



# Coated Microchannel Heat Exchangers

Coating guide

***Climetal***  
**Heat Exchangers**

## COATED MICROCHANNEL HEX

The use of the microchannel heat exchangers is becoming more widespread in the HVAC&R industry because its advantages and physical characteristics as: improved heat transfer, lightness, smaller, less refrigerant charge, environment and cost-friendly, and its optimum corrosion resistance. Nevertheless aluminum fins can degrade in very severe environmental conditions like on salty or acidic environments, and due to this degradation the performance may be reduced.

In these cases, one method of protecting the Heat Exchanger is coating. There are several protective coatings available on the market suitable for HVAC components, some of which have proven reliable in the field over several years. However for the Micro Channel Heat exchanger only a few coating solutions.

Climetal's coating options, Epoxy, Polyester and Epoxy-polyester have the same overall performance in highly corrosive environments, as a proof of this we have our SWAAT test report.



### Epoxy-Polyester Powder Coating

For extreme working conditions Climetal, with its long experience in the MCHEx manufacturing, recommends to coat the coils with the epoxy-polyester solution due to its excellent results and quality price ratio. The Polyester Epoxy powder is sprayed and electrostatically fixed to the coil. After drying and curing in a furnace, the results is a uniform and durable coating that provides our heat exchangers with an enhanced protection from external particles that can cause damages and corrosion.



Epoxy-Polyester coating is a thermosetting powder coating based on epoxy and polyester resins designed for interior applications. Thanks to its high crosslink density, it has good chemical resistance and good corrosion protection combined with excellent overall performance. Great choice to enhance corrosion resistance on coils that will not be exposed to sunlight.

## EPOXY-POLYESTER COATING BENEFITS

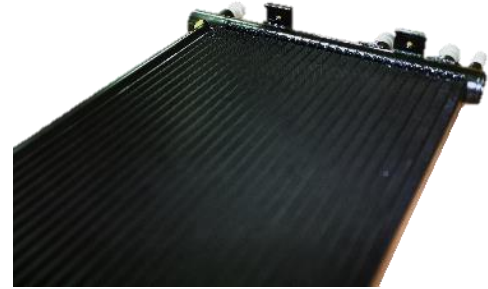
- ✓ High crosslink density
- ✓ Good chemical resistance
- ✓ Good solvent resistance
- ✓ Good corrosion protection
- ✓ Available for all RAL color
- ✓ One coat finishes
- ✓ Serviceable finish
- ✓ Interior applications
- ✓ Suitable for most indoor environments
- ✓ No solvents or emissions
- ✓ Less waste and pollution to the environment

## EPOXY-POLYESTER COATING PROPERTIES

<b>UV (WEATHER)</b>	It is not recommended for exterior use. It contains an epoxy component which will chalk on exterior exposure
<b>FLOW OUT</b>	good
<b>BUCHHOLZ HARDNESS</b>	90
<b>MELTING RANGE</b>	80 - 100 oC (Kofler)
<b>GEL TIME (180 °C)</b>	125 - 175 sec
<b>TG (DSC)</b>	58,0 ±0,5 °C
<b>COLOR</b>	A wide range of color
<b>SURFACE GLOSS</b>	GL – Semigloss HR – Wrinkle WR – Structure ST
<b>SPECIFIC GRAVITY</b>	1,5-1,8 gr/cm <sup>3</sup> (low with dark colours, high with light colors)
<b>SHELF LIFE</b>	24 months (@ 30 °C and 50% RH)
<b>GLOSS LEVEL</b>	60 – 95% gloss 60°, color dependent (for GL and HR)

## Polyester Powder Coating

Another coating option that Climetal puts in your hands is this Polyester Coating. A Qualicoat Approved thermosetting matt powder coating based on TGIC free polyester binder system designed for exterior applications. It provides decorative and durability characteristics combined with excellent overall performance. It has good UV and yellowing resistance. It is designed specifically for architectural applications where color and gloss retention are critical.



Tests	Colours Tested		
	RAL3012	RAL 7021	RAL 9022
Adhesion EN ISO 2409:1994	0	0	0
Buchholdz (EN ISO 2815)	>80	>80	>80
Cupping test (EN ISO 1520)	No cracking at a diameter of 5 mm	No cracking at a diameter of 5 mm	No cracking at a diameter of 5 mm
Bend test EN ISO 1519:1995	No cracking at a diameter of 5 mm	No cracking at a diameter of 5 mm	No cracking at a diameter of 5 mm
Impact test ASTM D 2794:1993	No cracking at 2,5 Nm	No cracking at 2,5 Nm	No cracking at 2,5 Nm
Kesternich EN ISO 3231:1997	No penetration or detachment beyond 1 mm	No penetration or detachment beyond 1 mm	No penetration or detachment beyond 1 mm
Acetic acid salt spray resistance ISO 9227:1990 1000 hrs	Conforming to QUALICOAT specification	Conforming to QUALICOAT specification	Conforming to QUALICOAT specification
Accelerated weathering test EN ISO 11341:1997	Residual Value (not less than 50%)	Residual Value (not less than 50%)	Residual Value (not less than 50%)
Resistance to mortar ASTM D 3260:1996	No defects no detachment	No defects no detachment	No defects no detachment
Resistance to boiling water	No defects no detachment	No defects no detachment	No defects no detachment
Humidity Test DIN 50017:1982	No defects no detachment	No defects no detachment	No defects no detachment

Figure 1 Performance test results for Polyester powder coating performed by coating manufacturer

## POLYESTER POWDER COATING BENEFITS

- ✓ Available for all RAL colour
- ✓ One coat finish
- ✓ Serviceable finish
- ✓ Qualicoat Approved Guaranteed performance on correctly pre-treated aluminum
- ✓ No solvents or emissions Less waste and pollution to the environment
- ✓ Good yellowing resistance Less yellowing at high temperature and by the time
- ✓ TGIC free Reduced risk to health
- ✓ Excellent storage stability Less potential for lumping in distribution and storage

## POLYESTER POWDER COATING PROPERTIES

<b>UV (WEATHER)</b>	very good UV resistance. Qualicoat approved (P-0462)
<b>FLOW OUT</b>	good
<b>TRIBO VALUE</b>	2,0 $\mu$ A (Kleber)
<b>MELTING RANGE</b>	85 – 95 oC (Kofler)
<b>GEL TIME (180 °C)</b>	70 – 120 sec
<b>TG (DSC)</b>	62,0 $\pm$ 0,5 °C
<b>COLOR</b>	A wide range of color
<b>SURFACE GLOSS</b>	Matt CM
<b>SPECIFIC GRAVITY</b>	1,5-1,8 gr/cm <sup>3</sup> (low with dark colors, high with light colors)
<b>SHELF LIFE</b>	24 months (@ 30 °C and 50% RH)
<b>GLOSS LEVEL</b>	15 – 50 % gloss 60°

## Coating COMPARISON

The following table sums up the main qualities of all three coating options so it is easy to compare them.

We strongly recommend, to all our customers, to use polyester coating because of its multiple benefits when compared to the epoxy only or the epoxy-polyester blend

Table 1 - Powder Coating Properties Comparison

Polyester Coating	Epoxy-Polyester Coating	Epoxy Coating
Designed for direct sunlight exposure	Designed for covered installations	Designed for indoor use only
Great UV Resistance	Not good UV Resistance	No UV Resistance
Good chemical resistance	Great chemical resistance	Excellent chemical resistance
Excellent corrosion protection	Excellent corrosion protection	Excellent corrosion protection
Good yellowing resistance	Good yellowing resistance	Average yellowing resistance

## Powder Coating maintenance

Both Epoxy-Polyester and Polyester coated MCHEX's could be regularly washed with warm water and mild liquid detergent, followed by a fresh water rinse to maintain the attractive appearance of the powder cured film.

The use of abrasive cleaners is not recommended, nor is the use of active organic solvents.

## ElectroFin® E-Coating

ElectroFin® E-Coat was designed to protect HVAC&R coils from corrosive environments and is a market-leading product, used by every major OEM.

It has excellent corrosion resistance, as well as uniformity of coverage and coating thickness, delivers corrosion durability protection for fin and tube heat exchangers, The unique technology of the ElectroFin® e-coat process increases the efficiency and length of service of HVAC&R systems, reducing maintenance, replacement and operating costs.



### ELECTROFIN® E-COAT BENEFITS

- ✓ Increased efficiency and length of service of HVAC&R systems
- ✓ Reduced maintenance, replacement and operating costs
- ✓ Corrosion protection with complete coverage of metallic surfaces and sharp edges.
- ✓ Uniform film thickness from the outside fin edges to the deepest and most recessed areas internally.
- ✓ Flexibility means that bent fins can be straightened with no cracking or flaking of coating.
- ✓ Thermal conductivity is not measurably diminished compared with uncoated coil because of the thin film thickness and uniformity. The thermal performance of a coated coil is better than that of a fouled, oxidised coil.
- ✓ Guaranteed 100% coverage of any fin design, including enhanced fins up to 30 fins per inch, without bridging.
- ✓ Coil useful life is 3-5 times longer than the life of an uncoated coil in the same location and environment.

## ELECTROFIN® E-COATING TECHNICAL SPECIFICATIONS

<b>COLOUR</b>	Black
<b>DRY FILM THICKNESS</b>	0.6-1.2 mils
<b>GLOSS - 60 DEGREES</b>	65 - 90%
<b>PENCIL HARDNESS</b>	2 H minimum
<b>WATER IMMERSION</b>	→1000 hours at 100 degrees F
<b>CROSS HATCH ADHESION</b>	4B-5B
<b>IMPACT RESISTANCE</b>	160 in./lbs. direct
<b>SALT SPRAY</b>	6,048+ hours
<b>HUMIDITY</b>	1,000 hours minimum
<b>DURABILITY</b>	Very flexible, consistent film
<b>HEAT TRANSFER REDUCTION</b>	Less than 1%
<b>BRIDGING</b>	No bridging guaranteed
<b>COATING OF ENHANCED FINS</b>	Up to 30 fins per inch
<b>PH RANGE</b>	3-12
<b>TEMPERATURE LIMITS</b>	-40 degrees F to 325 degrees F

 C/ Isla de Java, 27 | 28034 | Madrid | Spain

 (+34) 91 728 37 50

 (+34) 91 728 37 57

 climetal@climetal.com

 [www.climetal.com](http://www.climetal.com)

 CLIMETAL, S.A.

 @climetal

 CLIMETAL, S.A.

 Climetal Aluminium Heat Exchangers

