

Types of Fire Resistant Hydraulic Fluid

Which Hydraulic Fluids Are Resistant to Fire?

In many industrial systems, hydraulic fluids may come into contact with sparks, flames or could be subject to extreme ambient conditions caused by nearby equipment. When these conditions are present, hydraulic system designers are tasked with selecting fluids that will safely withstand the presence of high heat or other ignition sources. Hydrocarbon hydraulic oil is typically not suitable for use around open flames or sparks, or in environments where the oil can come into contact with machine parts that are above the specific flash point of the oil.

There are however, a range of fire resistant hydraulic fluid options available for us in a wide variety of applications. Keep in mind, not all of these solutions will be ideal for every application. Contact a Cross team member to discuss your equipment and application to determine which may be best for you. Below are a few of the most common types of fluids used when fire resistance is needed.

Phosphate Esters Fluids

Although Phosphate Ester Fluids offer very good lubricity for hydraulic components, extreme caution must be used when handling or discarding this type of fluid. Special seals and hoses must also be used on all of the hydraulic components within the hydraulic system. Typically, "Viton" seals are used with phosphate ester fluid.

Phosphate ester fluids also offer very good fire resistant properties. This fluid was originally formulated back in the mid-1940's and is still very popular in the aviation industry for use in aircraft hydraulic systems. Phosphate esters have fallen out of favor in recent years, due to the requirement for special seals and coatings, as well as the care required when working with or disposing of this fluid.

Water Glycol Fluids

Water Glycol Fluids offer excellent fire resistant properties, due to its high water content. However, when this fluid is subjected to high pressure, the protective lubricating film that hydraulic components require will be affected by the poor lubricity of the water contained in the fluid. Many times, pressure and speed ratings for hydraulic components are reduced when used with water glycol, due to the reduction in the film strength of this fluid. Water does not perform well as a lubricant.

Oil-in-Emulsion Fluids

Water-in-Emulsion Fluids are made by blending typical hydrocarbon hydraulic oil with water. This type of fluid requires anywhere from 35% to 45% water added to specially formulated hydraulic oil, in order to maintain its resistance to fire. Once again, due to the poor lubricity of water, many times hydraulic components pressure ratings are reduced. Also, water-in-emulsion fluids require careful monitoring of water content, to assure the water evaporation does not cause the fluid to become flammable once again.

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Polyol Ester Fluids

In recent years, many fluid manufacturers have developed new synthetic fluids known as Polyol Esters. These fluids offer very good fire resistant properties, excellent lubricity (even under high-pressure conditions), and good viscosity levels across a wide range of temperatures. Furthermore, these fluids can typically be used with standard NBR (Buna) seals.

When selecting a hydraulic fluid for high-temperature applications, make sure to follow the manufacturer's recommendations for viscosity, shear-down ratings, and lubricity requirements for the specific hydraulic components you wish to use. Hydraulic component longevity may be affected by specific application issues that may arise using special hydraulic fluids.

Also, care should be taken to select the proper system cooling when using water based systems. When fluid temperatures exceed 122 degrees F, water evaporation can affect the chemical balance of the fluid, resulting in potential loss of fire resistance.

In summary, significant improvements have been made in recent years for fire resistant fluids, which gives hydraulic designers many options for hydraulic systems that require fluids which operate in high-temperature environments. However, when selecting high-temperature fluids, care must be taken to avoid damage to the hydraulic system components. Designers also need to be aware of the potential environmental hazards that are associated with some fire resistant fluids.

It's always better "safe than sorry," so if you need clarification, help, or a second opinion, it's best to ask a trusted Fluid Power Specialist.

How Cross Can Help

Cross Hose and Fittings offers more than just superior product. We also have the expertise to back it up. We're members of the National Association for Hose and Accessories Distribution and the Fluid Power Distributors Association and closely follow established safety standards for common hoses used in hydraulic systems on mobile and stationary equipment. That means when you work with Cross, you're not just getting the hose you need. You're also getting our combined years of experience and commitment to hose safety and performance.

Whether you need hose, hose fittings, fabrication equipment, or just a quick hose assembly from our NC hose stores, Cross Hose and Fittings can help. Cross is a certified Parker store, meaning we offer reliable, high-quality Parker hose products as well as a huge range of Parker fittings and quick couplings. No matter your application, if it uses a hose, we have a solution. Between our in-house expertise and extensive inventory, we can get your operation back up and running. Contact our hose experts now.