Freezium

1 Description

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

2 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 rinks. 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 freezing and corrosion. The dilution is determined by system requirements, mainly freezing requirements.

3 Compatibility and mixability

Although **Freezium** is generally compatible with most organic salt based 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 if calcium chloride ($CaCl_2$) is mixed with **Freezium**, as this can increase the risk of corrosion significantly.

Freezium requires the use of soft water if you want to further dilute **Freezium** -60°C. Contact your local Arteco area sales manager for our dilution calculation tool.
In any case, **Freezium** -60°C should not be diluted to a freezing point below -20°C. This would results in a deterioration of its inhibitor performance level. Consult your local Arteco area sales manager for more information
It is recommended to avoid using **Freezium** in installations containing aluminum, Zinc or galvanized steel.

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4 Storage requirements

The product should be stored preferably at ambient temperatures. Periods of exposure to temperatures above 35°C should be minimized.

Further, it is strongly advised not to expose the coolant in translucent packages to direct sunlight because this can degrade the colour dyes present in the coolant, and result in fading of the colour or discoloration over time. This reaction can be accelerated if coupled with high ambient temperatures. It is therefore advisable to store coolant filled in translucent packages indoors to avoid this issue.

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. The use of galvanized steel is not recommended for pipes or any other part of the storage/mixing installation.

5 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.

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Chemical and physical properties

Addendum - Technical information

properties	method	F -60°C	F -40°C	F -25°C	F -15°C
colour	visual	light blue	light blue	light blue	light blue
pH*	ASTM D1287	9.5 typ.	9.5 typ.	9.5 typ.	9.5 typ.
freezing point	ASTM D1177	-60°C	-40°C	-25°C	-15°C
boiling point		114°C	111°C	108°C	105°C
Density, 20°C, kg/dm³	ASTM D1298	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 = amount of **Freezium** in g
B = amount of water in g
C = 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.

ASTM D1384 glassware corrosion tests

	weight loss in mg/coupon[1]					
	brass	copper	solder	steel	cast iron	aluminium
reference product -40°C	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

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Corrosion protection

Dynamic heat transfer corrosion test (2000W – 48 hrs)

	weight loss in mg/coupon[1] on Aluminum
reference product -30 [2]	
hot coupon	447.3
top coupon	-0.4
Freezium -30°C	
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

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