



TRI-ROTOR PUMPER

**ISSUE
NO
4**

DETERMINATION OF PUMP HORSEPOWER

The data below is based on conservative figures. Nevertheless, these are compromises which have been proven safe over the years. For pumps equipped with solid heads [for simple transfer applications] or bypass heads [with integral relief valve], the only penalty incurred would be the possibility of computing the next larger horsepower motor than required.

1. Select **RPM** [pump shaft speed] from Pumper Issue No. 3 or from the back cover of **Condensed Catalog No. 2** or from the chart on back of pump Drawings **J6013, J6014, J6015, J6017, J5991, J6019, or J6104**. NOTE: Pump displacement factor given in "GALLONS/100 REVOLUTIONS", from which determine **GPM** [pump discharge rate].

FORMULA FOR HORSEPOWER

$$\frac{\text{GPM [DISCHARGE RATE]} \times \text{PSI [TOTAL* PRESSURE]} \times 0.00058}{\text{MECHANICAL EFFICIENCY [%]}} = \text{BHP}$$

2. In above formula use **M.E.'s** [Mechanical Efficiency] as follows:

VISCOSITY(SSU)	5,000	10,000	15,000	20,000	30,000	40,000	50,000	75,000	100,000
MECHANICAL EFFICIENCY %	50	42	38	35	31	29	27	25	20

3. Selection of above calculated horsepower should be made within limits below:

PUMP SERIES	20	40	80, 100, 120	200, 220
MINIMUM HORSEPOWER REQUIRED AT NO LOAD	1/3	3/4	2	5
MAXIMUM ALLOWABLE HORSEPOWER	3	5	10	25

EXAMPLE: Application parameters are for **50 GPM** of **30,000 SSU** viscosity motor oil at pumping temperature and **30 PSI** maximum pumping pressure. The four simple steps below will enable you to figure the motor size required to drive a **Tri-Rotor**® solid or bypass head pump. [Remember **V-Head** pumps do not require the additional 20 PSI for the relief valve]:

1. A **Series 100** Pump run at **340 RPM** [3.40×14.8] = **50 GPM**.
2. Maximum pumping pressure is given as **30 PSI**. To allow for an external or internal relief valve an additional 20 PSI must be added; hence for this example **50 PSI** will be used. Your calculation will then be as follows:

$$\frac{50 \text{ GPM} \times 50 \text{ PSI} \times 0.00058}{.31} = 4.67 \text{ BHP}$$

3. NOTE: In above calculation we used **31%** [Mechanical Efficiency] for 30,000 SSU pumpages.
4. The calculated 4.67 BHP absorption fills the 2 HP no load requirement. A 5 HP motor would normally be chosen for this application. If considerable friction loss in the system is anticipated, or if cold starting conditions will occur, a 7 1/2 HP motor should be used.

* **TOTAL PRESSURE** for the solid or bypass style pump is the maximum pumping pressure **PLUS 20 PSI** additional for external or internal relief valve setting. **Tri-Rotor**® pumps equipped with the exclusive "**V-HEAD**" [variable volume] use **ONLY** the maximum pumping pressure for the **TOTAL PRESSURE**.