

METALGUARD® E-5000

Inhibitor Package for Low-Conductivity Coolants

Product Overview

METALGUARD® E-5000 low-conductivity additive package is for use in applications which require both efficient heat transfer and low electrical conductivity. Low-conductivity coolant can be required for applications that require electrical insulation for performance and safety. Coolants made with E-5000 additive maintains a stable, low-conductivity over a long period of time through E-5000's proprietary formulation of non-ionic corrosion inhibitors. This mechanism is essential to maintain safe operation of battery-powered and other electronics cooling applications. E-5000 coolant protects aluminum, copper, brass, stainless steel, and titanium. It is compatible with most elastomers and other materials including silicon rubber, viton, EPDM and graphite. It is not compatible with carbon steel, cast iron, or zinc/galvanized steel.

In addition to immersion cooling, large transformer cooling, and other non-vehicular applications, METALGUARD® E-5000 can be used to make both types of low-conductivity coolants: ASTM D8565 (hydrogen fuel cell coolant specification) and ASTM D8566 (electric vehicle coolant specification). ASTM D8566 is the specification for electric vehicle coolant which requires the finished coolant to have a conductivity $\leq 100 \mu\text{S/cm}$ (microsiemens/cm). ASTM D8565 is the specification for hydrogen fuel cell coolant, and it has a requirement of ≤ 5 microsiemens/cm in the finished coolant. Coolant with $\leq 5 \mu\text{S/cm}$ may be also be used in electric vehicles.

For fuel cell low-conductivity coolant, the deionized (DI) water system must be able to consistently out-put water with the applicable low-conductivity of $0-2 \mu\text{S/cm}$ and if you can buy or manufacture monoethylene glycol (EG) with a conductivity of $0-2$ microsiemens/cm then you can make a low-conductivity coolant for hydrogen cell powered vehicles or other low-conductivity applications with a requirement of $\leq 5 \mu\text{S/cm}$. For electric vehicle applications, there is more leeway. The DI water, EG and additive must all combine to be less than 100 microsiemens/cm, per ASTM D8566. However, most electric vehicle manufacturers want to see $\leq 50 \mu\text{S/cm}$ in the new coolant because the coolant will pick-up conductivity from the engine materials of construction over time; therefore, WEBA recommends providing an initial conductivity well below 100 . As a note, dye or regular colorant of any type should never be added to the finished coolant. Even a small amount of such ionic solutions will cause a dramatic increase in the fluid's electrical conductivity.

WEBA Technology can make the finished coolants for customers who do not have access to adequately deionized water and/or ethylene glycol. The E-5000 additive is used to make two different finished coolants: **METALGUARD® E-5100** ($\leq 100 \mu\text{S/cm}$) and **METALGUARD® E-5500** ($\leq 5 \mu\text{S/cm}$). METALGUARD low-conductivity products should never be used in internal combustion engine cooling systems.



Features & Benefits

- Direct battery cooling in electric vehicles
- Large transformer cooling systems
- Cooling of fuel cells in vehicles and other equipment powered by them
- Immersion cooling of computer components in data storage centers for computers and AI
- Electrical welding torches
- Certain optical and medical devices



ASTM Standards

When blended properly coolant:

- Meets ASTM D8566 for electric vehicles
- Meets ASTM D8565 for fuel cell vehicles



Quality Control & Technical Support

WEBA's products must pass rigorous quality control tests. They are tested for conformance with any product specifications and industry standards. Certificate of analysis are provided with every shipment. WEBA Technology can help with many other questions relating to anti-freeze and glycols, and assist with issues on any products containing our inhibitor packages.



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Product Specifications

METALGUARD® E-5000 Additive

Specific Gravity; 21°C (70°F)	1.150-1.155
Electrical Conductivity	<6.0 microsiemens/cm

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Packaging

- 55-gallon / 208-liter drums
- 275-gallon / 1041-liter totes
- Bulk tank truck



Blending & Use Instructions

Blending: Normally, the additive will be a homogeneous solution, requiring no mixing before use. However as an extra precaution, WEBA recommends that upon opening the drum of additive, stir thoroughly. Do not use high speed agitation. If you use only a portion of the drum (i.e. a few gallons at a time) be sure to deal the drum tightly after each use.

Test your ethylene glycol and water: Ensure their combined electrical conductivity does not exceed 95.0 microsiemens/cm for electric vehicle coolant and for hydrogen fuel cell coolant does not exceed 3 microsiemens/cm. The glycol used may not be reclaimed or recycled regardless of claims by producer.

To make antifreeze concentrate: First charge the desired quantity of glycol to the blending tank. Heat the glycol to 50°F (10°C) or higher. Maintain the minimum temperature throughout the blending procedure. Good agitation is vital to making a consistent and proper product; agitate for 30-60 minutes after the addition of the additive package.

Based on the quantity of glycol being treated, add 2.5% by weight of the additive package while agitating or circulating glycol.

To make 50/50 (50% glycol/50% water): Follow glycol instructions in concentrate section above, and then add 1.25% by weight of the additive package using the previous instructions.

Testing: Test your finished product to be sure it conforms to specifications. See below paragraph on quality control.

Storage: Store concentrated the additive package above of 60°F (15.5°C) at all times. If a container arrives very cold to your warehouse, immediately place it in a warm room for 1-2 days then stir thoroughly prior to use. Once a container is opened there is a possibility of the liquid phase evaporating, so close the container tightly after each use.

Water Quality And Dilution: When antifreeze concentrate is diluted to 50% by volume the water used must not exceed the microsiemens/cm specification. Deionized water is required. Tap or softened water may not be used.

Quality Control Procedures: WEBA strongly recommends that all antifreeze producers have an internal, complete quality control program in place for manufacturing and testing of all products made for sale.

The specifications listed in this bulletin are based on antifreeze produced with WEBA's additive packages, virgin glycol and deionized water. To confirm that your finished products meet the required industry specifications, WEBA recommends that you test your glycol and finished products at an accredited laboratory. WEBA will warrant our additive packages only if this procedure and the recommended blending and storage procedures are properly followed and documented. In addition, the glycol or other base fluid used with our additive systems should meet industry or ASTM standards unless specifically exempted in our literature.