

Standby Generators and Automatic Transfer Switch Operations

Standby generators operate automatically as needed. They do this through the use of an Automatic Transfer Switch (ATS), which can detect when the regular power supplier goes off-line. The ATS automatically transfers the load back to the utility company once steady power has been re-established.

Automatic Transfer Switches are an integral part of the power generation process, allowing smooth and immediate transfer of electrical current between multiple sources and the load. When the generator is operating, the transfer switch prevents dangerous feedback of current to the utility's system. Some transfer switches also ensure that different power sources are fully synchronized before their power is combined or loads are transferred, which is imperative for safe operation.

The transfer switch senses when utility power is interrupted, and starts up the generator if the utility power remains absent. In about five to ten seconds, when the generator is producing full power, the transfer switch disconnects the load from the utility and connects it to the generator, restoring electricity to the load. The transfer switch continues to monitor utility power, and when it is restored, switches the load from the generator back to the utility. Once the generator is disconnected, it goes through a cool-down routine and is automatically shut down.

The size of the generator (in kilowatts) is dependent upon the loads the customer wants to have available on standby power. Generators should be properly sized to allow for the customer's load, plus periodic surge from motor loads/start-up. The customer should consult with the generator manufacturer or a local engineering firm for proper size recommendations.

Many facilities test their generators once a month. However, if they simply start the engine, and don't connect the generator, they are only proving that the engine operates. If they simply bypass the transfer switch and manually start the engine and generator, they are only proving that the generator operates. These methods of testing do not test the integrity of the transfer switch. The Hartford Steam Boiler (HSB) recommended practice is to test the generator and the transfer switch, on a monthly basis. Typically this is done by turning off the utility power. However, facilities should consult the original equipment manufacturer (OEM) guidelines to ensure proper testing and operation of generators and ATS equipment. Testing should only be conducted by qualified personnel familiar with the operation of this equipment.

When a transfer switch is in its normal position of utility company feed, a microprocessor is used to sense the power loss from the utility, start the generator and transfer the load. Because of severe voltage transients frequently encountered with utility distribution systems, the microprocessor is susceptible to this transient voltage from the utility electrical supply. Thus, some sort of surge protection of this sensitive electronic equipment is imperative. While modern transfer switches may have surge protection, many older transfer switches do not have adequate protection.

Transfer switches should have surge protection that complies with transient suppression standards, such as UL 1449, or the following rigorous IEC standards.

Electrostatic Discharge (ESD) Immunity	EN 61000-4-2:1995
Radiated Electromagnetic Field Immunity	ENV 50140:1993
Electrical Fast Transient (EFT) Immunity	EN 61000-4-4:1995
Surge Transient Immunity	EN 61000-4-5:1995

If the transfer switch does not comply with one of these standards, additional surge protection should be added. HSB recommends that a Professional Engineer, experienced with surge suppression technology, be retained to design the protection scheme for your facility to ensure that all such devices are properly sized and coordinated. For more information, contact Ernest Freeman, director, Risk Management Services, at HSB at (847) 249-2324 or by e-mail at ernest_freeman@hsb.com.