

Spiral Rib CSP provides an effective and economical storm sewer solution that has a history of strength and durability.

- Predictable Service Life of 100+ Years
- Custom Lengths and Premium Coatings Available
- Cost-Effective
- Manning's "n" = 0.012



## Load Capacity of Spiral Rib CSP VS. Corrugated HDPE Pipe

Minimum and maximum allowable heights of cover reflect the load capacity of the pipe. The allowable covers for Spiral Rib CSP offer a much wider range of loading conditions.

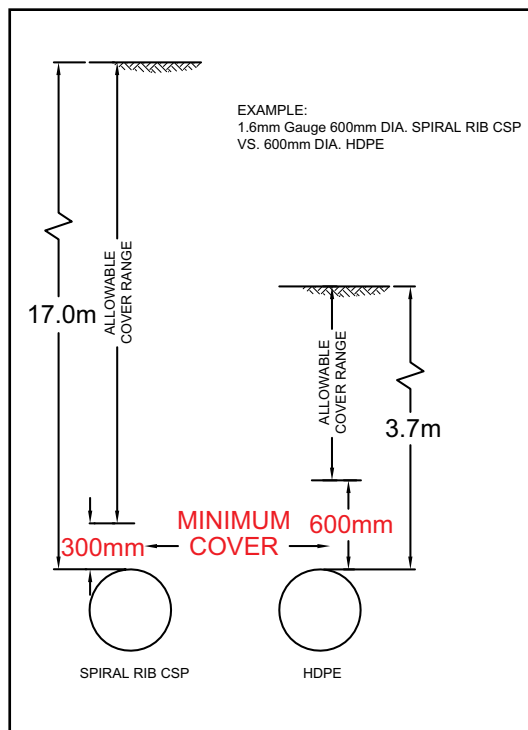
### MINIMUM COVER

Due to thermal expansion in thermoplastic pipe, a new AASHTO provision requires a minimum of 600mm of soil cover over HDPE pipe, or pipe span/2 for diameters above 1200mm. For Spiral Rib CSP, the minimum cover is 300mm of soil through 1200mm diameter, or pipe span/4. The minimum cover for Spiral Rib CSP is roughly half that of HDPE in all diameters.

### MAXIMUM COVER

The load capacity advantage of Spiral Rib CSP is further displayed in the maximum cover tables, which represent the highest allowable load for a pipe. The maximum height of cover for Spiral Rib CSP pipe is much higher than that of HDPE (see table below). When calculating maximum cover for Spiral Rib CSP, the values shown in the table are for all acceptable backfill materials. The maximum cover for HDPE is dependent on soil type and compaction condition. Therefore, the allowable cover for HDPE is dependent on ensuring that the more stringent backfill material requirements are met.

### Product Comparison

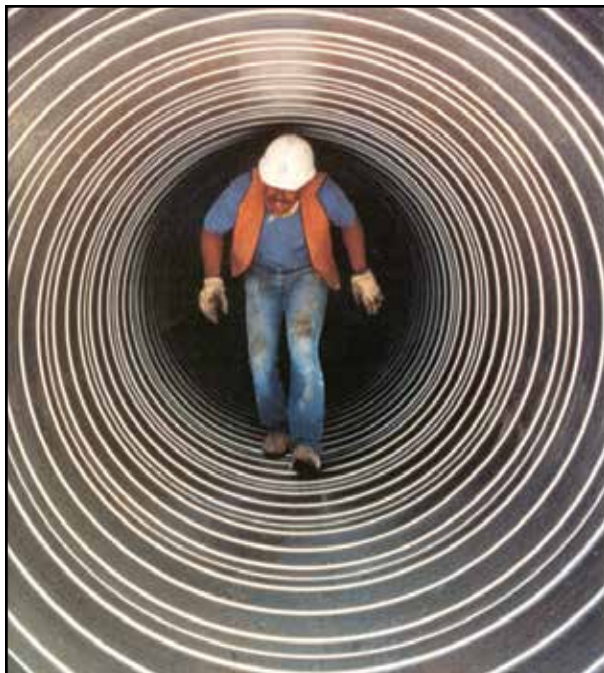


## Product Comparison

Spiral Rib CSP vs. Corrugated HDPE Pipe							
Diameter (mm)	Minimum Cover (mm)		Maximum Cover (m)				
	Spiral Rib CSP	HDPE Pipe	Spiral Rib CSP			HDPE Pipe	
			Class 1, 2, or 3 soil - 90% compaction			Class 2 Soil 90% Compaction	Class 3 Soil 90% Compaction
			1.6mm	2.0mm	2.8mm		
300*	300	600	38.1	47.8		6.1	4.9
375*	300	600	30.5	38.1		6.4	4.9
450	300	600	22.7	33.6		5.8	4.3
525	300	600	19.4	28.8	50.6	5.5	4.0
600	300	600	17.0	25.2	44.3	5.2	3.7
750	300	600	13.6	20.2	35.4	4.3	3.0
900	300	600	11.3	16.8	29.5	4.6	3.4
1050	300	600	9.7	14.4	25.3	4.6	3.4
1200	300	600	8.5	12.6	22.1	4.0	2.7
1350	350	675	7.5	11.2	19.7	4.3	3.0
1500	400	750	6.8	10.1	17.7	4.3	3.0
1650	450	not available		9.1	16.1	not available	not available
1800	450			8.4	14.7		
2100	550				12.6		
2400	600				11.0		

Notes:

1. HDPE pipe manufacturers have differing pipe wall profiles. Therefore, their outside pipe diameters and maximum cover heights can vary. The values shown are intended to be typical of AASHTO M294 HDPE pipe.
  2. For HDPE and CSP, minimum cover is per the AASHTO LRFD Bridge Design Specification, 2012, Section 12.6.6.3.
- \* Spiral Rib CSP has a manning's n value of 0.012. Since its minimum diameter is 450mm, the values shown in the table for 300mm and 375mm diameter CSP are for 68 x 13mm corrugation, where n = 0.011 for 300mm and n = 0.012 for 375mm.

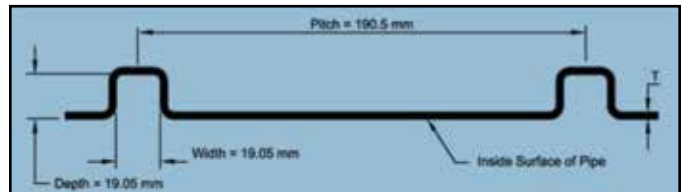


## Submittal for Spiral Rib Pipe as an Alternate Storm Sewer Material

Please consider this a formal request for your review and approval of Aluminized Type 2 (ALT2) and Polymer Laminated Spiral Rib Pipe for storm sewer application and inclusion into this project. CSPI proposes to furnish this pipe as an alternate to the project specified material.

### Aluminized Type 2 & Polymer Laminated Spiral Rib Pipe

1. Significant material cost savings
2. Fast lead times
3. Installation advantages offered by lightweight pipe in long lengths



- a. 2.0mm, 1200mm diameter spiral rib pipe is 71.5kg/m, coupled with 6m lengths means maximum production value (custom lengths also available)
- b. Utilize lightweight equipment
- c. All junctions, fittings, manholes, grate inlets, etc. can be handled "in-line" as a fabricated fitting

### Aluminized Type 2 & Polymer Laminated Spiral Rib Pipe for Storm Sewer

#### 1.0 General

This specification covers the furnishing, installation, and design considerations for Aluminized Type 2 & Polymer Laminated, Spiral Rib Pipe and Pipe-Arch for culverts and storm sewers for the types, sizes, and designations as shown on the plans.

#### 2.0 Material

The pipe shall be fabricated from an ALUMINIZED Type 2 coil, conforming to the requirements of AASHTO M274 or ASTM A929 or from Polymer Laminated coil to the requirements of ASTM A742.

#### 3.0 Pipe

The pipe and pipe-arch shall be manufactured to conform to CSA G401. The pipe shall have a helical corrugation pattern, and shall have the sectional properties per Table 6 in CSA G401.

#### 4.0 Coupling Bands

Coupling bands for the pipe and pipe-arch shall be made of the same base metal and coatings as the pipe and pipe-arch. Hugger bands and fully corrugated bands for round or pipe-arch shall be a minimum of 1.3mm gauge, 300mm wide bands with annular corrugations that are spaced to properly index with re-rolled corrugations of the pipe.

#### 5.0 Installation

The pipe shall be installed in accordance with AASHTO Section 26, Division II or ASTM A798.

#### 6.0 Hydraulics

Values of Coefficient of Roughness (Manning's "n") will not exceed 0.012 or that recognized by other materials.

#### 7.0 Structural

Material thickness will be determined based on AASHTO Section 12 and specific loading conditions. For highway loading, minimum Height of Covers are 300mm for up to and including 1200mm diameter, 600mm for 2400mm diameter pipes, respectively. Further consideration can be made for pipes exceeding 2400mm diameter.

#### 8.0 Durability

Aluminized Type 2 and Polymer Laminated pipe provides a minimum service life of 75 years in the appropriate environment. ( $3.0 \leq \text{pH} \leq 12.0$ ,  $r > 750 \text{ ohm-cm}$ ) Considering the application for use is pavement surface runoff with select backfill, it is anticipated that a minimum service life of 75 years will be achieved. See CSPI Technical Bulletin #1.