2 4377.8	1191.5 5300.2	1342.8 5972.9
125 - 1300	42 1067	0.75 19	51.17 1300	230.9 12,416	80.8 394.4	81.9 399.7	82.9 404.9	20 3418	±20°	0.472 12	42 1067	4849.6 662,250	964.8 4291.8	1157.3 5147.8	1259.2 5601.4	993.5 4419.2	1202.8 5350.3	1355.5 6029.4
126 - 978*	36 914	0.787 20	38.52 978	233.8 12,569	94.2 459.9	94.8 462.9	95.4 465.9	20 3418	±20°	0.472 12	36 914	4208.2 574,660	975.1 4337.4	1169.9 5203.9	1273.1 5663.2	1004.1 4466.4	1216 5409	1370.6 6096.5
129 - 1080*	40 1016	0.709 18	42.52 1080	238.3 12,811	85.7 418.4	86.2 421.1	86.8 423.8	20 3418	±20°	0.472 12	40 1016	4765.9 650,820	993.8 4420.5	1192.3 5303.8	1297.6 5772	1023.3 4552	1239.3 5512.8	1396.9 6213.6
132 - 1351	44 1118	0.75 19	53.17 1351	244.5 13,146	81.4 397.3	82.4 402.3	83.4 407.4	20 3418	±20°	0.472 12	44 1118	5379.3 734,590	1021.3 4543	1225.1 5449.4	1333 5929.7	1051.6 4677.9	1273.3 5663.8	1434.9 6382.9
134 - 1698	54 1372	0.625 15.9	66.83 1698	248.2 13,345	67.3 328.8	68.4 334.2	69.5 339.5	20 3418	±20°	0.472 12	54 1372	6702.1 915,230	1036.5 4610.7	1243.4 5530.8	1353 6018.4	1067.3 4747.6	1292.3 5748.5	1456.4 6478.5
136 - 1131*	42 1067	0.709 18	44.52 1131	251.6 13,524	85.9 419.5	86.5 422.1	87 424.7	20 3418	±20°	0.472 12	42 1067	5282.6 721,390	1049 4666.1	1258.6 5598.6	1369.7 6092.8	1080.2 4804.9	1308.2 5819.2	1474.5 6559

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	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexibility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
136 - 1080*	40 1016	0.75 19	42.52 1080	251.4 13,517	90.5 441.8	91 444.6	91.6 447.3	20 3418	±20°	0.472 12	40 1016	5028.2 686,640	1048.4 4663.6	1257.9 5595.5	1369 6089.4	1079.6 4802.3	1307.5 5816	1473.7 6555.3
138 - 1545	48 1219	0.75 19	60.83 1545	255.4 13,733	78.4 382.6	79.6 388.5	80.8 394.4	20 3418	±20°	0.472 12	48 1219	6130.4 837,160	1066.8 4745.2	1279.6 5692	1392.4 6193.8	1098.4 4886.1	1330 5916.1	1498.8 6667.2
142 - 1605	54 1372	0.625 15.9	63.17 1605	262.6 14,119	70.4 343.5	71.2 347.8	72.1 352	20 3418	±20°	0.472 12	54 1372	7090.5 968,270	1096.3 4876.8	1315.2 5850.2	1431.2 6366.1	1128.9 5021.6	1367 6080.5	1540.6 6852.8
142 - 1080*	40 1016	0.787 20	42.52 1080	263.2 14,151	94.8 463	95.4 465.8	96 468.5	20 3418	±20°	0.472 12	40 1016	5264 718,850	1097.6 4882.2	1316.9 5857.8	1433.1 6374.9	1130.2 5027.4	1368.8 6088.6	1542.8 6862.7
143 - 1131*	42 1067	0.75 19	44.52 1131	265.4 14,271	90.8 443.1	91.3 445.7	91.8 448.3	20 3418	±20°	0.472 12	42 1067	5574.2 761,210	1106.8 4923.5	1328 5907.4	1445.3 6428.8	1139.8 5069.9	1380.4 6140.2	1555.9 6920.8
147 - 1452	48 1219	0.75 19	57.17 1452	271.8 14,612	82.4 402.3	83.4 407	84.3 411.7	20 3418	±20°	0.472 12	48 1219	6522.9 890,770	1134.8 5047.8	1361.3 6055.3	1481.3 6589.2	1168.5 5197.8	1414.9 6293.7	1594.6 7092.9
150 - 1131*	42 1067	0.787 20	44.52 1131	277.9 14,942	95.1 464.4	95.6 467	96.2 469.6	20 3418	±20°	0.472 12	42 1067	5836.5 797,020	1158.9 5154.9	1390.5 6185.1	1513.2 6731.1	1193.4 5308.3	1445.3 6428.9	1629 7246.2
152 - 1850	60 1524	0.625 15.9	72.83 1850	282.2 15,171	68.4 334	69.4 338.9	70.4 343.8	20 3418	±20°	0.472 12	60 1524	8465.6 1,156,040	1177.8 5239.3	1413 6285.3	1537.6 6839.6	1212.8 5395	1468.6 6532.8	1655.2 7362.6
159 - 1545	48 1219	0.875 22.2	60.83 1545	295.7 15,896	90.6 442.3	91.8 448.2	93 454.1	20 3418	±20°	0.472 12	48 1219	7096.1 969,040	1234.4 5491	1480.8 6587	1611.4 7167.8	1271.1 5654.1	1539.1 6846.3	1734.6 7715.8
160 - 1757	60 1524	0.625 15.9	69.17 1757	297.1 15,974	71.2 347.7	72 351.6	72.8 355.4	20 3418	±20°	0.472 12	60 1524	8913.6 1,217,230	1240 5515.6	1487.5 6616.9	1618.8 7200.6	1276.8 5679.5	1546.1 6877.5	1742.6 7751.3
160 - 1698	54 1372	0.75 19	66.83 1698	295.8 15,903	80 390.4	81.1 395.8	82.2 401.2	20 3418	±20°	0.472 12	54 1372	7986.6 1,090,640	1234.7 5492.4	1481.2 6588.9	1611.9 7170	1271.4 5655.6	1539.6 6848.3	1735.1 7718.2
169 - 1605	54 1372	0.75 19	63.17 1605	312.9 16,825	83.7 408.7	84.6 413	85.5 417.2	20 3418	±20°	0.472 12	54 1372	8449.4 1,153,840	1306 5809.6	1566.8 6969.6	1705 7584.4	1344.9 5982.3	1628.5 7244.1	1835.4 8164.4
170 - 1452	48 1219	0.875 22.2	57.17 1452	314.6 16,914	95.4 465.8	96.4 470.5	97.3 475.2	20 3418	±20°	0.472 12	48 1219	7550.5 1,031,090	1313.2 5841.4	1575.4 7007.6	1714.3 7625.6	1352.2 6015	1637.4 7283.5	1845.4 8208.7
181 - 1850	60 1524	0.75 19	72.83 1850	336.5 18,092	81.3 397	82.3 401.9	83.3 406.8	20 3418	±20°	0.472 12	60 1524	10,095.1 1,378,570	1404.2 6246	1684.6 7493.4	1833.2 8154.4	1445.9 6431.7	1750.9 7788.5	1973 8778
181 - 1545	48 1219	1 25.4	60.83 1545	335.3 18,025	102.8 501.7	104 507.6	105.2 513.5	20 3418	±20°	0.472 12	48 1219	8046.3 1,098,790	1399.4 6224.8	1678.8 7467.5	1826.8 8126.2	1441 6409.8	1744.9 7761.6	1966 8747
185 - 1698	54 1372	0.875 22.2	66.83 1698	342.7 18,425	92.5 451.8	93.6 457.2	94.7 462.5	20 3418	±20°	0.472 12	54 1372	9252.8 1,263,560	1430.2 6361.6	1715.7 7631.9	1867.1 8305.2	1472.7 6550.7	1783.3 7932.5	2009 8940

O-Pile®

	Pipe		Width	Section modulus	Panel weight by ratio			Interlock strength	Flexi-bility	Minimum thickness	Depth (Height)	Moment of inertia	Bending moment by grade					
	Diameter	Thickness			60%	80%	100%						50	60	65	S 355 GP	S 430 GP	X70
	in mm	in mm	in mm	in³/ft cm³/m	lb/ft² kg/m²	lb/ft² kg/m²	lb/ft² kg/m²	k/ft kN/m		in mm	in mm	in⁴/ft cm⁴/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m	k•ft/ft kN•m/m
191 - 1757	60	0.75	69.17	354.3	84.8	85.6	86.4	20	±20°	0.472	60	10,629.4	1478.2	1773.5	1930	1522.2	1843.4	2077.6
	1524	19	1757	19,049	414	417.9	421.8	3418		12	1524	1,451,540	6575.6	7889	8585	6771.1	8199.7	9241.7
192 - 1283*	48	0.875	50.52	356	106.1	106.6	107.1	20	±20°	0.472	48	8544.8	1484.2	1780.9	1938.2	1528.4	1851.1	2086.5
	1219	22.2	1283	19,142	518.1	520.4	522.7	3418		12	1219	1,166,870	6602.2	7921.9	8621.4	6798.6	8234.2	9281.2
192 - 1452	48	1	57.17	356.7	108.4	109.3	110.3	20	±20°	0.472	48	8561.6	1488.7	1786	1943.5	1533	1856.3	2092.2
	1219	25.4	1452	19,179	529	533.7	538.4	3418		12	1219	1,169,160	6622.2	7944.5	8645.3	6819	8257.4	9306.5
195 - 1605	54	0.875	63.17	362.6	97	97.9	98.8	20	±20°	0.472	54	9789.1	1512.8	1814.9	1975	1557.8	1886.4	2126.1
	1372	22.2	1605	19,492	473.7	477.9	482.2	3418		12	1372	1,336,790	6729.2	8073.1	8785.4	6929.2	8391.1	9457.4
210 - 1850	60	0.875	72.83	390.1	94.2	95.2	96.2	20	±20°	0.472	60	11,703.9	1627.6	1952.7	2125	1676	2029.6	2287.6
	1524	22.2	1850	20,975	459.7	464.7	469.6	3418		12	1524	1,598,260	7239.9	8686.1	9452.5	7455.2	9028.2	10175.6
210 - 1698	54	1	66.83	388.9	105	106.1	107.2	20	±20°	0.472	54	10,501.1	1622.8	1946.9	2118.6	1671	2023.6	2280.7
	1372	25.4	1698	20,910	512.9	518.2	523.6	3418		12	1372	1,434,010	7218.5	8660.2	9424.2	7433.1	9001.3	10145.1
218 - 1436*	54	0.875	56.52	405.2	106.8	107.2	107.6	20	±20°	0.472	54	10,941.4	1689.2	2026.8	2205.8	1739.4	2106.8	2374.7
	1372	22.2	1436	21,787	521.3	523.4	525.4	3418		12	1372	1,494,140	7513.7	9015.9	9812	7737.3	9371.3	10563
218 - 1283*	48	1	50.52	403.7	120.8	121.2	121.7	20	±20°	0.472	48	9689	1682.9	2019.3	2197.6	1732.9	2098.9	2365.8
	1219	25.4	1283	21,705	589.6	591.9	594.2	3418		12	1219	1,323,120	7485.8	8982.2	9775.4	7708.5	9336.3	10523.6
221 - 1757	60	0.875	69.17	410.8	98.3	99.1	99.9	20	±20°	0.472	60	12,323.3	1713.5	2055.8	2237.2	1764.5	2136.8	2408.4
	1524	22.2	1757	22,085	480.1	484	487.9	3418		12	1524	1,682,860	7622.1	9144.8	9951.8	7848.8	9505.1	10713.1
222 - 1605	54	1	63.17	411.5	110.2	111.1	112	20	±20°	0.472	54	11,109.6	1716.6	2059.5	2241.2	1767.6	2140.6	2412.6
	1372	25.4	1605	22,122	538.3	542.5	546.8	3418		12	1372	1,517,120	7635.7	9160.9	9969.3	7862.7	9521.8	10731.9
239 - 1850	60	1	72.83	443.1	107	108	109	20	±20°	0.472	60	13,292	1848.2	2217.4	2413.1	1903.1	2304.8	2597.7
	1524	25.4	1850	23,821	522.2	527.1	532.1	3418		12	1524	1,815,150	8221.1	9863.5	10734	8465.6	10252.1	11555.1
245 - 1588*	60	0.875	62.52	454.5	107.3	107.7	108.1	20	±20°	0.472	60	13,634.7	1894.3	2273.1	2473.8	1950.7	2362.7	2663.2
	1524	22.2	1588	24,435	523.9	525.7	527.6	3418		12	1524	1,861,940	8426.4	10111.1	11004	8677.1	10509.7	11846.3
248 - 1436*	54	1	56.52	459.9	121.6	122	122.4	20	±20°	0.472	54	12,417.4	1916.9	2300.2	2503.3	1974	2390.9	2694.9
	1372	25.4	1436	24,726	593.5	595.6	597.6	3418		12	1372	1,695,700	8527	10231.7	11135.2	8780.7	10635.1	11987.6
251 - 1757	60	1	69.17	466.5	111.8	112.6	113.4	20	±20°	0.472	60	13,995.6	1945.8	2334.5	2540.6	2003.6	2426.5	2735
	1524	25.4	1757	25,082	545.9	549.8	553.7	3418		12	1524	1,911,220	8655.2	10384.5	11301.1	8912.6	10793.7	12165.7
278 - 1588*	60	1	62.52	516.2	122.2	122.6	123	20	±20°	0.472	60	15,484.9	2151.3	2581.4	2809.4	2215.3	2683.2	3024.5
	1524	25.4	1588	27,751	596.7	598.5	600.4	3418		12	1524	2,114,610	9569.4	11482.8	12496.8	9854.2	11935.5	13453.5