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RECOMMENDED UP-GRADES, PREVENTIVE MAINTENANCE AND ADDITIONS TO BENEFIT OPERATION OF ALL DIVIDER BLOCK LUBRICATION SYSTEMS

1. Install Non By-Pass Filters on Suction Side of Lubricator Pumps

Several situations have existed where trash in the lubricator pump created a low flow condition. The low flow condition is extremely hazardous to the compressor and can possibly cause phantom shutdowns or the cylinders, packing, rods or rings to fail prematurely. Filtration prior to the lubricator pump is essential. A 25 to 100 micron filter on the inlet side of the pump is extremely beneficial. This filter should be a non by-pass design, easy to remove, clean and/or replace. The non by-pass filter will give field service technicians and operators a quick fix for trash problems on the inlet side of the pump. (See page 5 Filtration) **Note: Do Not** use a typical automotive type filter. A typical automotive filter will by-pass when the filter becomes clogged introducing trash into the lubricator pumps, divider blocks and check valves. Always check with the filter manufacturer to ensure the filters installed on the compressor are non by-pass which will alleviate the problem of trash into the system.

2. Install Discharge Manifolds and/or a Pressure Gauge on the Discharge Side of the Lubricator Pump

A discharge manifold assembly consists of an anchor cross, purge port, pressure gauge and atmospheric rupture disc, all of which should be incorporated into all well designed divider block lubrication systems. The pressure gauge is a critical instrument to monitor divider block operation and lubrication system pressure. Fluid movement of the pressure gauge indicates proper operation of the divider block system. Erratic movement or sudden drops in pressure indicate by-passing or sticking pistons in the divider blocks or the presence of air or gas in the system. The pressure gauge gives the field service technicians or operator an inexpensive tool to recognize problems with by-passing pumps or divider blocks before major damage to the cylinders and packing occur. **Note:** Never assume the lubricator pump or divider blocks will not by-pass because it is new. (See page 5 Pressure Gauges)

3. Install a Purge Port on the Discharge Side of Lubricator Pump

An addition of the CCT pump discharge manifold (PCA) will allow a purge gun to be easily connected to the lubrication system and eliminate air from entering the system. The manifold is designed to provide field service technicians or operators easy access to purge the divider block system of air before startup or after any maintenance on the lubrication system. A ***check valve must be in place at the purge point*** to ensure air free oil is in the system when the purge gun is removed. This eliminates phantom shutdowns and air locking problems. (See page 14 Purging Air From Divider Block Systems)

4. Install Reset Pressure Indicators on Divider Blocks

An essential tool to allow field service technicians or operators to easily and immediately locate excessive system pressure or blockage in individual divider blocks, tubing runs or injection points. (See Page 11 Pressure Ind.)

5. Install an Oil Head Fitting (OHF) and Extreme Duty Check (XDC) Valve

The OHF ensures a minimum of 1 inch of oil head in front of the check valve. The oil head keeps a liquid seal on the check valve and increases reliability for many years. It is never recommended to install check valves in a vertical or horizontal position which would not allow for a liquid seal. (See page 13)

6. Install Base Plate Check Valves

Base plate check valves should always be installed on each working outlet of the divider block base plate to stabilize the operation of the divider block and eliminate gas or air from entering the divider block due to faulty or failed injection check valves. This will minimize phantom shutdowns until the faulty injection check valves can be replaced. (See page 12 Check Valves)

7. Double Poppet S.S. Check Valves

Install the CCT (XDC) Extreme duty double poppet 10,000 PSI check valve at all injection points. The poppet o-ring seal is extremely effective for positive sealing. Install the Oil Head Fitting where high pressures or temperatures exist and in the presence of gases known to create problems with elastomer seals. Failed check valve problems have been alleviated with the installation of the Oil Head Fitting (OHF) and Extreme Duty Check (XDC). (See page 12 Check Valves)

8. Review Divider Block System Design for Maximum Efficiency and Recommended Oil Consumption

To insure adequate oil supply to high pressure cylinders and packing, the divider block system should be designed to eliminate over lubricating lower pressure suction and interstage cylinders and packing. The total system *does not* need extra lubrication when only one or two cylinders and packing are operating with high discharge pressures. The high pressure injection points should reflect the needed amount of oil without over lubricating the medium to low pressure points. This will increase the efficiency of the compressor, reduce operating costs and eliminate problems associated with excessive lubrication. Contact the compressor manufacturer or a professional divider block system designer. Fill in one of the Design Sheets on pages 41 thru 43 or on the CCT website (www.cct.nu) specific to your compressor and email or fax it to C C Technology. This will enable the design engineer to check your system for correct divider blocks.

9. Test Divider Blocks for Pressure Integrity

All divider blocks are metal to metal sealing surfaces and the possibility of by-passing is always present. By-passing could be a result of excessive clearance between the piston and bore of a new divider block or from millions of cycles each year creating wear between the piston and bore. **Note: Never assume tolerances between the piston and bore are acceptable even if the divider block is new and the piston is cycling properly. Test all divider blocks for integrity at least every two years with the CCT Single Point Test Device (SPTD). When injection pressures are over 1000 PSI, the divider blocks should be tested for integrity or replaced every 24 months. Divider blocks are much less expensive to replace than compressor cylinders, rods or packing, not to mention the cost of labor and lost revenue from down time.** (See Pressure Testing Divider Blocks page 10)

10. Install Balancing Valves on Divider Block Systems with High differential Pressure

Use of balancing valves are recommended to assist divider blocks to accurately proportion lubricant when differential injection pressures of approximately 1200 PSI to 1500 PSI are present in a divider block system. Balancing valves should be installed on all low pressure injection points when 1200 PSI to 1500 PSI differential pressure exists in the system. This will eliminate divider block by-pass problems and create a fluid movement of the divider block system eliminating excessive wear to the divider block piston. Differential pressure is the actual difference between the pressure needed to inject oil into each cylinder or packing lubrication points. The divider block system will not typically see final discharge pressure of the compressor. Pressure gauges must be installed in the lubrication line with each balancing valve to enable field service technicians or operators to monitor and balance the system correctly. (See Balancing High Pressure Divider Block Systems pages 15,16,17)

11. Lubricator Gearbox Overflow into Compressor Frame

Several lubricator pumps have been discovered by-passing oil into the lubricator box. If tubing is connected from the lubricator box to the compressor frame to move excessive oil out of the lubricator tank it is impossible to detect a by-passing lube pump. Remove the tubing designed for overflow of the lubricator tank and plug the tank and frame tubing fitting. If the pump is by-passing it will be very noticeable by overfilling the lubricator box. If the operator prefers to keep the by-pass tubing in place it should be removed from the compressor frame every 6 to 12 months and left open to the atmosphere for several hours. If the lube pump is by-passing excessive oil will drip excessive oil from the tubing. This indicates to operators or service technicians the lubricator pump is faulty. Pressure test lubricator pumps every 12 months to ensure the pump will build sufficient pressure to blow the atmospheric rupture disc in the system. ***If the sight glass on the lube box is covered or stained with dirty oil, you will never know if the oil level is correct. Clean the sight glass and lube box every year and inspect the cam lobes in the box for wear. Never assume the lubricator pump will not by-pass because it is new or has been refurbished.***

12. Lubricator Camshaft and Pump Wear

It is absolutely necessary for the operator to remove all lube pumps, completely drain the oil from the lube box and check for wear on the pump rocker arms, cam lobes and internal gears of the lubricator reservoir every 12 months.