

Freezium™

DESCRIPTION

Freezium is used as a multipurpose heat transfer fluid based on potassium formate.

APPLICATION

Many applications in the industry require a fluid to transport heat or cold. Those applications range from solar panels or heat pump systems, over cooling or heating of industrial processes and refrigerants in indirect cooling systems to artificial ski-tracks or ice rigs. This transport medium is usually called secondary refrigerant or secondary coolant. The ideal secondary refrigerant must ensure a good thermal conductivity, have a high specific heat and low viscosity. **Freezium** remains completely fluid even if the pipe work is frozen. It is also important that the secondary refrigerant is non-flammable and compatible with common engineering materials.

Freezium has been developed specifically for indirect cooling systems and heat pumps. **Freezium** provides protection against boiling, freezing and corrosion. The dilution is determined by system requirements, mainly freezing requirements. Therefore **Freezium** is available in four ready-to-use dilutions.

% K-formate in Freezium , wt %	Freeze Point, °C
24	-15
34	-25
43	-40
50	-60

COMPATIBILITY AND MIXABILITY

Although **Freezium** is – to some extent – compatible with most alternative heat transfer fluids, exclusive use of **Freezium** is recommended for optimal corrosion protection. Mixing with other heat transfer fluids may lead to some precipitation of solid material, causing problems in systems by clogging or damaging pumps, and by increasing the risk of corrosion. Specifically special care should be taken with calcium chloride, as this can increase significantly the risk of corrosion.

Freezium is compatible with European hard tap waters, but we strongly dissuade you to further dilute **Freezium** yourselves. Consult your local Artec Area Sales Manager for more information.

It is recommended to avoid using **Freezium** in installations containing Aluminum, Zinc or galvanized steel.



Freezium

CHEMICAL AND PHYSICAL PROPERTIES

Properties	method	F -60°C	F -40°C	F -25°C	F -15°C
Color	visual	light blue	light blue	light blue	light blue
pH*	ASTM D1287	9.5 typ.	9.5 typ	9.5 typ	9.5 typ
Freeze Point	ASTM D 1177	- 60°C	- 40°C	- 25°C	-15°C
Boiling Point		114°C	111°C	108°C	105°C
Specific gravity, 20°C, kg/dm ³	ASTM D1122	1.34 typ.	1.28 typ.	1.22 typ.	1.14 typ.

* pH of a 5% potassium formate solution, which is a solution of **Freezium** in water prepared using the following formula:

$$100 = A + B$$

$$A = ((100*5)/C) = \text{amount of Freezium in g}$$

$$B = \text{amount of water in g}$$

$$C = \text{concentration of potassium formate in the Freezium}$$

CORROSION PROTECTION

Freezium contains an inhibitor package to ensure corrosion protection at both high and low temperature. Anti-corrosion performance is demonstrated through standard and specific corrosion testing.

<u>ASTM D1384</u> glassware corrosion tests	Weight loss in mg/coupon ¹					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminum
Reference product -40²	8.4	7.2	82.3	2.0	347.9	23.3
Freezium -40°C	2.0	2.5	112.0	-0.5	306.0	1.0

1 : Weight loss AFTER chemical cleaning. Weight gain is indicated by a - sign.

2 : Reference product is also potassium formate based

<u>Dynamic heat transfer corrosion test</u> <u>(2000 W - 48 hrs)</u>	Weight loss in mg/coupon ¹ on Aluminum
Reference product -30²	
Hot coupon	447.3
Top coupon	-0.4
Freezium -30	
Hot coupon	298.4
Top coupon	31.0

1 : Weight loss AFTER chemical cleaning. Weight gain is indicated by a - sign.

2 : Reference product is also potassium formate based



Freezium

STORAGE REQUIREMENTS

The product should be stored at ambient temperatures and periods of exposure to temperatures above 35°C should be minimized. **Freezium** can be stored for minimum 1 year in unopened containers without any effect on the product quality or performance. It is strongly recommended to use new containers and not recycled ones.

TOXICITY & SAFETY

For detailed Toxicity and Safety Data we refer to the Material Safety Data Sheet. **Freezium** is not toxic and biodegrades quickly. The transport is not regulated.

All information contained in this Product Information Leaflet is accurate to the best of our knowledge and belief as at the date of issue specified. However, the Company makes no warranty or representation, express or implied, as to the accuracy or completeness of such information.