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# Docking Station Solution Enhances System Design

Offers Alternate Electric Power Source  
and Improved Maintenance

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## INTRODUCTION

In 2017, NFPA 70, National Electrical Code (NEC) standards included changes for emergency power systems (NEC Article 700). As individual jurisdictions across the nation adopt the latest edition of the NEC at varying rates, generator set manufacturers must update their offerings in order to meet the needs of electric power customers.

## NEC 2017 PROVISION FOR LEGALLY REQUIRED STANDBY SYSTEMS (LRSS)

In the 2017 edition, changes to NEC Article 700.3(F) for legally required standby systems (LRSS) require facilities with an emergency generator set permanently installed to provide an alternate source of electric power in the event that the permanent emergency electric power source is disabled for maintenance or otherwise unavailable.

This provision applies to hospitals, office buildings and many other locations where reliable electric power is critical to ensure the safety of building occupants. LRSS provide power to communications, lighting, ventilation/smoke-removal systems and other loads that are considered essential for safety to human life. Loss of power to these systems could create hazards and interfere with rescue operations during an emergency.

The NEC article states that a facility's emergency system must include permanent switching means to connect a portable or temporary alternate source of power, which must be available for the duration of the maintenance or repair. The permanent switching means for connecting to a portable or temporary source of power must comply with the following:

- Connection to the portable or temporary source of power shall not require modification of the permanent standby system wiring.
- Transfer of power between the normal and emergency sources shall not exceed 10 seconds (in accordance with NEC 700.12).
- Mechanical or electrical interlocking shall prevent inadvertent interconnection of power sources.
- The switching means shall include a contact point that shall annunciate at a location remote from the generator set or at another facility monitoring system to indicate that the permanent emergency source is disconnected from the emergency system. It shall be permissible to utilize manual switching to switch from the permanent source of power to the portable source of power and to utilize the switching means for the connection of a load bank.

## MAINTENANCE/LOAD BANK TESTING CONSIDERATIONS

Prior to the NEC change, it was not uncommon to utilize the generator set's main output breaker as the termination point for temporary conductors used for annual load bank testing. With this method, if a utility interruption occurs, a manual disconnect/connect must take place for the generator set to provide emergency power to the building. This is prominently a challenge for single standby generator set installations. The service provider would need to take the time to reterminate all the feeder conductors before power to the building could be restored.

Alternatively, a dedicated load bank circuit breaker could be utilized. The emergency generator set would be equipped with multiple circuit breakers, with one dedicated to the temporary load bank connection. This solution generally requires a larger generator set footprint and often restricts permanent conduit and feeder conductor connection points at the generator set output terminal box. This method may also result in exposed live parts while the load bank test is being performed.

## DOCKING STATION SOLUTION ENHANCES SYSTEM DESIGN WHILE SAVING TIME AND REDUCING COSTS

Temporary connection boxes, also known as docking stations, are a preferred method that facility managers can utilize to comply with NEC 2017 provisions for LRSS and to enhance the overall system design. This method is typically suitable for single generator set installations. This allows for a more optimized generator set solution in a smaller footprint because space for multiple circuit breakers is not required. A well-designed docking station that includes provisions for temporary generator set and/or load bank connections allows for the use of a single generator set-mounted circuit breaker, thereby reserving the generator set output terminal box and lug connections for the permanent generator set feeder conductors.

Costs for annual load bank testing can be reduced with a docking station because of the minimal labor required to safely terminate temporary cables. If an outage occurs during a load bank test, generator set power is quickly restored to the facility. A safe exterior termination point for a temporary generator set in the form of a docking station will streamline the connections during an unplanned outage, reduce the amount of temporary cable required, reduce the overall costs to install the temporary generator set, eliminate exposed live parts and allow the building to remain secure while a temporary generator set or load bank is connected (indoor generator set installations no longer require building doors to remain open for temporary cable).

Docking stations typically include camlock termination points for temporary cables. This provides a better electrical connection than lugs on a breaker. Mechanical circuit breaker lugs are not intended for repetitive connect/disconnect, which can lead to durability concerns and compromise the integrity of the emergency system.

Docking stations can also be customized for project-specific needs such as:

- Common bus for paralleling of multiple generator sets
- Properly isolated distribution circuit breakers for life safety and fire pump circuit breakers
- Oversized feeder cable entry/termination areas

## CONCLUSION

For a facility manager, well-designed contingency preparedness and regular maintenance plans include an understanding of where and how to safely connect a temporary generator set or load bank to a building's emergency power system. Docking stations are one way to ensure that mobile generator sets can be safely and quickly connected to supply critical power during emergencies or when performing service on existing permanent generator sets. This allows NEC compliance in jurisdictions that have adopted NEC 2017, and design enhancements for all installations.

Whatever configuration best meets a customer's needs, Caterpillar can offer a solution that provides the end user with a better experience, including the increased reliability and longevity of their emergency system.

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