

U-3ARC TRAINING WEBINAR N°42

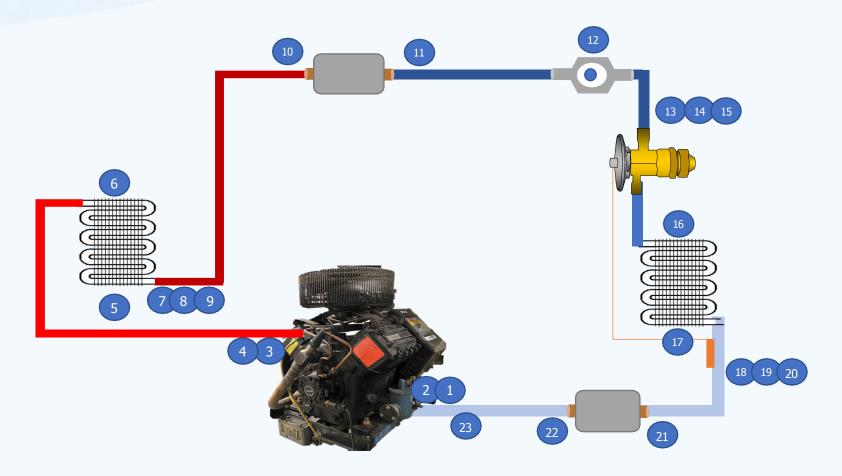
How To Properly Inspect a Compressor

TRAINER:

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31th May 2025

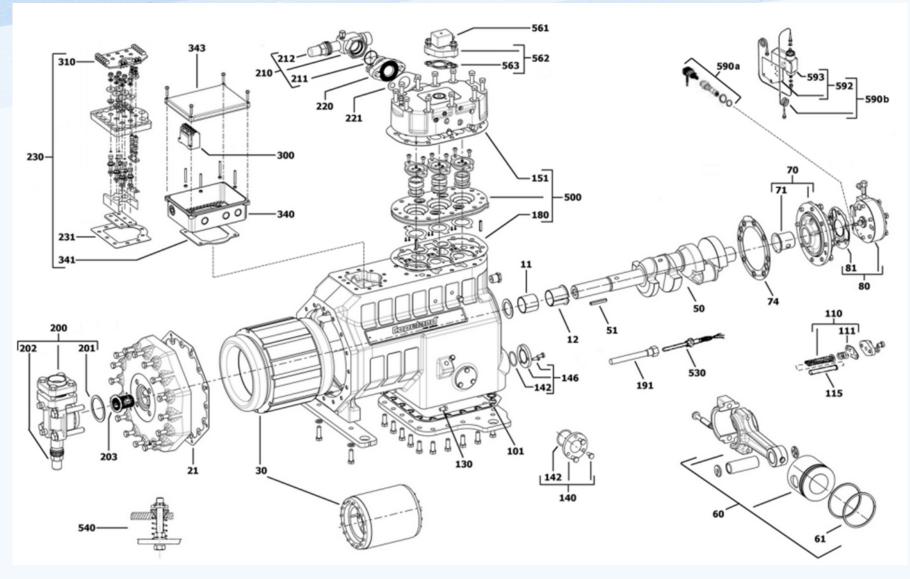
System Check Point Review



Suction Pressure Suction Temperature Discharge Pressure Discharge Temperature Condenser Air In Condenser Air Out Liquid Pressure Covert to Temp Liquid Temperature Condenser Out Subcooling Filter Temp In Filter Temp Out Moisture/ **Bubbles** Liquid Pressure Convert to Temp Liquid Temperature TXV In Subcooling Evaporator Air In **Evaporator Air Out** Evaporator (SST) **Evaporator Temperature Evaporator Superheat** Suction Pressure In Suction Pressure Out **Compressor Superheat**

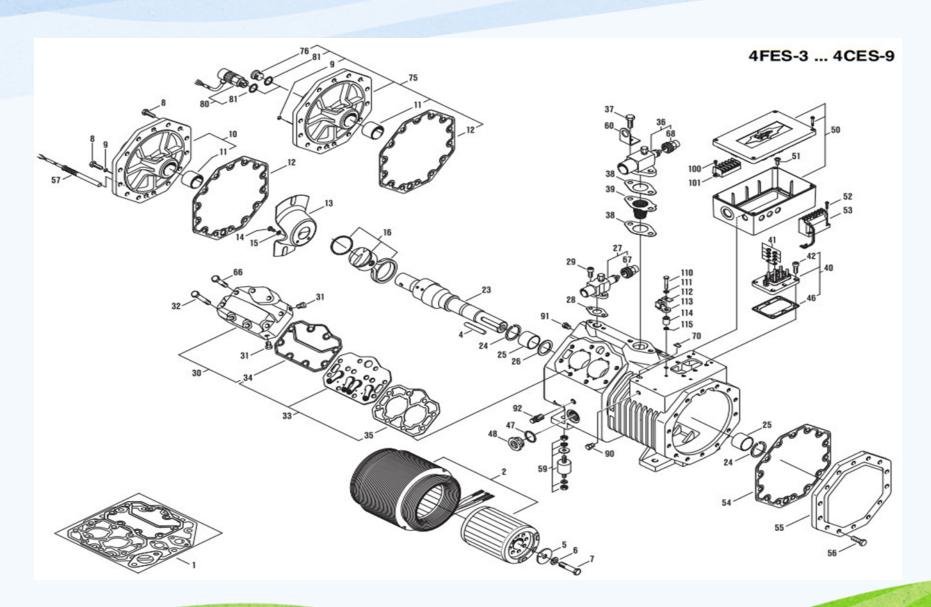
Inside compressor





Inside compressor

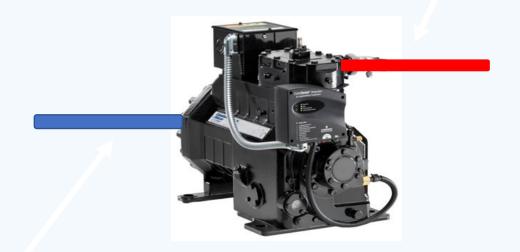




Overheat

Always check the discharge temperature 6" or 150mm from the discharge service valve and make sure you stay below 225F/107C Semi-Hermetics.





For every 1 degree increase in suction temperature you increase 1 degree in the discharge

Overheat Prevention



Always maintain compression ratios per manufacture design Make sure you set low pressure control inside compressor operation envelope Do not let suction pressure drop below the compressor design Make sure additional cooling methods are working properly if required

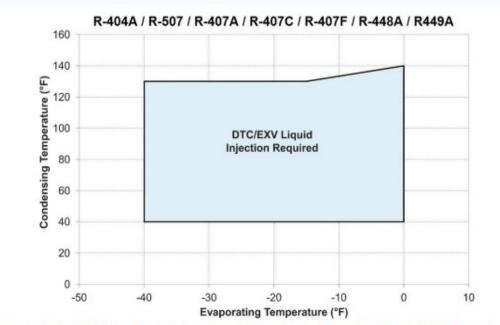
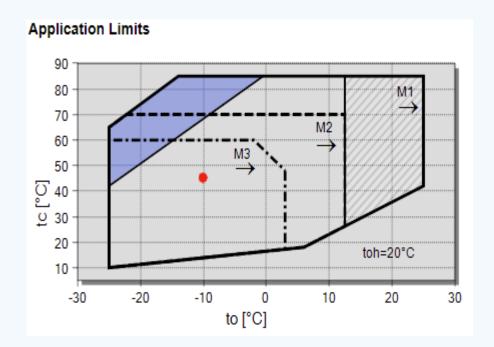


Figure 4 - ZF*K5E Low Temperature Liquid Injection-- Operating Map (65°F Return Gas)



What Causes Rotor Drag?









You Can See Floodback Happening

SUPERHEAT: SPECIFIC DESIGN (TRIBOLOGY // SUPER-FINISHING)





Floodback Prevention

- Ensure you have the correct or adequate refrigerant charge
- Always Set TXV superheat according to manufacture specifications



R-448A

Suction Line Temp 22°F / -6°C 22°F / -6°C 22°F / -17°C

Superheat 20°F / 11K



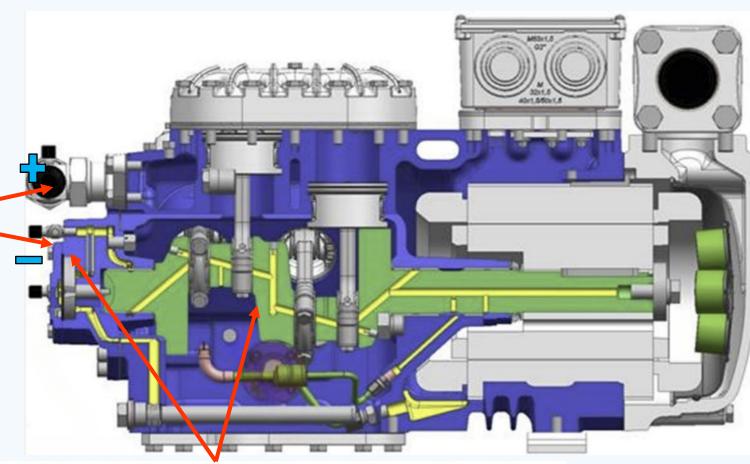
Checking Net Oil Pressure

- Net oil pressure = Oil pump pressure -Crankcase pressure
- For Copeland Compressors net oil pressure can range between 20 to 60 PSID (1.5 to 4 bard) but 40 to 50 psid (2.5 to 3 bard) is normal while ~10 PSID (~.7 bard) is the minimum allowable net oil pressure.
- Crankcase pressure does not equal to suction pressure should be ~2 psi difference
- Oil pump can pump in either direction





Checking Net Oil Pressure



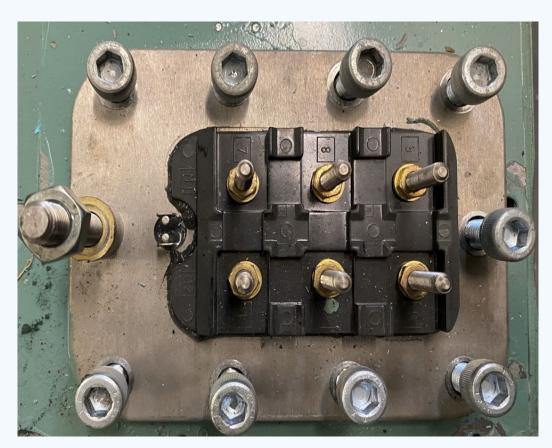
Connect gauges
here to check for
net oil pressure

2

Check for differential pressure in crankcase between oil screen inlet and "---"
oil pump port to see if screen is obstructed with debris.



Terminal Plate Insulator





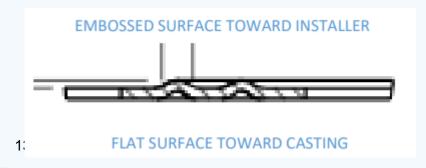


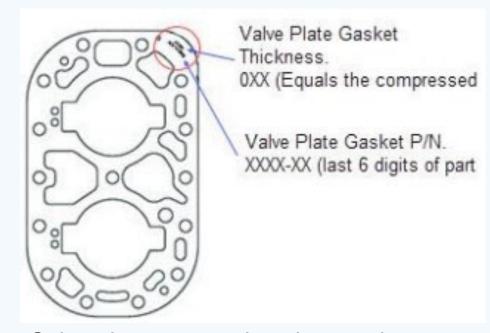
Replacing Gaskets

Rubber Coated Steel Gasket



Embossing (rigids) face technician





Select the proper valve plate gasket for the bore size of the compressor.

Installing Valve Plate Star Pattern





Bolt Torque Requirements

1. Recommended Torque with Lubricated Bolts

*See S.A.E. Grade Identification on Table 4 for remaining bolts not specified in this table.

Table 1

| | Models | | | | | | | |
|---|------------------|---------|--------------------------------|---|-----------------------------|---------------------------------------|---|---|
| Bolt Usage | Size inches | Grade * | H, K inch pounds (Nm) | E, 3A, 3R, L inch pounds (Nm) | N inch pounds (Nm) | M, 2, 3D, 9 inch pounds (Nm) | 4D, 4R, 6D, 6R, 8D, 8R inch pounds (Nm) | 4D/6D*N, 4D/6D*X ¹ inch pounds (Nm) |
| Bottom Plate | 5/16-18 | 8 | 300 (34) | | | | | |
| | 3/8-16 | 5 | | 400 (45) | 400 (45) | 400 (45) | 400 (45) | 400 (45) |
| | 3/8-16 | 8 | | 525 (59) | 525 (59) | 525 (59) | 525 (59) | 525 (59) |
| Capacity Control Valve | 3/8-16 | 8 | | | | 275 (31) | 275 (31) | 275 (31) |
| | 1/2-13 | 8 | | | | | 11 11 11 11 11 | 275 (31) |
| | 5/16-18 | 8 | 300 (34) | | | | | 300 (34) |
| Cylinder Head Bolts | 3/8-16 | 8 | | 525 (59) | 525 (59) | 525 (59) | 550 (62) | |
| | 1/2-13 | 8 | | | | | | 1230 (139) |
| Cylinder Head Two Center Bolts | 5/16-18 | 8 | 225 (25)2 | | | | | |
| Cadmium Plated Head | 5/16-18 | | 250 (28) | | | | | |
| Two Center Bolts | 5/16-18 | | 200 (23) | | | | | |
| Crankcase Heater Plug | 3/8 pipe | | | | | 400 (45) | 400 (45) | 400 (45) |
| | 1/2 pipe | | | | | | 450 (51) | 450 (51) |
| 111000000000000000000000000000000000000 | 5/16-18 | 8 | 355 (40) | | | | | |
| Housing Cover | 3/8-16 | 5 | | 400 (45) | 400 (45) | 400 (45) | | |
| | 3/8-16 | 8 | | | | | 550 (62) | 550 (62) |
| Oil Cooler Tee Fitting | | | | | | | 120 (14) | 120 (14) |
| Oil Dump or Pooring | 1/4-20 | 5 | 100 (11) | | | | | |
| Oil Pump or Bearing Cover to Housing Cover | 5/16-18 | 5 | | 250 (28) | | 30000000000 | 97131111 | |
| Cover to Housing Cover | 5/16-18 | 8 | | | 300 (34) | 300 (34) | 300 (34) | 300 (34) |
| Oil Schrader Fitting | | | | 180 (20) | 180 (20) | 180 (20) | 180 (20) | 180 (20) |
| Oil Sight Glass Cover Plate | | | | | 145 (16) | 145 (16) | | |
| 1 100 100 100 100 1 | Retainer nuts | | 100 (11) | 100 (11) | | (v. ranger | 1007000 | No area to |
| Oil Sight Glass | Bolts | 5 | | | 40 (4) | 40 (4) | 40 (4) | 40 (4) |
| | with 'O' ring | 8 | | | 75 (8) | 75 (8) | 75 (8) | 75 (8) |
| Oil Supply Magnetic | 3/4-16 | | | | | 1200 (136) | | |
| Plug | 1-16 | | | | | | 1200 (136) | 1200 (136) |

MAINTENANCE INSTRUCTIONS

INSTRUCTION DE MAINTENANCE MANUAL PARA EL MANTENIMIENTO

W-555-3

Tightening torques for screw fixings for compressors with

Couples de serrage pour assemblages vissés pour compresseurs avec corps

Pares de apriete para uniones atornilladas de compresores con bloque de aluminio

| uminium housing | d'a | aluminium | de | aluminio |
|--------------------------|--------------|--|-----------------|-------------------------|
| Shut-off valves | | Vannes d'arrêt | | Válvulas de cierre |
| | M8 ① | | 22 lbf-ft (30 | |
| | M10 ① | | 40 lbf-ft (54 | Nm) |
| Blind flange | | Bride d'obturation | | Brida ciega |
| | M8 ①, ② | | 22 lbf-ft (30 | |
| | M10 ①, ④ | | 40 lbf-ft (54 | Nm) |
| Companion flange | | Contre-bride | | Contrabrida |
| | M8 ①, ② | | 22 lbf-ft (30 | |
| | M10 ① | | 33 lbf-ft (45 | Nm) |
| Schrader valve | | Vanne Schrader | | Válvula Schrader |
| | 1/8"-27 NPTF | | 10 lbf-ft (10 | |
| | 1/4"-18 NPTF | 15 | 17 lbf-ft (20 | and the second second |
| Cylinder head | | Tête de culasse | | Tapa de cilindros |
| | M10 ①, ②, ③ | | 52 lbf-ft (70 | Nm) |
| Bottom plate | | Plaque de fond | | Placa del fondo |
| | M8 ①, ③ | | 22 lbf-ft (30 | |
| | M8 ②, ③ | | 18.5 lbf-ft (25 | |
| | M10 ①, ③ | The state of the s | 40 lbf-ft (54 | |
| Sealing cover | | Couvercle de fermeture | | Tapa de cierre |
| | M8 ③ | | 18.5 lbf-ft (25 | 5 Nm) |
| Bearing cover / housing | j cover | Couvercle de palier / de cor | rps | Tapa del cojinete |
| | M8 ①, ③ | | 22 lbf-ft (30 | |
| | M8 ②, ③ | | 18.5 lbf-ft (25 | |
| | M10 ①, ③ | | 40 lbf-ft (54 | |
| Pump cover | | Couvercle de la pompe | | Tapa de la bomba |
| | M8 @ | | 7.5 lbf-ft (10 | Nm) |
| Terminal plate | | Plaque à bornes | | Placa de bornes |
| | M6 ①, ② | | 8 lbf-ft (11 l | Nm) |
| with fibre gasket | 0 | avec joint plat des fibres | 0 | con obturación de fibra |
| with coated metal gasket | 2 | avec joint métallique revêtu | 2 | con obturación metálica |
| with washer | | arou i di lacilo | | con arandela |
| with O-ring | (4) | avec joint annulaire | (4) | con junta tórica |



Field Inspection Steps

Steps:

- 1.Isolate Compressor And Lockout Electrical
- 2.Check For Visual Signs Of Damage
- 3. Check The Resistance And Electrics Of The Compressor
- **4,Match Electrics To Compressor Specs**
- **5.Check Oil Level**
- **6.Safely Remove First Cylinder Head**
- 7.Inspect Valve Plate/S And Gaskets
- **8.Inspect Cylinders**
- **9.Remove Pump And Check Rotation**
- 10.Check Wrist Pin
- 11.Inspect Main Bearing
- 12.Put Compressor Back Together



THANK YOU FOR YOUR ATTENTION

