Reciprocating Compressor - Valve & Health Reference

Symptom	Likely Cause	Confirm By
High valve temp (one valve)	Leaking/failed valve - hot gas recirculation	IR gun scan across valve caps; compare siblings
Capacity loss	Valve leakage; unloader malfunction; ring wear	P-V card analysis; discharge temp; rod-drop trend
Knocking sound	Loose valve internals; excessive clearance; liquid carryover	Listen per-end; check suction scrubber level
High rod-drop reading	Rider band wear approaching limit	Trend vs alarm; plan ring/band replacement
Crosshead/frame knock	Bearing clearance; loose crosshead pin	Oil analysis for babbitt; clearance checks at overhaul
High discharge temp (stage)	Valve leakage; fouled cooler; ratio shift	Compare to design adiabatic temp; cooler approach

Key Relationships

Discharge temp	$Td = Ts \times (Pd/Ps)^{((k-1)/k)}$ (absolute units) - rising trend at constant ratio = valve trouble
Volumetric eff.	$VE = 1 + c - c(Pd/Ps)^{1/k}$ - clearance c added by unloaders/pockets reduces capacity
Rod load	Verify gas + inertia rod load reversal every stroke - needed for crosshead pin lubrication (API 618)

Pulsation & Piping

Pulsation bottles sized per API 618 Design Approach; watch for piping vibration at small-bore connections; supports and clamps tight; orifice plates in place after maintenance. Acoustic resonance shifts with gas composition changes.