

NovaForm™ PVC Liner

Product Data Sheet



< STANDARDS >



ASTM F1504
ASTM F1947

NovaForm™ 'Expand-in-Place' PVC Liner is used in sewer and culvert rehabilitation. Extruded and coiled onto reels, the product is heated and conditioned using steam at the job site, then pulled into an existing sewer or culvert by mechanical means. The NovaForm Liner is plugged at both ends and expanded by introducing steam and then air, allowing it to form snugly against the host pipe. As air is introduced, the pipe cools and hardens producing a fully functional pipe.

PRODUCT AVAILABILITY

Material	PVC
Size Range	6" – 30" (150mm – 750mm)

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Sample Specification

This specification covers requirements and test methods for materials, dimensions, workmanship, flattening resistance, impact resistance, pipe stiffness, extrusion quality, marking and packaging.

Material Specification

Basic Materials

The pipe shall be made from PVC compound meeting all the requirements for cell classification 12334 as defined in specification ASTM D1784 and with minimum flexural modulus properties, tested as per ASTM D790, of 320,000psi (2,200MPa).

Tensile Strength	ASTM D638	6,000 psi	(41.4 MPa)
Tensile Modulus	ASTM D638	320,000 psi	(2,206 MPa)
Flexural Strength	ASTM D790	6,000 psi	(41.4 MPa)
Flexural Modulus	ASTM D790	320,000 psi	(2,206 MPa)
Heat Deflection Temperature (tested @ 264psi)	ASTM D648	158°F	(70°C)

Other Requirements

Flattening

There shall be no evidence of splitting, cracking or breaking when the rounded pipe is tested according to Section 11.3 of ASTM F1504.

Impact Strength

The impact strength of rounded pipe shall not be less than the values in Table 1 when tested in accordance with ASTM D2444 as referenced in ASTM F1504.

Table 1: Minimum Impact Strength at 73°F (23°C)

Pipe size, in. (mm)	Impact strength, ft-lbf (J)
6 (150)	210 (284)
8 (200)	210 (284)
10 (250)	220 (299)
12 (300)	220 (299)
15 (375)	220 (299)
18 (450)	220 (299)
24 (600)	220 (299)
30 (750)	220 (299)

Stiffness

Values for pipe stiffness for the rounded pipe shall comply with Table 2 when tested in accordance with ASTM D2412 as referenced in ASTM F1504.

Table 2: Minimum Pipe Stiffness at 5% Deflection

Pipe Size, in. (mm)	Wall Thickness, in. (mm)	Pipe Stiffness, psi (kPa)
6 (150)	0.17 (4.3)	36 (250)
8 (200)	0.23 (5.8)	36 (250)
10 (250)	0.28 (7.3)	36 (250)
12 (300)	0.34 (8.7)	36 (250)
12 (300)	0.29 (7.4)	22 (153)
15 (375)	0.30 (7.6)	12 (83)
18 (450)	0.27 (6.9)	6 (41)
24 (600)	0.36 (9.2)	6 (41)
30 (750)	0.45 (11.5)	6 (41)

Extrusion Quality

The extrusion quality of the pipe shall be evaluated by both of the following test methods:

Acetone Immersion: The pipe shall not flake or disintegrate when tested in accordance with ASTM D2152 as referenced in ASTM F1504.

Heat Reversion: The extrusion quality of the pipe shall be estimated by heat reversion method in accordance with ASTM F1057 as referenced in ASTM F1504.

Flexural Properties: The flexural strength and modulus of the pipe shall be tested in accordance with ASTM D790 as referenced in ASTM F1504.

Dimensions

Rounded Pipe Diameter: The average outside diameter of the formed pipe shall meet requirements in Table 3, +/- 1.0% when tested in accordance with ASTM D2122 as referenced in ASTM F1504.

Rounded Pipe Wall Thickness: The wall thickness of the formed pipe shall not be less than the values specified in Table 3 when tested in accordance with ASTM D2122 as referenced in ASTM F1504.

Table 3 Rounded Pipe Dimensions

Nominal Outside Diameter In. (mm)	Minimum Wall Thickness In. (mm)
6 (150)	0.17 (4.3)
8 (200)	0.23 (5.8)
10 (250)	0.28 (7.3)
12 (300)	0.34 (8.7)
12 (300)	0.29 (7.4)
15 (375)	0.30 (7.6)
18 (450)	0.27 (6.9)
24 (600)	0.36 (9.2)
30 (750)	0.45 (11.5)

Note: As per the ASTM F1504 standard, some sizes are available in multiple thicknesses, as shown in the table above.

Workmanship, finish, and appearance

The rounded and folded pipes shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other defects. The pipe shall be as uniform as commercially possible in colour, opacity, density and other physical properties.

Product Marking

Pipe shall be clearly marked as follows at intervals of 5ft. (1.5m) or less:

- Manufacturer's name or trademark and code
- Nominal outside diameter
- The PVC cell classification, for example "12334"
- The legend "DR XX FOLDED PVC PIPE"
- The designation "Specification ASTM F1504"
- Length marker and liner distance label, for example "100ft" ("30.5m")

Packaging

The full length of the PVC pipe is coiled onto a reel in a continuous length for storage and shipment. The minimum diameter of the reel drum or core shall be 48in (1,219mm). NovaForm reels are available in sizes 8' tall x 4' wide, 8' tall x 6' wide and 8' tall x 8' wide. For detailed information about the available material lengths, please refer to the NovaForm product brochure.

Quality Assurance

When the product is marked with ASTM F1504 designation, the manufacturer affirms that the product was manufactured, inspected, sampled and tested in accordance with the specification and has been found to meet the requirement of it.

Installation

The NovaForm 'Expand-in-Place' PVC Liner should be installed in accordance with ASTM F1947 and the installation instructions below. For complete installation instructions, please consult the NovaForm Training Manual available at ipexna.com.

1. Preparing

For any lining technology, host pipe preparation is key to a successful installation.

This step is common to many rehabilitation technologies and involves common practices such as:

- Identifying any conditions in the existing host pipe that could impede or prevent the proper installation of the liner.
- Accurately recording the position of all service connections.
- Remediating large quantities of groundwater infiltration, roots, collapsed pipe, dropped joints or offsets more than 12.5% of the inside pipe diameter, protruding taps, amongst other common defects.
- Cleaning/Flushing the line
- Bypass control (if required)
- Traffic Control (if required)

For more information on these preparatory works, industry associations such as NASSCO should be consulted.

2. Conditioning

Prior to pulling the NovaForm PVC Liner into the existing host pipe, it must be softened to allow it to be pulled from the shipping reel. This is typically accomplished by passing steam through the entire length of the liner until the product is thoroughly heated. Infrared thermal guns allow the installer to monitor the temperature of the product during this stage.

3. Pulling

In order to process the NovaForm PVC Liner, it must be pulled into place, i.e. into the host pipe. This is accomplished through mechanical means by using a winch. A cable from the winch is fed from the downstream manhole ("B" side) to the upstream manhole ("A" side) and attached to the end of the NovaForm PVC Liner. It is then pulled into place using a series of rollers until it reaches the downstream manhole.

4. Processing

Once in place, NovaForm PVC Liner is processed. Processing generally involves the following steps:

- The conditioning of pipe ends ("A" and "B" sides) in order to insert plugs which allow the passage of steam and air through the product.
- Additional conditioning throughout the entire product length in order to ensure the product is heated sufficiently to allow for expansion.
- Product expansion by increasing the steam pressure in the line, gradually.
- Transition to air to complete the expansion process and cool the liner. Once sufficiently cooled, the product hardens and processing is completed.

5. Finishing

Finishing involves the reinstatement of service connections and trimming of the liner ends. This step is performed with the aid of CCTV inspection and robotic cutters. Additional details on the finishing phase of the NovaForm PVC Liner installation process can be found through industry associations such as NASSCO.

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