1. *How do I determine the rated-horsepower (hp) of my generator engine if all I know is the rated kW value?*

There are two types of kW numbers. One is called the mechanical kW (kW<sub>m</sub>) and the other is the electrical kW (kW<sub>e</sub>). Engine manufacturers and generator suppliers do not always state which one they are using and this can lead to confusion in determining the rated horsepower (hp) of the IC engine. The kW<sub>m</sub> is the mechanical power driving the generator. It is determined by multiplying the rated horsepower of the engine by the conversion factor of 0.7457 (1 hp = 0.7457 kW<sub>m</sub>). The electrical kW<sub>e</sub> is the actual useful power available to the end user and takes into account power losses due to the efficiency of the generator as well as fan power needs. These losses are engine specific, and 15-20 percent efficiency loss is not uncommon. As a result of accounting for the efficiency loss, the kW<sub>e</sub> value is always less than that of the kW<sub>m</sub>. Common kW<sub>e</sub> values can range from 80-85 percent of the kW<sub>m</sub> value. Older generators are often less efficient than newer models and therefore would be closer to the 80 percent end of the range.

*Example:*

A *Generac SD030* standby generator is rated at 30 kW<sub>e</sub> by Generac. This generator is powered by a *Deere 4024T* diesel engine. The rated horsepower of the Deere engine in standby operations is 48 hp (with a 36 kW<sub>m</sub> rating). If the only generator information available was the 30 kW<sub>e</sub> rating, the engine’s hp could be estimated by:

\[
\text{Est. engine hp} = \frac{(\text{rated kW}_e) \times (1/\text{efficiency}) \times (\text{hp} / 0.7457 \text{ kW}_m)}{(30 \text{ kW}_e) \times (1/0.84) \times (\text{hp} / 0.7457 \text{ kW}_m)} = 48 \text{ hp}
\]

In this case, the engine is new; therefore a higher efficiency (i.e., lower power loss) is assumed. This estimation calculation is only required if the engine specific data is not available.