Consultant's Corner: Generator Set Ratings

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Understanding gen set ratings

Rating gen sets for standby, prime or continuous power uses is based on industry and engineering standards. Architectural engineers, contractors and even building owners and maintenance personnel have common questions about CAT gen set rating criteria. Following are answers to commonly asked questions:

Q. What is the meaning of standby and prime ratings?

A. Standby power ratings for specific gen set models are determined under the following parameters:
· peak cylinder pressure
· exhaust temperature
· smoke level
· turbocharger speed (if applicable).

It is further defined as the output available with varying load for the duration of the interruption of the normal source of power. Ratings are based on fuel stop power in accordance with ISO 3046/1, AS 2789, DIN 6271 and BS 5514. The fuel stop is fixed for each engine model/configuration. It represents the maximum safe horsepower the engine model/configuration will be able to produce without exceeding the limits set according to the parameters.

Prime ratings are defined as the output available with a varying load for an unlimited time. It is set approximately 10 percent below the standby power ratings for each model/configuration.

Q. Are there any other ratings?

A. Continuous rating is output available with constant or near-constant load for an unlimited amount of time. These are determined in accordance with ISO 8528 as well as ISO 3046/1, AS 2789, DIN 6271 and BS 5514.

Electric power generation rating guidelines

Rating	Standby	Prime + 10%	Prime	Continuous
Typical load factor	60% or less	60% or less	60-70%	70-100%
Typical load	Varying	Varying	Varying	Non-varying
Typical hours/year	100 hours	500 hours	No limit	No limit
Typical peak demand	80% of standby rated kW with 100% of rating available for duration of an emergency outage	80% of prime +10% rated kW with100% of rating available for duration of an emergency outage	100% of prime rated kW used occasionally, but for less than 20% of operating hours	100% of continuous rated kW for 100% of operating hours
Typical application	Building service standby Enclosure/sheltered environment	Standby Rental Power module Unreliable utility Interruptible rates	Industrial Pumping Construction Peak shaving Cogeneration	Base load Utility Cogeneration

Note: For conditions outside the above limits, please contact Toromont Engine Power Systems. Typical load factor are the loads applied to the generator set divided by the engine operating hours under those loads

Q. How do you apply these rating definitions?

A. Unfortunately there are no hard and fast rules to determine what generator set to utilize in any installation. However, the following guidelines can help you select the kW rating that best suits your application. Your Caterpillar dealer can also help make judgements based on your load profile.

Typically, standby generator sets are used in situations requiring less than 100 hours of use per year, with a variable load of 60 percent or less. The typical peak demand would be 80 percent of standby rated kW with 100 percent of rating available for the duration of an emergency outage. Applications with these limits include building service standby where the unit(s) are in an enclosure or other sheltered environment.

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Prime rated gen sets are divided into two areas of use.
Prime plus 10 percent-rated gen sets are best utilized in standby, rentals or power modules, or where there is unreliable utility power and/or interruptible rates. These are generally used less than 500 hours per year with a typical load factor of 60 percent or less; peak demand is 80 percent of prime plus 10 percent rated kW with 100 percent of rating available for the duration of an emergency outage.

Prime-rated gen sets are most common where the gen set will be the only power source. At the prime rating, a gen set can be used 24 hours per day, 365 days per year. In most installations, they are specified to meet the demands of a variable load that is 60 to 70 percent of the gen set rating, but can supply 100 percent of its prime kW rating for less than 20 percent of operating hours. These prime gen sets are used industrial pumping, construction, peak shaving and cogeneration applications.

Continuous-rated gen sets are sized to operate at 70 to 100 percent of maximum load that is non-varying and has no hour-use limit. Typical peak demand is 100 percent of continuous rated kW for 100 percent of the time.