

# Refrigeration Technologies



## Contamination Detector Kit

# MANUAL

### Part One: OIL PHASE TESTING

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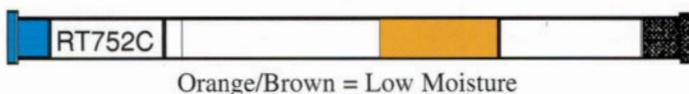
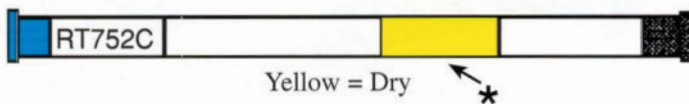
*Advanced Materials & Applications for the HVACR Industry*

## THE EASY OIL TEST

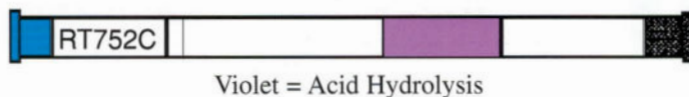
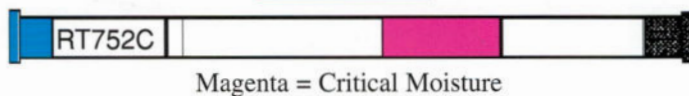
Color Chart for Determining the Level of Contaminants  
in Mineral, Alkylbenzene, PAG or POE Oils

### Test Results

#### PASS



#### FAIL



\* Indicator does not need to be fully stained. A 1mm spot is sufficient.

## PART ONE: OIL PHASE TESTING

### 1.1 DETERMINING CONTAMINANTS IN OIL

The bulk of all contaminants will be dissolved in the Compressor Oil of an operating System.

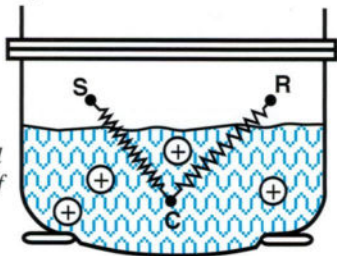
“The Easy Oil Test” (Detector Tube Method) offers a more definitive way to check the condition of any Compressor Oil or to pretest any stock Oil before it is to be added to a System.

*The traditional pH test in a bottle cannot measure the full range of Oil contaminants. A pH test will only work after a System has been exposed to long term acid production. Therefore, when the acid content of the Oil is ruled by the pH method, it is already a foregone conclusion that extensive corrosion, metal wear, copper plating and damage to the Compressors' electrical windings has already occurred.*



The Oil Detector Tube Method is not a pH test.

*Our Oil phase Detector Tubes will accurately measure the Oils' **dielectric strength**. Dielectric strength is best defined as “the fluids ability to conduct an electrical current”. Oil containing variable amounts of moisture and other dissolved impurities will increase the Oils' **conductance**.*



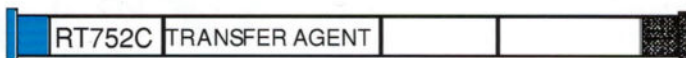
The ideal Oil should be nonconductive however, even virgin Refrigeration Oil will register slight conductivity. Working Compressor Oil will manifest conductance due to chemical interaction, notwithstanding, the introduction of contaminants during an installation or repair.

The Color Chart opposite this page displays the color breakouts of this test. The soft colors indicate low Oil conductivity progressing stepwise to the stronger colors of highly conductive Oil.

## 1.2 THE OIL DETECTOR TUBE



The sections of the vial are the Transfer Agent and the Indicator. A Refrigerant Vapor/Oil stream is allowed to flow into the tube. The liquid Oil will be observed wetting through the Transfer Agent. As soon as the Oil reaches the Indicator segment, the flow must be manually stopped. *The Oil test is not affected by refrigerant gas type.*



The TRANSFER AGENT contains dye fractions bonded to an ion exchange resin. The ion exchange resin will release a specific dye in direct proportion to the conductance of the Oil. Ignore any color change that occurs within the Transfer Agent.

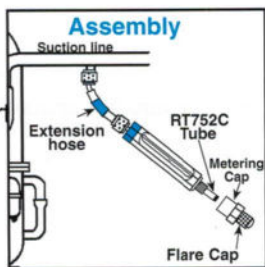


The INDICATOR segment of the Oil Detector Tube will capture and preserve the dye fraction liberated by the Transfer Agent for comparison against the Color Chart. The Indicator does not need to be fully stained. The Indicator can only hold about two (2) drops of Oil and this test only requires about one-tenth (1/10) of a drop.

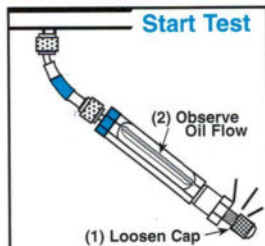
Failure to stop Oil flow will completely wash the test results out of Tube.

## 1.3 MILKING THE SYSTEM FOR OIL

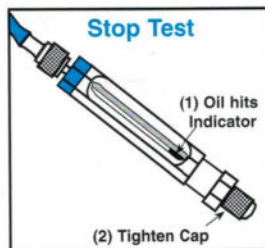
1. Connect blue extension hose and Checkmate Body to a clean and dry suction port of an operating system having positive pressure. **Never connect to a liquid or discharge port.**
2. Insert Oil Detector Tube RT752C - blue end first.
3. Attach metering cap and 1/4 flare cap to complete the assembly.



4. While the system is running, loosen the flare cap to commence a s-l-o-w bleed.
5. **BE PATIENT.** Watch for any Oil entering the Tube, Oil will appear as a liquid, wetting the crystals of the Transfer Agent.
6. Allow Oil to pass through the Transfer Agent and deposit a small stain on the Indicator.



7. As soon as the Oil hits the Indicator, stop flow immediately by tightening the flare cap. Close the suction port.
8. Remove entire Checkmate Assembly at extension hose relieving any remaining back pressure. Remove Detector Tube and compare stain on Indicator to the closest color on the chart.



At times you may experience difficulty coaxing Oil out of the System.

Try the following:

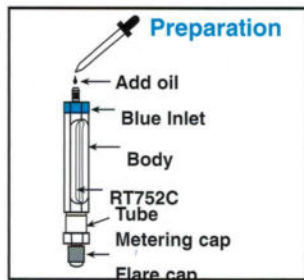
- (1) Shut down System and commence bleed while suction pressure is rising.  
Still no Oil?
- (2) Restart Compressor after a 5 minute rest.  
Bleed at startup.  
Be prepared to stop flow immediately. This technique may cause an enormous surge of Oil into the Detector Tube.

*Oil is always attainable with a de minimis Refrigerant bleed. If required, outlet of Checkmate devise can be adapted to a tank or vessel to capture the Refrigerant bleed.*

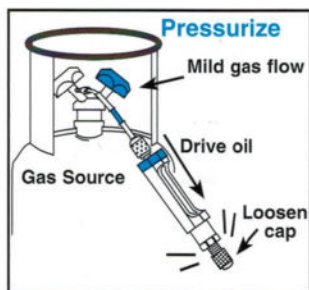
## 1.4 TESTING OIL "OUTSIDE" A SYSTEM

To pretest stock Oil before addition to a System, or to test Oil that can be directly drained from a Compressor. Use the following procedure:

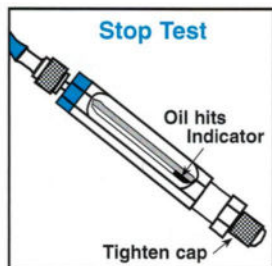
1. Add about two (2) drops of Oil to the Blue inlet of a fully assembled unit with Detector Tube in place.
2. Connect the Oil primed assembly to any gas source having a pressure displacement less than 150 psig.



3. Open gas valve to pressurize the assembly.
4. Loosen flare cap for a mild bleed.
5. Gas pressure will quickly drive the Oil through the Transfer Agent and deposit a stain on the Indicator.



6. Stop flow by tightening the flare cap and close the gas valve.
7. Disconnect entire assembly at extension hose relieving any remaining back pressure.
8. Remove Detector Tube and match the Indicator to the Color Chart.



## 1.5 INTERPRETING THE RESULTS

### Primary Color

Bright to pale YELLOW

### Equivalent Colors

Yellow with possible tints of green or tan

### Indication: Compressor Oil

Exceptionally pure system fluid

### Indication: Stock Oil

The preferred condition for virgin Mineral and Alkylbenzene

Oils to be added to equipment

### Special Notes

None

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### Primary Color

ORANGE

### Equivalent Colors

Orange with light brown or tan

### Indication: Compressor Oil

A very clean Mineral or Alkylbenzene system.

An exceptionally clean POE or PAG system.

### Indication: Stock Oil

Mineral or Alkylbenzene Oils containing high amounts of special additives will test at this level. It is otherwise preferred that MO and AB oils test Yellow before addition to a system.

Virgin POE or PAG oils will test at this level unless these Oils contain a high additive package.

### Special Notes

None

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### Primary Color

PINK or LAVENDER

### Equivalent colors

Pink with Lavender - combined or separating on the Indicator.

Soft Purple - a Lavender observed under a low lighting condition

### Indication: Compressor Oil

An acceptable condition for all system lubricants.

### Indication: Stock Oil

Do not add Mineral or Alkylbenzene Oils that test at this level.

POE and PAG Oils containing high additive packages are acceptable for use at this level. All others should not be added.

### Special Notes

The gap between the Pink/Lavender state to a Magenta or Violet condition is broad. Therefore, a Pink/Lavender status should not be considered a borderline condition since many systems tend to equilibrate normally at this level.

The Pink/Lavender state may revert to Orange when the same system is measured at a lower ambient, or under other operating conditions that stabilize and improve dryer performance.

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## 1.5 INTERPRETING THE RESULTS cont.

**Primary Color**  
MAGENTA

**Equivalent Colors**

Bright Reds having Lavender to Violet separations on the Indicator segment.

**Indication**

Evidence of high moisture or high moisture containing some depleted acids.

**Cause**

Inadequate dehydration or: Moisture has been driven out of dryer due to elevated liquid line temperature.

**Remedy**

Change dryers and recheck after 80-100 operating hours. Correct the problem that has caused abnormal liquid line temperature.

**Special Notes**

A "False Positive" is possible from connection of Checkmate unit to a wet service port. Dry service port and Checkmate assembly - Retest the equipment.

Liquid line moisture indicators will not confirm or forewarn of this condition because the Oil passing by the sight glass indicator is diluted with liquid Refrigerant.

**Primary Color**  
VIOLET

**Equivalent Colors**

Dominant Violet with Strong Red separating on the Indicator.  
Dominant Violet with soft Blue separating on the Indicator.

**Indication**

Products of acid activity dissolved in the Oil phase.

**Cause**

System operating at higher than normal operating temperatures.  
A system condition that has pro-

gressed due to inadequate dehydration. Numerous other known and unknown sources can lead to this condition.

**Remedy**

Most systems can recover by installing new dryers. However, an Oil change may be necessary.  
Retest after 80-100 operating hours.

**Special Notes**

Cross-Contamination can give a "False Positive" Violet. This is most often, but not necessarily, the level at which a pH test kit may indicate acidity. Retest the system.

**Primary Color**  
BLUE

**Equivalent Colors**

Blue with a Violet separation, Navy Blue, Blue-Gray with small carbon deposits.

**Indication**

A reservoir of acid/acidic products dissolved in the Oil Phase.

**Cause**

Prolonged exposure to high contaminant levels. Extreme heat.  
Numerous other circumstances.

**Remedy**

Change Oil and add new dryers to salvage remaining Compressor life.

**Special Notes**

Compressor Oil viscosity and lubricity has diminished.

A Blue level may also occur from Oil super saturated with liquid water.

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