

Antifreeze facts and basics

Most driver's understanding of the function of coolant is limited to expecting the coolant to not freeze in the winter or overheat in summer. That's it. febi explains what the real requirements are.

In truth, the requirements on coolant for state-of-the-art engines are extremely high. Modern engines are becoming lighter in weight, more compact and more efficient. The end result is an engine that is running hotter.

Protection from frost and overheating

Almost every antifreeze (concentrate) is made up of around 90% glycol and 10% additives and inhibitors that affect the antifreeze's properties. Car coolants are a mixture of water and antifreeze. The ideal mixing ratio is 1:1, achieving frost protection down to -36° Celsius. The maximum possible frost protection of approximately -52° C is achieved by mixing ratio of 2:1 (antifreeze: water).

Warning: Never use pure undiluted antifreeze, as it will freeze at -16° C and dissipates heat poorly. Water has a thermal conductivity that is approximately 4 times higher than glycol. More water in the mixture results in better cooling. Pure antifreeze reduces the efficiency of cooling by around 50% when compared to a 1:1 mixture. In addition to lowering the freezing temperature, glycol also increases the boiling point, which protects the engine against overheating. With a 1:1 mixture, the coolant's boiling point is around 107° C.

Lubrication

Antifreeze has lubricating properties, enabling the coolant to lubricate components in the cooling system (e.g. water pump, thermostat, heating valves). This is particularly important for the water pump's mechanical shaft seal, which would wear out after a short time without antifreeze.

Protection from corrosion

The inhibitors in the antifreeze also protect against corrosion and cavitation, as well as preventing deposits and foaming. Silicate is an additive with excellent corrosion prevention properties. If the mixing ratio of antifreeze to water is calculated wrongly, the level of protective inhibitors in the coolant may be too low. It can lead to corrosion throughout the entire cooling system. In this case, rust, lime scale or dirt may destroy the surfaces of the mechanical shaft seal. As a result, the sealing of the water pump bearing is no longer guaranteed.

Tip: It is advisable to clean and flush the cooling system when replacing the coolant. Do not re-use the coolant that is drained off. Also remember that coolant is a hazardous waste.

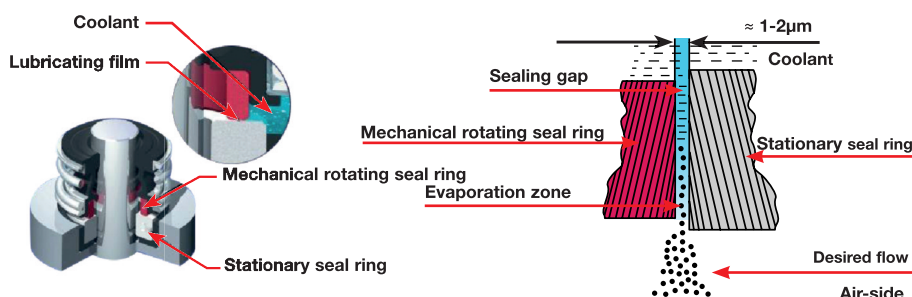


Figure 1: Antifreeze provides critical lubrication to the water pump's shaft seal (1µm = 0.001mm)

Silicate

Silicate is now an indispensable additive, given the increasing requirements in respect of material compatibility, corrosion protection, extended service intervals and the use of lighter weight materials in vehicle construction. However, the proportion in newer antifreeze has been reduced compared to older antifreezes with blue and yellow colouring. Nevertheless, some manufacturers (e.g. BMW and Mercedes-Benz) are still using antifreeze with a higher proportion of silicate. Of the antifreezes available from febi Bilstein, there are three that no longer differ in colour compared to their predecessors. The three antifreezes containing purple dye, making them visually identical, have monoethylene glycol (MEG) as their base, but have differences in the amounts of additives (see table below). The antifreeze in its current version now consists of approximately 70% glycol, 20% glycerol and 10% additives. Glycerol has similar properties to glycol, but is more environmentally compatible and less energy is consumed by comparison during its manufacturing. Corrosion protection and material compatibility have been further enhanced by new additives.

Mixability

Generally speaking, pay attention to the

colour of antifreeze and always use the same colour in the vehicle. In spite of this, almost all febi antifreezes can be mixed. The only exception is febi red antifreeze (febi 01381) that must never be mixed with blue (febi 01089) or yellow (febi 02374) antifreeze.

Service Intervals

Over time, some of the inhibitors are used up and no longer function as intended. As a result, the coolant loses frost and corrosion protection, as well as lubricating effects and thermal conductivity. Foaming and deposits may also occur. A coolant's shelf life depends on its quality and the cleanliness of the entire cooling system. Wear is particularly intensive if a leak occurs, or exhaust gases get into the cooling system (e.g. due to a faulty head gasket). It is therefore advisable to check the coolant regularly and replace it if necessary.

Tip: It is imperative to follow the manufacturer's instructions regarding specifications, service intervals, mixability and mixing ratios.

The full range of febi antifreezes and cooling system part scan be found at www.febi-parts.com.



Part No.	Colour	VAG Guide	Silicate share, mg/l	Glycerol share, %	Comment
01089	Blue	G11	500 - 680	0	
02374	Yellow	G11	500 - 680	0	
01381	Red	G12	0	0	
19400	Purple	G12+	0	0	Replaced in G12++ (febi 37400)
37400	Purple	G12++	400 - 500	0	Replaced in G13 (febi 38200)
38200	Purple	G13	400 - 500	20	Current design