Pump Performance

Volumetric efficiency

$$\eta_v = \frac{\text{actual flow rate produced by pump}}{\text{theoretical flow rate pump should produce}} \times 100 = \frac{Q_A}{Q_T} \times 100$$

Mechanical efficiency

$$\eta_m = \frac{\text{theoretical power required to operate pump}}{\text{actual power delivered to pump}} \times 100$$

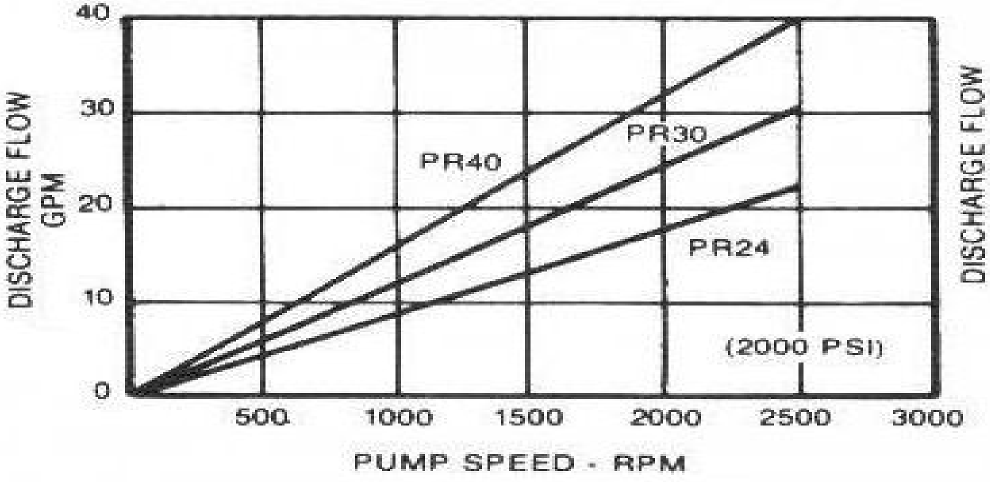
or

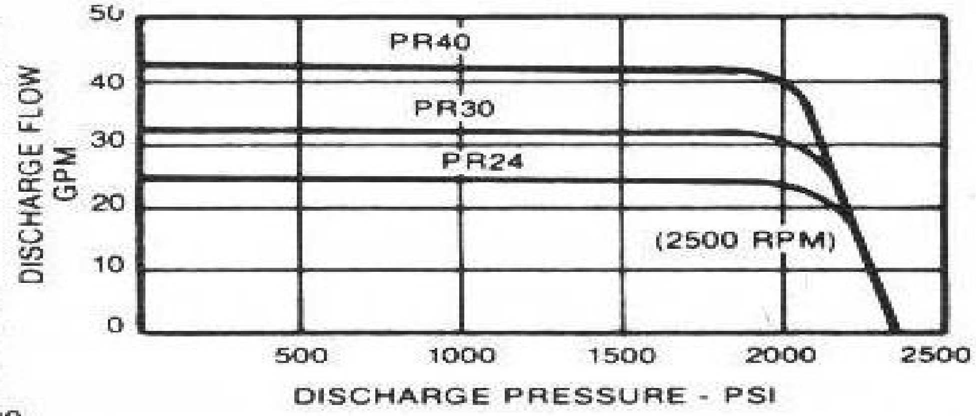
$$\eta_m = \frac{\text{pump output power assuming no leakage}}{\text{input power delivered to pump}} \times 100$$

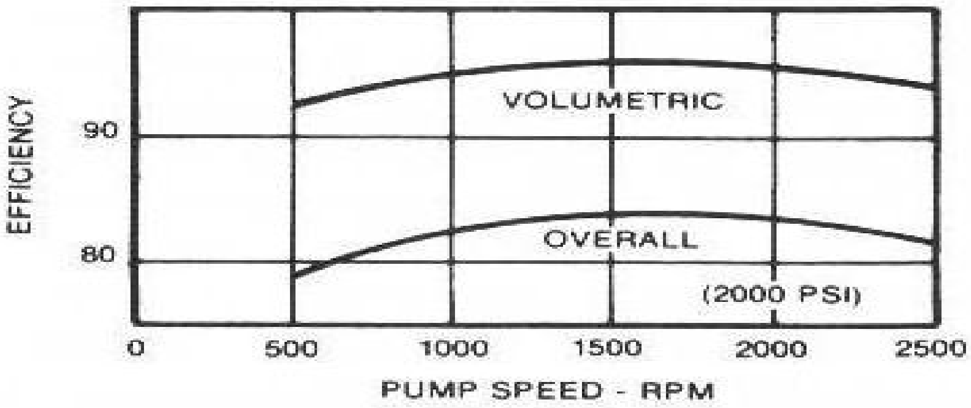
$$\eta_m = \frac{\text{theoretical torque required to operate pump}}{\text{actual torque supplied to pump}} \times 100 = \frac{T_T}{T_A} \times 100$$

$$\text{overall efficiency} = \frac{\text{volumetric efficiency} \times \text{mechanical efficiency}}{100}$$

Performance curve for radial piston pumps







Adjacent Curves:
Average performance at 190° F (87.8° C) inlet temperature, 25 psi [1.76 Kg/cm²] charge pressure, using SAE 10W20

PUMP PERFORMANCE COMPARISION FACTORS

PUMP TYPE	PRESSURE RATING (PSI)	SPEED RATING (RPM)	OVERALL EFFICIENCY (PER CENT)	HP PER LB RATIO	FLOW CAPACITY (GPM)	COST (DOLLARS PER HP)
EXTERNAL GEAR	2000–3000	1200–2500	80–90	2	1–150	4–8
INTERNAL GEAR	500–2000	1200–2500	70–85	2	1–200	4–8
VANE	1000–2000	1200–1800	80–95	2	1–80	6–30
AXIAL PISTON	2000–12,000	1200–3000	90–98	4	1–200	6–50
RADIAL PISTON	3000–12,000	1200–1800	85–95	3	1–200	5–35