



2008 Altom Court  
St. Louis, Missouri 63146  
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# SERVICE TIPS

3-240

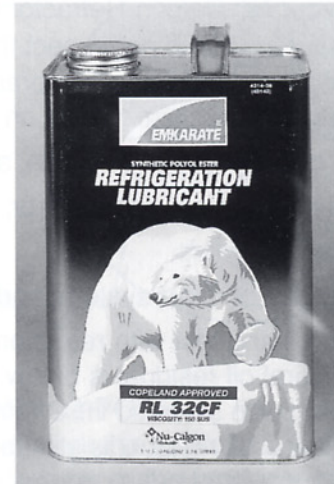
## RAPID RETROFIT PROCEDURE

Retrofit existing low and medium temperature CFC or HCFC systems to one of the long term HFC refrigerants in one service call using the ICI patent-pending Rapid Retrofit Procedure.

- *It's field-tested*
- *Use on low temp & medium temp systems*
- *Use of POE is minimized as compared to the "3-4 flush" process*
- *Completed in one service call, in 4 hours or less*
- *Do single compressor up to multi-compressor rack systems*

### GENERAL GUIDELINES

1. Use appropriate and established service techniques.
2. Use adequate recovery equipment.
3. Use approved ICI EMKARATE® RL lubricants; consult your wholesaler, Nu-Calgon, ICI or the compressor manufacturer.
4. Gather all data pertinent to system operation and performance in order to establish baseline information.



### SPECIFIC INSTRUCTIONS

1. Run de-frost cycle on all evaporators in order to maximize the movement (return) of mineral oil to the compressor.
2. Turn refrigeration off and isolate the compressor. Remove refrigerant from compressor via accessible ports using appropriate methods and recovery equipment. Remaining portion of CFC refrigerant will stay in the rest of the system.
3. This "idle" time where compressor is open to atmosphere will provide for the warming of the oil in the compressor and facilitate its subsequent draining.
4. Drain mineral oil from compressor. Where possible, drain any oil remaining in other system components such as receivers, accumulators and separators. It is recommended that this step not be rushed; taking adequate time will allow for the full warming and subsequently a more complete draining of the mineral oil in the compressor. This is important, particularly on medium temp, systems that may not have hot gas defrost nor electric defrost or warming.
5. Replace with equal volume (equal to what was removed) of approved EMKARATE RL lubricant. Charge with appropriate equipment (sealed refrigeration oil pumps, etc.) and procedures.
6. Change filter driers.
7. Using same hand pump (Robinair, Thermal Engineering, etc.), add an additional volume of the EMKARATE RL lubricant (equal to 1/2 of what was just charged to the compressor(s) to the system to the liquid line after the condenser, (and after the receiver, if there is one).
8. Continue using the pump to adequately push this additional lubricant into the system.

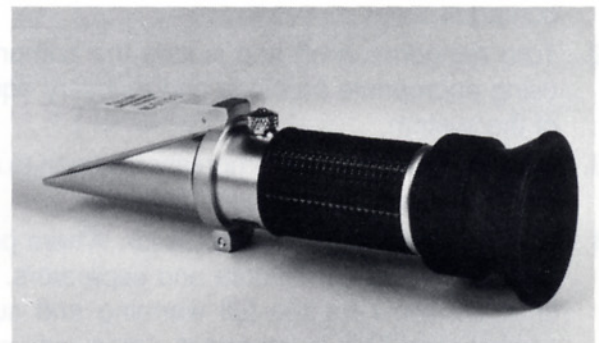


9. If there are multiple evaporators, be sure that all automatic defrosts are disengaged.
10. Re-charge the portion of CFC that was removed from the compressor in step two. Again, use appropriate methods and equipment.
11. Re-energize or start system, remembering that you have approximately 50% extra lubricant in the system. The additional lubricant will enable the system to be "scoured" or more efficiently cleaned of remaining mineral oil.
12. Monitor the compressor crankcase oil level, and drain crankcase as necessary to maintain proper oil levels. In about 15-30 minutes, most of the extra lubricant, including much of the remaining mineral oil, will have been drained from the system.
13. After 30-60 minutes, run defrost cycle(s) again to maximize oil return to the compressor(s).
14. De-energize or turn off the system and sample the oil from the compressor crankcase; if there are multiple compressors, take a sample from each.
15. Using your Nu-Calgon Refractometer (P/N 4815-0), test the sample(s) for residual mineral oil content. For this first test, you should not expect the residual mineral oil to automatically have reached the target of  $\leq 5\%$ . If your sampling more than one compressor, take an average of the test results.
  - a) See upcoming instructions on using a refractometer.
16. Isolate compressor once again, and recover CFC in compressor, again using appropriate procedures.
17. Drain lubricant from compressor, and charge with an equal volume of the same EMKARATE RL lubricant.
18. Change filter driers.
19. Re-energize or start system, and run to achieve full circulation of lubricant/refrigeration mixture.
20. Sample oil and test with refractometer.
  - a) If mineral oil residual is below 5%, and it should be, turn system off and recover CFC appropriately. Charge system with selected HFC refrigerant.
  - b) If mineral oil residual is still above 5%, and this would be very unusual, repeat Steps 15-18 and retest.

## USING THE NU-CALGON REFRACTOMETER

**Use the Nu-Calgon Refractometer to complete the Rapid Retrofit Procedure. It is a precision optical instrument that measures lubricant refractive indices rapidly and accurately.**

- Simplifies the retrofit procedure
- Can be calibrated in the field prior to each test
- Accurate...Efficient
- Simple to Use...Simple to Read
- Handy carrying pouch & case
- Part No. 4815-0



### GENERAL GUIDELINES FOR USING THE REFRACTOMETER,

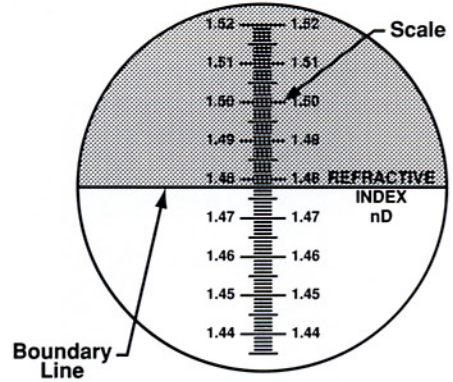
- Standardize with calibration fluid before first use and periodically thereafter. Keep both at same temperature, or at 20°C (68°F).
- When testing an oil sample, place a few drops on prism face, and close and open the lens several times to "de-gas" the oil.
- Clean the lens and prism face after every use with a soft damp cloth.
- Plot numbers on chart, see following page.



Use of Refractometer.....continued

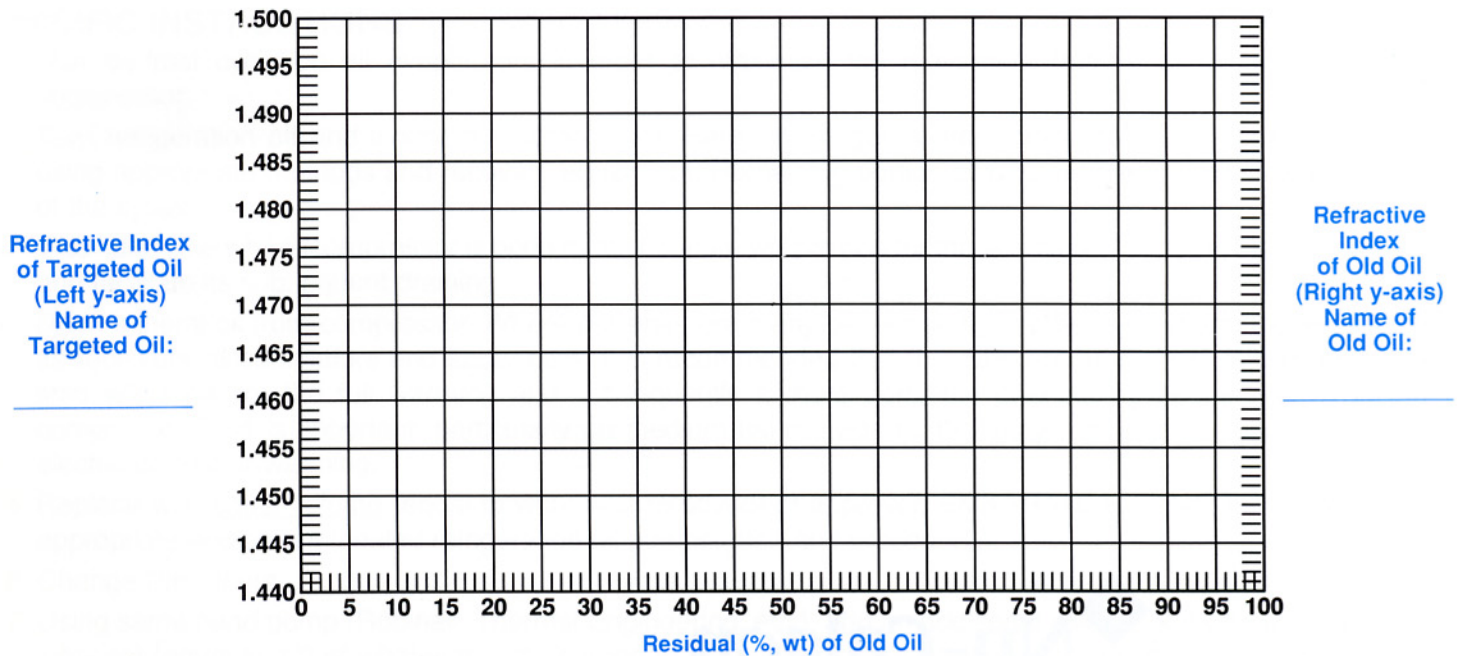
**SPECIFIC DIRECTIONS**

1. Measure the refractive index of a sample of the new ICI Emkarate lubricant that you are going to use, as follows:
  - a) Place a few drops of the new (targeted) oil on the prism face.
  - b) Close and open the lens cover several times, and wait a few seconds to allow the solution to reach the refractometer's temperature.
  - c) Hold the refractometer up to a light source and adjust the focusing ring so that you can read the scale.
  - d) Note the scale position where the boundary line crosses the scale. This is the oil's refractive index; plot this number as POINT 1 on LEFT SIDE Y axis of the chart. Also, make a note of which ICI Emkarate lubricant that it is.
  - e) Clean the prism face and the lens cover using a soft, damp cloth, taking care not to scratch the lens cover.
2. Measure the refractive index of a sample of old oil being removed from the compressor BEFORE the start of the first oil change.
  - a) Test the sample following the above procedure.
  - b) Plot reading as POINT 2 on RIGHT SIDE Y axis. Again, mark what oil is being removed.
3. Connect points 1 and 2 with a straight line.
4. Before each additional lubricant change, but at least 48 hours since the last change, take a lubricant sample from the compressor and measure the refractive index.
  - a) Plot the reading point as POINT 3 on LEFT SIDE Y axis.
5. Draw a horizontal line (parallel to the X axis) from point 3 to where it intersects the line connecting Points 1 and 2. Mark this new point as POINT 4.
6. From point 4, draw a vertical line (parallel to the Y axis) to the X axis, and mark this as Point 5. This is the percent residual of old oil in the compressor. Check with the compressor manufacturer or the producer of the new oil for the recommended maximum level of residual old oil in the system.



*Note: The compressor should run 48 hours between lubricant changes to get a good mix of oils. False readings may be obtained when this is not done.*

**Refractive Index vs. Residual Oil Content**



**REFRACTIVE INDICES ON NU-CALGON LUBRICANTS**

ICI EMKARATE			CALUMET (Mineral)
RL22H:1.4519	RL324:1.4530	RL68S:1.4564	C-3: 1.4942
RL32S:1.4546	RL68H:1.4557	RL100S:1.4574	C-4: 1.4973
RL32CF:1.4546	RL68HP:1.4557	RL220H:1.4580	C-5: 1.4953



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