



3x1 and 5x1 corrugations for manufacturing of Corrugated Steel Pipe are considered to have **equal "stiffness"** in the industry. 3x1 tooling was first developed and later 5x1 (metric dimensions) tooling was made available in the industry.

Both corrugations are approved by AASHTO. AASHTO and AISI design methodology have the same minimum fill height tables for 3x1 and 5x1 corrugation.

Flexibility Factor (pipe stiffness measurement) is normally the determining factor in steel gage selection of Corrugated Steel Pipe. Moment of inertia of wall, in⁴/ft, as well as the pipe diameter and modulus of elasticity determine the flexibility factor of a given pipe.

For both 3x1 and 5x1 corrugations, the modulus of elasticity and diameter would be the same. The only different measurement would be moment of inertia. 5x1 actually has a higher moment of inertia than 3x1. Although 5x1 is higher, it is so similar that the industry publishes one height of cover table for both 3x1 and 5x1 and considers them to be practically the same.

Formula for flexibility factor is;

$$FF = D^2 / E I$$

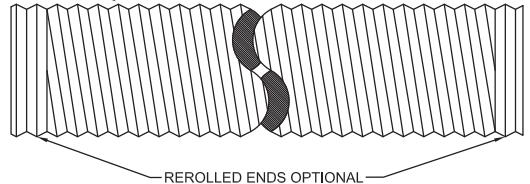
E = Modulus of elasticity = 30 X 10⁶ psi

D = Diameter of Span in inches

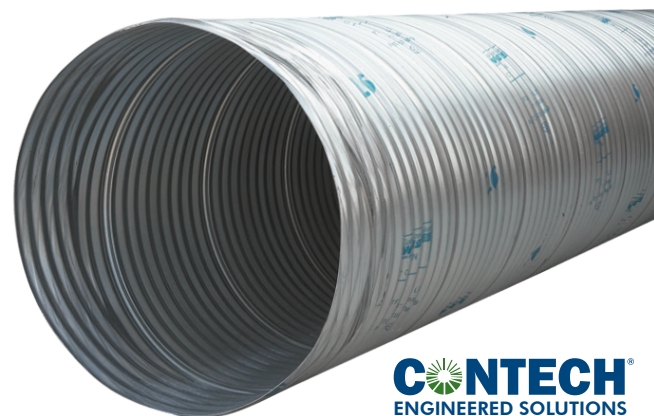
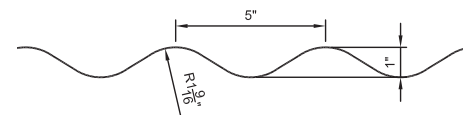
I = Moment of inertia of wall, in⁴/ft

Moment of Inertia (I) of CSP for Underground Conduits					
Corrugation Profile (inches)	Specified Thickness (inches)				
	0.064	0.079	0.109	0.138	0.168
	Moment of Inertia (I) in ⁴ /ft				
3 x 1	.1039	.1306	.1855	.2421	.3010
5 x 1	.1062	.1331	.1878	.2438	.3011

HEL-COR CORRUGATED STEEL PIPE. PROFILE, COATING & GAGE AS SPECIFIED



5 x 1 or 3 x 1 Height of Cover Limit for H20 & H25 Live Loads						
Diameter (inches)	Minimum Cover (inches)	Maximum Cover, Feet*				
		0.064	0.079	0.109	0.138	0.168
54	12	56	70	98	127	155
60	12	50	63	88	114	139
66	12	46	57	80	103	127
72	12	42	52	74	95	116
78	12	39	48	68	87	107
84	12	36	45	63	81	99
90	12	33	42	59	76	93
96	12	31	39	55	71	87
102	18	29	37	52	67	82
108	18		35	49	63	77
114	18		32	45	58	72
120	18		30	42	54	66
126	18			39	50	61
132	18			36	46	58
138	18			33	43	53
144	18				39	49



* Maximum covers shown are for 5 x 1. Increase by 12% for 3 x 1.