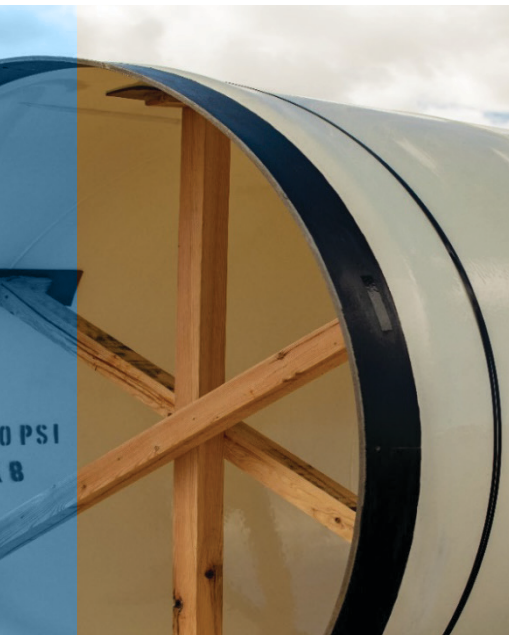


# InfraShield®

## JOINT SYSTEM

### *Geohazard Resistant Steel Pipe (GRSP) for Differential Settlement Applications*



#### A Fully Welded, Easy-to-Install Solution

Buried water transmission pipelines connected to rigid structures often undergo differential settlement or subsidence. Left unchecked, this movement can cause significant stress and strain in the pipe wall, affecting the structural integrity of the pipeline and ultimately leading to leaks, or worse, critical failure.

The InfraShield® Joint System by Northwest Pipe Company offers a groundbreaking solution to safeguard steel pipelines in differential settlement or subsidence areas—without the need for gasketed joints. InfraShield® is an easy-to-install, fully welded Geohazard Resistant Steel Pipe (GRSP) technology designed to efficiently absorb deformation in a controlled manner, resulting in reliably leak-free performance even in the face of shifting ground conditions.





## Manufactured for Resilience

The InfraShield® Joint System technology builds on the proven performance of C200 steel pipe with a standard bell and spigot lap welded joint to provide even greater resilience in areas with differential settlement and subsidence. Previously, couplings or joints with seated gaskets were typically used to maintain water containment after settlement. However, complex installation and the potential for leaks in gasketed connections can increase risk and threaten reliability. InfraShield’s innovative, patent-pending joint design eliminates the need for gaskets, providing a fully welded, leak-proof system that ensures uninterrupted water delivery to critical infrastructure and communities.

### Simple & Effective Design

The InfraShield® Joint System utilizes a strain-based design to enhance the resiliency of lap-welded steel pipe. A small projection is manufactured into the steel pipe wall which effectively absorbs deformation imposed by differential settlement without over-stressing the lap-welded joint itself. Extensive full-scale physical testing and finite element analysis has verified the integrity of the InfraShield® Joint System.

From an installer’s perspective, InfraShield® installs no differently than C200 pipe with a bell and spigot lap weld joint. It requires no specialized training, tools, or supervision. This means quick installation with no additional costs or risks.

## Advantages

### Quick Installation

InfraShield® installs like any C200 steel pipe with bell-and-spigot lap weld joints—no special training or equipment required. It’s a contractor-friendly system that saves time in the field and minimizes risk.

### Cost Savings

Simple installation translates to lower construction costs, especially compared to alternative systems that require additional crew training and installation oversight.

### Proven Performance

The InfraShield® Joint System has been verified with rigorous, full-scale physical testing backed by extensive finite element simulations.

### Reliably Leak-Free

InfraShield’s fully welded, gasketless design provides a high-strength watertight connection, delivering joint soundness without perfect trench grading or soil stability. Our leak-proof joint system guarantees continuous water delivery without the need for system redundancy.

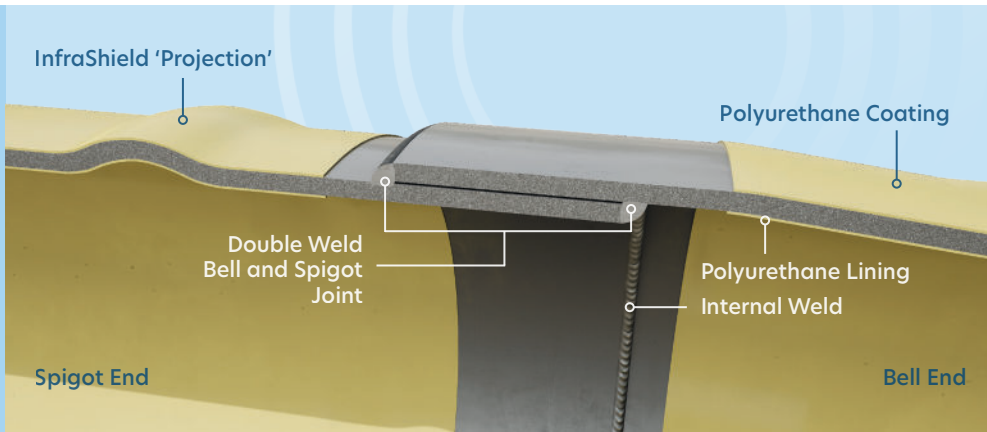
## Applications

- Differential Settlement
- Subsidence
- Expansive or soft soils
- Replace leaking joints or couplings

## InfraShield® Components

100% American Made

The InfraShield® Joint System improves the mechanical response of lap-welded joints by introducing a small projection around the pipe circumference at the spigot side of the weld. This enhancement forces any deformation to occur at the projection, thereby protecting the lap weld joint.



InfraShield® Joint System

# Design Guide – Differential Settlement

The number and location of InfraShield® projections required for effective performance in differential settlement applications is determined by pipe diameter and amount of predicted settlement. Use the following design guidelines to easily specify InfraShield® GRSP for areas with commonly encountered settlement ranges of up to four inches. (Contact your NWP representative for additional guidelines for applications with larger settlements and other pipe diameters.)

## 1 Determine Number of InfraShield® Projections

Settlement (Inches)	Diameter (Inches)												
	24	30	36	42	48	54	60	66	72	78	84	90	96
1	S	S	S	S	S	S	S	S	S	S	S	S	S
2	D	S	S	S	S	S	S	S	S	S	S	S	S
3	D	D	D	S	S	S	S	S	S	S	S	S	S
4	D	D	D	D	D	D	S	S	S	S	S	S	S

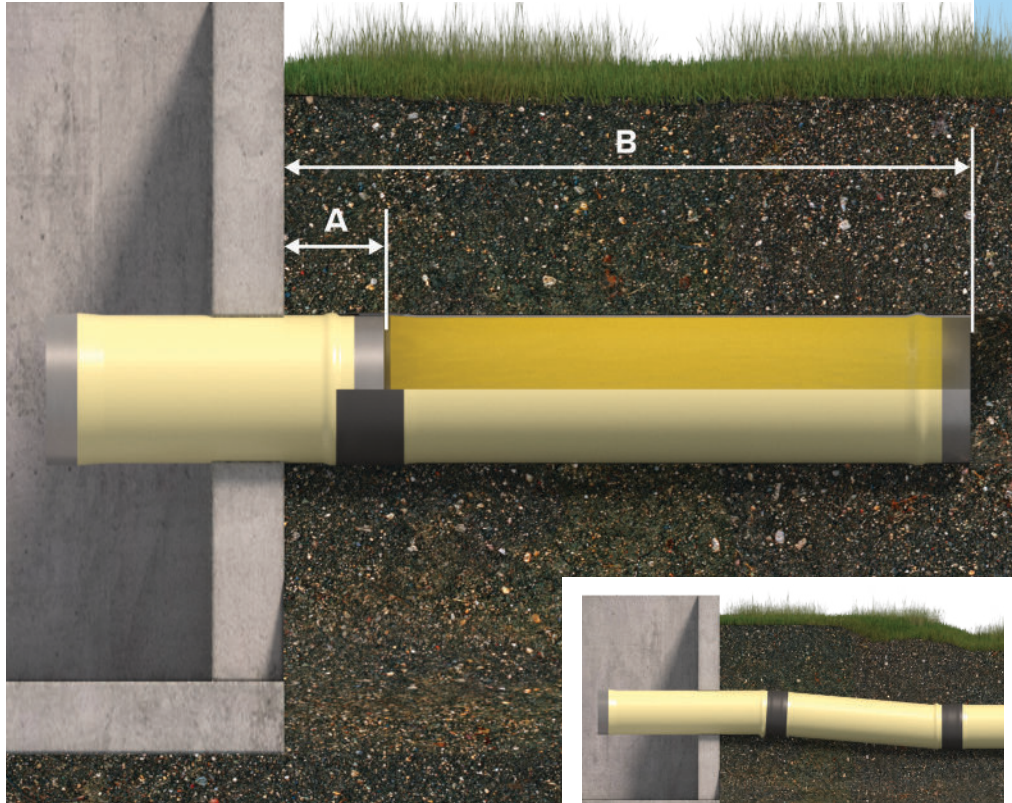
\*Applicable for SC1, SC2 or SC3 soil embedment as defined in AWWA M11 (2017)

First, determine whether one or two InfraShield® projections are required in the pipeline design. Use the table to match the to the amount of expected settlement with the pipe diameter.

**S = Single**  
1 projection needed

**D = Double**  
2 projections needed

## 2 Determine Location of InfraShield® Projection(s)



Then, refer to this figure to determine the location of the required InfraShield® projection(s).

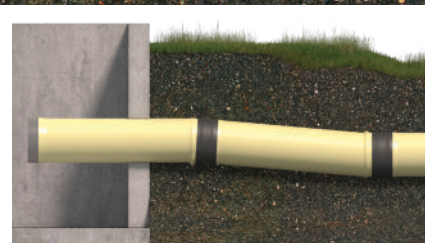
**A Joint Length Extending from the Structure\***  
(single & double projection designs)

Dia. (in.)	A (ft.)
24-36	1.5
36-96	2.0

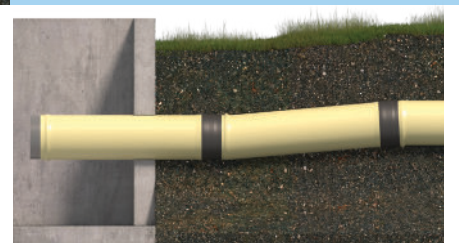
**B Second Joint Length**  
(double projection designs only)

**B = 4 pipe diameters (4D)**

\*Structure may be a wall or existing buried pipe.



Soil settles relative to building

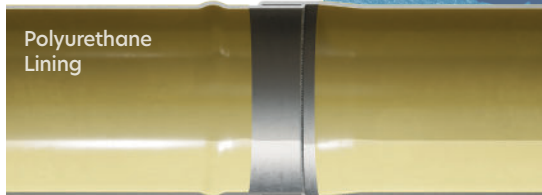
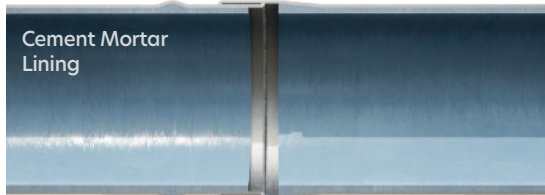


Building settles relative to pipe envelope

# InfraShield®

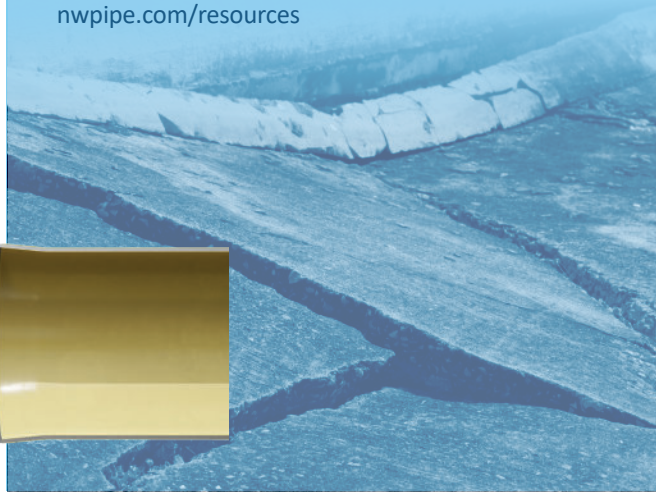
JOINT SYSTEM

Specifications	
Pipe Standards	AWWA M11, AWWA C200
Typical Diameters	24" — 120" (and larger)
Steels	AWWA C200 Table 1
Joints	Lap Weld or Butt Strap
Pipe Joint Length	Up to 50'
Differential Settlement Design Details	Expected differential settlement, source of movement, pipe diameter, internal pressure, backfill material, and height of cover. Design movement is absorbed by the projections.
Geohazard Design Details	Expected permanent ground deformation, deformation length, backfill material, pipe diameter, fittings or specials required in displacement zone, and internal pressure. Design maintains beam strength.
Coating	Polyurethane
Lining	Polyurethane or Cement Mortar



## Learn More

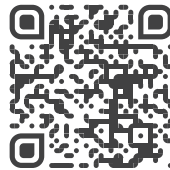
The InfraShield® design concept and testing data has been reported in numerous peer-reviewed technical papers. For a deeper dive into the development and numerical analysis behind this patent-pending technology, download the publications from our website: [nwpipe.com/resources](http://nwpipe.com/resources)



## Contact Us

Our sales and engineering teams are ready to support your project from specification to installation. Scan below to get started today!

Find your NWP Representative:



Technical Question? Ask an Engineer:

