

# NORKOOL™ Industrial Coolants

Can your coolant last up to 25 years?





## The NORKOOL™ advantage

### The NORKOOL product line is Dow's premium heat transfer fluid for gas compression engines and line heaters.

The NORKOOL™ family of industrial coolants and associated system maintenance products from Dow sets the highest standards in the oil and gas industry for quality, performance, technical expertise and service.

Whether you need an ethylene glycol (EG) or propylene glycol (PG)-based coolant, specialized corrosion inhibitors, system cleaning agents or degreasing agents, Dow has a product designed to meet your needs.

#### Formulated for demanding oil and gas service conditions

All NORKOOL™ industrial coolants are formulated to provide high performance, long and dependable service life, and the favorable economics required across a broad range of applications in the oil and gas industry including:

- Cooling of large stationary engines (natural gas compression)
- Cooling of field compression units (natural gas gathering systems)
- Natural gas line heaters
- LNG vaporizers
- Wellhead heaters
- Combustion air pre-heaters

#### Improved corrosion protection

The enhanced formulation for NORKOOL coolants includes Dow's patented anti-scaling technology with our tried-and-true NORKOOL phosphate- and nitrite-based corrosion inhibitor. This combination provides long-term protection of cast iron, copper alloys and solders, even when elevated levels of chloride, sulfate or water hardness are present. This optimal set of inhibitors makes NORKOOL coolants more "forgiving" than competitive fluids and ensures the long and reliable life of the system with proper maintenance and operation.

In addition, NORKOOL™ coolants offer superior cavitation and crevice corrosion protection, especially important for protection of the cylinder wet liner sleeves of large industrial engines.

#### Outstanding freeze and burst protection

NORKOOL™ coolants offer excellent freeze and burst protection. Inhibited glycols are highly efficient at depressing the freezing point of water, the temperature at which the first ice crystals form. These coolants also give added protection against bursting and system damage. Because water expands when it freezes and can cause catastrophic ruptures, the addition of an inhibited glycol-based coolant to your system significantly reduces the expansion potential. Systems in cold weather operation should use a fluid with a freeze point of 5°F below the coldest expected temperature. Those systems that are idle during cold weather may use a fluid concentration that provides burst protection only.

#### Propylene glycol-based NORKOOL™ Coolant

Dow offers a PG-based coolant, NORKOOL LTC, which provides, the same outstanding protection against wet sleeve liner cavitation and system corrosion as our EG-based NORKOOL SLH. NORKOOL LTC also offers a lower toxicity profile compared to SLH.

#### High quality and reliable supply

NORKOOL industrial coolants use the highest quality materials, starting with virgin glycols that are free of the harmful contaminants found in recycled glycols.

You can count on Dow to help you maintain your coolants to provide the highest performance, the lowest maintenance, and to ensure the longest life and the safest operation. Dow also strives to ensure that you have a reliable supply of coolants.

Dow has been the world's premier supplier of heat transfer fluids for more than 75 years. With back-integration to key raw materials and a broad distribution network, we're equipped to provide the most reliable supply of fluids possible.

#### Strong technical support

Our technical experts can assist you with all your fluid selection and usage needs. From system design to troubleshooting, Dow provides a range of services to help optimize your operations.

## Maintenance and testing services

NORKOOL™ coolant comes with a complimentary testing program to help maintain fluids at peak operating condition for customers under contract or for those having systems containing 2,500 gallons or more of NORKOOL coolant. Dow recognizes the high cost of downtime, so data and technical expertise are provided to help keep systems running smoothly.

Free sample kits include bottles, labels and a shipping box. Each sample goes directly to the lab, where Dow performs a series of tests to evaluate the fluid's current condition. A Dow specialist will review each report and make recommendations for maintaining the integrity of the fluid. The final report will be sent by e-mail, and a Dow representative will be available to review the results and answer any questions.

Please note that inhibitors should be added only as specified by the report. Incorrectly adding inhibitors can result in precipitation, leaving the system unprotected from corrosion. Under-inhibiting can also result in inadequate inhibition. Please consult a Dow representative to request a test kit or information on sampling procedures, or to receive answers to any questions.

### Advantage of calculated corrosion rate

A key feature of the Dow analytical report is the calculated corrosion rate, which combines several fluid parameters into a single, practical indicator of ongoing corrosion protection performance.

There are two main advantages to having corrosion rate listed on your fluid analysis report. First of all, corrosion rate eliminates false alarms caused by error-prone metals analysis. Too often, coolant samples contain suspended solids, such as weld flash or pipe scale, at sizes too small to be visibly seen but high enough to contribute to high metals concentration. This gives a false indication of corrosion problems. Corrosion rate, on the other hand, is unaffected by suspended particles and gives a truer indication of the condition of your fluid.

Secondly, by utilizing corrosion rate, you avoid falling into the costly trap of adding more inhibitor every time a reported concentration falls below a supplier's threshold. The potential for corrosion depends on more than just inhibitor levels. Corrosion rate helps make sure that more inhibitor is added only when your system truly stands to benefit.

### Recommended operating limits for NORKOOL™ Coolants

Key parameter	Acceptable range
Glycol concentration (volume %)	> 30 < 60
pH	8-10.5
Degradation acids (ppm as C <sub>2</sub> H <sub>4</sub> O <sub>3</sub> )	< 3000
Chloride (ppm as Cl)	< 200
Sulfate (ppm as SO <sub>4</sub> )	< 500
Hardness (ppm as CaCO <sub>3</sub> )	< 300



## What causes corrosion?

### Salt contamination

Soluble mineral salts are often present in industrial coolants because of the use of a poor quality coolant or the addition of highly contaminated water. Poor quality water contains too many ions, which make the fluid “hard” and corrosive. Ideally, deionized water should be used for dilution. Common soluble mineral salts include calcium, magnesium and sodium cations, as well as chloride, sulfate and carbonate anions. Calcium and magnesium cations cause reduced heat transfer through scaling on the walls, formation of sediment and circulation problems, and under-deposit corrosion. In addition, high concentrations of corrosive ions, such as chloride and sulfate, will eat through any protective layer that the corrosion inhibitors form on the walls of the system.

### Thermal degradation

Glycol degradation occurs when the glycol is exposed to high temperatures, particularly in the presence of oxygen or oxidizing agents. This degradation results in the formation of organic acids, specifically, glycolic, formic and acetic acids. As degradation progresses and the pH of the fluid decreases, the system eventually becomes acidic and accelerates the corrosion of many metals.

## NORKOOL™ products

NORKOOL™ Ethylene Glycol-Based Coolants			
Product name	Description	Color	Freeze point
NORKOOL SLH	Concentrate	Blue-green	NA
NORKOOL SLH50	Pre-diluted 50vol% as EG	Blue-green	-34.7°F
NORKOOL SLH40	Pre-diluted 40vol% as EG	Blue-green	-12.6°F
NORKOOL SLH30	Pre-diluted 30vol% as EG	Blue-green	3.7°F
NORKOOL Propylene Glycol-Based Coolants			
Product name	Description	Color	Freeze point
NORKOOL LTC	Concentrate	Yellow	NA
NORKOOL LTC50	Pre-diluted 50vol% as PG	Yellow	-28.6°F
NORKOOL LTC40	Pre-diluted 40vol% as PG	Yellow	-6.7°F
NORKOOL LTC30	Pre-diluted 30vol% as PG	Yellow	8.5°F
NORKOOL System Cleaner and Degreaser			
Product name	Description		
NORKOOL Cleaner	Mixture of chelating agents for rust and scale removal		
NORKOOL Degreaser	Mixture of nonionic and anionic surfactants for grease removal		

### A note about product safety

When considering the use of any Dow products in a particular application, you should review the latest Material Safety Data Sheets from Dow and ensure that they are intended for safe use. For other products mentioned in the text, you should obtain the current Material Safety Data Sheet and other available product safety information when reviewing and take necessary steps to ensure safety of use before handling.

No chemical should be used as or in a food, drug, medical device or cosmetic, or in a product or process in which it may contact a food, drug, medical device or cosmetic until the user has determined the suitability and legality of the use.

Since government regulations and use conditions are subject to change, it is the user's responsibility to determine that this information is appropriate and suitable under current, applicable laws and regulations.

Dow requests that the customer read, understand and comply with the information contained in this publication and the current Material Safety Data Sheet(s). The customer should furnish the information in this publication to its employees, contractors and customers, or any other users of the product(s), and request that they do the same.

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Note: This guide is designed as a general product overview. Please contact your local Dow Oil & Gas representative for up-to-date, detailed technical information including registrations and use limitations and to discuss individual applications or requirements.

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