BULLETIN #:	**17T-01**
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SUBJECT: Shaft Seal Recommendations for Open Drive

☐ TECHNICAL ☐ MARKETING

	☐ 06D	☐ 06E	☐06CC	☐06M	☐06U	☐06V
Products Affected:	☒ 5F	☒ 5H	☒ 05G	☒ 05K		
	☐ 06TA/TR		☐ 06TS-TT-TU-TV			

Introduction:

Carlyle open drive compressors use a rotating mechanical shaft seal to prevent refrigerant from leaking to the atmosphere. The models that include these shaft seals are 5F/H, 05K, and 05G compressors. The seal consists of a carbon ring that rotates against a fixed silicon carbide mating ring or a polished cast iron plate. The faces of these parts are very flat. However, they rely on an oil film to maintain the seal between them and prevent excessive friction and wear. This bulletin outlines Carlyle's recommendations pertaining to shaft seals for drive compressors.

Compressor Storage:

Compressors are shipped from the factory with a holding charge of dry air or nitrogen between 5 and 20 psig. Any compressor received without a holding charge should be checked for leaks. A lack of holding charge does not necessarily indicate a shaft seal leak. Leaks can be at fittings, gaskets, or the shaft seal. Any leaks should be repaired before the compressor is installed into a system.

If compressors are stored for several months, the oil film on the seal face may diminish, reducing the effectiveness of the seal. In this case the holding charge may leak out through the seal. Carlyle recommends that the shaft be rotated periodically to allow oil to wet the seal face. This recommendation also applies to compressors installed in systems that do not operate for extended periods of time, such as during the winter months in cold climates. Running the compressor after long off periods will re-lubricate the shaft seal assembly and re-seal to its prior operation although there may be more oil dripping during the first 24 hours of operation.

Leak Detecting:

The best method to locate leaks is with a refrigerant leak detector. Shaft seal leaks are best located after blowing out the seal with compressed air, then using a leak detector. Proper maintenance and setting of the leak detector is critical to diagnosing a shaft seal leak. Shaft seal refrigerant leaks greater than 2-oz per year are considered excessive. Gross leaks at fittings and gaskets can be detected with a bubble solution such as "Snoop" and or a Leak Detector. To prevent rusting on the shaft, water based solutions should not be used in the seal area.

POE oil Effect:

Of concern with 5F/H compressor and POE oil, is potential seal damage and leaks due to the cleaning / solvent characteristics of the POE oils. Seal leaks with HFC/POE oil combination can occur more frequently than with CFC and HCFC refrigerant applications with mineral oil or alkyl-benzene oil. This is an especially important consideration on retrofit applications where the POE oil solvent characteristics brings back systems contaminates that had been dormant with mineral or alkyl-benzene oil. These contaminants find their way into the lubrication system of the compressor and the discharge of the oil at the oil pressure regulator into the seal compartment. Shown in Figure A is a schematic of the oil path in a 5F/H compressor.

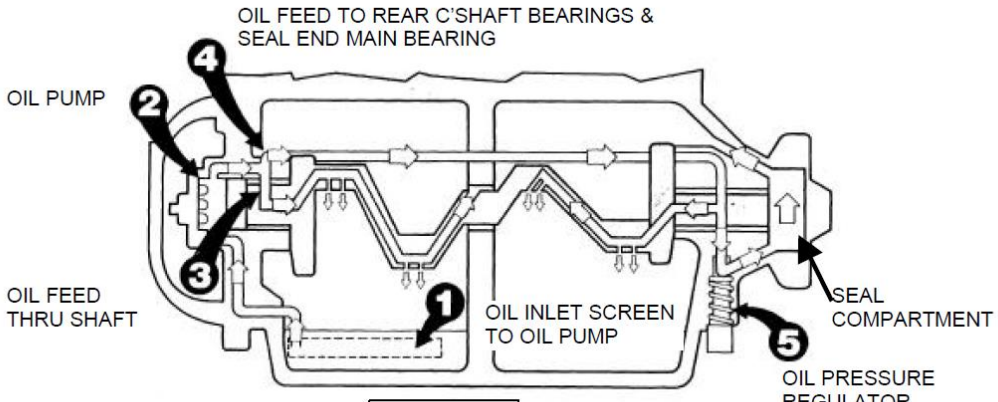


FIGURE A

These contaminants can damage the seal's carbon ring and mating polished cast iron plate resulting in a seal leak. This emphasizes the importance of system cleanliness when working with HFC's and POE oils. The application of an oil filter system, installed in the same oil circuit as an oil cooler, can be applied to assist in removing contaminants. See Figure B.

5H40, 60, 80 Full Flow Oil Filter Modifications

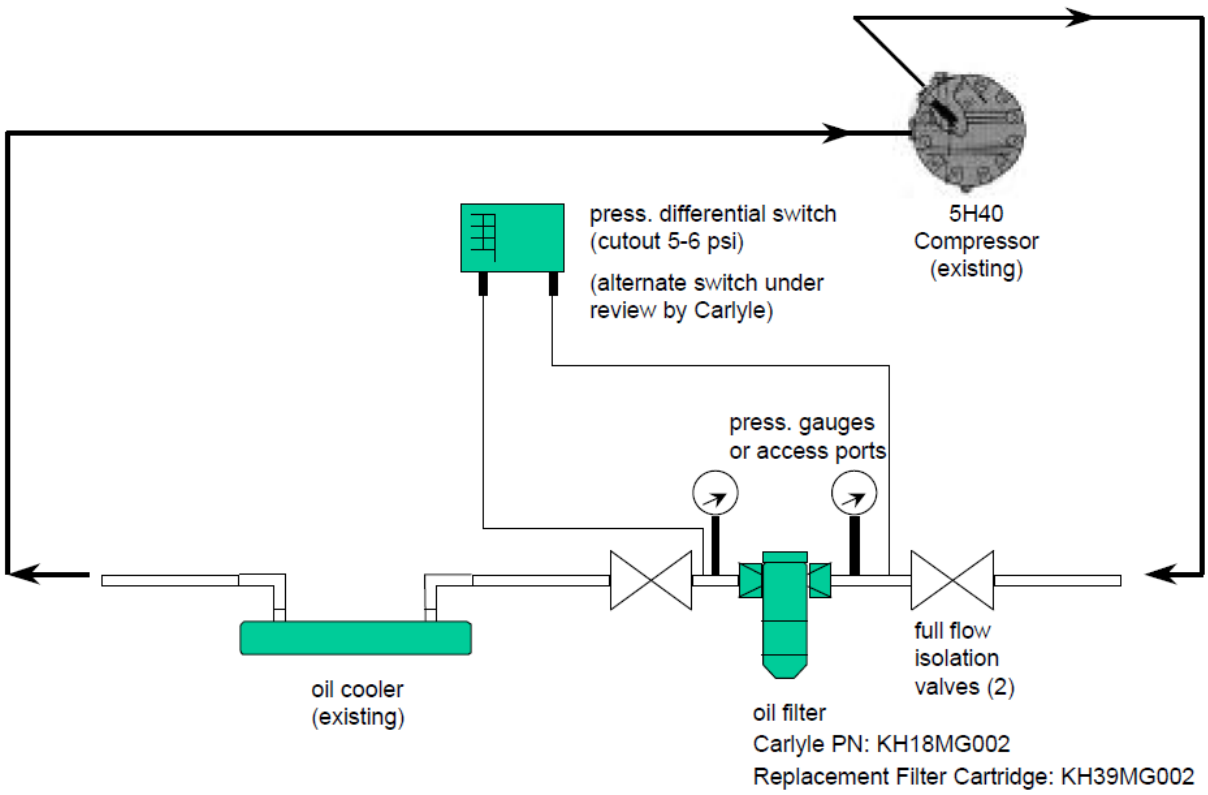


Figure B

Note: On retrofits, two or three filter changes may be required. A "contaminated" system may require more. Consult Carlyle Application Engineering for more specific guidelines on retrofitting system refrigerant charges.

Expected Oil Leakage:

Oil is required at the interface between the rotating primary ring and the stationary mating ring to seal. Internal system pressure continually forces oil across the seal face to the outside. The oil is what creates the seal for refrigerant gas inside the system, and lubrication for the seal surfaces. This oil may eventually drip from the compressor. An oil leak at the seal should not be diagnosed as a refrigerant leak until the compressor has been checked using a leak detector as outlined above.

Seal Replacement:

Good repair practices are essential to maintaining the cleanliness of the system. Particular care should be taken to avoid introducing any contamination to the seal surfaces or the seal cavity during the service replacement. Any contamination will greatly increase the risk of subsequent seal leaks.

Whenever the compressor is open to the atmosphere, it should be dehydrated with a vacuum pump for a sufficient amount of time to remove any moisture that has been absorbed into the oil.