
FREEZIUM™
GREETINGS FROM THE COLD
KEMIRA
KEMIRA CHEMICALS

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What is Freezium?

Freezium™
A new coolant for a new era in coolin

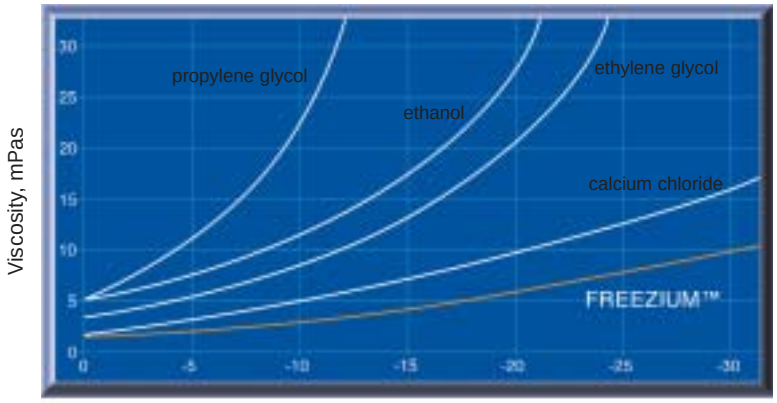
Freezium™ is a secondary coolant developed by Kemira, one of Europe's leading chemical companies, specifically for use in indirect cooling systems and heat pumps. Modern secondary refrigeration systems deliver a host of advantages (see panel). But filling them with old - fashioned refrigerants - such as glycols - unnecessarily compromises both their efficiency and safety.

Freezium™, based on a solution of potassium formate (HCOOK) - an organic salt - has been modelled to possess all the properties of the ideal secondary refrigerant: low viscosity, good thermal conductivity, and high specific heat capacity. Unlike conventionally used coolants, Freezium™ is neither toxic nor flammable. And it biodegrades quickly if ever released into the environment.

With Freezium™, there isn't a catch, just a few changes to the refrigerator's rulebook.

Low viscosity

The ease with which Freezium™ circulates is remarkable when compared to glycols. And this difference in viscosity becomes even more apparent at really low temperatures. Freezium™ remains completely fluid even when the pipework is completely frozen.



High thermal conductivity

Freezium™ cools and heats rapidly. Its ability to transfer heat so efficiently means much smaller heat exchangers can be specified – an immediate cost saving. Thanks to a higher temperature level in the evaporator, compression costs are lower too.

Achieve significant cost savings by using Freezium™, the ideal cooling fluid.

Reasons for saving achieved by the ideal cooling fluid		
	Low viscosity	***High thermal conductivity***
Savings in investments costs	*Smaller equipment required*	*Smaller heat exchange area needed*
Savings in operation costs	*Less pumping and especially less compressor power needed*	*Higher evaporator temperature utilized*

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Material requirements

Engineer-friendly specs

Materials

Freezium™ is perfectly compatible with most common engineering materials including copper, stainless and carbon steel, and user-friendly plastics.

The materials to avoid are aluminium, zinc and galvanised steel use of cast iron should be restricted to cool parts of the system.

Design

Attention to design and the use of good quality materials always pays off in the long run. Remember to keep the applications and properties of Freezium™ in mind.

Joints

You can use almost any usual kind of joint in a Freezium™ system: welding, compression fittings, adhesives, or (non-zinc) solder. When choosing the proper joint, remember that Freezium™ has an exceptionally low viscosity, so it is more susceptible to leakage. Threaded joints can be made leak-tight by using Teflon tape together with glue.

Equipment

Equipment should also be chosen for its suitability for the cooling or refrigeration application. Pumps are best placed on stainless steel drip trays with a discharge to a floor drain.

Separators

Freezium™ will perform at peak efficiency as long as system integrity remains uncompromised. If the solution becomes diluted or contaminated, its properties will begin to deteriorate. For that reason, dirt and air separators should be built into the system.

Guidelines (and tips) for starting up a (new) system with Freezium™

Upgrading to Freezium™? Existing installations can certainly clean up their act by switching over to Freezium™, which in principle can replace any other cooling media immediately. New systems should be designed to take optimal advantage of Freezium™'s excellent thermophysical propeties.

Biodegradable

Developing products with environmental consciousness is a priority at Kemira Group's Oulu Research Centre in northern Finland. Our own splendid surroundings are a constant reminder of that value. For people who know and care about chemicals, there's no friendlier coolant than Freezium™. It's safe for use during the long lifespan of your system. Even if this is not your top priority right now, it soon may be. Environmental regulations in the industries in which we operate can only get stricter.

To convert an existing system, check all the materials used for compatibility with Freezium™ In case of doubt, please get in touch with us for advice on performing the conversion as cleanly as possible.

The mixing of Freezium™ with glycols is not harmful, but best avoided.

Hazard-free

Non-toxic, non-flammable and with a biodegradability around 10 times that of glycols, Freezium™ demands no special environmental precautions and if accidentally released won't harm the ozone layer. Freezium™ is classified as non-hazardous for transport.

Accidental spills? No problem

Should Freezium™ be spilled outside the installation, simply flush it away to the drain with a large quantity of water since it biodegrades fully at low concentrations.

If Freezium™ gets on the skin or in the eyes it can, like every salt solution, prickle - again, just rinse copiously with water (It is always better to wear gloves and goggles to prevent direct skin or eye contact.)

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Cleaning, filling, de-aeration

Cleaning

Your (new) pipework should of course be thoroughly cleaned inside and out, and properly flushed and drained, before filling with Freezium™.

• Don't forget to test for leaks before filling with Freezium™: flush through water and pressurize the system (this will help to clean it as well).

• Pipework that needs special cleaning is best treated with a chemical pickling agent (always have a professional company carry out this work).

• Make sure the system is emptied thoroughly. A final rinse can be performed with a small amount of Freezium™ (remember to always use Freezium™ pure and undiluted).

• Almost all systems will show some sludge formation after start-up and during their life. Filters can prevent this reaching moving parts or the plate heat exchanger. A recommended mesh size is 0.1 mm (install the filters with easy cleaning access: as a by-pass after the pump, for example).

• Fill the system slowly and, preferably, from bottom to top (this will prevent air pockets forming in the lines).

• The system should be manually de-aerated. (check first that the de-aeration device is correctly located at the highest point in the system).

De-aeration may cause a few drops of Freezium™ to form at the de-aeration device (a flexible tube leading to a closed bucket or a drain will help prevent any spillage onto the outside of the system).

It is essential that all air is removed from the refrigeration system, and that it is kept airtight. (air in the system will negatively affect performance).

Since materials may shrink on cooling, re-check all the connections after starting up. (Freezium™ is far less viscous than other coolants so any leaks in the system will show quickly).

Indirect cooling systems

Why having a secondary refrigeration system makes sense

Refrigeration via indirect cooling demands a fraction of the amount of refrigerant: the primary system's requirements are minimal; the secondary, low-pressure system is filled with a special coolant solution - such as Freezium™ - to transport coldness where it's needed.

Retailers have led the switch to indirect cooling, an 'old' technology rediscovered in Scandinavia in the 1980's. In the closely managed economy of the supermarket, the key benefits of higher environmental standards and lower energy consumption are at their most quantifiable.

Savings in running costs

The whole system can be controlled with precision and minimal wastage. The facility to regenerate heat further enhances energy efficiency. There's less maintenance, the smaller the primary cooling circuit, the fewer legally mandatory maintenance and checking operations. Service costs work out at around one-third of those of a traditional system.

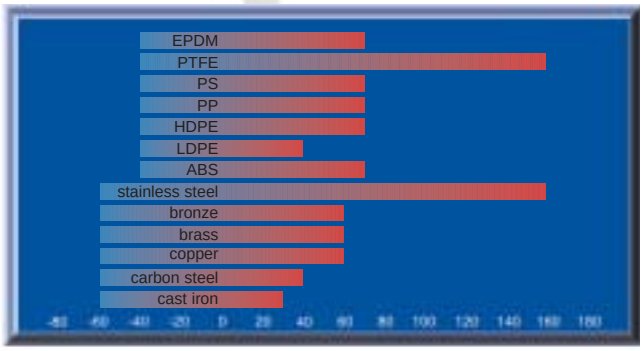
Defrosting is quick and simple

Simpler, cheaper installation

The primary system can make use of standard low-cost chillers The secondary system can be bought in pre-assembled component groups and fitted easily by any professional installer. It's simpler to modify, too - a boon for production processes requiring flexibility.

Environmental benefits

With direct refrigerant confined to the small primary system, indirect cooling is a responsible and effective answer to the real environmental threat posed by halocarbons.



Continuous use temperature ranges of some common materials in Freezium™

Note! Compositions of plastics and elastomers may vary according to the supplier. Ask the final approval from the supplier of material.

Global cooling applications

Freezium™ is an ideal coolant wherever secondary refrigeration systems are used:

Some of the most sophisticated installations are in supermarkets where cold needs to be transported to a variety of fresh and frozen displays effectively, economically and, above all, safely.

What are indirect systems?

Would you like to know more?

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