STANDBY BACKUP GENERATORS

Introduction

In areas often hit by severe weather conditions there are frequent power outages which can disrupt the normal activities of residents and affect their living conditions and comfort. A **power outage** can have even more dangerous consequences in public institutions like medical facilities, train stations and office buildings. Imagine being in a skyscraper office building when a **power outage** occurs and having no light to indicate exits.

Standby backup generators are used to solve this problem by providing backup power to selected circuits or the entire circuit until the main power supply is restored. This allows for certain critical elements to continue functioning during the outage period. Depending on their destination generators come in many types and in this article I will focus more on generators intended for homes and residential areas.

When talking about a new house or a small apartment building development, I always try to make the developer take into consideration adding a **backup generator** to the electrical system from the start. The big advantage in doing so is that you can design the electrical system so that the generator will supply power to certain desired circuits in that respective building. This can be more cost effective especially in apartment buildings where you don't have control on all energy consumers.

Choosing a backup generator

Adding a backup generator later on will most likely end up in the generator powering up the entire circuit. With a house this is not very inconvenient because you can choose what to turn on or not. Usually power requirement for a house is kept below 20kW, for example to run the AC unit, Water Heater, Water Well Pump, Septic Pump, Fridge, Electric Oven, a TV set and a Stereo system, Lighting and Security system you will need about 12kW. A generator rated between 13kW and 20kW should satisfy most demands although it is a good practice to calculate the power required in order to choose the best generator.

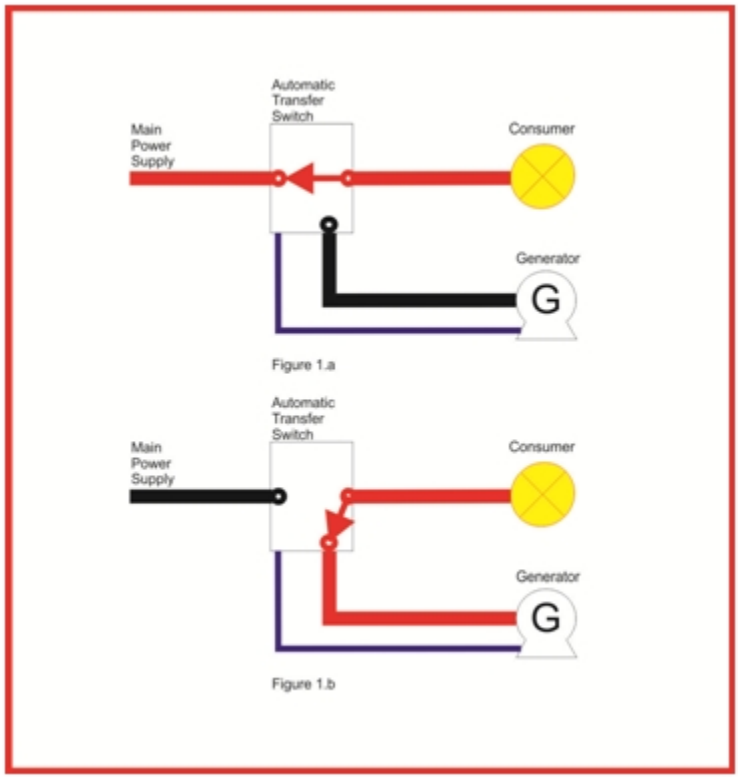
Another big criteria in selecting your generator is the type of fuel available at that location and desired dependency on this fuel. Usually it runs on natural gas, liquid propane or diesel fuel. In an area with frequent severe weather that can disrupt natural gas supply it is best to use a liquid propane or diesel fuel generator if installation of a fuel tank is possible. Either way area building regulations must be inspected to see what is allowed or not and a plumbing license might be required for this job.

Most backup generator manufacturers or retailers will offer assistance in selecting the best unit for your intended application but other things to be considered should be:

- Alternator harmonic distortion to be under 5%
- Fuel efficiency
- Sound attenuation and sound pressure level
- Integrated safety measures
- Test cycles, scheduling test runs at specific intervals

Installing a backup generator

Most standby generators for residential locations are designed to operate outdoors, outside the house or building. This ensures further sound attenuation. Building code regulations will dictate the placement of such a device but usually it is kept at 1-2 meters from the building.
It is desired to place it close to the main electrical panel that connects the home circuit to the electrical grid. This is where a main part of the backup system will also be installed, the Automatic Transfer Switch (ATS) also known as Changeover Switch. The ATS monitors the main power supply and when it detects the absence of power it will automatically start the backup generator and route the home circuit to the generator's line. This flow is indicated in figure 1.



In figure 1 the red lines indicates the presence of power, the black lines indicate the absence of power and the blue line is the startup line of the generator. We can see in 1.a the main power supply line has power and is connected to the consumer and in 1.b the absence of power in the main supply line has triggered the Automatic Transfer Switch to connect the consumer to the Generator.
In many cases the ATS comes with an integrated 200A or less circuit breaker but depending on the particularities of the installation you might need to add more protection.

Conclusion

In conclusion a backup generator can make life more comfortable and secure. No matter the reason of the power outage in just a few seconds power is restored avoiding any disruption of daily activities. In most public buildings a backup generator is now mandatory to ensure safety. Usually in such buildings power distribution can be routed by the Building Management System in order to save electricity in extended periods of power outage.

Source : http://engineering.electrical-equipment.org/electrical-distribution/standby-backup-generators.html