# TYPICAL SPECIFICATIONS OF RENTAL GENERATOR SETS

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Unlike generator systems applied to one-off individual applications, a rental generator is designed and constructed to enable it to be connected to multiple types of loads. While mobile generator designs are available for specific power nodes, a rental generator not only has to have mobility, but also has be able to power a variety of loads, both prime and standby. Within North America, a standardized rental specification has evolved and it is useful for users to be familiar with typical rental set specifications and accessories. It is important to understand typical rental generator set specifications, solutions for adapting to multiple types of load, and accessories available for the application of rental power.

## 1.0 FACTORS TO CONSIDER WHEN DESIGNING A RENTAL GENERATOR:

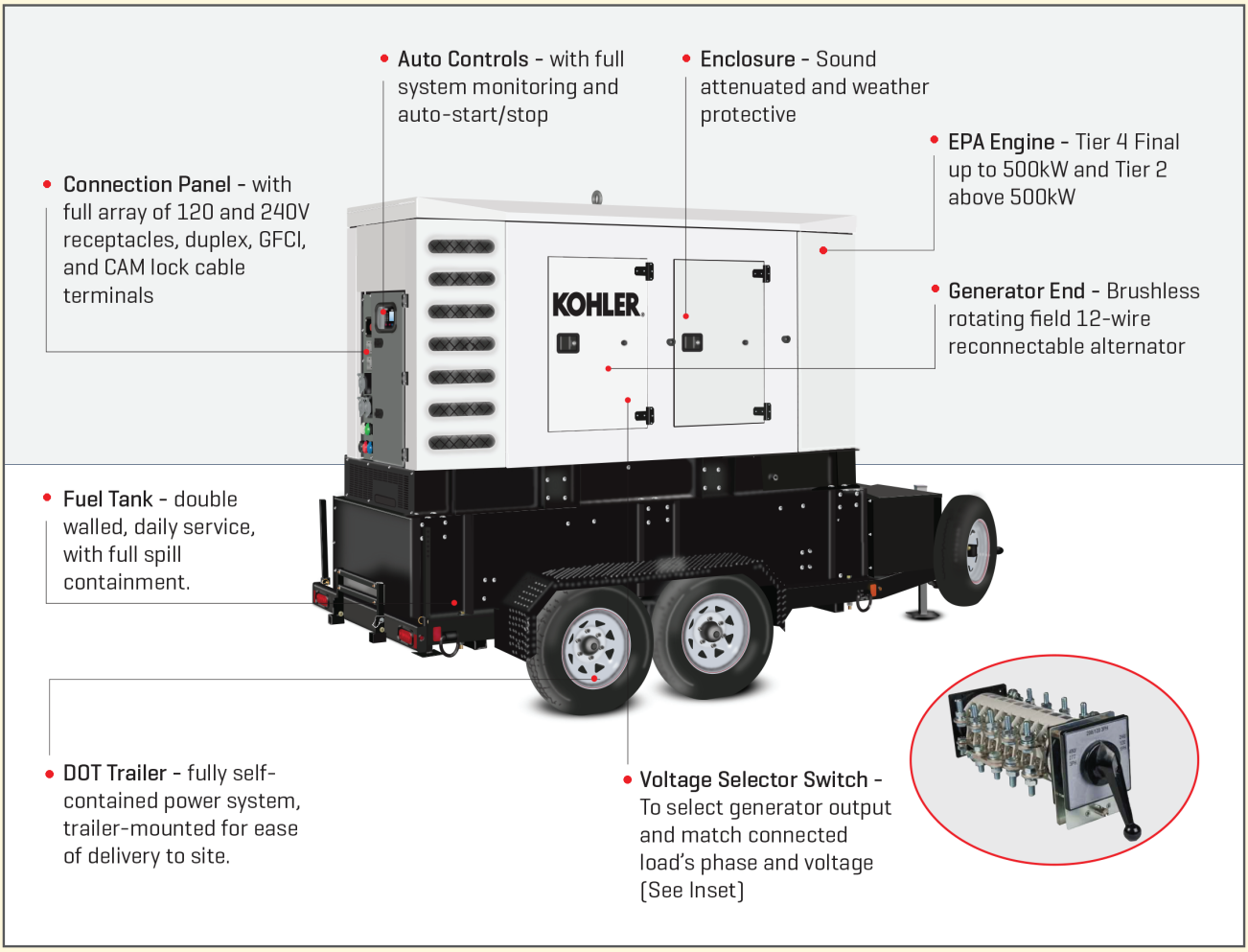
When designing a generator system for rental applications, system-designers have to consider several factors to ensure a self-contained temporary power source that can be easily delivered to different locations, fully self-contained, and ready to be connected to a wide variety of loads, either as a prime or standby power source

The following criteria influences the specification of a rental generator system.

### 1.1 MOBILITY:

Rental companies and authorized distributors of generator manufacturers usually offer a range of rental generator sets. Rental sets have to be easily delivered and removed to a variety of locations. To achieve the required level of mobility, rental sets are:

- Trailer Mounted - Mounting the generator on a DOT (Department of Transportation) compliant road towing trailer with the appropriate tow hitch allows the generator to be easily transported to the required location. The size of the unit will dictate single, tandem, or triple axle(s) with leaf spring suspension, steel fenders, welded steel frame, and tongue-mounted swivel jack with flat disc foot. It is common to see trailer-mounted sets up to 500kW.
- Heavy-Duty Skid - If not supplied on a trailer, the generator can be mounted on a heavy-duty skid made from heavy gauge steel. A skid, unlike a traditional rigid generator base, can be dragged across a construction site. Frequently larger kW rental sets are mounted on rigid steel skid frames.



### 1.2 ENVIRONMENT:

Rental sets can be delivered to various locations with different ambient conditions:

- Temperature - The engine should be able to be connected to various loads and supply its rated output. Within North America this means an operating ambient temperature from minus 40°F to 120°F. The mounted cooling radiator has to provide adequate cooling at full load throughout this temperature range. Starting aids such as water jackets, battery and lube oil heaters, and glow plugs are included to manage cold ambient conditions.
- Weather - To manage operation in all weather, a rental generator will be mounted within a weather-protective enclosure. Units operating in snow-prone conditions will be fitted with motorized louvers and snow hoods to prevent the ingress of snow and other precipitation when the unit is stationary.
- Noise Sensitivity - The load to be powered may be located adjacent to areas where people are working, receiving healthcare, and within areas subject to local sound ordinances. Enclosures are layered with sound absorbent material to bring the dBA @ 23 ft below 68dBA. For applications such as filming, special sound attenuated units are made to bring sound emissions below 50dBA.
- Airborne Contaminates - Rental sets are fitted with heavy-duty air filtration to manage dust laden operating conditions. Enclosures are painted to resist salt and water atmospheric conditions.

### 1.3 CONNECTED LOADS:

Unlike a permanent generator connected to a known load, a rental set has to be sized and specified to manage a wide variety of connected loads. Components within a system affected by load are:

- Generator End Sizing - Rental generator sets are fitted with larger alternators than the rated power given for the generator set. Larger frame alternators enable the generator to absorb the high starting loads when the load is connected to a higher percentage of electric motors.
- Inductive and SCR Loads - Alternators are fitted with Permanent Magnet Generator (PMG) excitation to provide an independent power supply to the Automatic Voltage Regulator (AVR) to give better voltage regulation when connected to SCR, inductive loads (electric motors, transformers) that can feed adverse harmonics into the stator windings.
- Various Voltage Selections - Unlike a fixed permanent installation, the voltage and phase of the connected load can vary from application to application. Therefore, rental sets are fitted with a Voltage Selector Switch. Depending on the size, selector switches allow generator output selection of three and single phase through a range of voltage outputs.
- Brushless Rotating Field Generator - As connected voltages can vary, the rental set is fitted with a 12-wire reconnectable brushless rotating field generator that enables the rotary selector switch to switch the generator windings through various voltage configurations including series and parallel star, delta, and parallel zigzag.

### 1.4 INDEPENDENT POWER SOURCE:

Rental sets are used when power at a location is unavailable or off-line. The user of a rental set usually requires a self-contained power system ready to be connected to the load. This requires the set to be fitted with:

- Mounted Fuel Tanks - Most rental sets are fitted with fuel tanks that permit a day's operation at nominal load. The rental set design and fuel tank will have to comply with mobile storage and spill containment codes. The most common fuel is diesel, but rental sets are also being supplied to run on various gaseous fuels.
- Terminal Panel and Controls - The set will have terminals for connecting the various loads. These terminals will permit a variety of connected voltages and phases. The terminal panel will also include other receptacles including twist locks, duplexes, and the required circuit breaker protection. Controls will include full metering and remote start and stop capability. Some rentals sets are fitted with a remote annunciator to provide operational status to the rental supplier.
- Cable Connection - Some rental sets are supplied with cable storage trays for easy on-site connection.

### 2.0 CONSTRUCTION SITE CODES/REGULATIONS COVERING RENTAL GENERATOR SYSTEMS:

The designer of a rental set system will have to ensure the system complies with various codes including:

- EPA - The applicable codes for engines in mobile applications are more stringent that those for fixed standby applications that are limited to run the time of the power outage, and no more than 100-hours for exercising and maintenance per annum. Mobile engines will have to comply with Tier 4 final up to 500kW and Tier 2 above.
- UL Fuel Storage - UL142 for above ground storage and mobility. UL2200 for construction and design. UL158 for low voltage circuit breakers. UL891 safety criteria applicable to electrical switchgear up to 600-volt systems.
- NEMA - This standard covers switchgear boxes and electrical connections.
- Local Codes - These will include noise ordinances applying in any given location, and exhaust emissions.

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