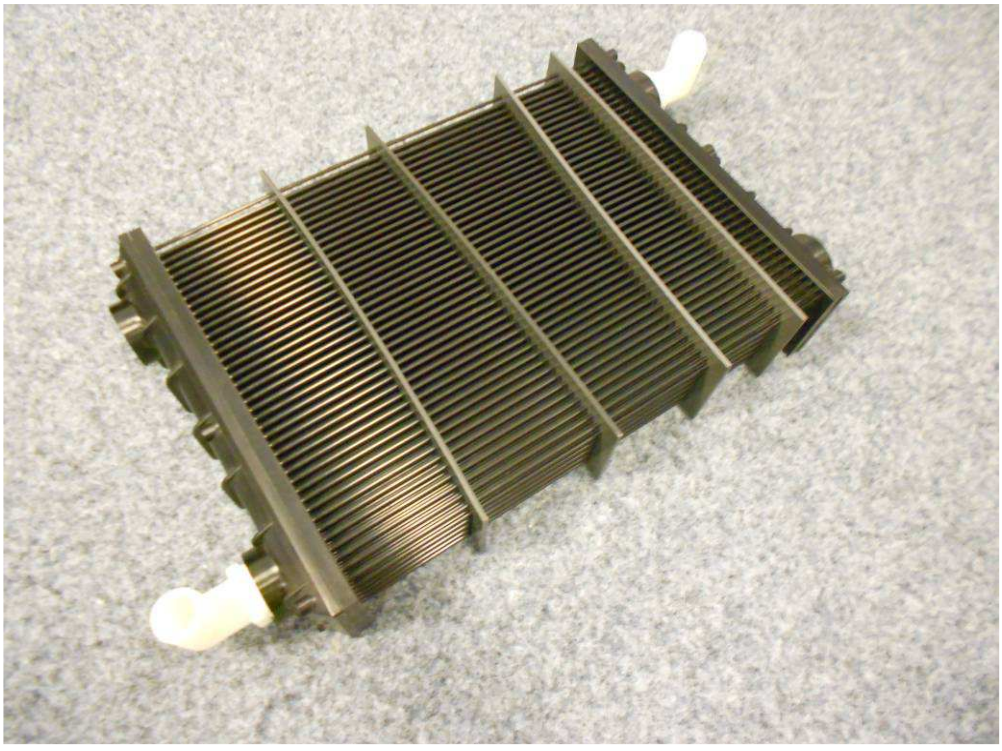
# PolyCoil Heat Exchangers



## WWW.POLYCOIL.EU

# PolyCoil Heat Exchangers

The PolyCoil heat exchanger is a revolutionary polymeric heat exchanger that was developed by CTI together with DuPont after years of research, all rights and patents are on the moment in the hands of CTI.

REBEL Space B.V. distributes the PolyCoil on the European market and supports clients with engineering, product specifications, delivery and product support of the PolyCoil.

Together with CTI, REBEL Space markets this Polymeric Heat Exchanger in Europe. The PolyCoil can be used in special designs but also in large volume systems.

Features and benefits of the PolyCoil Polymeric heat exchanger in regard to conventional systems of aluminum or steel;

- Light Weight.
- Easy to install.
- Easy to repair in the field.
- Cost Competitive and reduced life cycle cost.
- Reduced Fouling.
- High Heat Transfer.
- Moisture Resistant.
- Superior Corrosion Resistance.
- Flexibility in Design.
- Rugged, Impact Resistant.
- Improved Vibration Resistance.
- Reduced Maintenance Costs.
- Totally Recyclable.

PolyCoil all-polymeric heat exchangers offer high heat transfer performance in a package that is lightweight and flexible. PolyCoil exchangers are rugged and corrosion resistant. They are suitable for use with many fluids including water, brine, glycol solutions and hydrocarbons.

PolyCoil heat transfer systems have been developed for a variety of applications, ranging from military vehicles and small pleasure craft to HVAC equipment, thermal ice storage systems and evaporative fluid coolers. Air to air exchangers have also been developed for several automotive applications.

The lightweight of the systems makes installation simple. The all-polymeric construction makes them moisture resistant and much less susceptible to damage when compared to current systems with fragile metal fins. This makes them ideal for harsh environments.

PolyCoil polymeric heat transfer systems are available in several styles and forms including a shell and tube style for liquid to liquid heat transfer applications and a flat panel array for liquid to air applications.

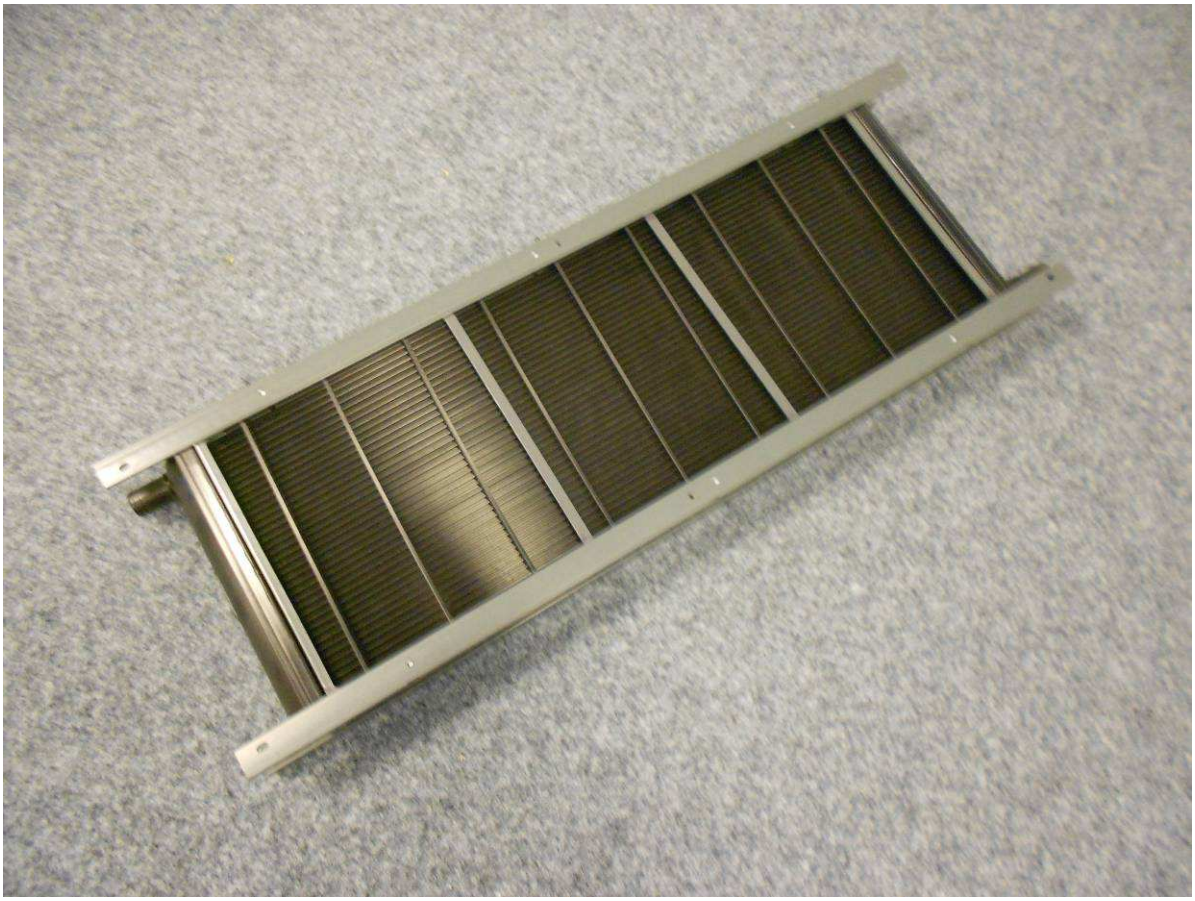
PolyCoil polymeric heat exchangers offer high heat transfer, superior impact resistance and reduced fouling in an equivalent package size and shape when compared to traditional metal designs.

The Poly Coil heat exchanger is made from special nylon tubes with thin walls and a similar heat / cold exchange as a conventional aluminum system. The Poly Coil heat exchanger maintains its efficiency over many years, compared to the aluminum systems that loose 10% of their yield after several months due to corrosion and fouling.

Other advantages of Poly Coil heat exchanger are that it’s not sensitive to dirt and thus requires no maintenance. The materials used are 100% recyclable.

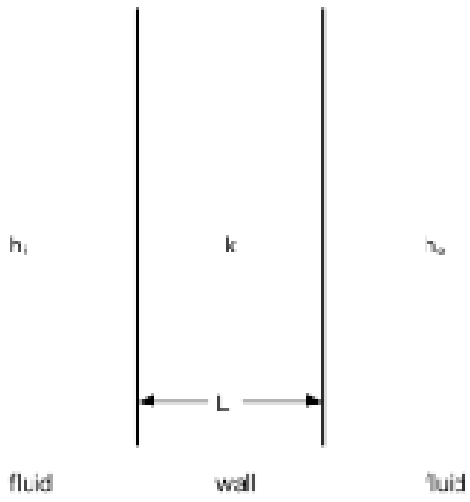
PolyCoil heat exchangers have been successfully used in the following applications:

- Oil coolers for gearbox oil.
- Hydraulic oil coolers.
- Turbo charger Air coolers.
- Power steering Oil coolers.
- Heating, ventilation and air-conditioning heat exchangers.
- Marine coolers.
- Radiators for Civil and Military applications.



# The Theory behind the PolyCoil.

Plastics cannot conduct heat very well. They can however, transfer heat extremely well when it is below a certain thickness.




$$U = \frac{1}{(\frac{1}{h_i}) + (\frac{L}{k}) + (\frac{1}{h_o})}$$

Plastics cannot be used as an extended surface (fin) because they do not conduct heat well.

Wall resistance is a very small percentage of overall heat transfer resistance.

The heat transfer coefficient of a gas flowing past a solid surface is about two orders of magnitude less then that of a liquid.

Overall Resistance to Heat Transfer:

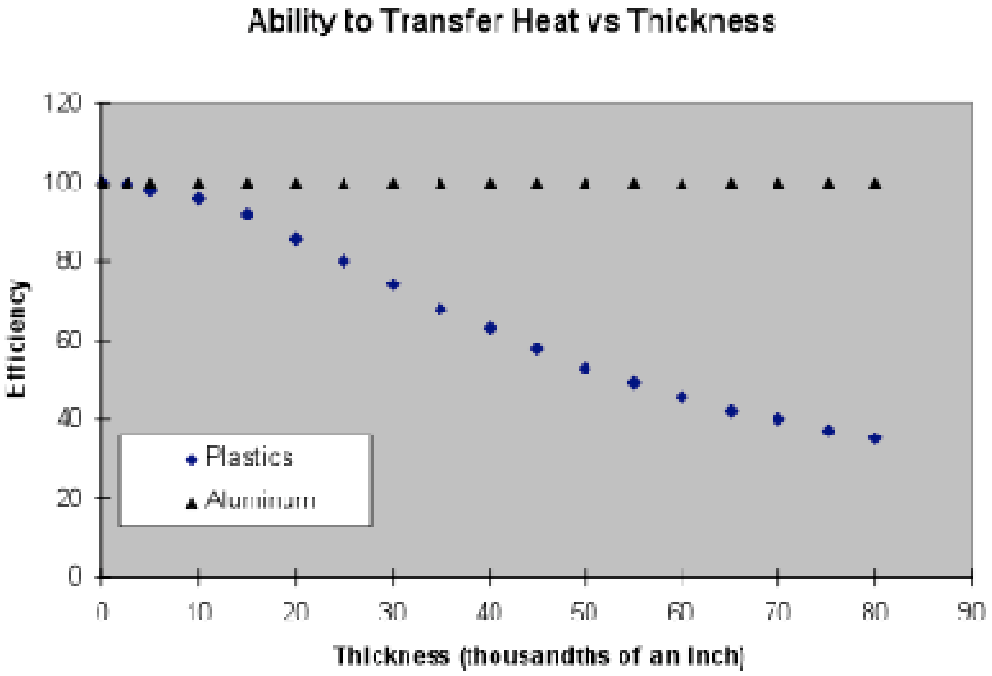
| *Water side* | | | | *Wall* | *Air side* |
|---|---|---|---|---|---|
| 0.036 | mm | Alu | 5.0E-3 (6.94%) | 9.0E-6 (0.01%) | 6.7E-2 (93.05%) |
| 0.02 | mm | Nylon | 5.0E-3 (6.5%) | 4.4E-3 (6.5%) | 6.7E-2 (87.7%) |

Overall Heat Flux; Alu = 2163 W / (m*K) Nylon = 2039 W / (m*K)

Thermal Conductivity: Alu = 237 W / (m*K) Nylon = 0,27 W / (m*K)

This gives; 237 / 0.27 = 867x but, heat flux only 6.1% greater

Conductive Resins can increase thermal conductivity ten-fold therefore nylon ---> 2151 W / (m*K). (Aluminum only 1% greater).



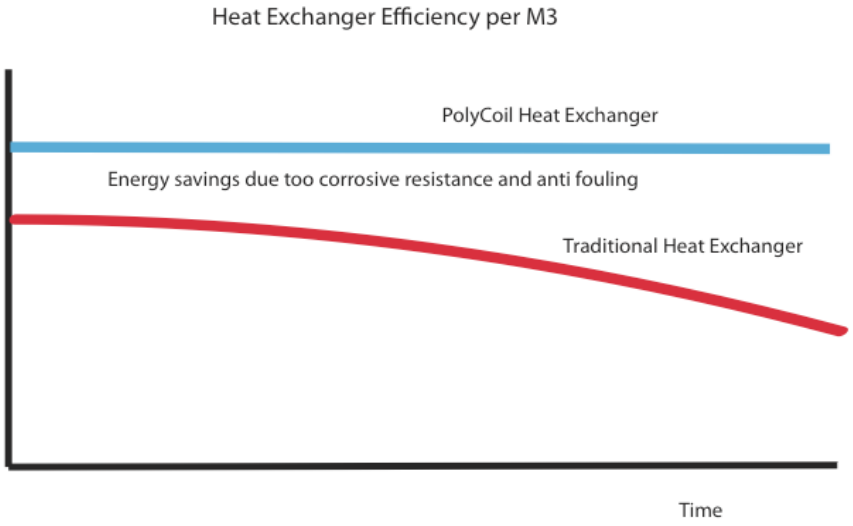

Wall resistance is a function of thermal conductivity of the material, wall thickness and effective wall area. Therefore we make use of thin-walled nylon tubing and increase the primary heat transfer area within a given volume.

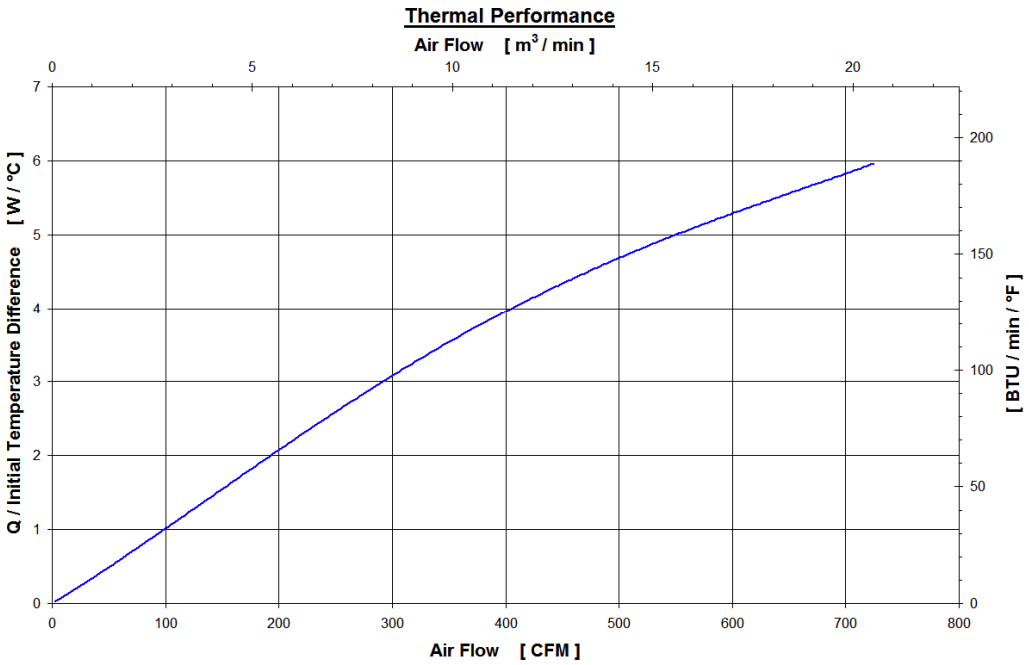
Chemical compatibility will depend on what material the exchanger is made from.

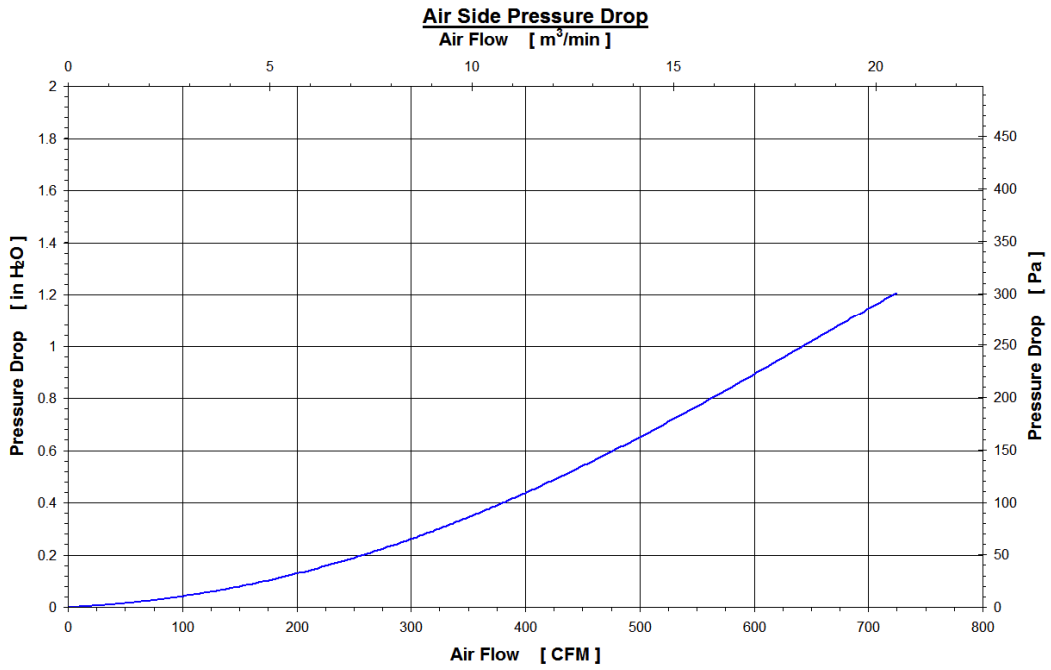
Most PolyCoil exchangers are made from Polyamide (Nylon) and are compatible with:

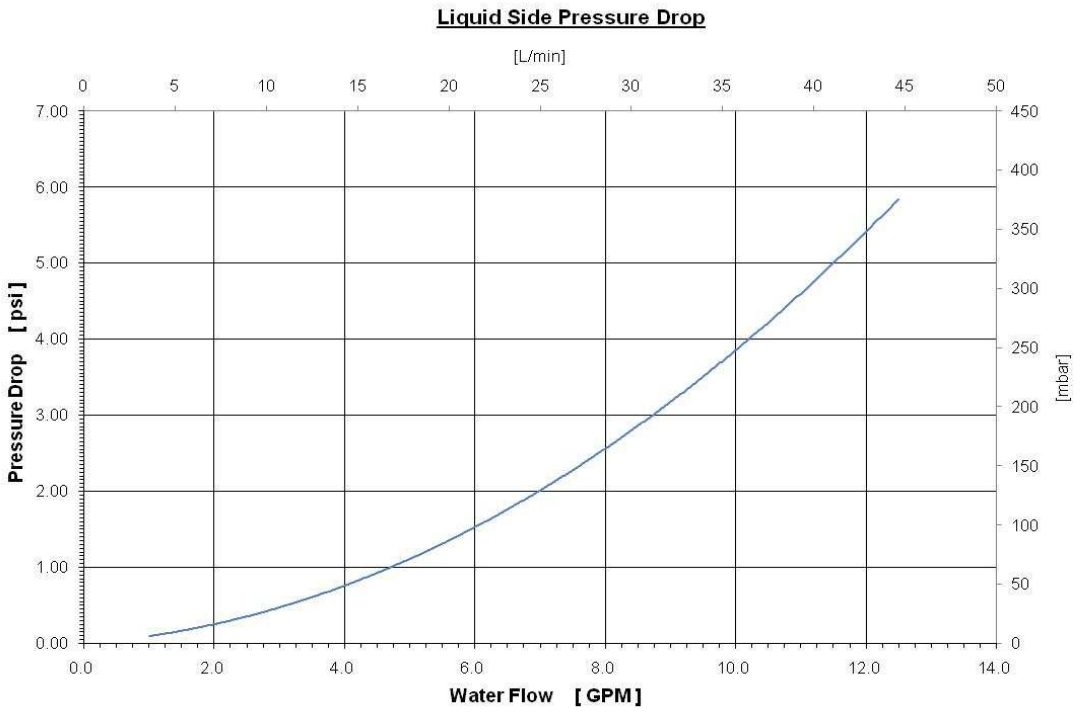
- City Water / Sea Water / Distilled water
- Salts
- Hydrocarbons / Oils
- Propylene Glycol
- Ethylene Glycol (<90% solutions)

The PolyCoil Heat Exchanger is built from small special nylon tubes with thin walls and has a comparable thermal performance as a conventional aluminum Heat Exchanger. A PolyCoil Heat Exchanger keeps its performance however after many years, this as an Aluminum Heat Exchanger looses already 10% of its efficiency after a few months as a result of corrosion and fowling. As a result of the anti-fouling and corrosion resistance of the PolyCoil Heat Exchanger a lot of energy can be saved compared to an Aluminum Heat Exchanger.




Air Side Pressure Drop
Air Flow [ m³/min ]
0
5
10
15
20
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Pressure Drop [ in H₂O ]
450
400
350
300
250
200
150
100
50
0
Pressure Drop [ Pa ]
0
100
200
300
400
500
600
700
800
Air Flow [ CFM ]


Liquid Side Pressure Drop
[L/min]
0
5
10
15
20
25
30
35
40
45
50
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Pressure Drop [ psi ]
450
400
350
300
250
200
150
100
50
0
[mbar]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Water Flow [ GPM ]

For several air / fluid and fluid / fluid applications a standard PolyCoil has been developed. By producing this PolyCoil in different lengths it can be used for different heat exchanging applications.

**Standard 1,8 meter PolyCoil;**

| | | |
|---|---|---|
| Total dimensions | 1973 x 279 x 76 | [mm] |
| Tubing Dimensions | 1829 x 279 x 76 | [mm] |
| Surface | 0,5103 | [m2] |
| Surface standing | 0,1309 | [m2] |
| Tubes Amount | 440 | [tubes] |
| Diameter Tubing | 3 | [mm] |
| Max Temperatures | - 40 tot 149 | [˚C] |
| Max working pressure | 5,17 | [BAR] |
| Max Airspeed | 2 – 10 | [m / sec] |

Contact us for your applications or if you have questions regarding the PolyCoil.

The PolyCoil heat exchanger is being distributed in Europe and Asia by REBEL Space;

**www.polycoil.eu**

REBEL Space B.V.
de Trompet 14A
1601 MK Enkhuizen

tel; 0228-312052
mobiel; 06-34825554

www.polycoil.eu
www.rebelspace.eu

sales@polycoil.eu
info@polycoil.eu