CONTECH®

ULTRA FLO Storm Sewer Pipe

Customer Proven Innovation

Superior System Hydraulics

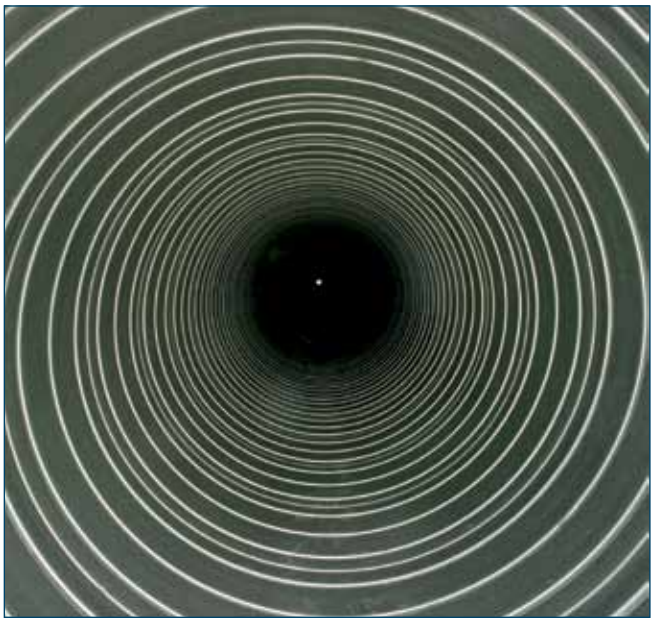
CONTECH® ULTRA FLO® has a long history of proven performance on municipal, transportation, airport, shopping center and residential development storm sewer projects. ULTRA FLO's rapid acceptance is based on its Manning's "n" of 0.012, structural strength and faster/lower-cost installation than concrete pipe. Plus, ULTRA FLO is available in a wide variety of materials to meet environmental and service
life requirements.

Superior Hydraulics

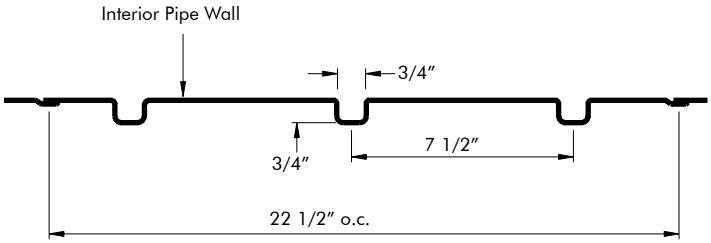
Research at Utah State University shows that ULTRA FLO Storm Sewer Pipe, with a Manning's "n" of 0.012, is hydraulically equivalent to reinforced concrete pipe. The Water Research Laboratory performed hydraulic tests on ULTRA FLO spiral-rib pipe with 3/4" x 3/4" x 7-1/2" continuous rib corrugation. At 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	AASHTO M274	ASTM A929
	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 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.

- Steel and Aluminum ULTRA FLO weighs 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.

Reduced excavation because of ULTRA FLO's smaller outside diameter.

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

Handling Weights

Table 1
Handling Weight for **ALUMINIZED STEEL Type 2** or **Galvanized Steel** ULTRA FLO

Diameter (Inches)	Weight (Pounds/Lineal Foot) Specified Thickness and Gage		
	(0.064″)	(0.079″)	(0.109″)
	16	14	12
18	15		
21	18		
24	20		
30	25		
36	30	37	
42	35	43	59
48	40	49	67
54	45	55	75
60	50	61	83
66		67	92
72		73	100
78		80	108
84			116
90			125
96			133
102			140

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			
21	6			
24	7	9		
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

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 3, 4, 5 and 6.

Durability

Corrugated metal pipe has been in use for over 100 years. Today, various metals, metallic and nonmetallic coatings, and pavements are available to provide the required service life to meet your project design life.

ULTRA FLO can be supplied in galvanized steel or where added durability is needed, ALUMINIZED STEEL™ Type 2 or aluminum. ULTRA FLO can also be asphalt-coated or asphalt-coated with a paved invert. Depending on the site conditions, one of these materials will meet your project's design life.

A CONTECH representative can provide more information on ULTRA FLO's 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 its placement help ULTRA FLO achieve its designed structural capacity.

Table 3

ALUMINIZED STEEL Type 2 or **Galvanized Steel** ULTRA FLO HS 20 Live Load

Diameter (Inches)	Minimum/Maximum Cover (Feet) Specified Thickness and Gage		
	(0.064″) 16	(0.079″) 14	(0.109″) 12
18	1.0/68		
21	1.0/58		
24	1.0/51		
30	1.0/41		
36	1.0/34	1.0/48	
42	1.0/29	1.0/41	1.0/69
48	1.0/25	1.0/36	1.0/60
54	1.25/22	1.25/32	1.0/53
60	1.25/20*	1.25/28	1.0/48
66		1.5/26	1.25/44
72		1.5/24*	1.25/40
78		1.75/22*	1.5/37
84			1.75/34
90			2.0/32*
96			2.0/30*
102			2.5/28*

For larger diameters inquire with Headquarters marketing.

Table 4

Aluminum ULTRA FLO HS 20 Live Load

Diameter (Inches)	Minimum/Maximum Cover (Feet) Specified Thickness and Gage			
	(0.060″) 16	(0.075″) 14	(0.105″) 12	(0.135″) 10
18	1.0/41	1.0/57		
21	1.0/35	1.0/49	1.0/79	
24	1.0/30	1.0/42	1.0/69	
30	1.25/24	1.0/33	1.0/55	
36	1.5/19*	1.25/27	1.0/45	1.0/65
42		1.5/23*	1.25/39	1.0/55
48			1.5/34	1.25/48
54			1.75/30	1.25/43
60			2.0/46	1.5/38
66				1.75/35
72				2.0/31*

Table 5

Steel ULTRA FLO Pipe-Arch HS 20 Live Load

Equiv. Pipe Dia. (In.)	Span (In.)	Rise (In.)	Minimum/Maximum Cover (Feet) Specified Thickness and Gage		
			(0.064″) 16	(0.075″) 14	(0.109″) 12
18	20	16	1.0/15		
21	23	19	1.0/15		
24	27	21	1.0/15		
30	33	26	1.0/15	1.0/15	
36	40	31	1.0/15	1.0/15	
42	46	36			1.0/15
48	53	41			1.0/15
54	60	46			1.0/15
60	66	51			1.25/15

Table 6

Aluminum ULTRA FLO Pipe-Arch HS 20 Live Load

Equiv. Pipe Dia (In.)	Span (In.)	Rise (In.)	Minimum/Maximum Cover (Feet) Specified Thickness and Gage			
			(0.060″) 16	(0.075″) 14	(0.105″) 12	(0.135″) 10
18	20	16	1.0/17			
21	23	19	1.0/14			
24	27	21	1.25/12			
30	33	26	1.50/11*			
36	40	31		1.75/10*		
42	46	36			1.50/9	
48	53	41			1.75/8	
54	60	46			2.0/8*	
60	66	51				1.75/9

NOTES (Tables 3, 4, 5, and 6)

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. All heights of cover are based on trench conditions. If embankment conditions exist, there may be restrictions on gages for the large diameters. Your CONTECH Sales Engineer can provide further guidance for a project in embankment conditions.
3. Tables 3, 4, 5 and 6 are for HS-20 loading only. For heavy construction loads, higher minimum compacted cover may be needed. See Table 7.
4. All steel ULTRA FLO is installed in accordance with ASTM A798 "Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications."
5. Heights of cover are for 3/4" x 3/4" x 7-1/2" external rib corrugation.

*These sizes and gage combinations are installed in accordance with ASTM A796 paragraphs 17.2.3 and ASTM A798. For aluminum ULTRA FLO refer to ASTM B790 and B788. Also see page 7 of this catalog.

Table 7

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	2.5 ft.	3.0 ft.	3.5 ft.	3.5 ft.

NOTES (Tables 5 and 6 only)

6. The foundation in the corners should allow for 4,000 psf corner bearing pressure.
7. Maximum cover shown for all pipe arch is 15 feet.
8. Larger size pipe-arches may be available on special order.

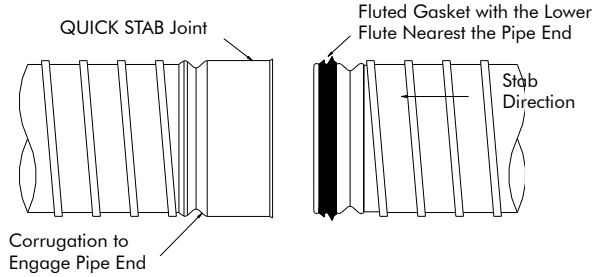
Accessories

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 15" through 60" diameters.

Bell & Spigot

Bell & Spigot Coupling System



Fittings

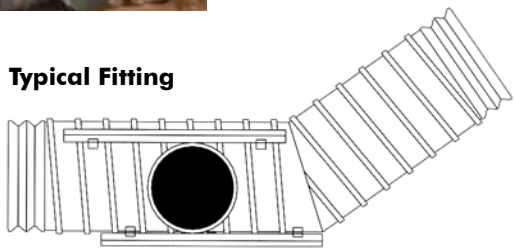
Factory-made fittings offer a complete, fully compatible ULTRA FLO Pipe System that minimizes installation time and hydraulic junction losses.

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 NCSPA guidelines.

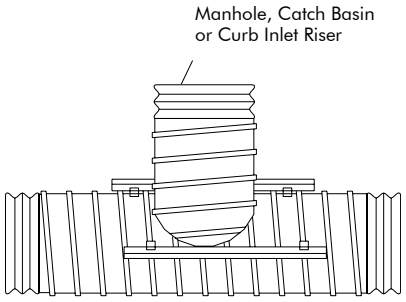
Typical Fitting



Plan View

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.



Elevation View

CONTECH ULTRA FLO vs. Reinforced Concrete Pipe

	24″		30″		36″		42″		48″		60″		72″		84″		96″	
	RCP Class III	ULTRA FLO 16 Ga.	RCP Class III	ULTRA FLO 16 Ga.	RCP Class III	ULTRA FLO 16 Ga.	RCP Class III	ULTRA FLO 16 Ga.	RCP Class III	ULTRA FLO 16 Ga.	RCP Class III	ULTRA FLO 14 Ga.	RCP Class III	ULTRA FLO 12 Ga.	RCP Class III	ULTRA FLO 12 Ga.	RCP Class III	ULTRA FLO 12 Ga.
Pipe length, Ft.	8	20	8	20	8	20	8	20	8	20	6	20	6	20	6	20	6	20
Approx. wt. Lb./Ft.	264	20	384	25	524	30	698	35	867	40	1,295	61	1,811	100	2,409	116	3,090	133
Approx. wt. per piece, Lb.	2,112	398	3,072	498	4,192	596	5,584	696	6,936	796	7,770	1,224	10,866	1,992	14,454	2,322	18,540	2,652
Outside Dia., In.	30	26	37	32	44	38	51	44	58	50	72	62	86	74	100	86	114	98
Max. allowable fill, Ft.	15	51	15	41	16	34	16	29	16	25	16	28	16	40	17	34	17	30
Truck loads per 1000 Ft. of pipe	6	2	8	3	11	5	14	7	18	7	27	13	38	25	50	25	65	25
Joints per 1000 Ft. of pipe	124	49	124	49	124	49	124	49	124	49	166	49	166	49	166	49	166	49

Trench Installation

Overview

Millions of feet of ULTRA FLO have been installed in a variety of storm sewer projects across the U. S. 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.

ULTRA FLO's light weight 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 Storm Sewer Pipe

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
2. Galvanized
3. Aluminum
4. Polymeric

Pipe

The 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 and erosion control begin at CONTECH.

CONTECH Construction Products Inc. provides site solutions for the civil engineering industry. CONTECH's portfolio includes bridges, drainage, retaining walls, sanitary sewer, stormwater, erosion control and soil stabilization products.

For more information, call one of CONTECH's Regional Offices located in the following cities:

Ohio (Corporate Office)	**513-645-7000**
California (Long Beach)	562-733-0733
Colorado (Denver)	720-587-2700
Florida (Tampa)	727-544-8811
Georgia (Atlanta)	770-409-0814
Maine (Scarborough)	207-885-9830
Maryland (Baltimore)	410-740-8490
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