

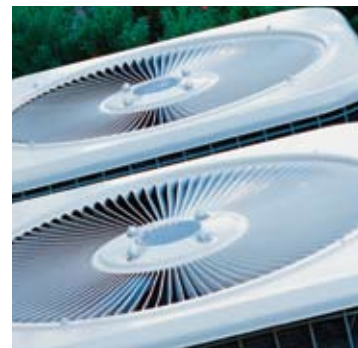


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Chemicals, Lubricants and Accessories

Catalog G-1, January 2008



ENGINEERING YOUR SUCCESS.

Lubricants - Retro-Fit To Emkarate Polyol Ester

Emkarate RL and the Rapid Retro-Fit Technique

Reduces Retro-Fit Time

A proprietary technique has been developed to save time retrofitting CFC/HCFC systems to environmentally friendly HFC refrigerants and EMKARATE RL lubricants. This procedure eliminates many of the service visits now required as part of the "dilution retrofit method" which typically involves up to five lubricant flushes. This novel technique improves the cost effectiveness of transitioning from CFC and HCFC refrigerants to long term HFC refrigerants and EMKARATE RL lubricants.

The Advantages

- Lower labor costs by reducing service visits from 3-5 to only 1 or 2 visits.
- Lubricant cost can be also be reduced by the cost of 1 to 2 lubricant changes.

The Concept Behind The Technique

- Most of the mineral oil retained in a system is in the evaporator.
- EMKARATE RL polyol ester lubricant exhibits a greater surface affinity for metal than does traditional mineral oil.
- This property can be used to "push" the mineral oil off the metal surface of the evaporator and back to the compressor.
- Specific application of these principals (patent pending) can reduce the time and cost of the "dilution retrofit method" without potentially changing system chemistry, with the introduction of new chemicals to the system as other flushing fluid methods suggest.

An Overview Of The Procedure

- Prior and post lubricant change procedures should be followed including changing system filter-driers.
- With the system shut down, EMKARATE RL polyol ester is added to the liquid line after the liquid receiver.
- The system is started with evaporators fully loaded for the EMKARATE RL polyol ester to "push" the mineral oil out.
- The lubricant level must be monitored and drained from the compressors as necessary to maintain proper fill levels.
- After the EMKARATE RL polyol ester has returned to the compressor, the standard lubricant change is done.
- If necessary, further lubricant changes are carried out to get the desired level of residual mineral oil or alkylbenzene oil.



Lubricants

Emkarate RL and the Rapid Retro-Fit Technique Reduces Retro-Fit Time

Specific Instructions

1. Gather and record all system operation data in order to establish base line information.
2. Begin defrost cycle on all evaporators in order to maximize the return of mineral or alkylbenzene oil to the compressor. If defrost cycle is not included in the system design go to step three.
3. Shut down refrigerant system and isolate the compressor. Remove refrigerant from compressor through access ports by using proper methods with recovery equipment. Balance of CFC or HCFC refrigerant will remain isolated in the system.
4. This "down" time will allow the oil in the compressor to warm, allowing it to drain easier.
5. Drain mineral oil from compressor. Use a hand pump to remove oil residue in compressor sump.
6. Install drain valves on all compressors to drain off returning mineral oil to prevent over filling of compressors.
7. Recharge compressors with the OEM required fill of approved EMKARATE RL lubricant. Use with appropriate equipment (sealed refrigeration oil pumps, etc.) using proper procedures.
8. Isolate and change filter-driers.
9. With oil hand pump, add an additional volume of EMKARATE RL lubricant equal to 1/2 of what was just charged to the compressor(s) through the liquid line after the condenser (or after the liquid receiver).
10. Ensure that all automatic/manual defrosts remain off.
11. Recharge the portion of CFC or HCFC that was removed from the compressor in step three.
12. Restart the refrigeration system, recall 50% extra lubricant now exists in the system.
13. Monitor compressor crankcase oil levels, and drain crankcases as necessary to maintain proper oil levels. In approximately 30 minutes, most of the extra POE lubricant including much of the remaining mineral or alkylbenzene oil, will have drained from the system.
14. After 30 to 40 minutes, run defrost cycle(s) again to maximize oil return to the compressors.
15. Shut down refrigeration system and sample the oil from the compressor crankcase; if there are multiple compressors, sample each compressor.
16. Using a refractometer or Virginia RTK test kit, test the sample(s) for residual mineral oil content. For the first trial, you should not expect the residual mineral oil to automatically have reached the target of $\leq 5\%$. If you're sampling more than one compressor, take an average of the test results.
17. Isolate compressors once again, and recover CFC or HCFC in compressors.
18. Drain lubricant from compressors, and charge with an equal volume of the same EMKARATE RL lubricant. Use hand pump to remove oil residue in compressor sump.
19. Isolate and change filter-driers.
20. Restart refrigeration system and run to achieve full circulation of lubricant/refrigeration mixture.
21. After brief run time, sample lubricant and test with refractometer or test kit.
 - If mineral oil residue is below 5% (and it should be at this time), turn system off and recover CFC or HCFC refrigerant. Charge system with the desired HFC refrigerant.
 - Though unlikely, if the mineral oil residue is still above 5% repeat steps 15 - 18 and retest.



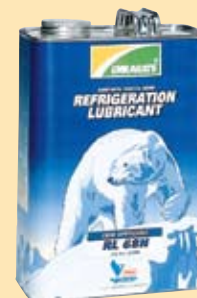
Emkarate RL Product Data

Value	Viscosity at 105°F (40°C)	Viscosity at 212°F (100°C)	Pour Point	Density at 68°F (20°C)	Flash Point
Units	CST	CST	°F (°C)	g/ml	°F (°C)
Test Method	D445	D445	D97	D1298	D92
LE22H	18.9	4.2	-62 (-52)	0.995	464 (240)
LE32H	32.5	5.8	-51 (-46)	0.977	496 (258)
LE32-3MAF	31.2	5.9	<-40 (<-40)	0.981	>446 (>230)
LE46H	45.3	7.1	-51 (-46)	0.977	500 (260)
LE68H	65.5	9.3	-38 (-39)	0.980	518 (270)
LE100H	98.8	12.7	-33 (-36)	0.974	518 (270)
LE170H	170	17	-13 (-25)	0.968	554 (290)
LE220H	222	19.5	-8 (-22)	0.976	536 (280)

Value	Water Content	Acid Value	Hydroxyl Value	Calour	Miscibility 10% lube in R134a
Units	ppm	mg KOH/g	mg KOH/g	Hazen	°F (°C)
Test Method	E1064-85	*in-house	E326	D1209	in house
LE22H	<40	0.02	<4.5	100	-49 (-45)
LE32H	<40	0.02	<4.5	60	-44 (-42)
LE32-3MAF	<50	0.02	<4.5	–	-22 (-30)
LE46H	<40	0.02	<4.5	70	-35 (-37)
LE68H	<40	0.02	<4.5	70	-15 (-26)
LE100H	<40	0.02	<4.5	125	43 (6)
LE170H	<40	<0.04	<5.0	250	Immiscible
LE220H	<40	0.02	<4.5	100	3 (-16)

Test methods are ASTM Standard methods unless otherwise stated.

*This is a modified version of ASTM D974



Emkarate RL Frequently Asked Questions

What is hygroscopicity and its association with lubricants?

Hygroscopicity is a term used to describe the affinity for moisture of a lubricant and/or refrigerant. HFC refrigerants and POE lubricant have polar molecular structures, which attract polar water molecules. The solubility of water in HFCs, such as R134a is many times greater than in the CFCs they replace. POEs are also hygroscopic and can pick up more moisture from their surroundings and hold it much tighter than traditionally used mineral oils. The most hygroscopic refrigeration lubricants in descending order are: PAGs, PVEs, POEs, ABs, and mineral oils. The rate at which POEs pick up moisture is dependent on temperature, relative humidity, exposure time, and relative surface area. Polyalkylene glycol (PAG) lubricant is typically used in automotive applications and polyvinylether (PVE) is used sparingly in certain regions of the world.

How does moisture enter a refrigeration system?

Moisture can enter the refrigeration system by a number of routes:

- Improper evacuation of the system
- System leaks
- System components
- Improper handling of the refrigerant
- Improper handling of POE lubricants (e.g. excessive exposure to air)

How is moisture measured in the refrigeration system?

The most practical form of system testing is the use of a moisture and liquid indicator. This device gives field guidance to the moisture level in the system. At a minimum, the filter-drier must be changed if an elevated moisture level is seen in the moisture and liquid indicator. For an in depth evaluation of the refrigerant and lubricant mixture, laboratory options are available.

Karl Fisher titration (ASTM E1064) has become the accepted standard method for laboratory determination of moisture in refrigerants and lubricants. Purpose built equipment is commercially available from several manufacturers. Samples of lubricants can be taken and placed inside the Virginia OA1 test kit. This test kit is sent to our lab for complete analysis, which includes moisture content levels.

What does the term hydrolysis mean?

Hydrolysis is the reverse of the esterification process, in which water reacts with an ester to form partial esters, the original organic acid and alcohol. The degree of hydrolysis is driven by the amount of water present. The speed at which hydrolysis occurs is dependent on the temperature of the system and the acid content (acids can act as a catalyst). In addition to an elevated acid content select lubricant additives and impurities inside the system can catalyze this reaction.

What should the moisture content be for refrigeration lubricants?

Less than 50 ppm in the lubricant before addition to the refrigeration system and <100 ppm in the system.

POE's are very hygroscopic. Must I throw out any unused lubricant once I have opened the can?

No, as long as the container of POE is tightly capped immediately after each use, the lubricant can be used until the container is exhausted.



Emkarate RL Frequently Asked Questions

What procedures are recommended for maintaining low moisture contents in POE lubricants?

Good practices should eliminate most potential sources of moisture.

- Avoid exposing POE lubricant to air for an extended period of time (<10 minutes).
- Keep containers of POE lubricants tightly closed except when the oil is actually being dispensed.
- Keep the compressor and refrigeration system components closed, except when work is actually being performed on the equipment. Never leave the equipment open during work breaks, overnight, or while doing other work.
- Keep POE lubricants in their original containers.
- Ensure that any vessel or equipment used to transfer the POE is thoroughly dried.
- The use of a new appropriately sized filter-drier, after servicing a refrigeration system, will reduce the impact of moisture introduction that could have occurred.

At what temperature will EMKARATE RL lubricant break down?

Lubricants with a thermal stability of >175°C (347°F) has generally been shown to be of sufficient stability to work well in refrigeration systems. The glass sealed tube test, as described by ASHRE Standard 97, is widely used to assess the stability of refrigeration lubricants. This method is widely viewed as the standard for thermal stability screening tests. Historical test results using this procedure show EMKARATE RL lubricants excel in thermal stability, by achieving results beyond 175°C.

Are there EMKARATE RL lubricants for low temperature applications?

Several years of research by the lubricant manufacturer, and ultra low temperature system manufacturers using a variety of compressor, have shown the "H" series lubricants demonstrate outstanding performance. Compressor screening and field trials have demonstrated that EMKARATE RL "H" lubricant possess good lubricant return and excellent lubricating performance at temperatures as low as -100°C (-166°F) with R508, R503 and other ultra low temperature refrigerants. Cascade systems and environmental chambers have been commercially using various low temperature refrigerants and EMKARATE RL "H" lubricants successfully for several years.

It is important to note, that for ultra low temperature applications, all the components of the lubricant including the addition of additives have to demonstrate good solubility and low temperature flow characteristics. Correct formulation of the polyol ester lubricant eliminates components which have poor low temperature flow performance. If the polyol ester lubricant is incorrectly formulated, components which have poor low temperature flow performance can precipitate leading to waxy deposits and poor performance at the metering device. This can occur with lubricants which are miscible at very low temperatures. Extensive testing of the "H" series has shown them to be highly resistant to waxy deposit formation.

The superior lubricity of the Emkarate RL "H" series lubricants also allows them to be used without antiwear additives, thus avoiding the many potential disadvantages of employing this additive. Their excellent performance has resulted in a wide range of approvals. EMKARATE RL22H and RL32H are particularly suitable for cryogenic applications.

How do I dispose of EMKARATE RL after use?

EMKARATE RL lubricants can be handled in a manner similar to used mineral or alkylbenzene oils. Using approved oil recoverers, disposal should always be carried out in accordance with local, state and national regulations.

What is the EMKARATE shelf life?

Shelf life is two years provided correct handling procedures are followed.



Emkarate RL Frequently Asked Questions

What can I use to check acid level in a refrigeration system?

The most convenient method of testing the acid level of a refrigeration oil is the use of a Virginia brand acid test kit. A more accurate, but less convenient, method of measuring acid value is to use the Virginia OA1 test kit and send an oil sample to our certified test laboratory, which will evaluate the total contaminant content in the lubricant.

What refrigerants are EMKARATE RL lubricants compatible with?

All CFCs, HCFCs, HFCs, carbon dioxide and hydrocarbons (e.g. R-290, R600a) refrigerants.
EMKARATE RL lubricants are **not** compatible with ammonia (R-717)

What elastomers are compatible with EMKARATE RL?

Generally Acceptable: HNBR, NBR (Buna-N), NYLON-6,6, TEFLON

Marginal: EPDM (EPR), NEOPRENE

Generally Unacceptable: Butyl Rubber, Fluorocarbon Rubber (FPM) (Viton), Natural Rubber (NR)

NBR/HNBR should exceed >36% nitrile content. Elastomer compounds supplied by different suppliers can yield different results. Individual testing of specific products is highly recommended.

Are there new brand names for Icematic products?

The following Icematic products have been re-branded under the Emkarate RL brand.



ICEMATIC	EMKARATE
Icematic SW20 and 20C	Emkarate RL22H
Icematic SW32 and 32C	Emkarate RL32H
Icematic SW46	Emkarate RL46H
Icematic E68 and SW68A	Emakrate RL68H
Icematic SW68 and SW68C	Emkarate RL68H and/or RL68HP
Icematic SW100 and E100	Emkarate RL100E
Icematic SW220	Emkarate RL220HPlus
Icematic SW220XL	Emkarate RL220XL

Emkarate Polyol Ester Cross Reference

INDUSTRY LUBRICANT	VISCOSITY		EMKARATE RL LUBRICANT	VIRGINIA PRODUCT
	SUS	ISO		
Atochem Planet Elf ACD22AW	100	22	RL 22H	LE 22H
Atochem Planet Elf ACD32AW	150	32	RL 32H	LE 32H
Atochem Planet Elf ACD46AW	200	46	RL 46H	LE 46H
Atochem Planet Elf ACD68AW	300	68	RL 68H	LE 68H
Atochem Planet Elf ACD100AW	500	100	RL 100E	LE100E
BVA S46	200	46	RL 46H	LE 46H
BVA S68	300	68	RL 68H	LE 68H
BVA 32	150	32	RL 32H	LE 32H
BVA 46	200	46	RL 46H	LE 46H
BVA 68	300	68	RL 68H	LE 68H
BVA 100	500	100	RL 100E	LE 100E
BVA 120	600	120	N/A	N/A
BVA 170	850	170	RL 170H	LE 170H
BVA 220	1100	220	RL 220Hplus	LE 220Hplus
Castrol Icematic SW 20C	100	22	RL 22H	LE 22H
Castrol Icematic SW 20	100	22	RL 22H	LE 22H
Castrol Icematic SW 22	100	22	RL 22H	LE 22H
Castrol Icematic SW 32	150	32	RL 32H	LE 32H
Castrol Icematic SW 32C	150	32	RL 32H	LE 32H
Castrol Icematic SW 46	200	46	RL 46H	LE 46H
Castrol Icematic SW 68A	300	68	RL 68HP	LE 68HP
Castrol Icematic SW 68	300	68	RL 68HP	LE 68HP
Castrol Icematic SW 68C	300	68	RL 68H	LE 68H
Castrol Icematic E 68	300	68	RL 68H/68HP	LE 68H/68HP
Castrol Icematic SW 100	500	100	RL 100E	LE 100E
Castrol Icematic E 100	500	100	RL 100E	LE 100E
Castrol Icematic SW 220	1100	220	RL 220Hplus	LE 220Hplus
Castrol Icematic SW 220XL	1100	220	RL 220Hplus	LE 220Hplus
Carrier PP 47-10	100	22	RL 22H	LE 22H
Carrier PP 47-12	300	68	RL 68H	LE 68H
Carrier PP 47-15	100	22	RL 22H	LE 22H
Carrier PP 47-16	150	32	RL 32H	LE 32H
Carrier PP 47-17	300	68	RL 68H	LE 68H
Carrier PP 47-25	150	32	RL 32H	LE 32H
Carrier PP 47-26	300	68	RL 68H	LE 68H
Carrier PP 47-30	150	32	RL 32H	LE 32H
Carrier PP 47-31	300	68	RL 68HP	LE 68HP
Carrier PP 47-33	500	100	RL 100E	LE 100E
Carrier PP 47-32	1100	220	RL 220Hplus	LE 220Hplus
Carrier PP 47-34	1100	220	RL 220XL	LE 220XL
PP23BZ102	150	32	RL 32H	LE 32H
PP23BZ103	300	68	RL 68HP	LE 68HP
PP23BZ104	1100	220	RL 220Hplus	LE 220Hplus
PP33BZ106	150	32	RL 32H	LE 32H
PP23BZ107	300	68	RL 68H	LE 68H
Copeland 22CC	100	22	RL 323MAF	LE 323MAF
Copeland 323MAF	300	32	RL 323MAF	LE 323MAF
Copeland 170	850	170	RL 170H	LE 170H



Emkarate Polyol Ester Cross Reference



INDUSTRY LUBRICANT	VISCOSITY		EMKARATE RL LUBRICANT	VIRGINIA PRODUCT
	SUS	ISO		
CPI Solest 22	100	22	RL 22H	LE 22H
CPI Solest 31HE	150	32	RL 32H	LE 32H
CPI Solest 32	150	32	RL 32H	LE 32H
CPI Solest LT32	150	32	RL 32H	LE 32H
CPI Solest LT32NA	150	32	RL 32H	LE 32H
CPI Solest 46N	200	46	RL 46H	LE 46H
CPI Solest 46NA	200	46	RL 46H	LE 46H
CPI Solest 68	300	68	RL 68H	LE 68H
CPI Solest 68NA	300	68	RL 68H	LE 68H
CPI Solest 120	600	120	N/A	N/A
CPI Solest 170	850	170	RL 170H	LE 170H
CPI Solest 220	1100	220	RL 220Hplus	LE 220Hplus
Emery 2927-A	150	32	RL 32H	LE 32H
Freol Alpha 68	300	68	RL 68H	LE 68H
Hatco EAL 22	100	22	RL 22H	LE 22H
Hatco EAL 22CC	100	22	RL 323MAF	LE 323MAF
Hatco EAL 22A	100	22	RL 22H	LE 22H
Hatco EAL 32	150	32	RL 32H	LE 32H
Hatco EAL 32BC	150	32	RL 32HB	N/A
Hatco EAL 32ST	150	32	RL 32H	LE 32H
Hatco EAL 46	200	46	RL 46H	LE 46H
Hatco EAL 68	300	68	RL 68H	LE 68H
Hatco EAL 100	500	100	RL 100	N/A
Henry Pro-Eco 2882	100	22	RL 22H	LE 22H
Henry Pro-Eco 2821	150	32	RL 32H	LE 32H
Henry Pro-Eco 2887	200	32	RL 32H	LE 32H
Henry Pro-Eco 2823	200	46	RL 46H	LE 46H
Henry Pro-Eco 2830	300	68	RL 68H	LE 68H
Henry Pro-Eco 2824	500	100	RL 100E	LE 100E
Hitachi SR30	1100	220	RL 220Hplus	LE 220Hplus
HULS Anderol RCF-E22	100	22	RL 22H	LE 22H
HULS Anderol RCF-E32	150	32	RL 32H	LE 32H
HULS Anderol RCF-E46	200	46	RL 46H	LE 46H
HULS Anderol RCF-E68	300	68	RL 68H	LE 68H
HULS Anderol RCF-E100	500	100	RL 100E	LE 100E
Hydro Balance ISO32	150	32	RL 32H	LE 32H
Hydro Balance ISO46	200	46	RL 46H	LE 46H
Hydro Balance ISO68	300	68	RL 68H	LE 68H
Hydro Balance ISO100	500	100	RL 100E	LE 100E
Hydro Balance ISO220	1100	220	RL 220Hplus	LE 220Hplus
Lubrizol 2916S	300	68	RL 68H	LE 68H
Lubrizol Lubrikuhl ISO68	300	68	RL 68H	LE 68H
Mobil Artic EAL 322R	150	32	RL 32H	LE 32H
Mobil Artic 22CC	100	22	RL 323MAF	LE 323MAF
Mobil Artic 22	100	22	RL 22H	LE 22H
Mobil Artic 22A	100	22	N/A	N/A
Mobil Artic 22BC	100	22	N/A	N/A
Mobil Artic 32	150	32	RL 32H	LE 32H
Mobil Artic 32BC	150	32	RL 32HB	N/A

Emkarate Polyol Ester Cross Reference

INDUSTRY LUBRICANT	VISCOSITY		EMKARATE RL LUBRICANT	VIRGINIA PRODUCT
	SUS	ISO		
Mobil Artic 32ST	150	32	RL 32HB	N/A
Mobil Artic 323MAF	150	32	RL 323MAF	LE 323MAF
Mobil Artic 46	200	46	RL 46H	LE 46H
Mobil Artic 68	300	68	RL 68H	LE 68H
Mobil Artic 100	500	100	RL 100E	LE 100E
Mobil Artic 220	1100	220	RL 220Hplus	LE 220Hplus
National NPE-22	100	22	RL 22H	LE 22H
National NPE-32	150	32	RL 32H	LE 32H
National NPE-46	200	46	RL 46H	LE 46H
National NPE-68	300	68	RL 68H	LE 68H
National NPE-100	500	100	RL 100E	LE 100E
National NPE-170	850	170	RL 170H	LE 170H
National NPE-220	1100	220	RL 220Hplus	LE 220Hplus
Reniso Triton SE 55	275	55	N/A	N/A
Reniso Triton SE 120	600	120	N/A	N/A
Reniso Triton SE 170	850	170	RL 170H	LE 170H
Reniso E32	150	32	RL 32H	LE 32H
Reniso E68	300	68	RL 68H	LE 68H
Reniso E100	500	100	RL 100E	LE 100E
Reniso Triton SEZ 22	100	22	RL 22H	LE 22H
Reniso Triton SEZ 32	150	32	RL 32H	LE 32H
Reniso Triton SEZ 80	400	80	N/A	N/A
Reniso Triton SEZ 170	850	170	RL 170H	LE 170H
Summit RPE-32	150	32	RL 32H	LE 32H
Summit RPE-46	200	46	RL 46H	LE 46H
Summit RPE-68	300	68	RL 68H	LE 68H
Summit RPE-100	500	100	RL 100E	LE 100E
Suniso SL 22	100	22	RL 22H	LE 22H
Suniso SL 32	150	32	RL 32H	LE 32H
Suniso SL 46	200	46	RL 46H	LE 46H
Suniso SL 68	300	68	RL 68H	LE 68H
Suniso SL 100	500	100	RL 100E	LE 100E
Texaco HFC 22	100	22	RL 22H	LE 22H
Texaco HFC 32	150	32	RL 32H	LE 32H
Texaco HFC 68	300	68	RL 68H	LE 68H
Texaco HFC 220	1100	220	RL 220Hplus	LE 220Hplus
Texaco HFC 32NA	150	32	RL 32H	LE 32H
Texaco HFC 68NA	300	68	RL 68H	LE 68H
Texaco HFC 100NA	500	100	RL 100E	LE 100E
HTexaco HFC 220NA	1100	220	RL 220Hplus	LE 220Hplus
Thermoking 203-413	150	32	RL 32H	LE 32H
Thermoking 203-426	150	32	RL 32H	LE 32H
Thermoking 203-433	150	32	RL 323MAF	LE 323MAF
Thermoking 203-427	750	150	N/A	N/A
York Type K	150	32	RL 32H	LE 32H
York Type L	150	32	RL 32H	LE 32H
York Type J	200	46	RL 46H	LE 46H
York Type H	300	68	RL 68H	LE 68H
York Type P	750	150	N/A	N/A



Emkarate RL Lubricants - Approval List

Industrial and commercial compressor manufacturers - HFC/HCFC Systems

EQUIPMENT MANUFACTURER	COMPRESSOR TYPE / (MODEL)	APPROVED EMKARATE RL GRADE(s)	VIRGINIA CATALOG NO.
BITZER	Reciprocating (M)	RL 32H	LE 32H
	Reciprocating (H)	RL 68H	LE 68H
	Screw	RL 170H	LE 170H
BLISSFIELD	Reciprocating (M)	RL 32H	LE 32H
	Reciprocating	RL 68H	LE 68H
BOCK	Reciprocating (H, M, L)	RL 46H	LE 46H
	Reciprocating (H, M)	RL 68H	LE 68H
BOEING	Service (Aerospace)	RL 68H	LE 68H
CARLYLE CARRIER TRANSICOLD	Reciprocating	RL 22H	LE 22H
	Centrifugal (17DA, 17EA)	RL 32H	LE 32H
	Centrifugal (17MPS, 17FA)	RL 68H	LE 68H
	Centrifugal (17EX, 19EA, EB, FA, 19XL/XT)	RL 68HP	LE 68HP
	Centrifugal (19EX, 19XR/XRT)	RL 68HP	LE 68HP
	Centrifugal (17EX, 17FA, with external gears)	RL 68H	LE 68HP
	Reciprocating (05G, 5K, 5F, 5H, 06D, 06E, 06CC)	RL 68H	LE 68H
	Screw (05T, 06T)	RL 100E	LE 100E
CARRIER TOYO	Screw (23XL, 23XG, 30GX, 30HX)	RL 220XL	LE 220XL
	Reciprocating	RL 68H	LE 68H
	Centrifugal	RL 68HP	LE 68HP
CARRIER TRANSICOLD	Screw (06NF, 06NH)	RL 220Hplus	LE 220Hplus
	Scroll	RL 32-3MAF	LE 32-3MAF
COPELAND	Reciprocating & Scroll	RL 32-3MAF	LE 32-3MAF
	Screw	RL 170H	LE 170H
DORIN	Reciprocating	RL 22H, 32H, 46H & 68H	LE 22H, 32H, 46H, & 68H
DUNHAM BUSH	Reciprocating (D-B Metc and D line)	RL 32H & 68H	LE 32H & 68H
	Screw	RL 100E & 170H	LE 100E & 170H
FRIGOPOL	Reciprocating (60-DLB-13 to 80-DLB-30)	RL 32H	LE 32H
GRASSO (GEA)	Reciprocating	RL 32H, 68H & 100E	LE 32H, 68H & 100E
	Screw	RL 100E & 170H	LE 100E & 170H
HARTFORD	Reciprocating (M)	RL 32H	LE 32H
	Reciprocating (H)	RL 68H	LE 68H
KOBELCO	Screw	RL 220Hplus	LE 220Hplus
LOCKHEED MARTIN	Used to service Lockheed owned compressors	RL 68H	LE 68H
McQUAY (J&E Hall)	Centrifugal	RL 32H	LE 32H
	Screw	RL 68H, 68HP, 100E, 220Hplus	LE 68H, 68HP, 100E & 220Hplus
MYCOM	Screw	RL 100E	LE 100E
	Reciprocating	68H, 100E	68H, 100E
NATO MILITARY NSN	NSN 6850-P4314-H	RL 32H	LE 32H
	NSN 9150-99-870-1432	RL 32HB	LE 32HB
	NSN 9150-01-443-9390	RL 46H	LE 46H
	NSN 9150-01-443-9396	RL 46H	LE 46H
	NSN 9150-01-435-1899	RL 68H	LE 68H
	NSN 9150-01-410-8972	RL 68H	LE 68H
PRESTCOLD	NSN 9150-01-387-4469	RL 68H	LE 68H
PRESTCOLD	Reciprocating	RL 32-3MAF	LE 32-3MAF
REFCOMP	Reciprocating	RL 32H & 68H	LE 32H & 68H
ROLTEC	Screw	RL 68H, 170H & 220Hplus	LE 68H, 170H & 220Hplus
ROTOCOLD	Rotary	RL 100E	LE 100E
ROYCE	Reciprocating	RL 32H	LE 32H
SABROE	Reciprocating	RL 32H, 46H, & 68H	LE 32H, 46H, & 68H
	Screw	RL 68H, 100E, 170H	LE 68H, 100E, 170H
	Screw	RL 220Hplus	LE 220Hplus
THERMOKING	Reciprocating	RL 32H	LE 32H
TRANE	Reciprocating	Icematic AP32	---
	Reciprocating	RL 68H	LE 68H
	Scroll	RL 32HB	LE 32HB
	Screw	RL 68H	LE 68H
YORK	Reciprocating	Contact Lubrizol	---
	Centrifugal	Contact Lubrizol	---
	Screw	Contact Lubrizol	---

This approvals list should be used as a guide only. User should confirm with the original equipment manufacturer which EMKARATE RL grade is qualified for use with a particular combination of compressor model, refrigerant and application.