Heresite P-413

Our 50 years of coating history speaks for itself.

In 1964, Heresite was the first company to apply coatings to aluminum-finned, copper-tubed heat exchangers. The Heresite coating became then, and still remains a standard in the industrial coatings industry. We provide the highest quality protective coatings for air conditioning and refrigeration systems that operate in moderate to severely corrosive environments, including both coastal and/or industrial applications. Our phenolic epoxy has an advantage of dense cross linking and can therefore be applied as a very thin film maintaining stable heat transfer.

We continue our focus on innovation and again have a new story to tell, as we introduce our updated P-413

- A high performance phenolic epoxy coating developed specifically for heat exchangers.
- The flexibility and corrosion resistance of Heresite P-413 appreciably increases the service life of your heat exchange equipment.
- It is specially suited for coating light gauge metals in equipment operating in severe corrosive environments.

P-413 Specifications

The coil will receive a uniform coating on all surfaces, including fin edges, with P-413, a thermoset, modified phenolic coating. Application of P-413 will be through multiple coats by immersion or flow coating to a film thickness of approximately 1.0 mil.

P-413 provides corrosion protection in a 6,000 hour salt spray test in accordance with ASTM B-117 and humidity resistance of >2,000 hours per ASTM D2247. Chemical resistance is demonstrated via 100+ acetone double-rubs per ASTM 5402. P-413 also exhibits superior hardness of 5–6H per ASTM D3363, adhesion of 5B per ASTM B3359 and impact resistance of 160 in/lbs (ASTM D2794). Color shall be brown with gloss of 20–60 — 60 degree. If the coils are to be subjected to direct ultraviolet (UV) exposure, a spray-applied UV-resistant topcoat is an option.

Effective date: 10/09/17

P-413 Typical Properties (@ 1 mil DFT)

Salt Spray: ASTM B-117: 6,000+ hours

SWAAT: ASTM G85-11 Section A.3: Passed 1,000 hours using pressurized coil (see page 2 for results)

Cyclic Weathering: ISO 20340 Offshore Standard: Passed (4,200 hours)

Performance Testing: ISO 12944-6 C5 I/M: Passed C5-M high durability and C5-I high durability

Heat Transfer Reduction: <1% as applied for heat transfer components

Humidity: ASTM D-2247: 2,000+ hours

Simulated Sea Water Resistance: 2,000 hours

Solvent Resistance: ASTM-D5402: 100 acetone double rubs

Cross-hatch Adhesion: ASTM D-3359: 5B

Mandrel: ASTM-D522: >1/4 inch

Impact: ASTM D-2794: 160 lb/inch steel; 40 lb/inch aluminum

pH Range (14 day liquid spot test): 2.4–12.6

Temperature Cycling (4 hours at –75°C; 4 hours at 190°C): 4B–5B adhesion after 5 cycles

Dry Heat Resistance (4 hours at 200°C; 20 minutes at 232°C): 4B–5B adhesion after 5 cycles

Dry Film Thickness: ~1 mils

Hardness: ASTM D3363: 5–6H

Gloss: 20–60 on 60 degree meter (topcoat dependent)

Microchannel Compatible

Abrasion Resistance: 30–40 mg loss per 1,000 cycles

Meets FDA 175.300 for indirect food contact

Meets MIL Spec: MIL-C-18467, MIL-E-480 and MIL-STD-883 Method 1101

Meets Other Specs: Honeywell MC 7200-01 and GE F50T17

Thermal Conductivity: At approximately 2 mils thickness, Thermal Conductivity is less than 1.0 w/mK

Dielectric Strength [ISO2376:2010(e)]: 286 volts per mil of thickness

NSF Certified – ANSI 51 Certification of Coatings for Food Zone – Non Contact

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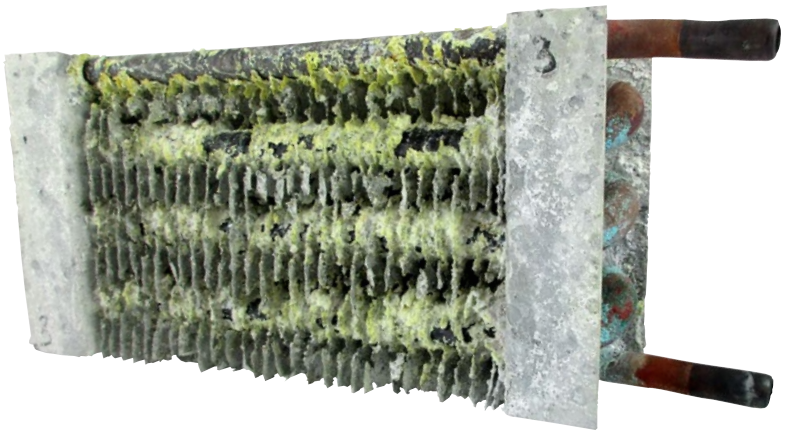
SWAAT Results

	**Bare 1,000 hour SWAAT**
	**P-413 1,000 hour SWAAT**
	**P-413 + topcoat 1,000 hour SWAAT**

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Product Description
Baking cross-linked phenolic epoxy

Recommended Uses
Heresite P-413 is a high performance coating used principally for heat transfer components and parts — especially air conditioning and refrigeration systems that operate in moderate to severely corrosive environments, including both coastal and/or industrial applications. This phenolic epoxy has an advantage of dense cross linking and are therefore highly corrosion resistant even when applied as a very thin film.

Chemical Resistance
P-413 is chemically resistant to a wide range of acids, solvents, and inorganic salts. Please review chemical resistance guide for further information.

Packaging Information
P-413 is available in one gallon, five gallon and 54 gallon drum quantities.

Thinners and Cleanup
Recommended use of Heresite S-275.

Storage Conditions
Coating should not be stored longer than 6 months. Coating should be stored in a clean, dry environment at 50–75°F. Keep out of direct sunlight. Avoid excessive heat and keep from freezing.

Physical Properties
Solids by weight: Approximately 73%

Solids by volume: Approximately 57%

Pot life: NA

Mixing Ratio by Volume: NA 1 component

Shelf life: 6 months

Color: Brown

VOC Content
2.25 lbs/gal (270 g/L) as supplied

Film Thickness
For heat transfer, a 2 coat immersion process will typically yield a dry film thickness of 1.0–2.0 mils (25–50 microns).

For other parts, please contact Heresite.

Coverage
Theoretical coverage is 800 square feet per gallon per dry mil. Coverage rates are estimates and make no allowance for material loss. Actual rates will vary dependent on application method, surfaces, etc.

Surface Preparation
All surfaces must be clean, sound, and free of any oils, dirt, grease, wax and any other contamination that may interfere with coating adhesion.

In general, the surface should be cleaned by solvent or a cleaner at elevated temperature followed by a clean water rinse. Rinse water shall have a conductivity of lower than 500 microsiemens and a neutral pH (7.0–8.0). All surfaces must be dried prior to application of coating.

In cases where there is a large amount of contamination or heat treated steel, a commercial blast is acceptable in accordance with NACE #3 or SSPC-SP-6-63 specifications. Surface profile or anchor pattern shall be 20–25% of the recommended dry film thickness.

Thinning
Reduce P-413 with S-275 solvent to 13–13.5 seconds on ISO Dip 3 mm Cup. This requires approximately a 1:1 dilution by volume.

The amount of thinner required is dependent upon temperature, ventilation, humidity, application type and desired film thickness.

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Application

Application is specific to heat transfer components, for other parts — please contact Heresite.

Immersion Application:

1. Consult SDS prior to use.
2. Do not apply if temperature is less than 5°F above dew point, or if temperature is below 45°F.
3. Consult Heresite for tank and pump recommendations.
4. Ensure as the part is prepared for immersion, one will have a low point for drainage.
5. Immerse the cleaned part for 15 seconds in the reduced P-413.
6. Upon removal of the part from the coating, apply light air pressure (approximately 15 psi) using an Air Knife or similar device to spread the air flow. Using the compressed air, remove excess coating. Minimal brushing should be required.
7. Air dry a minimum of 15 minutes with ventilation prior to introducing heat.
8. Typically, a two coat immersion process is required to achieve 1.0 to 1.5 mil DFT. An intermediate bake is required between coats — see baking schedule.
9. It may be deemed desirable to apply a final aesthetic spray. This can be accomplished immediately after the final immersion is accomplished and prior to final bake.
10. During immersion application, the viscosity must be maintained and monitored. It is recommended that the viscosity be checked every hour to ensure compliance with the specification of 13–13.5 seconds. Additional solvent and coating can be added to adjust viscosity as needed.

Spray Application for Final Aesthetic Spray:

1. Consult SDS prior to use.
2. Do not apply if temperature is less than 5°F above dew point, or if temperature is below 45°F.
3. Use standard production type spray equipment (conventional, HVLP, airless, etc.). A few starting recommendations can be found below:

Guns	Fluid	Air
DeVilbiss JGA-510	E	46MP
Binks #2100	67-SS	46-21MD-2 or 3
Binks #95	66-SS	66-SD
Graco Air Pro HVLP		

4. Spray viscosity will be dependent on type of equipment being used. It has been seen that spraying at immersion viscosity is very effective.
5. Spray equipment: always flush spray equipment with solvent to clean prior to applying coating.
6. Air supply must be uncontaminated. Adjust air pressure to approximately 50 pounds at the gun and provide 15–20 pounds at pressure pot. Adjust spray gun by first opening liquid valve and then adjust air valve to give approximately an 8"–12" fan, holding gun perpendicular to the surface at a distance of 12".
7. Apply a mist bonding pass.
8. Allow to flash off for approximately a minute, but not long enough to allow film to completely dry.
9. Apply 3–4 crisscross multi-passes maintaining a wet appearing film.
10. Air dry a minimum of 15 minutes with ventilation prior to introducing heat.
11. Typically, a one coat process is required to achieve 0.5 to 1.0 mil DFT.

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Spray Application for Higher Film Build — 4–6 mil:

1. Consult SDS prior to use.
2. Do not apply if temperature is less than 5°F above dew point, or if temperature is below 45°F.
3. Use standard production type spray equipment (conventional, HVLP, airless, etc.). A few starting recommendations can be found below:

Guns	Fluid	Air
DeVilbiss JGA-510	E	46MP
Binks #2100	67-SS	46-21MD-2 or 3
Binks #95	66-SS	66-SD
Graco Air Pro HVLP		

4. Spray viscosity will be dependent on type of equipment being used. It has been seen that spraying at immersion viscosity is very effective (13.0–13.5 seconds ISO Dip 3 mm).
5. Spray equipment: always flush spray equipment with solvent to clean prior to applying coating.
6. Air supply must be uncontaminated. Adjust air pressure to approximately 50 pounds at the gun and provide 15–20 pounds at pressure pot. Adjust spray gun by first opening liquid valve and then adjust air valve to give approximately an 8"–12" fan, holding gun perpendicular to the surface at a distance of 12".
7. Apply a mist bonding pass.
8. Allow to flash off for approximately a minute, but not long enough to allow film to completely dry.
9. Apply 3–4 crisscross multi-passes maintaining a wet appearing film. Allow a minimum of 10 minutes to allow the slow solvents to evaporate. Then apply another 2–3 crisscross multi-passes.
10. Air dry a minimum of 15 minutes with ventilation prior to introducing heat.
11. Intermediate bake at 130°C (metal temperature) for a minimum of 10 minutes.
12. Repeat steps 7–10.
13. Final bake per the instructions within the bake schedule.
14. Typically, a two to three coat process is required to achieve 4.0 to 6.0 mil DFT.

Bake Schedule

Intermediate Bake:

1. 90°C (metal temperature) for a minimum of 10 minutes.
   a. To decrease the bake time, a maximum temperature of 130°C may be used.

Final Bake:

1. "Normal" Bake:
   a. 90°C (metal temperature) held for 10 minutes, then increased to 160°C. 160°C (metal temperature) held for 15 minutes, then increased to 190°C. 190°C (metal temperature) held for 45 minutes.
2. "Soft Solder" Bake:
   a. 90°C (metal temperature) held for 10 minutes, then increased to 160°C. 160°C (metal temperature) held for 130 minutes.

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions and application. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKERS MUST WEAR FRESH AIR LINE RESPIRATORS. PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRICAL EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMERS SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

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