# First Revision No. 37-NFPA 110-2016 [ Section No. 2.4 ]

2.4 References for Extracts in Mandatory Sections.


## Submitter Information Verification

<table>
<thead>
<tr>
<th>Submitter Full Name</th>
<th>Christopher Coache</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>National Fire Protection Assoc</td>
</tr>
<tr>
<td>Street Address</td>
<td></td>
</tr>
<tr>
<td>City</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td></td>
</tr>
<tr>
<td>Zip</td>
<td></td>
</tr>
<tr>
<td>Submittal Date</td>
<td>Tue Sep 20 12:14:25 EDT 2016</td>
</tr>
</tbody>
</table>

## Committee Statement

<table>
<thead>
<tr>
<th>Committee Statement</th>
<th>The references were added since the definitions have been extracted from other NFPA standards.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Message</td>
<td></td>
</tr>
</tbody>
</table>
3.3.5  Field Evaluation Body (FEB).
An organization, or part of an organization, that performs field evaluations of electrical or other equipment. [79, 2016]

3.3.6  Field Labeled (as applied to evaluated products).
Equipment or materials to which has been attached a label, symbol, or other identifying mark of an FEB indicating the equipment or materials were evaluated and found to comply with requirements as described in an accompanying field evaluation report. [79: 100]

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Sep 07 18:40:55 EDT 2016

Committee Statement

Committee Statement: The new definitions are necessary for the terms added in the new exception for Section 5.2.5.
Response Message:
This standard recognizes two levels of equipment installation, performance, and maintenance requirements.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 11:25:46 EDT 2016

Committee Statement

Committee Statement: The editorial change clarifies the intent of the statement.
Response Message:

Public Input No. 51-NFPA 110-2016 [Section No. 4.4 [Excluding any Sub-Sections]]
First Revision No. 29-NFPA 110-2016 [ Section No. 5.2.5 ]

5.2.5
The EPS shall be installed in accordance with NFPA 70, National Electrical Code.

Exception: When a listing process is not available for the engine-generator assembly, a field evaluation body acceptable to the authority having jurisdiction shall be permitted to affix a field label.

Submitter Information Verification

<table>
<thead>
<tr>
<th>Submitter Full Name</th>
<th>Chris Coache</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>[ Not Specified ]</td>
</tr>
<tr>
<td>Street Address</td>
<td></td>
</tr>
<tr>
<td>City</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td></td>
</tr>
<tr>
<td>Zip</td>
<td></td>
</tr>
<tr>
<td>Submittal Date</td>
<td>Wed Sep 07 18:25:13 EDT 2016</td>
</tr>
</tbody>
</table>

Committee Statement

| Committee Statement | The exception was added since there currently is no listing process for medium voltage stationary engine-generator assembly. |

Response Message: [Not provided]
5.3.5

The ambient air temperature in the EPS equipment room or outdoor housing containing Level I rotating equipment shall be stabilized at not less than 4.5°C (40°F) when the equipment is not operating.

<table>
<thead>
<tr>
<th>Committee Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>The revision clarifies the intent of the section. The temperature requirement is only relevant when the EPS is not operating.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Input No. 45-NFPA 110-2016 [Section No. 5.3.5]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Input No. 25-NFPA 110-2016 [Section No. 5.3.5]</td>
</tr>
</tbody>
</table>
**5.6.2 Prime Mover Ratings.**

Proper derating factors, such as altitudes, ambient temperature, fuel energy content, accessory losses, and site conditions as recommended by the manufacturer of the generator set shall be used in determining whether or not brake power meets the connected load requirements.

---

### Submitter Information Verification

**Submitter Full Name:** Chris Coache  
**Organization:** [ Not Specified ]  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Wed Sep 07 13:52:47 EDT 2016

### Committee Statement

**Committee Statement:** The authoritative source for actual derating factors is the manufacturer of the prime mover, not the assembler of a generator set.

**Response Message:**
First Revision No. 5-NFPA 110-2016 [Section No. 5.6.3.6.1]

5.6.3.6.1
A battery charger driven by the prime mover shall not be required for Level 2 generators, provided the automatic battery charger has a high-low rate capable of fully charging the starting battery during running conditions as specified in 5.6.3.6 within the time frame required by this standard while powering all loads connected to the starting batteries.

Submitter Information Verification
Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Sep 07 13:55:05 EDT 2016

Committee Statement
Committee Statement: An AC powered battery charger is less reliable than a mechanically driven DC alternator because the AC-powered system has several single points of failure including the incremental wiring, ac protective devices, and the charger itself. So, for critical applications it is reasonable to require both DC power sources in the system.

Generators often have significant DC loads when they are operating, in addition to the starting battery recharge duty. This addition makes it clear that the charger for critical applications must be capable of continuous operation with all loads attached.

Response Message:
Public Input No. 26-NFPA 110-2016 [Section No. 5.6.3.6.1]
For Otto or diesel cycle prime movers, the type and duration of the cranking cycle shall be as specified in Table 5.6.4.2.

### Table 5.6.4.2 Starting Equipment Requirements

<table>
<thead>
<tr>
<th>Starting Equipment Requirements</th>
<th>Level 1</th>
<th>Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Battery unit</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(b) Battery certification</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(c) Cycle cranking</td>
<td>X or O</td>
<td>O</td>
</tr>
<tr>
<td>(d) Cranking limiter time-outs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle crank (3 cycles)</td>
<td>75 sec</td>
<td>75 sec</td>
</tr>
<tr>
<td>Continuous crank</td>
<td>45 sec</td>
<td>45 sec</td>
</tr>
<tr>
<td>(e) Float-type battery charger</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(f) Recharge time</td>
<td>24 hr</td>
<td>36 hr</td>
</tr>
<tr>
<td>(g) Low battery voltage alarm contacts</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

X: Required, O: Optional, NA: Not applicable.

---

**Submitter Information Verification**

**Submitter Full Name:** Chris Coache  
**Organization:** [Not Specified]  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Wed Sep 07 13:58:10 EDT 2016

**Committee Statement**

The cranking cycle was changed to only specify "O". Something that is either required or optional will be taken to mean it is optional.

**Response Message:**

Public Input No. 50-NFPA 110-2016 [Section No. 5.6.4.2 [Excluding any Sub-Sections]]
5.6.4.7

All chargers shall include the following characteristics, which are to be accomplished without manual intervention (i.e., manual switch or manual tap changing):

(1) At its rated voltage, the charger shall be capable of delivering energy into a fully discharged battery unit without damaging the battery.

(2) The charger shall be capable of returning the fully discharged battery to 100 percent of its ampere-hour rating within the time specified in Table 5.6.4.2, item (f).

(3) As specified in Table 5.6.4.2, item (e), meters with an accuracy within 5 percent of range shall be furnished.

(4) The generator set or charger shall be permanently marked with the following:

   (a) Allowable range of battery unit capacity that can be recharged within the time requirements of Table 5.6.4.2
   (b) Nominal output current and voltage
   (c) Sufficient battery-type data to allow replacement batteries to be obtained

(5) The battery charger output and performance shall be compatible with the batteries furnished.

(6) Battery chargers used in Level 1 systems shall include temperature compensation for charge rate.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Sep 07 14:00:22 EDT 2016

Committee Statement

Committee Statement: The marking requirements in (4)(a), (b), and (c) are modified to make the requirement more clear.

Temperature compensation is added because battery failure is the most common reason for failure of a generator set to start and pick up loads. Improper charge rate is the most common reason for premature battery failure because proper charge rate is temperature dependent, and without temperature compensation there isn't a good way to assure that a proper charge rate is achieved.

Response Message:

Public Input No. 27-NFPA 110-2016 [Section No. 5.6.4.7]
5.6.5.1
A control panel shall be provided and shall contain the following:

(1) Automatic remote start capability
(2) "Run-off-automatic" mechanical switch
(3) Shutdowns as required by 5.6.5.2(3)
(4) Alarms as required by 5.6.5.2(4)
(5) Controls as required by 5.6.5.2(5)

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Sep 07 14:24:26 EDT 2016

Committee Statement

Committee Statement: Mechanical was added to ensure direct mechanical control for manual generator starting.
Response Message:

Public Input No. 28-NFPA 110-2016 [Section No. 5.6.5.1]
Where a control panel is mounted on the energy converter, it shall be mounted by means of antivibration shock mounts, if required, to maximize reliability. An automatic control and safety panel shall be a part of the EPS containing the following equipment or possess the following characteristics, or both:

(1) Cranking control equipment to provide the complete cranking cycle described in 5.6.4.2 and required by Table 5.6.4.2

(2) Panel-mounted control switch(es) marked “run–off–automatic” to perform the following functions:
   - (a) Run: Manually initiate, start, and run prime mover
   - (b) Off: Stop prime mover or reset safeties, or both
   - (c) Automatic: Allow prime mover to start or stop by closing operating a remote contact and stop by opening the remote contact:

(3) Controls to shut down and lock out the prime mover under any of the following conditions:
   - (a) Failing to start after specified cranking time
   - (b) Overspeed
   - (c) Low lubricating-oil pressure
   - (d) High engine temperature (An automatic engine shutdown device for high lubricating-oil temperature shall not be required.)
   - (e) Operation of remote manual stop station

(4) Individual alarm indication to annunciate any of the conditions listed in Table 5.6.5.2 and with the following characteristics:
   - (a) Battery powered
   - (b) Visually indicated
   - (c) Have additional contacts or circuits for a common audible alarm that signals locally and remotely when any of the itemized conditions occurs
   - (d) Have a lamp test switch(es) to test the operation of all alarm lamps

(5) Controls to shut down the prime mover upon removal of the initiating signal or manual emergency shutdown

(6) The ac instruments listed in 5.6.9.9

Table 5.6.5.2 Safety Indications and Shutdowns

<table>
<thead>
<tr>
<th>Indicator Function (at Battery Voltage)</th>
<th>Level 1</th>
<th>Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CV</td>
<td>S</td>
</tr>
<tr>
<td>(a) Overcrank</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(b) Low water temperature</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(c) High engine temperature pre-alarm</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(d) High engine temperature</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(e) Low lubricating-oil pressure</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(f) Overspeed</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(g) Low fuel main tank</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(h) Low coolant level</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>(i) EPS supplying load</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(j) Control switch not in automatic position</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(k) High battery voltage</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(l) Low cranking voltage</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(m) Low voltage in battery</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(n) Battery charger ac failure</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(o) Lamp test</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(p) Contacts for local and remote common alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(q) Audible alarm silencing switch</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>(r) Low starting air pressure</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(s) Low starting hydraulic pressure</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>(t) Air shutdown damper when used</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(u) Remote emergency stop</td>
<td>NA</td>
<td>X</td>
</tr>
</tbody>
</table>


Notes:

(1) Item (p) shall be provided, but a separate remote audible signal shall not be required when the regular work site in 5.6.6 is staffed 24 hours a day.

(2) Item (b) is not required for combustion turbines.
(3) Item (r) or (s) shall apply only where used as a starting method.
(4) Item (i) EPS ac ammeter shall be permitted for this function.
(5) All required CV functions shall be visually annunciated by a remote, common visual indicator.
(6) All required functions indicated in the RA column shall be annunciated by a remote, common audible alarm as required in 5.6.5.2(4).
(7) Item (g) on gaseous systems shall require a low gas pressure alarm.
(8) Item (b) shall be set at 11°C (20°F) below the regulated temperature determined by the EPS manufacturer as required in 5.3.1.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 14:33:15 EDT 2016

Committee Statement

Committee Statement: The change to the start command is in response to changes in the 2017 National Electrical Code. The word "indication" was struck from table legend for clarity.
Response Message: Public Input No. 48-NFPA 110-2016 [Section No. 5.6.5.2]
5.6.5.5
The cranking cycle shall be capable of being initiated by any of the following:

1. Manual start initiation as specified in 5.6.5.2(2)(a).
2. Loss of normal power at any automatic transfer switch (ATS) considered a part of the EPSS. Prime mover shall start upon closing of a remote switch or contacts and shall stop, after appropriate time delays, when switch or contacts are opened.
3. Clock exerciser located in an ATS or in the control panel.
4. Manually operated (test) switch located in each ATS that simulates a loss of power and causes automatic starting and operation until this switch is reset, to cause the engine circuit to duplicate its functions in the same manner commercial power is restored after a true commercial power failure.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 14:38:38 EDT 2016

Committee Statement

Committee Statement: Remote start circuits for most generator sets will accept either a N.O. or a N.C. contact, so the requirement shouldn't be tied to just the N.O. case. For example, a NC remote contact must be used when projects require fail-safe genset start/stop wiring.

Response Message:
Public Input No. 49-NFPA 110-2016 [Section No. 5.6.5.5]
All installations shall have a be provided with at least one remote manual stop station of a type to prevent inadvertent or unintentional operation tamperproof emergency stop switch located outside the room housing the prime mover, where so installed, or elsewhere on the premises where the prime mover is located outside the building.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Sep 07 15:21:49 EDT 2016

Committee Statement

Committee Statement: This revision clarifies the use and location of the stop station required by NFPA 110.
Response Message:
First Revision No. 11-NFPA 110-2016 [Section No. 5.6.9.9]

5.6.9.9
The generator instrument panel for Level 1 applications shall contain the following:

1. An ac voltmeter(s) for each phase or a phase selector switch
2. An ac ammeter(s) for each phase or a phase selector switch
3. A frequency meter
4. A voltage-adjusting feature to allow ± 5 percent voltage adjustment
5. An ac kW meter indicating total load on the generator set

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 14:44:57 EDT 2016

Committee Statement

Committee Statement: In a generator set application an engine has very limited overload capability, and without a kW meter there is no easy way for an operator to visually see when loads are approaching the limits of the engine. Because ammeters don't consider power factor, they don't actually indicate impending overload on an engine.

Level 1 systems should have this critical feature. kW meters are now a standard feature in most generator set products used in Level 1 systems.

Response Message:

Public Input No. 29-NFPA 110-2016 [Section No. 5.6.9.9]
6.2.2.1*
Undervoltage-sensing devices shall be provided to monitor all ungrounded lines of the primary normal source of power as follows:

(1) When the voltage on any phase falls below the minimum operating voltage of any load to be served, the transfer switch shall automatically initiate engine start and the process of transfer to the EPS.

(2) When the voltage on all phases of the primary normal source returns to within specified limits for a designated period of time, the process of transfer back to primary normal power shall be initiated.

Submitter Information Verification
Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 15:59:13 EDT 2016

Committee Statement
Committee Statement: The word "primary" used to describe the power source referenced in this paragraph is not consistent with other NFPA documents. NFPA 70 and 99 both use "normal" to describe this power source in multiple places. The word "normal" is also the conventional term used in the electrical power industry and by most equipment manufacturers on their products and literature describing this power source and the transfer switch position.

Response Message:
Public Input No. 3-NFPA 110-2016 [Section No. 6.2.2.1]
First Revision No. 14-NFPA 110-2016 [ Section No. 6.2.3 ]

6.2.3* Interlocking.
Mechanical interlocking or an approved alternate method shall prevent the inadvertent interconnection of the primary normal power supply and the EPS, or any two separate sources of power.

Submitter Information Verification

Submitter Full Name: Chris Coache  
Organization: [ Not Specified ]
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Wed Sep 07 16:08:59 EDT 2016

Committee Statement

Committee Statement: The word "primary" used to describe the power source referenced in this paragraph is not consistent with other NFPA documents. NFPA 70 and 99 both use "normal" to describe this power source in multiple places. The word "normal" is also the conventional term used in the electrical power industry and by most equipment manufacturers on their products and literature describing this power source and the transfer switch position.

Response Message:
6.2.5* Time Delay on Starting of EPS.

A time-delay device shall be provided to delay starting of the EPS. The timer shall prevent nuisance starting of the EPS and possible subsequent load transfer in the event of momentary power dips and interruptions of the primary source.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 16:11:25 EDT 2016

Committee Statement

Committee Statement: The word "harmless" was removed from the sentence. If there are momentary power dips and interruptions with the primary source, we don't really know if they will be harmless. It could be harmless to some loads, but not harmless to others.

Response Message:

Public Input No. 54-NFPA 110-2016 [Section No. 6.2.5]
6.2.8* Time Delay on Retransfer to Primary Source.
An adjustable time-delay device with automatic bypass shall be provided to delay retransfer from the EPS to the primary source of power and to allow the primary normal source to stabilize before retransfer of the load.

Submitter Information Verification
Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 09 14:14:50 EDT 2016

Committee Statement
Committee Statement: The word "primary" used to describe the power source referenced in this paragraph is not consistent with other NFPA documents. NFPA 70 and 99 both use "normal" to describe this power source in multiple places. The word "normal" is also the conventional term used in the electrical power industry and by most equipment manufacturers on their products and literature describing this power source and the transfer switch position.
Response Message:
6.2.9 Time Delay Bypass If EPS Fails.
The time delay shall be automatically bypassed if the EPS fails.

6.2.9.1
The transfer switch shall be permitted to be programmed for a manually initiated retransfer to the primary normal source to provide for a planned momentary interruption of the load.

6.2.9.2
If used, the arrangement in 6.2.9.1 shall be provided with a bypass feature to allow automatic retransfer in the event that the EPS fails and the primary normal source is available.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 09 14:20:07 EDT 2016

Committee Statement

Committee Statement: The word "primary" used to describe the power source referenced in this paragraph is not consistent with other NFPA documents. NFPA 70 and 99 both use "normal" to describe this power source in multiple places. The word "normal" is also the conventional term used in the electrical power industry and by most equipment manufacturers on their products and literature describing this power source and the transfer switch position.

Response Message:
6.2.11.1
Transfer switches shall transfer the connected load to the EPS and immediately return to normal power automatically in case of an EPS failure.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 09 14:21:56 EDT 2016

Committee Statement

Committee Statement:
The word "primary" used to describe the power source referenced in this paragraph is not consistent with other NFPA documents. NFPA 70 and 99 both use "normal" to describe this power source in multiple places. The word "normal" is also the conventional term used in the electrical power industry and by most equipment manufacturers on their products and literature describing this power source and the transfer switch position.

Response Message:
6.2.12 Test Switch.

A test means shall be provided on each ATS that simulates failure of the primary normal power source and then transfers the load to the EPS.

Committee Statement:
The word "primary" used to describe the power source referenced in this paragraph is not consistent with other NFPA documents. NFPA 70 and 99 both use "normal" to describe this power source in multiple places. The word "normal" is also the conventional term used in the electrical power industry and by most equipment manufacturers on their products and literature describing this power source and the transfer switch position.
6.2.16.1 Interlocking.

Reliable mechanical interlocking or an approved alternate method shall prevent the inadvertent interconnection of the primary power source and the EPS.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Fri Sep 09 14:25:48 EDT 2016

Committee Statement

Committee Statement: The word "primary" used to describe the power source referenced in this paragraph is not consistent with other NFPA documents. NFPA 70 and 99 both use "normal" to describe this power source in multiple places. The word "normal" is also the conventional term used in the electrical power industry and by most equipment manufacturers on their products and literature describing this power source and the transfer switch position.

Response Message:
6.3 Load Switching (Load Shedding). Requirements for Paralleled Generator Sets.

When two or more engine generator sets are paralleled for emergency power, the paralleled system is the source, and system logic shall be arranged to inhibit connection of EPS-damaging loads manage the loads to maintain power quality.

6.3.1
Each transfer switch shall have a continuous current rating and interrupting rating for all classes of loads to be served.

6.3.2
The transfer switch shall be capable of withstanding the available fault current at the point of installation.

6.3.1
The transfer of loads to the EPS shall be sequenced as follows:

(1) First-priority loads shall be switched to the emergency bus upon sensing the availability of emergency power on the bus.

(2) Each time an additional engine generator set is connected to the bus, a remaining load shall be connected in order of priority until all emergency loads are connected to the bus.

(3) The system shall be designed so that, upon failure of one or more engine generator sets, the load is automatically reduced, starting with the load of least priority and proceeding in ascending priority, so that the last load affected is the highest-priority load.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address: [Not Specified]
City:
State:
Zip:
Submittal Date: Wed Sep 07 16:13:28 EDT 2016

Committee Statement

Committee Statement: The title "Load Switching (Load Shedding)" was too specific and only described 6.3.3.(3). Section 6.3 and the underlying text are about the requirements for transfer switches used with paralleled generator sets. The last part of the sentence was changed to clarify that the system logic is managing the loads, whether it's priority pickup (when gensets are coming on line), or load shed (if a genset fails). This revision also clarifies that the paralleled system is the source, so that ATS ratings can be correctly chosen.

The requirements in 6.3.1 and 6.3.2 are deleted since they are already covered 6.1.4 and 6.1.5.

Response Message:

Public Input No. 47-NFPA 110-2016 [Section No. 6.3]
Public Input No. 30-NFPA 110-2016 [Section No. 6.3 [Excluding any Sub-Sections]]
Public Input No. 31-NFPA 110-2016 [Sections 6.3.1, 6.3.2]
7.9.13
Automatically actuated valves shall not be permitted in the fuel oil supply or fuel oil return lines for Level 1 emergency power supply systems.

Submitter Information Verification
Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 16:36:23 EDT 2016

Committee Statement
Committee Statement: Based on reliability of fusible links or other automatically actuated valves, NFPA 110 Level 2 generators that do not support life safety systems should be allowed to use automatically actuated valves to protect network or IT infrastructure from fire.

Response Message: Public Input No. 57-NFPA 110-2016 [Section No. 7.9.13]
7.11.6*
For systems in seismic risk areas, the EPS, transfer switches, distribution panels, circuit breakers, and associated controls shall be capable of performing their intended function—during and after being subjected to the anticipated seismic shock.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Sep 07 16:41:04 EDT 2016

Committee Statement

Committee Statement: The revision is made to align the seismic requirements in this document with the International Building Codes (IBC). The IBC requires that generator sets and their support equipment, transfer switches, and switchgear be able to operate after a seismic event.

Response Message: Public Input No. 46-NFPA 110-2016 [Section No. 7.11.6]
First Revision No. 20-NFPA 110-2016 [ Section No. 7.12.3 ]

7.12.3
The wiring between the EPS output terminals and the first distribution overcurrent protective device terminals within the EPSS shall be located at a minimal distance to ensure system reliability and safety.

Submitter Information Verification
Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 17:03:30 EDT 2016

Committee Statement
Committee Statement: This section is redundant with 7.12.1.
Response Message:
A load shall be applied for a 2-hour, full-load test. The building load shall be permitted to serve as part or all of the load, supplemented by a load bank of sufficient size to provide a load equal to 100 percent of the nameplate kW rating of the EPS, less applicable derating factors for site conditions. With full load applied, the coolant temperature of the generator set shall stabilize at a constant value relative to outdoor ambient temperature at least 30 minutes prior to completion of the test.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Wed Sep 07 17:06:48 EDT 2016

Committee Statement

Committee Statement: In general, a 2-hour full load test is sufficient to verify that a generator will carry rated load successfully. However, in order to verify that high load levels will not cause eventual cooling system failure, the coolant temperature should be observed to stabilize prior to stopping the test.

Response Message: 
Public Input No. 34-NFPA 110-2016 [Section No. 7.13.4.3 [Excluding any Sub-Sections]]
7.13.4.5
All safety specified in 5.6.5 and 5.6.6 shall be tested on site as recommended by the manufacturer.

Exception No. 1: It shall be permitted for the manufacturer to test and document overcrank, high engine temperature, low lube oil pressure and overspeed safety prior to shipment.

Exception No. 2: Where the safety functions are proven to be fail-safe as demonstrated by monitoring of normal conditions on engine metering and demonstration that a failed sensor or circuit will not cause shutdown of the engine, further testing of the safety is not required.

Submitter Information Verification
Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address: 
City: 
State: 
Zip: 
Submit Date: Wed Sep 07 17:09:09 EDT 2016

Committee Statement
Committee Statement: Engines that utilize analog sensors and verify the operation of protective functions by setting trip points at normal operating values of parameters demonstrate proper safety shutdown operation.

Response Message:
Public Input No. 35-NFPA 110-2016 [Section No. 7.13.4.5]
First Revision No. 23-NFPA 110-2016 [Section No. 8.4.2]

8.4.2*
Diesel generator sets in service shall be exercised at least once monthly, for a minimum of 30 minutes, using one of the following methods:

1. Loading that maintains the minimum exhaust gas temperatures as recommended by the manufacturer
2. Under operating temperature conditions and at not less than 30 percent of the EPS standby nameplate kW rating

8.4.2.1
The date and time of day for required testing shall be decided by the owner, based on facility operations.

8.4.2.2
Equivalent loads used for testing shall be automatically replaced with the emergency loads in case of failure of the primary source.

8.4.2.3*
Diesel-powered EPS installations that do not meet the requirements of 8.4.2 shall be exercised monthly with the available EPSS load and shall be exercised annually with supplemental loads at not less than 50 percent of the EPS nameplate kW rating for 30 continuous minutes and at not less than 75 percent of the EPS nameplate kW rating for 1 continuous hour for a total test duration of not less than 1.5 continuous hours.

8.4.2.4
Spark-ignited generator sets shall be exercised at least once a month with the available EPSS load for 30 minutes or until the water temperature and the oil pressure have stabilized. The date and time of day for required testing shall be decided by the owner, based on facility operations.

8.4.2.4.1
The date and time of day for required testing shall be decided by the owner, based on facility operations. Equivalent loads used for testing shall be automatically replaced with the emergency loads in case of failure of the primary source.

8.4.2.4.2
Equivalent loads used for testing shall be automatically replaced with the emergency loads in case of failure of the primary source.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address: [Not Specified]
City: [Not Specified]
State: [Not Specified]
Zip: [Not Specified]
Submittal Date: Wed Sep 07 17:18:00 EDT 2016

Committee Statement

Committee Statement: Load level on natural gas generator sets can be qualified in the same way that they are for diesel generator sets, with the primary difference being that the required exhaust gas temperature level is different, and it takes considerably less load to reach that temperature. Separate paragraphs for diesel and natural gas generator sets are not needed.

Preventing damage/degradation in the engine is not the only concern with generator sets: operating them at load helps to drive moisture out of the electrical portions of the system so they are less likely to fail. So, even if the gas genset may run a few more hours a year than might be allowed with the current rules, the effect on the generator is beneficial.

Response Message:

Public Input No. 37-NFPA 110-2016 [Section No. 8.4.2]
8.4.9.7*
Where the test required in 8.4.9 is combined with the annual load bank test, the first 3 hours shall be at not less than the minimum loading required by 8.4.9.5 and the remaining last hour shall be at not less than 75 percent of the nameplate kW rating of the EPS, and the duration of the test shall be in accordance with 8.4.9.1 and 8.4.9.2.

Submitter Information Verification

- **Submitter Full Name:** Chris Coache
- **Organization:** [ Not Specified ]
- **Street Address:**
- **City:**
- **State:**
- **Zip:**
- **Submittal Date:** Wed Sep 07 17:29:19 EDT 2016

Committee Statement

- **Committee Statement:** This revision simplifies and clarifies the requirements of this section.
- **Response Message:**
  
  *Public Input No. 15-NFPA 110-2016 [Section No. 8.4.9.7]*
A.3.3.4 Emergency Power Supply System (EPSS).

Where multiple generators are connected together on a common bus, the common bus is considered to be the system source. See Annex B for diagrams of typical systems.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 09 11:42:23 EDT 2016

Committee Statement

Committee Statement: Recognizing the system bus for multiple generator systems will clarify design requirements for things such as grounding and bonding of the system, and selective coordination of the distribution system connected to the generator source.

Response Message:

Public Input No. 24-NFPA 110-2016 [Section No. 3.3.4]
A.5.1.1(1)
The grade of diesel fuel selected for use in a prime mover should be based on recommendations from the diesel engine manufacturer and ASTM D975, Standard Specification for Diesel Fuel Oils. Where possible, the purchaser of fuel for the prime mover should specify a diesel fuel that does not contain biodiesel, which can accelerate the degradation of the diesel fuel if stored longer than 6 months. If diesel fuel is stored outside for long-term storage, it can be necessary to use a winter or arctic grade of diesel fuel or to take precautions such as insulating and heat-tracing fuel tanks and lines to ensure that fuel will flow to the prime mover under the coldest possible conditions.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 17:32:10 EDT 2016

Committee Statement

Committee Statement: Biodiesel is not recommended in a standby generator set.
Response Message:

Public Input No. 38-NFPA 110-2016 [Section No. A.5.1.1(1)]
First Revision No. 26-NFPA 110-2016 [Section No. A.5.6.4.6]

A.5.6.4.6
It is intended that the battery charger be factory-built, adjusted, and approved for the specific type, construction, and capacity of the battery. For lead-acid batteries, the battery charger should be tested for the specific gravity, type, and concentration of grid alloys, such as high or low gravity, high or low antimony, calcium, or none.

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 07 17:50:30 EDT 2016

Committee Statement

Committee Statement: Section 5.6.4.6 relates to battery chargers not to batteries.
Response Message:

Public Input No. 39-NFPA 110-2016 [Section No. A.5.6.4.6]
A.6.2.15

ATSs can be provided with accessory controls that provide a signal to operate remote motor controls that disconnect motors prior to transfer and to reconnect them after transfer when the residual voltage has been substantially reduced. Another method is to provide in-phase monitors within the ATS in order to prevent retransfer to the primary source until both sources are nearly synchronized. A third method is to use a programmed neutral position transfer switch. See Section 230.95 of NFPA 70, National Electrical Code.

Submitter Information Verification

Submitter Full Name: Chris Coache
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Street Address: [Not Specified]
City:
State:
Zip:
Submittal Date: Wed Sep 07 18:01:31 EDT 2016

Committee Statement

Committee Statement: NEC Section 230.95 describes ground fault protection which has nothing to do with transfer switch operation when switching inductive loads.

Response Message:

Public Input No. 41-NFPA 110-2016 [Section No. A.6.2.15]
Annex C  Informational References

C.1  Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

C.1.1  NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

C.1.2  Other Publications.

C.1.2.1  ANSI Publications.
American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

C.1.2.2  ASCE Publications.
American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191.

C.1.2.3  ASTM Publications.
ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

C.1.2.4  IEEE Publications.
IEEE, Three Park Avenue, 17th Floor, New York, NY 10016-5997.

C.1.2.4  NEMA Publications.
National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1947, Rosslyn, VA 22209.

C.1.2.5  NHC Publications.
National Hurricane Center, 11691 SW 17th Street, Miami, FL 33165-2149.
SLOSH (Sea, Lake and Overland Surges from Hurricanes) Model.

C.1.2.6  U.S. Government Publications.

C.2  Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.
C.2.1 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


C.3 References for Extracts in Informational Sections. (Reserved)

Submitter Information Verification

Submitter Full Name: Chris Coache
Organization: [ Not Specified ]
Street Address:
City:
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Submittal Date: Wed Sep 07 18:07:23 EDT 2016

Committee Statement

Committee Statement: References are changed to current SDO names, addresses, standard names, numbers, and editions.
Response Message:

Public Input No. 2-NFPA 110-2015 [Chapter C]