

When you shouldn't use water based hydraulic fluids in your carwash hydraulic system.

Contrary to the hype of the synthetic fluid sales companies, not all hydraulic systems can tolerate the water based fluids commonly sold into the carwash industry. It's not that the fluids can't deliver on the promises but the hydraulic system may have design features and components that are incompatible with water based fluids.

The primary reason for switching from mineral oil based fluids to water based, is that in the carwash industry petroleum based fluids are extremely difficult to clean up. When a catastrophic leak occurs with a vehicle in the tunnel, not only does the vehicle surface get covered with oil but also the clothes and brushes. This creates the problem of not only to have to hand clean the vehicle's surface but also cleaning of the system cloth and brushes. As anyone who has encountered the problem, this is no easy task. The wash must be shut down, time and labor expended, all contributing to losses to the bottom line. Beginning in the mid 1990s water based hydraulic fluids were introduced into the industry eliminating many problems since water based fluids are water soluble and easily wash away.

Biodegradability is another important feature of water based hydraulic fluids. These fluids easily degrade and present a minimal impact on the environment. If they do find their way into the waste water disposal system, they will not cause damage.

Although it is not as important in the carwash industry, fire resistance is another important feature of water based fluids.

Finally, those water based fluids that contain a dye leak detector make it easy to locate and identify small leaks before they become catastrophic.

Even with all the benefits that water based hydraulic fluid can provide, there are certain systems that do not perform well with the synthetic fluids. All hydraulic systems currently in use in the carwash industry are designed for mineral oil based hydraulic fluids. The system OEM designs the system to the full capabilities of the petroleum based fluid. The nature of petroleum based oils provides certain characteristics that may not be mirrored by water based fluids. For instance; as the petroleum based fluid heats up, the oil's viscosity thins and it maintains the lubricity boundary layer. Water based fluid's viscosity does not thin in a similar manner and it has a much more difficult time maintaining the boundary layer when hot. Therefore, systems operating in high temperature environments should not use water based fluids unless a cooling system is added. Another issue effecting water based fluids and high temperatures is that the water will begin to evaporate in operating conditions above 122° F (50° C). Evaporation changes the chemistry balance and adversely affects the systems performance, possibly causing the system to act sluggish and require more input energy. To bring the chemistry back into balance it requires adding distilled water or softened D.I. water. This is a

specialized process that requires the use of a refractometer or viscometer. If an error is made and too much water is added the fluid will have to be completely changed.

A number of carwash hydraulic systems were manufactured with components of non anodized aluminum. These components can be primarily found in the system reservoir tank. Although the tanks are painted on the exterior, the interior are uncoated. When the water based fluid makes contact with the untreated aluminum it chemically reacts. Fluid that has come into contact with non-anodized aluminum takes on a soapy texture and characteristic. The water based fluid must be drained since it will cause further contamination and wear on the rest of the system components. Water based fluids may also adversely react to galvanized surfaces. Although it may or may not react, contact should be avoided if at all possible. Other than non anodized aluminum reservoirs, some hydraulic systems may contain other non anodized aluminum components such as pumps, valves and cylinders. The hydraulic component OEMs should be contacted to check for compatibility before converting to water based hydraulic fluids.

Another problem area is with seal compatibility. There are certain seal materials that cannot be used with water based hydraulic fluids. Buna S, Polyurethane, and Epichlorohydrin seals should be avoided. Even elastomers that are generally considered compatible may, on occasion, degrade depending on the manufacturer. Again, contacting the hydraulic component OEM to assure seal compatibility would be wise.

Other systems that shouldn't use water based hydraulic fluids are systems that are not well maintained. Although the overall system may be compatible with the synthetic fluid, unless the owner/operator is willing to properly maintain the system, then they are better off not converting. By and large petroleum based mineral oil based fluids are more forgiving of poor maintenance. Water based systems must be monitored for fluid chemical balance. This involves routinely testing the fluid with a refractometer, viscometer, or litmus paper. The pH will indicate if the chemical balance is within the normal range. Also, on an annual or semiannual schedule, a sample of fluid should be taken and sent off to be analyzed. Other maintenance issues involve changing the return filters when they get full and keeping the system fluid level up. Low system fluid levels will contribute to improper cooling of the fluid in the system, especially for those systems without a system cooler.

Many carwash owner/operators would benefit from using water based hydraulic fluids; there are others where they should not. Reviewing who shouldn't use water based fluids:

- Systems that routinely experience fluid temperatures in excess of 120° F
- Systems with non anodized aluminum and galvanized components
- Systems that contain incompatible elastomers
- Poorly maintained hydraulic systems

Whenever contemplating conversion it is recommended to ask for assistance from the carwash OEM, a fluid power professional, and a competent fluid supplier. From these

outside sources their recommendations can assist in making the right decision for you and your system.

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