**DONELLI ALEXO S.r.l.**
TRATTAMENTI ANTICORROSIVI, METALLIZZAZIONE
E RIVESTIMENTI FBE

Sede legale e operativa:
Via F. Somma, 64 – 20012 Cuggiono (MI) – Tel: +39 02 97240792 – Fax: +39 02 9746141
alexo@donelli.it – Pec: donellialexo@pec.it – www.donelli.it

Sede operativa di Voghera:
Via G. Pacchiarotti, 8 – 27058 Voghera (PV) – Tel: +39 0383 43345 - voghera@donelli.it

Sede amministrativa:
Via F.lli Cervi, 7 – 20025 Legnano (MI) – Tel: +39 0331 408511 – Fax: +39 0331 408666

R.E.A. 1535588 – Reg. Imp., C.F. e P. I.V.A.: IT 12196000157 – Cap. Soc. €50.000,00 i.v.

**Sistema di Gestione Qualità** certificato **ISO 9001:2015** da **SGS** con n° IT03/0965.02.

**Sistema di Gestione Ambientale** certificato **ISO 14001:2015** da **SGS** con n° IT17/0561.

Aderente a **Lombardy Energy Cleantech Cluster** (LE2C).

**OGGETTO:** **TRATTAMENTO ANTICORROSIVO DI SCAMBIATORI DI CALORE A PACCO ALETTATO E MICROCANALE CON RESINA FENOLICA MODIFICATA TERMOINDURENTE HERESITE P413 – REVISIONE 7, 27/12/2018**

Con la presente ci pregiamo sottoporVi una proposta tecnica relativa all'applicazione su scambiatori di calore a pacco alettato e microcanale della nuova versione di **Heresite P413**, un rivestimento a base di resina fenolica modificata termoindurente ad alta resistenza alla corrosione ed inerzia chimica anche applicato a bassi spessori (target su superficie di scambio minimo 25 [µm]).

Con l'occasione, presentiamo anche il kit per ritocchi **Heresite VR-554T Brown**.

## A. CICLO DI LAVORO HERESITE P413:

- Sgrassaggio delle superfici da rivestire con acqua calda ed apposito agente sgrassante;
- Risciacquo della batteria con acqua fredda fino alla totale rimozione degli agenti utilizzati;
- Rimozione con aria compressa dell'acqua depositata;
- Asciugatura in forno a temperatura di massimo 190°C;
- Pulizia a secco delle superfici in rame con bicarbonato depolverato a bassa pressione;
- Rimozione con aria compressa del bicarbonato depositato;
- Allineamento delle alette per facilitare applicazione del prodotto (se necessario);
- Fornitura e applicazione di uno strato di **Heresite P413** spessore 10-15 [µm];
- Pre-polimerizzazione in forno per 15 minuti alla temperatura di 90°C;
- Fornitura e applicazione di uno strato di **Heresite P413** spessore 10-15 [µm];
- Pre-polimerizzazione in forno per 15 minuti alla temperatura di 90°C;
- Fornitura e applicazione di uno strato di **Heresite P413** spessore 10-15 [µm];
- Pre-polimerizzazione in forno per 15 minuti alla temperatura di 90°C;
- Controlli e collaudi pre-polimerizzazione finale;
- Polimerizzazione finale in forno per minimo 45 minuti a 190°C.

Note:

- **Protezione UV opzionale:** fornitura ed applicazione di uno strato di finitura poliuretanica in tinta RAL 8002 (Marrone Segnale) o altra da concordare in funzione del progetto e spessore 50-75 [µm];
- **Scambiatori rame-rame:** la pulizia delle superfici sarà estesa anche alle alette in rame.

## B. KIT PER RITOCCHI:

- Heresite P413 richiede una polimerizzazione finale a 190°C ed è quindi inadatto ad interventi di ritocco;
- Heresite consiglia **VR-554T Brown**, una resina fenolica che polimerizza a temperatura ambiente fornita in bombolette da 330 grammi pronte all'uso;
- **Heresite VR-554T Brown** offre una buona resistenza alla corrosione e colorazione simile a quella di Heresite P413.

## C. ALLEGATI:

1. **Heresite P413** - Scheda tecnica e sintesi report test di laboratorio, inclusi impatto del rivestimento sulla capacità di scambio termico e risultati test SWAAT;
2. **Heresite P413** - Conformità alla normativa FDA CFR 175.300 e NSF ANSI 51 (contatto indiretto con alimenti);
3. **Heresite P413** - Resistenza a basse temperature (Standard MIL-STD-883 metodo 1011);
4. **Heresite P413** - Protocollo di manutenzione e lavaggio;
5. **Heresite VR-554T Brown**: documentazione informativa;
6. Galleria fotografica.

Note: **tabella di resistenza chimica** di dettaglio dei prodotti Heresite disponibile su richiesta.

***Allegato 1 - Heresite P413 - Scheda tecnica e sintesi report test di laboratorio, inclusi impatto del rivestimento sulla capacità di scambio termico e risultati test SWAAT***

TECHNICAL DATA SHEET

# 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.

## 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

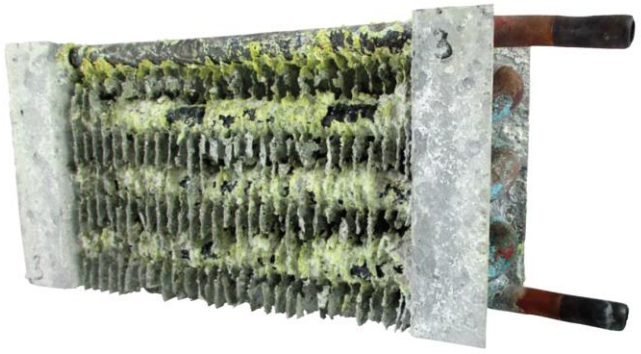
**Effective date: 10/09/17**

**Heresite Protective Coatings LLC** • 822 S. 14th St • Manitowoc, WI 54220
800-558-7747 or 920-684-6646 • sales@heresite.com • www.heresite.com

HERESITE PROTECTIVE COATINGS, LLC

TECHNICAL DATA SHEET

## SWAAT Results

| | |
|---|---|
|  | Bare 1,000 hour SWAAT |
|   | P-413 1,000 hour SWAAT |
|   | P-413 + undercoat 1,000 hour SWAAT |

**Effective date: 10/09/17**

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HERESITE PROTECTIVE COATINGS, LLC

***Allegato 2 - Heresite P413 - Conformità alla normativa FDA CFR 175.300 e NSF ANSI 51 (contatto indiretto con alimenti)***

HERESITE
PROTECTIVE COATINGS, LLC
"A Tradition of Quality Since 1935"

January 25, 2017

To Whom it May Concern:

Heresite Coatings, P-413 is formulated to conform to FDA regulation 21 CFR 175.300. These coatings have undergone rigorous evaluation against this standard and meet the qualifications as listed in the standard. Therefore, P-413 meets this regulation.

The P-413 coating is appropriate for conditions with continuous temperatures up to 200°C, with short excursions (20 minutes) of temperature up to a maximum of 232°C.

Furthermore, Heresite P-413 coating has recently become NSF Certified – ANSI 51 Certification of Coatings for Food Zone – Non Contact.

Dan Puyleart
Technical Director

822 South 14th ST., Manitowoc, WI 54220 • (920) 684-6646 • Fax: (920) 684-0110
www.heresite.com • E-mail: sales@heresite.com

The Public Health and Safety Organization

# NSF Product and Service Listings

These NSF Official Listings are current as of **Saturday, November 04, 2017** at 12:15 a.m. Eastern Time. Please contact NSF International to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information: http://info.nsf.org/Certified/food/Listings.asp?Standard=051&Company=C0321398&

## NSF/ANSI 51
## Food Equipment Materials

Heresite Protective Coatings, LLC
822 South 14th Street
Manitowoc, WI 54220
United States
800-558-7747
920-684-6646

**Facility :** Manitowoc, WI

| Trade Designation | Color | Type of Food | Maximum Temperature of Use in °F |
|---|---|---|---|
| **Phenolic-Epoxy Coating for Non Contact Food Zone** | | | |
| P-413 | Brown | N/A | 450° |
| P-413PX | Red Brown | N/A | 450° |

Number of matching Manufacturers is 1

Number of matching Products is 2

Processing time was 0 seconds

*Allegato 3 – Resistenza a basse temperature (Standard MIL-STD-883 metodo 1011)*

HERESITE
PROTECTIVE COATINGS, LLC
"A Tradition of Quality Since 1935"

July 27, 2011

**LAB COATING REPORT**
**(Thermal Cycling)**

**Objective:** Determine if there is any detrimental effect on the coating when subjected to extreme cold then to extreme hot in a relatively short time period.

**Coatings Tested:** CSE-6008, CSE-6106, CSE-6206, CSE-6208, EB-6817, P-403L, P-413C, P-413C1, and VR-514

**Test:** Mil-STD-883 method 1011. The basics of this method is rapid change from hot to cold and a brief, ½ -2 minute equilibrium in the medium before going in the opposite direction. This method is suggested for -65ºF to 200ºF.

**Results:** For the extreme cold I used Dry Ice and acetone resulting in a temperature of -60 to -65ºC (on average -80ºF). Boiling water 100ºC (212ºF) was the hot end. Panels cycled 5 times between both the hot and cold. None of the panels displayed any damage to the coating. Visual observations were made under the stereoscope.

I can state the tested coatings will withstand 5 cycles from -80ºF to 212ºF

Steve Brunner
Technical Director

822 SOUTH 14TH ST., MANITOWOC, WI 54220 • (920) 684-6646 • FAX: (920) 684-0110
www.heresite.com • E-Mail: sales@heresite.com

# Recommended Maintenance and Cleaning Procedures for Heresite Coated Coils

**Proper maintenance and cleaning will help preserve the performance of Heresite coated coils and avoid corrosion over the length of the product life. Two important factors for slowing corrosion are:**

- **Keeping the coils clean**
- **Keeping the coils dry**

## CLEANING FREQUENCY

At a minimum, coils should be inspected and cleaned at least once per year. In extreme environments, where the coils are exposed to high concentrations of salt air (within 25 miles of any seacoast), or where they are installed near engine exhausts, plumbing or manufacturing vents, or regularly exposed to corrosive chemicals, you may need to clean coils more often, up to 4 times per year.

## CLEANING PROCESS

1. Turn off electrical power to the unit using lock-out system.
2. Flush the coil with water to rinse off loose residue. Allow the water to soak for 10–20 minutes to loosen surface residue.
3. Flush the coil thoroughly with any mild liquid detergent and warm water (~100°F) until all signs of residue are eliminated. If harsher cleaners are required for your environment, please contact Heresite for advice.
4. Rinse the unit thoroughly with clean water (it should not be brackish or contain excessive dissolved minerals).
5. Allow the unit to dry completely prior to turning the electrical power on or returning the unit to service.

## TOUCH UP

If coils require a touch up to protective coatings, contact Heresite for information about onsite application options.

## AVOID

- Water under high pressure, such as a high-pressure washer. Fins may fold under high pressure causing the coating to crack
- Abrasive products or processes to scour or remove dirt
- Striking the coil with a tool to dislodge or remove soil or residue
- Corrosive, caustic or alkaline cleaners (with a pH < 5.5 or > 8.5) as these may permanently damage the coating and void the warranty. If you have questions about the cleaner that you are using, please contact Heresite.

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HERESITE® PROTECTIVE COATINGS, LLC

*Allegato 5 – Documentazione informativa Heresite VR-554T Brown*

# VR-514T and VR-554T Aerosol Air Dry Phenolics

## 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.

## VR-514T and VR-554T Air Dry Phenolics are available in easy-to-use aerosol spray cans

- For those small touch-up jobs such as Solder and Brazed Joints, Fin Tube Coil touch-up, Fans, Duct Work, Copper Tubing, and other maintenance projects. Perfect for service personnel performing field work.
- Protects against fumes from Salt Air Environments, Dilute Acids, Dilute Alkalies, Solvents, and more.
- Minimal surface preparation needed
- 1-year shelf life
- Contains no fluorocarbons

When throughly cured, the VR-514T and VR-554T coating produces a hard corrosion resistant film. It is recommended as a heavy duty maintenance coating for exposures to splash, spillage and fumes. Some of the outstanding properties are excellent durability, good adhesion, flexibility and good film building characteristics.

## VR-514T and VR-554T Specifications

**Temperature limitation:** Accepts dry heat temperatures up to 200°F (94°C)

**Colors:** VR-514T and VR-554T, only dark brown available in spray cans. Other colors are available in 1 and 5 gallon liquid cans

VR-554T Brown

VR-514T Red Brown

**Coverage:** Theoretical coverage for spray cans 27 square feet per spray can at 1 mil. For heat transfer surfaces 2 mils recommended. For all other applications 4–6 mils recommended in 2 to 3 coats.

**Storage conditions:** Shelf life: 1 year @ 70°F (21°C). Storage above 80°F (27°C) may shorten shelf life




**Effective 10/09/17**

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HERESITE® PROTECTIVE COATINGS, LLC

***Allegato 6 – Galleria fotografica***

*Scambiatori di calore a pacco alettato e microcanale durante le lavorazioni.*

*Scambiatori di calore a pacco alettato e microcanale a lavorazioni completate.*