solutions

for global water, wastewater and industrial infrastructure

spray-applied polyurethane technology for structural rehabilitation, infiltration control, corrosion management and peace of mind.

SPRAYROQ®
Protective Lining Systems

about the company

Sprayroq, Inc. was founded in Jacksonville, Florida in 1990, as an extension of the innovative rehabilitation technique known as cured-in-place-pipe (CIPP). Utilizing plural component spray technology, Sprayroq developed a fast-curing structural and chemical resistant formula capable of excellent adhesion for the rehabilitation of underground infrastructure. This trenchless technology solution provides long life, corrosion control, abrasion resistance and NSF 61 approval.

Sprayroq products are widely used to protect and rehabilitate structures associated with potable water or sanitary sewer systems. The process incorporates a combination of unique product engineering and technologically advanced application equipment.

Today, Sprayroq continues to develop new products to meet the world's corrosion resistance and infrastructure renewal needs.

a word about polyurethanes...

While both epoxy and polyurethane are catalyzed, two-component coatings, polyurethanes cure much faster than epoxies, allowing them to be applied much more thickly in one application.

Typically, an epoxy must cure for 6-24 hours. Sprayroq's polyurethane products begin curing in about 10 seconds. They reach a tack-free state within 2 minutes and full cure-thru within 4-6 hours.

Depending upon coating thickness, typical polyurethane applications allow a structure to return to service within a few minutes or hours as opposed to dozens of hours or even days.

All this performance comes without any emission of volatile organic compounds (VOCs), making it safe for applicators and the environment. And different formulations allow varying degrees of elasticity and rigidness to match structural and protective performance needs.

applications

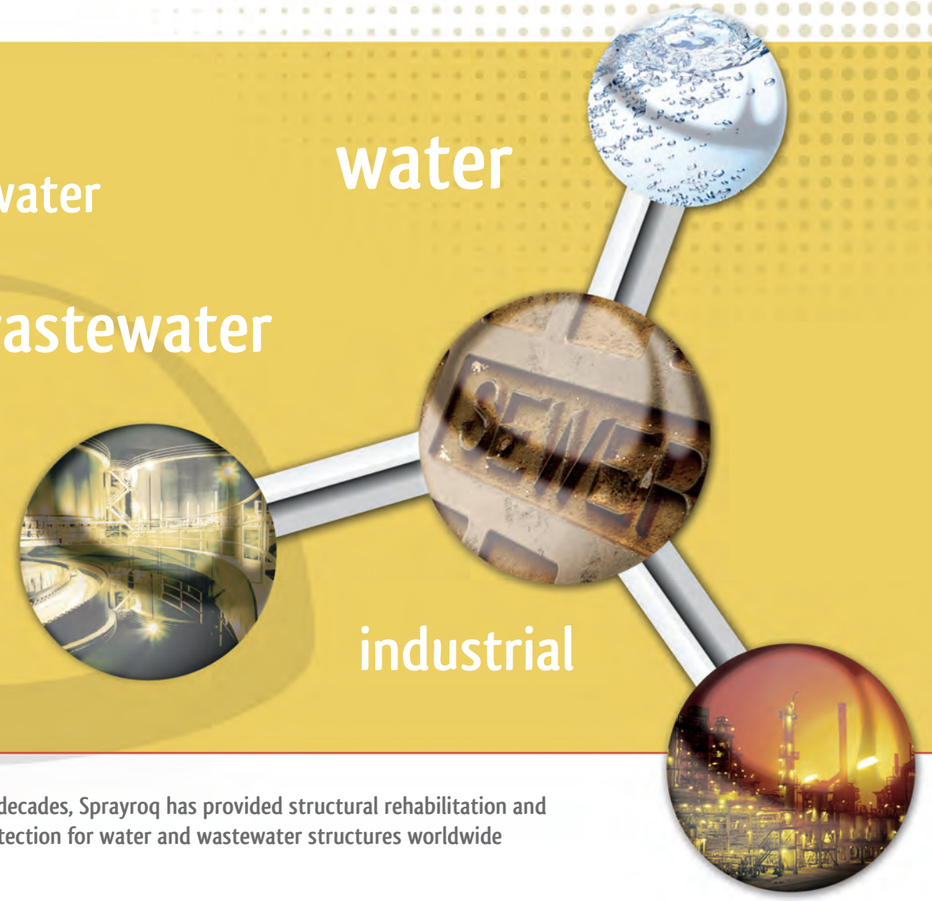
protect, rehabilitate and improve a broad variety of infrastructure assets

Manholes
Lift Stations
Wet Wells
Tanks
Grit Chambers
Clarifiers
Digesters
Junction Boxes
Pipelines (Man Entry Only)
Tunnels
Secondary Containment
Lagoons

Sprayroq polyurethanes are fast setting, tough, corrosion and abrasion resistant linings that can be spray-applied at any desired thickness in a single mobilization.

Our products are ideally designed for applications on surfaces exposed to acids, corrosives and other caustic elements. Environmental and climatic factors such as freeze/thaw cycling, high humidity or shrinking and swelling soil conditions have minimal effect.

With a range of formulas that span applications requiring elastomeric, semi-rigid or rigid (structural) properties, Sprayroq is the source for structural rehabilitation and corrosion protection solutions that provide excellent Return On Investment (ROI) and extension of asset performance life.



For over two decades, Sprayroq has provided structural rehabilitation and corrosion protection for water and wastewater structures worldwide

Product Line Overview

All Sprayroq products are quick curing polyurethanes, polyureas or hybrids; with one exception, SR6100 is a trowellable, high strength epoxy used for spot repairs or for coating structures where our Sprayroq Certified Partner's spray rigs cannot access.

Polyurethanes & Polyureas

Our polyurethane solutions include our core products SprayWall®, SprayShield Green® I and SprayShield Green® II. These products bring seamless solutions and are uniquely designed to meet the need for structural rehabilitation, corrosion resistance and/or long term protection of new structures. These durable, spray-applied polyurethane products are 100% VOC Free and offer fast cure times among other similar use products. They have all successfully passed a host of Third Party Tests. SprayWall® and SprayShield Green® I are NSF 61 Approved.

Epoxies

Although Sprayroq produces primarily polyureas, we do produce epoxies for use in manhole coatings repair. SR 6100 uses the same technologies we incorporate in our other core products to produce outstanding results. The SR 6100 Series of products by Sprayroq offers spray-applied abrasion and impact resistant coatings. These products are ideal for OEM applications in industrial and commercial markets. The SR 6100 Series products are 100% solids – VOC Free, corrosion resistant, fast curing and extremely durable materials designed for heavy use applications.

Equipment

Sprayroq is a proud supplier of the leading equipment lines in the industry today. Due to the outstanding quality and workmanship of these product lines our Sprayroq Certified Partners are able to maintain a steady rate of performance in the industry.

Product Differentiation

SprayWall® is a structural, spray-applied polyurethane with a flexural modulus of 735,000 psi and 4% elongation. This unusual combination of performance factors is part of what helps SprayWall® achieve a 50 year design life. As well, SprayWall® is NSF 61 certified for use in potable water applications. It is excellent for use in infiltration control, high hydrostatic loading and structural reinstatement of deteriorated water structures.

SprayShield Green® is a polyurethane as well, but is highly elastomeric with excellent tear strength. It is designed for use in applications where thermal cycling and geological events are commonplace. SprayShield Green® has the same corrosion resistant qualities as SprayWall® and NSF 61 certification as well.

Third Party Testing

We appreciate that Sprayroq products' end-users are often spending taxpayer money, and so are held to a high level of accountability. We take responsibility for maintaining your high reputation as seriously as our own. That's why we're committed to an ongoing program of third-party testing for our products' performance.

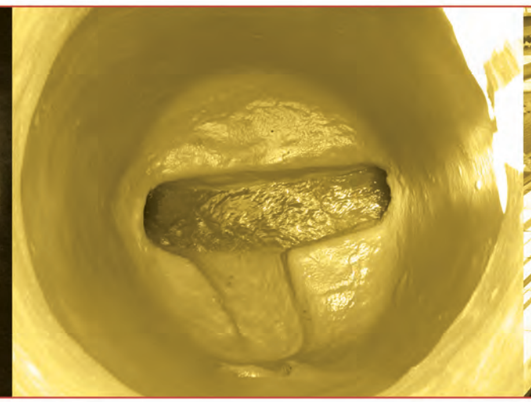
We use only ASTM professional labs to test actual performance of our materials against industry standards. You can have confidence that what we claim our products can do, they'll do.

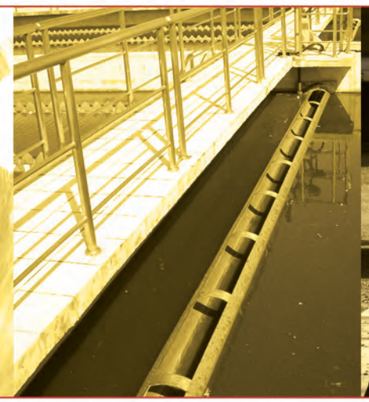
So when you specify a Sprayroq product for your next infrastructure rehabilitation project, you're purchasing a long-term solution that will live up to your expectations. And you don't have to take our word for it—we even cross-test our lab results between independent testers.

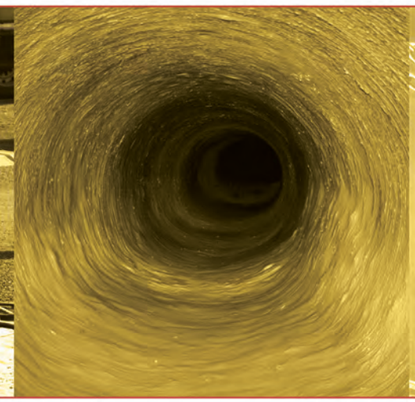
We have the confidence that our claims will stand up to the test so you can, too.

Certifications & Approvals

Sprayroq products are tested and certified on a regular basis as required. Current copies of all testing results and certifications are available electronically at our website: **www.sprayroq.com**







Sprayroq Certified Partners (SCP)

Though Sprayroq is proud of its solid line of products that perform above expectations, we feel that's not enough.

To bring the most value to our contractor customers and their end users, we know it's critical to be able to rely on the ability of those applying our products to do the job right the first time, every time.

After all the testing and work it took for us to arrive at our ideal product formulations, we realized that coaxing optimum performance from each application would require a thorough understanding of the chemical properties of the products and their interaction with surrounding environments.

This meant developing a thorough training course that would encompass virtually every infrastructure substrate, atmospheric and moisture condition that may be encountered in the field.

training and certification

All contractors wishing to use Sprayroq products in their rehabilitation work must become Sprayroq Certified Partners (SCPs). Candidates are carefully selected and must pass an extensive training and certification course to earn SCP status.

- **ONLY SCPs are authorized to apply Sprayroq products**
- **SCP candidates go through two weeks of rigorous training in product knowledge, performance theory and field application**
- **SCPs are personally certified by the President of Sprayroq**
- **SCPs must submit to annual skills review to maintain their certification**

Upon successful completion of this course, applicators are prepared not just to correctly apply the material, but also to make fact-based judgments about real-world conditions that will ensure the integrity of every installation they do. And they will work with the confidence that they're supported with constantly updated manufacturer training and technological support.

install with confidence

things to consider when selecting a rehabilitation or protective method

Your engineers have finalized the specifications on your upcoming project, and now it's time to decide how you're going to tackle the physical requirements of infrastructure rehabilitation or protection.

A few considerations will help you weed out viable techniques from obvious non-starters among the plethora of options you have to choose from.

- **CREDIBILITY –** Are the claims of the product and/or process backed up by third-party testing by at least one ASTM independent lab?
- **SATISFACTION ASSURANCE –** Does the product's manufacturer offer a meaningful warranty? Does the product's manufacturer offer rigorous, substantial authorized training for and certification of applicators/installers?
- **TECHNICAL GUIDANCE –** Can you find an easily accessible, up-to-date website containing technical specifications, preparation and application guidelines for the product or process?
- **CUSTOMER SUPPORT –** Does the manufacturer make its engineers and designers available to answer any of your questions not readily answered by its literature or website?
- **TRACK RECORD –** Can you easily locate case studies and testimonials for previous applications, and if so, do these include contact information for the decision-makers on those projects?

SprayWall®

SprayWall® is a 100% VOC-free self-priming polyurethane lining that reinstates structural integrity, provides infiltration control and chemical resistance for concrete, steel, masonry, fiberglass and other surfaces.

SprayWall®'s quick curing time allows the newly protected structure to be returned to service shortly after the application is completed.

COLOR

Gold is the standard product color. SprayWall®'s color is derived from the natural coloration of our raw materials.

SOLIDS BY VOLUME & VOCs

100% VOC (Volatile Organic Compounds) free

COVERAGE

16 square feet per gallon at 1/10" (100 mil) thickness
.4 square meters per liter at 2.5 mm thickness

APPLICATION METHOD

SprayWall® is applied by utilizing a proprietary heated plural component spray system. Complete integrated spray system information is available by contacting Sprayroq technical support.

SURFACE TEMPERATURE

60°F / 16°C minimum recommended
120°F / 49°C maximum recommended for optimum protection

COMPONENTS & MIX RATIO

Part A, Resin | Part B, Hardener | 65 : 1.00 by volume

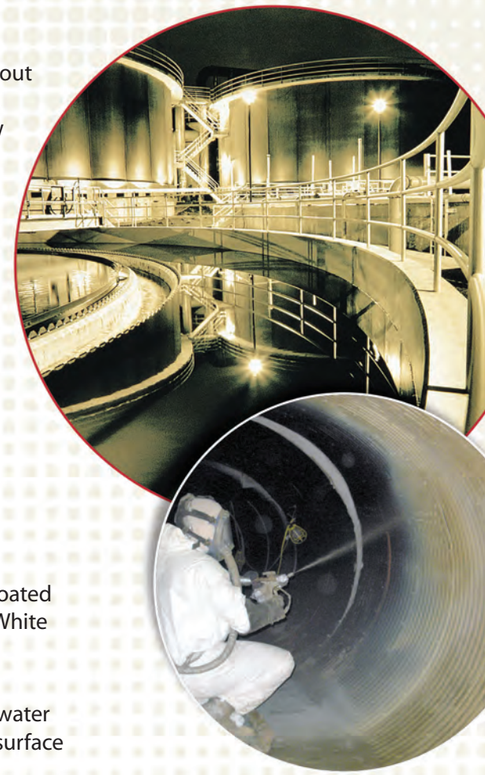
PACKAGING

SprayWall® is sold exclusively to Sprayroq Certified Partners in 1,500 lb. / 680.4 kg sets of material

CURE & RECOAT TIME

After the A and B components are mixed, SprayWall® begins to gel in about 8 seconds, with a tack-free condition after 2 minutes. Within 60 minutes, the initial cure is complete and the structure is capable of accepting flow while complete curing continues for the next 4-6 hours.

Note: If several coats are applied, no more than 15 minutes should be allowed between coat applications. Surfaces should be cleaned thoroughly to remove any contaminants between coats. In addition, all precaution should be taken to protect the application surfaces between coats.



PREPARATION

Surfaces to be treated must be cleaned of all oil, grease, rust, scale, deposits and other debris or contaminants. All resins, including SprayWall®, require a clean and dry substrate for optimal technical performance of the product.

STEEL

Solvent Cleaning (SSPC-SP1) may be necessary for steel. Surfaces to be coated should be prepared in accordance with SSPC-SP10 or NACE No.2: "Near White Blast Cleaning."

When applicable, an alternate procedure may be employed using high (>5,000 psi / >34.5 MPa) or ultrahigh (>10,000 psi / >69.0 MPa) pressure water cleaning or water with sand injection and approved rust inhibitors. The surface profile must be a minimum of 2 mils / 0.05 mm.

CONCRETE AND MASONRY

Low (2,500 – 3,000 psi / 17.2-20.7 MPa) to high (>5,000 psi / >34.5 MPa) pressure water cleaning, shot blasting, abrasive blasting or combination acid etching and water cleaning can be used to prepare these surfaces.

FIBERGLASS

Prepare fiberglass by rinsing, neutralizing, scarifying and cleaning with water or a mixture of water and solvent. Be sure all dust and loose particles are removed. The surface should be thoroughly dry before application of SprayWall®.

SHELF LIFE & STORAGE

Shelf Life: 1 year in sealed, unmixed containers
Store in a sheltered area between 50°F / 10°C and 95°F / 35°C

SprayShield Green®

Bio-based polyurethane technology for preserving our infrastructure and environment

SprayShield Green® I

Elastomeric Polyurethane

SprayShield Green® I is a flexible, 100% solids polyurethane lining that provides chemical resistance for concrete, steel, masonry, fiberglass and other surfaces in municipal, industrial, agricultural and maritime applications. SprayShield Green® is formulated for use in wastewater and potable water environments. SprayShield Green®'s quick curing time allows the newly protected structure to be returned to service immediately.

SprayShield Green® II

Semi-RigidPolyurethane

SprayShield Green® II is a semi-rigid, 100% solids polyurethane lining which provides chemical resistance for concrete, steel, masonry, fiberglass and other surfaces in municipal, industrial, agricultural and maritime applications. SprayShield Green® II is formulated for use in wastewater, stormwater and water environments. SprayShield Green® II's quick curing time allows the newly protected structure to be returned to service quickly.

COLOR

SprayShield Green® I standard color is Light Green
SprayShield Green® II standard color is Yellow Green

COVERAGE

16 square feet per gallon at 100 mil. thickness

SOLIDS BY VOLUME & VOCs

100% solids by volume and VOC
(Volatile Organic Compounds) free

COMPONENTS & MIX RATIO

Part A, Resin | Part B, Hardener
65 : 1.00 by volume

APPLICATION METHOD

SprayShield Green® is applied by utilizing a proprietary heated plural component spray system. Complete integrated spray systems informatio is available by contacting Sprayroq.

SURFACE TEMPERATURE

60°F / 16°C minimum recommended
120°F / 50°C maximum recommended for optimum protection

CURE & RECOAT TIME

After the A and B components are mixed, SprayShield Green® begins to gel in about 8 seconds, with a tack-free condition after one minute. Within 30 minutes, the initial cure is complete and the structure is capable of accepting flow while the complete curing process continues for the next 4-6 hours.

SprayShield Green® may be applied up to 300 mils (.3") / 7.6mm thick in a single application.

Note: If several coats are applied, no more than 15 minutes should be allowed between coat applications. Surfaces should be cleaned thoroughly to remove any contaminants between coats. In addition, all precaution should be taken to protect the application surfaces between coats.

STEEL

Solvent Cleaning (SSPC-SP1) may be necessary for steel. Surfaces to be coated should be prepared in accordance with SSPC-SP10 or NACE No.2: "Near White Blast Cleaning."

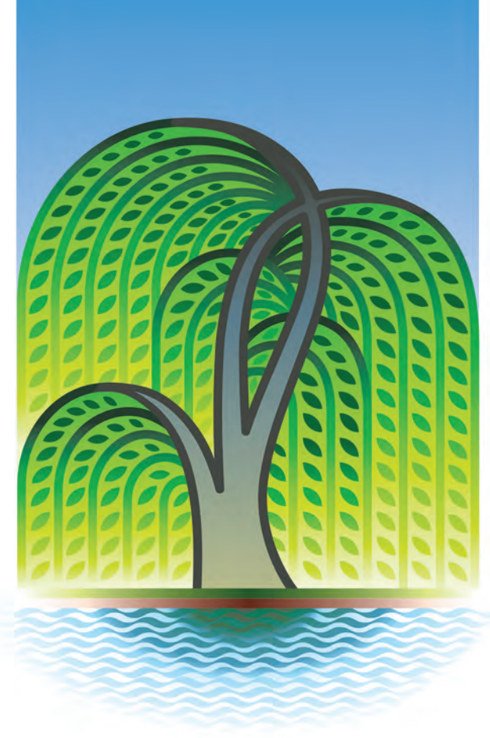
When applicable, an alternate procedure may be employed using high (>5000 psi / >34.5 MPa) or ultrahigh (>10000 psi / >69.0 MPa) pressure water cleaning or water with sand injection and approved rust inhibitors. The anchor profile for surface preparation must be a minimum of 2 mils.

CONCRETE AND MASONRY

Low (2500 – 3000 psi / 17.2-20.7 MPa) to high (>5000 psi / >34.5 MPa) pressure water cleaning, shot blasting, abrasive blasting and water cleaning can be used to prepare these surfaces.

FIBERGLASS

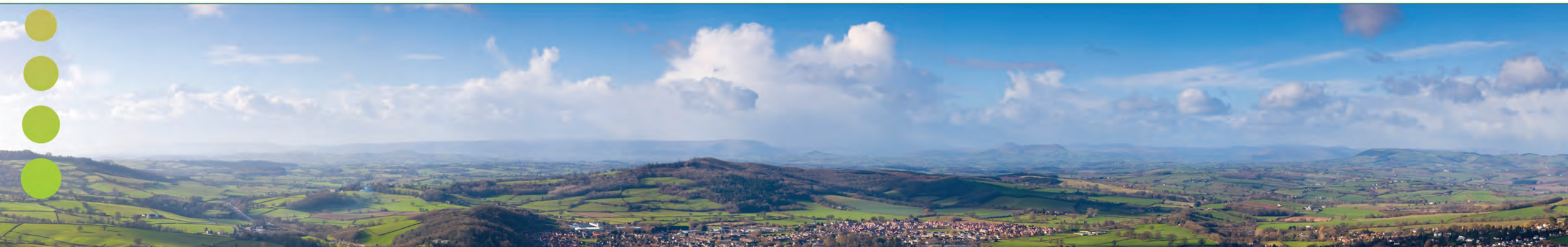
Prepare fiberglass by rinsing, neutralizing, scarifying and cleaning with water or a mixture of water and solvent. Be sure that all dust and loose particles are removed. The surface should be thoroughly dry before application of SprayShield Green®.



Why a Willow Tree?

The willow tree is one of the strongest structures in nature. Because it has learned over time to bend and be flexible, the willow gracefully withstands extreme conditions and environmental pressures.

It is the willow tree's attributes of strength, flexibility and longevity that Sprayroq incorporates into its green product line to create sustainable solutions.



chemical resistance testing

CHEMICAL	CONCENTRATION	RESULTS
Acetic Acid	5% - 40%	No Effect
Acetone		Not Recommended
Ammonium Hydroxide	5%	No Effect
Benzene		No Effect
Benzol Alcohol		Little Visible Effect | Samples Pitted
Benzoyl Chloride		Little Visible Effect
Brake Fluid		Little Visible Effect
Diesel Fuel		No Effect
Dimethyl Formamide		Not Recommended
D-Limonene		No Effect
Ethanol		Not Recommended
Ethylbenzene		No Effect
Ferric Chloride	1-4%	No Effect
Gasoline w/o Ethanol		No Effect
Hexane		No Effect
Hot Tub Water		No Effect | 140° F with Spikes up to 170° F
Hydraulic Oil		No Effect
Jet Fuel (Jet-A, JP-5, JP-8)		No Effect
Kerosene K1		No Effect
Methanol		Not Recommended
MethylEthylKetone(MEK)		Not Recommended
Mineral Spirits		No Effect
Motor Oil		Little Visible Effect
M-Pyrol (methyl pyrollidone)		Not Recommended
Muriatic Acid	1% - 10%	No Effect
Nitric Acid	1%	No Effect
Perchlorethylene		No Effect
Sodium Hydroxide	5%	No Effect
Sodium Hypochlorite-Clorox	5%	Not Recommended
Styrene		No Effect
Sulfuric Acid	1% - 20%	No Effect
Tap Water		No Effect
Toluene		No Effect
Vinegar	5%	No Effect
Xylene		No Effect

important to note

surface preparation

Proper surface preparation is the most important factor for the immediate and long-term successful performance of any polymer application. Sprayroq recommends that all surface preparation procedures follow standards set by both the National Association of Corrosion Engineers (NACE) and Society for Protective Coatings (SSPC).

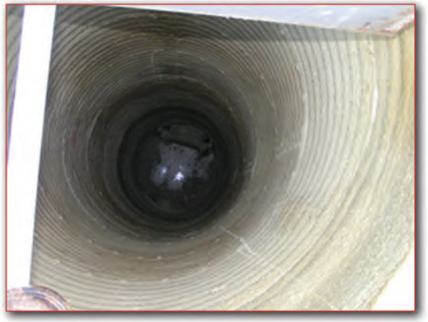
Surfaces must be cleaned of all oils, greases, scale, deposits and other debris or contaminants using water or abrasive blasting methods. Water or foreign substance infiltration must be stopped and the substrate must be allotted the proper amount of time to thoroughly dry before any coatings are applied. There is no such thing as a tolerable amount of moisture when referring to the coating of structures with any kind of polymer. In some cases the substrate will need to obtain a certain profile before proceeding with the coating process.

Sprayroq also recommends that any contractor applying coatings have the proper training to be able to understand possible failures, trouble shooting techniques and proper application testing methods.

TEST DESCRIPTION	Method	SprayWall®	SprayShield Green® I	SprayShield Green® II
Flexural Modulus	ASTM D790	>735,000 psi / 5,067.6 Mpa	Not Applicable	>75,000 psi / 517.1 Mpa
Long Term Flexural Modulus of Elasticity	ASTM D6992	529,000 psi / 3,647.3 Mpa	Not Applicable	Not Applicable
Tensile Strength, psi	ASTM D638	>7,450 psi / 51.4 Mpa	>2,780 psi / 19.2 Mpa	>2,900 psi / 20.0 Mpa
Elongation %	ASTM D638	<4%	115%	43%
Tear Strength, pli	ASTM D624	Not Applicable	580 pli / 102 Kn/m	593 pli / 104 Kn/m
Compressive Strength	ASTM D695	>18,000 psi / 124.1 Mpa	Not Applicable	Not Applicable
Water Permeation g/day/m^2	ASTM E96	1.65	1.49	1.49
Abrasion, mg loss / 1,000 cycles	ASTM D4060	17.7 mg loss	53.0 mg loss	42.0 mg loss
Hardness, Shore D	ASTM D2240	85	62-68	62-68
Density, lbs./ft^3	ASTM D792	87 lbs./ft^3 / 1,394 Kg/m^3	67.5 lbs./ft^3 / 1,081 Kg/m^3	67.5 lbs./ft^3 / 1,081 Kg/m^3
Mannings "N" Factor	- - -	0.009	0.01	0.01
NSF	NSF 61	Yes	Yes	No
Biobased Content	ASTM D6866	Not Applicable	35%	34%

All third party rest results documents are availalble at www.sprayroq.com

Sprayroq in Action



Lake Heron Overflow Pipe

Lake Heron's water level was so low that it was impossible for the city of Liverpool, Pennsylvania, to allow any recreational use. To fix the pipe, the city needed a corrosion barrier and a product that was structural in nature.

The corrugated pipe measured 20' deep and 42' in diameter. This would make spray access easier, but the depth made it a nightmare for dealing with water. With the average annual temperature of 27.6°F during this time of the year, snow and freezing temperatures would also be troubleshooting factors.

Since the pipe was located in the lake, the water had to be blocked out and dried up before the project could commence. This was achieved by stopping the infiltration with a chemical grout pumped into the openings, then using a blower to dry the structure. The pipe would require 300 mils of SprayWall® to give the structure the corrosion barrier and structural protection it needed.

Results: The project took two days and used 1100 lbs. of SprayWall® material. The city was now able to return the lake to regular recreational use.

Metropolitan Water Reclamation District of Chicago

The existing sewer to be rehabilitated was approximately 80 years old and was located 20 ft. below ground. This project also included ten 4-foot-diameter manholes that were to be coated with SprayWall®, a structural coating.

The age and depth of the sewer line, combined with a project design that assumed 15 ft. of hydrostatic water pressure above the invert with an engineered safety factor of 1.5, led to a SprayWall® application thickness of 1,250 mils. This coating was determined to be able to overcome the earth load, with applicable live load and the assumed hydrostatic load above the pipe.

Due to the condition of the pipe, it was determined that if the system were to be placed back in service after the preparation, the patch compound would wash away. After the floor repair was complete, along with the removal and preparation of an unanticipated coffer dam, SprayWall® was ready for application. Applied at 1,250 mils using concrete nails to measure the thickness, the sewer section would take up to 16 hours of continuous spraying to complete. The east and west sections would take 32 continuous spraying hours to finish.

Results: 25,000 lbs. over two days. 10 manholes were completed and the sewer rehabilitation was completed on time.

Rubber Products Manufacturing Plant

The project consisted of two below-grade, concrete, closed-top cooling tanks. The 10,000 sq. ft. total surface area was accessible only through two 20" man entries per tank. The scope of work included removal of existing 23-year-old liner material and installation of SprayWall® by Sprayroq at 100 mils throughout the structure.

After the existing liner was removed, workers found that due to numerous cracks, water infiltration was much more severe than anticipated. The team dealt with this problem by injecting 500 linear feet of floor-to-wall cold joint, and an additional 200 ft. in wall cracks. This allowed the crew to begin pressure-washing the structure. It was at this point when it was determined that 8,000 sq. ft. of the wall surface needed to be parged by hand trowel to bring the wall out to spec.

After all this preparation was complete, SprayWall® could be applied to the structure, from 150 to 250 mils thick in some places.

Results: The project was completed on time, with no lost production for the plant.

Seneca Lift Station

The Kelly Station, a 40+ year old brick construction lift station operated by the City of Seneca, South Carolina had a significant evidence of infiltration, root intrusion and a high level of debris build-up on its walls. Because of the current levels of infiltration and root intrusion the station's pumps were operating almost 60 minutes per day.

On June 3, 2008, the SCP crew mobilized to the Kelly Lift Station and cleaned the structure using a 4000 PSI pressure washer. This was followed by the pumping of Hydro-Cut Urethane Grout by de Neef Construction Chemicals to stop the water infiltration from seeping through the existing brick structure.

After the initial infiltration was eliminated, the crew began coating the walls with Five Star structural repair mortar. After the walls were parged, SprayWall® was applied at a thickness of 250 mils to the inside of the structure.

Results: The lift station was put back into service on June 6, 2008 (Less than 1 hour after the installation of SprayWall®) and by June 8, 2008 the City of Seneca reported a decrease in pump usage at the Kelly lift station of 50%.

your Sprayroq certified installer

Warranty and Disclaimer:

As best determined, the technical data represented for all Sprayroq products is deemed to be accurate. All products are to be applied by trained and approved Sprayroq Certified Partners only and in strict accordance with the directions for usage and installation of the Sprayroq product. Sprayroq guarantees our products to conform to the quality assurance procedures established by Sprayroq and its resin blending partners. We assume no responsibility for coverage, performance or injuries resulting from the use of our products. Liability, if any, is limited to replacement of the product for a period of three years from the date of application only. Sprayroq is not responsible for any treble expenses, liquidated damages or related labor expenses stemming from the use of this product. No other warranty is made by Sprayroq, expressed or implied, statutory or by operation of the law, including merchantability and fitness for a particular purpose.

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SPRAYROQ®
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...the gold standard®