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PowerHour FAQs

NEC 2017 Code Changes for Emergency Power Systems

The 2017 National Electrical Code (NEC) introduced provisions that impact emergency power system design. First, the start signal between the power transfer equipment (e.g., transfer switch) and the generator set controller must have fail-safe operation if the start signal wiring is compromised. The other new regulation addresses temporary power source connection requirements during generator set maintenance or repair. Topics will include a review of exceptions, NEC amendments, and recommended solutions.

To learn more about NEC code changes please join the Cummins PowerHour webinar:

Following this PowerHour participants should be able to:

- Identify key NEC 2017 code changes and related Tentative Interim Amendment (TIA)
- Describe start signal integrity and temporary generator set connection requirements
- Recognize compliant solutions for start signal integrity and temporary generator set connection provisions

Does NEC 700.3 now require that a temporary generator be available when the system operator needs to perform a simple oil change?

The short answer is yes. If you read the NEC requirement, NEC is suggesting if your permanent generator source is offline for service or maintenance, you as a designer need to provide a connection point for a temporary generator set so that a temporary source of power is available during maintenance. So, yes, NEC is indicating that there needs to be a temporary source of power available any time your permanent generator is offline. However, as a design principle you cannot always ensure that a generator will be available—that's up to the system operator. You simply need to provide a permanently-installed connection point, so that a temporary generator can be connected quickly and without error. The connection point for the temporary generator must be marked with the phase rotation and system bonding requirements.

How do Cummins generator sets meet the new NEC requirement for start signal integrity?

The AUX A and AUX B contacts are integral components of the generator set. The generator set ships from the Fridley manufacturing plant pre-configured and meeting all code requirements. No user input is required.

If you have multiple generators supplying a facility, do you still need to provide a temporary generator set back-up in case one of the permanent generators goes down?

If you have multiple generators and each generator is capable of carrying the full emergency load for the facility, and your power transfer system is configured to connect emergency loads first within the NFP 110 specified time (usually 10 seconds), then Cummins interprets the rule to mean a temporary back-up is not required. Any of the other generator sets that are operational would in effect serve as the emergency back-up.

Why did NEC add the new requirement for an added temporary source of power? This will mean a substantial increase in the cost for life safety systems. Was there a particular incident or problem that motivated the NEC to make this change?

I really don't know what motivated this change, but my interpretation is that they were anticipating a scenario where there's a single back-up power source that is unavailable while being serviced, and the utility happens to fail at the same time. NEC wants to ensure that emergency loads always have power available. We see this type of configuration in the field at hospitals, where lives are depending on it. It does add cost and may seem redundant for less critical applications, but NEC's intention is to protect lives and property and I think that was their concern.

Does the NEC requirement for a monitored start circuit apply to legally-required and optional standby generators as well as emergency generators?

No, NEC doesn't require start circuit integrity for anything other than emergency loads, so only the emergency circuit must meet the start circuit integrity requirement. You can, of course, apply this standard to other loads as well, but NEC doesn't require it.

If a fire pump is applied, does it need to be supported by the docking station as well? If the fire pump is fed from two or more breakers on the generator set, how do you recommend applying a docking station in this scenario?

This is a situation where you need to consult with your local inspector or authority having jurisdiction (AHJ) to understand their interpretation of NEC 695, the section covering fire pumps. I think you have to have a docking station. It's a little complicated but I think it would be possible to design a connection for supplying power to both the emergency loads and the fire pump. The system would look something like the example I used earlier showing multiple transfer switches connected to the same temporary back-up generator.

Is it correct to say that dual breakers tap boxes can have both breakers set to meet the selective coordination and have arc energy reduction means?

Yes, if you have a dual breaker system, it should be selectively coordinated. That way if you bring in a portable generator that's much bigger than your permanently installed generator and you tune down the breaker to meet the maximum load, it's easier for the AHJ to approve it. Also, make sure you have a good design that isolates faults if they do happen while the system is connected to the temporary generator.

Is the start circuit integrity requirement for emergency circuits only applicable for certain occupancies? For example, an assembly facility for more than 1,000 occupants, or a high-rise, healthcare or education facility for more than 300 people?

Yes, that's correct. If you look at the Emergency Load section under NEC 700, there is a definition of what is covered under the emergency load provision. I believe your examples are correct — as long as the application qualifies as an emergency system it must meet the requirements for an emergency load.

Are Kirk keys an absolute requirement when using breakers?

That's a good question. Kirk brand keys are the most common way of providing an interlock, but NEC doesn't specifically say "Kirk keys." There are other types of interlock but Kirk keys are the most prevalent. NEC just says there has to be an interlock, either mechanical or electrical. A Kirk key is a mechanical interlock but NEC also permits electrical interlocking. NEC just wants to be sure that the two sources are never connected to each other.

What intervals does Cummins recommend for emergency generator set maintenance and inspection?

We strongly recommend that you test for at least 30 minutes every month, with a 30% or more load. NFP 110 also has a recommended testing schedule, so you should check the NFP 110 to verify the minimum required testing. As long as you follow our recommendation and meet the NFP 110 requirement, you'll be good.

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Are existing, commissioned emergency systems which do not meet the new requirements grandfathered in or exempt from the new requirements, or must they be modified to be compliant?

Typically, older installations do not need to meet new NEC requirements or updates. But if you think something has changed that might need additional inspection, you should contact your electrical inspector or AHJ to determine if any modifications are required.

Is a portable generator required when a permanently-installed generator is being tested using a load bank?

I believe not. If your permanently installed generator is being tested using a load bank, and your utility fails during the test, ideally you should have a method for dropping the load bank and transferring the power back to your emergency system. If you have an emergency start signal, you may be able to wire that to the load bank system so that in the event of a utility failure, the load bank automatically disconnects so that the generator set is available at full capacity to pick up the emergency load.

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