The CIP Liner

STANDARD SPECIFICATIONS

CURED-IN-PLACE (CIP) STRUCTURAL LINER
Designed for Structural Repair and Protection of
Wastewater and Storm Water Collection Systems

- Structural Rehabilitation
- Eliminates Infiltration and Exfiltration
- Stops Corrosion from Sewer Gases and Chemicals
- Lifetime Protection for New Structures

Specifically designed for use in Sewer Manholes,
Lift Stations, Catch Basins, Pump Stations, Wet Wells,
Vaults, Storm Water Culverts and Pipes

Infrastructure Rehab USA INC
The 21st Century Solution Company

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The CIP Liner

STANDARD SPECIFICATIONS

1. PRODUCTS

The CIP Liner 116 oz. Series - Multiple structural woven roving fiberglass layers with a non-porous membrane bonded between the layers of fiberglass, with a total fabric weight of 116 oz. per square yard, saturated with 100% solids epoxy, cured-in-place, and bonded to the existing structure. This liner is designed to meet or exceed D.O.T. load requirements for culverts under roads and for manholes where extreme deterioration has left the structure unsound.

The CIP Liner 68 oz. Series - Multiple structural woven roving fiberglass layers with a non-porous membrane bonded between the layers of fiberglass, with a total fabric weight of 68 oz. per square yard, saturated with 100% solids epoxy, cured-in-place, and bonded to the existing structure. This liner is the strongest liner used for structural rehabilitation in typical manholes with corrosion and infiltration.

The CIP Liner 56 oz. Series - Multiple structural woven roving fiberglass layers with a non-porous membrane bonded between the layers of fiberglass, with a total fabric weight of 56 oz. per square yard, saturated with 100% solids epoxy, cured-in-place, and bonded to the existing structure. This liner is used for structural rehabilitation in manholes with moderately deteriorated conditions.

2. MANUFACTURER/DISTRIBUTOR/INSTALLER

Manufacturer:

CIP Industries, LLC
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Panama City, FL 32405
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3. PRODUCT DESCRIPTION

Usage: The CIP Liner is designed to provide a sustainable solution for rehabilitation of sewer and storm water infrastructure for municipal and industrial applications. It is designed with a 100-year useful life expectancy using “green technology” in that it contains no solvents, evaporative materials, polystyrene or VOC’s. The liner is resistant to deterioration in severe

sewer gas situations such as municipal trunk lines. Other industry suitable resins can be used to saturate the liner for industrial applications.

The CIP Liner is a structural cured-in-place (CIP) liner designed for use as a non-porous, multi-layer system for rehabilitation of structures such as manholes, pump stations, wet wells, vaults, storage tanks, large diameter pipe, and culverts. It provides an impervious water and sewer gas resistant membrane layered between layers of structural fiberglass. Therefore, the liner system is ideal for correcting H_2S gas deterioration, infiltration and exfiltration problems in structures of most any shape or size.

This waterproof liner system eliminates infiltration and exfiltration. The liner fabric and epoxy resins are resistant to gases and chemicals typically encountered in domestic sewer systems. The structural liner permanently adheres to wet or dry surfaces of brick, concrete, PVC, and ductile iron and prevents further deterioration, infiltration, and exfiltration, while providing structural reinforcement to the existing structure, and provides a chemical and sewer gas resistant protective lining system.

The CIP Liner is manufactured in three (3) standard liner weights that are designed for varying depths and structural conditions. The three liner designs provide the end-user with solutions ranging from preventive maintenance to extreme structurally deteriorated conditions.

Each liner is a type that allows rehabilitation of concentric, eccentric or flat top structures without removing the ring top section or corbel. This minimizes traffic disruption and eliminates the need for road repairs. All liner material and components are custom fabricated at the CIP Industries, LLC manufacturing facility to conform to the contours within each individual structure. Structure measurements are taken, and liners are manufactured prior to commencement of the liner installation to minimize the on-site field time required for the liner installation.

Materials and Liner Installation System:

The **116 oz Series** is a five-layer composite system with a total pre-saturated fabric weight of 116-ozs. per square yard. The 116 oz series is designed for sewage pump stations, culvert pipe and manholes. It has been successfully used in vertical structures up to 100 ft. deep. Layers #1 & 2 are both 24-oz. structural, woven-roving fiberglass layers. Layer #3 is a 20-oz. non-porous membrane. Layers #4 & 5 are both 24-oz. structural, woven-roving fiberglass. The layers are saturated with epoxy resins and bonded under heat and pressure forming a monolithic composite to the host structure.

The **68 oz Series** is a three-layer composite system with a total pre-saturated fabric weight of 68-ozs. per square yard. The 68 oz series is designed for sewage pump stations and manholes with problems of deterioration and infiltration. Layer #1 is 24-oz. structural, woven-roving fiberglass. Layer #2 is a 20-oz. non-porous membrane. Layer #3 is 24-oz. structural, woven-roving fiberglass. The layers are saturated with epoxy resins and bonded under heat and pressure forming a monolithic composite to the host structure.

The **56 oz Series** is a three-layer composite system with a total pre-saturated fabric weight of 56-ozs. per square yard. The 56 oz series is designed for structural rehabilitation in sewage pump stations and manholes with moderately deteriorated conditions. Layer #1 is 18-oz. structural, woven-roving fiberglass. Layer #2 is 20-oz. a non-porous membrane. Layer #3 is

24-oz. structural, woven-roving fiberglass. The layers are saturated with epoxy resins and bonded under heat and pressure forming a monolithic composite to the host structure.

The standard impregnating resin for typical domestic wastewater sewer system liners is a modified Polyamide Bisphenol "A" Epichlorodhydrin system that is field applied. After the resin is applied, the liner is lowered into the manhole where, in most cases, it is cured in place with a temperature inversion system of air pressure and steam heat injection. Most liners are cured within two hours and become a structural monolithic wall bonded to the host structure. Other chemical and industrial applications may require alternate resin system depending on the site conditions and chemicals present in the structures. In these cases, the Owner shall supply an analytical report of chemicals present to CIP Industries, LLC. The resin system used in these cases is determined on a case-by-case basis.

Sizes: Each liner is custom fabricated to fit the individual structure. There is no standard configuration in manholes and many other structures; therefore, exact measurements must be completed and submitted prior to manufacturing each liner. CIP Industries, LLC provides diagrams for location, configuration, measurements, site & structure conditions, notes and observations.

4. INSTALLATION PROCESS

Cleaning: All surfaces of the host structure are to be cleaned with a high-pressure hydro-jet sprayer with an operating pressure of at least 4,000-psi. After pressure cleaning, surface may be cleaned with degreaser or other solvents, if needed to remove any film or residue on the surface. Structure shall then be pressure rinsed with water.

Final Preparation: All incoming laterals and main truck line openings shall be properly trimmed and grouted with hydraulic or Portland Type II Cement, forming a filet between the structure wall and each pipe. All inlet and outlet pipes should be trimmed so they do not extend into the structure more than two inches. Such application of grout shall extend at least six inches from the outlet onto the wall area. Manhole steps shall be removed flush to within ½" of the structure wall. Any remaining protrusion shall be grouted over to provide smooth surface for the liner.

Benches, walls, and floors shall be repaired and contoured as appropriate, using chemical grout, hydraulic cement or Portland type II cement. Bench areas and floors shall be lined with The CIP Liner System materials saturated with the epoxy resin and placed in the bottom to overlap with the liner wall section.

Manhole Liner Installation:

Once the liner is fully saturated with resin at the job site, it shall be lowered into the structure to the pre-marked position at the cover seat of the structure opening. The liner shall form a monolithic structure permanently connecting the ring & cover seat to the chimney, corbel, walls, and benches. Unless otherwise required, the liner will end on the bench at the beginning of the invert channel. In cases where invert channel lining is required, the sewage flow must be stopped for a minimum period of 3 hours and should be a separate cost item.

Normal installation procedures do not require the restricting or bypassing of the main trunk line in manholes where the sewage flow is contained within the channels, and channel lining is not required.

In cases where channel is required to be lined, the same process may be used as on the bench area however, the sewage flow must be stopped. Channels may also be lined with a hand lay-up method using structural epoxy CIP Mastic. Using the hand lay-up method, the channel shall be dry and free of infiltration of groundwater. The channel will receive not less than 1 24-oz structural woven roving fiberglass layer along with structural fiber reinforced epoxy mastic. If channel lining is required, it shall be specifically noted in the liner proposal or the client's quotation request.

The CIP Liners for manholes shall be pressurized with air or water, and cured with steam, ambient or heated air, or ambient or heated water. Most typical installations of The CIP Liner will be pressurized at a minimum of 250 lbs. per square foot, depending on the condition of the structure and the amount of hydrostatic pressure from incoming infiltration.

Pump Station, Wet Well and Vault Installation:

All pumps, pipes, and switches shall be removed from the structure, providing the installer of The CIP Liner an empty structure. Unless otherwise specified by the owner, the liner will include walls, the floor, and the underside of top slab. The underside of the top slab may be lined in conjunction with the walls and floor, or it may be coated with structural epoxy mastic. The underside of the top slab may also be lined by removing the top slab for installation of the liner and applying The CIP Liner materials or structural epoxy mastic, then allowing it to cure at ambient temperature. Removal of the top slab method will allow the top slab to be removed in the future.

Once the liner is fully saturated with resin, it shall be lowered into the structure to the appropriate pre-marked position at structure entrance. In the case of large or non-cylindrical structures, the liner may be installed in sections with multiple cure times. The liner shall form a monolithic laminated composite permanently bonded to all interior surfaces (and top slab where applicable).

Sewage pump stations and larger structures are cured under air pressure and heat, conforming to interior contours of the structure, with major infiltration being stopped prior to installation. The liner may also be cured with air pressure at ambient temperature or by filling the structure with water to approximately one foot above the surface area to be lined. Depending on specific site conditions, such as ground water infiltration, the water method may be preferred in order to offset hydrostatic head pressures.

Culvert/Pipeline Installations: The CIP Liner is designed for pipes from 12" to 96" in diameter. Once the liner is saturated with resin, it is lowered into the pipe and then pulled through the section to be lined. A dual inflation cannister system will be attached to the liner on each end. Air pressure and steam heat will be injected from one end and the other end will be equipped with an exhaust valve to control the amount of pressure within the structure. The liner will cover the entire circumference of the pipe or the portion of the pipe required to be lined. Hydraulic flow control will be required during the installation process.

Curing Process: Once the liner is positioned inside the structure it is pressurized with air or water. It is then cured with steam, ambient or heated air, or ambient or heated water. Most typical installations are heated by a temperature inversion system of pressurization with steam injection and a high velocity hot air column. This creates a steam/convection oven atmosphere which brings the liner temperature to approximately 150° to 190° F. The liner is heated for approximately one to three hours. The actual curing time will generally be based on the size of the structure. Regardless of the curing process, The CIP Liners will be fully covered under The CIP Liners warranty.

Upon completion of the liner curing process, the inflation bladder is removed, all lines are reopened, and the excess liner is cut off at the manhole cover seat or structure opening.

5. AVAILABILITY AND COST

Availability: The CIP Liners are available in all major marketing areas throughout the United States and Canada.

Cost: The CIP Liners require custom manufacturing and installation procedures tailored for each structure. The result is a sustainable, "green" solution to infiltration and H_2S gas deterioration. The CIP Liners provide the utmost in "value-engineering."

6. WARRANTY

CIP Industries, LLC and The CIP Liners authorized licensed Installer jointly provide their standard Twenty (20) Year unlimited and non-prorated Materials Warranty and One (1) Year Labor Warranty for all of The CIP Liners. The CIP Liner fabrics and resins are warranted to be free of defects in materials and workmanship, to prevent infiltration, prohibit root intrusion and provide a surface coating resistant to sewer gases and chemicals typically found in domestic sewer collection systems.

This warranty is for the repair or replacement of the liner as needed. Labor and Materials Warranties are as follows:

The CIP Liners -**Manholes:**
Unlimited, Non-prorated Twenty-Year Materials and One-Year Labor
The CIP Liners -**Sewage Pump Stations, Wet Wells & Culverts:**
Unlimited, Non-prorated Ten-Year Materials and One Year Labor

CIP Industries, LLC does not certify the structural integrity of existing structure or substructure, but the liner system will eliminate further deterioration due to sewer gases and significantly increase the life of the existing structure. In the case of industrial or chemical applications, warranty will be provided on a case-by-case basis.

7. MAINTENANCE

Although no maintenance is anticipated for decades, The CIP Liners are easily repaired. Small holes or cracks can be repaired with CIP Mastic. Larger areas may be repaired using fiberglass material coated on both sides with CIP Mastic for greater structural integrity. The

liner may be core drilled through for the addition of incoming lateral lines. CIP Mastic is a non-shrink 100% solids grout and is recommended for use as a seal between any incoming new line and the manhole or pump station lined wall.

8. TECHNICAL SERVICE

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