HERESITE P-413 BAKED PHENOLIC EPOXY

DEFINING PERFORMANCE IN EVERY ENVIRONMENT

Since 1935 Heresite Protective Coatings has been an innovator in the development of high-performance specialty coatings. In 1964, Heresite was the first company to develop and apply direct-to-metal thin film coatings to aluminum-finned, copper tubed heat exchangers for the HVAC/R industry. These unique coatings increase equipment performance and service life while having less than 1% heat transfer loss. Heresite still remains the performance leader in protective coatings for air conditioning and refrigeration systems in salt air and industrial applications throughout the world.

P-413 BAKED PHENOLIC EPOXY

- A thin film high-performance phenolic epoxy coating developed specifically for heat exchangers and related equipment.
- Made for the most severe chemical and C5 offshore environments.
- The performance leader in HVAC/R coatings made for new or unfinished metal.
- Features dense cross linking with superior chemical and salt air resistance providing stable heat transfer.
- Appreciably increases the service life of heat exchange equipment exhibiting superior flexibility and corrosion resistance.
- After baking it can be touched up with VR-554T Brown air dry phenolic aerosol spray.

P-413 SPECIFICATIONS

After proper surface preparation the coil shall receive a uniform coating on all surfaces, including fin edges. Multiple coats are applied by immersion or flow coating resulting in dry film thickness of approximately 1.0 mil. If the coils are to be subjected to direct ultraviolet (UV) exposure, consider spray-applied UC-55XX UV-resistant topcoat. Please read and follow detailed application instructions on page 4 & 5.

See the Heresite Chemical Resistance Guide for performance results in hundreds of chemical environments. (https://www.heresite.com/chemical-resistance-guide/).

When baking is not an option consider HereShield spray applied air dry coatings for salt air and mild to medium chemical environments.

P-413 TYPICAL PROPERTIES (@ 1 MIL DFT)

Salt Spray: ASTM B-117: 30,000 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

UV-C Exposure: Passed 1,500 hours

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

Humidity: ASTM D-4585: 5,000+ 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 on 60-degree meter (topcoat dependent) Abrasion **Resistance**: 30–40 mg loss per 1,000 cycles

Blowing sand (MIL-STD-810-H Method 510.7) Passes

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

Microchannel Compatible

Meets FDA 175.300 for indirect food contact

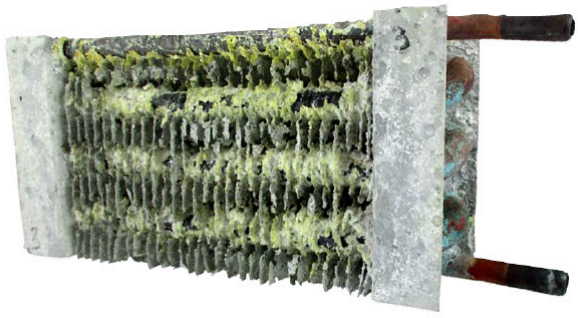
Meets MIL Spec: MIL-C-18467, MIL-E-480 and MIL- STD-883 Method 1101

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

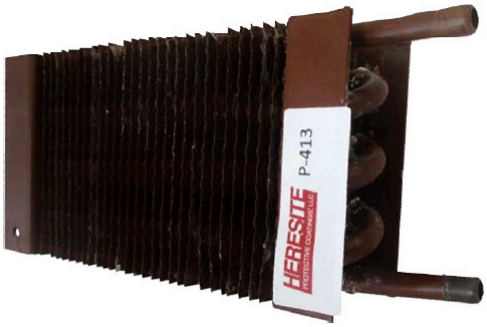
Thermal Conductivity: At approximately 2 mils thickness, Thermal Conductivity is less than 1.0 w/mK

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

SWAAT RESULTS



Bare 1,000 hour SWAAT



P-413 1,000 hour SWAAT

P-413 + topcoat 1,000 hour SWAAT

PRODUCT DESCRIPTION

Baked 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 the advantage of dense cross linking and is 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 the 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 15 – 17 seconds on ISO Dip 3 mm Mini Cup (13-13.5 seconds for spray). 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.

APPLICATION

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

Immersion Application:

1. Consult SDS prior to use.
2. Tank mixing should be adequate to create enough mixing, able to witness surface movement. Mixing should not be turbulent, no waves in the tank. Excessive mixing will cause foam generation.
3. Do not apply if temperature is less than 5°F above dew point, or if temperature is below 45°F.
4. Consult Heresite for tank and pump recommendations.
5. Ensure that the part is prepared for immersion, one will have a low point for drainage.
6. Immerse the cleaned part for 15 seconds in the reduced P-413.
7. Upon removal of the part from the coating, apply air pressure (70-100 PSI) through the fins to help move the coating throughout the coil. Brushing maybe required.
8. Air dry a minimum of 15 minutes with ventilation prior to introducing heat.
9. 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.
10. 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.
11. 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 15 – 17 seconds. Additional solvent and coating can be added to adjust viscosity as needed.

Flooding / Flow coat Application:

1. Consult SDS prior to use.
2. The reservoir containing the paint needs to be under continual agitation .
3. Do not apply if temperature is less than 5°F or C above dew point, or if temperature is below 45°F (7°C)
4. Cork/tape all tube openings to prevent coating flowing to interior tubes. Check after each application to assure openings remain sealed.
5. Reduce P-413 with S-275 solvent according to the thinning instructions on page 3. It was noted that at lower viscosities, multiple coats were required to achieve the same internal appearance. The higher the viscosity, the higher the tendency to bridge fins.
6. Lay coil in a horizontal position elevated 25-30 degrees on a flow coat table with the fins vertical to ensure coverage of all bare metal.
7. Use a low pressure/high volume pump to flow the paint over the coil. Care must be taken to achieve uniform/ complete coverage.
8. Apply paint to both sides of the coil by turning the coil over and laying it on the coated side.
9. Lift coil to allow draining with fins in a horizontal position. Use compressed air (70-100 PSI) through the fins to help move the coating throughout the coil.
10. It may be necessary to brush out coating to remove drips/runs/areas of excessive coverage.
11. A final light cosmetic spray is recommended after flooding /flow coat process.
12. During application, the viscosity must be maintained and monitored. It is recommended that the viscosity be checked every hour to ensure compliance with the specification listed above. Additional solvent and coating can be added to adjust viscosity as needed.
13. Paint can be recirculated by catching it in a flow coat ‘table’ with drainage into the can holding the liquid P-413.

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	46-21MD-2 or 3
Graco Air Pro HVLP		

4. Spray viscosity will be dependent on the 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. The air supply must be uncontaminated. Adjust air pressure to approximately 50 PSI (3.5 bar) at the gun and provide approximately 50 PSI (3.5 bar) at pressure pot. Adjust spray gun by first opening liquid valve and then adjust air valve to give approximately an 8”-12” fan (20-30 centimeters), holding gun perpendicular to the surface at a distance of 4”-6” (10-16 centimeters).
7. To minimize sagging and dripping, apply a tack coat (a light first pass with maybe 30-40% coverage) first by turning down the liquid and holding the gun 8”-12” (20-30 centimeters) from the surface.
8. Allow it to flash off for approximately a minute, but not long enough to allow the 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.

Spray-Application for Higher Film Build – 4 to 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 the type of equipment being used. It has been seen that spraying at immersion viscosity is very effective (13-13.5 seconds ISO Dip 3 mm Mini).
5. Spray equipment: always flush spray equipment with solvent to clean prior to applying coating.
6. The 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 it to flash off for approximately a minute, but not long enough to allow the 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 instructions within the bake schedule.
14. Typically, a two to three coat process is required to achieve 4.0 ti 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, WORKERS SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

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Effective date: 08/19/24