marine lubricants information bulletin 16

hydraulic fluid changeover procedure

When switching suppliers, the question often arises on how to best transition from one hydraulic fluid to another. Some hydraulic fluids are incompatible, and may cause foaming, filter plugging, poor water separability or other performance issues if mixed.

This Information Bulletin provides the following:

- Guidance on transitioning from one hydraulic fluid to another
- Brief descriptions of Chevron premium hydraulic fluids
  - Chevron Clarity® Synthetic (and non-synthetic) Hydraulic Oils AW
  - Chevron Rando® HD Premium Oil MV
  - Chevron Rando HDZ
- Recent Chevron compatibility testing

General guidelines for any fluid changeover to Chevron hydraulic oil products

- Always confirm the right product is used for the application.
- Follow OEM recommended lubricant flushing and change-out procedures, if available, including all relevant safety precautions.
- Properly dispose of used oil.
- With water-emulsifying hydraulic oils in a hydraulic system, we recommend following Procedure 1 as outlined below for both our Rando (HD and HDZ) and Clarity (Hydraulic and Synthetic Hydraulic Oils AW) product lines which are water-demulsifying oils and will not be compatible with these water-emulsifying hydraulic oils.

Guidelines for switching over to Chevron's ashless hydraulic oils

Clarity Hydraulic and Clarity Synthetic Hydraulic Oils AW are:

- Generally compatible with mineral oil/PAO based ashless hydraulic oils, but refer to the table below to confirm (if the product of interest is not listed, provide a sample of fresh and in-service fluid to be tested). Procedure 1 is the preferred recommendation for best performance results.
- Usually not compatible with water-demulsifying hydraulic oils containing calcium/zinc additives, but refer to the table below to confirm. Procedure 1 is the preferred recommendation for best performance results.
- Not compatible with water-emulsifying type products being used as hydraulic oils. Procedure 1 is the preferred recommendation for best performance results.

Our field experience has shown that in most cases, draining the hydraulic system of zinc/calcium containing hydraulic oil, and then charging the system with fresh Clarity Hydraulic or Synthetic Hydraulic Oil AW has resulted in no known performance issues (contamination at <5% level) (Procedure 2). However, in other cases, especially with old or contaminated in-service oil, foaming, filter plugging, or poor water

separability properties have been observed. Therefore, a thorough flushing and cleaning is recommended and Procedure 1 needs to be followed.

We do not recommend the practice of topping-off a system containing any zinc/calcium containing hydraulic oil with Clarity® Hydraulic AW or Clarity Synthetic Hydraulic Oil AW.

There may be a transition period needed to purge out the built-up sludge and deposits in the system. The length of this transition may depend on the amount of deposits formed previously. After the oil change-out, it is recommended to routinely monitor the hydraulic operation and filter life, closely monitor and evaluate the oil condition on a periodic basis to ensure proper performance, and take any corrective action that may be needed, including changing filters.

Procedure 1 — Drain and Flush

1. Operate the hydraulic system under normal operating temperature and conditions for minimum of 1 hour. Then shut the hydraulic system down. The lubricant in the system should be warm/hot when initiating the lubricant change.
2. Relieve all pressure in the system and disconnect all electrical power.
3. Drain the entire system as best as possible and try to include oil in all hoses and lines, hydraulic pump and motor, oil cooler, valves, reservoir, and filters. (Extreme caution should be exercised when draining hot lubricant to prevent possible injury.)
4. Thoroughly clean the hydraulic system if needed. Examine and replace all worn seals. Replace filters and strainers.
5. We then recommend the customer fill the system with Chevron Canopus® 13, or the replacement fluid, and run at minimum pressure with no-load condition for a determined length of time to clean, and flush the system. In some cases, a more viscous fluid, like Chevron Canopus 68 may be the preferred flushing oil.
6. Thoroughly drain the system as outlined in Step 3, rechecking filters for any contamination.
7. Refill the entire system to the correct level with fresh oil and operate system under normal operating conditions. An additional flush with the replacement fluid is recommended so that the new oil will be the lubricant being applied to the application when the operation re-starts to achieve the best performance results.

Procedure 2 – Drain and Fill

1. Operate the hydraulic system under normal operating temperature and conditions for minimum of 1 hour. Then shut the hydraulic system down. The lubricant in the system should be warm/hot when initiating the lubricant change.
2. Relieve all pressure in the system and disconnect all electrical power.
3. Drain the entire system (tank and reservoir) as best as possible and if desired for better performance include draining oil in the hoses, lines, hydraulic pump and motor, oil cooler, valves, reservoir, and filters. (Extreme caution should be exercised when draining hot lubricant to prevent possible injury.)
4. Thoroughly clean the hydraulic system if needed. Examine and replace all worn seals. Replace filters and strainers.
5. Refill the entire system to the correct level with fresh oil and operate system under normal operating conditions.

Chevron Clarity Synthetic Hydraulic Oils AW

Ashless, high viscosity index Clarity Synthetic Hydraulic Oils provide outstanding thermal, oxidation, and shear stability. Clarity provides hydraulic system energy efficiency. Clarity is also for systems operating in environmentally sensitive locations.

Chevron Rando® HD Premium Oil MV

Chevron Rando HD Premium Oil MV is an ISO 32 product with very high viscosity index (VI), beneficial for relatively extreme temperature swings and hydraulic system energy efficiency. Even after significant use, the VI of HD Premium Oil MV can remain higher than the starting (fresh oil) VI of other products. HD Premium Oil MV also contains a seal swell agent to help combat leakage. HD Premium Oil MV provides excellent thermal, oxidation, and shear stability as well. Rando HD Premium can be used where zinc anti-wear characteristics are preferred.

Chevron Rando HDZ Oils

Chevron Rando HDZ Oils also provide excellent thermal, oxidation, and shear stability, along with hydraulic system energy efficiency. Rando HDZ can be used where zinc anti-wear characteristics are preferred.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces.

For further information, please contact Chevron Technical Services at CMLtechservice@chevron.com ■

Product Compatibility Table[1]

Chevron Replacement Product (all fresh oil unless noted)	Product to be replaced	Compatible?[1]
Chevron Clarity® Hydraulic Oil AW (fresh)	Citgo Dimension Hydraulic Fluid (fresh)	Yes
Chevron Clarity Hydraulic Oil AW 46 (fresh)	Castrol SHF 46 (fresh)	Yes
Chevron Clarity Hydraulic Oil AW 46 (fresh)	Citgo Dimension Hydraulic Fluid (fresh)	Yes
Chevron Clarity Synthetic Hydraulic Oil AW (fresh)	Chevron Rando HDZ (fresh)	No
Chevron Clarity Synthetic Hydraulic Oil AW (fresh)	Mobil DTE 10 Excel 32 (fresh)	No
Chevron Clarity Synthetic Hydraulic Oil AW 46 (fresh)	Shell Tellus EE 46 (fresh)	Yes
Chevron Clarity Synthetic Hydraulic Oil AW 46 (fresh)	Shell Tellus STX 46 (fresh)	Yes
Chevron Rando® HD Premium Oil MV (fresh)	Mobil SHC 524 (fresh)	Yes
Chevron Rando HDZ 15 (fresh)	Exxon Univis HVI 13 (fresh)	Yes
Chevron Rando HDZ 22 (fresh)	Mobilarma 522 (fresh)	Yes
Chevron Rando HDZ 32 (fresh)	Mobil DTE 10 Excel 32 (fresh)	Yes
Chevron Rando HDZ 32 (fresh)	Shell Tellus T 32 (fresh)	Yes
Chevron Rando HDZ 46 (fresh)	Chevron Hydraulic Oil 5606A (fresh)	Yes
Chevron Rando HDZ 46 (fresh)	Frontier Wear Guard AW 46 (fresh)	Yes
Chevron Rando HD 150 (fresh)	Chevron Regal R&O 150 (fresh)	No
Chevron Rando HD 22 (fresh)	Mobilarma 522 (fresh)	Yes[2]
Chevron Rando HD 32 (fresh)	Shell Tellus T 32 (fresh)	No
Chevron Rando HD 32 (fresh)	Mobil DTE 10 Excel 32 (fresh)	Yes
Chevron Rando HD 46 (fresh)	Fuchs Renolin AF 46 (fresh)	No
Chevron Rando HD 46 (fresh)	Mobil DTE 25 (fresh)	Yes
Chevron Rando HD 68 (fresh)	76 Unax AW 68	Yes

1. Compatibility of fresh oils may be different than in-service oils. Contamination and aging of oils can make them incompatible. Reported results are based on ASTM D7155-06 "Standard Practice for Evaluating Compatibility of Mixtures of Turbine Lubricating Oils." The Tier 1 method compares the visual appearance of specific mixtures strictly for changes in physical appearance and the data are reported here. The Tier 2 method compares selected performance properties of specific mixtures and were not performed here. Please note that Chevron's compatibility testing is typically limited to appearance only (as described above for Tier 1 method) and that Chevron has not tested the performance properties of a mixture of the two products; Chevron has not utilized the Tier 2 testing method. Chevron has relied upon the information provided to make the recommendation set forth in this document. Chevron has not evaluated the particular operating environment or the specific application. The statement that two lubricants are compatible using the ASTM D 7155 Tier 1 method offers no information about the performance characteristics of either product or of mixtures of the products regarding wear prevention characteristics, load carrying capacity, sludge-formation tendency, the mechanical shear stability of lubricants mixtures while in service or any other measurable aspect of lubricant performance. When changing lubricants, it is essential that all equipment manufacturer recommended procedures be followed, including drain and flush requirements.
2. Although fresh Chevron product is visually compatible, we do not recommend using this product in place of Mobilarma 522.

The above table includes hydraulic oil compatibility testing since 2009. Even if products have been tested as compatible (by appearance), draining and flushing remains the preferred practice.