Automotive Coolant – General Information

Coolants have changed substantially over the past 25 years. The reasons are quite logical - in the early to mid 1980's cars began to change in size, materials of manufacture and the engine technology improved. Overall cars and their engine bays got smaller. As a result the radiator needed to be reduced in size (and hence capacity) to fit. Improved engine technology and power resulted in greater heat generation and new alloys began to be used in the construction of the engine itself. The end result was that more heat needed to be extracted from a smaller capacity cooling system that now contained new and various steels and alloys. More recently coolants have been used to get the engine to the optimum operating temperature as quickly as possible after a cold start and keep that temperature within a narrow band for normal operation.

Traditionally coolant in Australian cars did not have an anti boil anti freeze component. Europe and North America had always had to deal with cold winter temperatures however in Australia before the mid eighties the only time we really thought about anti freeze was if we went skiing.

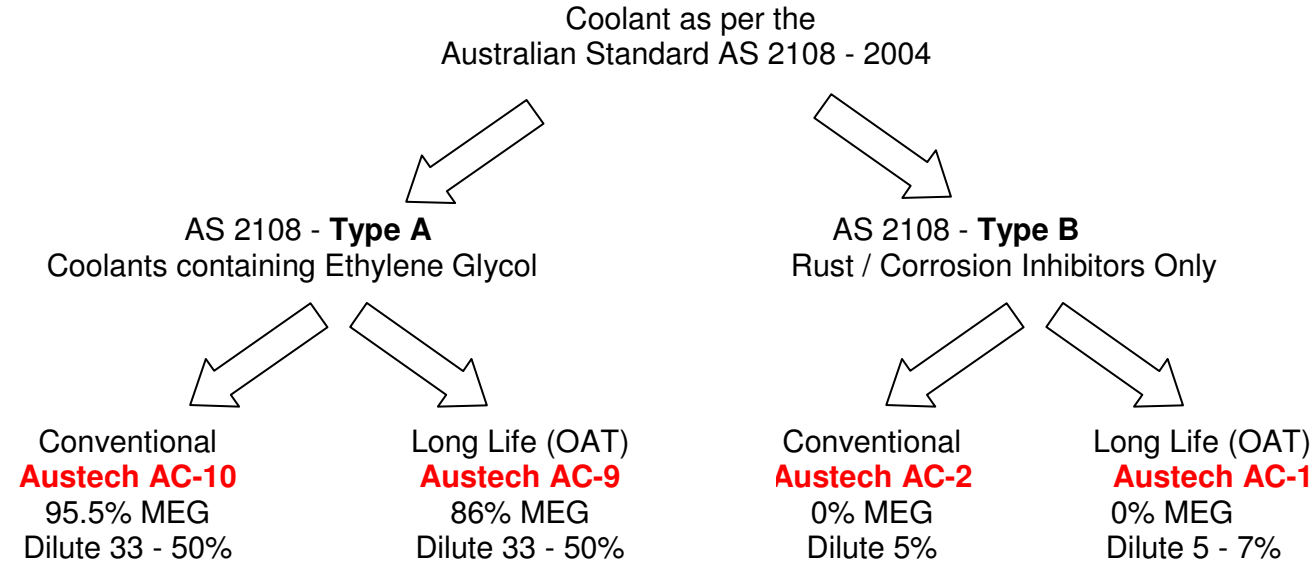
The anti boil anti freeze component is Ethylene Glycol (also referred to as MEG). It is manufactured from oil after much refining by specialised companies. We use mono ethylene glycol in coolant. It has a very high boiling point and very low freezing point and as a result helps the coolant fluid to not boil or freeze and subsequently create the associated problems. It is also the best known protector against '*hot spot boiling*' which can be a very detrimental problem.

The other critical (and often overlooked) component of the coolant fluid is the rust and corrosion inhibitor (referred to as RCI). The RCI protects the various metals in the system from deteriorating as a result of the fluids corrosion and negative action on them over time. The failure or poor performance of a rust and corrosion inhibitor can result in considerable damage to the system and especially the engine head, hose fittings and the heater and radiator core.

In approximate numbers the optimum coolant in the system is made up as follows;

Water 50% **and** MEG 40 – 45% **and** Rust and Corrosion Inhibitor 5 – 10%

The next important point to understanding coolants is the different types and their advantages and limitations;



Austech AC-7 and AC-8 Hybrid Coolants for Diesel Application are Type A Coolants.

Coolant Limitations

Coolant Type	Recommended Limit KM's	Recommended Limit Years
AC-10 Type A – Conventional	20,000 km	1 year
AC-9 Type A – Long Life	300,000 km	5 years
AC-2 Type B – Conventional	20,000 km	1 year
AC-1 Type B – Long Life	160,000 km	5 years

The definition of **Long Life Organic Coolants** is often sought. The Long Life Organics are also referred to as OATS (organic acid technology). Notably, the corrosion inhibitors in OAT coolants are slower acting but much longer-lived than those in the traditional conventional coolants which is where the 'long life' term originates. Organic Acid coolants include ingredients from the organic chemistry family, but no silicates or phosphates.

Nowadays there are also coolants on the market known as **Hybrid OAT Coolants**. This formulation also uses organic acids (different organic acids are used). Hybrid OAT coolants sometimes add some silicate to provide quick-acting protection for aluminum surfaces. Silicate also helps repair surface erosion caused by cavitation in the water pump. Hybrid OAT coolants are currently used by many European vehicle manufacturers and are gaining in popularity in Australia.

The **AC-10 (V2000)** is a Conventional Type A Coolant under Australian Standard AS 2108 that meets the requirements of GMH specification HN 2043. The formula for this product was developed and published by Holden to suit the V Series Commodores. It contains 95.5% MEG. The majority of Long Life Organic Coolant and Hybrid OAT coolants have approximately 87 - 89% ethylene glycol. Austech **AC-9 (V2001)** is a highly effective coolant with many millions of litres having been sold. We take a highly technical approach to coolant development and the stable of coolants, **AC-7**, **AC-8**, and **AC-9** are all excellent coolants that lead the industry for performance.

The manufacture of coolant is a chemical process and involves reacting several different chemicals. There are excellent formulas and some very poor formulas, and also technology has changed over the years. The lesser products in the market have a tendency to be unstable and not provide true rust and corrosion protection. Unstable products will often cause chemicals to fall out of solution and create sediment in the system causing considerable damage. A high quality coolant from a reputable manufacturer is always recommended.

Always remember that the cooling system has one and only one purpose - to remove excess heat from your engine. As your engine burns petrol or diesel, a little less than a third of the released energy goes into mechanical energy to run your car. The rest is converted to heat. Some of that heat is expended via the exhaust system and a large portion of it is transferred to the engine itself. Without a cooling system, the engine would be destroyed by heat within 3 to 30 minutes of starting the engine.

Lastly, a quick comment on mixing of coolants. All manufacturers are very specific that coolants should never be mixed and this is the only recommendation that can be made. At a practical level, long life and conventional coolant should never be mixed under any circumstances as they have very different pH levels. Generally a HN 2043 coolant can be mixed with another HN 2043 coolant as they, in theory, should be manufactured to the same formula. However the old saying is "if in doubt, drop it out".

If you have any questions that you need assistance with in the field please do not hesitate to contact Austech Chemicals on 07 3204 8511.