



Raven Lining Systems
 686 S. Adams Street
 Kansas City, KS. 66105

Raven® 410 HCR

Chemical Resistant Epoxy

Technical Data Sheet

Selection & Specification Data

Description:

Raven 410 HCR is a solvent-free 100% solids, ultra-high build “novolac” epoxy coating formulated with excellent physical strengths and excellent chemical resistance. Raven 410 HCR exhibits superior adhesion to concrete, steel, masonry, fiberglass and other surfaces. Designed for continuous operating temperatures up to 140°F in 98% sulfuric acid solution, 410’s unique ultra-high-build ability allows it to be spray applied on vertical and overhead surfaces up to 80 mils in one application. The surface tolerance and high physical strengths of 410 HCR allow it to be designed as a semi-structural, chemical resistant lining in pipelines, tanks and other new or deteriorated structures.

Typical Uses:

Surfaces where rehabilitation of an existing structure requires enhancement of the structural integrity and where exposure to concentrated acids and caustics may be expected, including:

- Tunnels and pipelines
- Clarifiers
- Digesters
- Tank Linings
- Secondary containment
- Petroleum Tanks
- Wastewater facilities
- Floors and walls

Color & Stability (Limitations)

The Part A Resin is Baby Blue; the Part B Curing Agent is unpigmented. When mixed, the product is light blue. Limited special colors are available on request.

Limitations: This product is an aromatic epoxy and is not UV-stable for color or gloss retention. Discolorations and yellowing can and will occur upon exposure to UV (exterior applications). Discoloration or down-glossing does not affect performance.

Coverage:

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

Film Thickness:

Raven 410 HCR is a 100% solids epoxy with zero shrinkage. Wet film thickness and dry film thickness are the same (i.e. 80 mils WFT = 80 mils DFT). Depending on the substrate type and profile, a maximum of 80 mils per coat is recommended to prevent sagging. The recommended total thickness will vary from 20 - 250 mils+ 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. |
| Carbon Steel: | 30-50 mils DFT. |

Physical Properties (Typical)

| Description | Method | Results |
|--|------------|-------------------|
| Tensile Strength | ASTM D638 | 7,000 psi |
| Abrasion, Taber (CS-17 Wheel, 1kg, 1,000 revs) | ASTM D4060 | <112 mg loss |
| Tensile Elongation | ASTM D638 | 1.4% |
| Compressive Strength | ASTM D695 | 14,000 psi |
| Hardness, Shore D | ASTM D2240 | 88 |
| Adhesion, Concrete | ASTM D7234 | Substrate Failure |
| 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.



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Surface Preparation

General

Before 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: Surfaces must be sound and contaminant-free with a surface profile equivalent to a minimum CSP3 to CSP5 following 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 before surface preparation following “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.

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 Raven Tech Service

*Do not use this primer if immersion temperatures will exceed 140°F

Thinning and Mixing

Thinning

Do not thin with solvents.

If lower viscosity is needed, heat the 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 150°F.

Components and Mix Ratio: Part A Resin: Part B Curing Agent. The mix ratio is 3:1 by volume.

Power Mixing (Hand Mix)

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 color without light or dark spots.



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| Application & Equipment Guidelines | | | | | | | | | | | | | |
|---|--|------------------|--|------------------|-------------|------------------------|-----------------|-----------------------|-----------|----------------------|-------------|----------------------|---------|
| <p>Spray Application</p> <p>Optimal proportioning and mixing is achieved with the use of a Raven Lining Systems approved plural-component airless spray system. Raven recommends the use of a fixed ratio (3:1), such as a 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 150°F.</p> <p>Recommended spray temperatures</p> <p>115-125°F for Part 'A' and 90-125°F for Part 'B'. Temperature is dependent on ambient conditions and hose lengths. To equalize viscosities and reduce operating pressure, Part A should be 20°F warmer than Part B during processing.</p> | <table border="1"> <thead> <tr> <th colspan="2">Equipment Set-Up</th> </tr> </thead> <tbody> <tr> <td>Heated Hose Temp</td> <td>125°F-145°F</td> </tr> <tr> <td>Typical Spray Pressure</td> <td>1,800-3,000 psi</td> </tr> <tr> <td>Recommended Tip Sizes</td> <td>.019-.031</td> </tr> <tr> <td>Pot life at whip/gun</td> <td>1-2 minutes</td> </tr> <tr> <td>Supply pump pressure</td> <td>100 psi</td> </tr> </tbody> </table> <p>Brush/Trowel</p> <p>For touch-up and holiday repair only.</p> | Equipment Set-Up | | Heated Hose Temp | 125°F-145°F | Typical Spray Pressure | 1,800-3,000 psi | Recommended Tip Sizes | .019-.031 | Pot life at whip/gun | 1-2 minutes | Supply pump pressure | 100 psi |
| Equipment Set-Up | | | | | | | | | | | | | |
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| Application & Service Conditions | | | | | | | | | | | | | |
| <p>Environmental & Substrate Conditions</p> <p>Minimum recommended substrate temperature: 40°F (4°C) Maximum recommended substrate temperature: 120°F (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.</p> | <p>Service Temperatures (Temperature Resistance)</p> <p>The maximum recommended dry temperature: 200°F (93°C). This product may be post-cured for service up to 250°F (121°C). Wet temperature resistance depends on chemical concentration and exposure time. Contact Raven Technical Service for additional information.</p> | | | | | | | | | | | | |
| Curing Schedule & Re-Coat Window | | | | | | | | | | | | | |
| <p>Cure Time</p> <p>The set time varies with substrate temperature and application thickness. Generally, the coating will be tack-free in 3 ½ hours at 72°F (22°C) and dry-hard in about 6 hours.</p> <p>Cure to Service (Municipal wastewater):</p> <p>12 hours at 72°F</p> | <p>Recoat Time</p> <p>This product 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 6 hours at 72°F (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 before recoating.</p> | | | | | | | | | | | | |



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| Cleanup & Safety | |
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| <p>Clean Up: To clean tools, use acetone, MEK or xylene. To clean skin, wash immediately and thoroughly with soap and water. Refer to the Material Safety Data Sheet for additional information on health and safety.</p> | <p>Safety: SDS's are available on the website (www.ravenlining.com) or upon request. All personnel should read and understand the safety recommendations as set forth in the SDS. Keep uncured product away from children at all times.</p> |
| Packaging, Storage and Shelf Life | |
| <p>Available Packaging: Available in 5 gallon pails (20 gallon kit), 30 gallon drums (120 gallon kit) and 55 gallon drums (220 gallon kit). Kits are supplied in the correct proportions of A & B; these two components must be mixed together before use. Raven 410 HCR is available through Raven Certified Applicators.</p> | <p>Storage: Store in a sheltered area between 60°F and 80°F (15°C and 27°C).</p> <p>Shelf Life: Product shelf life is 1 year from purchase date in original unopened containers</p> |
| Warranty | |
| <p>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.</p> <p>Limitation of Liability. COMPANY'S LIABILITY FOR DEFECTIVE OR NON-CONFORMING GOODS SHALL BE LIMITED TO, AND SHALL IN NO EVENT EXCEED, THE AMOUNT PAID BY CUSTOMER FOR SUCH DEFECTIVE OR NON-CONFORMING GOODS. UNDER NO CIRCUMSTANCES SHALL COMPANY BE LIABLE FOR ANY SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR FOR LOST PROFITS. In no event may any claim by Customer arising from or relating to any sale of any goods or services referenced herein be brought more than one year after the date of delivery of such Goods.</p> | |