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English

Voulis®

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EV COOLANTS

Low conductivity coolants
For EV electric vehicles

HANDBOOK

- Why EV electric cars need coolant?
- Why it should be of low conductivity?
- What other properties should EV coolant have?
- When should EV coolant be changed?
- How should the change be made and where?
- Why is it necessary to flush before changing?
- How to flush and where?
- Why final degassing is needed?

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EV coolants

Low conductivity coolant for EV electric vehicles

EV (electic vehicle) electric cars are now in increasing production range of almost all automobile manufacturers.

Electric cars have some pretty basic components, which need special protection against overheating, equal heat distribution elsewhere, material protection and potential leakage current, which they are called upon to provide specialized coolants.

The main ones are::

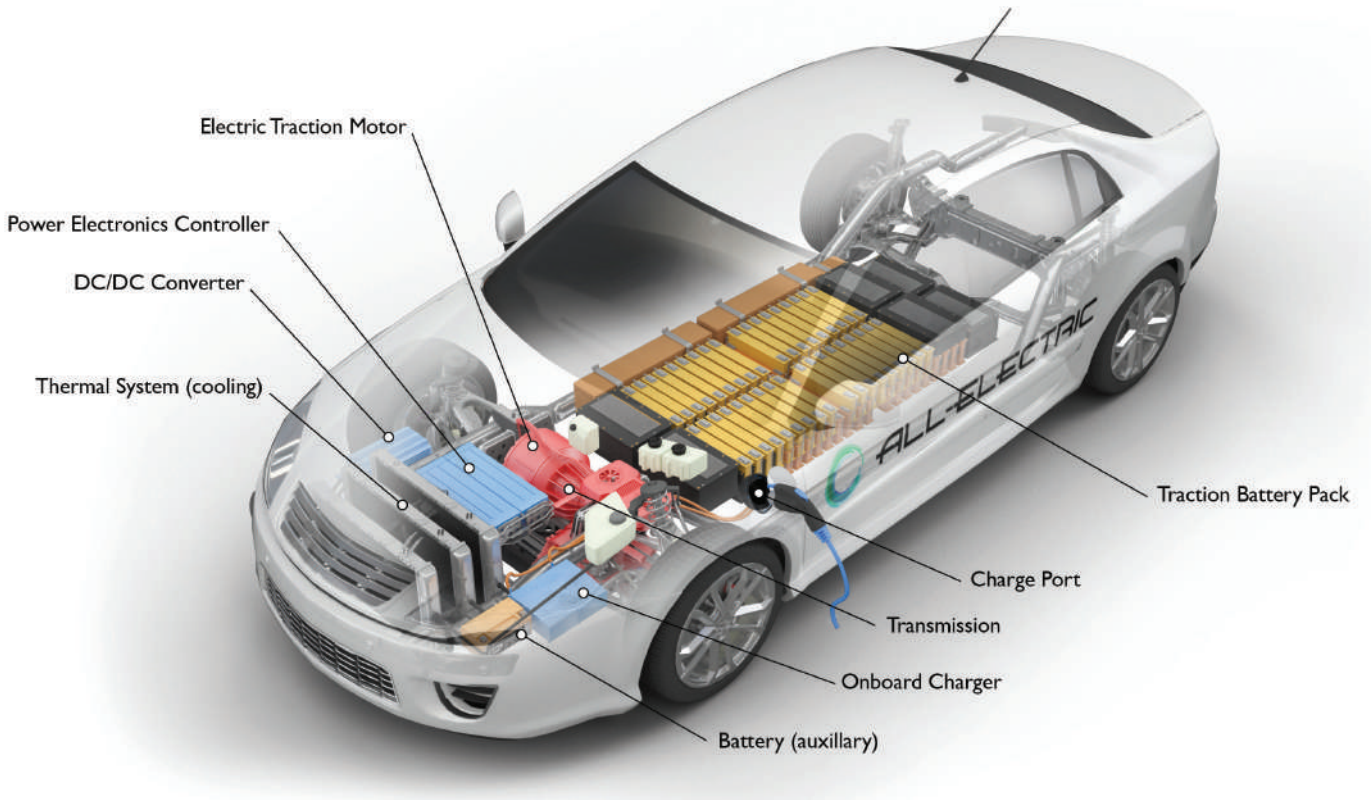
Batteries (the most important)

The electric motor

Electronic power systems

The integrated charging system.

All of these generate heat during their operation. Especially the batteries when charging in fast chargers, receive a strong electrical charge while also during operation, heat is generated which if we do not remove it, the effects will be disastrous for the entire electrical system but especially for the batteries.



The abduction and subsequently, proper management of transfer elsewhere of the heat must be done correctly in order to balance the thermal energy produced. To be successfully channeled to where it is needed most eg in the HVAC (Heating – Ventilation – Air Conditioning) system.

This is done in some early models with air, while it is now established and in most models it is done with a suitable coolant, based on glycol.

How does the whole system work

The coolant should therefore have:

Good thermal conductivity. So that it efficiently absorbs the heat and transfers it evenly away from the battery

Suitable freezing and boiling points, to operate effectively under a wide range of operating conditions.

Appropriate viscosity for comfortable circulation of the system. Without causing excessive pressure drop or strain on the pump.

Corrosion protection protection of the metals and thermoplastics it comes into contact with... and most importantly:

Strong dielectric protection and durability.

This is needed to ensure the system, that in the event of a failure or excessive overheating if an electric current leakage occurs in this liquid to act as insulation, i.e. to have a very low electrical conductivity (below 100 µS/cm), so as to successfully prevent the creation of electric arc or short circuit.

All the above properties that the coolant should have, in addition to optimal operation, also ensure the longevity of all protected components.

Battery operating temperatures.

Batteries today can withstand on their own during fast charging a range... between **0°C and 50°C** *(32°F - 122°F)*.

While in normal operation a range between **-30°C and 50°C** *(-22°F - 140°F)*.

At high temperatures and in the range between **70°C - 100°C** *(158°F - 212°F)*, there is a risk of thermal leaks, which may cause a chain reaction of battery destruction.

For this reason it is important that the coolant provides all these protection capabilities.

Topping or changing coolant?

- Regular checking of the coolant level, and topping up if necessary.
- Change coolant, if the material shows:

  Symptoms of aging:

  - It doesn't cool like before (thermometer monitoring)
  - It's not circulating like before (pump sound monitoring)
  - Visible leakage (on the ground when parked).
  - Check if engine light comes on.
  - Steam in the fridge (maybe even a strange smell) etc
- Or preventive every 75 - 150.000 kilometers.
- Always in workshop: it is recommended to change the coolant.
  - It should be done in 5 phases:

A) Safe extraction with complete draining of the old liquid.

B) Properly flush the tank and circuit to remove any old residue that could contaminate the new coolant.

C) Complete drain from the flushing fluid circuit, for the same reason.

D) Fill the circuit with safe low conductivity coolant.

E) And finally a complete and thorough degassing.

After all the above is done thoroughly, then the system is ready and safe for operation.

PACKAGING: Transparent packaging is not recommended because direct exposure to sunlight negatively affects the life of the product.

VOULIS CHEMICALS and EV COOLANTS

VOULIS CHEMICALS has studied in collaboration with large companies and produces the following EV coolants, high quality suitable for EV electric cars and specially designed for the protection of BEV (Battery Electric Vehicle) type batteries of these cars.

It also produces the flushing aid, **EV plisis**. Flushing is a procedure that must be done before placing coolant in the entire circuit.

VOULIS products are available as **READY TO USE** by the name **EV fifty-fifty**.

And concentrated (using a 50% dilution with deionized water) with the name **EV coolant** (concentrated).

Both of the above products are available with either **MEG** (Monoethylene GLYCOL), or **PG** (PROPYLENE GLYCOL).

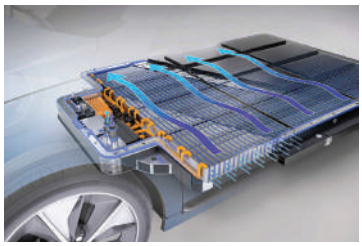
MEG (monoethylene glycol) or PG (propylene glycol)

The products are also available with **PG** (propylene glycol) instead of **MEG** (monoethylene glycol).

All the necessary specifications are present and work flawlessly in both materials.

The differences concern exclusively the environmental side.

PG (propylene glycol) is less toxic than **MEG** (monoethylene glycol), and less burden on the environment during export from the cooling and waste management system. Also **PG** (propylene glycol) traditionally costs more.



So much for the product **EV fifty-fifty** as well as the product **EV coolant** available in the same packages, with a special indication on the labels that it contains:

MEG (monoethylene glycol), or **PG (propylene glycol).**

EV coolant (concentrated)

Concentrated (needs dilution) special OAT technology coolant with stable (over time) low conductivity (<100μS/cm). Stops arcing or shorting. Contains a brazing flux compensation package, reducing the negative effects of CAB brazing. Provides excellent protection of all materials in contact (metals, thermoplastics, materials and elastomers). It ensures efficient disposal of produced heat. The user should add 50% of strictly good quality deionized water, while special **ATTENTION** will be needed during the process so as not to contaminate the final result with various foreign impurities. The product is also available ready-to-use under the name **EV fifty-fifty**, see next page.

The product **EV coolant (MEG & PG)** is available in packages:

- **Cardboard boxes** / **PET:** 16 x 1lit - 4 x 4 lit - 4 x 5 lit - 2 x 10 lit
- **Barrels** 210 Kg
- **IBC tanks** 1.000 Kg

EV fifty-fifty 50-50

Ready to use

Low conductivity (<100μS/cm) coolant (-37 to +110°C)

This high-tech OAT product is designed to offer the highest degree of safe indirect cooling for electric vehicles with batteries (BEV) and wider multiple protection benefits in EV cars. These are:

DIELECTRIC PROTECTION AND RESISTANCE

It has a low and extremely stable (over time) low conductivity (<100μS/cm). This essential element enriches the liquid with insulating properties from any possible leakage:

Either due to damage, the batteries,

Either due to leakage at some current point,

Either due to violent destruction (crash)

If there is a leakage of electricity, or a short circuit at some point in the path of the electricity... the coolant as a direct recipient of the leakage, works due to its very low conductivity as a bad conductor of electricity and stops the creation of an electric arc or short circuit, which will it had a disastrous effect.

In the opposite case (e.g. the coolants of ICE (Internal Combustion Engine) machines, because they are good conductors of electricity, instead of stopping the leakage, they will multiply it catastrophically.

FLOW STABILIZER

It is important that the coolant maintains its properties as long as it remains stationary or flows in a circuit.

The modern inhibitors and stabilizers it contains ensure long-term and stable operation and low electrical conductivity.

ANTI-RUST AND ANTI-CORROSION PROTECTION.

Excellent protection of all materials in contact.

METALS: A variety of metals that come into direct contact with the product need effective protection, such as: copper, brass, aluminum, steel and stainless steel, cast iron and their welds.

It also has the CAB aluminum welding flow compensation property, making the coolant fully compatible with this type of manufactured components.

THERMOPLASTIC MATERIALS: Pipes, resins and thermoplastic various materials such as POM, PVC, PP etc. but also elastomers. These materials have perfect compatibility with the product while being protected even in extreme conditions, effectively.

COLOR: Color is independent of quality. **EV fifty-fifty** mainly available in blue.

PACKAGING: EV fifty-fifty and up to 2X10, available in red PET packaging.

The product **EV fifty-fifty (MEG & PG)** is available in packages:

- **Cardboard boxes** / **PET:** 16 x 1lit - 4 x 4 lit - 4 x 5 lit - 2 x 10 lit
- **Barrels** 210 Kg
- **IBC tanks** 1.000 Kg

EV plisis

EV flushing fluid

At each coolant change, all manufacturers recommend thoroughly flushing the container and the entire cooling circuit, and then putting in the new coolant.

To facilitate this process, **VOULIS CHEMICALS** has studied, produces and supplies **EV plisis**. It is a low conductivity cleaning fluid enriched with protective properties of metals and plastics and elastomers, which has the ability to absorb all old and stressed residual fluids in the circuit, as well as any contaminants, leaving the internal surfaces spotlessly clean, so that the new coolant is not contaminated liquid.

This works like this:

We completely drain the old coolant from the special drain plug or valve.

We fill the special container with **EV plisis**, close the cap and with a circulation system (either EV's or ours) we create a circuit of about 15 minutes.

We open the cap again and now completely drain the flushing liquid.

We close the cap again after flushing, and we are ready to fill with the new coolant. After first doing the proper degassing, our electric car is ready for operation.

It is recommended that the entire process be done in the workshop.

The product **EV plisis** is available in packages:

- **Cardboard boxes** / **PET:** 2 x 10 lit
- **Barrels** 210 lit
- **IBC tanks** 1.000 lit

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