



ULTRA FLO[®] Storm Sewer Pipe

CONTECH
ENGINEERED SOLUTIONS

CONTECH
PIPE SOLUTIONS

ULTRA FLO® Storm Sewer Pipe

ULTRA FLO® Advantages:

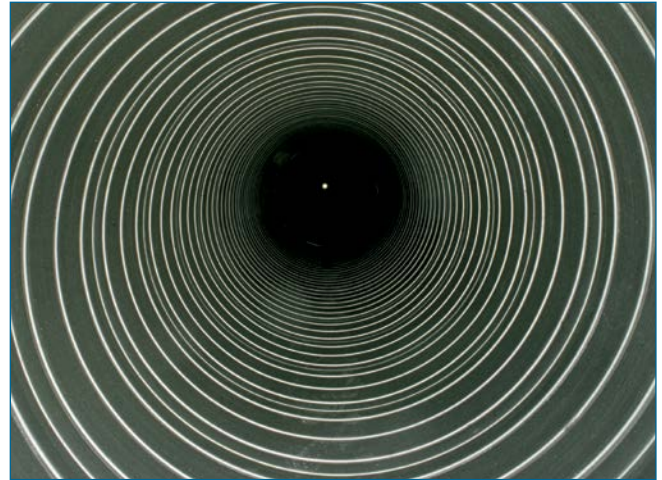
- Long history of proven performance
- Superior hydraulics (Manning's "n" of 0.012)
- Faster/lower-cost installation than concrete pipe
- Structural strength
- Available in a wide variety of materials to meet environmental and service life requirements.

Superior System Hydraulics

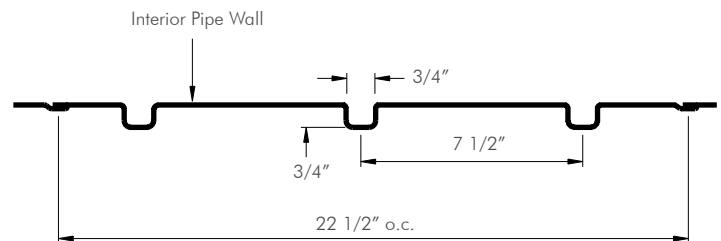
Research at Utah State University shows that ULTRA FLO® Storm Sewer Pipe, with a Manning's "n" of 0.012, is hydraulically equivalent to reinforced concrete pipe. The Water Research Laboratory performed hydraulic tests on ULTRA FLO® spiral-rib pipe with 3/4" x 3/4" x 7-1/2" continuous rib corrugation. At full flow, the Manning's "n" was 0.012 (Report No. 146, 1986 and No. 280, 1991). For further reference, see FHWA Hydraulic Design Series No. 5, December 1996.

ULTRA FLO® is one of the most hydraulically efficient storm sewer systems because of the smooth interior surface, longer lengths and efficient prefabricated junctions: elbows, manholes, and catch basins.

ULTRA FLO® allows engineers and owners to specify alternate products without having to perform more than one hydraulic design.



Smooth interior of ULTRA FLO® pipe improves hydraulic capacity while the exterior box ribs provide structural strength.



External Rib Profile

REFERENCE SPECIFICATIONS

Material	Galvanized Steel	AASHTO M218	ASTM A929
	Aluminized Steel Type 2 (ALT2)	AASHTO M274	ASTM A929
	Polymer Coated	AASHTO M246	ASTM A742
	Aluminum	AASHTO M197	ASTM B744
Pipe	Steel	AASHTO M36	ASTM A760
	Aluminum	AASHTO M196	ASTM B745
Design	Steel	AASHTO Section 12*	ASTM A796
	Aluminum	AASHTO Section 12*	ASTM B790
Installation	Steel	AASHTO Section 26*	ASTM A798
	Aluminum	AASHTO Section 26*	ASTM B788

* AASHTO Standard and LRFD Specifications for Highway Bridges

Cost Savings

Installed Cost Savings

Millions of feet of ULTRA FLO® have been installed in thousands of storm sewer projects nationwide, providing significant cost savings while meeting owners' structural, hydraulic, and service life requirements.



Reduced excavation because of the smaller outside diameter of ULTRA FLO®.

- Both steel and aluminum ULTRA FLO® weigh less than 10% of concrete pipe.
- Coupling bands do not require special skills or tools; Contech's QUICK STAB® joint is also available upon request.
- Twenty-foot standard lengths mean fewer joints and faster installation; longer lengths are available on special order.
- ULTRA FLO® has a smaller outside diameter than thick-walled concrete pipe. This permits a reduction in trench widths and depths, providing time and cost savings for both excavation and back-filling operations.
- Shop-fabricated fittings save installation time in the field while providing hydraulically efficient junctions.



ULTRA FLO® is available in long lengths, while its light weight allows it to be unloaded and handled with small equipment.

HANDLING WEIGHTS

TABLE 1

Handling Weight for **Galvanized, ALT2 or Polymer Coated*** ULTRA FLO®

DIAMETER (INCHES)	WEIGHT (POUNDS/LINEAL FOOT) SPECIFIED THICKNESS AND GAGE			
	(0.064)	(0.079)	(0.109)	(0.138)
	16	14	12	10
18	15	18		
21	17	21	29	
24	19	24	36	
30	24	30	42	
36	29	36	50	
42	33	42	58	
48	38	48	66	80
54	45	54	75	90
60	48	60	83	99
66		66	91	109
72		72	99	119
78		78	108	129
84			116	139
90			124	149
96			132	158
102			141	168
108				175
114				196
120				206

Table 2

Handling Weight for **ALUMINUM** ULTRA FLO®

DIAMETER (INCHES)	WEIGHT (POUNDS/LINEAL FOOT) SPECIFIED THICKNESS AND GAGE			
	(0.060)	(0.075)	(0.105)	(0.135)
	16	14	12	10
18	5	6		
21	6	8	11	
24	7	9	13	
30	9	11	15	
36	11	13	18	23
42	12	15	21	26
48		17	24	30
54		19	27	34
60			30	37
66			33	41
72			36	45
78				49
84				52

* Contact your local Contech representative for more specific information on Polymer Coated ULTRA FLO® for 12 gage.

Strength and Durability

Structural Strength

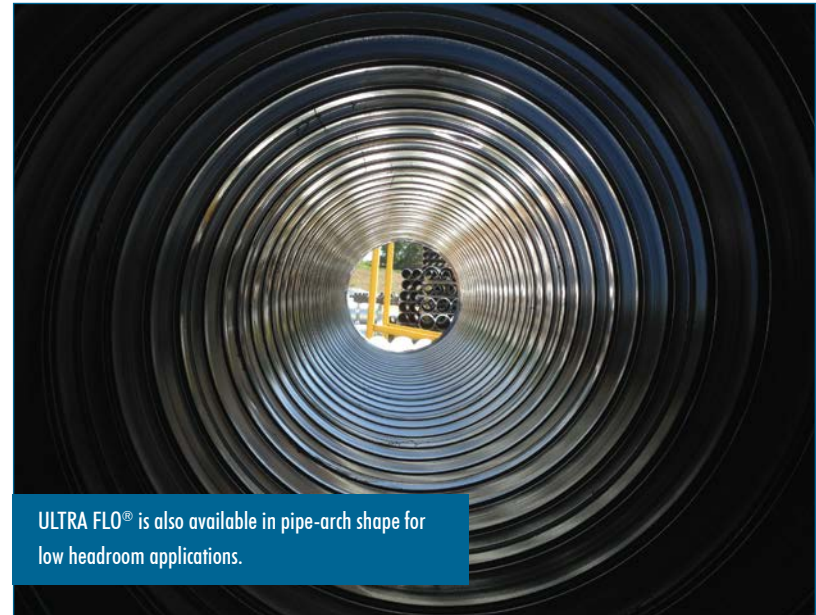
ULTRA FLO® has undergone structural tests and analysis to confirm effective section properties (see ASTM A 796 and B 790). The resulting section properties and ASTM design procedures were used to derive the allowable height of covers shown in Tables 4 through 9.

Durability

Corrugated metal pipe has been in use for over 100 years. Today, Contech offers a variety of coatings and material types to meet the required service life of your project, including:

- Galvanized Steel
- Aluminized Steel Type 2 (ALT2)
- Polymer Coated
- Aluminum
- Asphalt-Coated
- Asphalt-Coated with Paved Invert

A Contech representative can provide more information on ULTRA FLO® materials, coatings and pavements.



ULTRA FLO® is also available in pipe-arch shape for low headroom applications.

For multiple runs of ULTRA FLO®, ample spacing must be provided between the runs to allow proper side fill 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 shown below.

PIPE DIAMETERS	SPACING*
Up to 24"	12"
24" to 72"	1/2 diameter of pipe
Over 72"	36"

* Spacing maybe reduced if using controlled low strength material (flowable fill) for the backfill.

Proper backfill and placement help ULTRA FLO® achieve its designed structural capacity.

TABLE 3

Heavy Construction Loads Minimum Height of Cover Requirements for Construction Loads on ULTRA FLO® Pipe

DIAMETER/ SPAN/ (INCHES)	AXLE LOAD (KIPS)			
	>32≤50	50≤75	75≤110	110≤150
	Steel 3/4" x 3/4" x 7-1/2"			
15-42	2.0 ft.	2.5 ft.	3.0 ft.	3.0 ft.
48-72	3.0 ft.	3.0 ft.	3.5 ft.	4.0 ft.
78-108	3.0 ft.	3.5 ft.	4.0 ft.	4.5 ft.
	ALUMINUM 3/4" X 3/4" X 7-1/2"			
15-42	3.0 ft.	3.5 ft.	4.0 ft.	4.0 ft.

HEIGHTS OF COVER

TABLE 4

GALVANIZED, ALT2 OR POLYMER COATED**

ULTRA FLO® H 20 AND H 25 LIVE LOAD

DIAMETER (INCHES)	MINIMUM/MAXIMUM COVER (FEET) SPECIFIED THICKNESS AND GAGE			
	(0.064")	(0.079")	(0.109")	(0.138")
	16	14	12	10
18	1.0/108	1.0/151		
21	1.0/93	1.0/130	1.0/216	
24	1.0/81	1.0/113	1.0/189	
30	1.0/65	1.0/91	1.0/151	
36	1.0/54	1.0/75	1.0/126	
42	1.0/46	1.0/65	1.0/108	
48	1.0/40	1.0/56	1.0/94	1.0/137
54	1.25/36	1.25/50	1.0/84	1.0/122
60	1.25*/32*	1.25/45	1.0/75	1.0/109
66		1.5/41	1.25/68	1.25/99
72		1.5*/37*	1.25/63	1.25/91
78		1.75*/34*	1.5/58	1.5/84
84			1.75/54	1.75/78
90			2.0*/50*	2.0/73
96			2.0*/47*	2.0/68
102			2.5*/43*	2.5/61
108				2.5*/54*
114				2.5*/49*
120				2.5*/43*

TABLE 5

GALVANIZED, ALT2 OR POLYMER COATED**

Steel ULTRA FLO® E 80 Live Load

DIAMETER (INCHES)	MINIMUM/MAXIMUM COVER (FEET) SPECIFIED THICKNESS AND GAGE			
	(0.064")	(0.079")	(0.109")	(0.138")
	16	14	12	10
18	1.0 / 93	1.0 / 130		
21	1.0 / 79	1.0 / 111	1.0 / 186	
24	1.0 / 69	1.0 / 97	1.0 / 162	
30	1.0 / 55	1.0 / 78	1.0 / 130	
36	1.5 / 46	1.25 / 65	1.0 / 108	
42	1.5 / 39	1.5 / 55	1.25 / 93	
48	2.0 / 34	1.75 / 48	1.5 / 81	1.5 / 118
54	3.0* / 28*	2.0 / 43	1.5 / 72	1.5 / 104
60		2.0 / 39	1.75 / 65	1.75 / 94
66		2.5* / 35*	2.0 / 58	2.0 / 85
72			2.0 / 49	2.0 / 78
78			2.5 / 42	2.5 / 72
84			2.75* / 35*	2.5 / 67
90				2.5 / 62
96				2.5* / 58*
102				3.0* / 52*

TABLE 6

Aluminum ULTRA FLO® HL 93 Live Load

DIAMETER (INCHES)	MINIMUM/MAXIMUM COVER (FEET) SPECIFIED THICKNESS AND GAGE			
	(0.060")	(0.075")	(0.105")	(0.135")
	16	14	12	10
18	1.0/43	1.0/61		
21	1.0/38	1.0/52	1.0/84	
24	1.0/33	1.0/45	1.0/73	
30	1.0/26	1.25/36	1.25/58	
36	1.5*/21*	1.50/30	1.5/49	1.5/69
42		1.75*/25*	1.75/41	1.75/59
48			2.0/36	2.0/51
54			2.0/32	2.0/46
60			2.0*/29*	2.0/41
66				2.0/37
72				2.5*/34*

TABLE 7

Galvanized, ALT2 or Polymer Coated**

Pipe-Arch ULTRA FLO® H 20 and H 25 Live Load

EQUIV. PIPE DIA. (INCHES)	SPAN (INCHES)	RISE (INCHES)	MINIMUM/MAXIMUM COVER (FEET) SPECIFIED THICKNESS AND GAGE		
			(0.064")	(0.079")	(0.109")
			16	14	12
18	20	16	1.0/16		
21	23	19	1.0/15		
24	27	21	1.0/13		
30	33	26	1.0/13	1.0/13	
36	40	31	1.0/13	1.0/13	
42	46	36	M.L. ⁸	M.L. ⁸	1.0/13
48	53	41	M.L. ⁸	M.L. ⁸	1.25/13
54	60	46	M.L. ⁸	M.L. ⁸	1.25/13
60	66	51	M.L. ⁸	M.L. ⁸	1.25/13

TABLE 8

Galvanized, ALT2 or Polymer Coated**

Pipe-Arch ULTRA FLO® E 80 Live Load

SPAN X RISE (INCHES)	ROUND EQUIVALENT	MINIMUM COVER (FEET)	MINIMUM GAGE	MAX COVER (FEET)
20 x 16	18	2	16	22
23 x 19	21	2	16	21
27 x 21	24	2	16	18
33 x 26	30	2	16	18
40 x 31	36	2	16	17
46 x 36	42	2	12	18
53 x 41	48	2	12	18
60 x 46	54	2	12	18
66 x 51	60	2	12	18

TABLE 9

Aluminum ULTRA FLO® Pipe-Arch HL 93 Live Load

EQUIV. PIPE DIA. (INCHES)	SPAN (INCHES)	RISE (INCHES)	MINIMUM/MAXIMUM COVER (FEET) SPECIFIED THICKNESS AND GAGE			
			(0.060")	(0.075")	(0.105")	(0.135")
			16	14	12	10
18	20	16	1.0/16			
21	23	19	1.0/15			
24	27	21	1.25/13	1.25/13		
30	33	26	1.5/13	1.5/13	1.5/13	
36	40	31		1.75/13	1.75/13	
42	46	36			2.0/13	2.0/13
48	53	41			2.0/13	2.0/13
54	60	46			2.0*/13*	2.0/13
60	66	51				2.0/13

NOTES

- The tables for Steel H 20 and H 25 loading are based on the NCSPA CSP Design Manual, 2008 and were calculated using a load factor of K=0.86. The tables for Steel E 80 loading are based on the AREMA Manual. The tables for Aluminum HL 93 loading are based on AASHTO LRFD Design Criteria.
- The haunch areas of a pipe-arch are the most critical zone for backfilling. Extra care should be taken to provide good material and compaction to a point above the spring line.
- E 80 minimum cover is measured from top of pipe to bottom of tie.
- H 20, H 25 and HL 93 minimum cover is measured from top of pipe to bottom of flexible pavement or top of rigid pavement, 1999. These tables may reduce the minimum gage due to a higher flexibility factor allowed for a trench condition.
- The H 20, H 25 and HL 93 pipe-arch tables are based on 2 tons per square foot corner bearing pressures.
- The E 80 pipe-arch tables minimum and maximum covers are based on 3 tons per square foot corner bearing pressures shown.
- Larger size pipe-arches may be available on special order.
- M.L. (Heavier gage is required to prevent crimping at the haunches.)
- For construction loads, see Page 4.
- Sewer gage (trench conditions) tables for corrugated steel pipe can be found in the AISI book "Modern Sewer Design," 4th Edition, 1999. These tables may reduce the minimum gage due to a higher flexibility factor allowed for a trench condition.
- All heights of cover are based on trench conditions. If embankment conditions exist, there may be restriction on gages for the large diameters. Your Contech Sales Representative can provide further guidance for a project in embankment conditions.
- All steel ULTRA FLO® is installed in accordance with ASTM A798 "Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications."

* These sizes and gage combinations are installed in accordance with ASTM A796 paragraphs 18.2.3 and ASTM A798. For aluminum ULTRA FLO® refer to ASTM B790 and B788.

** Contact your local Contech representative for more specific information on Polymer Coated ULTRA FLO® for 12 gage.

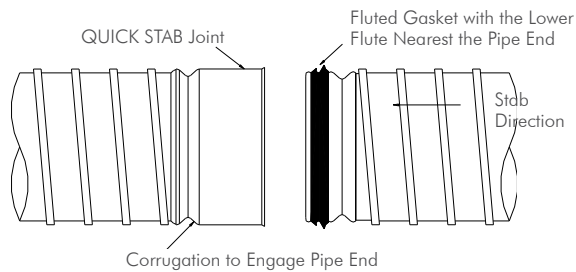
Accessories

Bell & Spigot Joint

Contech's innovative QUICK STAB® Bell & Spigot joint is 50% faster than standard bands in joining sections of pipe. There are no bands and no bolts to handle. ULTRA FLO® pipe arrives at the job site with the QUICK STAB® bell already on one end. Simply position the gasket on the spigot end and insert pipe section into the adjoining QUICK STAB® bell. QUICK STAB® is readily available in 18" through 60" diameters.



Bell & Spigot Coupling System



Bands

Contech's HUGGER® Band offers simple installation and excellent pull-apart resistance for special design projects. The HUGGER® Band is available with one of two types of fasteners: either angles with bolts or a bar bolt, and strap connector. With the addition of gaskets, most infiltration and exfiltration requirements can be met.



Fittings

Factory-made fittings offer a complete, fully compatible ULTRA FLO® Pipe System that minimizes installation time and hydraulic junction losses.

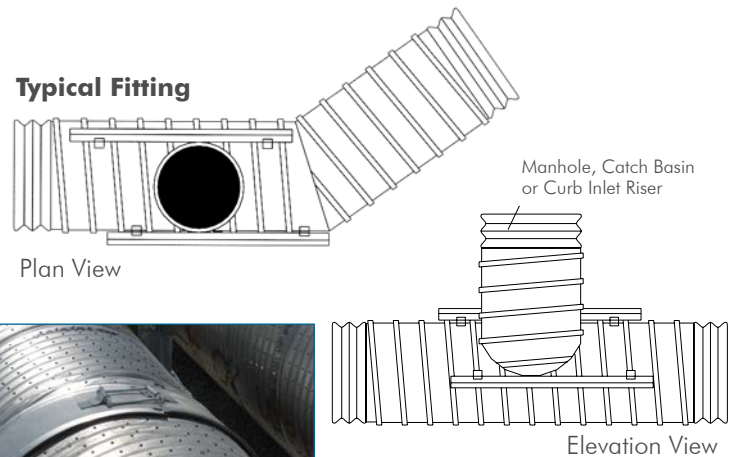
Manhole risers, catch basin risers, elbows, reducers and similar-type fittings are fabricated and shipped to the job site for quick and easy installation.

Review with your Contech representative the various fittings for your storm sewer project.



ULTRA FLO® fittings improve installation time in the field. This fitting incorporates an elbow, a riser and lateral stub. The fitting is reinforced according to NCSA guidelines.

Typical Fitting



CONTECH ULTRA FLO® VS. REINFORCED CONCRETE PIPE

	36"		42"		48"		60"		72"		84"		96"	
	RCP	ULTRA FLO	RCP	ULTRA FLO	RCP	ULTRA FLO	RCP	ULTRA FLO	RCP	ULTRA FLO	RCP	ULTRA FLO	RCP	ULTRA FLO
	Class III	16 Ga.	Class III	16 Ga.	Class III	16 Ga.	Class III	14 Ga.	Class III	12 Ga.	Class III	12 Ga.	Class III	12 Ga.
Pipe Length, Ft.	8	24	8	24	8	24	6	24	6	24	6	24	6	24
Approx. Wt. Lb./Ft.	559	29	786	33	972	38	1,349	61	2,158	99	2,807	116	3,562	158
O.D., In.	44	38	51	44	58	50	72	62	86	74	100	86	114	98
Max. Allowable Fill, Ft.	16	54	16	46	16	40	16	45	15	63	15	54	15	68
Truck Loads per 1000 Ft. of Pipe	11	5	14	6	18	6	27	11	38	21	50	21	65	21
# Pieces per 1000 Ft. of Pipe	125	42	125	42	125	42	167	42	167	42	167	42	167	42
Trench Width, In.	67.0	60	76	67	85	75	102	90	120	105	132	120	155	135

Trench Installation

Overview

Millions of feet of ULTRA FLO® have been installed in a variety of storm sewer projects across the United States. Like all pipe products, proper installation is important for long-term performance. The installation of ULTRA FLO® is similar to standard corrugated steel pipe in a trench condition. Your Contech representative will be glad to assist should you have any questions.

Relining and Rehabilitation

Restoration of failed or deteriorating pipe can be accomplished by relining with ULTRA FLO®. Its low-wall profile may yield an inside diameter that approaches the original pipe, while the hydraulic capacity is improved.

Lightweight ULTRA FLO® makes the lining process easier and can be provided in various lengths to meet individual site conditions.



ULTRA FLO® is often used to reline old and deteriorating culverts.

Specification for ULTRA FLO®

Scope

This specification covers the manufacture and installation of the ULTRA FLO® Pipe detailed in the project plans.

Material

The pipe material shall be:

1. Aluminized Steel Type 2 (ALT2)
2. Galvanized
3. Aluminum
4. Polymer Coated

Pipe

ULTRA FLO® shall be manufactured with the 3/4" x 3/4" x 7-1/2" external ribs in accordance with the applicable requirements of ASTM A 760 (steel) or B 745 (aluminum). The pipe sizes and gages shall be as shown on the project plans.

Handling and Assembly

Shall be in accordance with the recommendations of the National Corrugated Steel Pipe Association.

Installation

Shall be in accordance with ASTM A 798 and A 796 (steel) and B 788 and B 790 (aluminum) and in conformance with the project plans and specifications. If there are any inconsistencies or conflicts, the contractor must bring them to the attention of the project engineer. It is always the contractor's responsibility to follow OSHA guidelines for safe practices

Construction Loads

Construction loads may be higher than final loads. Follow the guidelines of the manufacturer or the National Corrugated Steel Pipe Association.

Contech Solutions

Innovative Civil Engineering Solutions is the hallmark of Contech's nationwide team of sales engineers. Combined with our wide variety of site development products we can solve many civil engineering problems. Innovative applications for water detention systems, storm drainage, sewage lines, bridges, tunnels, retaining walls, erosion control and wastewater treatment begin at Contech.



Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.



STORMWATER
SOLUTIONS



PIPE
SOLUTIONS



STRUCTURE
SOLUTIONS



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