EVANS®

WATERLESS ENGINE COOLANTS

The ULTIMATE COOLING SOLUTION

Auto Cool 180°

Waterless Coolant for modern car engines fabricated from a mixture of cast iron, copper, steel and aluminium components.

Power Cool 180°

Waterless Coolant for performance car engines primarily fabricated from aluminium, plus some steel and copper components.

Classic Cool 180°

Waterless Coolant for classic car engines primarily fabricated from cast iron with carbon steel, copper & aluminium components.

Vintage Cool 180°

Waterless Coolant for pre-war vintage car engines that have pre-nodular cast iron blocks and many components made from copper and brass.

PowerSports

Waterless Coolant for MX, Trial and Enduro bike engines primarily fabricated from aluminium with steel and copper components.

Aero Cool 180°

Waterless Coolant especially for Rotax engines as per Rotax bulletin 912-043 RB & 914-029 RB.

Heavy Duty

Waterless Coolant for commercial diesel engines, with large cast iron blocks and cylinder liners plus aluminium, steel and copper components.

Marine Cool HD

Waterless Coolant for heavy duty marine diesels, with large cast iron blocks and cylinder liners plus aluminium, steel and copper components.

Marine Cool 180°

Waterless Coolant for cruisers and sports boats fitted with inboard engines fabricated from cast iron, steel, copper and aluminium components.

Prep Fluid

Hygroscopic flushing fluid formulated to remove residual water from the engine cooling system, prior to filling with Evans product.

For individual product information please refer to insert at back of folder.

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WATERLESS ENGINE COOLANTS

NO WATER NO PROBLEMS

Purpose-formulated for use in engines, Evans Waterless Coolants represent a logical and overdue progression in liquid cooling technology. Whilst water is essential for life it is not ideally suited to cooling engines – where it has a natural tendency to boil, corrode, erode and generate high operating pressures.

Statistics published by manufacturers and motoring organisations confirm, that water is the cause for 60% of engine breakdowns and 40% of catastrophic failures. While internal damage goes mostly unnoticed in new engines, the cumulative effects become increasingly apparent over time.

For decades engine designers and antifreeze formulators have endeavoured to constrain waters natural characteristics, because there was no viable alternative. That is no longer the case.....

Since 1993 Evans waterless coolants have been successfully installed in >500,000 engines around the world. The first truck conversion is still going strong after 20 years and a million miles – all without the need for top-up or replacement! A rapidly growing list of *'the converted'* includes hundreds of highly respected engineers, restorers and collectors – all of whom agree that...

"Evans performs as advertised"

An increasing number of fleet operators and manufacturers confirm that Evans coolants not only solve problems, but often provide the opportunity to improve performance and advance engine design. Just imagine, a cooling system hermetically sealed for engine life!

All engine users can now opt for a purpose-formulated coolant. An alternative which eliminates all the issues associated to water in engines, including; boiling, freezing, overheating, detonation, power loss, corrosion, erosion, cavitation and the need for regular replacement.

In everyday terms Evans coolants reduce running costs, improve reliability, maximise performance, extend engine life and thereby increase resale value.

In Technical Partnership with
Honda Racing

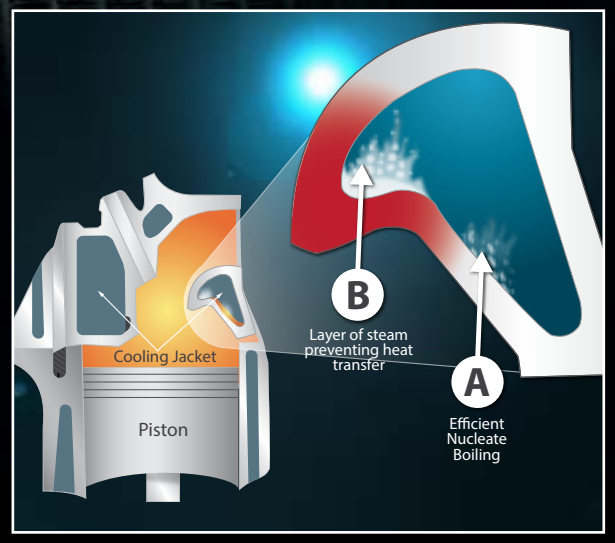
Progress through partnership

Physical Limitations

Within an engine cooling system the hottest surfaces are those adjacent to the combustion chamber, specifically cylinder liners and cylinder heads. In these areas water-based coolants regularly cross the thermal boundary that seperates efficient cooling from overheating. In an ideal heat transfer situation micro-bubbles of vapour form on the surface of the metal and then move into the main coolant flow, where they condense and dissipate their energy. This process is refered to as Nucleate Boiling (A).

When a fluid is heated beyond the point of efficient Nucleate Boiling it is said to reach Critical Heat Flux (CHF) which rapidly leads to Film Boiling (B). Film Boiling produces an insulating layer of steam-vapour between the metal and the coolant.

Steam-vapour has a fraction of the required heat transfer capacity compared to it's fluid state. Film Boiling leads to rapid overheating of local metal surfaces, warping of cylinder heads, distortion to liners, pre-ignition, detonation, boil-over and after boil. Overheating of water-based coolants is the most common cause of engine downtime.



"In a recent 12 month period the AA responded to more than 56,000 breakdowns caused by overheating"

AA - U.K Automobile Association 2013

NO WATER
NO EROSION
NO CORROSION
NO OVERHEATING
NO PRESSURE
NO PROBLEMS

Evans Waterless Engine Coolants have a boiling point >180°C ensuring liquid-to-metal cooling at all loads which eliminates overheating - permanently!

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Chemical Limitations

Although water was the natural choice when IC engines were first invented, it is also the root cause of corrosion in cooling systems. For the last 100 years chemists have been toiling to restrain the corrosive characteristics of water. However significant evidence confirms success has only ever been temporary and limited, hence the need to regularly replenish water-based coolants and replace corroded components.

Oxidation Corrosion

Water contains dissolved oxygen which leads to oxidation corrosion of carbon steel. Rust is a permeable oxide layer that allows continuous corrosion in the event of inhibitor failure. The oxides of aluminium, copper and stainless steel are often impermeable to water and oxygen but still susceptible to galvanic corrosion (see right). When water is heated to 99ºC most of the dissolved oxygen is driven off (de-oxygenated). However as water cools it has the ability to absorb fresh oxygen (re-oxygenate). This cycle can be repeated every time an engine runs and gradually neutralises the corrosion inhibitors – hence the need for regular coolant replenishment and why so many engines suffer from corrosion damage.

Galvanic Corrosion

Also called 'dissimilar metal corrosion' is the damage caused when two dissimilar materials are coupled in a corrosive electrolyte, such as water. When a galvanic couple forms, one of the metals in the couple becomes the anode and corrodes faster than it would by itself, while the other becomes the cathode and corrodes slower than it would alone. The relative nobility of a material can be predicted by measuring its corrosion potential. The well known galvanic series lists the relative nobility of certain materials. Water-based inhibitors can limit galvanic corrosion, but ongoing reports confirm that the corrosive nature of water often prevails.

"60% of all engine failures can be attributed to (water-based) cooling system failure"

BTC Testing Advisory Group - www.btctag.org

NO WATER
NO EROSION
NO CORROSION
NO OVERHEATING
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NO PROBLEMS

Evans Waterless Engine Coolants do not contain dissolved oxygen and minimise galvanic action thus eliminating corrosion for an engine lifetime!

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Cavitation

Cavitation erosion is caused by the rapid formation and explosive collapse of vapour bubbles. Significant effort has been invested over many decades in an attempt to reduce the damage to engine liners and pumps caused by cavitation. Unfortunately much of that effort has been wasted because the saboteur (cause) remains at the crime scene – water is constantly vaporising and cavitating adjacent to engine components and until it is removed the problem (effect) will remain.

John Deere Cavitation Test

In 2009 Evans Cooling Systems hailed the findings of the ASTM D7583 Standard Test Method for the John Deere coolant cavitation test. The report confirmed that Evans Waterless Engine Coolant achieved results that cannot be matched by any water-based coolant.

The 250 hour engine-dyno test, developed by John Deere was approved and adopted by ASTM as the official method to verify liner cavitation. The establishment of ASTM D7583 was an important milestone for determining how well various coolants protect cylinder liners against cavitation erosion.

Above: Water pump blades severely damaged through cavitation erosion.

Above: Pitting caused by cavitation.

Tom Light, Evans USA Chief Engineer, was delighted with the results of the John Deere test. Evans Waterless Engine Coolant was recorded as reducing pitting by 90% in comparison with other heavy duty water-based coolants.

Caterpillar, Inc. state that 40% of all catastrophic engine failures are caused by (water-based) coolant issues. They go on to say, in great detail, that coolant maintenance is paramount if failures are to be avoided. By installing Evans in place of a water-based coolant the need for intensive maintenance and the risk of catastrophic failure are eliminated at a stroke.

"40% of all catastrophic engine failures are caused by (water-based) coolant issues"

Caterpillar, Inc

NO WATER
NO EROSION
NO CORROSION
NO OVERHEATING
NO PRESSURE
NO PROBLEMS

Evans Waterless Engine Coolants are not prone to vapourisation and proven to reduce liner erosion by **90%** compared with water-based coolants

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Vapour Pressure

Cooling hose and pump seal failure are common reasons for vehicle breakdown and plant downtime. Apart from the operational inconvenience, hose failure is cited as the 10th most common cause of automotive injury, where high pressure steam has escaped and scalded the driver or plant operator.

50-50 water-antifreeze coolants have an inherently high vapour pressure which causes them to boil at 103ºC at atmospheric pressure (1.013 Bar). In an attempt to prevent water-based coolants boiling inside an engine it is necessary to fit a spring-loaded cap, which increases the system pressure by 0.5 - 2.0 Bar Gauge (7 - 29psig). Each time the engine runs, vapour pressure puts stresses on all cooling system components, particularly on the hoses, seals and radiator seams.

Modern engines are running at temperatures at or above 100-110ºC in an endeavour to improve fuel economy and reduce exhaust emissions. These increased operating temperatures require a cooling system pressure of >1.5 Bar (21.75psig) in an attempt to maintain the coolant in a liquid state. As temperatures and pressure continues to rise it will become increasingly difficult and more dangerous to restrain water-based coolants. In this respect most of the Formula 1 drivers have the added risk of an 'explosive' cooling system operating at >130ºC and 3.2 Bar directly behind them!

Whilst water remains ideally suited for powering high pressure steam turbines its use as an engine coolant is far from ideal. It is no longer necessary for engines to perform as proxy pressure cookers - Evans Waterless Engine Coolants generate 75% less pressure, eliminating the risk of hose bursts and injury from escaping steam.

"around 9000 people are scalded every year by high pressure water escaping from burst hoses and radiators"

Forbes USA, Report on automotive injuries

NO WATER
NO EROSION
NO CORROSION
NO OVERHEATING
NO PRESSURE
NO PROBLEMS

Evans Waterless Engine Coolants generate **75%** less system pressure compared to water-based coolants. Making it possible to safely remove the radiator cap whilst the engine is still running.

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Delivering a Global Solution

From humble beginnings in 1992 Evans Waterless Engine Coolants are now making a global impact across all engine sectors. It is now possible to buy Evans in the remotest areas of China, a local garage in Dubai, downtown Sydney and upstate New York. Or if you are based in Europe, from Alta in Norway to Zakaki in Cyprus and every latitude between.

Evans recent appointment as a technical partner to Honda Racing is the latest of many associations with OEM's, fleet operators, racing teams and specialist restorers that confirm the unique benefits gained by installing Evans Waterless Engine Coolants.

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Honda Worlds MX Team

Specified by Rotax

Wheeler Dealers Edd China

Veolia

Staying cool afloat

Thunderbolt

Quentin Willson

London Port Authority

Evans XKRS

Cape Town to London World Record

Hawk Rentals

Phill Bayliss

Team Japspeed

1903 Italo

Casper Elgaard

Porto Pekin Winner

Steve Griffiths Lotus F1

Kubota

Beaulieu Motor Museum

Ariva Buses

Aprilia to Yamaha

David Knight

Team Kamaz Master

Nick Mason's GTO

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Progress through partnership

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