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The Importance of Standards in Sustainable Lateral Rehabilitation

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REQUIREMENTS FOR A SUCCESSFUL SYSTEM RENEWAL PROJECT

The entire collection system must be sealed

- **Main line pipes**
- **Manholes**
- **Laterals**

The system must be sealed as tightly as possible

The rehabilitation project must be sustainable, performing for the next 50-75 years

Sound science, engineering and a commitment to established standards

Water Tight

+

Design Life = Service Life

50 Years = 50 Years

COMPARISON OF COMMON SEALING SYSTEMS

There are two main types of sealing systems used in trenchless rehabilitation:

- Hydrophilic adhesive or paste-based systems
  - Epoxy, silicate, polyester or vinyl-ester compounds, either reinforced or unreinforced by materials such as fiberglass
- Preformed, Pre-Engineered hydrophilic, Neoprene rubber gaskets, similar to that used in new pipe installations

Long-term performance depends on the ability of the seal to withstand the forces on the seals in-place after installation and during the service life of the pipe

CIPP Rehabilitation

The Good

The Bad

The Ugly

Infiltration Through CIPP Annular Space

Water Tight Seals Are Needed To Reduce This Infiltration Over the Full Service Life of the CIPP Installation

- These Seals Must Be Placed At:
  - The Connection between the Mainline CIPP Liner and the Manholes
  - The Connection Between the Lateral and the Mainline CIPP
  - At the End of the Lateral Liner Where It Meets the Unlined Portion of the Lateral

Water Tight

Water Tight


SPORT WATCH
LIGHT
START
MODE
RESET
WATER RESIST
Waterproof

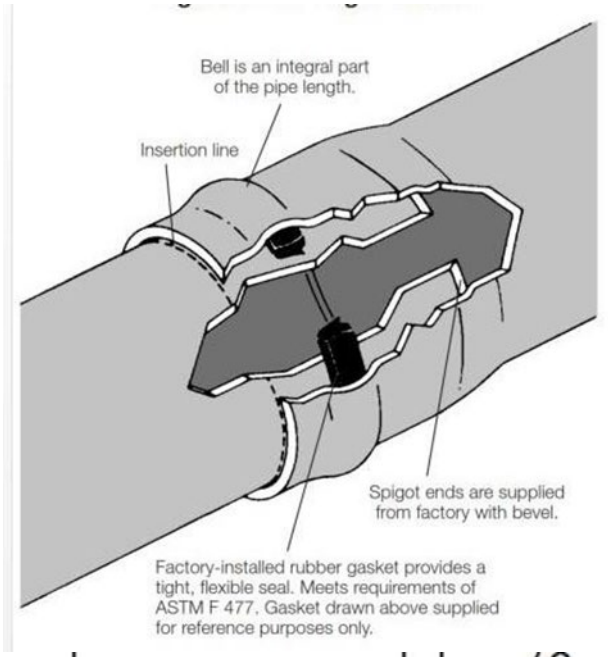

SEIKO

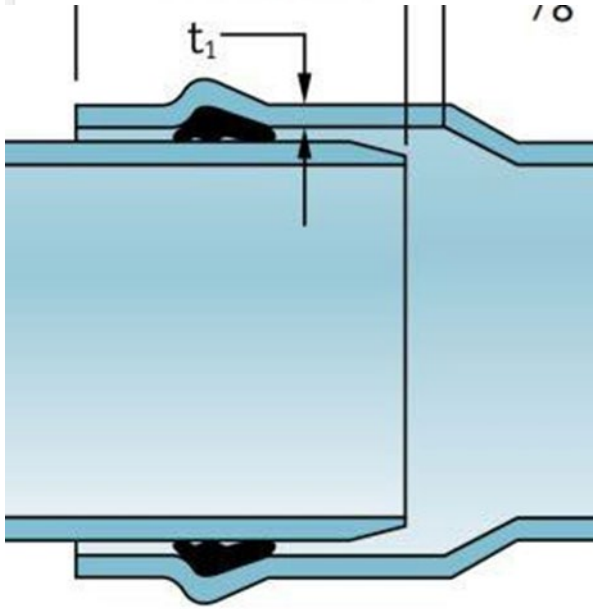
Buried pipe must provide long lasting water tight performance

New pipe seals designed and installed to be water tight for the life of the buried pipe.

Proper design elements are:

- **A flexible pre-formed gasket of durable material**
- **A groove or channel for holding the gasket in place as the pipes are joined together**
- **Cross-sectional geometry to perform under loading**
- **New pipes use these design elements in accordance with ASTM 477**



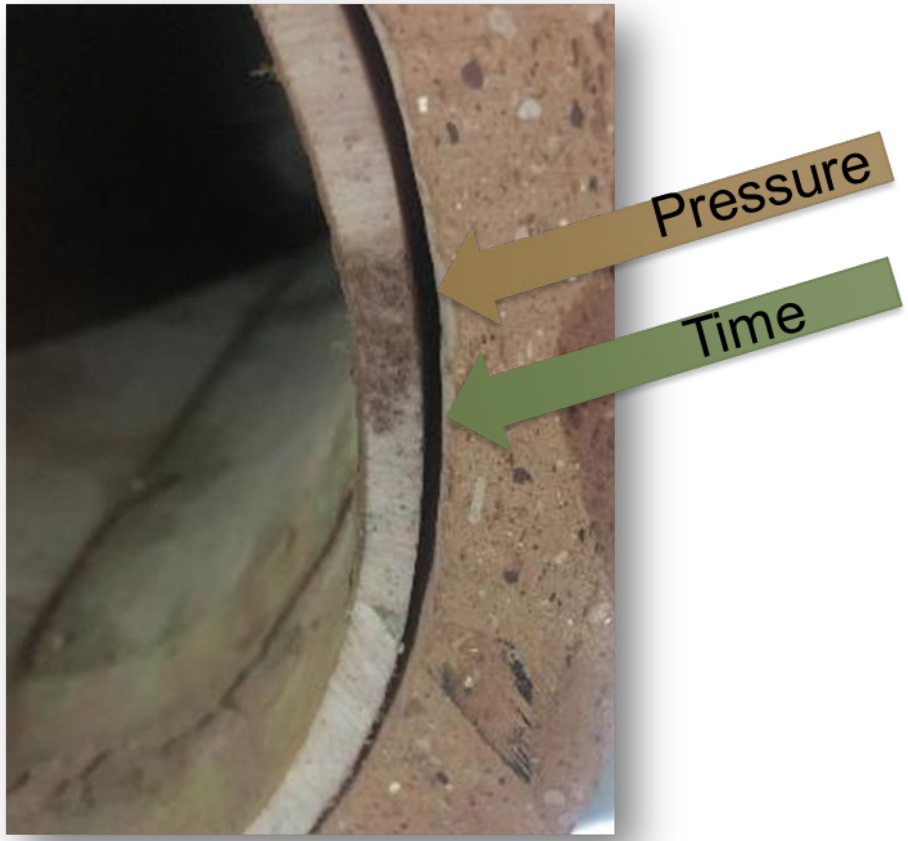


Gets Uglier

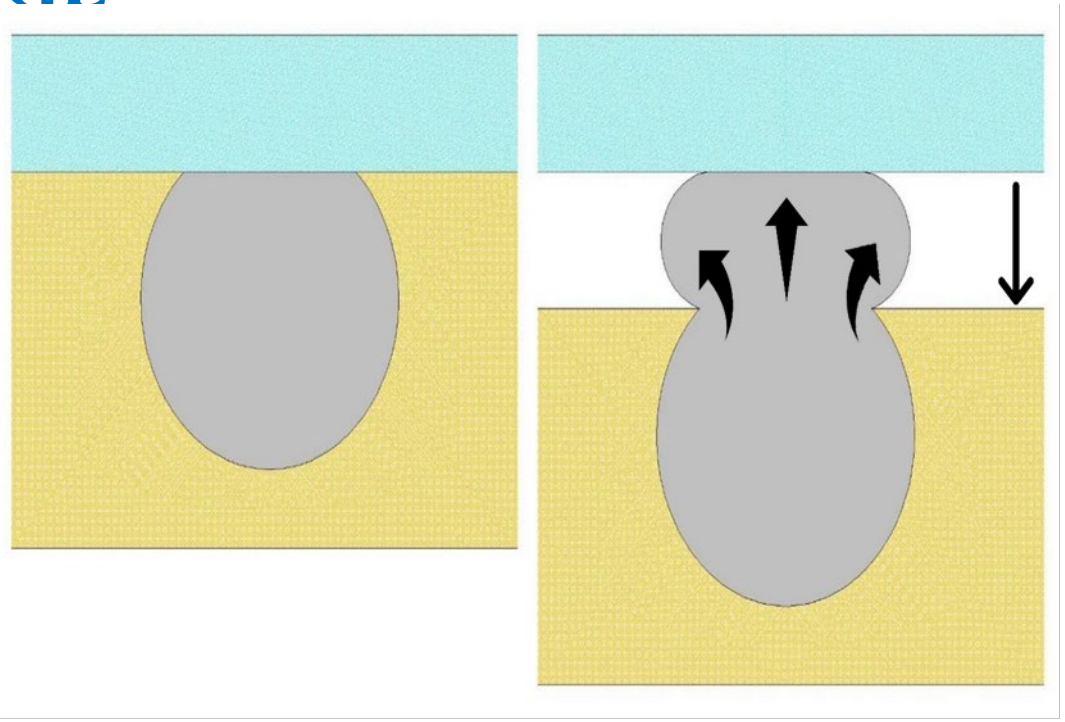
Polymerization

Movement

Creep



A GOOD SEAL MUST OVERCOME BOTH SHRINKAGE AND CREEP OVER TIME



The figure on the left illustrates the liner and seal immediately after the hardening of the resin after installation.

The figure on the right illustrates the liner and the annular space after the effects of shrinkage and creep over time.

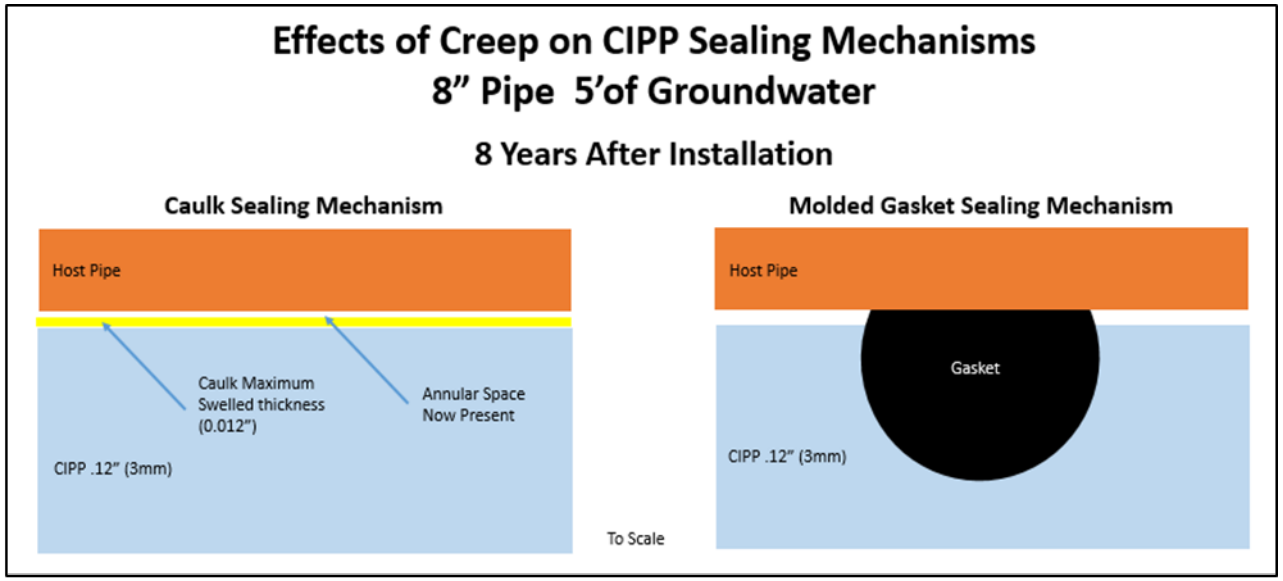
A good seal must be able to compensate by filling this annular space to prevent leakage.

EIGHT YEARS AFTER INSTALLATION THE PASTE-BASED SEAL LEAVES AN ANNULAR GAP

Even when the hydrophilic paste expands to its proposed 100%, The gap after 7.5 years is approximately .012 inches

The molded gasket, with its demonstrated ability to expand to a minimum of 800% in thickness, retains its sealing capability

COMPARISON OF SEALING MECHANISMS OVER TIME EIGHT YEARS AFTER INSTALLATION



Gap Calculated using Olivier Thépot's Modified Glock Solution.

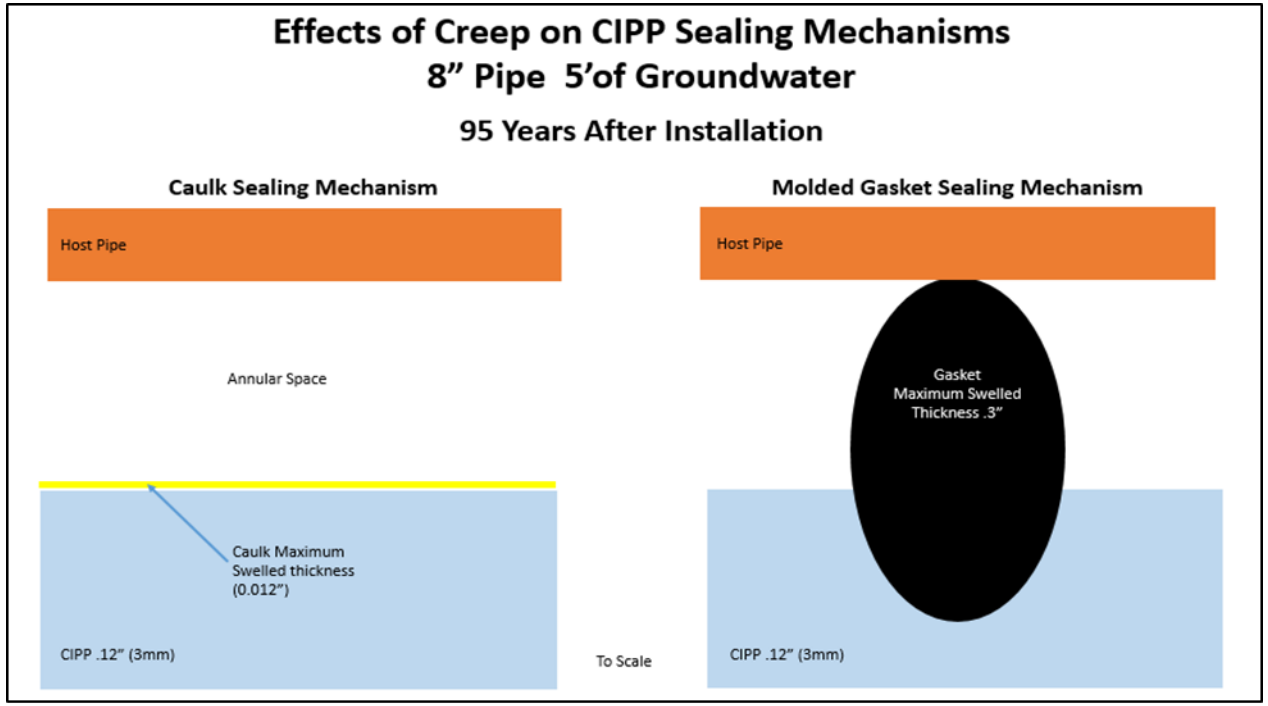
AT THE MAXIMUM SERVICE LIFE OF THE LINED LATERAL, THE PASTE-BASED SEAL HAS FAILED

The preformed hydrophilic Neoprene gasket with an engineered minimum volumetric expansion of 800% assures a tight seal

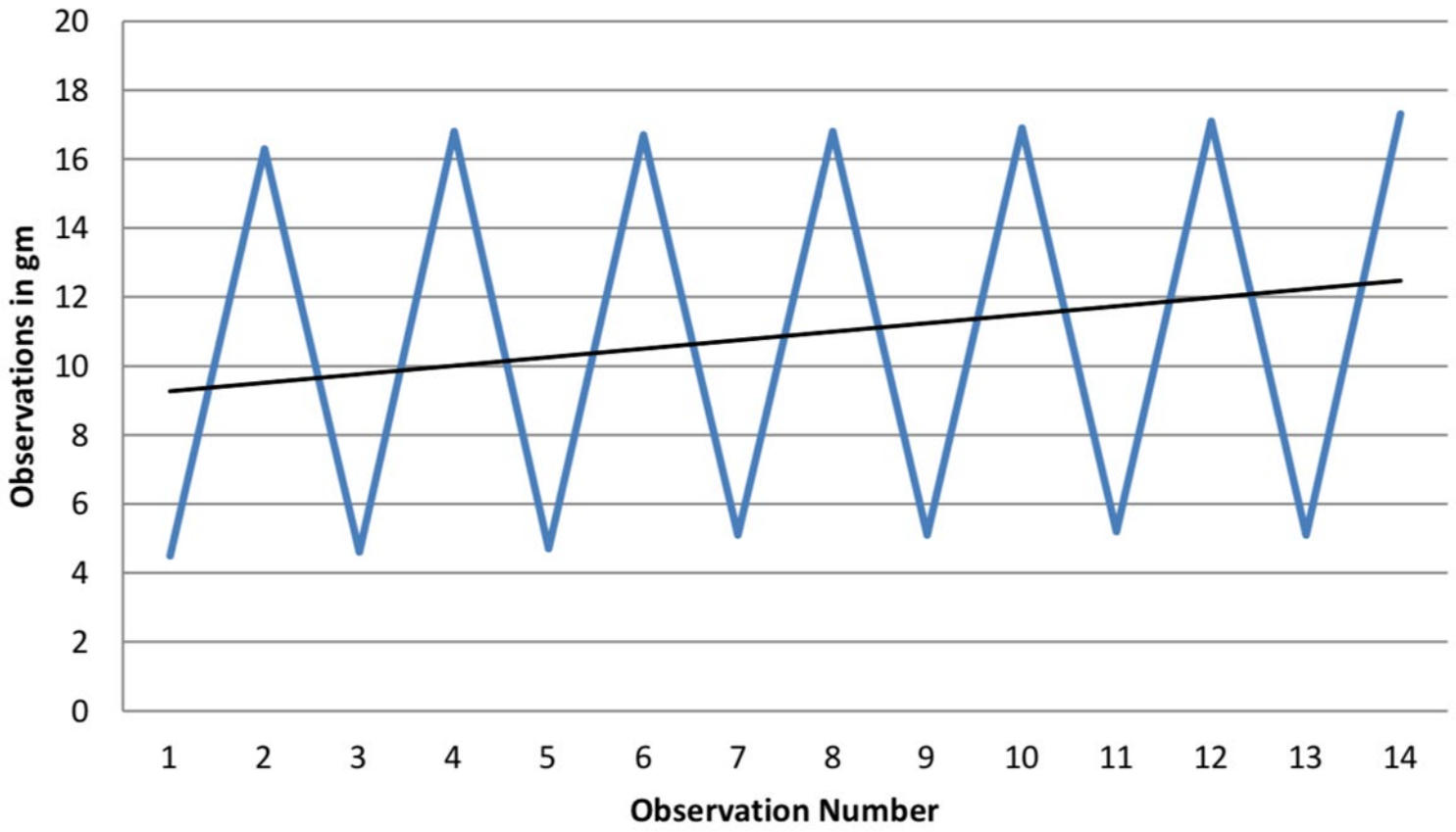
This seal is on a par with new pipe installations

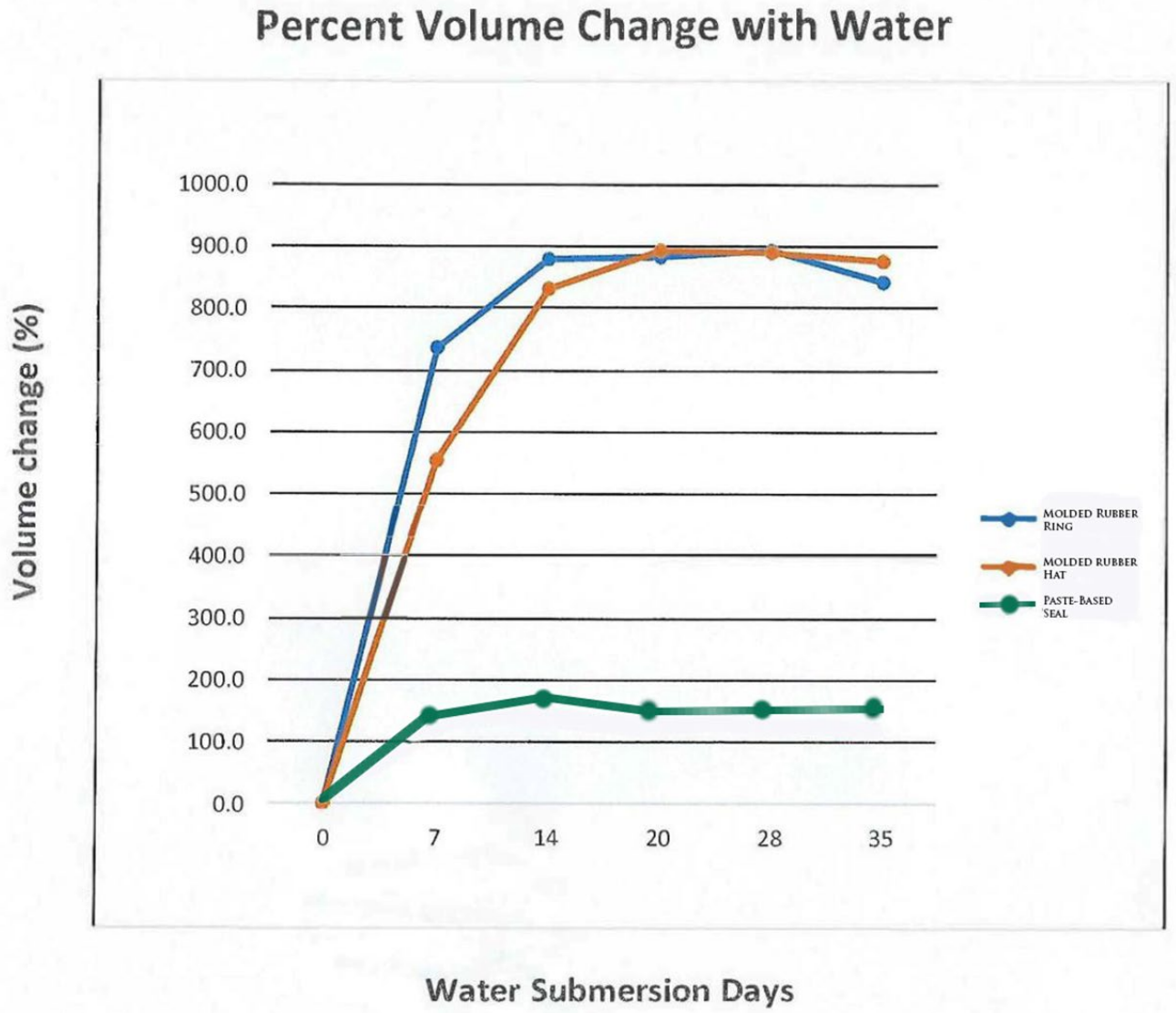
The controlled expansion of the Neoprene gasket results in a conservative maximum thickness of 0.3 inches. Providing a tight seal for approximately 95 years

COMPARISON OF SEALING MECHANISMS OVER TIME 95 YEARS AFTER INSTALLATION



10,000 Hour Hydration/Dehydration

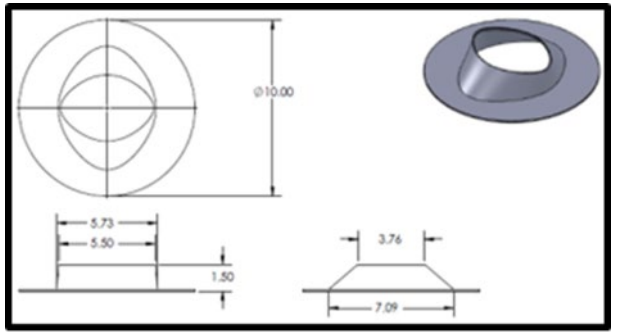



Percent Volume Change with Water
Volume change (%)
1000.0
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
0
7
14
20
28
35
Molded Rubber Ring
Molded Rubber Hat
Paste-Based Seal
Water Submersion Days

Molded Hydrophilic Gaskets

- Verifiable
  a) Seamless
  b) Visual verification that gasket is in place
  c) Strategic Fixed Position

- Service Life Proven By
  a) 10,000 hour long-term
  b) Hydration/dehydration testing



Hydrohat CAD Drawing

Hydrohat

End Seal

Engineered Gasket?


INDUSTRY
STANDARD


CERTIFIED
ISO
ISO 17025


ASTM
INTERNATIONAL


NSF


ANSI
American National Standards Institute

The Important Standards For CIPP Lining

- ASTM F 1216 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube – *Mainline Pipe Lining Only*
- ASTM F 2561 - Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner
- ASTM 3240 - Standard Practice for Installation of Seamless Molded Hydrophilic Gaskets (SMHG) for Long-Term Watertightness of Cured-in-Place Rehabilitation of Main and Lateral Pipelines

QUESTIONS?