

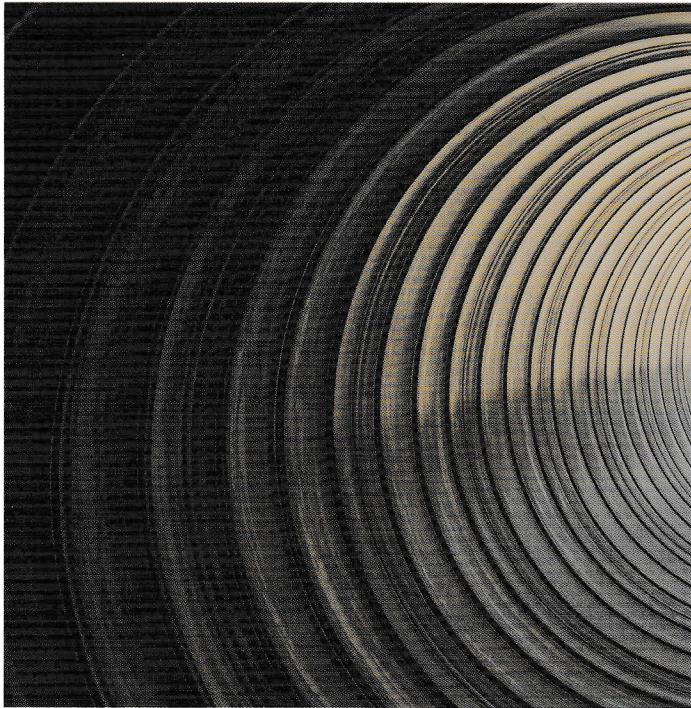
Spiral Rib

Durable Metal

Variety of Coatings

Hydraulics of Smooth Wall Pipe

**METAL
CULVERTS
INC.**



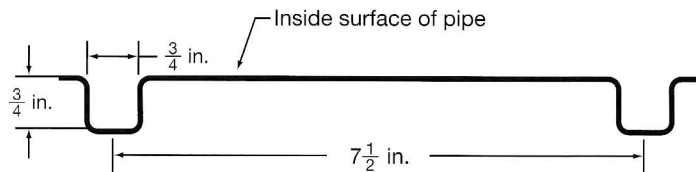
The Perfect Pipe

Metal Culverts' Spiral Rib Pipe combines the advantages of many piping varieties into one revolutionary product. Spiral Rib features the hydraulics of concrete and HDPE pipe, without the burden of installation costs due to the weight of concrete and the low pipe stiffness of HDPE. Like standard metal pipe, Spiral Rib is light-weight and easy to use. Strong, long-lasting, with superior performance, available in long lengths, Spiral Rib truly is the perfect pipe.

Revolutionary Hydraulic Design

Spiral Rib not only has better hydraulics than traditional metal pipe, it was proven to have a Manning's "n" factor of .012 at Utah State University's Hydraulic Laboratory, allowing it to be used interchangeably with concrete pipe and plastic pipe without affecting flow capacity. In effect, engineers, consultants and owners can specify alternate drainage pipe products without having to develop more than one hydraulic design on a project.

Spiral Rib tested as a Mannings "n" of 0.012



Strength and Durability

The cost savings of Spiral Rib increases after installation. Spiral Rib is stiffer than HDPE pipe and therefore less inclined to deflect. The positive joint connection and long pipe lengths of Spiral Rib also maintain the project grade longer than concrete pipe. Various metals and coatings are available depending on site conditions. Matching the metal and coating with the individual site allows for maximum economic efficiency and/or longer service life.

Table 1: Handling Weight for Aluminized Steel and Galvanized Steel Spiral Rib Pipe

Pipe Diameter Inches	Weight (pounds/foot) Thickness and Gage			
	(.064") 16	(.079") 14	(.109") 12	(.138") 10
18	15.1	18.5	25.5	
21	17.5	21.5	29.6	
24	19.9	24.5	33.6	
30	24.7	30.4	41.7	
36	29.5	36.3	49.9	
42	34.3	42.2	58.0	
48	39.1	48.1	66.1	83.3
54	43.9	54.0	74.2	93.6
60	48.7	59.9	82.3	103.8
66		65.8	90.4	114.0
72		71.7	98.6	124.3
78		77.7	106.7	134.5
84			114.8	144.7
90			122.9	154.9
96			131.0	165.2
102			139.2	175.5

Table 2: Handling Weight for Aluminum Spiral Rib Pipe

Pipe Diameter Inches	Weight (pounds/foot) Thickness and Gage			
	(.060") 16	(.075") 14	(.105") 12	(.135") 10
18	4.9	6.1		
21	5.7	7.1		
24	6.5	8.0	11.0	
30	8.0	10.0	13.9	
36	9.6	11.9	16.6	
42	11.3	14.0	19.3	
48		15.9	22.0	28.2
54		17.9	24.7	31.7
60			27.4	35.1
66			30.1	38.6
72			32.9	42.0
78				45.4
84				48.6

Table 3: Section Properties of Aluminized Steel and Galvanized Steel Spiral Rib Pipe

Gage	Sheet Thickness In.	Area of Section (A) In. ² /Ft.	Moment of Inertia I x 10 ³ In. ⁴ /In.	Radius of Gyration (r) In.
16	0.064	0.509	2.821	0.258
14	0.079	0.712	3.701	0.250
12	0.109	1.184	5.537	0.237
10	0.138	1.717	7.433	0.228

Table 4: Section Properties of Aluminum Spiral Rib Pipe

Gage	Sheet Thickness (T) In.	Area of Section (A) In. ² /Ft.	Moment of Inertia I x 10 ³ In. ⁴ /In.	Radius of Gyration (r) In.
16	0.060	0.415	2.558	0.272
14	0.075	0.569	3.372	0.267
12	0.105	0.914	5.073	0.258
10	0.135	1.290	6.826	0.252

Net effective properties at full yield stress (Tables 3 & 4)



Big Savings on Installation

Both steel and aluminum Spiral Rib provide significant handling and installation savings over heavier pipe. Steel Spiral Rib weighs only 10% as much as concrete pipe, while aluminum Spiral Rib weighs only 3% as much. With this weight reduction comes quicker installation and an equally significant reduction in labor costs. The cost of Spiral Rib is substantially less than concrete pipe and often the actual materials cost is even lower than that of plastic pipe. The cost savings are increased when including the cost of the prefabricated fittings, manholes, inlets, outlets and elbows. See the chart for handling weights.

Versatility

Spiral Rib can be fabricated in virtually any length or diameter. If a project requires a non-standard pipe size, Metal Culverts can fabricate Spiral Rib to your specifications. Arched Spiral Rib Pipe is available for sites with demanding fill height requirements. Concrete and plastic pipes can't match that versatility.

Perfection Is Possible

Because of its performance, strength, versatility and cost savings, Spiral Rib is the perfect pipe for any job. Call Metal Culverts today at (800) 735-7312 and ask about Spiral Rib.

Table 5: Height-of-Cover Limits for Aluminized Steel and Galvanized Steel Spiral Rib Pipe

Diameter Inches	Min. Cover Inches	Maximum Cover Over Pipe (feet) Thickness and Gage		
		(.064") 16	(.079") 14	(.109") 12
18	12	68		
21	12	58		
24	12	51	72	121
30	12	41	58	97
36	12	34	48	81
42	12	29	41	69
48	12	26	36	61
54	18	*	32	54
60	18	*	29	49
66	18		*	44
72	18		*	40
78	24		*	37
84	24			*
90	24			*
96	24			*
102	30			*

Table 6: Height-of-Cover Limits for Aluminum Spiral Rib Pipe

Diameter Inches	Min. Cover Inches	Maximum Cover Over Pipe (feet) Thickness and Gage			
		(.060") 16	(.075") 14	(.105") 12	(.135") 10
18	12	55	76		
21	12	47	65		
24	12	41	57	91	
30	18	33	45	73	
36	18	27	38	61	86
42	24	*	32	52	74
48	24		*	46	64
54	24		*	41	57
60	24			36	52
66	24			*	47
72	30			*	43
78	30				*
84	30				*

Notes (Tables 5 & 6)

1. Minimum and maximum covers are calculated for H25 loads.
2. For minimum cover under heavy construction loads, refer to Table 9.
3. Height of cover is measured from top of pipe to bottom of flexible pavement or to top of rigid pavement.
4. Backfill density is 120pcf.
5. Installation may be trench or embankment condition and shall be in accordance with ASTM A798 (Table 5) and ASTM B788 (Table 6).
6. * Consult Metal Culverts, Inc. for applications involving this size pipe. Requires improved backfill conditions.
7. Height-of-Cover Limits (Table 6) are based on H34 alloy.
8. If H32 alloy is used, cover limits (Table 6) must be adjusted a minimum of 17%, by adding to minimum cover and reducing maximum cover.

Table 7: Height-of-Cover Limits for Aluminized Steel and Galvanized Steel Spiral Rib Pipe Arch

Equivalent Diameter Inches	Span & Rise Inches	Minimum Thickness Inches (gage)	Minimum Cover Inches	Maximum Cover Feet
18	20 x 16	0.079 (14)	12	13
21	23 x 19	0.079 (14)	12	13
24	27 x 21	0.079 (14)	12	13
30	33 x 26	0.079 (14)	12	13
36	40 x 31	0.079 (14)	12	13
42	46 x 36	0.079 (14)	12	14
48	53 x 41	0.079 (14)	18	15
54	60 x 46	0.079 (14)	18	15
60	66 x 51	0.079 (14)	18	15

Notes (Tables 7 & 8)

1. Minimum covers and maximum covers are calculated for H25 loads.
2. For minimum cover under heavy construction loads, refer to Table 9.
3. Height of cover is measured from top of pipe to bottom of flexible pavement of to top of rigid pavement.
4. Backfill density is 120pcf.
5. Maximum cover over pipe-arch is based on maximum soil bearing pressure (corner) of 2 tons/ sq. ft.
6. Backfill around pipe-arch, other than in corners, must be compacted to a minimum density of 90%.
7. Installation may be trench or embankment condition and shall be done in accordance with ASTM A798 (Table 7) and ASTM B788 (Table 8).
8. *Consult Metal Culverts, Inc. for applications involving this size pipe. Requires improved backfill conditions.
9. Height-of-cover limits (Table 8) are based on H34 alloy.
10. If H32 alloy is used, cover limits (Table 8) must be adjusted by a minimum of 17% by adding to minimum cover and reducing maximum cover.

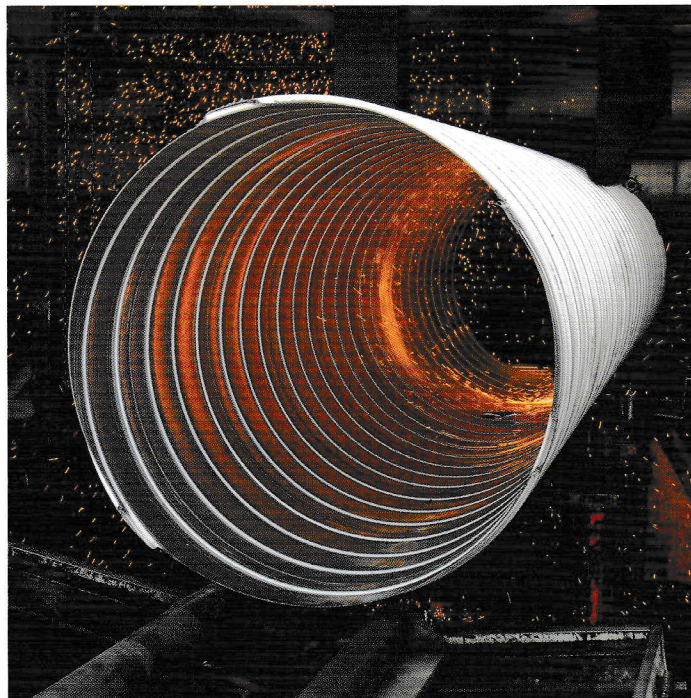


Table 8: Height-of-Cover Limits for Aluminum Spiral Rib Pipe Arch

Equivalent Diameter Inches	Span & Rise Inches	Minimum Thickness Inches (gage)	Minimum Cover Inches	Maximum Cover Feet
18	20 x 16	0.075 (14)	12	13
21	23 x 19	0.075 (14)	12	13
24	27 x 21	0.075 (14)	15	13
30	33 x 26	0.075 (14)	18	13
36	40 x 31	0.075 (14)	24	13
42	46 x 36	0.105 (12)	24	14
48	53 x 41	0.105 (12)	24	15
54	60 x 46	0.135 (10)	24	15
60	66 x 51	0.135 (10)	24	15

Table 9: Guidelines For Minimum Cover Required for Heavy Off-Road Construction Equipment

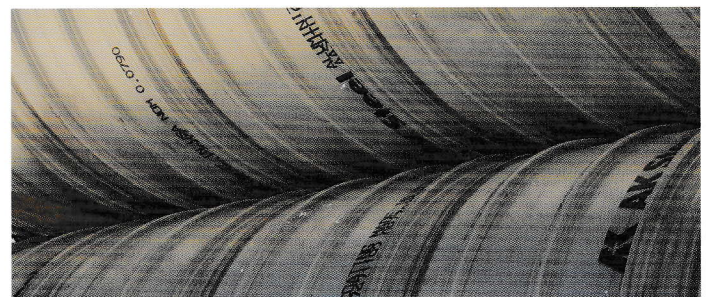
Axle Load Pipe Span (in)	Minimum Cover (feet) for Indicated Axle Load (kips)							
	18 – 50 k		50 – 75 k		75 – 110 k		110 – 150 k	
	Steel	Alum	Steel	Alum	Steel	Alum	Steel	Alum
15 – 42	4.0	5.0	4.0	5.0	4.5	6.0	5.0	6.0
48 – 72	4.5	6.0	4.5	6.0	5.0	7.0	6.0	8.0
78 – 120	4.5	6.0	5.0	7.0	6.0	8.0	6.0	8.0

Table 10: Reference Specifications

	Material	ASTM	AASHTO
Sheet	Galvanized Steel	A929	M218
	Aluminized Steel	A929	M274
	Aluminum Alloy	B744	M197
	Polymer Precoat	A742	M246
Pipe	Steel	A760	M36
	Aluminum	B745	M196
	Polymer Precoat	A762	M245
	Asphalt Coated	A849	M190
Design	Steel	A796	Sec. 12
	Aluminum	B790	Sec. 12
Fabrication	Fittings Reinforcement	A998	
Installation	Steel	A798	Sec. 26
	Aluminum	B788	Sec. 26

Table 11: Spiral Rib Pipe vs Concrete Pipe

Pipe Diam.	Spiral Rib Pipe (steel)				Concrete Pipe (Class III)		
	Gage	Pipe Length (ft)	Unit Weight (lb/ft)	Weight Per Piece (lbs)	Pipe Length (ft)	Unit Weight (lb/ft)	Weight Per Piece (lbs)
24"	16 ga	20	19.9	398	8	264	2112
30"	16 ga	20	24.7	494	8	384	3072
36"	16 ga	20	29.5	590	8	524	4192
42"	14 ga	20	42.2	844	8	698	5584
48"	14 ga	20	48.1	962	8	867	6936
60"	12 ga	20	82.3	1646	6	1295	7770
72"	12 ga	20	98.6	1972	6	1811	10,866
84"	12 ga	20	114.8	2296	6	2409	14,454
96"	12 ga	20	131.0	2620	6	3090	18,540



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