

**White Paper**

**Benefits and Applications of  
Containerized Load Banks**

# Benefits and Applications of Containerized Load Banks

To ensure accurate and reliable load test data, a load bank must meet the requirements for the application. For the toughest environments, heavy duty designs ensure reliability. The following narrative describes how the construction and features of containerized load banks are perfectly suited to a variety of high capacity, load test applications.

## ADVANTAGES OF CONTAINERIZED LOAD BANKS

Industrial machinery such as gen-sets, transformers, uninterruptible power supply (UPS) systems, and chillers are often deployed in standardized containers to facilitate shipping, logistics, and storage. Load banks are no different. Using standard container sizes simplifies logistical planning and space utilization. In addition, containerized load banks present unique advantages in design, capacity, ruggedness, and operational environment.

Robustness is an inherent characteristic of shipping containers, which are continually exposed to harsh, abusive environments throughout their life cycle. Containerized load banks capitalize on this robustness to endure a range of environments without negative effects. While the term “containerized” implies that a standard load bank is placed inside a standard shipping container, enclosures are actually designed specifically to accommodate load bank equipment, and the container is integral to the design. For instance, air duct openings can reduce the structural integrity of standard shipping containers. Consequently, thicker carbon steel is used for floors and ceilings of containers that house load banks. This enables the International Standard Organization to certify these containers because they can handle the wear-and-tear of global shipping as well as the demands of static or moveable applications. Non-containerized load banks cannot claim the same robustness. Without a full protective enclosure, load banks may be exposed to dirt and water and to temperature fluctuations that can shorten service life.

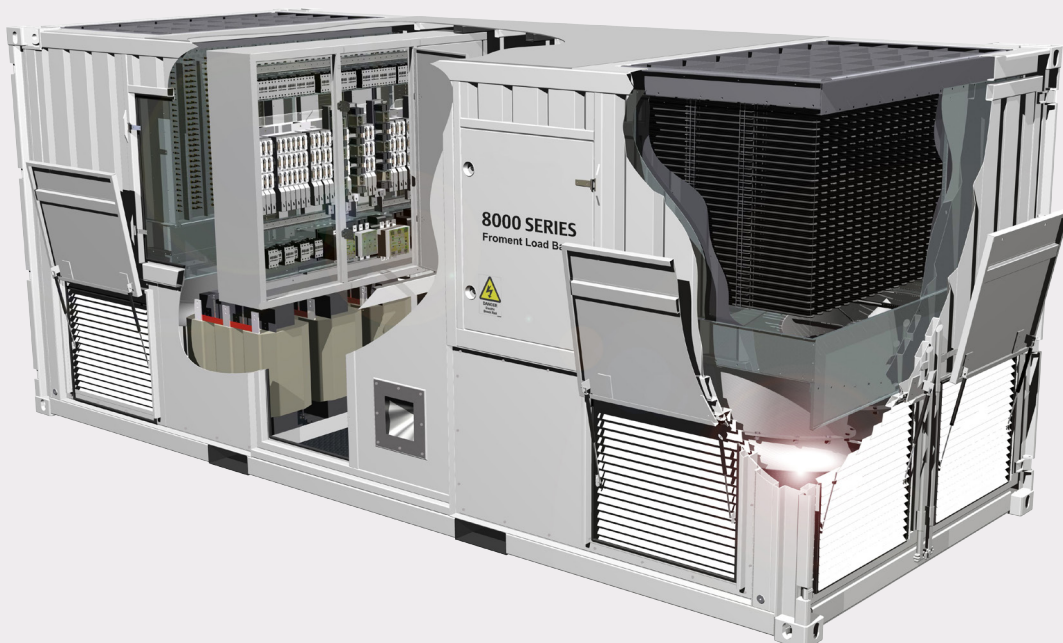


Figure 1: Internal cutaway of an ASCO Froment 8000 Series 20 foot containerized load bank.

The ambient temperature and humidity of the load test environment play a significant role in load bank selection. Many load bank containers are double skinned, allowing for placement of insulating materials within the interstitial space to stabilize internal temperatures. In hot environments, the internal equipment stays cooler, and in cold environments, equipment stays warmer. This thermal stability enhances reliability and reduces risk of component failure. Non-containerized load banks are directly susceptible to temperature fluctuations that can reduce operational life.

An additional advantage of containerized solutions is that the entire volume of the unit is solely dedicated to load bank components and controls. The resulting equipment density allows larger systems to be installed in smaller spaces than conventional load bank equipment.

## DESIGN DIFFERENCES

Many load bank manufacturers offer their own “containerized” load bank solutions. However, there are significant differences available in designs:

- Some manufacturers offer built-in “control rooms”. While control rooms typically are unoccupied when load tests are underway, they provide safe access for pre-test checks, control setup, and maintenance activities. Operators can access the controls and switchgear from inside the unit, an important advantage in inclement climates. Furthermore, switchgear and controls are compartmentalized to increase operator safety and prevent ingress of moisture and dirt. Within the control room, built-in HMI touchscreens can display load bank status, provide local control, and present in-depth diagnostics to an on-site operator. Without an integral control room, pre-test checking and fault finding become more time consuming and complex.
- Integral fans used to cool the resistive elements in a load bank can create high levels of noise. Government regulations often restrict noise levels in urban and residential areas, so reducing noise is essential in these applications. Leading manufacturers of containerized models use various methods to reduce noise levels, including lining enclosures with sound deadening materials, slowing fan speeds, and adding lined ‘pods’ to airflow discharge locations. When noise attenuation measures overly restrict airflow, load banks can overheat. When this occurs, load banks must reduce capacity to levels that can be cooled by available airflow. Careful design, selection, and installation can ensure that load banks will deliver their rated capacity whenever needed.
- In many load test applications, ease of manoeuvrability is necessary for efficient load bank storage and positioning. In addition, weight distribution can affect movability. Leading manufacturers position the heavy inductors on the floor of the container to lower its center of gravity. By strategically positioning fans and resistors, designers can improve balance. Pad eyes facilitate lifting and manoeuvring at sites with limited space, such as oil rigs.
- Leading manufacturers offer circuit breaker options in containerized load banks to protect electrical components from overload or short circuit conditions. Circuit breakers are often specified by equipment rental companies and test cell load bank users.
- In tough coastal and marine environments, an unprotected containerized load bank could be prone to rusting of the enclosure and internal components. Some manufacturers offer special marine paint to protect the enclosure from spray and salt. For even harsher environments the container, internal enclosures, nuts, bolts, fixings, and ducts can be manufactured in stainless steel. Protective measures allow load banks to operate reliably in coastal and marine environments.
- Data centers and industrial facilities are often located in cooler locations to reduce air conditioning costs. However, cold temperatures can cause load bank circuits and components to freeze and cease operation. To prevent these outcomes, containerized load banks can be fitted with cold weather equipment to mitigate the effects of temperatures as low as -20°C. Internal anti-condensation heaters can maintain ambient temperatures and limit moisture accumulation, and extra insulation can be installed in floors, walls, and ceilings.

## CONTAINERIZED LOAD BANK APPLICATIONS

The versatility of containerized load banks allows configuration for a wide range of applications. The following sections describe application considerations for selected typical markets.

### Rental and Service Market

The rental and service market often presents the toughest applications for industrial equipment. Constant movement, environmental variability, and frequency of use require load banks to be rugged, reliable, and versatile.

The structural characteristics of containerized load banks allows rental companies to ship them anywhere without a separate, dedicated shipping container. This simplifies logistics for transporting load banks to rental customers. Because the equipment is contained, equipment strapping and packaging becomes unnecessary. Time is not wasted sourcing trucks that can handle non-standard sizes. Time-to-site is reduced because containerized load banks can be shipped immediately.

Rental and service buyers value robustness because rental load banks are handled and transported more frequently than non-portable equipment. A load bank that cannot handle knocks and bumps is rarely suited for rental applications, and associated repair costs subtract from the bottom line. The thick carbon steel that encloses containerized load banks provides a heavy duty shell to keep internal equipment intact.



Figure 2: A rented 10 foot containerized load bank on a trailer performing a load test at a data center.

Load banks are provided in the same 10, 15 and 20-foot containers used to ship other industrial machinery. Standard dimensions simplify load bank shipping and storage. Many load bank containers have an IP rating such as IP55. This rating demonstrates that an enclosure can resist water and dust ingress that could damage internal equipment.

Load bank versatility is an important attribute for any rental provider. Load banks that can perform multiple functions will be rented more often, increasing revenue. As with standard load banks, containerized models can be custom-built to suit a wide range of specifications. Various capacities, voltages, and control systems can be used to offer load bank solutions that do not require site-specific modification.



## Permanently Installed at Mission Critical Facilities

Mission critical facilities such as hospitals, data centers, and financial institutions typically rely on uninterruptible power supplies (UPS) to provide instantaneous back-up power until generators can start, synchronize, and connect to a facility's power system. Load bank testing of both UPS and gen-sets is essential for verifying operational readiness and averting backup power failure.

Containerized load banks are also well-suited to permanent backup power applications. Their enclosures are sufficiently robust to mitigate adverse environmental effects. Permanent containerized load banks can be kept in the same outdoor locations for years without negative effects.



Figure 3: Two networked 20 foot containerized load banks providing a combined 10MVA of load.

Designing critical facilities is a complex process. Optimizing machinery and equipment locations is vital for effective operation. Because containerized load banks are built to standard sizes, they easily integrate into facility design plans. Furthermore, high capacity containerized solutions allow simultaneous testing of multiple parallel gen-sets. This reduces the area required to provide equal capacity when compared to non-containerized load bank solutions.

## SUMMARY

Containerized load banks offer a range of features that provide unmatched versatility. Heavy duty designs lend themselves to a variety of load test applications, and their size and portability meets primary requirements for many sites. Containerized solutions offer value that makes them one of the most popular types of load banks.

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