Sullair Compressor Troubleshooting

HISTORIC PROBLEM AREAS

Compressor Capacity Problems

Compressor Control Problems

Compressor Oil Blow By Problems

Compressor Overheating Problems

DIAGNOSTIC METHODS

90% By Phone With Manufacturer or Distributor

10% Expensive Service Call

It is important to note that screw compressors run relatively trouble free and most problems that arise can be dealt with over the telephone. A good percentage of service calls resulting in down-time and expense to the customer/distributor/manufacturer are caused because the customer does not, or has not taken the time to understand the compressor and its systems.

The Customer Or His Employees Should Take The Time To Thoroughly Understand:

Compressor Specifications

Capacity Operating Speed Operating Pressure

Compressor Cooling System

Fan Speed Oil Capacity Operating Temperature

Compressor Control System

Valve Function Valve Location Operating Pressures

Compressor Lubrication System

Oil Flow Valve Function/Location Filter Location Air/Oil Separation

ORIFICE SIZING @ 100 PSIG, SEA LEVEL

CFM RATINGS	ORIFICE DIA		DRILL SIZE
100	.244"		15/64"
125	.270"		17/64"
160	.304"		19/64"
185	.328"		21/64
250	.368"		3/8"
300	.421"		13/32"
375	.472"		15/32"
425	.505"		1/2"
600	.599"		19/32"
700	.654"		5/8"
750	.669"		21/32"
800	.691"		11/16"
900	.735"		47/64"
1050	.793"		25/32"
1250	.867"		55/64"
1300H	.750"		3 /4"
1600	.980"		31/32"
750/250	.514"	(245 PSIG)	1 /2"
750/350	.433"	(285 PSIG)	7/16"
900/300	.472"	(295 PSIG)	15/32"
1000/350	.500"	(330 PSIG)	1 /2"
1200/300	.551"	(330 PSIG)	9/16"
1150/500	.4489"	(500 PSIG)	
1150/500	.472"	(450 PSIG)	15/32"

****NOTE INTERSTAGE PRESSURE IS USALLY ABOUT 55 PSIG AT 350 PSIG FULL LOAD.

Customer complains that compressor is not making full volume of air

The only way to be sure the compressor is not making the rated CFM is to do an orifice test.

If the orifice test shows low CFM the following are some things that could cause this problem.

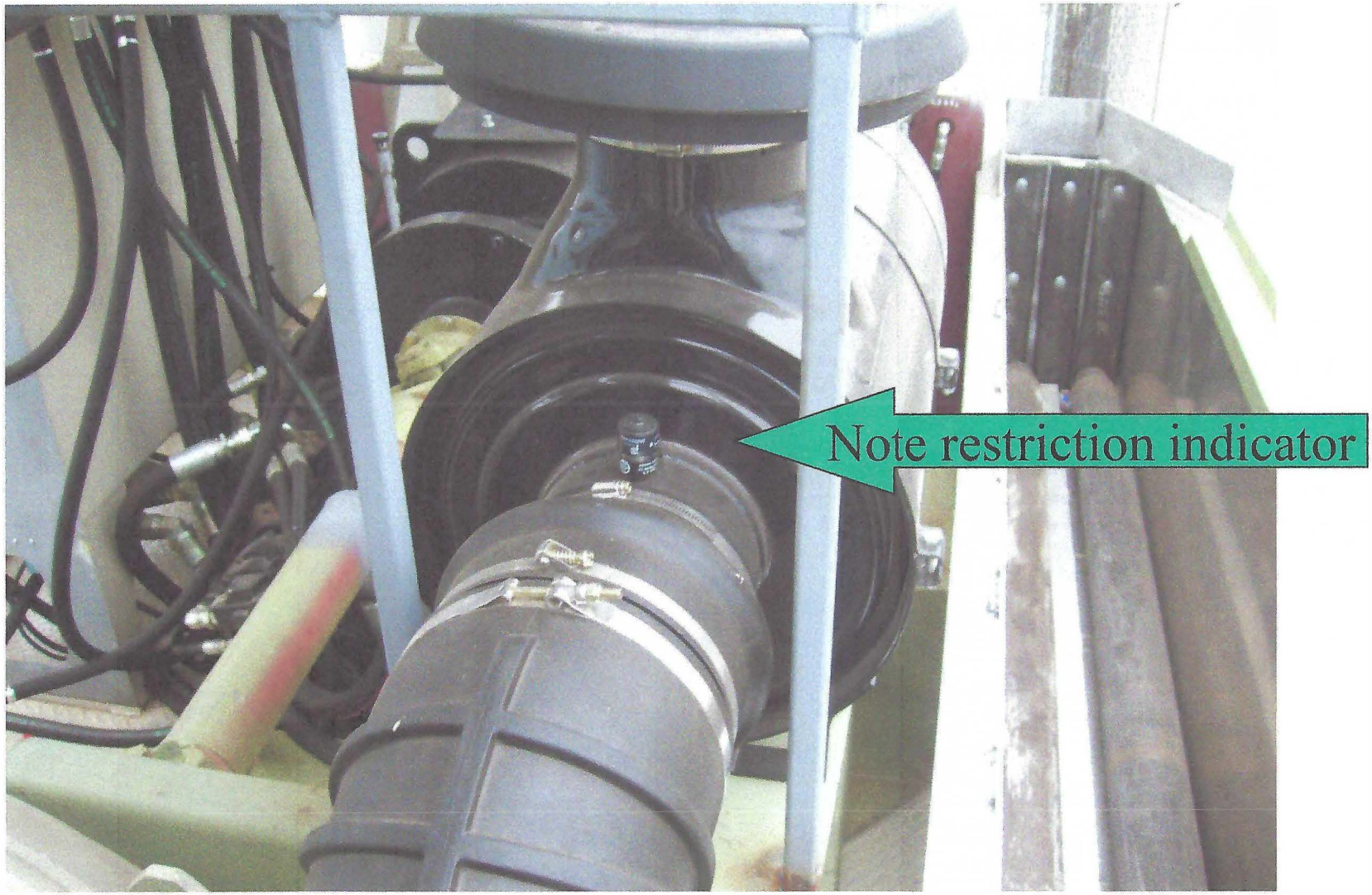
Compressor Speed

Many times the complaint of "My compressor is not making full volume" has been traced back to the fact that the transmission is in the wrong gear or in low range. This is so obvious that it is sometimes overlooked until several hours have been wasted exhausting other possibilities.

Control lines

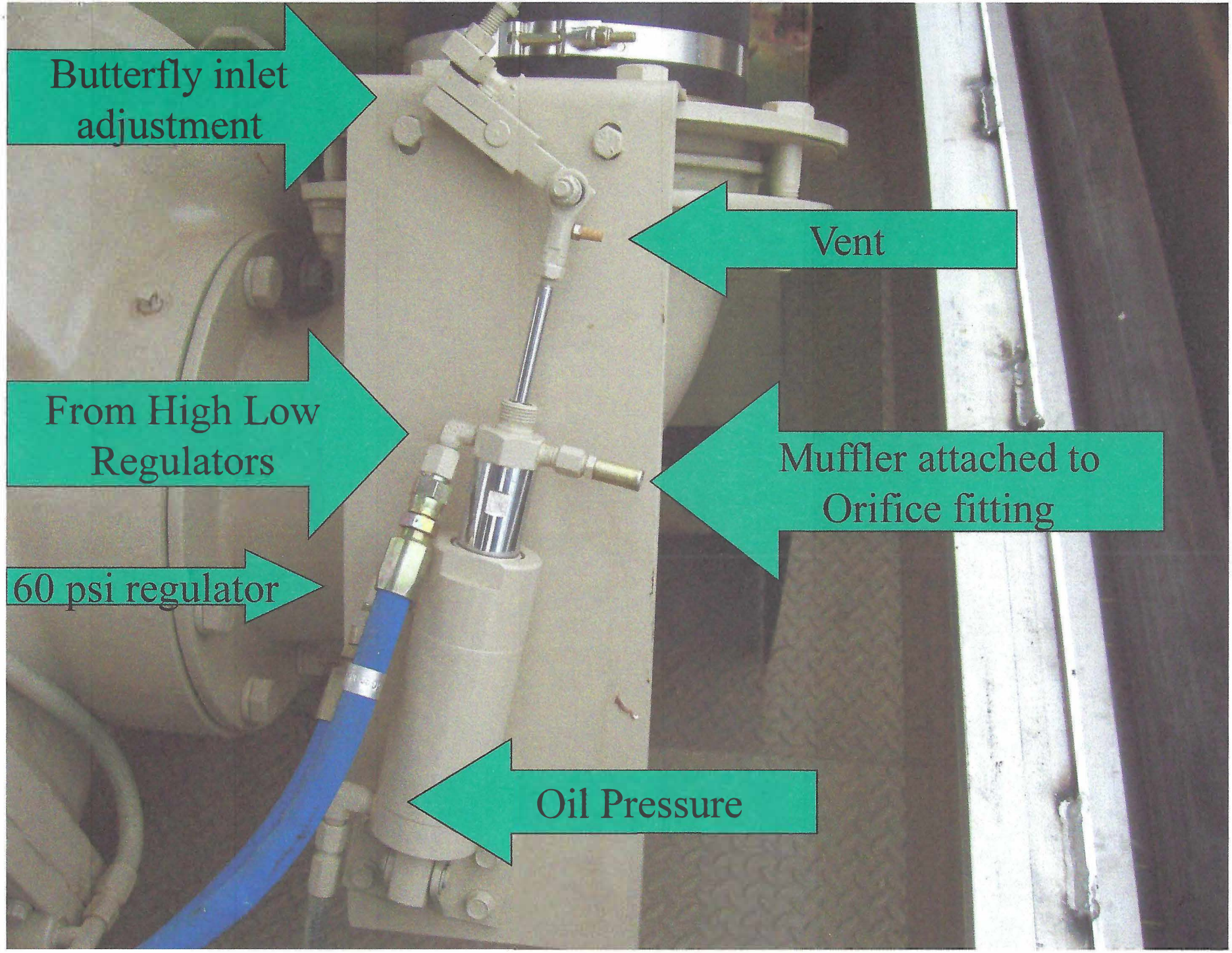
Just because you are sending a signal through a control line doesn't mean it is making it to the other end of the line. Control system lines are small and the control valves are sensitive and susceptible to contamination. Due to the heat of compression, water forms in the control system. The water, when mixed with the oil and or dirt, can plug control lines, valves, and orifices. Keep the system clean by changing filters on schedule and draining moisture daily.

Air Filter



There should be a filter indicator located on the filter housing. Filters should also be visually inspected. There is a inner and outer filter. Many times the inner filter will have a colored eye that will show restriction. Do not blow out filters and try to re-use. Filters can be contaminated by compressor oil due to emergency or high speed shut-downs.

On older compressors the rubber elbows, that connect the air filter to the compressor, can become soft and collapse under suction causing compressors to loose CFM


Butterfly inlet adjustment
Vent
From High Low Regulators
Muffler attached to Orifice fitting
60 psi regulator
Oil Pressure

Large Stage

As noted in the previous slide the inlet cylinder has two stages. The bottom, or larger stage is stroked open by oil pressure. The top, or smaller stage is opened by a spring.

If the larger, or bottom stage is not stroking open look for the following.

Since it takes oil pressure to stroke open the large stage check the oil pressure where it goes into the cylinder verses the other end of the hose where oil pressure is supplied from the oil manifold. If there is a loss of pressure from one end of the hose to the other check the hose for obstructions or internal collapse.

If oil pressure is okay check the amount of pressure from the 60 psi regulator. If this pressure is to high it could keep the large stage from stroking open.

COMPRESSOR CAPACITY PROBLEMS

KNOW THE CAPACITY OF YOUR COMPRESSOR

KNOW THE NORMAL OPERATING SPEED OF THE COMPRESSOR

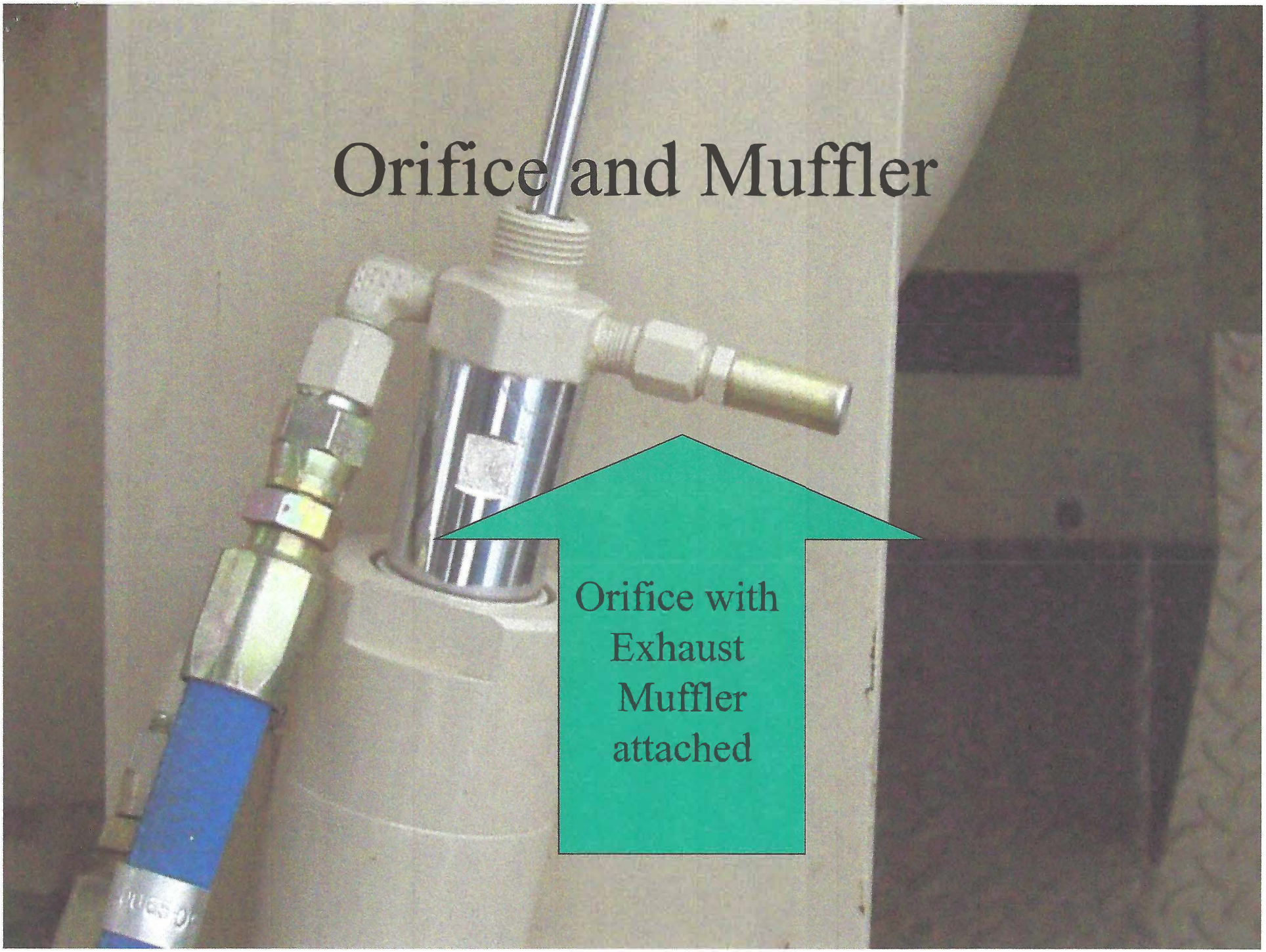
AS A RULE OF THUMB, IF THE COMPRESSOR IS RELATIVELY NEW, THE CAPACITY PROBLEM SHOULD NOT BE WITH THE COMPRESSOR ITSELF

Small Stage

There are a variety of problems that can keep the small stage of the cylinder from opening.

The first thing to check if the small stage is staying stroked shut is to look for a blockage in the orifice behind the muffler on the side of the inlet cylinder. If the orifice is blocked this will not allow the pressure from the High/Low regulators to bleed off and allow the small stage to stroke open again when there is a demand for air.

Orifice and Muffler



High/Low Regulators

If orifice is not plugged check the High/Low regulators to see if there is a signal keeping the small stage stroked shut. The easiest way to check this if you don't have a gauge available is to follow this procedure.

With compressor running open the discharge line so there is a demand for air.

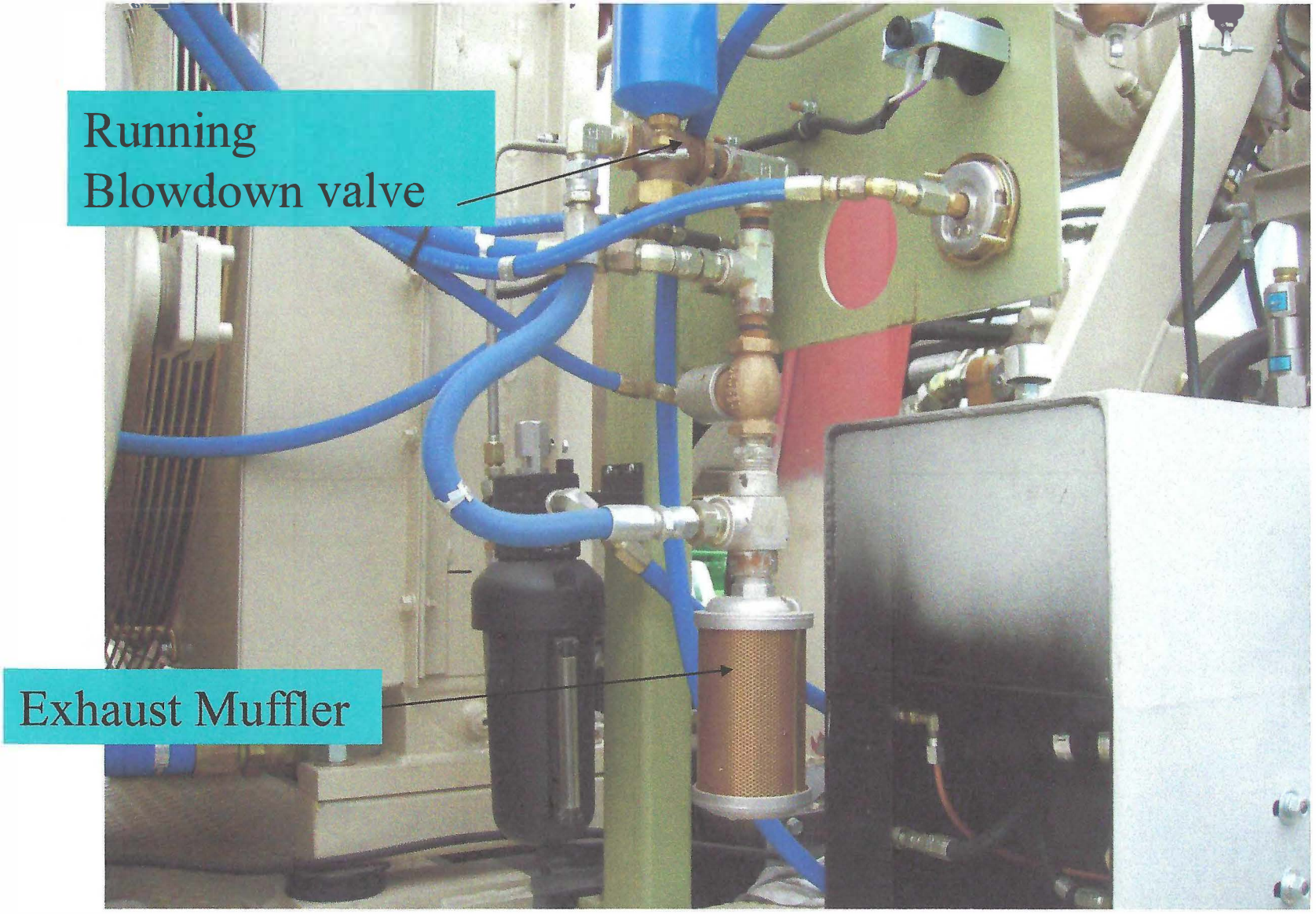
Locate the High/Low regulators and crack open the fitting that tee's off of them and goes to the inlet cylinder.


Crack open this fitting to see if air pressure is present

If air pressure is present, this means one of the regulators is opening and sending a signal to the inlet cylinder causing it to stay stroked closed. Many times the running blowdown valve will exhaust air at the same time. To determine which regulator is the problem, turn the high-low selector valve to the high position, if the air signal is lost then it is the low regulator, if the air signal remains then it is the high regulator.

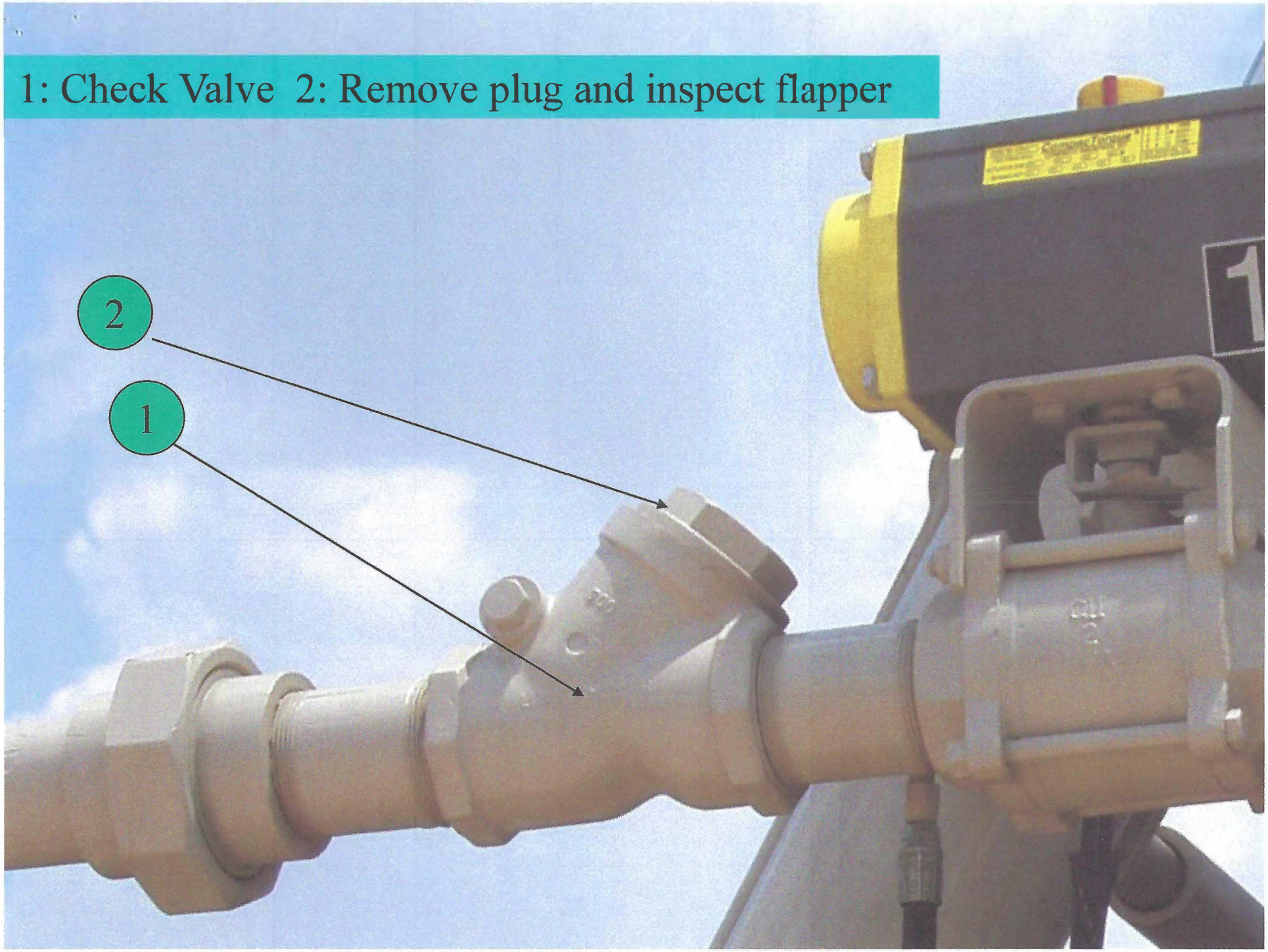
Change out the regulator and reset for the appropriate pressure

Running Blowdown Valve



Discharge Check Valve

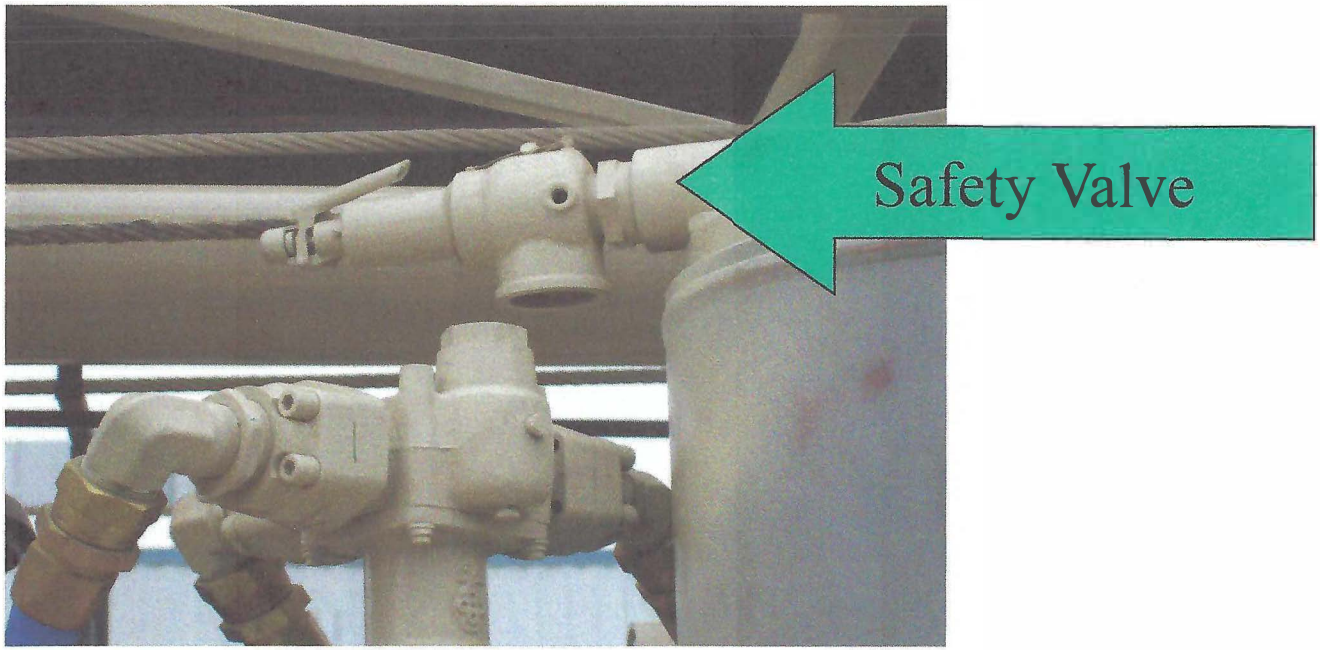
If the receiver tank pressure stays constant when the service line is opened or compressor modulates but discharge air is low cfm check the discharge check valve. Remove the plug on the check valve body and visually inspect the flapper to make sure it is still attached to the swing arm.


1: Check Valve 2: Remove plug and inspect flapper
2
1

Compressor Blows Safety Valve

Is the pressure in the receiver above 350 psi?

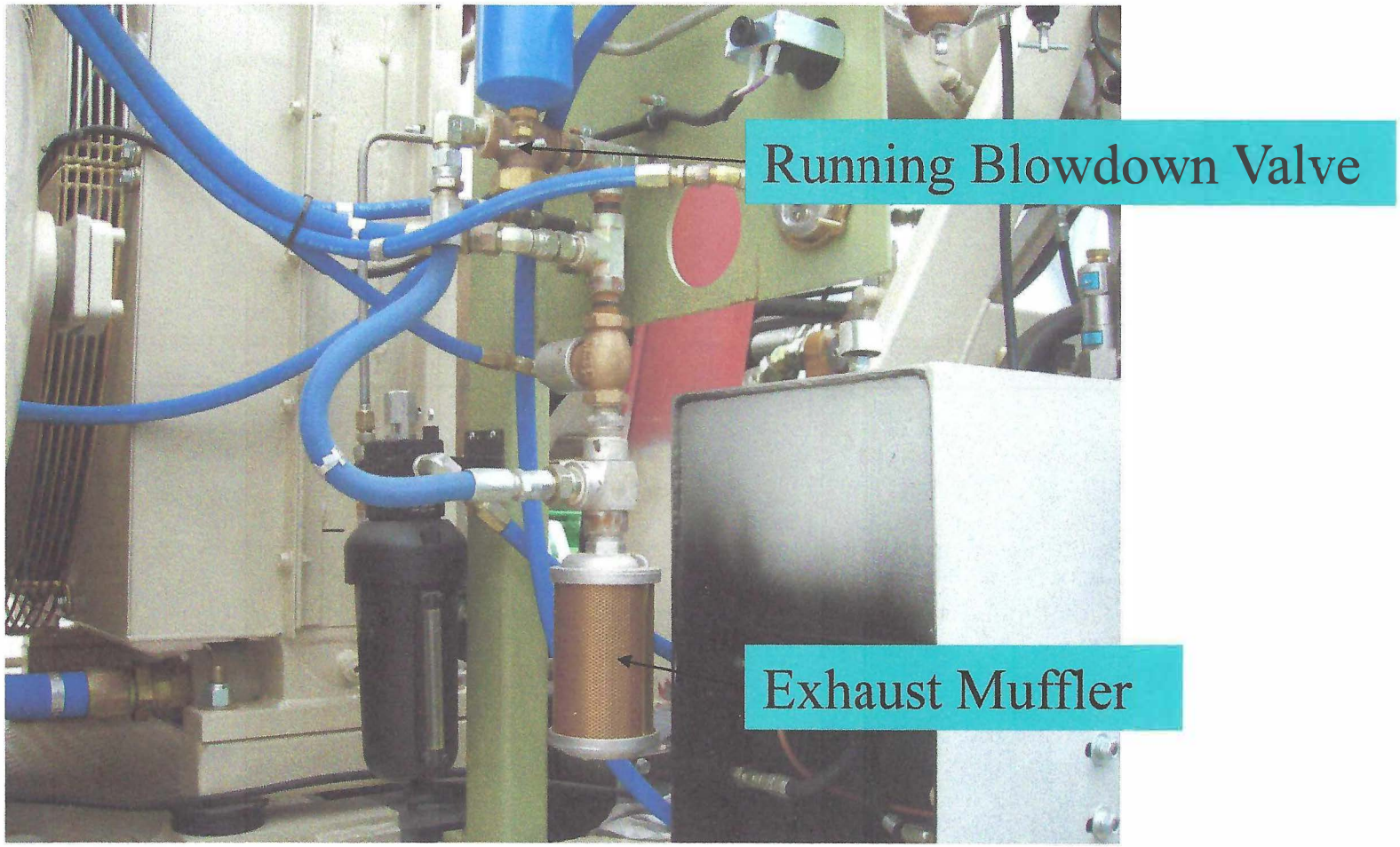
If the answer is no, the pressure is below 350 psi, change the safety valve. Once the safety valve opens, for what ever reason, the spring starts to get weak and the safety valve opens at a lower pressure each time.



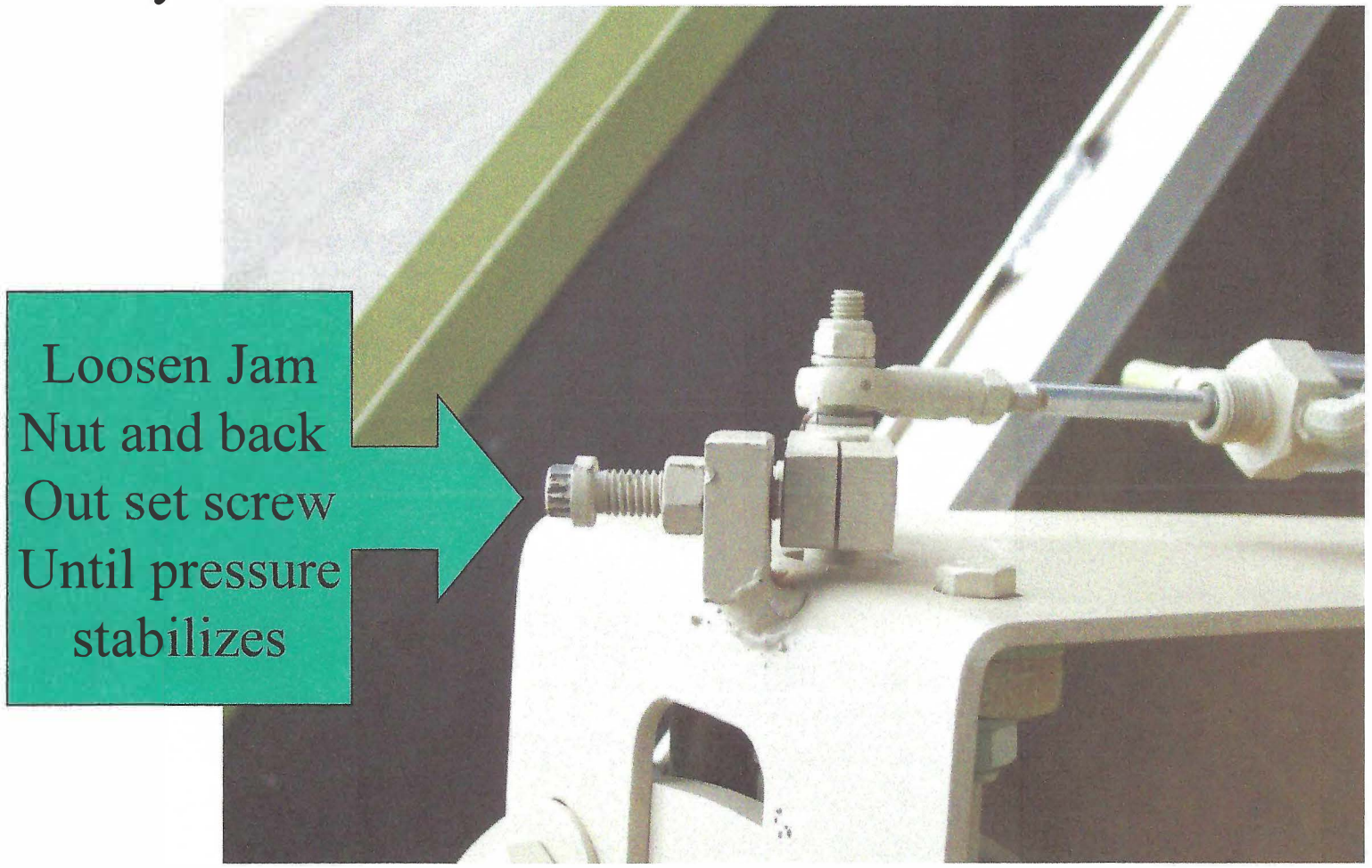
If the safety valve is opening above 350 psi it is a control problem.

Check the High regulator to see at what pressure it is opening and sending a signal to stroke the inlet cylinder closed. Start compressor and open the service line. Close the service line valve just enough so that the compressor maintains 350 psi. Crack open the fitting between the high/low regulators that goes to the inlet cylinder. Adjust the high regulator till it sends an air signal to the inlet cylinder at 350 psi. If the regulator will not adjust, replace the regulator with a new one and then set the pressure.

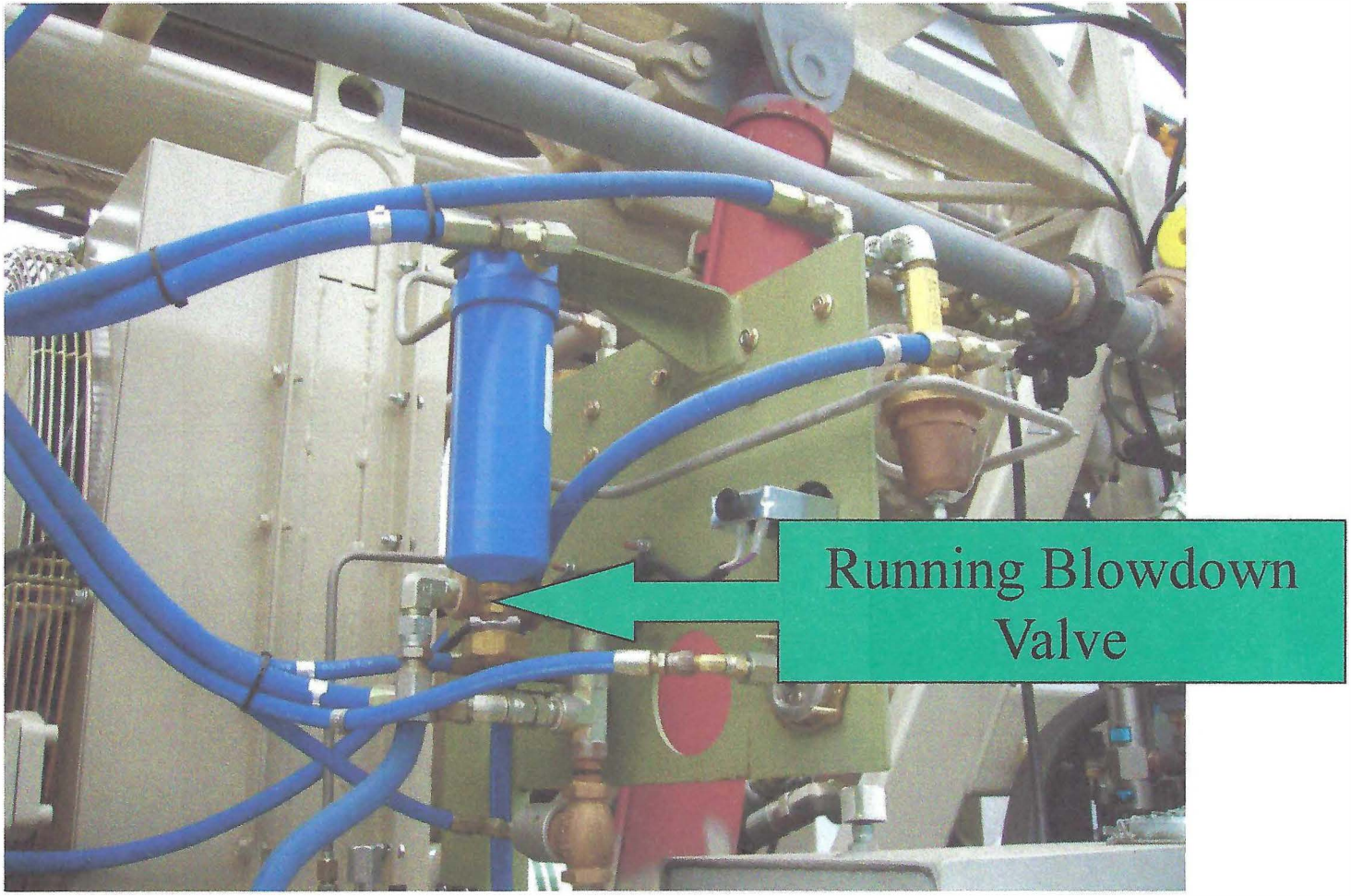
If the high regulator is opening at 350 psi and the small rod on the inlet cylinder is stroking shut, check the running blowdown to make sure it is opening and exhausting air through the muffler.



If the inlet cylinder is stroked shut and the blowdown valve is open and pressure continues to increase it may be necessary to adjust the butterfly inlet valve.



If no air is exhausting from the muffler, shut down compressor and clean or rebuild the running blowdown valve.



On older compressors there is a possibility of wear in the linkage that will cause this problem also. If this is occurring linkage will need to be repaired or replaced.

If the inlet cylinder is exhausting air around the seals it may need to be rebuilt or replaced.

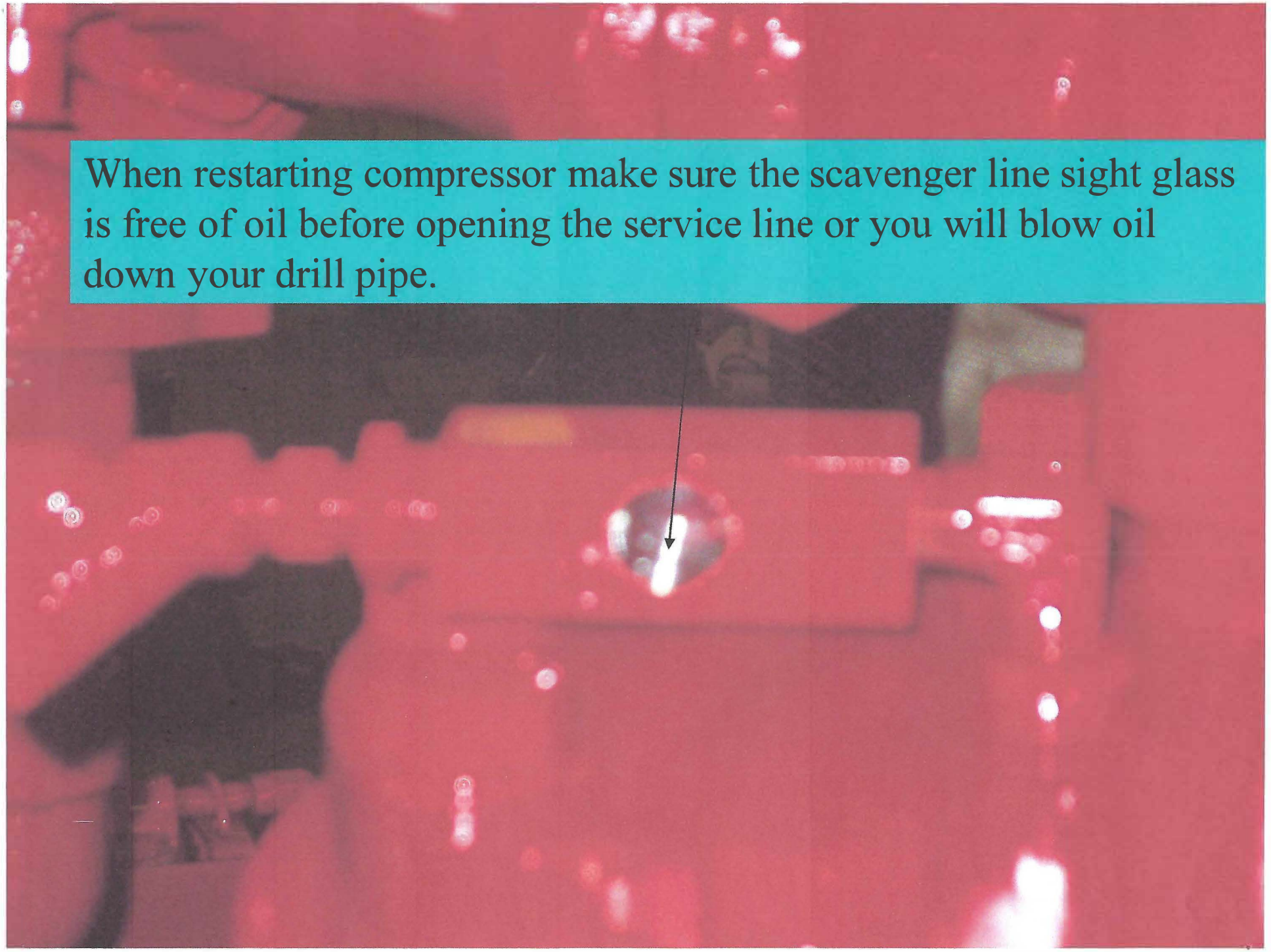
Compressor Oil Blow By Problems

There are only two places compressor oil can go, on the ground or down the drill pipe. The first situation we will address is oil on the ground.

Emergency shut down: Shutdown from full speed does not allow the oil stop valve to close fast enough. This causes foaming oil to flood the compressor and separator, allowing oil to enter the air filter and controls, resulting in blowing oil out the inlet filter and the blowdown valve.

Quick Shutdown: This is similar to an emergency shutdown. Always reduce the engine speed. Then unload the compressor by closing the service line and putting the selector valve in the low position. Let the compressor run for a few minutes to cool down, then slow engine speed to @ 1200 rpm. Disengage the compressor clutch while at the same time slowing engine speed to an idle.

Remember, do not restart the compressor until the receiver tank has finished blowing down.


When restarting compressor make sure the scavenger line sight glass is free of oil before opening the service line or you will blow oil down your drill pipe.

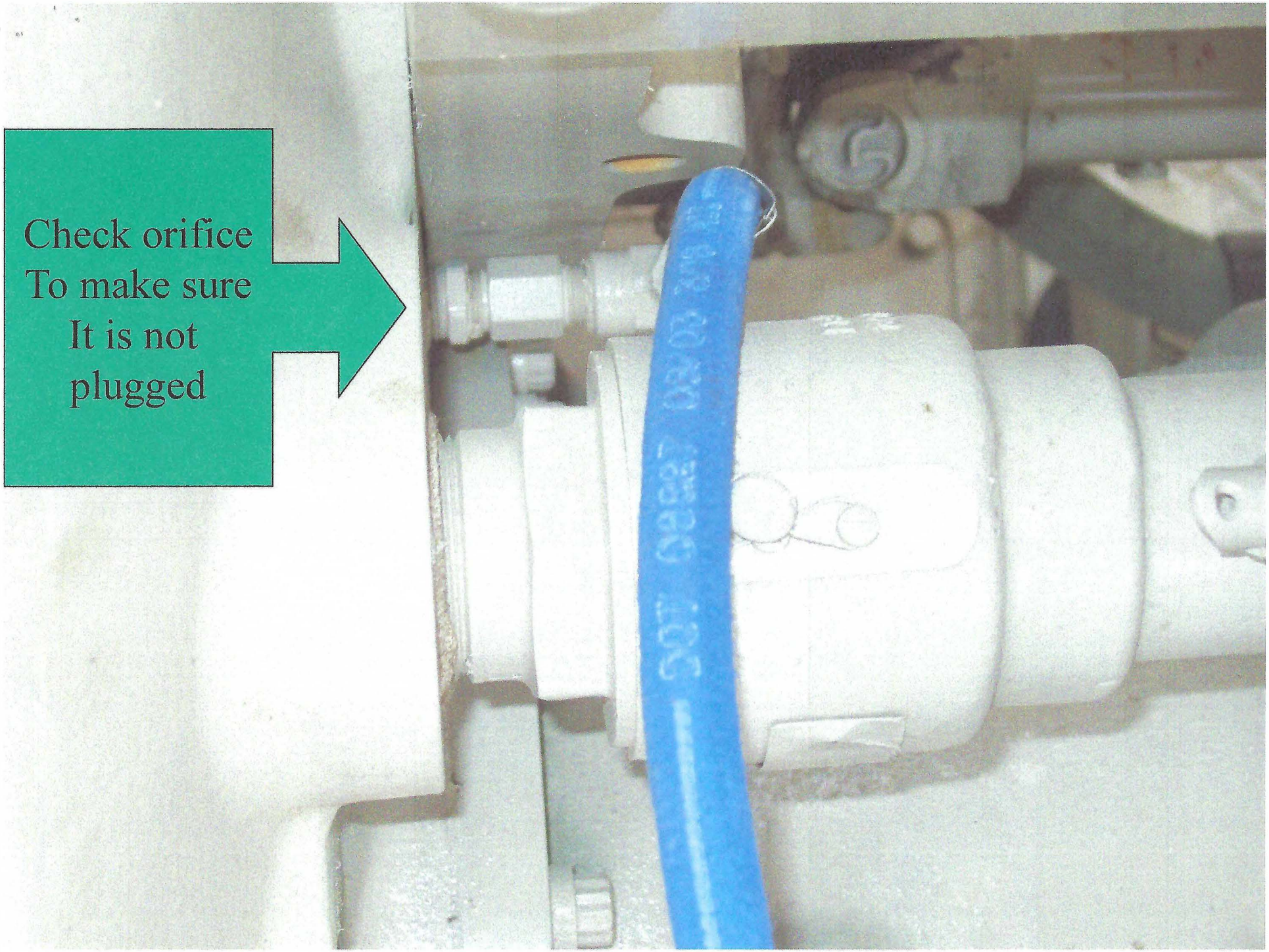
Compressor oil blow by down the drill pipe can be caused by the following scenarios.

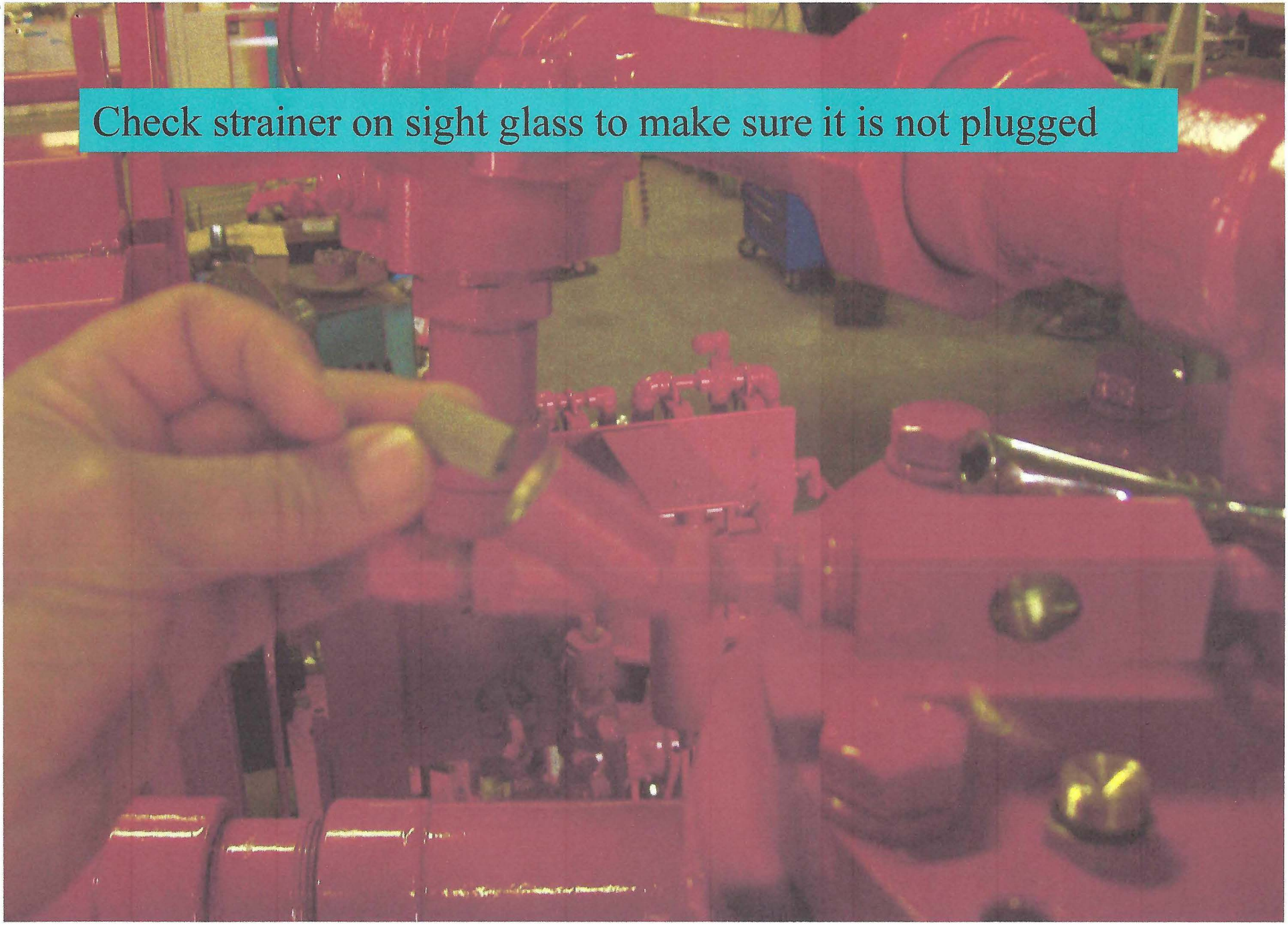
Engine speed: Running the compressor to slow may result in oil carry over into the air line.

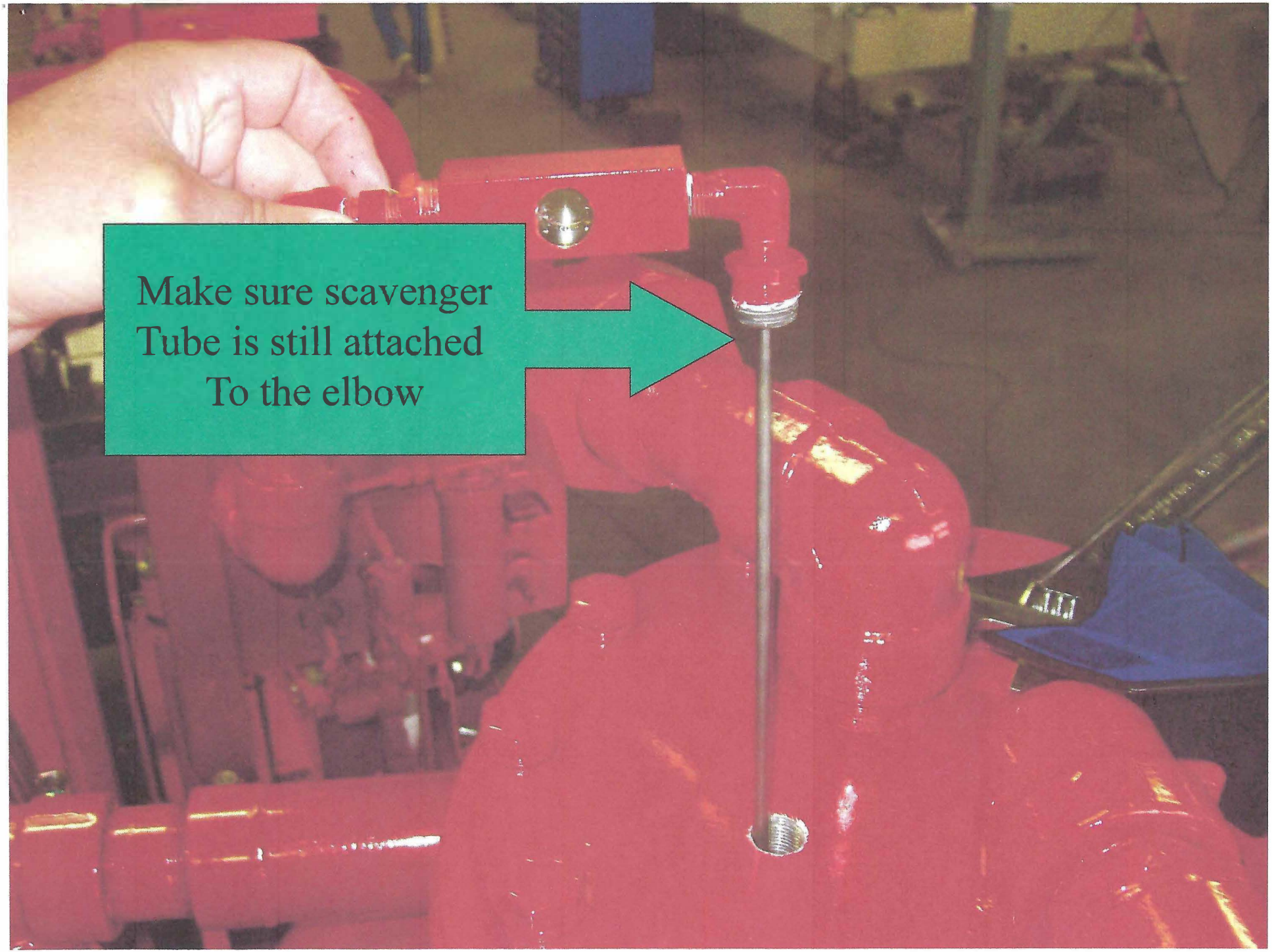
Low minimum pressure: The minimum pressure valve should maintain approximately 100 to 140 psi on the receiver tank at all times. If pressures fall below this compressor oil can be blown down the drill pipe.

Faulty oil stop valve or Discharge check valve. These will cause to compressor to spin backwards and puke oil out of the inlet filter.

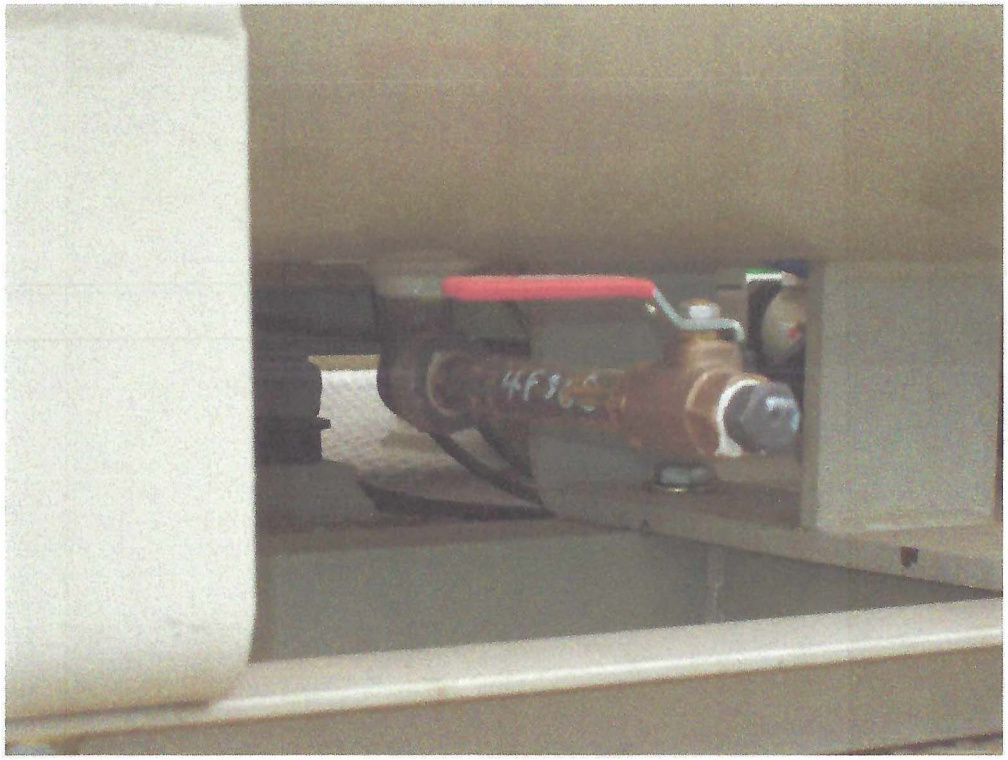
Scavenger line blocked or plugged. Or the scavenger tube broken. The following pictures show the different areas to check the scavenger line.


Check orifice
To make sure
It is not
plugged


Check strainer on sight glass to make sure it is not plugged


Make sure scavenger
Tube is still attached
To the elbow

In times of high humidity and temperature it is possible for the receiver tank to displace the oil with water. With the compressor disengaged and receiver tank at 0 psi, drain water from receiver tank and recheck the oil level.



If an excessive amount of water is in the receiver tank is can get the air/oil separator filter wet and prevent it from filtering the oil from the air.

Over filling the receiver tank with oil can also cause oil blow by. Check gauge for accuracy.

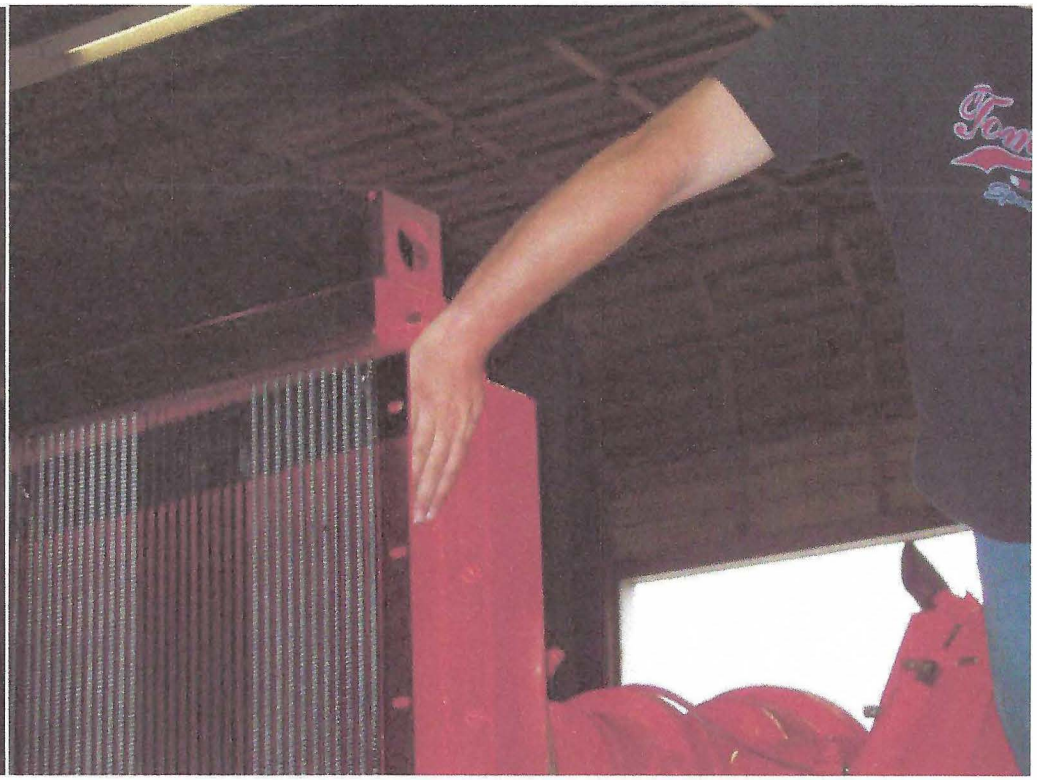
If none of the previous conditions exist the final recourse is to remove and inspect the air/oil separator filter and see if it has collapsed.

Compressor Overheating

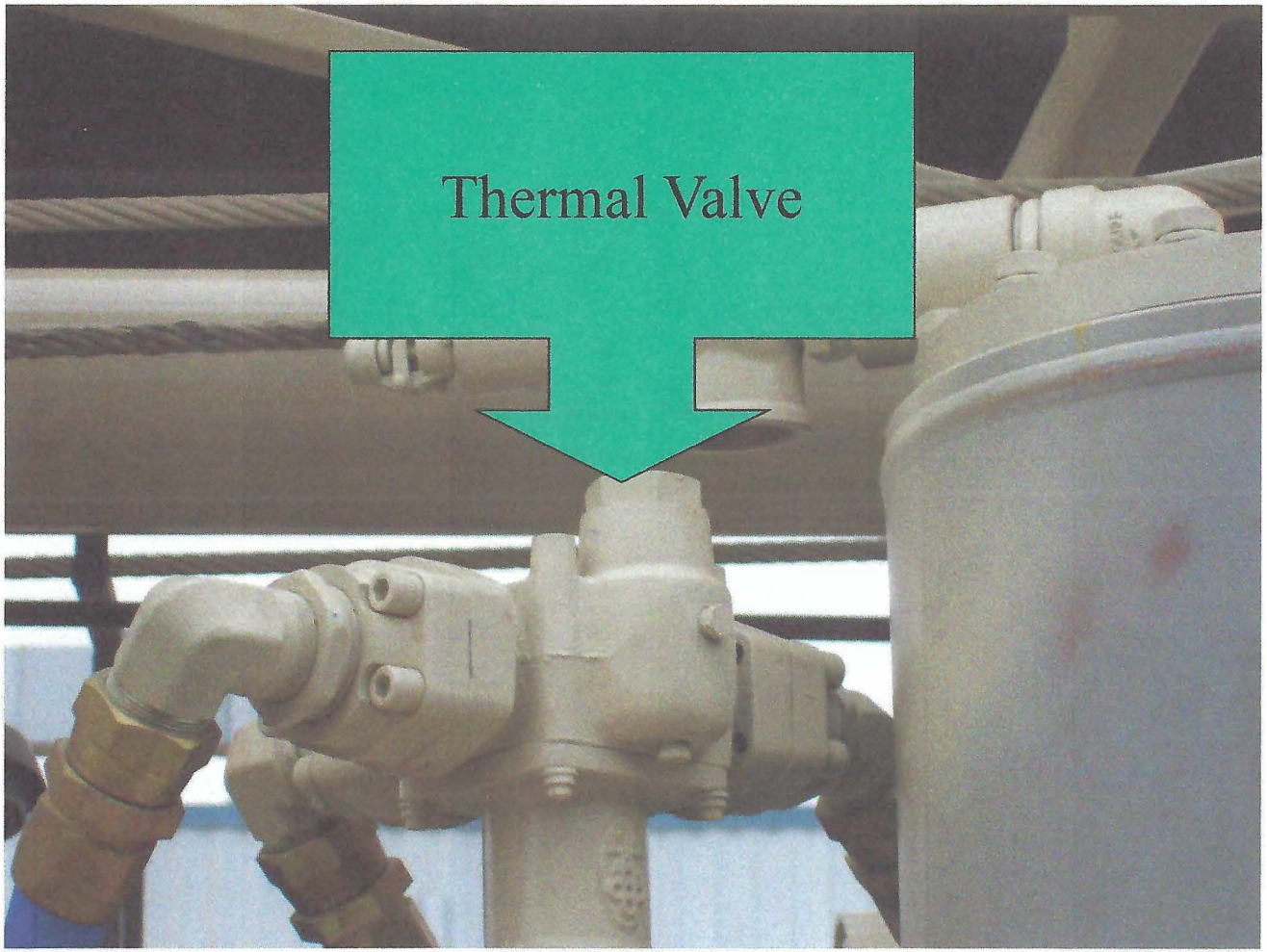
The most common reason for overheating is a dirty or restricted cooler. Check to insure that the cooler is clean and air flow is good through the cooler. The cooler should be pressure washed on a regular basis when operating in extreme conditions.

Check the oil level. Low oil levels will cause the compressor to overheat.

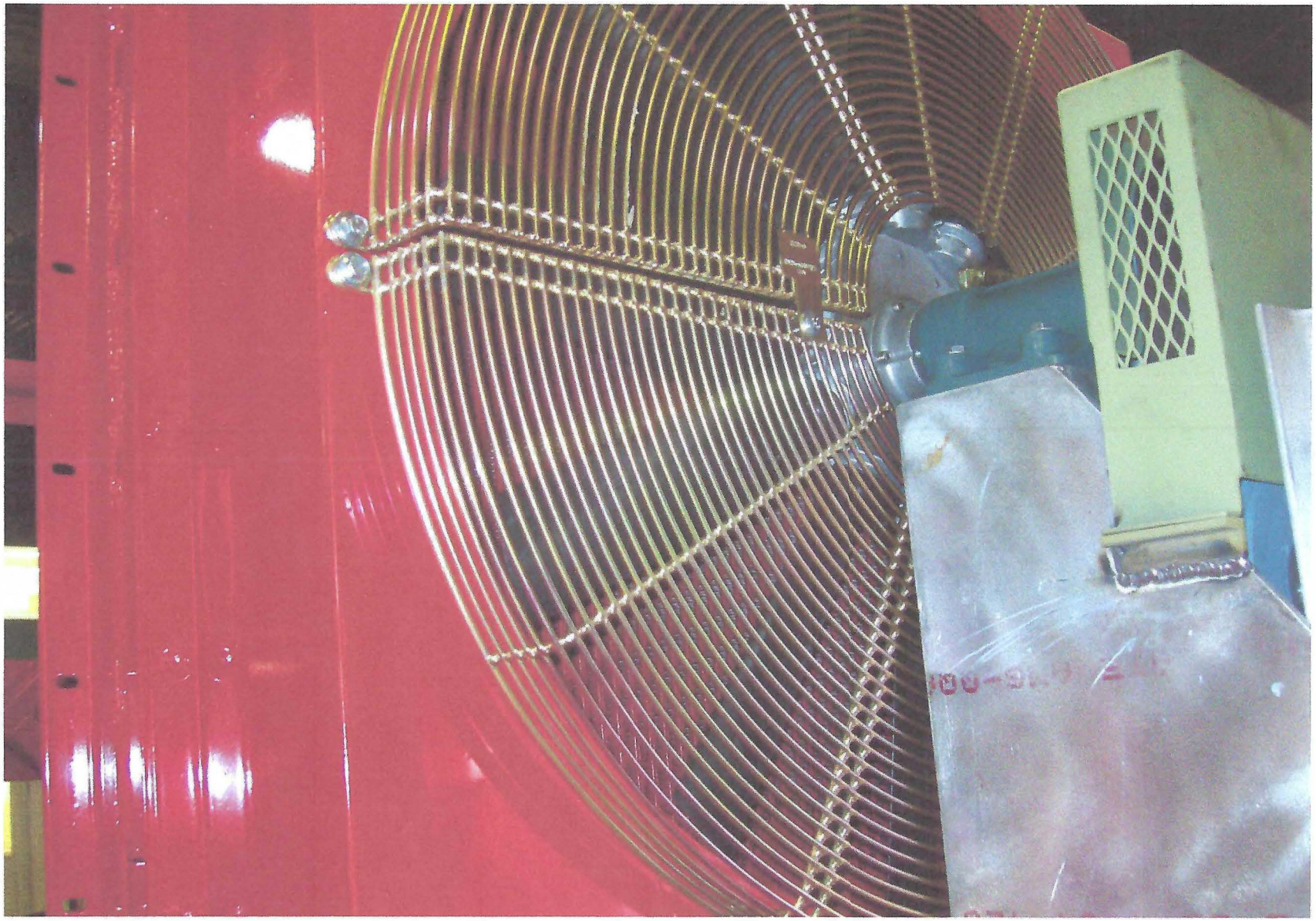
A stuck thermostat will cause the compressor to over heat. Check the oil cooler. Usually one side will be cold and one side will be hot.



If this is the case replace the thermostat located in the thermal valve.



Low cooling fan speed. Check belts and sheaves on the fan drive for slippage.

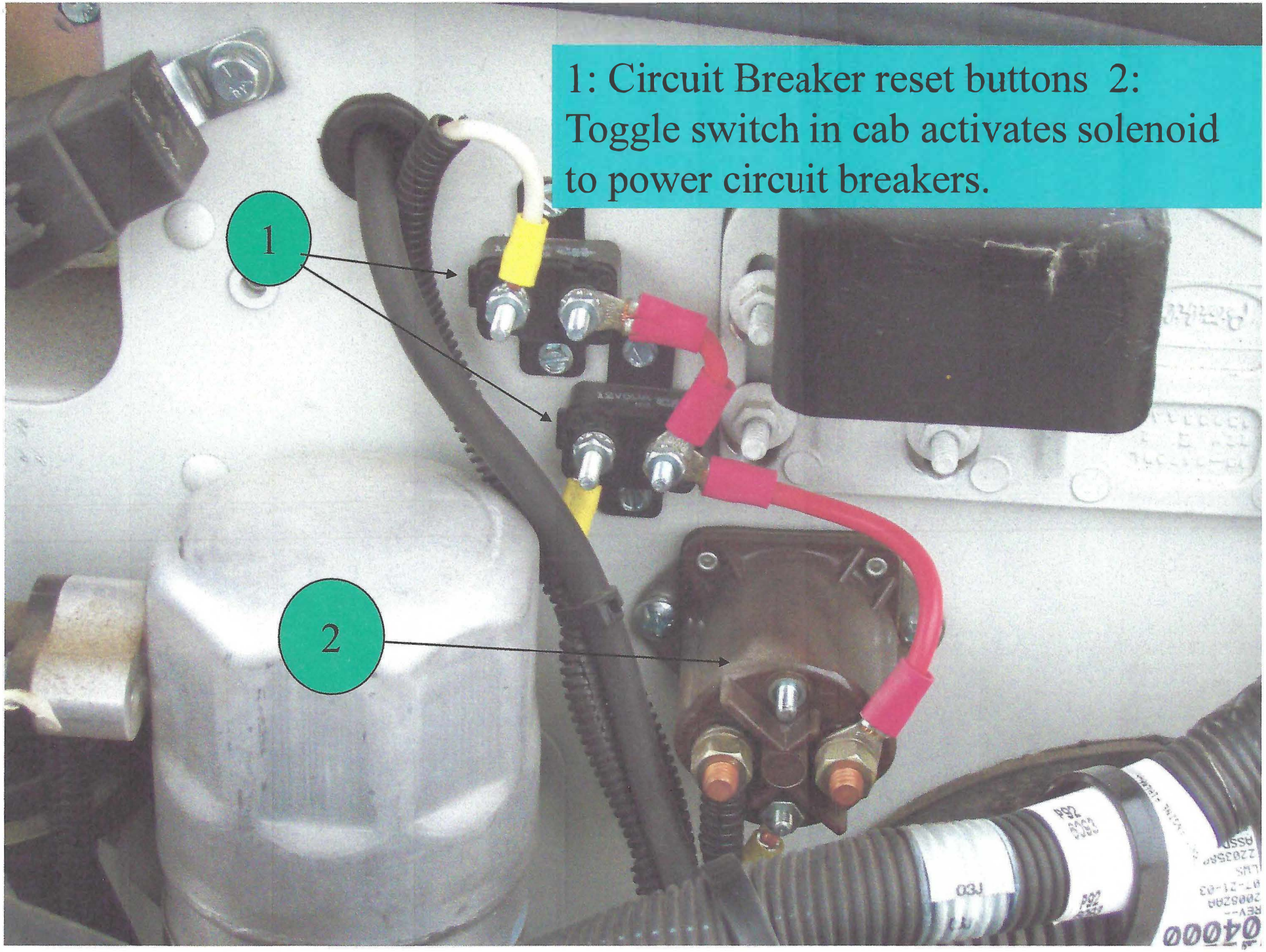


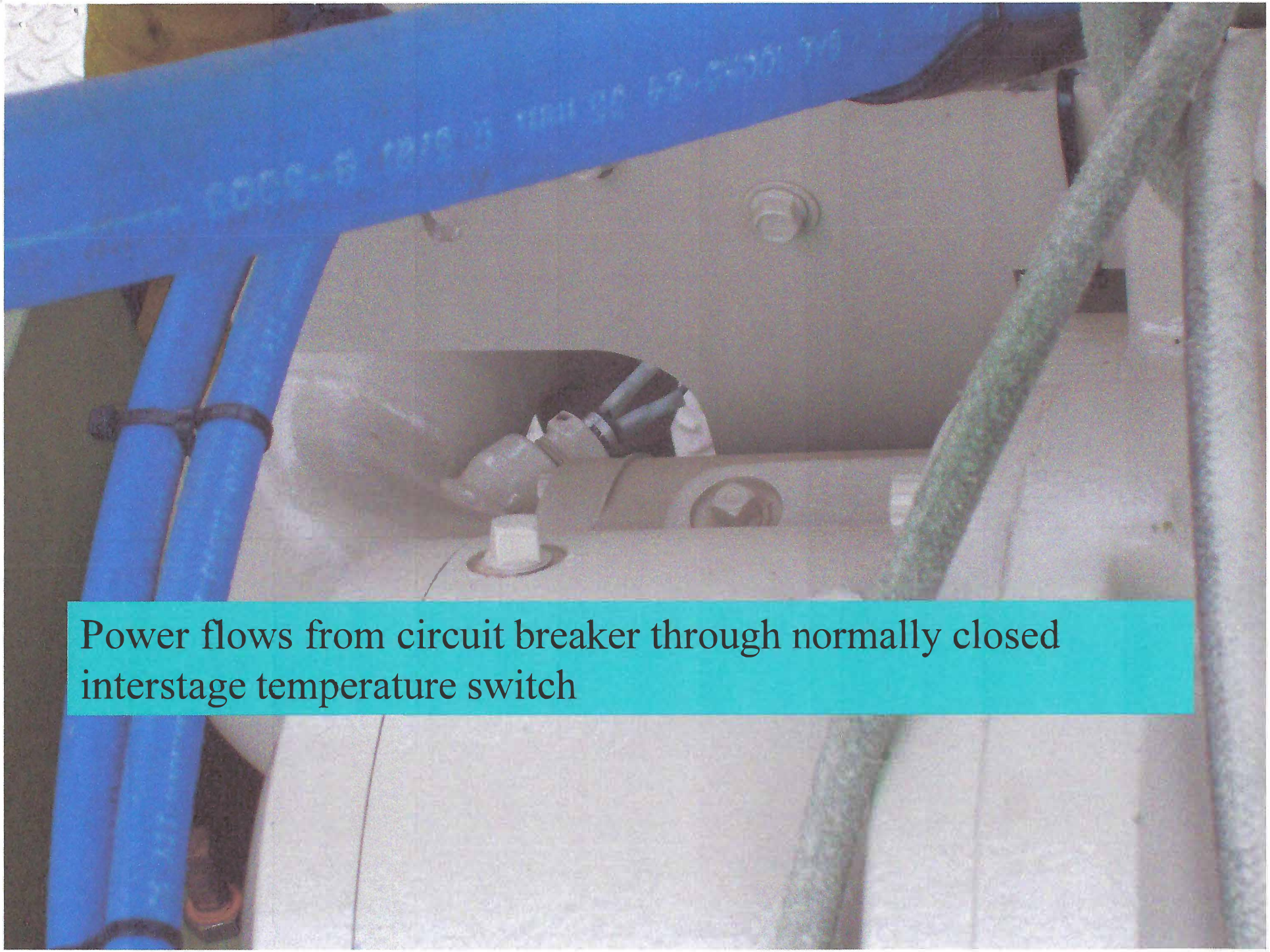
Compressor Clutch

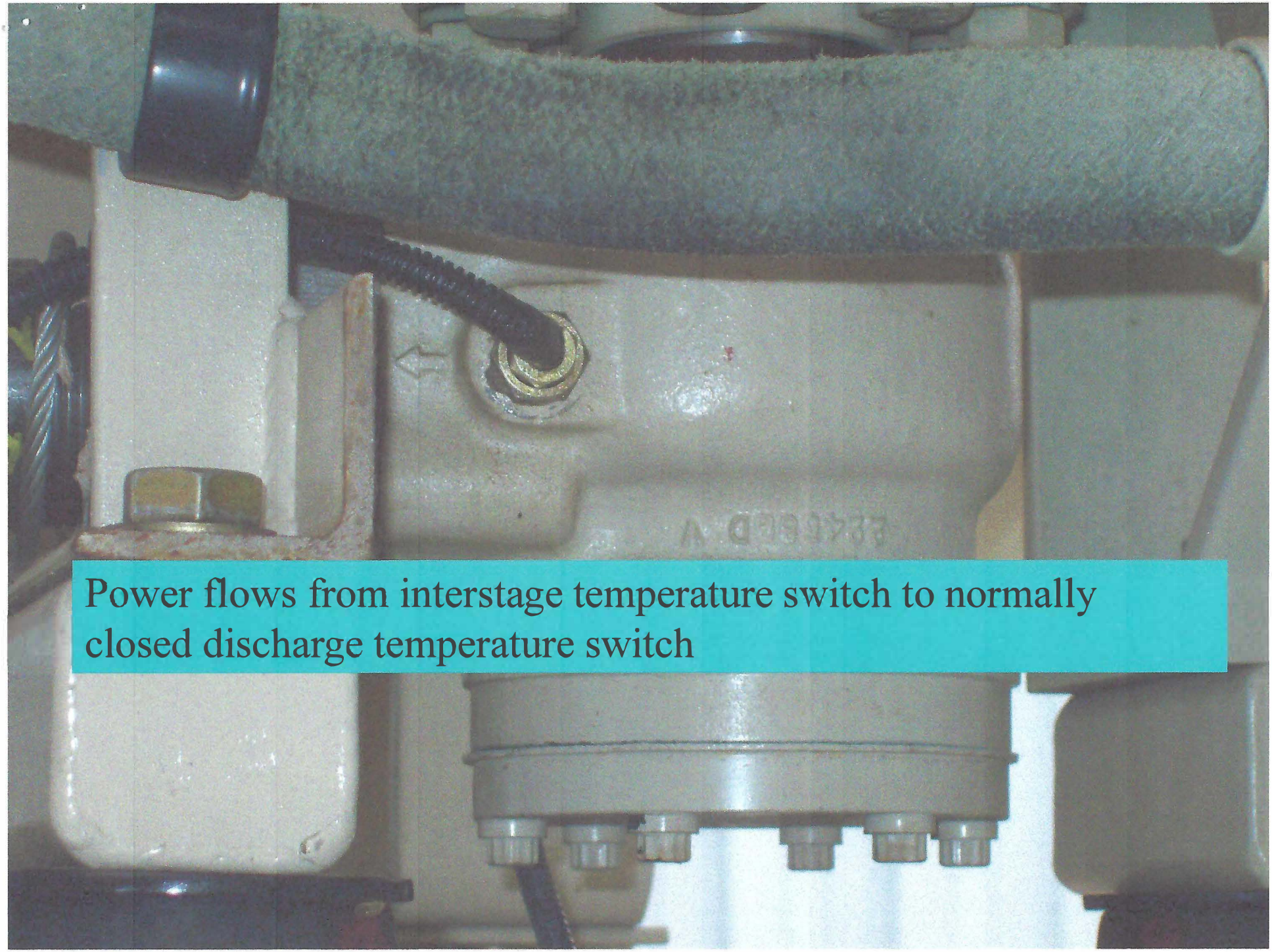
My compressor clutch kicked out by it's self.

The compressor has safety switches to kick out the compressor if it overheats. Interstage temperature temperature should not exceed 235 degrees F. Discharge temperature should not exceed 245 degrees F. If the compressor itself is not overheating the problem will lie somewhere in electrical circuit of the safety shut down.

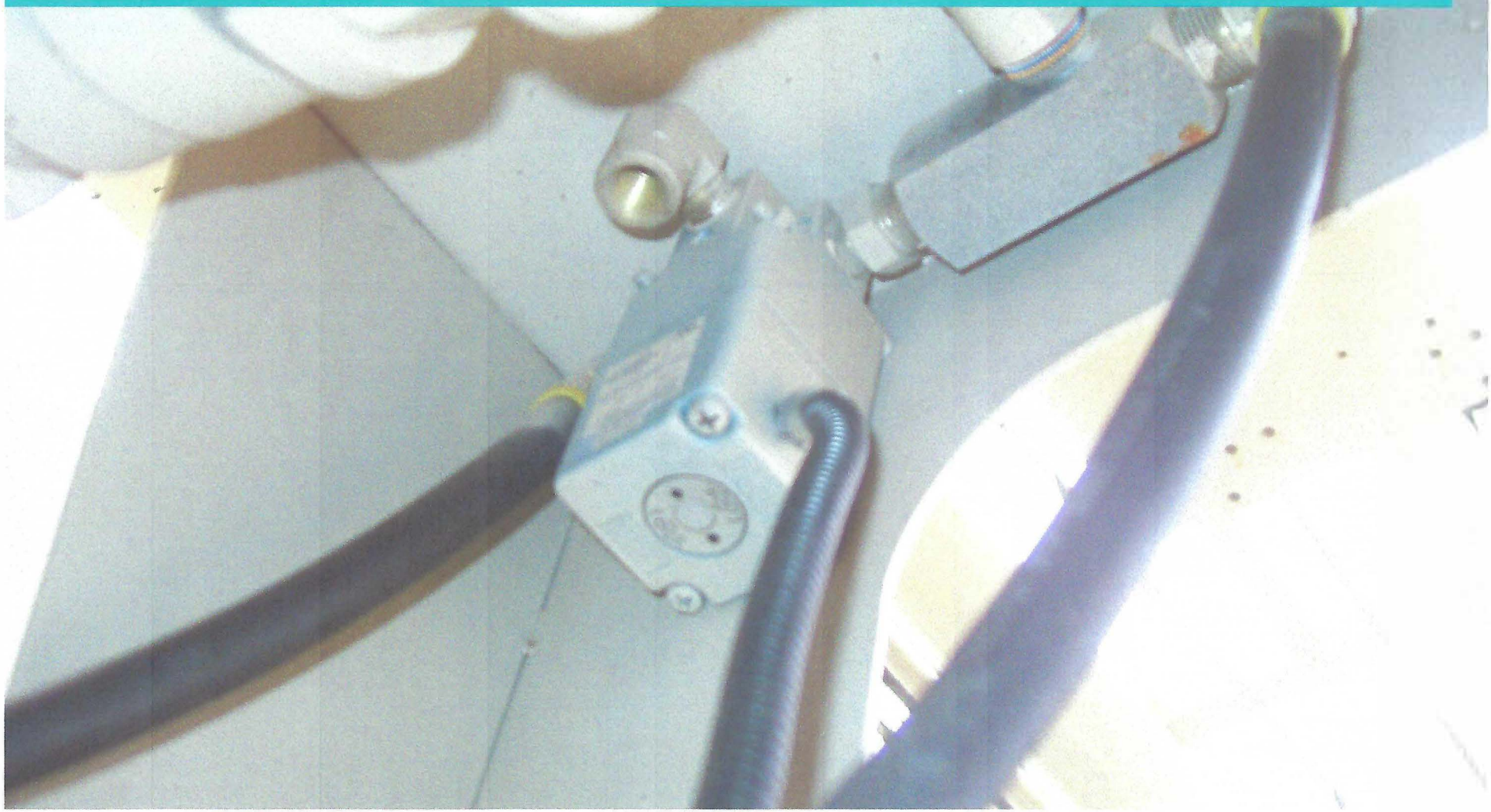
Electrical power to the compressor circuit is supplied at a circuit breaker located on the firewall of the truck on the drivers side. This circuit breaker has a reset button on the side. This circuit breaker can be bypassed in emergency situations until it is determined if it is the circuit breaker at fault or another component in the system.

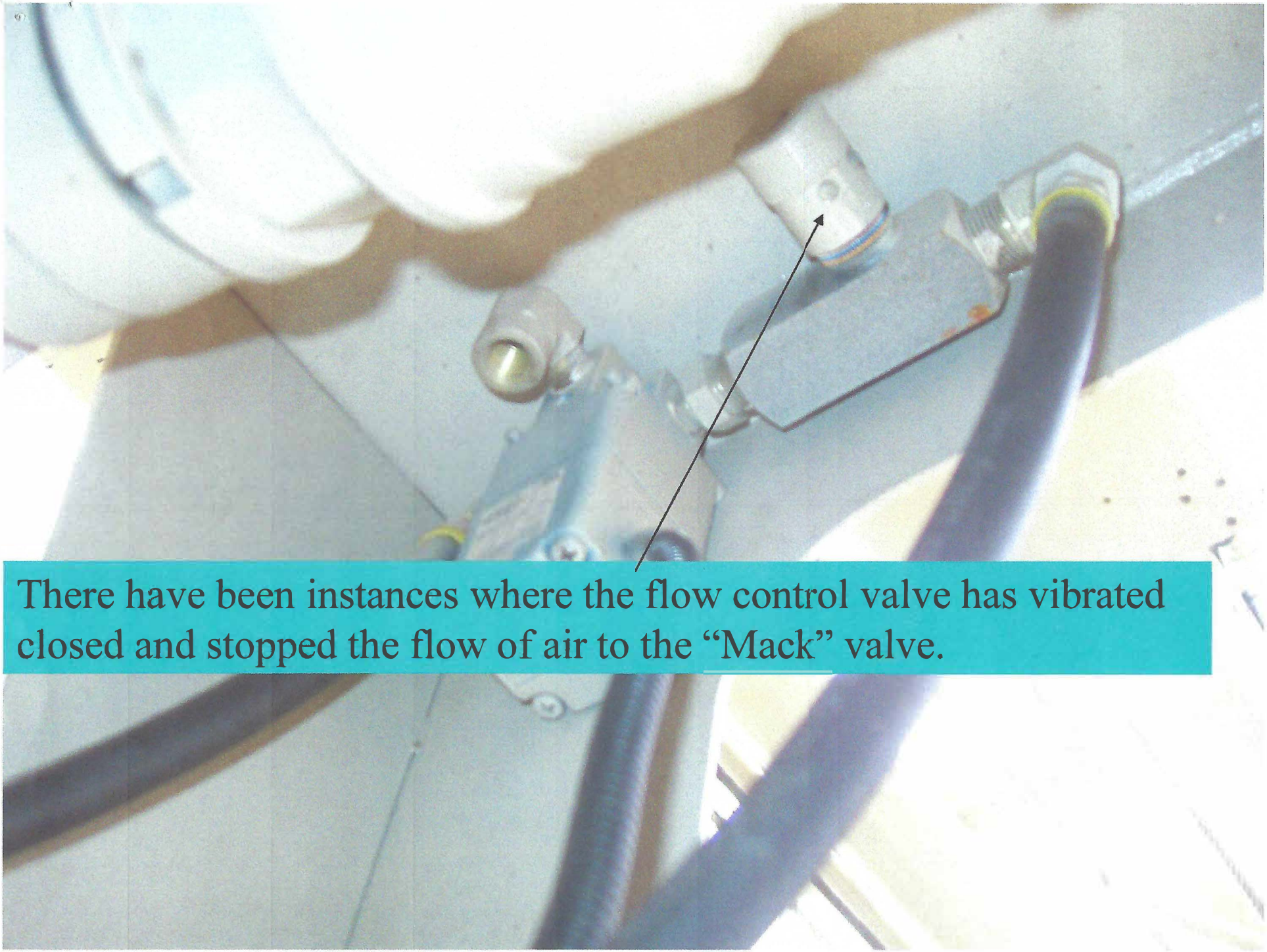

1: Circuit Breaker reset buttons 2: Toggle switch in cab activates solenoid to power circuit breakers.
1
2


Power flows from circuit breaker through normally closed interstage temperature switch


Power flows from interstage temperature switch to normally closed discharge temperature switch

Power flows from discharge temperature switch to the “Mack” valve. If electrical circuit is interrupted for any reason, (compressor overheats, circuit breaker trips, wire comes unplugged from temperature switch) the “Mack” valve stops the flow of air to the clutch and diverts it to atmosphere.




There have been instances where the flow control valve has vibrated closed and stopped the flow of air to the "Mack" valve.