

White Paper:

The Advantages of LECTRUS Equipment Centers over Conventional Site Built Structures

Foreword

Electrical equipment centers have been in existence for decades. These robust, prefabricated, self-contained steel structures typically safeguard low, medium and high voltage electrical equipment, which can include

Switchgear	Racks and Servers
Motor control	Power distribution units
Drives	Instrument control panels
Relay panels	Heat trace panels
RTUs	Transformers
Generators	Economizers
Rectification	Automatic transfer switches
DCS, PLC, UPS, SCADA systems	Batteries

The equipment center can also serve as an outdoor enclosure for high voltage switchgear when Gas Insulated Switchgear (GIS) equipment is utilized.

In addition, equipment centers often incorporate wide varieties of Auxiliary Systems such as

- Communications
- Fire and Gas detection
- Network connection for smart substations
- Annunciators
- Crew or work spaces

Equipment centers are designed to provide protection from a variety of environmental conditions and contain industrial primary and secondary cooling systems for handling anticipated internal and external heat loads. They are designed and manufactured in accordance with a number of rigorous industry standards, such as ASTM, NEMA, IEEE, NEC, ANSI, OSHA, IBC, UL and CUL (Canada). And of course, an equipment center must comply with local building codes.



The most common designs are self-framing, interlocking wall and roof panels attached to a structural steel base, but Lectrus offers three specific construction types for optimal protection under all applicable environmental or site conditions and risk factors.

Best Choice Considerations

Traditionally, site-built equipment buildings have long been a standard in protecting electrical equipment and

personnel—they ostensibly offer the protection and longevity only a brick or concrete

block building is thought to afford. However, Lectrus is shifting that paradigm by offering a robust, technically optimized, cost-effective, highly-customizable, highly scalable alternative—the modular equipment center. We believe that in the majority of cases, it makes better sense to choose Lectrus equipment centers over traditional, site-built structures.

Features, Benefits and Advantages of Lectrus Equipment Centers

To begin with, Lectrus enclosures offer superior protection, access and scalability over traditional Sheltered Aisle applications. Our equipment centers provide the ideal operating environment for your switchgear, MCCs and other equipment, as well as comfort and protection for the operator and easy access to your equipment for maintenance. All your switchgear or data center equipment is



integrated at our factory within an enclosed, insulated, walk-in, NEMA 3R-rated building, complete with computer floors or other required access. A multitude of design options can be included for personnel access and equipment door configurations. Included in the design of your custom equipment center are wire management, grounding, cable trays, lighting and fire suppression.



Most major switchgear suppliers offer a line of sheltered aisle in single-row or double-row arrangements that typically comply with NEMA 3-R requirements for outdoor installation. Single-row installations consist of a line-up of outdoor switchgear adjacent to a weatherproof walk-in aisle. The overall design provides weather protection and an economy of space; however, it is limited in application flexibility and in the room available for auxiliary equipment.

Table 1 on Page 3 provides a more detailed comparison of equipment center construction and application as an alternative to traditional, site-built NEMA 3-R Sheltered Aisle Switchgear enclosures.

Table 1 - Equipment Center vs. NEMA 3-R Sheltered Aisle Enclosure		
	Equipment Center	Sheltered Aisle Switchgear
Major Electrical Equipment	No Difference	No Difference
Sourcing	One Manufacturer is responsible; enclosure is flexible and can accommodate various equipment	Separate enclosure must be sourced for each type of electrical equipment
Design and Engineering	Complete package designed and engineered by one manufacturer	Purchaser must design and engineer
Foundation	Minimum foundation, i.e., curb type or pier type	Usually requires full slab foundation with relatively large stem walls and footings
Base	Self-supporting, allowing all equipment to be factory leveled before shipment	Purchaser provides channel base and grouting for leveling all equipment
Internal Wiring	Factory wired complete with wiring schematics	Job-site interconnection of control wiring as well as major equipment
External Connections	Easily adaptable to overhead or underground conduit systems	Slab floor mandates detailed and exact conduit location; changes are difficult
Testing	Unit is completely factory tested; customer can complete many pre-energization tests before installation	Each type of equipment is tested at different factories. Witness testing requires more time and travel.
Receiving, Handling & Storage	Arrives in single shipment, usually unloaded in one hour; can be stored indefinitely as integral unit, inherently protected against elements	Purchaser must provide for receiving and storage of multiple units made at different times by different suppliers. This oftentimes involves redundant handling for storage, trucking to intermediate locations and protection during storage from pilferage and other loss, or time due to weather
Installation	Involves minimum number of crafts	NEMA 3-R construction must be field assembled

Lectrus' equipment centers have the flexibility to provide a variety of equipment, interconnected and installed in the same enclosure prior to delivery on-site. Additionally, equipment centers provide superior weather protection and can be insulated and air conditioned to protect sensitive electronic equipment. Sheltered aisle switchgear is limited to the type of non-switchgear equipment that can be housed in the enclosure.

Another significant benefit of choosing a Lectrus equipment center is the added convenience of our integration and testing of third-party electrical equipment at the manufacturing plant, rather than the jobsite. This streamlined solution rids the customer

of the need to coordinate multiple vendors in the manufacturing and component integration processes—and accept delivery from a single company.

And because Lectrus' prefabricated equipment centers are finished at our factory, our customers are relieved of the burden of planning the coordination of on-site labor and construction materials. All skilled trades are managed at each specific Lectrus manufacturing and integration facility, where our customers work with their own dedicated project specialist. With Lectrus, you can be confident that the building of your equipment center will not be delayed due to staff shortages or adverse weather conditions.

In addition to saving you time, equipment centers save you money. The Lectrus equipment center's modularity and mobility allows you to locate equipment such as switchgear and motor control centers close to the processes they control, reducing load cable lengths and translating to cost savings. Special raceways are installed to cut down on massive control or power wiring materials.

Shortcomings of Traditional, Site-built Structures

Conventional shelters and block buildings also possess inherent or potential shortcomings:

- Size limitation is a factor when upgrading, adding or expanding processes or operations employing the use of electrical and electronic equipment, and its accompanying HVAC and cabling.
- Large concrete foundations are the norm with traditional buildings; wiring and cable exits must be carefully planned to preclude the need for significantly modifying the foundation.
- Effective sound attenuation and true structural protection in the event of a catastrophic event are not inherent attributes of a site-built structure, and must be specially engineered into brick or block buildings.
- Site-built enclosures may not be able to endure with long-term integrity the variety of conditions that an equipment center can—such as corrosive environments, high temperatures, atmospheric contaminants or extreme weather.



This is just a sampling of our findings related to limitations of traditional site-built structures. For a more complete list of comparisons between Lectrus equipment centers and site-built enclosures, see Table 2 on Page 5.

Table 2 - Comparison of Equipment Centers to Conventional Site Built Structures		
Aspect	Equipment Center	Conventional Site-Built Building
Tax, Depreciation & Commercial Issues	Taxed and depreciated as equipment over 5 - 7 years, vs. Real Estate over 29 years.	Treated as real estate improvement leading to higher tax schedule, much longer depreciation, building permits, progress inspection, bonding & insurance.
Major Electrical Equipment	Pre-installed, wired and tested at factory before shipment.	Stored, handled, installed, wired and tested on site.
Sourcing	EC manufacturer is responsible for all equipment inside EC.	Separate solicitation, analysis (and often) sourcing of switchgear, building, battery systems, bus duct, etc.
Design Engineering	Complete package designed and engineered by EC manufacturer.	Purchaser, or engaged third party, must design and engineer.
Future Portability	Disconnect line and load cables and the EC is ready to move.	Not feasible. Site-built structures are permanently located.
Future Expansion	EC may be constructed with removable ends for quick and easy future expansion.	Extremely cumbersome, especially with block wall construction.
Foundation	Minimum foundation - piers or ring wall.	Requires full slab foundation with relatively large stem walls and footings.
Size and Accessibility	EC is designed for facilitated access to all electrical equipment with custom-engineered doors and panels.	Requires an average 20 percent larger footprint due to need for additional space required for rear aisle switchgear and motor control space.
Construction	Variety of materials including painted galvanized steel, stainless steel, and aluminum.	Typically, concrete block.
Base	Self-supporting, allowing all equipment to be factory installed and leveled before shipment.	Purchaser provides channel base and grouting for leveling all equipment on site.
Internal Wiring	Factory wired complete with wiring schematics.	Job-site interconnection of control wiring as well as major equipment.
Main Bus	Coordinated by EC manufacturer.	Purchaser coordinates the match up of main buses for different types of equipment.
Bus Duct from Transformers	Checked for ease of assembly.	Purchaser coordinates and assembles bus to switchgear in field for first time.
Grounding System	Integral to EC.	Must be planned and built into foundation.
External Connections	Easily adaptable to overhead or underground conduit systems.	Slab floor mandates detailed and exact conduit location; changes are difficult.
Testing	EC is factory tested; customer can complete many pre-energization tests before installation. Witness testing at one location.	Each type of equipment is tested at different factories. Witness testing requires more time and travel.
Changes	Changes can be made after functional testing and inspection in controlled factory environment.	Requires coordination between various trades, often after initial construction is complete.
Receiving, Handling, & Storage	Arrives in single shipment, usually unloaded in one hour, can be stored indefinitely as integral unit, inherently protected against elements.	Multiple component receiving often involves redundant handling for storage, trucking to intermediate locations, and protection during storage from pilferage or other loss, or lost time due to weather.
Electrical Load Cables	Place the EC near the process being controlled for minimal Load cable runs.	Load cables may have to run excessively long lengths from the conventional building to the process being controlled.
Installation	Involves minimum number of crafts.	Requires many crafts, i.e., carpenters, ironworkers, cement finishers, bricklayers, electricians—all with foremen and helpers.
Schedule	Have the completed EC delivered the day it fits in your critical path.	Requires months of multiple trades and on-site coordination.

On the Other Hand

Lectrus equipment centers are not limited. From design to delivery and installation on-site, your Lectrus enclosure is engineered from the foundation up to anticipate every conceivable future factor, including site conditions, future add-ons and upgrades.

And because Lectrus equipment centers are modular, they are not ultimately limited in size as are traditional buildings. We engineer prefabricated modular structures for single- or multi-level installation, up to 30 feet wide and 200 feet long, with ceiling heights up to 11 feet for hot and cold aisle configurations. Lectrus' interlocking steel wall panel design allows for expansion as equipment needs increase. And our buildings can easily be designed complete with shipping splits for ease of transport and efficient reassembly on the site.

Thirdly, Lectrus builds our durable and long-lasting enclosures to meet and counter the environmental extremes under which your equipment is required to perform. We have built structures designed to greater than 250 PSF floor loadings, 30 PSF roof load ratings, up to 180 MPH winds and capable of withstanding high snow loadings. For blast-resistant enclosures deployed in Class 1, Div. 2 zones, we employ fully-welded deck plate or interlocking panel designs—ideal for both onshore and offshore applications. Our equipment centers can be designed per seismic Zone 4 requirements, fire-rated, and engineered to include offices, bathrooms, maintenance rooms, battery rooms and HVAC rooms—eliminating the necessity for additional buildings at your site.

Finally, prefabricated equipment centers are unlimited in the scope of their industrial application and function: With three construction types available, Lectrus can custom design and engineer an equipment center to accommodate virtually every industrial sector—be it power distribution, power generation, data centers, oil & gas, mining, transportation, wastewater and water treatment—plus a host of other applications.

Making the Wisest Choice Begins Here

If your firm plans on expanding its operations and acquiring additional electrical equipment, we invite you to call us. Lectrus specialists can assist you in your planning and along every engineering step. Our equipment centers can be designed and engineered to the most stringent technical, regulatory, safety and fire standards—and save you time and money.

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