HAMMERSLEY
INDUSTRIAL RANGE
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PRODUCT MANUAL

HIBITEC - PROTECTION FROM CORROSION & SCALE

PURPOSE

To protect water-cooling lines of internal combustion engines from corrosion and scale.

Three Main Benefits of Product

- Low cost - 2% solution is all that is necessary for most operations.
- Protects in cavitation areas because it is carried into the vapour phase.
- Suitable for alloy motors and multi-metal components.

Exceptional Feature of Product

HIBITEC is not exhausted by its reaction with corrosion and scale forming agents, and normally needs no concentration adjustments between services.

MOST IMPORTANT FEATURES

- Very low toxicity.
- Non-flammable.
- Non-pollutant.
- Universally suitable for petrol, diesel or LPG fuelled motors.
- Compatible with anti-freeze solutions and other protection systems.
- Liquid concentrate blends instantly with water.
- Assists in cleaning corroded and scaled systems.
- Is not "used up" or neutralised like nitrite systems.
- Far superior corrosion properties than glycol systems.
- Not effected by hard water.
- Good suspension properties for contaminations.
- Because system is kept scrupulously clean, engine is assisted in maintaining peak efficiency.
- HIBITEC forms an anodic monomolecular barrier on all metal parts - locks out corrosive elements.
- Will not effect rubber hoses, or seals.
- Contains no chromates or environmentally destructive compounds.

SPECIAL TECHNICAL DATA

- HIBITEC does not increase the boiling point nor decrease the freezing point of the cooling water.
- Before initial additions occur, systems should be emptied and flushed.
- When additions are made to systems effected by corrosion or scale, 2% HIBITEC should be used. The system should be drained, flushed and refilled after one weeks running.
- Do not overuse. 2% concentration is all that is required.

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AREAS OF USE

Trucks, buses, earthmoving and mining equipment, car fleets or stationary motors.

Functional inhibitors contained in HIBITEC.

- A Nitrate provides protection for aluminium, specifically against pitting and crevice corrosion.
- Molybdate is a general purpose inhibitor that is particularly affective for ferrous alloys. Another advantage is its long-range durability providing protection after other inhibitors have been depleted.
- Silicate provides the best overall protection for aluminium against hot-surface corrosion, cavitation and immersion exposure.
- Organic phosphate has some general purpose protection for several metals and is very effective in preventing cavitation-erosion damage of aluminium.
- Mercaptobenzothiazole (MBT) and Tolyltriazole (TT) are both specific inhibitors for copper and brass, although MBT will provide some protection for aluminium. TT is more durable than MBT, particularly at high temperatures. A synergistic effect from the combined inhibitors provides additional protection for solder, particularly high-lead solders.
- Polyctylates loosen any hard water scale and solubilises it off metal surfaces.
- They complex hard water salts and keep them in solution so that they do not plate out or interfere with the action of the inhibitor.
- Alkali is added for pH control.
- Borate provides some protection for ferrous metals under mildly corrosive conditions, but its principal use is as a buffer to maintain proper pH levels.

Mechanism of Protection

- HIBITEC is an efficient multi-functional additive designed for the cooling system protection of modern automotive engines.
- Each additive in HIBITEC is specially active against and attracted to an individual metal in the system, creating a complex molecular oxide barrier on that metal.
- The oxide acts as an impervious, chemically inert barrier around the metal, isolating it from other metals in the system and from all other corrosive influences.
- The oxide layer is strongly bonded to the surface of the metal and resists mechanical or chemical removal.
- Should the surface protection be displaced by implosion in hot spot areas the molecular strength of solution at correct Hibitec concentration ensures fast repair and continuing protection of this site.

COMPARISON TO ETHYLENE GLYCOL SOLUTIONS

Ethylene Glycol is an effective anti-freeze solution designed for depressing the freezing point of water. It was originally used in the sub-zero temperature regions of Europe and North America and is useful in Australian Alpine regions where extreme conditions exist. Glycol preparations also slightly elevate the boiling point of water and find some use in the extreme heat areas of outback Australia.
Glycol/water solutions are considerably corrosive and all propriety products contain inhibitors to prevent this inherent corrosiveness from adversely affecting cooling systems.

NOTE: This inhibiting effect does not indicate complete corrosion protection for the system, merely a negation of the normal corrosive tendencies of the glycol.

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Ethylene Oxide (EtO) has been widely recognised as a potential mutagenic and an occupational carcinogen. EtO is a major industrial chemical with widespread use in the production of automotive antifreeze, polyester fibres, films, bottles, solvents and fumigants and has a number of acute toxic effects, including peripheral neuropathy.

The American Occupational Health & Safety Administration (OH&SA) published, on 21 April 1983, a proposal for an EtO standard reducing the permissible exposure level to one part per million Time Weighted Average, with an action level of 0.5 ppm triggering monitoring and medical surveillance requirements.
The standard provides for the use of engineering controls, personal protective equipment, measurement of employee exposures, training, medical surveillance, signs and labels, regulated areas, emergency procedures and record keeping by employers.

	HIBI-TEC	ETHYLENE GLYCOL SOLUTIONS
Exposure to low temperatures	No effect	No effect
Compatibility	Compatible with Nitrite and Glycol solutions	Compatible with HIBITEC & Nitrate solutions
Cleaning existing corrosion or scale	Excellent at 2% concentration	No effect
Concentration in cooling water	2% maximum necessary. Less is still effective.	Min. recommendation 20%. More usual 30+%
Scale inhibition	High level at 2%	Negligible
Crystal modification of scale	Complete distortion of scale crystal	Nil
Dispersant	High level at 2%	Negligible
Anti-corrosive effect	Highly effective	Effectiveness should not be assumed
Effect on boiling point/freezing point	No effect	Elevates boiling point. Depresses freezing point.

COMPARISON TO SODIUM NITRITE SOLUTIONS

Ability to clean corrosion and scale from existing cooling systems

Hibitec	2% concentration (20ml/lt) - excellent
Sodium Nitrite Solution	NIL

Compatibility with Anti-freeze Solutions

Hibitec	Completely compatible
Sodium Nitrite Solution	Completely compatible

Engine Cooling System Concentration

Hibitec	2% concentration (20ml/lt). Concentration below this level will perform adequately. NOTE: Action against the corrosiveness of the cooling system will not deplete concentration of HIBITEC.
Sodium Nitrite Solution	5% concentration.

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NOTE: Depletions below an acceptable level will allow water salts to change the anti-corrosive environment of Nitrite to a corrosive environment of Nitrate. Reactions with dissolved oxygen will deplete concentration of Sodium Nitrite in systems.

Scale Inhibition

Hibitec	High level
Sodium Nitrite Solution	NIL

Dispersant

Hibitec	High level
Sodium Nitrite Solution	NIL

Crystal Modification

Hibitec	High level
Sodium Nitrite Solution	NIL

Test Procedures

Hibitec Non sacrificial action - concentration and activity is not depleted by its action against corrosive tendencies of the cooling water. No testing is necessary - no concern over continuation of protection.

Sodium Nitrite Solution Chemically changed by its action and the effect is depleted. Constant testing is necessary to avoid increased corrosiveness.

EXPOSURE TO EXTREMELY LOW TEMPERATURE

Hibitec	No effect
Sodium Nitrite Solution	May crystallise

THE MODERN MOTOR VEHICLE ENGINE

The modern internal combustion engine is a complex and sophisticated machine working at high temperature and under high pressure.
The cooling systems of these motors are themselves complex and need to always operate at maximum efficiency to ensure the overall efficiency and safe operation of the engine.
A modern cooling additive must be technically advanced in order to ensure adequate protection to these modern cooling systems. Many additives which were suitable for engines a decade ago are no longer adequate.

REQUIREMENTS OF A MODERN COOLANT ADDITIVE

1. The ability to protect a range of different metals. The cooling water of a modern engine comes in contact with the following metals or alloys.

   Aluminium
   Aluminium Alloys

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Ferrous Alloys (Steel etc)
Copper
Brass
Solder

2. Problems may occur not only from the normal corrosive tendencies of each metal but from galvanic corrosion because of the presence in the closed water system of dissimilar metals. An efficient coolant additive must be able to neutralise the corrosive electrolytic forces or isolate each particular metal from them.

3. The ability to maintain its protection under conditions of high temperature
Although heat transfer through the radiator maintains the cooling system at around 100°C some metal surfaces of the engine around the combustion chamber that come on contact with the water, are very much hotter. Around these hot spots the coolant water may flash boil for short periods.

The protection of the metal surfaces and the stability of the coolant additive in the water must be maintained in these extreme conditions.

4. Protection against cavitation corrosion.
At hot spot site and slow moving coolant areas flash boiling and condensing of coolant water cause extra stresses. Explosions caused by the instant generation of gaseous steam in the enclosed system and implosions caused by its rapid condensation to the normal liquid state expose the metal to cavitation corrosion. Cavitation causes a gas/liquid interface to exist that is highly corrosive. The negative pressure around the implosion also has the capacity to tear off protective barriers in the immediate area thus exposing bare unprotected metal to this highly corrosive environment.

An efficient coolant additive must maintain a high level of protection at cavitation sites and be able to quickly repair any breakdown of barrier protection.

4. The capacity to keep the system clean.
When flash boiling takes place in cooling system hot spots, hard water scale may deposit on the hot metal surfaces.

The scale is very insulative and decreases the rate of heat transfer from the engine. In severe cases scale can slow down the water flow in the system and cause overheating problems.

To maintain efficiency in heat transfer from the system a coolant additive must be able to complex and/or disperse hard water salts and maintain a clean metal surface area to maximise heat transfer.