IDENTIFYING COMPRESSOR FAILURES

Most compressors fail due to system malfunctions which must be corrected to prevent repeat failures. After a compressor fails, field examination of the failed compressor often will reveal symptoms of system problems. Proper corrections will help eliminate future failures.

REFRIGERANT FLOODBACK

This is a result of liquid refrigerant returning to the compressor during the running cycle. The oil is diluted with refrigerant to the point it cannot properly lubricate the load bearing surfaces.

- Air Cooled Compressors
  Worn pistons and cylinders
  No evidence of overheating

  The liquid washes the oil off the pistons and cylinders during the suction stroke causing them to wear during the compression stroke.

- Refrigerant Cooled Compressors
  Center and rear bearings worn or seized
  Dragging rotor, shorted stator
  Progressively scored crankshaft
  Worn or broken rods

  The liquid dilutes the oil in the crankcase and the refrigerant rich oil will be pumped to the rods and the bearings through the crankshaft. As the refrigerant boils off, there will not be enough oil for sufficient lubrication at the bearings furthest from the oil pump. The center and rear bearings may seize or may wear enough to allow the rotor to drop and drag on the stator causing it to short.

Correction:
(1) Maintain proper evaporator and compressor superheat.
(2) Correct abnormally low load conditions.
(3) Install accumulators to stop uncontrolled liquid return.

FLOODED STARTS

Worn or scored rods or bearings
Rods broken from seizure
Erratic wear pattern of crankshaft

This is the result of refrigerant vapor migrating to the crankcase oil during the off cycle. When the compressor starts, the diluted oil cannot properly lubricate the crankshaft load bearing surface causing an erratic wear or seizure pattern.

Correction:
(1) Locate compressor in warm ambient or install continuous pump down.
(2) Check crankcase heater operation.

SLUGGING

Broken reeds, rods, or crankshaft
Loose or broken backer bolts
Blown head gaskets

This is the result of trying to compress liquid refrigerant and/or oil, in the cylinders. Slugging is an extreme floodback in air cooled compressors and a severe flooded start on refrigerant cooled compressors.

Correction:
(1) Maintain proper evaporator and compressor superheat.
(2) Correct abnormally low load conditions.
(3) Install accumulators to stop uncontrolled liquid return.
(4) Locate compressor in warm ambient or install continuous pump down.

HIGH DISCHARGE TEMPERATURE

Discolored valve plate
Burned valve reeds
Worn pistons, rings and cylinders
Stator spot burn from metal debris

This is the result of temperatures in the compressor head and cylinders becoming so hot that the oil loses its ability to lubricate properly. This causes rings, pistons and cylinders to wear resulting in blow by, leaking valves, and metal debris in the oil.

Correction:
(1) Correct abnormally low load conditions.
(2) Correct high discharge pressure conditions.
(3) Insulate suction lines.
(4) Provide proper compressor cooling.

LOSS OF OIL

All rods and bearings worn or scored
Crankshaft uniformly scored
Rods broken from seizure
Little or no oil in crankcase

This is a result of insufficient oil in the crankcase to properly lubricate the load bearing surfaces. When there is not enough refrigerant mass flow in the system to return oil to the compressor as fast as it is pumped out, there will be a uniform wearing or scoring of all load bearing surfaces.

Correction:
(1) Check oil failure control operation if applicable.
(2) Check system refrigerant charge.
(3) Correct abnormally low load conditions or short cycling.
(4) Check for incorrect pipe sizes and/or oil traps.
(5) Check for inadequate defrosts.

ELECTRICAL

While many motors fail as a result of mechanical failures, others are true electrical failures.

GENERAL OR UNIFORM BURN

All windings uniformly overheated or burned.

Correction:
(1) Check for proper voltage.
(2) Check for unbalanced voltage.
(3) Check for inadequate motor coding.

SINGLE PHASE BURN

Two phases of a three phase motor overheated or burned as a result of the contactor opening only one of its contacts.

Correction:
(1) Replace contactors.
(2) Check for proper motor protection.

HALF WINDING SINGLE PHASE BURN

Half of two phases of a three phase motor overheated or burned due to one contactor opening one of its contacts on a two contactor application.

Correction: **(1) Replace contactors.**

HALF WINDING BURN

Half of all phases on a two contactor three phase motor are overheated or burned.

Correction:
(1) Replace contactors.
(2) Check for feed back circuit holding one contactor closed.

PRIMARY SINGLE PHASE BURN

Only one phase of a three phase motor is overheated or burned as the result of opening one phase on the primary side of a delta to wye transformer.

Correction: **(1) Check primary side of a delta to wye mainpower transformer.**

START WINDING BURN

The start winding only of a single phase motor is uniformly overheated or burned.

Correction:
(1) Check for proper wiring of compressor.
(2) Check starting capacitor and/or starting relay.
(3) Correct compressor overloading.

SPOT BURN

A localized burn within a winding, between windings, or from windings to ground. If not the result of mechanical problems, check for spikes or surges of high current flow.

SHORTED TERMINALS

A break down of the insulation between terminals and compressor body generally the result of over torquing terminals.