

Freecor[®] EV Micro 10

Low electrical conductivity fuel cell coolant

Arteco's **Freecor[®] EV Micro 10** is a coolant with low electrical conductivity. It is a mixture of ultra-pure water and high-purity antifreeze grade glycol. The coolant contains non-ionic additives for corrosion protection and electrical conductivity control. **Freecor[®] EV Micro 10** is compatible with stainless steel, aluminium, copper, brass and common elastomers as well as thermoplastics found in cooling systems.

Freecor[®] EV Micro 10 is specifically designed as a low electrical conductivity coolant for direct cooling of fuel cell stacks.



PRODUCT BENEFITS



5 fold protection



Excellent flow characteristics

- Low viscosity
- Reduced back pressure
- Less wear on parts, bipolar plate protection and crack prevention



Operation safety for fuel cell

- Low and stable electrical conductivity (< 5 $\mu\text{S}/\text{cm}$)



Ready to use

- No further manipulation nor dilution needed
- The coolant is also available with bitterant agent for use in aftermarket



Compatibility

- Compatible with fuel cell cooling system components including but not limited to the ion exchanger, radiators and hoses



Material protection

- Corrosion protection for fuel cell system components, i.e. stainless steel, aluminium, copper, brass and common elastomers as well as thermoplastics found in fuel cell cooling systems

Application

Arteco's **Freecor® EV Micro 10** is designed as a liquid heat transfer medium for fuel cell stack cooling.

Freecor® EV Micro 10 is also available with bitterant, complying with the French decree 95-326 dd 20/03/1995, relating to safety obligations concerning the distribution of monoethylene glycol-based liquids, **Freecor® EV Micro 10 +B2**. Also available upon request is an MPG (mono propylene glycol) based version if toxicity is important to you: **Freecor® EV Micro 10 MPG**.

Key approvals, standards and specifications

Arteco is renowned for working in close collaboration with most Original Equipment Manufacturers (OEMs) to develop its coolants meeting their stringent requirements for first fill and service applications.

The overview of the approvals on **Freecor® EV Micro 10** can be found on [Arteco's Product Finder](#).

Toxicity & safety

For toxicity information, safe handling and disposal of the product, we refer to the Safety Data Sheet. This product should not be used to protect the inside of drinking water systems.

Availability

Arteco's **Freecor® EV Micro 10** is available as ready-mix in the following packs:



IBC 1000KG



20L



**Bottle
5L**



Plastic Drum

Arteco's **Freecor® EV Micro 10** is available with and without bitterant.



Colourless

Contact details

Should you have questions on Arteco's **Freecor® EV Micro 10**, its available packages and colours or one of the other Arteco solutions, please do not hesitate to contact your local Area Sales Manager or send your inquiry to info@artecco-coolants.com.

Addendum - Technical information

Chemical and Physical Properties

Property	Typical value Freecor® EV Micro 10	Typical value Freecor® EV Micro 10 +B2	Unit	Specification
Base fluid	Ethylene glycol	Ethylene glycol		
Appearance	Clear liquid	Clear liquid		
eConductivity (25°C)	< 2	<3	µS/cm	ASTM D1125
eConductivity (80°C)	< 5	-	µS/cm	ASTM D1125
Density (20°C)	1,065	1,065	g/ml	ASTM D5931
Density (80°C)	1,027	1,027	g/ml	ASTM D5931
pH as such	5,0 - 7,0	5,0 - 7,0		ASTM D1287
Freezing point	-35	-35	°C	ASTM D1177
Kinematic viscosity (20°C)	3,6	3,6	mm²/s	ASTM D445
Kinematic viscosity (80°C)	1,0	1,0	mm²/s	ASTM D445
Boiling point	108	108	°C	ASTM D1120
Pour point	-46	-46	°C	ASTM D97

Engineering data Freecor® EV Micro 10

Temp.	Density ASTM D5931	Specific Heat	Thermal Conductivity	Volume Expansion
	Observed	Observed	Theoretical*	Theoretical*
°C	g/ml	kJ/kg.K	W/mK	V(T)/V(20°C)
0	1,077	3,28	0,381	0,99
20	1,065	3,35	0,392	1,00
40	1,052	3,42	0,403	1,01
60	1,040	3,49	0,415	1,02
80	1,027	3,56	0,426	1,04
100	1,014	3,64	0,437	1,05

* Ethylene glycol-water mixture with same freezing point

Shelflife & Storage requirements

Freecor® EV Micro 10 can be stored for 18 months in unopened recipients without any effect on the product quality or performance. It is strongly recommended to use new non-translucent containers, and where possible packages with a UV filter. Direct sunlight and high temperatures can degrade the quality of the product. In case the storage period has exceeded one year, it is strongly recommended to test the coolant on pH and electrical conductivity before the product is added to the system. **Freecor® EV Micro 10** should be stored below 30°C. Periods of exposure to temperatures above 35°C should be minimised.

Handling instructions

Arteco strongly recommends to rinse the cooling system with **Freecor® EV Micro 10** or ultra-pure water (electrical conductivity below 5 µS/cm) prior to (re)filling the cooling system. A full drain after rinsing is required. Any other engine coolant which can not guarantee the required low electrical conductivity level (< 5 µS/cm) should not be used for rinsing the fuel cell cooling system.

A conventional engine coolant has an electrical conductivity level of more than 1000 times higher, which causes damage to the fuel cell system. Therefore, **Freecor® EV Micro 10** should not be mixed with any conventional engine coolant. A conventional coolant can equally not be used to top up the fuel cell coolant. Its use is not intended for traditional and conventional engine coolant applications and the use of carbon steel alloys, cast iron, zinc and galvanised parts is prohibited. In case of doubt, please contact your local Area Sales Manager.

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