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PowerHour FAQs

NFPA 110 Overview for Generator Set Emergency Power Systems

The purpose of the NFPA 110 Standard for Emergency and Standby Power Systems is to outline performance requirements for emergency and standby power systems installed in facilities that provide backup electrical power when the primary source fails. This webinar will outline some of the key requirements as they pertain to applications utilizing engine-driven generator sets as the Emergency Power Source (EPS).

To learn more about NFPA 110 for generator set emergency power systems, please join the Cummins PowerHour webinar:

Following this PowerHour participants should be able to:

- Identify key aspects and intent of NFPA 110 that affect the equipment selection and design of engine-driven generator set emergency power systems
- List various testing and maintenance requirements
- Describe different means of achieving code compliance
- Identify recent updates to the code

Are natural gas generator sets suitable for emergency systems? What additional considerations, if any, need to be taken into account?

Traditionally, diesel generator sets are preferable because they are known for higher power density and durability. So, they have superior starting performance. However, having said that, our natural gas generator sets are catching up in terms of performance. But it depends whether you have rich burn spark-ignited engines or lean burn engines. Cummins spark-ignited generator sets can meet the starting time requirements; however, one caveat is the class requirements for fuel. NFPA requires you to have onsite storage for fuel. So, if you have a natural gas-only generator set, how are you going to meet that requirement if you're having natural gas piped in from the utility?

The local AHJ might not approve fuel supplied by the utility. One way you could design around that requirement is to have a dual fuel system, so you could specify your generator sets with both natural gas and liquid propane gas with an automatic

fuel changeover between the two. This allows you to have the generator set fueled by your natural gas supply from the utility, but in the event of an earthquake or other disaster where that supply becomes disrupted, you then have an onsite liquid propane tank sized to meet the class requirements for the generator sets.

What measures can be taken to ensure the generator sets are protected from flooding?

This is an excellent question, especially if we think about the events that took place after Hurricane Katrina, where many of the generator sets were installed in indoors and were flooded by water. Obviously, electricity and water don't get along, but there are some specific measures within NFPA 110 which provide some guidance. For example, Section 7.2.4 specifically states that EPSS rooms, enclosures, or separate buildings "…housing Level 1 or Level 2 EPS equipment shall be designed and located to minimize damage from flooding, including that caused by the following: flooding resulting from firefighting, sewer water backup, and other disasters or occurrences."

Another requirement is that if possible, the EPS equipment should be located above previous flooding elevations. So, there may be other codes that have more specific requirements, but you have to look at what flood zone you're in. One key factor to be aware of is trending changes in climate patterns. For example, last year alone in the US we had nine 500-year floods in different parts of the country, so that's significant. It's better to design the systems to account for unforeseen circumstances. I know there's a tradeoff between reliability and cost and other factors, but it all depends on your local site conditions.

What are the requirements for selective coordination?

There is a section within the code which does say that selective coordination is required, although it doesn't explicitly use that term. One thing that the code does elude to is that selective coordination should be done to the extent that it's practicable. I think that qualification was put in to deal with the contradictions that currently exist between NFPA 99 and NFPA 70 (NEC National Electrical Code) Article 700, where the NFPA 70 Article 700 requires selective coordination for all current levels, whereas the NFPA 99 only requires selective coordination for time durations from 0.1 second and above.

So, if you look at the Annex section of NFPA 110 it says that it's important that various overcurrent devices be coordinated as far as practicable to isolate the circuits and protect against cascading operations and short-circuit falls. So, although it does emphasize the importance of selective coordination, NFPA 110 does recognize that it may not be practicable to coordinate across all current levels. NFPA 110 does help bridge the gap between the NFPA 99 and the National Electric Code Article 700.

Is there a kW size limit for a natural gas generator to meet Type 10 loads?

I wouldn't say it's a kW size limit. I think it really depends on the combustion—whether it's a rich burn engine or a lean burn engine. So, lean burn natural gas generator sets are designed for combined heat and power applications or continuous load prime power applications. They are very fuel efficient, but at the expense of load pickup capability, because they're running so lean on oxygen. However, rich burn generator sets are different in that they have the right oxygen

and fuel mixture to provide required starting and transient performance. It's important to make sure that you're working with a manufacturer that can verify the performance capability of their natural gas generator sets, but as far as a kilowatt limit I think it all depends on the product portfolio of the manufacturer.

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Note: *All references to codes and standards are based on the latest revisions at the time this course was presented.*

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