NFPA 110
STANDARD FOR EMERGENCY & STANDBY POWER SYSTEMS

The National Fire Protection Association sets safety standards in an effort to reduce risks associated with fire, electrical and other hazards. NFPA 110: Standards for Emergency and Standby Power Systems establishes guidelines for the installation of back-up generators in applications where the loss of electrical power could result in the loss of human life or serious injury. Winco designs and tests our generator sets to meet NFPA 110 safety standards when properly installed and maintained. This document outlines the requirements and features of NFPA 110 compliant generators. The 2019 version of the standard is referenced in document. It is essential to work with the Authority Having Jurisdiction that will be approving the installation to understand and meet any local requirements.

SYSTEM SPECIFICATION

Systems are designed to meet the specific criteria of the applications. When an NFPA 110 application is specified the Level, Class, and Type must be determined to properly select the generator. Some systems may combine back up systems such as uninterrupted power supplies and standby generators to meet their needs. This document focuses on generator specific considerations.

LEVEL

The generator level required will be either Level 1 or Level 2 systems. The standards are high for either application. Winco configures all of our generators to comply with Level 1 systems.

LEVEL 1: Loss of life or serious injury is possible without electrical power. These systems include safety lighting, fire systems, elevators, critical safety communication systems, critical ventilations systems, and other medical or life support devices.

LEVEL 2: Loss of electrical power is less critical to human life and safety. These systems include HVAC, communications systems, ventilation systems, swage systems, lighting systems and some industrial processes.

CLASS

Class is defined in the standard as the number of hours the generator can supply its full rated load to the facility without being refueled. For example, a Class 2 system has to have enough fuel on-site to independently run for 2 hours without refueling. The most common classes we see are Class 24 (24 hour runtime) and Class 72 (72 hour runtime).

TYPE

The type clearly defines how quickly power will be restored to the system. This means that the generator needs to start, transfer switch to generator and the generator accept the load in this window. The following gives examples of Type specifications that you may run into.

TYPE	START UP
Type U	Uninterruptible (UPS System)
Type 10	10 seconds
Type 60	60 seconds
Type M	Manual stationary, no time limit

At Winco, we design our single generator systems to accept the load within Type 10 requirements. Multiple generator parallel applications can generally be specified in Type 60 applications.

SPECIAL CONSIDERATIONS

Each generator comes equipped with some extra alarms, settings and accessories designed to help maintain the generator set in prime starting and operating condition. The following section covers the key areas.

COOLING SYSTEM

Each generator is outfitted with a Kim Hotstart coolant heater with a thermostat. It is designed to keep the block warm enough to start and quickly accept load in cold environments. A low coolant temperature alarm is programmed to warn of any issues with the heater. Winco recommends our full synthetic 5W-30 or 5W-40 engine oils to provide excellent broad temperature range engine protection from cold starting to the heat of the summer months.

All NFPA units are also outfit with a low coolant sensor. If the coolant level drops below a designated point in the radiator the engine will be shut down before damage occurs. Some applications may require the low coolant level to only provide a warning without shutting down. The Deep Sea controller program is easily modified in the field to meet this specification.

FUEL SUPPLY

The installation must come with enough fuel to meet the Class runtime standards. Winco generators can work with on-site fuel systems of diesel systems can be outfitted with a fuel tank from the factory. The fuel tank should be sized at 133% of the required runtime. This prevents the system from running below the minimum required on-site fuel during testing and maintenance. If the generator ships from the factory with a fuel tank a low fuel alarm will be programmed to provide a warning when the generator is below 24 hours of fuel in the tank. This setting may require adjusting in the field if the generator ships without a tank or the application requires more than 24 hours of fuel reserve. The Deep Sea controller is also capable of accepting discrete and analog inputs to monitor the fuel system.

BATTERY MAINTENANCE

Each generator is specified with a battery to meet the crank requirements of a Level 1 system. Winco partners with Interstate Batteries for high quality and durable batteries. The battery is sized to crank the engine through two complete crank cycles. In order to keep the batteries at full charge we use DSE966X chargers.

These chargers include a battery charge failure circuit as well as the required DC ammeter and voltmeters. A low battery voltage alarm provides early warning if there are any problems with the electrical system.

CONTROLS

Each Winco generator is outfitted with a DSE7310 or DSE8610 controllers. These non-proprietary controllers are powerful and flexible to meet the most stringent criteria. In order to get maintenance reminders quickly Winco outfits our NFPA 110 compliant generators with a 16 light remote annunciator. This is designed to be mounted in a constantly occupied location of the facility and provides both visual and audible alarms when a generator operating parameters is outside of specification. An upgraded mimic panel is available that meets the NFPA standards and provides full instrumentation and alarms in the system.

SAFETY INDICATIONS & SHUTDOWNS

The following table outlines requirements for alarms and shutdowns. Winco's NFPA 110 always meets the level one standard.

	LEVEL 1			LEVEL 2		
INDICATOR FUNCTION	Control Panel	Shutdown of Generator	Remote Audible	Control Panel	Shutdown of Generator	Remote Audible
Overcrank	✓	✓	✓	✓	✓	Optional
Low Water Temperature[1]	✓	N/A	✓	✓	N/A	Optional
High Engine Temperature - pre alarm	✓	N/A	✓	Optional	N/A	N/A
High Engine Temperature	✓	✓	✓	✓	✓	Optional
Low Lube Oil Pressure	✓	✓	✓	✓	✓	Optional
Overspeed	✓	✓	✓	✓	✓	Optional
Low Fuel Main Tank[2]	✓	N/A	✓	Optional	N/A	Optional
Low Coolant Level	✓	Optional	✓	✓	Optional	✓
EPS Supplying Load[3]	✓	N/A	N/A	Optional	N/A	N/A
Control Switch Not in Auto Position	✓	N/A	✓	✓	N/A	✓
High Battery Voltage	✓	N/A	N/A	Optional	N/A	N/A
Low Cranking Voltage	✓	N/A	✓	Optional	N/A	Optional
Low Voltage in Battery	✓	N/A	N/A	Optional	N/A	N/A
Battery Charger AC Failure	✓	N/A	N/A	Optional	N/A	N/A
Lamp Test	✓	N/A	N/A	✓	N/A	N/A
Contacts for Local & Remote Common Alarm[4]	✓	N/A	✓	✓	N/A	✓
Audible Silencing Switch	N/A	N/A	✓	N/A	N/A	Optional
Remote Emergency Stop	N/A	✓	N/A	N/A	✓	N/A

Notes: (1) Set at 20°F (11°C) below the regulated temperature determined by the generator manufacturer. (2) On gaseous systems, shall require a low gas pressure alarm. (3) Generator AC ammeter shall be permited for this function. (4) Shall be provided, but a separate audible signal shall not be required when the regular work site in 5.6.6 is staffed 24 hours/day.

All required Control Panel functions shall be visually annunciated by a remote,comon visual indicator.

All required functions indicated in the remote audible column shall be annunciated by a remote, common audible alarm as required in 5.6.5.2(4).