

TROUBLE LOCATING OF RECIPROCATING PUMPS

Trouble	Possible Causes
Low Volumetric Efficiency <i>(Failure To Deliver Rated Capacity And Pressure)</i>	<ol style="list-style-type: none"> 1) Air or vapor pocket in inlet line 2) Capacity of charge pump less than capacity of power pump 3) Air or vapor trapped in or above inlet manifold 4) Air leak in liquid supply piping system 5) Loose bolts in pump inlet manifold 6) Air or gases entrained in liquid 7) Foreign object holding pump inlet or discharge valve(s) open 8) Incorrect drive ratio 9) Loose belts 10) Incorrect motor or engine speed 11) Loose valve covers or cylinder head 12) Worn valves and seats 13) Safety relief valve partially open, or not holding pressure 14) Worn liners, piston rings or plungers 15) Bypass valve open, or not holding pressure 16) Blown liner gasket 17) NPSHA not sufficient 18) Liquid bypassing internally 19) Foreign object blocking liquid passage 20) Vortex in supply tank 21) Insufficient power delivered by motor
NPSHA Too Low	<ol style="list-style-type: none"> 1) Inlet line partially clogged 2) Liquid vapor pressure too high 3) Liquid pumping temperature too high 4) Restricted inlet pipe fittings 5) Inlet line too long 6) Too many pipe fittings 7) Too small inlet line 8) Too low static inlet head 9) Too low atmospheric pressure
Liquid Not Delivered	<ol style="list-style-type: none"> 1) Pump not primed 2) Air or vapor pocket in inlet line 3) Clogged inlet line 4) All inlet valves propped open 5) All discharge valves propped open 6) Loose bolts in pump inlet manifold 7) Too high valve velocities

Cavitation	<ol style="list-style-type: none"> 1) NPSHA too low 2) Liquid NOT Delivered to Pump Inlet Connection 3) Excessive Stuffing Box Leakage 4) NPSHR too high
Leak at Cylinder Head or Valve Cover	<ol style="list-style-type: none"> 1) Over Recommended Pressure 2) Loose Cylinder Head/Valve Cover 3) Damaged Gasket/O-ring
Water in Crankcase/Oil	<ol style="list-style-type: none"> 1) Water Condensation 2) Worn seals 3) Clogged Air Breather(s) 4) Worn Crankcase Packing 5) Loose Covers
Oil Leakage from Crankcase	<ol style="list-style-type: none"> 1) Oil Level/Temperature Too High 2) Worn seals 3) Worn Crankcase Packing 4) Loose Crankcase Cover
Excessive Heat in Power End	<ol style="list-style-type: none"> 1) Pump Running Backward/RPM too low 2) Insufficient Oil in Power End 3) Excessive Oil in Power End 4) Incorrect Oil Viscosity 5) Operating Pump above Recommended Pressure 6) Main Bearings too Tight 7) Drive Misaligned 8) Belts too Tight 9) Discharge Valve, one or more, Stuck Open 10) Insufficient Cooling 11) Pump RPM too Low 12) Inadequate Ventilation 13) Liquid End Packing Adjusted too Tight (adjustable style packing only)
Pump Overloads Driver	<ol style="list-style-type: none"> 1) Pump RPM too High 2) Low Voltage or other Electrical Trouble 3) Trouble with Engine, Turbine, Gear Reducer or other Related Equipment 4) Excessive Discharge Line Pressure 5) Clogged Discharge Line 6) Closed/Throttled Valve in Discharge Line 7) Incorrect Plunger/Piston Size for Application 8) Improper Bypass Conditions 9) Over-tightened Stuffing Box Glands on Adjustable Packing

Stuffing Box Leakage	<ol style="list-style-type: none"> 1) Worn Packing 2) Worn rods or plunger 3) Worn stuffing boxes 4) Wrong size packing 5) Worn O-ring seal (replaceable boxes)
Stud Failure	<ol style="list-style-type: none"> 1) Excessive discharge pressure 2) Improper torquing of nuts 3) Shock overload caused by pump cavitation
Excessive Valve Noise	<ol style="list-style-type: none"> 1) Broken or weak valve spring 2) Pump cavitation 3) Air leak in inlet piping or loose bolts in pump inlet manifold 4) Air trapped above inlet valve
Inlet or Discharge Line Vibration	<ol style="list-style-type: none"> 1) Piping inadequately supported 2) Inlet line too long or too small in diameter 3) Too many bends in inlet line 4) Multiple pump installations operating in phase 5) Obstruction Under Valve(s) 6) Packing Worn 7) Operating Above Recommended Pressure or RPM 8) Low NPSHA
Noisy Operation <i>(Be sure to differentiate between liquid knock and mechanical knock - very few knocks are mechanical on new installations.)</i>	<ol style="list-style-type: none"> 1) Piston or plunger loose 2) Valve noise amplified through power end 3) Pump cavitation 4) Liquid knock 5) Air leak in inlet piping 6) Loose bolts in pump inlet manifold 7) Hydraulic noise in liquid end 8) Loose or worn crosshead pins and bushings 9) Loose connecting rod cap bolt 10) Worn connecting rod bearings 11) Worn crosshead 12) Main bearing end play excessive 13) Worn gears or chains 14) Gears or chains out of line 15) Pump running backward 16) Partial loss of prime 17) Shocks in piping system 18) Water in power end crankcase 19) Poorly supported piping, abrupt turns in piping, piping misaligned, pipe size too small