

## DOWFROST™ HD Heat Transfer Fluid

### Why a Minimum 25% Glycol Concentration is Recommended in GSHP Applications

#### Introduction

Numerous questions have been raised about the use of 20% glycol concentrations in geothermal ground source heat pump applications. Dow's product literature states a recommended minimum glycol concentrate of 25%. Many engineers are specifying concentrations of less than the recommended 25% as an economical option for customers, suggesting that the product will still perform in a satisfactory manner. Although the inhibited propylene glycol will still provide adequate heat transfer efficiency and freeze protection, there are several other factors that need to be considered.

#### Additional Factors to Consider

There are several reasons for the recommended minimum concentration of 25% in any application, including GSHP.

**Corrosion Protection:** DOWFROST™ HD is designed to work in both heating and cooling systems at a wide range of concentrations. For them to work successfully, the starting fluid must have the right balance of inhibitors in order to maintain proper corrosion protection at various concentrations. The inhibitors are formulated to give optimum performance and fluid lifetime at glycol levels between 25 and 60%. Reducing the glycol concentration below 25% reduces the inhibitor concentration to a level that may not provide adequate corrosion protection for a system.

**Fluid Stability:** Propylene glycol breaks down on exposure to high temperatures. With a higher concentration of DOWFROST™ HD, there is also a greater concentration of inhibitor present in the solution. The higher level of inhibitor provides more buffering for any organic acids that may be formed due to glycol degradation.

**Microbial Growth:** Concentrations at or above 25% inhibit the growth and proliferation of most microbes and fungi. The reduced surface tension in the glycol solution interrupts the cell walls of the bacteria, resulting in an environment that will not support bacterial growth. At lower glycol concentrations, the propylene glycol may act as a nutrient for bacteria causing the bacteria to biodegrade the glycol, causing rapid growth of bacterial contamination.

#### Conclusion

There are several factors to take into account when considering the use of an inhibited glycol below the recommended 25% concentration into a GSHP system. Although many GSHP systems typically consist of plastic piping and are operated at fairly low temperatures, which help to minimize corrosion effects, there may still be the possibility for corrosion, glycol degradation and an opportunity for microbial growth. Therefore, Dow maintains the recommendation, as stated in our product literature, to use a minimum glycol concentration of 25% in GSHP applications. In Dow's opinion, the money saved via a slight reduction in glycol concentration is not worth the associated risk of a total system failure and fluid replacement.

Contact your sales representative for additional information or copies of Dow's product literature.

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