

***Are You Going
To Change
To An HCFC
Refrigerant
Like...***

R-401A

or

R-409A

***Better Change
The Oil To...***

ZEROL®



ZEROL[®]

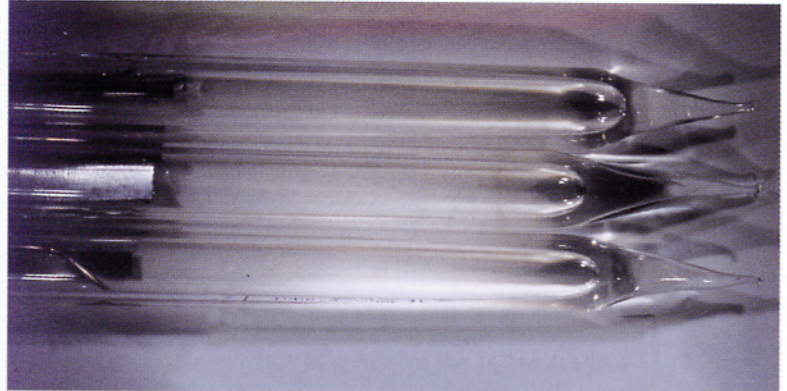
*...the original
alkylbenzene...*

**has outstanding
thermal stability
and superior
miscibility with
R-401A, R-409A
and other HCFC
refrigerants.**

THERMAL STABILITY: It is critical for refrigeration oils to have good thermal stability, which is the resistance to breakdown at high temperatures. ZEROL has far greater thermal stability as compared to mineral oils, and using it with these HCFC refrigerants will eliminate problems with sludge and acid formation as well as copper plating.

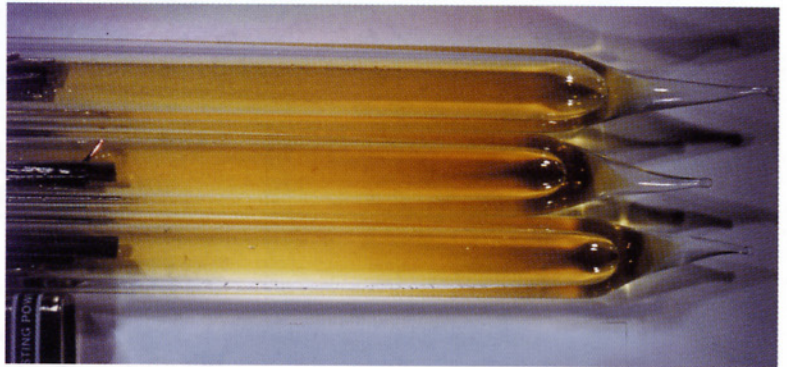
A good indicator of an oil's thermal stability is the Elsey or 14 Day Sealed Tube Test. As you can see in the results shown here, where ZEROL 200TD was compared to a standard mineral oil in the presence of R-401A and R-409A, the mineral oil exhibited greater breakdown as shown by its darker color and higher Total Acid Number (TAN) after 14 days at 347°F.

ZEROL 200TD & R-401A
14 days at 175°C (347°F)



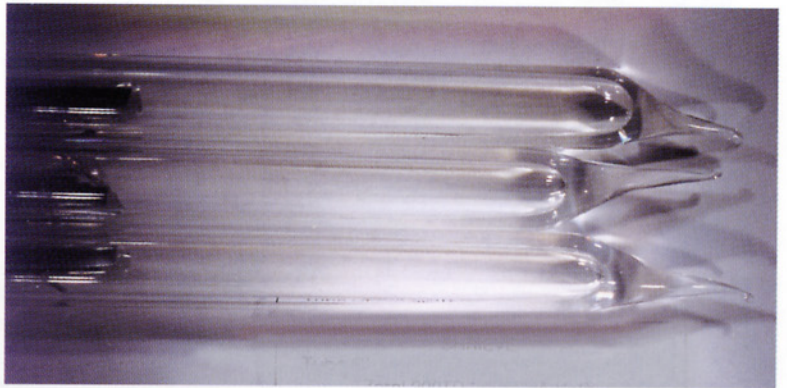
**Thermal Stability Data:
Zerol vs Mineral Oil in R-401A**

	ASTM Color		TAN		TAN % Increase
	Before	After	Before	After	
ZEROL 200TD (with R-401A)	0.5	0.5-Clear	0.015	0.015	0.0
Witco 3GS (with R-401A)	1.0	3.0-Drk Yellow	0.026	0.054	107.6



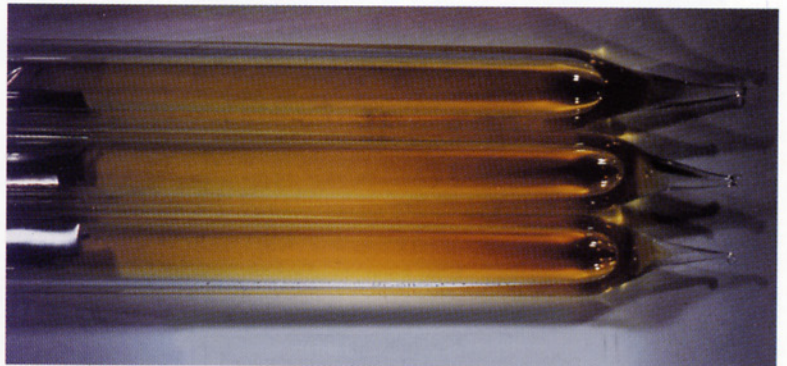
Witco 3GS & R-401A
14 days at 175°C (347°F)

ZEROL 200TD & R-409A
14 days at 175°C (347°F)



**Thermal Stability Data:
Zerol vs Mineral Oil in R-409A**

	ASTM Color		TAN		TAN % Increase
	Before	After	Before	After	
ZEROL 200TD (with R-409A)	0.5	0.5-Clear	0.015	0.019	26.6
Witco 3GS (with R-409A)	1.0	3.5-Drk Yellow	0.026	0.076	192.3



Witco 3GS & R-409A
14 days at 175°C (347°F)

MISCIBILITY: This is the ability of two different fluids to mix together in any ratio and form a single homogeneous fluid; in a refrigeration system, it is the ability of the refrigerant and lubricant to stay together as one homogeneous solution at wide ranges in temperature and pressure.

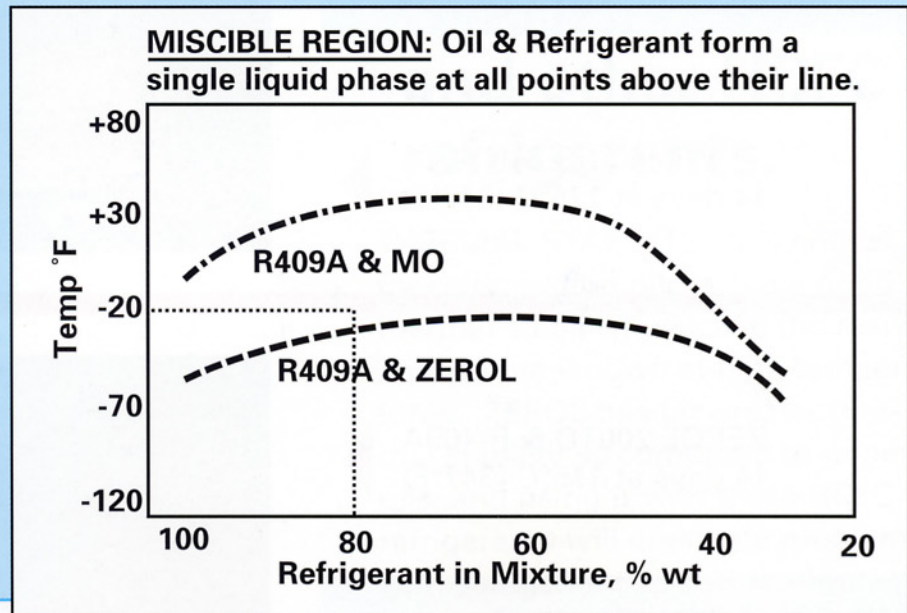
Good miscibility provides for good oil return to the compressor which in turn assures good lubricity for the compressor. In addition, good miscibility prevents oil logging or build-up in the evaporator. ZEROL has far better miscibility with R-22 and other HCFCs as compared to mineral oil, and that is why it is the oil of choice for retrofitting to HCFCs.

In the chart shown, a mixture of ZEROL and R-409A is compared to one of mineral oil and R-409A by plotting the miscibility curve for each oil/refrigerant mixture. All points above a plotted curve represent temperatures where any ratio of oil and refrigerant are in a single liquid phase.

For example, at -20°F, a ZEROL and R-409A mixture composed of 20% oil and 80% refrigerant would be fully miscible. The oil and refrigerant would be one single liquid phase, encouraging a clean evaporator and good oil return to the compressor.

However, an identical mixture of mineral oil and R-409A at the same temperature would exhibit immiscible characteristics. In other words, the mineral oil would have a strong tendency to separate from the refrigerant and drop out. This would result in oil plugging and loss of heat transfer as well as poor oil return to the compressor.

Because ZEROL is more miscible with the HCFC, it encourages better system performance.



MISCIBILITY: A comparison of Zerol & mineral oil with R-409A at various temperatures and oil/refrigerant mixtures.



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