Water temperature limits for hydraulic hoses

According to ISO 8330 *"Rubber and plastic hoses and hose assemblies - Vocabulary"*, the working temperature is the *"maximum or minimum temperature at which a hose is designed to be serviceable"*. This temperature range is indicated in the hose pages. However, note that the nature of the hydraulic fluid used can lower the maximum working temperature. The below chart shows the maximum working temperature for Gates hoses when used with water-based hydraulic fluids.

The main reasons for lowering maximum working temperatures of hydraulic systems using water-based hydraulic fluids are:

- Hot water can leach the plasticiser out of the rubber compound, whereby the hose becomes stiff and brittle.
- Heated water even under pressure can de-gas and cause gas bubbles. These gas bubbles contain about 20% oxygen which will lead to oxidation of the metal parts of the system.
- Mixed phases of hot water and steam can occur, which causes several issues like tube popcorning, permeation of steam through the walls of the hose and even steam hammer.

CAUTION!

MAXIMUM TEMPERATURE LIMITS FOR WATER, WATER/OIL EMULSIONS AND WATER/GLYCOL SOLUTIONS.

Hose	Pressure lines	Return lines
EFGxK, MXG, MXT, MxK, M2T, G2, G1, G2L, EFGxKL, M4KL, Pro Series	+93°C	+82°C
G2H, G1H, G2XH, G3H, GTH, M4KH, M3KH, GMV	+107°C	+82°C
TH8, TH7	+70°C	+70°C

The fluid manufacturer's recommended maximum temperature for any given fluid must not be exceeded.
If different from the above listed hose temperatures, the lower limit must be chosen.

HYDRAULIC SYSTEM PRESSURE DROP

Pressure

Factors that can influence the amount of pressure drop:

- **Friction**

This is the turbulence of fluid against the inside walls of the hose assembly and within itself generating heat and causing pressure drop.

- **Type of fluid**

Different fluids behave differently under pressure. Thicker fluids are moved with greater difficulty and will exhibit greater pressure drop because of greater friction loss.

- **Temperature of the fluid**

Warming fluids thins them, so they are moved more easily.

- **Length of hose assembly**

The longer the hose assembly, the more surface area there is for friction to decrease pressure.

- **Size (I.D.) of hose**

Affects the fluid velocity for a given flow rate. Higher velocities result in greater pressure drop. Therefore, a larger I.D. hose will produce less pressure drop.

- **Type of couplings and adaptors**

Any change in bore or change in direction (such as with 45° or 90° elbow) can increase the amount of pressure drop. So keep hose assembly routing as smooth as possible.

- **Flow rate**

Pressure drop increases with flow rate for the same size hose.