1. What is the best utility voltage to operate this motor at?

$$V_{util} = 480V \tag{1}$$

2. What is the synchronous speed of this motor?

$$n_s = 120\frac{f}{p} = 120 * \frac{60Hz}{6\ poles} \tag{2}$$
$$\underline{\overline{|n_s = 1200rpm|}}$$

3. How many poles does this motor have?
   6 poles, 2 for each phase.

4. What is the slip of this motor?

$$s = \frac{n_s - n}{n_s} = \frac{1200rpm - 1080rpm}{1200rpm} \tag{3}$$
$$\underline{\overline{|s = 0.1|}}$$

5. What is the mechanical output in HP of this motor at full speed?

$$15hp(intowatts)timesefficiency \tag{4}$$
$$\underline{\overline{|HP = 12.75hp|}}$$

6. What is the X/R ratio of the motor?

$$12.75hp * 746w/hp = 9511.5W \tag{5}$$
$$S = \frac{P}{pf} = \frac{9511.5W}{0.85} = 11190VA$$
$$Q = \sqrt{S^2 - P^2} = \sqrt{11190^2 - 9511.5W^2} = 5894.7VAR$$
$$\frac{X}{R} = \frac{P}{Q} = \frac{9511.5W}{5894.7VAR} = 1.613$$

7. What is the total impedance of this motor at full load (magnitude and angle)?

$$|Z| = \sqrt{R^2 + X^2} = \sqrt{24.22\Omega^2 + 39.09\Omega^2} \tag{6}$$
$$< Z = tan^{-1}(\frac{X}{R}) = tan^{-1}(1.613)$$
$$Z = 45.968\Omega < 58.2^\circ$$

8. What is the resistive impedance of this motor at full load (ohms)?

$$R = \frac{V^2}{P} = \frac{480V^2}{9511.5W} \tag{7}$$
$$\underline{\overline{|R = 24.22\Omega|}}$$

9. What is the reactive impedance of this motor at full load (ohms)?

$$X = \frac{V^2}{Q} = \frac{480V^2}{5894.7VAR} \tag{8}$$

$$\underline{\overline{|X = 39.09\Omega|}}$$

10. What is the full load active power drawn by this motor (kW)?
    $9.5kW$
11. What is the full load reactive power drawn by this motor (kVAR)?
    $5.8kVAR$