Information provided in this table is relative to sewer force main applications only.

NASSCO®

Install Method	Name of Technology	Structural Classification*	Typical Diameter Range	Hazen Williams Coefficient (typical values)	Connections (ARVs), Terminations and End Seals	Comments
Segmental Sliplining	Discrete Sliplining using FRP and PVC	Class III and Class IV (Semi-Structural and Fully Structural)	12 in. to 84 in.	140 to 150	PVC: PVC and DI Fittings FRP: Flange adapters, backup rings, MJ adapters	Medium footprint Installation length can reach more than 5,000 LF on a single installation Pressure ratings up to ~300 psi May accommodate 11 1/4-degree deflection dependent upon material, pipe size and annular space Does not require consistent I.D. of host pipe This method of sliplining incorporates grouting the annular space after install To accommodate for grouting a minimum of 38mm (1.5 in.) annular space is typical, plus the wall of the new pipe, which is designed for the operating conditions
Continuous Sliplining	Loose Fit Sliplining using HDPE, PVC and FPVC	Class III and Class IV (Semi-Structural and Fully Structural)	4 in. to 60 in.	140 to 150	PVC: PVC and DI Fittings HDPE: Flange adapters, backup rings, MJ adapters	Large footprint as pipe is fused prior to insertion Installation length per setup can reach more than 7,000 LF on a single pull Operating pressures up to ~300 psi May accommodate 11 1/4-degree deflection dependent upon material, pipe size and annular space Does not require consistent I.D. of host pipe This method of sliplining incorporates grouting the annular space after install To accommodate for grouting a minimum of 38mm (1.5 in.) annular space is typical, plus the wall of the new pipe, which is designed for the operating conditions
	Close Fit Sliplining using HDPE	Class III and Class IV (Semi-Structural and Fully Structural)	16 in. to 63 in.	140 to 150	Flange adapters, backup rings, MJ adapters	Large footprint as pipe must be strung out in its entirety Installation length per setup can reach up to 5,000 LF on a single pull dependent upon installation method Class III solution accommodating internal pressure Class IV pressure up to 126 psi Class IV solution accommodating both internal pressure and external loading. May accommodate 11 1/4-degree deflection Reduces internal diameter a minimum of 13mm (0.5 in.) or greater
Modified Loose Fit Sliplining	Flexible Fabric Reinforced Pipe (FFRP)	Semi-Structural	6 in. to 20 in.	140 to 150	Flanged end fitting and adaptors.	Small footprint Installation length per setup can reach over 8,000 LF Pressure ratings can exceed 1,000 psi Can accommodate multiple bends including 90 degree bends Does not require consistent I.D. of host pipe Semi-structural. Does not support external loads.
Inversion or pull in place	Cured In Place Pipe (CIPP)	Class III and Class IV (Semi-Structural and Fully Structural)	6 in. to 72 in.	140 to 150	Hymax couplings and mechanical end seals used at CIPP termination.	Medium footprint Installation length per setup subject to diameter and thickness (up to 1,200 LF) Pressure ratings up to 250 psi. Larger diameter, lower MAOP Can accommodate 45-degree and sweeping 90-degree bends Class IV solution accommodating both internal pressure and external loading Resin impregnation (wetout) of the liner may be in a factory setting, or on-site (over-the-hole) Lining thickness is 4mm to 15mm (0.2 in. to 0.6 in.)

Install Method	Name of Technology	Structural Classification*	Typical Diameter Range	Hazen Williams Coefficient (typical values)	Connections (ARVs), Terminations and End Seals	Comments
Spray in place	Polymeric Lining	Class I to Class III (Non-Structural to Semi Structural)	4 in. and greater	140 to 150	New connections performed in traditional manner (saddles, spools, etc.) No end seals required at coating termination	Small footprint Application length per setup subject to diameter and thickness (typically up to 1,000 LF) Not rated for internal pressure (dependent on host pipe) May require multiple layers to achieve desired thickness Cleaning and surface preparation of host pipe wall is critical Lining thickness is 40mils to 500mils (1mm to 13mm, or up to 0.5 in.)
	Geopolymer	Class II and III (Semi-Structural)	36 in. to 120 in.	125 to 135	New connections performed in traditional manner (saddles, spools, etc.) No end seals required at coating termination	Medium footprint Installation Application length per setup subject to diameter and thickness (typically up to 700 LF) Not rated for internal pressure (dependent on host pipe) Relies on adhesion to host pipe Cleaning and surface preparation of host pipe wall is critical Lining thickness is 25mm to 100mm (1in. to 4 in.)
Wet Lay-up	Fiber Reinforced Polymer (FRP)	Class III and Class IV (Semi-Structural and Fully Structural)	30 in. and greater	140 to 150	N/A	Small footprint Installation is hand applied and subject to confined space entry Pressure ratings can exceed 450 psi Can accommodate bends Class IV solution accommodating both internal pressure and external loading Does not require consistent host pipe inside diameter Reduces internal diameter a maximum of 13mm (0.5 in.) Can be used externally
Insitu Pipe Replacement	Pipe Bursting HDPE, PVC, and FPVC	Class IV (Structural Replacement, Upsize I.D. / Capacity)	4 in. to 48 in.	140 to 150	PVC: PVC and DI Fittings HDPE: Flange adapters, backup rings, MJ adapters	Large footprint Installation length per setup can reach up to 2,000 LF Pressure rating dependent on replacement pipe May accommodate up to a 22 1/2-degree deflection Can enable pipe diameter upsizing Does not require consistent I.D. of host pipe. Class IV solution accommodating both internal pressure and external loading

*Structural classification is quantified through type testing which defines the capabilities of the rehabilitation product to provide corrosion protection as well as structural enhancement or replacement of the existing pipe. Manufacturers of the rehabilitation product(s) may provide data to support further classification of the general product categories in this table. Guidelines for the classification of pressure pipe linings can be found in the AWWA Committee Report – *Structural Classifications of Pressure Pipe Linings* .