

Emergency Generators

Businesses today are highly reliant on electricity. Any disruption in the supply of electricity can cause a loss of capital to the business owner. Emergency generators are an effective method of mitigating such an exposure. Simply installing a generator will not mitigate a loss. Such units must be maintained and tested on a regular basis to ensure their readiness and reliability.

Risk Assessment

An audit of critical equipment, electrical distribution panels, and electrical requirements for this equipment should be performed to identify:

- Equipment such as lighting, fire protection equipment or motors that would be required during an electrical outage.
- Power requirements during an outage.
- The size of generator required to supply the electrical load.
- Location of a generator.
- Emergency electrical distribution such as wiring, panels, and switches.

System Components

On the surface it seems to be a simple process to purchase and install an emergency generator but the following components must be considered:

- **Fuel supply** – Depending on the situation the generator engine will be fueled by; gasoline, diesel, or natural gas/propane.
- **Batteries** – A battery is required to start the generator engine. The size and type will depend on the type and size of generator selected.

- **Generator engine combination** – Typically the generator is driven by a separate engine. The configuration will depend on load requirements, fuel chosen etc.
- **Cooling** – Engines are typically cooled by air, either directly by blowing air over the engine or indirectly by circulating coolant through the engine and then expelling the heat through a radiator into the air. A clean source of a cooling air supply must be found.
- **Transfer switches** – These are switches used to transfer the load between the normal electrical supply and the generator.

Installation

Emergency generators require careful placement. The units tend to be quite heavy and require special consideration:

- Placements of transfer switches require a tie-in to the existing electrical feed.
- Suitable space must be found to locate the fuel storage tank.
- Generator sets create a lot of noise. Locations or noise reduction schemes must be considered.
- Vibrations to the facility caused by the generator must be considered.
- Adequate ventilation must be supplied both for combustion and cooling.
- Engine exhaust must be directed outside of the building away from any openings.

Operation

Facility management must develop and implement an outage response plan. This plan will describe

procedures to follow during a power outage. It will include a schematic outlining the equipment that is powered by the generator, responsibilities of various personnel including the individual responsible for the operation of the generator. In the event of an outage it is important for this person to be familiar with the entire system especially the following procedures:

- Confirm that the generator has started and transferred the load as designed.
- Monitor the engine and generator to confirm that the operation is within design parameters. A log of critical readings such as voltage, and engine temperature should be kept.
- Monitor the level of fuel in the storage tank and order as required.
- Patrol the facility to ensure that the critical equipment is adequately powered. Also confirm that all non-essential equipment has been shut down.

Maintenance

No matter how well a system has been planned and installed its operation will only be as reliable as the maintenance performed. Most emergency generator failures such as dead batteries or low voltage can be traced back to poor maintenance, all equipment should be maintained in accordance with the manufacturers specifications and include the following:

- **Engine/Generator** – Typically should be run under load on a weekly, biweekly, or monthly basis.
- **Battery** – The battery and charging system should be inspected on a regular basis for fluid leakage, corrosion or loose connections.
- **Cooling system** – Engine coolant levels, and coolant air supply systems should be monitored.
- **Fuel** – Tank levels should be maintained as appropriate. All fuel lines should be checked on a regularly for leaks, loose connections or corrosion. The fuel should be tested on a regular basis for contaminants.
- **Exhaust system** – This system is used to exhaust products of combustion from the engine to atmosphere. The piping should run from the engine to the exterior of the building. During each engine operation the exhaust system should be examined for leaks. Leaks can be detected through abnormal sounds, or smells coming from the exhaust piping.

- **Transfer switch** – Operate often. Check voltage drop across switch contacts on an annual basis.

It is important that trained personnel carry out all maintenance in a safe manner. If such expertise does not exist within the facility it is important that a reputable firm be contracted to maintain the equipment as required by the manufacturers.

Summary

The installation of an emergency generator is an effective method of mitigating losses due to the disruption of the electrical supply. Provided that consideration is given to the design, installation, operation and maintenance of the system.

Key Action steps

- Carry out a risk assessment of the facility including key equipment.
- Evaluate key system components.
- Design and install the emergency generator.
- Develop and implement an outage response plan.
- Implement a comprehensive maintenance program.

For more information contact:

- A reputable electrical contractor.
- Local Electrical Services Authority
- www.howthingswork.com, emergency power.