SPI Performance Coatings
Mopes Ln, Purton, Wiltshire
SN5 4HG

Raven® 405FS

Technical Data Sheet

Selection and Specification Data

Description

Raven® 405 is a 100% solids, Fast Set (FS), ultra-high build, solvent free epoxy coating formulated with exceptionally high physical properties and chemical resistance. 405 exhibits a superior bond to dry and damp concrete, masonry, steel, ductile iron and fibreglass and is specifically designed as a corrosion protection and structural enhancement lining system which can be used on and in wastewater structures, buried pipelines, tanks, and other corrosive environments.

Typical Uses

Severe Wastewater Environment—New or existing concrete and steel structures where rehabilitation of an existing structure requires enhancement of the structural integrity and where exposure to concentrated acids and caustics may be expected. Also, designed to reduce the Inflow and Infiltration (I&I) to sewer collection systems.

Colour & Stability (Limitations)

The Part A Resin is white; the Part B Curing Agent is blue. When mixed the product is light blue. Discolourations and yellowing can and will occur upon exposure to UV (exterior applications). Discolouration or down-glossing does not affect performance.

Theoretical Coverage Rates

Theoretical coverage is 1604 square feet per gallon at 1 mil DFT. Actual surface coverage will depend on substrate porosity and roughness. A wet film thickness gauge or pump stroke counter may be used to determine actual coating coverage.

Dry Film Thickness

Recommended thickness will vary from 30 - 250+ mils per coat based on service conditions.

Recommended Dry Film Thickness (Typical)	
Concrete, New/Smooth	80-250+ mils DFT
Concrete, Rough	100-250+ mils DFT
Concrete, Resurfaced	80-250+ mils DFT
Masonry/Brick	125-250+ mils DFT
Masonry/Brick, Resurfaced	80-250+ mils DFT
Steel (Carbon)	30-80 mils DFT
Non-Ferrous Metals	30-80 mils DFT

Physical Properties (typical)

Description	Method	Results
Tensile Strength	ASTM D638	>7,500 psi
Tensile Elongation	ASTM D638	1.5%
Compressive Strength	ASTM D695	>16,000
Hardness, Shore D	ASTM D2240	88
Adhesion, Concrete	ASTM D7234	Substrate Failure
Adhesion, Steel	ASTM D4541	>2,500 psi
Flexural Strength	ASTM D790	>13,000
VOC	Calculated	0 g/L

The value ranges stated in this Technical Data Sheet are based on system processing under controlled laboratory conditions. Equipment configuration and/or field application conditions may produce variances in the final system values.

Surface Preparation

Prior to coating, the substrate must be prepared in a manner that provides a uniform, clean, sound, neutralized surface suitable for the specified coating. The substrate must be free of all contaminants, such as oil, grease, rust, scale or deposits. In general, coating performance is proportional to the degree of surface preparation.

Concrete and Masonry

Reference SSPC SP-13/NACE No. 6 Surface Preparation of Concrete. Surfaces must be sound and contaminant-free with a surface profile equivalent to a minimum CSP3 to CSP5 in accordance with ICRI Technical Guideline No. 310.2R-2013. This can generally be achieved by abrasive blasting, shot blasting, high-pressure water cleaning, water jetting, or a combination of methods.

Steel (Immersion Service)

Clean the surface prior to surface preparation in accordance with “Solvent Cleaning” (SSPC SP- 1) to remove oil, grease, and other soluble contaminants. Surfaces to be coated should then be prepared according to SSPC SP-10/NACE No. 2 Near-White Metal Blast Cleaning for immersion service. The resulting angular anchor profile shall be 3.0-5.0 mils and be relative to the coating thickness specified..

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Steel (Atmospheric/Non-Immersion Service)

Visible deposits of oil, grease, or other contaminants shall be removed according to SSPC-SP 1 followed by SSPC SP-6/NACE No. 3 Commercial Blast Cleaning, resulting in a sharp angular anchor profile of 2.5-4.0 mils.

Ductile Iron Pipe (Atmospheric and Immersion Service)

All oils, small deposits of asphalt paint and grease shall be removed by solvent cleaning (see NAPF 500-03-01). Abrasive blast to accordance with NAPF 500-03-04. More information on cleaning ductile iron pipe can be found at www.napf.com

Primers (Suggested)	
Concrete (optional)	Raven 175 Raven 171FS Raven 155
Carbon Steel (blast holding)	AquataPoxy 190* Raven 490*
Non-Ferrous Metals	AquataPoxy 190

PVC, PE, PP, PS, & HDPE- Contact SPI Performance Coatings

*Do not use this primer if immersion temperatures will exceed 60°C

Thinning and Mixing

Components and Mix Ratio: Part "A" Resin: Part "B" Curing Agent. Mix ratio is 3:1 by volume. Note: Raven 405 "A" side is compatible with all 405 Series "B" sides.

Hand Mixing (touch-up or small repairs)

Individually power mix both Part A and Part B containers prior to measuring out 3 parts of Part A to 1 part of Part B by volume into a clean disposable pail. Completely mix combined A & B for a minimum of one minute before transferring contents to a clean pail. Continue mixing at least another minute, scraping the sides and bottom, to obtain a thorough mix before application. Properly mixed material will be a uniform colour without light or dark spots.

Thinning

Do not thin with solvents. If lower viscosity is needed, heat unmixed material by placing the containers in hot tap water until the desired flow properties are obtained. To heat larger quantities, drum heaters or inline heaters on specialized spray equipment may be used. Unmixed material should not be heated above 66°C.

Pot Life

The pot life is ~10 minutes for 2.3 litres at 22°C. Longer pot life is possible by mixing smaller amounts and/or cooling down the part A & B before mixing.

Spray Application

Optimal proportioning and mixing is achieved with the use of an approved plural-component airless spray system. Raven recommends the use of fixed ratio (3:1), such as, Graco XP 50 or 70 Plural-Component Pump System. Viscon Fluid Heaters and heated hoses are recommended. Carefully monitor, heating devices such as drum blankets or bands to avoid scorching of the material or melting drum liners. Pre-heating containers must not exceed temperatures greater than 65°C.

Recommended Spray Temperatures

46-62°C for Part 'A' and 32.2-51.7°C for Part 'B'. Temperature is dependent on ambient conditions and hose lengths. To equalize viscosities and reduce operating pressure, Part A should be 11.1°C warmer than Part B during processing.

Equipment Set-Up	
Heated Hose Temp	51.7 - 62.8°C
Typical Spray Pressure	1,800 - 3,000 psi
Recommended Tip Sizes	531-535
Pot life at whip/gun	1 - 2 minutes
Supply pump pressure	100 psi

Brush/Trowel

For touch-up and holiday repair only.

Environmental and Substrate Conditions

The minimum recommended substrate temperature: 4° C Maximum recommended substrate temperature: 49°C. For best results in limiting outgassing, with a primer or not, apply to prepared concrete when the substrate temperature is stable or falling.

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Service Temperatures (Temperature Resistance)

Maximum recommended dry temperature: 77°C. Wet temperature resistance depends on chemical concentration and exposure time. Contact SPI Performance Coatings for additional information.

Cure Time

The set time varies with substrate temperature and application thickness. Generally, the coating will be tack-free in 3.5 hours at 22°C and dry-hard in about 5 hours.

Cure to Service (Municipal wastewater):

2.5 hours at 15.6°C

Recoat Time

Raven 405FS may be recoated as soon as it becomes tacky but does not transfer to the finger. When applying multiple coats, do not allow more than 12 hours at 22°C substrate temperature to pass between coats, higher temperatures will shorten this window. Before recoating; visually inspect, clean and dry surface thoroughly to remove all contamination, including amine blush or condensation. If the recoat time is missed, abrade and clean surfaces prior to recoating.

Clean Up

To clean tools, use acetone, MEK or xylene. To clean skin, wash immediately and thoroughly with soap and water. Refer to the Safety Data Sheet (SDS) for additional information on health and safety.

Safety

SDS's are available on the website (www.spiperformancecoatings.com) or upon request. Consult the Safety Data Sheet for this product concerning health and safety information before using. Strictly follow all notices on the Safety Data Sheet and container label. If you do not fully understand the notices and procedures provided on the SDS or if you cannot strictly comply with them, do not use this product. Actual safety measures are dependent on application methods and work environment. Keep uncured product away from children at all times.

Available Packaging

Available in 19L pails as a 76L kit, 113.5L drums as a 454L kit, and 208L drums as a 832L kit. Kits are supplied in the correct proportions of A & B; and the two components must be mixed together before use.

Storage

Store in a sheltered area between 16°C and 38°C.

Shelf Life

Product shelf life is 2 years from purchase date in original unopened containers.

Warranty

Limited Warranty: Company warrants its goods to be free of manufacturing defects. Goods manufactured by Company will comply with all applicable federal, state and local laws and regulations. Company makes no warranty as to any parts or equipment manufactured by others. Customer shall look solely and only to the manufacturer of such parts or equipment with respect to any warranty claims. Company hereby assigns to Customer the original manufacturer's warranties to all such equipment and parts, to the full extent permitted. THE AFORESAID IS THE EXCLUSIVE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. SPECIFICALLY, THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

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