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STEEL: PROVEN 100-YEARS STRONG

100 Years of Innovation

**REAL
DEAL**

STEEL
PROVEN 100-YEARS STRONG.



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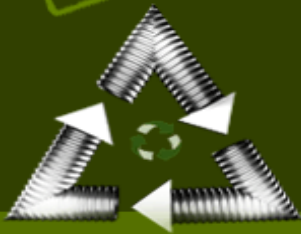


STEEL: PROVEN 100-YEARS STRONG

Presentation Overview

STEEL GREY
IS THE
NEW GREEN.

**REAL
DEAL**



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STEEL: PROVEN
100-YEARS STRONG

Introduction to Corrugated Steel Pipe

- Fabrication
- Installation
- Design
- Durability
- Applications
- Case Studies

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INTRODUCTION TO CORRUGATED STEEL PIPE





BENEFITS OF CSP?

- Long Lengths
- Light Weight
- Durable
- Gasketed Joints
- Manning's "n" = 0.012 – 0.027
- Proven Design Methodology
- Minimum Covers to 12"
- High Fill Heights
- Cost Effective

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MANUFACTURING PROCESS BEGINS WITH COIL



Coil is produced by highly regulated steel manufacturers.

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STEEL. PROVEN 100-YEARS STRONG

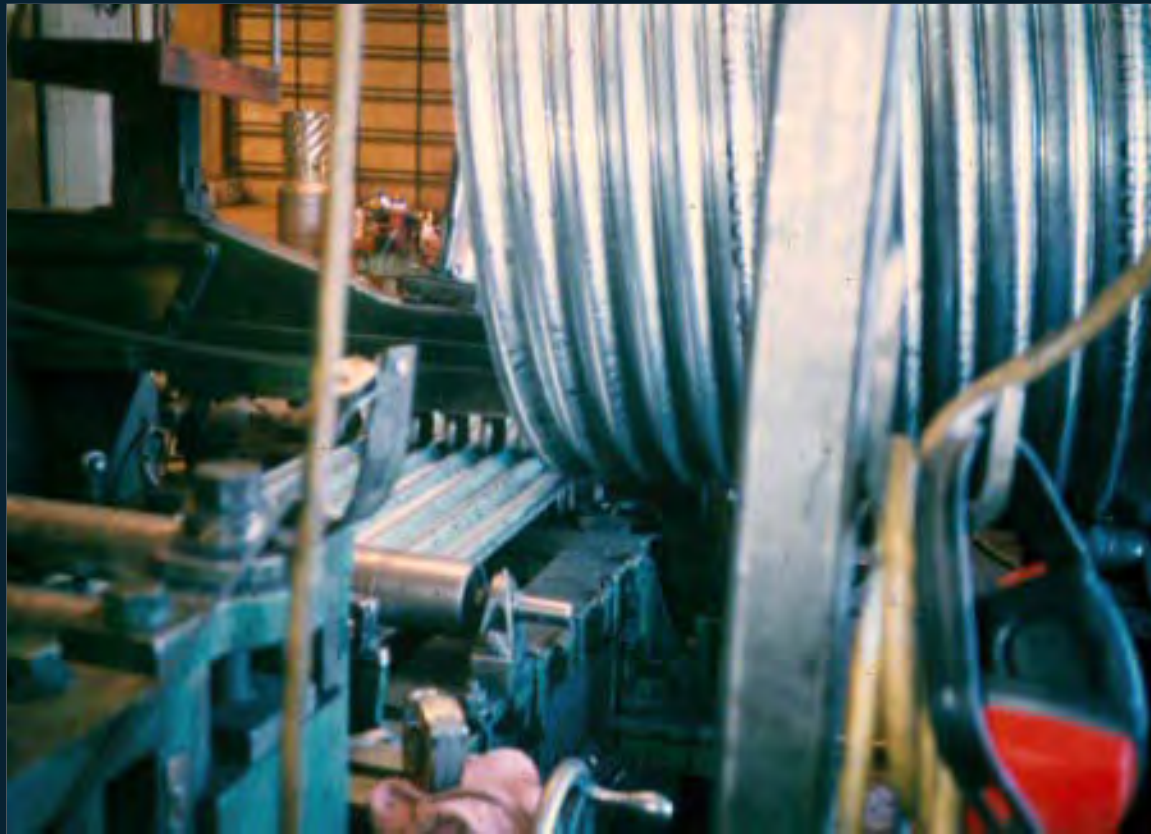
Corrugated Steel Pipe Mill



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Re-Corrugated Ends: Positive Connections

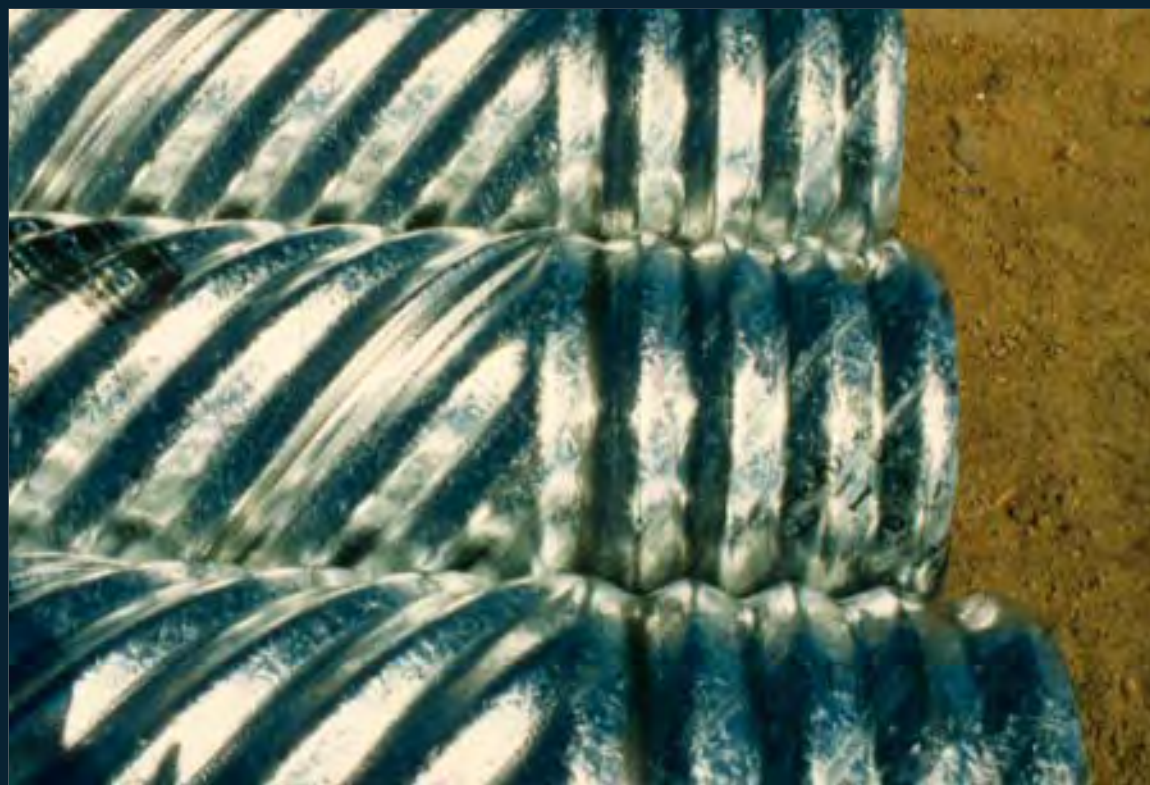


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RE-ROLLED ENDS





Internal Arch Machine

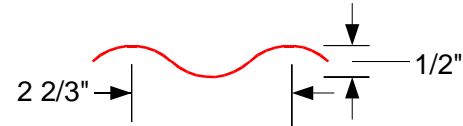


External Arch Machine

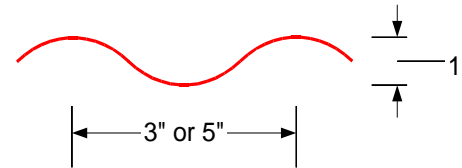


Corrugations

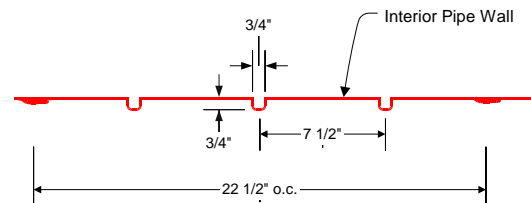
12" – 48"

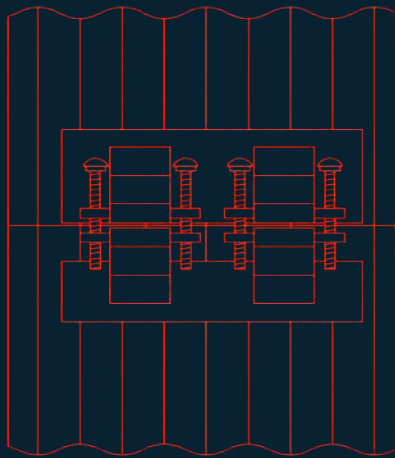


54" – 144"



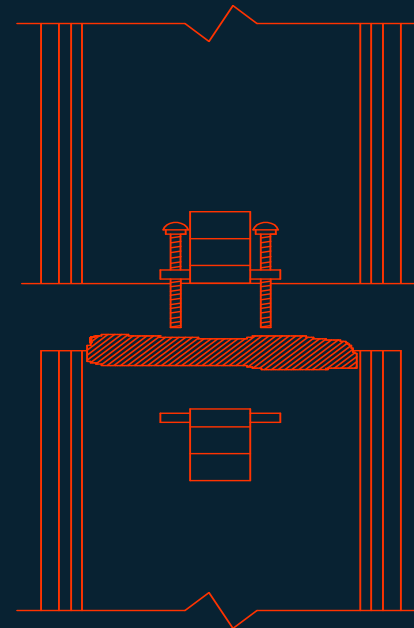
SPIRAL RIB
18" – 108"





Annular Corrugated Band

CORRUGATED 5C

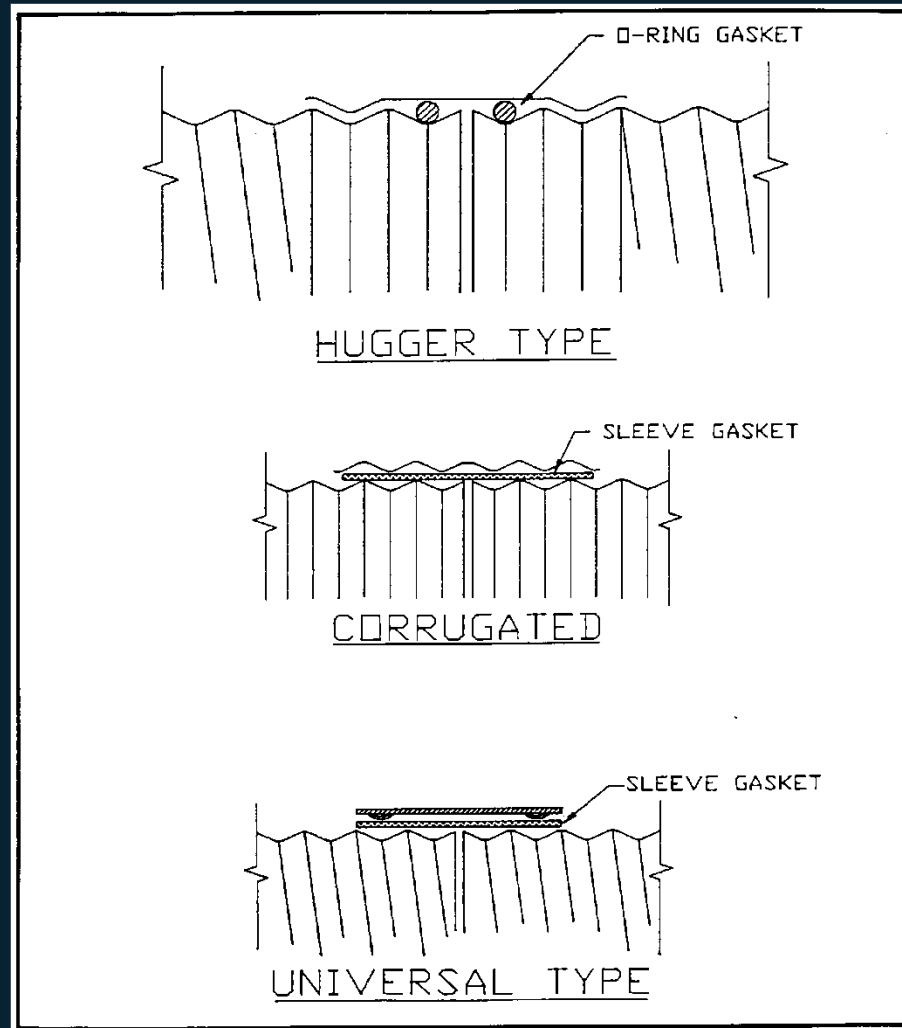


Hugger Band

SEMI-CORRUGATED



Bands with Gaskets



Installation: A Key to ALL Pipe Performance

- GRANULAR MATERIALS
- COMPACTION:
 100 % Proctor Density
- CONTROLLED PLACEMENT & LIFTS
- HAUNCH SUPPORT





- Quality Granular Structural Backfill
- Placement in 6" – 8" lifts
- Bring fill up in a balanced manner
- Compaction: 100% Proctor Density
- Protect ends from erosion
- Maintain adequate minimum cover for highway and construction loads

- Flared end sections



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- Safety end sections





Structural Design Methodology

- AISI and AASHTO outline steps to determine minimum pipe wall thickness/gage.
- Design Methodology is NOT new.
- CSP Design Methodology has been around for over 100 years.
- Ring Compression Design is recognized by every Highway Department in the Country.

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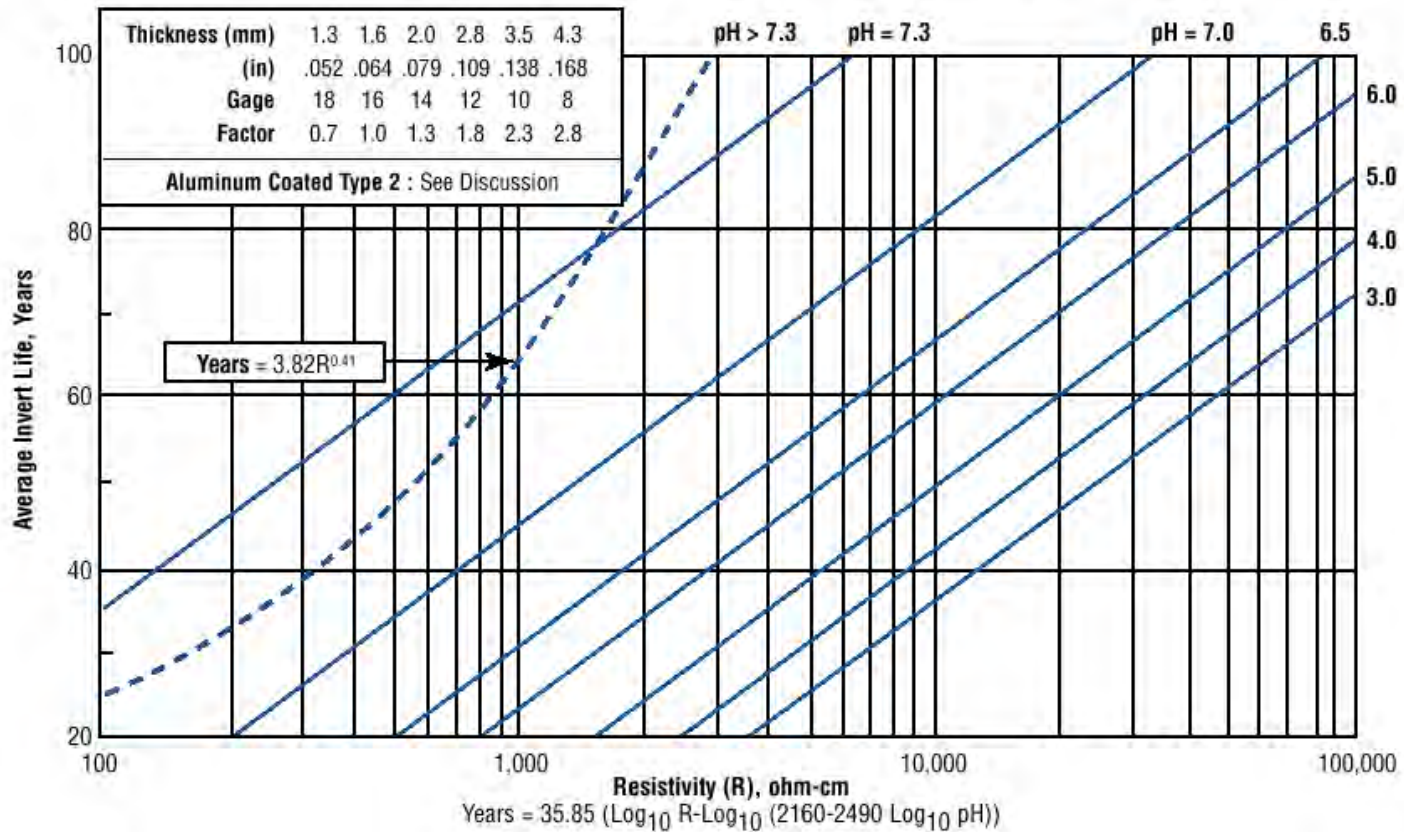
Durability

How long will it last?





AISI Chart for Estimating Average Invert Life for Galvanized CSP





POLYMER COATED CSP

- Extended Environmental Range
- Service Life Up to 100 Years



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ALUMINIZED STEEL TYPE 2

- Minimum 75 Year Service Life in the Recommended Environmental Range
- pH: 5 – 9, $R > 1500$ ohm-cm
- Based Upon 50 Years of Actual In-Service Performance



- Culverts
- Storm Sewers
- Detention
- Slotted Drain
- Underpasses
- Steam Crossings
- Fish Passage
- Wetland Crossings
- Stream/Canal Enclosures
- Bridges
- Tunnels
- Rehabilitation

