MAX FLOW

ST REGIS
CULVERT INC.

800-527-4604

MAX FLOW

Superior Hydraulics

St. Regis Max Flow combines the advantages of lightweight steel with the hydraulic capacity of concrete pipe to provide an economical, durable storm sewer system that moves water efficiently. A smooth interior provides the flow characteristics of concrete pipe while specially designed exterior box ribs assure the structural strength to produce one of the most efficient and economical storm sewer products available today.

Because steel spiral rib pipe weighs as little as 1/12th the weight of concrete pipe, handling requirements and installation costs are reduced substantially. With a smaller outside diameter than thick-walled concrete pipe, St. Regis Max Flow allows a reduction in trench widths and depths to effect additional savings in both excavation and backfilling.

Hydraulically equivalent and more economical to install than concrete pipe, St. Regis Max Flow is the ideal solution for owners and engineers seeking to specify alternate pipe products for the same hydraulic design.

Table 1: Handling Weight for Galvanized Steel 3/4″ x 3/4″ x 7 1/2″ Corrugation
Weight (Pounds/Lineal Foot)
Thickness and Specified Gauge

Diameter (Inches)	(.064″) 16	(.079″) 14	(0.109″) 12	(0.138″) 10
18	13.71	17.26	24.13	N/A
21	15.90	20.00	27.97	N/A
24	18.08	22.75	31.81	N/A
30	22.46	28.25	39.49	50.24
36	26.83	33.75	47.16	60.00
42	31.20	39.25	54.84	69.76
48	35.58	44.75	62.52	79.52
54	39.95	50.24	70.20	89.28
60	44.32	55.74	77.87	99.05
66	48.70	61.24	85.55	108.80
72	53.07	66.74	93.23	118.56
78	57.44	72.24	100.91	128.32
84	61.81	77.74	108.58	138.08
90	66.19	83.23	116.26	147.85
96	70.56	88.73	123.94	157.61
102	74.93	94.23	131.61	167.37

Table 2: Galvanized Steel HS-20 Live Load 3/4″ x 3/4″ x 7 1/2″
Minimum/Maximum Cover (Feet)
Thickness and Specified Gauge

Diameter (Inches)	(.064″) 16	(.079″) 14	(0.109″) 12	(0.138″) 10
18	1.0/68	1.0/96	–	–
21	1.0/58	1.0/82	–	–
24	1.0/51	1.0/72	–	–
30	1.0/41	1.0/58	1.0/97	–
36	1.0/34	1.0/48	1.0/81	–
42	1.0/29	1.0/41	1.0/69	–
48	1.0/26	1.0/36	1.0/61	–
54	[1.5/23]	1.5/32	1.0/54	–
60	<1.5/21>	1.5/28	1.0/49	1.0/71
66	–	[1.5/26]	1.0/44	1.0/63
72	–	<1.5/24>	1.5/40	1.0/58
78	–	<2.0/22>	[1.5/37]	1.5/53
84	–	–	[2.0/35]	1.5/50
90	–	–	<2.0/32>	[2.0/46]
96	–	–	<2.0/30>	<2.0/43>
102	–	–	<2.5/29>	<2.0/42>

Notes:
1. Allowable minimum cover is measured from top of pipe to bottom of flexible pavement or top of pipe to top of rigid pavement. Minimum cover in unpaved areas must be maintained.
2. CONDITION I installations are allowed unless otherwise shown.
3. [ ] requires CONDITION II installation.
4. < > requires CONDITION III installation.

INSTALLATION

Bedding

Proper bedding preparation is critical to both pipe performance and service life.

A good bedding foundation will help maintain the proper pipe elevation, eliminate undesirable stresses in the pipe, and ensure good hydraulic performance. The bedding should be free of rock formations, protruding stones, frozen lumps, roots, or other foreign material that may cause unequal settlement.

It is recommended that the bedding foundation be a stable, well-graded granular material. Placing the pipe on the bedding surface is generally accomplished by two methods to ensure satisfactory compaction beneath the haunches. One method is to shape the bedding surface to conform to the lower section of the pipe. The other method is to carefully tamp a granular or select material beneath the haunches to achieve a well-compacted condition.

Where unstable or otherwise unsuitable foundation soils are encountered, a qualified engineer should be consulted.

Backfill

Satisfactory backfill material, proper placement, and compaction are key factors in obtaining satisfactory performance.

Minimum pipe metal thickness (gauge) is dependent upon minimum and maximum cover and installation CONDITION I, II, or III, as noted in the fill height tables (see Page 2). Backfill in the pipe envelope shall be granular materials with little or no plasticity; free from rocks, frozen lumps, and foreign matter that could cause hard spots or that could decompose and create voids; compacted to a minimum 90% standard density per ASTM D698 (AASHTO T99).

Installation conditions are:
CONDITION I - Installations can be in an embankment or fill condition. Installation shall meet ASTM A798 (steel) requirements. ML (silts) and CL (clays) materials are typically not recommended. Compaction equipment or methods that cause excessive deflection, distortion or damage shall not be used.
CONDITION II - Installations require trench-like conditions where compaction is obtained by hand, or walk-behind equipment, or by saturation and vibration. Backfill materials are the same as for CONDITION I installations. Maximum loose-lift thickness shall be eight inches. Controlled moisture content and uniform gradation of the backfill may be required to limit the compaction effort while maintaining pipe shape. Spiral Rib Pipe should be placed in a trench cut with sufficient working area to allow compaction of the material in the haunches and adjacent to the sides.
CONDITION III - Installations have the same requirements as CONDITION II installations except that backfill materials are limited to clean, nonplastic materials that require little or no compaction effort (GP, SP), or to well-graded granular materials classified as GW, SW, GM, SM, GC, or SC with a maximum plastic index (Pl) of 10. Maximum loose-lift thickness shall be eight inches. Special attention to moisture content to limit compaction effort may be required. Soil cement or cement slurries may be used in lieu of the selected granular materials.

NOTES

1. Simple shape monitoring – measuring the rise and span at several points in the run – is recommended as good practice with all types of installation. It provides a good check on proper backfill placement and compaction methods. Use soil placement and compaction methods which will ensure that the vertical pipe dimension (rise) does not increase in excess of 5% of the nominal diameter. Use methods which will ensure that the horizontal pipe dimension (span) does not increase in excess of 3% of the nominal diameter. These guidelines will help ensure that the final deflections are within normal limits.

2. For multiple runs of large-diameter Spiral Rib Pipe, ample spacing should be used between runs to allow proper sidefill placement and compaction. Pipe spacing will change depending upon pipe diameter, backfill material and compaction methods. General guidelines for spacing between runs of pipe are:
DIAMETERS:
Up to 24 inches – 12-inch space.
24 inches to 72 inches – 1/2 diameter of pipe for space.
72 inches and over – 36-inch space.

Relining

Restoration of failed or deteriorating rigid pipe can be accomplished by relining with Spiral Rib Pipe. The thin walls may give an inside diameter that approaches the original pipe. The hydraulic capacity may be improved over the existing disjointed and misaligned storm sewer.

Spiral Rib Pipe's light weight makes the lining process easier. Spiral Rib Pipe can be provided in various lengths to meet individual site conditions.

Spiral Rib Flow Test Results

At the Utah Water Research Laboratory, 27 separate, full-scale flow tests were conducted on a 200-ft. run of 24 in., and a 300-ft. run of 36 in. diameter spiral rib pipe. The 24 in . pipe was tested for open channel flow between half and three-quarters full, and as a closed conduit at velocities between 4.7 and 16.4 fps. The 36 in. pipe was tested as a closed circuit at velocities between 3.9 and 12.7 fps.

Analysis of test results shows spiral rib pipe to be comparable to reinforced concrete pipe for use in Mannings Formula.

Mannings Formula

$V = 1.486\ R2/3\ S1/2$
$n = 0.012$
$Q = A1.486\ R2/3\ S1/2$

Actual Scale Resultant

Diameter	Full	Part Full
24	.0102	.0106
36	.0108	–
36*	.00987	–

Reference Specifications for Spiral Rib

Material	Galvanized Steel	AASHTO M218	ASTM A 929
	Aluminized Steel T-2	AASHTO M274	ASTM A 929
	Polymer Coated	AASHTO M246	ASTM A 742
Pipe	Max Flow	AASHTO M36	ASTM A 760
Design	Max Flow	AASHTO Sec. 12	ASTM A 796
Installation	Max Flow	AASHTO Sec. 26	ASTM A 798

- Steel meets both AASHTO M-36 type 1R and ASTM A-760 type 1R.
- Aluminized Steel Type 2 meets both AASHTO M-274 and ASTM 929-95.

Specification data referring to mechanical and physical properties and chemical analyses relate solely to tests performed at the time of manufacture in specimens obtained from specific locations of the product in accordance with prescribed sampling `ng procedures.

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