KLUBER-SUMMIT RHT-68

Industrial Refrigeration Compressor Oil for
Ammonia Refrigeration Systems

KLUBER-SUMMIT RHT 68

RHT-68 is a highly refined, hydrotreated ammonia compressor oil specially designed to function under the most stringent requirements of closed-loop direct expansion (DX) ammonia refrigeration systems.
It is a premium compressor oil that has many performance advantages over traditional naphthenic refrigeration oils.

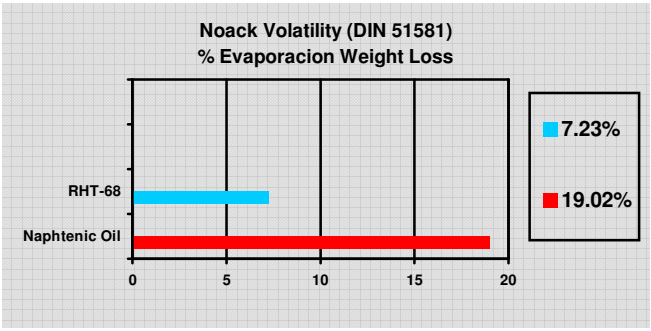
Besides providing value-added benefits in the areas of improved system efficiency and higher productivity, the performance advantages of Klüber-Summit RHT-68 versus naphthenic refrigeration compressor oils include:

- Reduced oil carryover & make-up
- Superior cleanliness
- Superior chemical and thermal stability
- Enhanced wear protection
- Lower foaming tendency
- Extended oil drain interval capability
- Enhanced system efficiency & electrical energy savings

Let's compare KLUBER-SUMMIT RHT-68 against naphthenic refrigeration oils:

1. LOW VOLATILITY

Using well-accepted test standards like NOACK Volatility (DIN 51581) Klüber-Summit RHT-68, with lower evaporation rates, has a distinct advantage vs. naphthenic oils, resulting in a 60% reduction in oil make-up rates.



Lower volatility influences the amount of oil vapor carryover with the ammonia gas past the separator. This oil normally does not return to the compressor. Because the oil is heavier than ammonia, these oil vapors are later condensed and collected in oil traps that have to be serviced (drained) on a regular basis. In most cases, the condition of the used oil warrants proper disposal. RHT-68 can be re-cycled from these traps if laboratory analyses confirm RHT-68 is in good condition and suitable for continued service.

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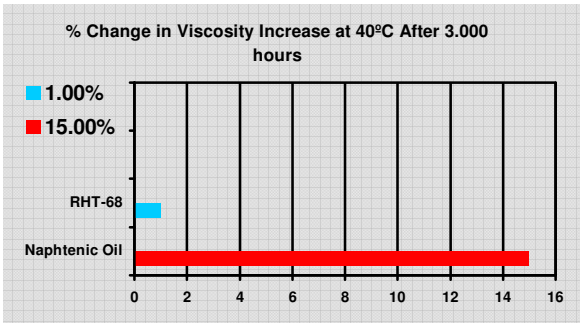
2. BETTER PERFORMANCE

Naphthenic oils for refrigeration service are not formulated using narrow, straight cut base oils. Typically, a lighter molecular weight base oil is blended with a
heavier molecular weight base oil to arrive at the desired viscosity grade. In field service, the lighter oil component is more easily evaporated than the heavier component resulting in high oil carryover of these vapors into the
closed-loop.

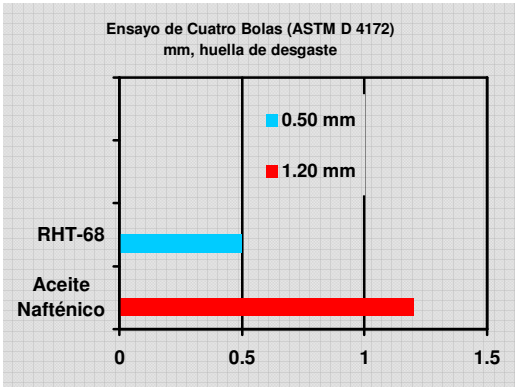


As new oil is added due to the evaporation of the lighter component, system oil viscosity begins to increase resulting in higher temperatures, deposit formation, foaming and a definite decrease in system
heat transfer efficiency.
Thanks to stay-in-grade viscosity control and superior chemical and thermal stability KLUBER-SUMMIT RHT-68 guarantees no drop in system efficiency.

3. LOW WEAR

In order to evaluate the effects of pressure or load on moving parts, e.g. bearings, the Four Ball Wear Test is a good industry standard to compare two
lubricating oils against each other.

Using this standard, KLUBER-SUMMIT RHT 68 with a high viscosity index (VI of 98) produces a smaller wear scar than naphthenic oil resulting in higher load
capacity and better lubricity.



Lower wear rates mean lower friction and longer equipment and component (including oil filter) life.

4. EXTENDED OIL DRAIN INTERVAL CAPABILITY

KLUBER-SUMMIT RHT 68 | MINERAL NAFTÉNICO

Naphthenic oils are distilled from crude oils that are a mixture of naphthenic, paraffinic and aromatic components. Solvents are used to remove as many impurities as economically feasible. Unfortunately, the base oil is left with a high concentration of impurities like aromatics, sulfur, waxes and unsaturated compounds that reduce extended oil drain capability.
KLUBER-SUMMIT RHT-68 is a highly inert, hydrotreated oil with virtually no impurities to foul system components. The
naphthenic component in RHT-68 assures no compatibility issues with shaft seals or O-rings.

5. EASY OF INSTALLATION

KLUBER-SUMMIT RHT-68 is compatible and miscible with naphthenic oils, other hydrotreated oils, synthetic PAO oils and alkylbenzene (AB) oils. In other words, KLUBER SUMMIT RHT-68 can be introduced into a refrigeration system as top-off (make-up oil) or as a complete oil change without the
need for flushing.

If a complete oil change is made to KLUBER-SUMMIT RHT 68, we recommend a complete drain of the existing oil charge while the oil is still warm. Oil filters and coalescing filter elements should also be changed in accordance with pressure differential guidelines and compressor OEM recommendations.

Periodic used oil analysis should complement any preventive maintenance program. The most important condemning limits on KLUBER-SUMMIT RHT 68 are a maximum TAN (Total Acid Number) value of 0.5
mg KOH and a maximum viscosity increase of 10% at 40ºC from new oil specifications.

6. WIDE TEMPERATURE PERFORMANCE CAPABILITY

The base oil for KLUBER-SUMMIT RHT-68 is derived from a process known as hydrotreating or double-hydrogenation. The approximately 70% paraffinic and 30% naphthenic base oil has a high VI (viscosity index) and is very inert due to the elimination of impurities such as unsaturated molecules, 5,000 ppm sulfur (yellowish color) and aromatic components.
A high VI (98) offers excellent lubrication at the higher operating temperature ranges with enhanced wear protection, especially in reciprocating ammonia compressors.

TABLA DE EVOLUCIÓN DE VISCOSIDAD (cSt) EN FUNCIÓN DE TEMPERATURA

	Temperatura (ºC)				
Referencia	**-30**	**+0**	**+40**	**+100**	**+120**
KL-SUMMIT RHT 68	41.000	1.075	70	8,8	5,7
Nafténico 68	183.000	1.750	68	6.9	4.4
Nafténico 46	13.000	495	43,6	6.4	4.1

The table above compares the viscometrics of KLUBER-SUMMIT RHT 68 against two refrigeration naphthenic mineral oils ISO VG 68 & 46. At lower temperatures RHT-68 would have better flow characteristics than the ISO VG 68 naphthenic oil. At higher temperatures RHT-68 would offer better wear protection & lower oil carryover than either naphthenic oils, especially in reciprocating compressors.

Summit RHT-68 has realized excellent operational service and maintenance savings in compressor makes all over the world including Frick, GEA, Howden, Mycom, Vilter and Sabroe.

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Typical problems with the mineral-based naphthenic oils that can be solved by using KLUBER-SUMMIT RHT-68.

Oil foaming: This is indicative of a dirty compressor and perhaps dirty oil, as well. Air leak contamination may also be a contributing factor. Poor oil quality and impurities contribute to short oil life, overheating and oil viscosity increases that trap air as foam. The foam is visible in the separator sight gage.
Recommendation: Use KLUBER-SUMMIT RHT-68.

High TAN (Total Acid Number) value: Oil impurities react with ammonia causing an increase in the TAN value. The condemning TAN value is 0.5 mg KOH. The oil can also be degraded by air and moisture being sucked into the closed-loop system and promoting oil oxidation. Oil with a high TAN value leads to the formation of varnish and sludge and shorter oil drain intervals.
Recommendation: Use KLUBER-SUMMIT RHT-68.

Viscosity increase of 10% or more: Naphthenic refrigeration oils are typically blends of a light and a heavier molecular weight base oil. As the lighter component is carried over past the separator as a vapor, the heavier component is left behind in the compressor. Topping off with new oil is required to replace that oil that is now in oil traps in evaporators, condensers and receivers.
Recommendation: Use KLUBER-SUMMIT RHT-68.

Oils turns dark oil after 200 hours:
Oil impurities and some additives can react with ammonia. Degradation means the oil darkens (dark yellow) in service and this normally leads to viscosity increases and higher TAN values.
Recommendation: Use KLUBER-SUMMIT RHT-68.

High wear metal content: Naphthenic refrigeration oils have lower Viscosity Indices (VI) than API Group II paraffinic, hydrotreated oils. Lower VI oils thin out quicker at higher temperatures than higher VI oils, leading to accelerated wear rates in moving parts like bearings and piston rings. Discharge temperatures in rotary screw compressors exceed 67ºF (75C°).Reciprocating compressors have discharge temperatures above 212ºF(100C°).

Recommendation: Introduce KLUBER-SUMMIT RHT-68 (VI is 98).

Oil solidification in the evaporator:
The oil does not meet the requirements of the system operating conditions such evaporator temperatures below -40ºC/-40ºF. Some oils are not as wax-free as others and dirty oil will thicken up quicker than new oil. Evaporators have to be heated periodically to remove the solid oil that is hurting system cooling efficiency by blocking heat transfer.
Recommendation: Use KLUBER-SUMMIT RHT-68.

Oil causes shaft seals and O-rings to shrink:
Some seal materials like Neoprene (chloroprene) or Buna-N tend to swell with naphthenic refrigeration oils, but tend to shrink with paraffinic oils or synthetic PAOs. Seal leaks lead to ammonia leaks and high oil carryover. Other seal materials like NBR with medium- to high-acrylonitrile content are more compatible with these oils. Some oils have base oil components that have minimum effect on seals.
Recommendation: Use KLUBER-SUMMIT RHT-68.