

2023 NEC Study Guide For “Emergency Systems”

(This Study Guide was prepared by Gaylord Poe)

As an inspector I hear the term “emergency systems” (or “emergency system”) used incorrectly more often than it is used correctly. Electricians, inspectors, vendors, home & business owners often talk about installing, inspecting, selling, or buying an “emergency generator”. An “emergency generator” being the most frequently used term...and most often used incorrectly I might add. To make matters worse, because of this incorrect use, the wrong part of the NEC (Article 700) is also often referenced causing greatly increased installation costs and numerous field “issues”. The basic cause of the confusion is because when the power goes out, the typical person relies on (or wishes they had) an “emergency generator” to bring the power back on until the “emergency” is over. Most power outages are not technically “emergencies” and most generators are not technically “emergency generators”. Let’s look into this further....

How does the NEC define emergency systems? NEC 100 defines emergency systems as systems that are **legally required** by any governmental agency having jurisdiction. It goes on to state that when normal power fails these systems must provide power automatically to supply power *essential* to human life.

So where do I look for NEC rules for non-emergency systems? There are two other Articles. NEC 701 “Legally Required Standby Systems” and NEC 702 “Optional Standby Systems”.

What is a legally required standby system? A legally required standby system is similar to an emergency system in that it is **legally required** but the difference is in what this system supplies. A legally required standby system supplies “non emergency” loads such as HVAC equipment, telephone/radio equipment, smoke evacuation systems, lighting systems (but not egress or emergency lighting), or necessary industrial process systems.

What is an Optional Standby System? An optional standby system differs from the “other two” in that this system **is not legally required** and is chosen only for convenience. Because of this difference, the rules differ greatly from the rules applicable to emergency systems or legally required standby systems.

Important Highlights of NEC 700 – Emergency Systems –

700.2 Provides several Informational Notes that explain the true role of “emergency” for proper NEC application.

700.3 Tests shall be made when first installed and periodically thereafter. Systems shall be maintained. Records of tests and maintenance shall be kept. Tests shall be made under anticipated load conditions.

700.5 Transfer equipment shall be automatic. Transfer equipment shall be identified (by a recognized testing lab) for emergency use. Transfer equipment shall be installed to prevent inadvertent interconnection with normal sources. Automatic transfer switches (1000V or less) shall be listed for emergency system use. Transfer equipment shall only supply emergency loads.

700.6 Audible and visual signals are required (where practicable) to indicate when the system is in use, when it is not functioning, and in some cases when there is a ground fault.

700.7 Signage is required.

700.10 Extreme wiring separation and protection is required. Remember these systems are essential for safety to human life!

700.12 This section lists not only the general requirements for all types of emergency power sources (such as initiation time, location, duration, etc.) but also lists the various types of systems recognized and specific rules applicable for their use.

700.15 Only emergency loads can be supplied by emergency circuits.

700.16 This rule not only spells out the “where” but also the “how” including prohibiting reliance on “any individual lighting element” for sole illumination. It also clarifies that emergency illumination includes egress lighting and exit signs.

Important Highlights of NEC 701 – Legally Required Standby Systems –

Legally Required Standby Systems are clearly defined in this Art. 100.

701.3 Tests shall be made when first installed and periodically thereafter. Systems shall be maintained. Records of tests and maintenance shall be kept. Tests shall be made under anticipated load conditions.

701.5 Transfer equipment shall be automatic. Transfer equipment shall be identified (by a recognized testing lab) for legally required standby use. Transfer equipment shall be installed to prevent inadvertent interconnection with normal sources. Automatic transfer switches (1000V or less) shall be listed for legally required standby system use. Unlike emergency transfer equipment this transfer equipment is not prohibited from supplying other loads.

701.6 Audible and visual signals are required (where practicable) to indicate when the system is in use, and when it is not functioning.

701.7 Signage is required.

701.10 System wiring is permitted to occupy the same raceways, cables, boxes, and cabinets with general wiring.

701.12 This section lists not only the general requirements for all types of legally required standby system power sources (such as initiation time, location, duration, etc.) but also lists the various types of systems recognized and specific rules applicable for their use.

Important Highlights of NEC 702 – Optional Standby Systems –

Optional Standby Systems are clearly defined in Art.100.

702.4 This section is important to understand in that although the load applied to the system is always determined by conformance with NEC 220, this load does not determine the size of the optional standby system. The type of transfer equipment employed determines the size of the optional standby system.

- **702.4(A)(1)** provides that when manual transfer equipment is used the “user” of the system is permitted to manually select the load connected to the system. This can be as simple as the user turning off selected circuit breakers. This rule permits the sizing of the system to be solely at the users discretion.
- **702.4(A)(2)** provides that when automatic transfer equipment is used that (in the absence of automatic load shedding) the standby system shall be sized to the full load being transferred.

702.5 (Exception) Provides that transfer equipment is not needed at all if a portable generator is used, the “conditions of maintenance and supervision” ensure that only “qualified persons” service the installation, and the normal supply is physically isolated by a lockable disconnecting means or by disconnection of the normal supply conductors.

702.6 Audible and visual signals are required (where practicable) to indicate that the system is operable and/or in use and carrying load except for when portable generators are employed.

702.7 Signage is required.

702.10 System wiring is permitted to occupy the same raceways, cables, boxes, and cabinets with general wiring.

**** See NEC 100 – Definitions – For the NEC definitions of “Approved”, “Automatic”, “Equipment”, “Identified”, “Listed”, “Qualified Person”**