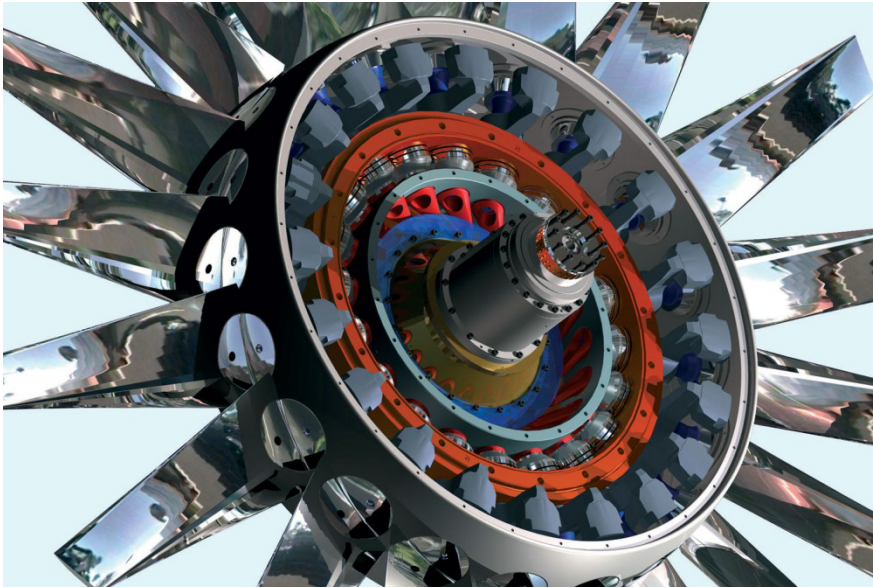


Howden High Temperature Oil Supports Extended Service Life



Howden High Temperature Oil provides long service life for VARIAX[®] blade bearings due to excellent thermal stability and resistance to degradation.

Howden High Temperature Oil offers an opportunity to move away from the traditional grease lubricated blade bearing design, that is used in Howden legacy hubs, to a totally oil lubricated hub used in current hub designs.

Howden High Temperature Oil is exclusively manufactured to meet the most demanding operating conditions that Howden hubs are subjected to during normal operation.

Howden High Temperature Oil is a perfluoropolyether (PFPE) and is mostly intended to howden fans that operate at 160°C (320°F) and above.

The synthetic fluid is thermally stable up to 260°C (500°F), and can handle excursions up to 300°C (572°F) for 30 minutes.

The Howden High Temperature Oil is chemically inert and does not mix with or absorb other oils and materials found in Howden hubs, such as Molykote M55, slide shoe lubricant, mineral oil or wear contaminants deposited into the hub oil.

Easy handling and minimum waste



Howden High Temperature Oil comes in three different sizes:

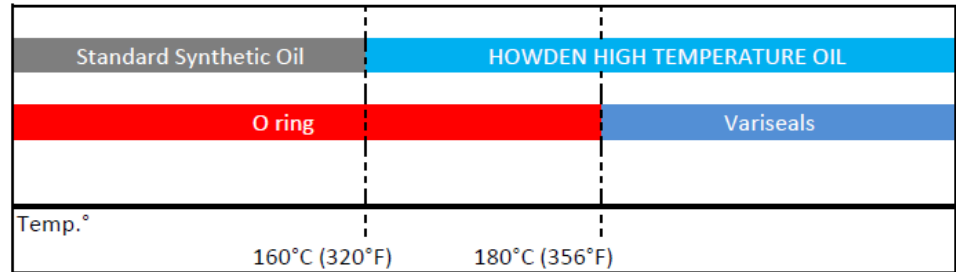
- 0.5 liter canister (part no. 9140319-5)
- 1 litre canister (part no. 9144942-5) (available in US only)
- 5 liter canister (part no. 9-1400413-5) with spout, securing easier handling and minimum waste on site.

High Thermal and Oxidative Stability

PFPE oil does not contain Hydrogen or Carbon-Hydrogen bonds found in most lubricants, which are typical sources of decomposition and oxidation in lubricants.

Without these bonds, PFPE oil exhibits extremely high thermal and oxidative stability. This eliminates the need for anti-corrosion additives which can break down at the operating temperature ranges of the hubs and become corrosive agents inside the hubs.

Hub Oil and Seal Type Usage by Temperature



Howden High Temperature Oil has very good lubricity, degradation resistance, excellent stability and resistance to attack by a type of chemical known as Lewis Acid.

Attack from Lewis acids (Fe_2O_3) on Howden High Temperature Oil only occurs at elevated temperatures that are way beyond the normal maximum design operating temperature for the Howden hubs (400°F/205°C).

Howden High Temperature Oil is the most stable and chemically resistant oil that can be utilized for the lubrication of Howden hubs and contains carbon, oxygen and fluorine.

Carbon oxygen bonds are the point of vulnerability in the oil's molecular chain. However, they are shielded from attack by the special molecular structure of the PFPE oil.

Test results

With the sampling and testing of Howden High Temperature Oil in North America since the mid 1990s, no degradation of the Howden High Temperature Oil samples has been noted.

Our customers and our internal test labs, have observed cloudiness of the Howden High Temperature Oil samples, as a black oily substance and /or some black particles in the oil.

As a result of the above, analysis has been carried out on the Howden High Temperature Oil samples (>50). Investigation at our test labs in the USA and in Germany indicates that the black oily substance is a Hydrocarbon-based contaminant containing mineral oil and ester.

Hydrocarbon and ester are not soluble in PFPE oil, therefore the oil appears cloudy. Also present in the oil samples are other materials; black solid particles which are difficult to analyze because the particles are

not soluble. XRF (X-ray fluorescence) analysis of the particles indicate that other wear elements and unidentified inorganic compounds are present in the oil samples.

The most probable cause of the black oily substance and the black solid particles is two sources. Firstly the black oil substance is a contaminant resulting from a combination of other lubricants, hydraulic fluid or Molykote M55, and secondly the black solid particles are burnt carbon from other lubricants and wear materials from the hub. None of these elements originates from the PFPE oil or are soluble in the oil.

Since there is no PFPE oil degradation occurring, no toxic chemicals or harsh acids are present.

It has also been noted that the Howden High Temperature Oil samples that have been allowed to sit statically for a period of time, result in the oily substance, and black particles float to the surface of the oil, and the oil sample becomes clear and colorless again, this also occurs when the sample is placed in a centrifuge in the lab.

With the fan operational, PFPE oil centrifuges out around the diameter of the inner hub surface covering the blade bearings in PFPE oil.

The PFPE oil separates from the contaminants as these are less dense than the oil, and hence gather in the inner diameter of the oil bath where they form a scum. The performance of the HHTO is unaffected by the contaminants in the oil because they are not soluble in the PFPE oil and they are not present in the bearing load zone.

When the fan is stopped, the PFPE oil drains down to the bottom of the hub, depositing some of the contaminants over the hub internals.

Howden recommends the following criteria to evaluate the serviceability of Howden High Temperature Oil

- Contamination of the Howden High Temperature Oil should not exceed 10-15% by oil volume of a representative sample. The color of the oil sample does not indicate the serviceability of the oil. The oil analysis should be used to determine whether there is any deterioration in the PFPE oil. Howden has worked closely with Klüber Lubrication to streamline a testing process.
- Howden recommends only new (unused) Howden High Temperature Oil be used to fill new or refurbished hubs.

Filter cleaning of used oil

Used PFPE oils can be filtered to remove solid contaminants from the oil; this will require the draining of the hub oil into a clean container, running the PFPE oil through a filtering system and then returning the clean PFPE oil to the hub.

Unfortunately only a small amount of the foreign material inside the hub will be washed out as the oil is drained so the benefits of filtering the oil in Howden experience will be limited without the employment of a flushing program for the hub.

Oil flushing of the hub will be a time-consuming process because the PFPE oil is so dense and takes a considerable amount of time to drain and fill the hub each time, requiring the process to be repeated 5-6 times. The fan hub(s) will have to be rotated a number of times between the filling and draining of the hub each time to wash the contaminants out of the hub internals.

For more information please **contact your local Howden office.**

This bulletin has been released by:

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