Electrifying a Sustainable Future

STADIUM & ARENA POWER SOLUTIONS

Entertainment & Emergency Power

Why Trust ESL with Stadium Solution

Founding & Early Breakthrough

1991 – UL 508A Panel Shop

1992 – Safety interlocked Module – POLB Pier J

Expansion into Shipyards

2003 - PDUs for Avondale

2004 - Power Distribution Stations for Ingalls Shipbuilding

Innovation & New Markets

2005 – Entertainment Industry – USC Galen Center

2006 – Emergency Power Product Line

2007 – Navy Shore Power Port Hueneme California

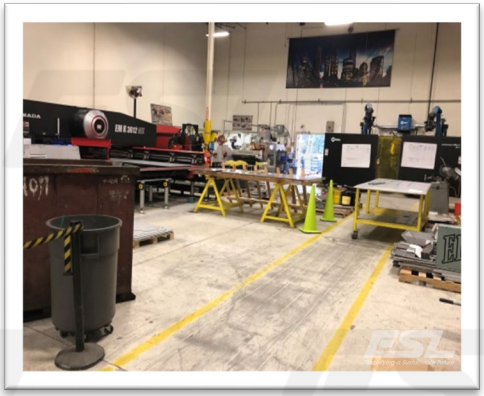
2019 ESOP

2018 – eTRUconnect Product Line

2023 – Doug Roy new CEO

ESL Owns Its Processes

- ESL Engineers And Designs All Equipment
- ESL Fabricates All E-Power Switch Enclosures
- ESL Assembles All of its Units



ESL's "STANDARD" Product

Enclosure Construction (typical)

- Double-coated steel (powder-coated wrinkle gray RAL 7035)
- Built to NEMA 4 standard, labeled NEMA 3R due to cable entry holes for a portable generator

Schneider Square D Breakers (or molded case switches)

Industry Compatible Series 16; 400A rated cam-style quick disconnects (Hubbell, Leviton, Crouse Hinds, others)

Optional Leg Kits

- Voids seismic certification

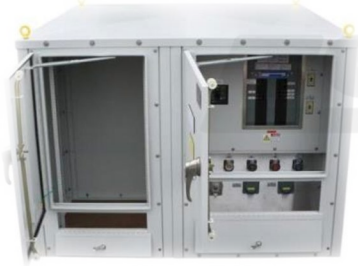
Stadium/Arena Equipment Suite

ShowSwitch
Company Switch

Concert Power Distribution Boards

Pin & Sleeve
Company Switch

Food Service
Power Cabinets



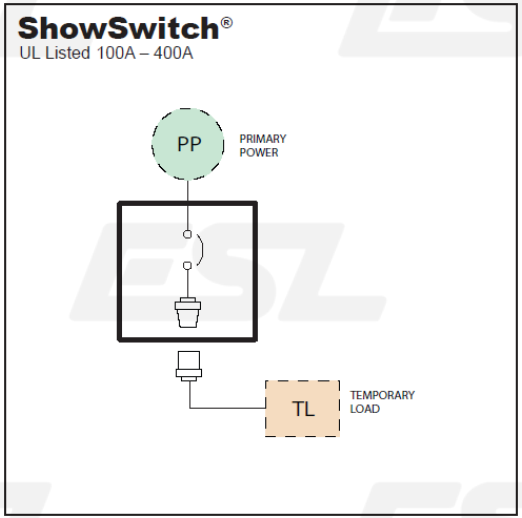
Broadcast Truck
Power Pedestal

ADA/GFCI
Shore Power Pedestals

Generator Docking
Station

What is a Company Switch

- A Company Switch is a specialized type of electrical disconnect that is used extensively in the entertainment industry
  - Lighting
  - Sound effects
  - Video
- Provides a safe, easy, and legal way to tie into building power.
- Standard range supports 100A – 400A
- Company Switches include cam lock receptacles to allow single-pole cam connections to be made quickly and easily.
  - NEC 406.13 Single-Pole Separable Connectors: single-pole separable connectors used in entertainment and similar applications must be listed and labeled; and must be of the locking or latching type.



ShowSwitch® (Company Switch)

UL 891 (Switchboard - Theatrical) Listed Assembly

LEDs Indicate When Power is Available at Connectors

Safety-Interlocked Door for Safe Connection, Operation, and Maintenance.

Type 1 (or Type 3R) Powder Coated Steel Enclosure

Color-Coded Series 16 Cam Style Receptacles

ShowSwitch Company Switches

Alternate Configurations

PAD-MOUNT

Used Outdoors When No Mounting Rack Available
Used to Eliminate Conduit Exposure

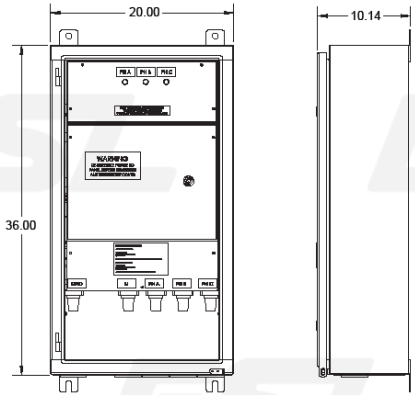
FLUSH-MOUNT

Used in Tight Interior Spaces

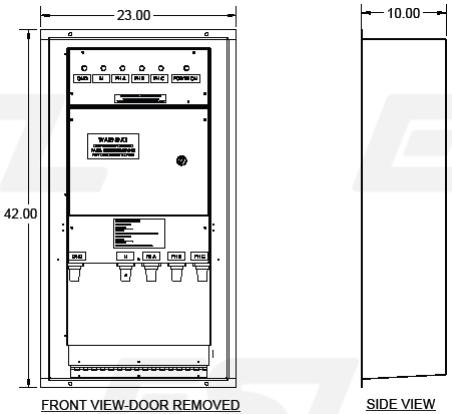
DUAL (COMBO)

Used for Higher Amperages and Eliminates the Need for Multiple Conduits to Individual Units.

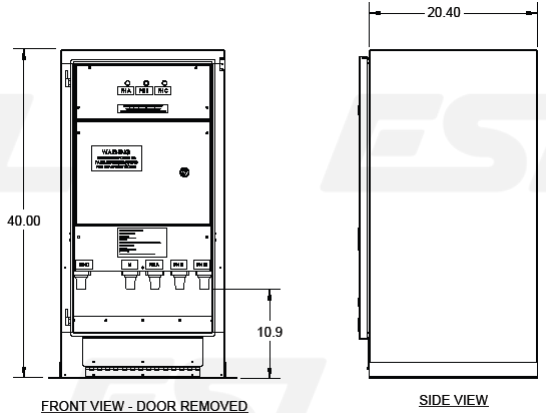
ShowSwitch Frame Sizes



Wall Mount



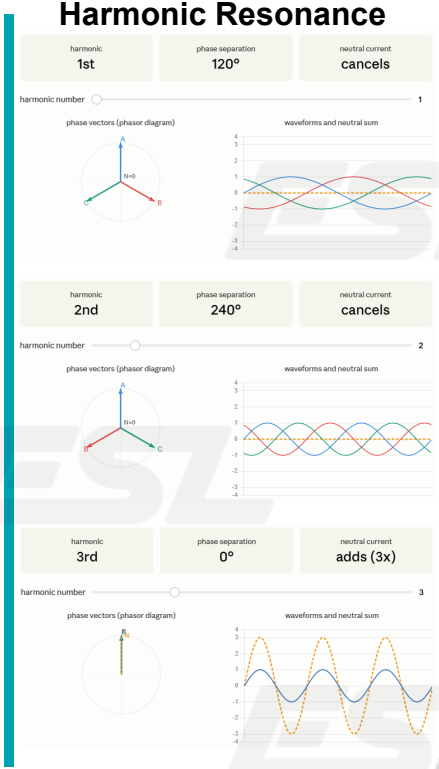
Flush Mount / Flange Mount



Pad Mount

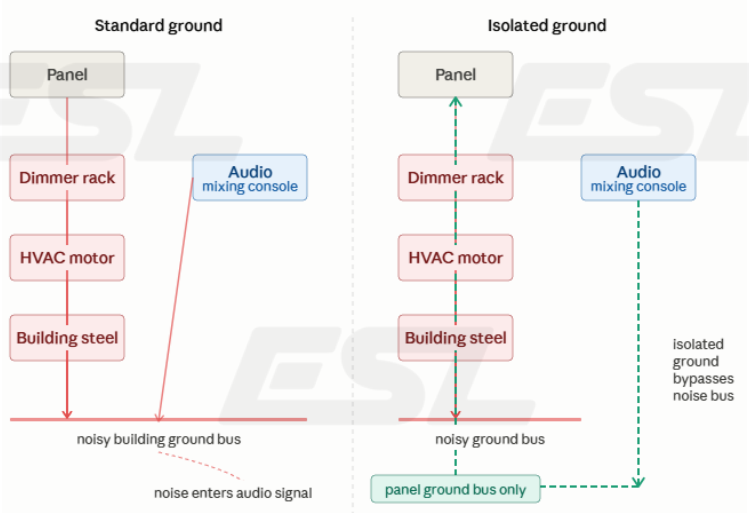
Company Switch Features Harmonics & 200% Neutral

- In a 3-phase system each harmonic multiplies the natural 120 degree phase separation by its harmonic number
- Harmonics landing at 120 or 240 degrees of separation cancel at the neutral, producing zero neutral current
- Dimmer racks are the primary source of 3rd harmonic current in entertainment power, generated by TRIAC phase angle firing that chops the sine wave
- The 3rd harmonic content peaks at approximately 50% dim level, the worst case scenario for neutral heating



Company Switch Features
Isolated Ground

- In a standard installation every metal component is bonded together: panel enclosures, conduit, outlet boxes, building steel, and receptacle ground pins
- This creates a continuous metal network, web, or an antenna.
- Electrical noise from every piece of equipment in this ground network can be picked up by sensitive audio equipment: HVAC, motor controllers, dimmer racks, and fluorescent lights
- When audio equipment shares this noisy ground network the noise enters the signal path, appearing as audible hum, buzz, or interference in the sound system
- An isolated ground bypasses this noisy network by running a dedicated ground conductor back to the panel without bonding to building steel along the way, giving audio equipment a clean noise-free reference point



Company Switch – Distribution Style

- Limited electrical room locations in the venue require consolidating connection points, resulting in longer feeder runs to the stage
- The engineer of record is thinking in switchgear terms, designing a main switchboard lineup rather than distributed show power connection points

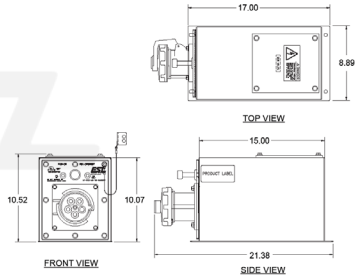
When in this configuration:

- A main circuit breaker in a dedicated compartment feeds a common bus running through the entire lineup
- Each section of the lineup is an individual company switch with its own breaker, safety interlock, indicator lights, and cam-lock outputs
- The common bus ties all sections together under a single main disconnect

Tradeoffs:

- Consolidating into a lineup means longer feeder runs from the electrical room to the stage, increasing cable requirements for each touring production
- Running multiple sets of 4/0 cable feeder sets from a single location to the stage creates significant cable management challenges

Pin & Sleeve Company Switches



- An alternative to the large 400A Company Switch style offerings pin and sleeve receptacles a compact footprint delivering up to 100A.
- Venues such as amusement parks and stadiums often require a compact footprint for set stage applications, e.g. behind columns or under stages.
- IEC 60309 is the internationally recognized standard for industrial connectors, ensuring compatibility with touring equipment from anywhere in the world.
- IEC 60309 dictates keyed, color-coded, locked multipole connectors that cannot be mis-mated, unlike five loose single-pole cam conductors connected in sequence
- To comply with the weatherproofing requirements of NEC 312.2, 406.9(B), and 110.28, Pin & Sleeve Company Switches can be manufactured in NEMA Type 1, 3R, 3RX, or 4X
- Needs an adapter cable if intended for use for equipment using 1016 single pole cams.
  - Sold by ESL if requested.

Broadcast Truck Shore Power

Why shore power:

- Production trucks run diesel generators by default, costly and polluting
- Permanent shore power connection eliminates diesel runtime during broadcasts
- Shore power supports league sustainability commitments: the NFL and NBA are signatories to the *UN Sports for Climate Action Framework*
- CBS Sports reported running the entire 2021 PGA Masters broadcast compound on shore power, saving more than 60,000 gallons of diesel fuel

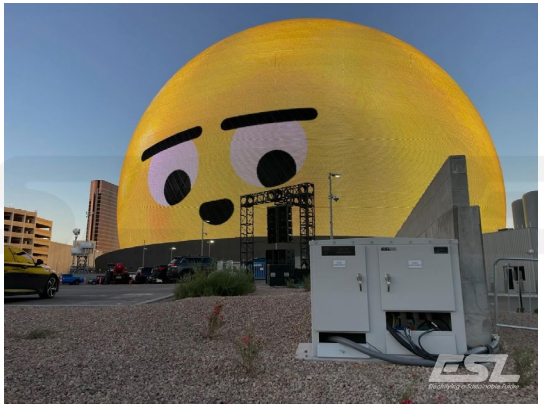
Code Drivers:

- NEC 210.8(B): GFCI protection required for outdoor and wet location receptacles up to 50A single-phase and 100A three-phase
- NEC 406.9(B): weatherproof enclosure required whether or not a cord is connected
- NEC 406.13: single-pole separable connectors (cam-locks) must be listed and labeled, locking or latching type
- NEC Article 408: panelboard must be rated for available fault current, labeled, and in a raintight enclosure outdoors

Broadcast Truck Connections – ESL Solution

Product Overview

- Broadcast power and signal pedestal for production trucks
- Two-compartment design: signal compartment and power compartment



Signal compartment

- Empty 19" rack space at standard spacing for broadcast equipment
- GFCI receptacles inside power the rack-mounted gear
- Trucks slide in satellite/communication modules temporarily during broadcasts

Power compartment

- Powers the truck directly so it doesn't run on diesel — convenience, not critical power
- Panelboard feeding a variety of receptacles
- Receptacle types available
  - 20A, 30A, 50A twist-lock
  - 400A single-pole cams
  - 20A GFCI quadplex
  - 100A or 200A pin & sleeve receptacles

Concessions: Demand Outpaces Throughput

Oracle, "The Fan Experience," 2016 :

- 45% of fans have abandoned a concession line over wait time
- Fans would spend ~$20 more each if waits were cut in half

Oracle, "Sports Fans Call Foul on Long Concession Wait Times at Stadiums," 2019

- 42% of fans say long lines to make an order is the most frustrating aspect of the food and beverage experience
- 53% love the idea of pre-ordering food and drinks before the game

Oracle, "Stadium without Borders," 2022 :

- 42% of fans say long lines to make an order is the most frustrating aspect of the food and beverage experience
- 29% say slow service is frustrating
- 57% love the idea of pre-ordering food and drinks before the game

The takeaway:

- The constraint is throughput, not demand
- More points of sale, closer to fans

NEC Requires GFCI for Concession Power

NEC 210.8(B): Other than Dwelling Units

GFCI protection required for all 125V-250V receptacles on single-phase circuits 50A or less, and three-phase circuits 100A or less, in the following locations:

- (2) Kitchens
- (3) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
- (4) Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking
- (6) Outdoors
- (7) Sinks where receptacles or cord-and-plug-connected appliances are installed within 6 ft of the sink bowl
- (8) Indoor damp or wet locations

NEC 210.8(D): Specific Appliance

GFCI protection required for branch circuits supplying the following appliances rated 150V or less and 60A or less:

- Vending machines
- Dishwashers
- Electric ranges, wall-mounted ovens, counter-mounted cooking units
- Microwave ovens
- Drinking water coolers and bottle fill stations

ESL Concession Power Panels

Flush-mounted or in-wall power enclosures installed in the concourse ring, purpose-built for concession stands and roll-up food carts

What ESL provides:

- Dedicated 20A, 30A, and 50A receptacles for cooking and refrigeration equipment
- Low-voltage pathway for a wired data connection point
- Weatherproof, GFCI-protected outlets
- While-in-use front door assembly restricts access to live receptacles when cords are connected

Typical setup:

- Flush-mounted in the concourse wall
- Roll-up carts and portable stands plug in directly
- Multiple circuits per enclosure to serve adjacent stands

Accessible Seating Needs Power Too

Code Drivers

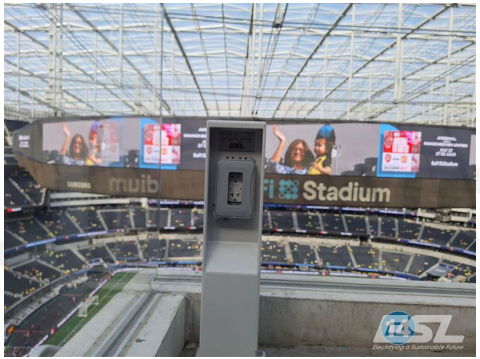
- ADA Sections 308 and 309: outlets in accessible spaces must be reachable from a wheelchair (15" to 48" above floor)
- NEC 210.8(B): GFCI protection required for receptacles in outdoor and wet locations
- NEC 406.9(B): weatherproof enclosure required whether or not a cord is connected

Product Overview

- Freestanding or post-mounted GFCI receptacle pedestals
- Accessible power for powered wheelchairs, mobility devices, and medical equipment
- Compact footprint, designed for aisle and accessible seating installations

Typical configuration:

- 15A–20A duplex or quadplex GFCI receptacles (NEMA 5-15R/5-20R) in weatherproof enclosures



Source: ADA Standards for Accessible Design, Sections 308 and 309 (2010) / NEC 210.8(B) / NEC 406.9(B)

Emergency Backup Power

Emergency systems code requirements

- NFPA 101 & 110 on require backup power for egress lighting, illuminated exit signs, fire alarm/detection, designated emergency elevators, and crowd-facing PA/mass notification systems for ~90 minutes.

Stadiums for usage as disaster shelters

- No North American league mandates full-venue backup generators. Leagues require only local building code compliance for backup power.
- Stadiums are widely used as disaster shelters but are rarely purpose-built for it. During an emergency event temporary generators are a necessity.
- Without a pre-installed hookup point, connecting a temporary generator safely and legally could take days, not hours.
- Caesars Superdomes is equipped with four standby gensets (estimated ~2.2–3.0 MW) cover life-safety only, versus the venue's ~12 MW game-day load.

StormSwitch®

MANUAL TRANSFER SWITCH

TripleSwitch®

PERMENANT & PORTABLE GENERATOR INLET + LOAD BANKING

StormSwitch®

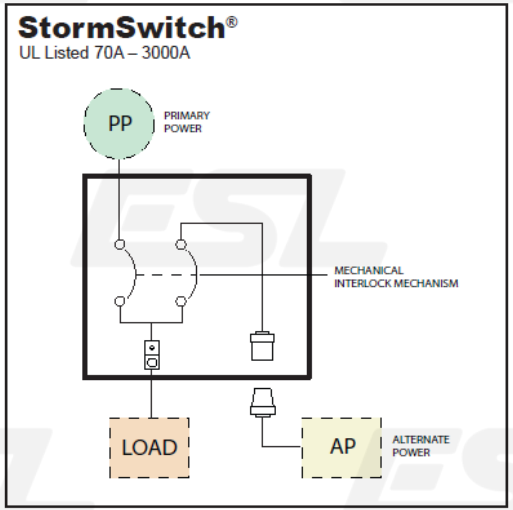
MANUAL TRANSFER SWITCH

UL 1008 Listed 70A – 3000A *AVAILABLE UP TO 5000A*

StormSwitch® provides a reliable solution for connecting a portable generator to grid-tied facilities. In conjunction with an ATS, it can also switch between a permanent generator and a portable generator.

Common Options

- Phase Rotation Monitor
- Generator Start Signal Terminal Blocks
- Shunt Trip & Aux Contacts
- Heater, Thermostat & Humidistat options
- Available in CRS, 304SS, or 316SS
- Above 1200A ERMS and MSS are available
- SUSE Rated
- Options for additional receptacles on the lift or right side of the unit



TripleSwitch®

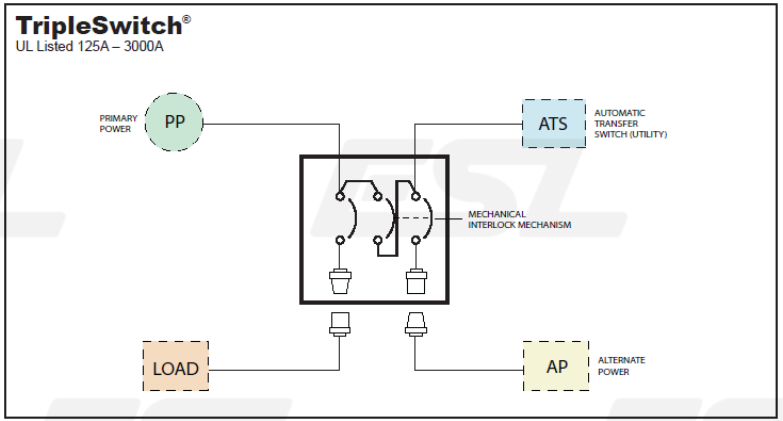
3-WAY MANUAL TRANSFER SWITCH

UL 1008 Listed 125A – 3000A *AVAILABLE UP TO 5000A*

TripleSwitch® is designed to service facilities that are equipped with an automatic transfer switch and a dedicated generator to easily and quickly connect a portable load bank or portable generator such as:

Common Options

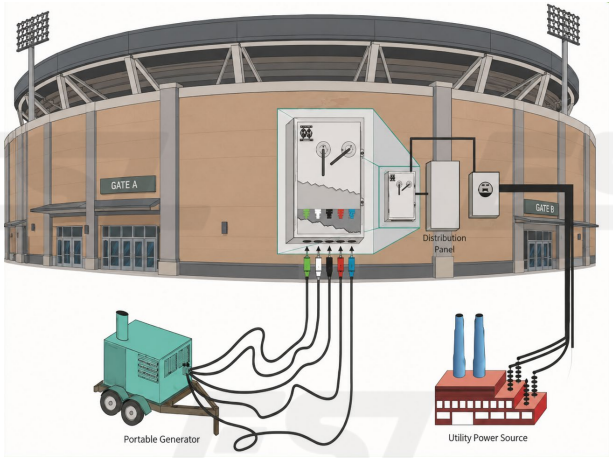
- Phase Rotation Monitor
- Generator Start Signal Terminal Blocks
- Shunt Trip & Aux Contacts
- Heater, Thermostat & Humidistat options
- Available in CRS, 304SS, or 316SS
- Above 1200A ERMS and MSS are available
- Options for additional receptacles on the lift or right side of the unit



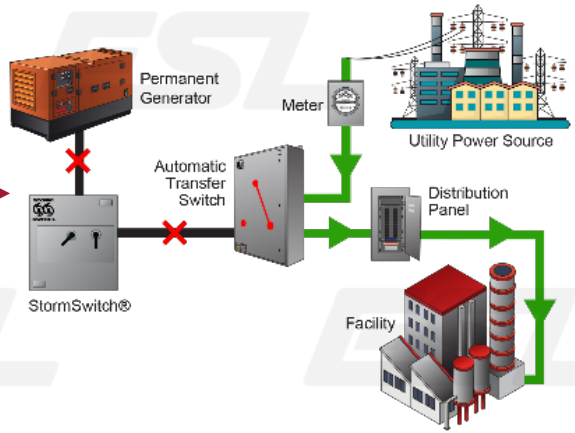
StormSwitch®
MANUAL TRANSFER SWITCH

- Switching between permanent and portable generators

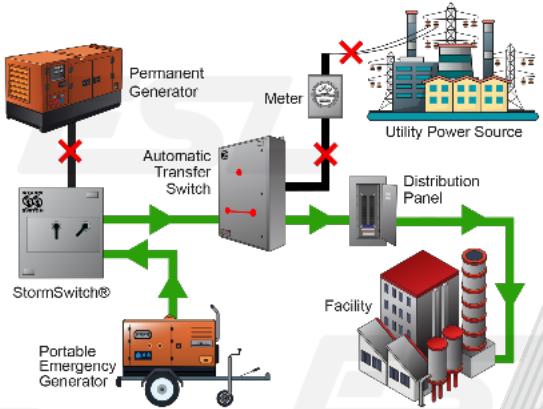
- Switching between utility and portable generator



Normal Operation Using a StormSwitch®

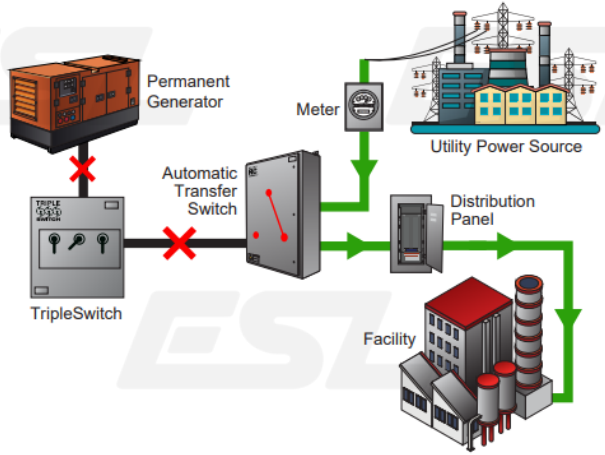


Alternate Operation Using a StormSwitch®

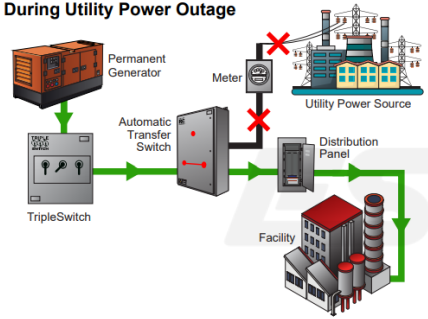


TripleSwitch
OPERATION

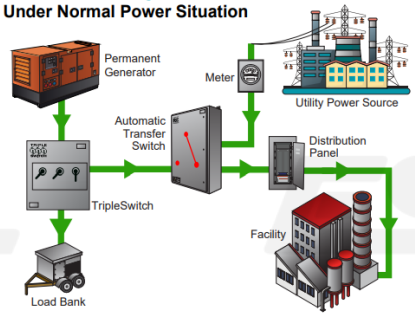
Normal Operation



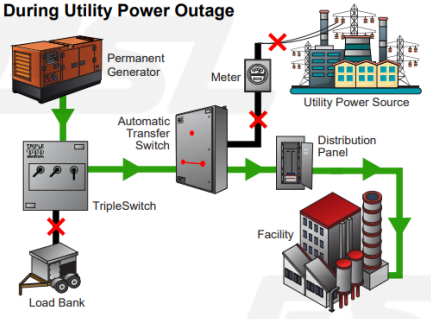
Permanent Generator Running
During Utility Power Outage



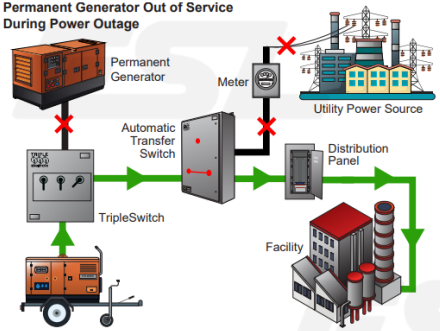
Load Bank Testing
Under Normal Power Situation



Load Bank Testing Shunt Trip Activated
During Utility Power Outage

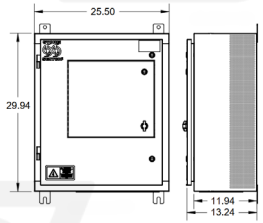


Portable Emergency Generator Connected and Running
Permanent Generator Out of Service
During Power Outage

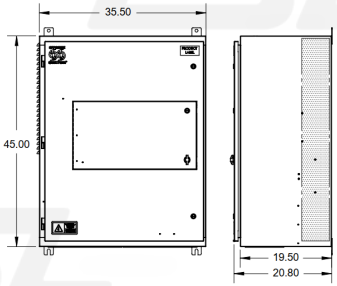


Emergency Product Frame Sizes

Seismic up to 3000A – UL1008 up to 3000A



[70 – 200] UL LISTED



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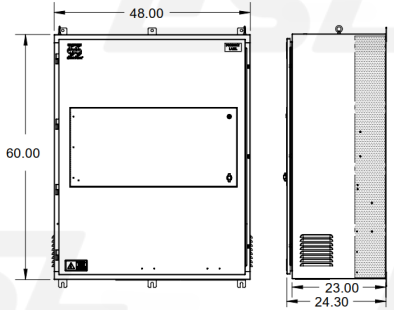

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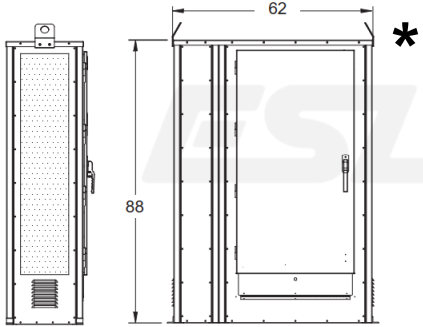

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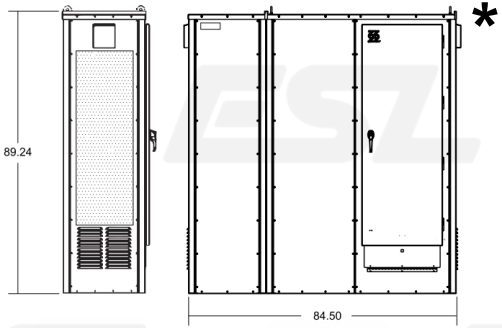
[850 – 1200] UL LISTED



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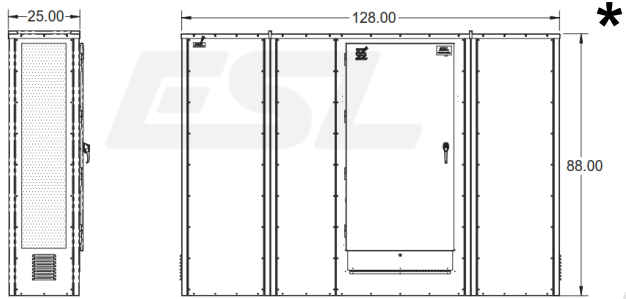
[1200 - 3000] UL LISTED



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[*Up to 5000]

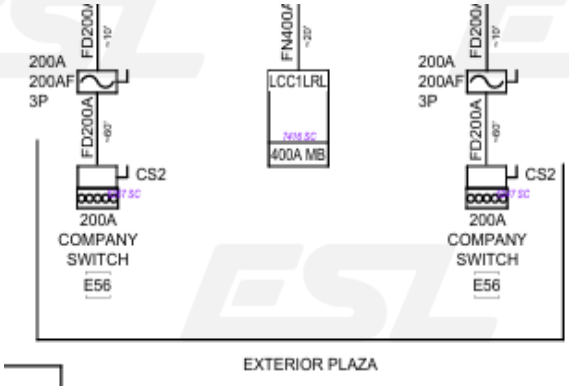
Spotting ESL Opportunities- Company Switch

Industry Standard Language & Application

- **ESL ShowSwitch™ = Company Switch**— the industry standard ESL product for entertainment show power distribution
- **Typical Applications:** Ballrooms, Convention Centers, Stage/Theatrical, Catwalks, LED Screens, Concourses, Outdoor Festival Grounds
- **Common Tag Call-Outs:** Show Power, Camlock/Connections, CS1

Where to look on Drawings

- **Look for cam-style outlet symbols**, panel schedules labeled 'Show Power' or 'CS,' and load schedules referencing touring/event power
- **Power needs**: indoor/outdoor installations- festival grounds, concourse kiosks, tradeshow floors, sounds rooms, venue distribution panels feeding show power outlets in catwalk or stage infrastructure



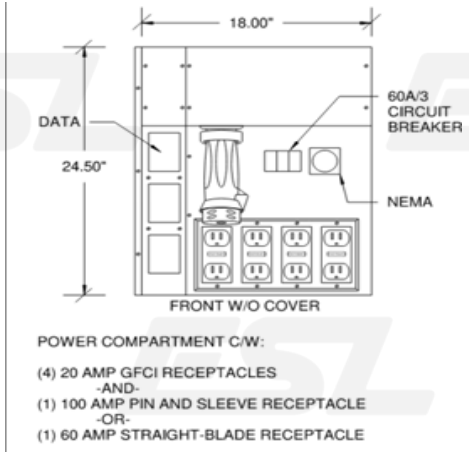
Spotting ESL Opportunities- Broadcast Truck Power

Industry Standard Language & Application

- **Broadcast Truck Power** — Outdoor power & signal compartments in broadcast truck bays for production crews
- **Typical Applications:** Installed in broadcast truck bays, parking lots, and designated service areas around stadiums and arenas
- **Common Tag Call-Outs:** Broadcast Truck Power, Company Switch, Power Pedestal

Where to look on Drawings

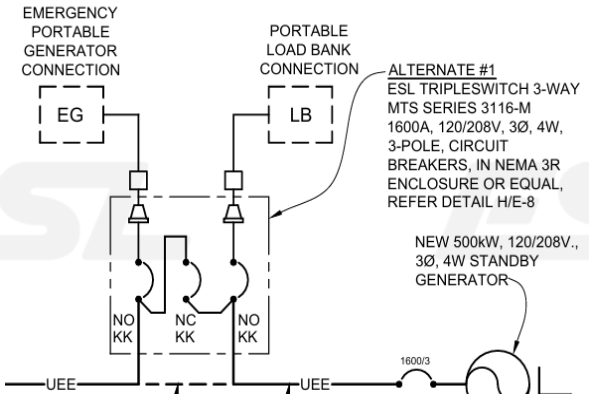
- **Look for** site plans showing broadcast/media truck bays, typically at the stadium bowl perimeter or truck staging areas
- **Power needs**: Broadcast power, media truck bay, remote production power, outdoor event power



Spotting ESL Opportunities- Generator Docking Station

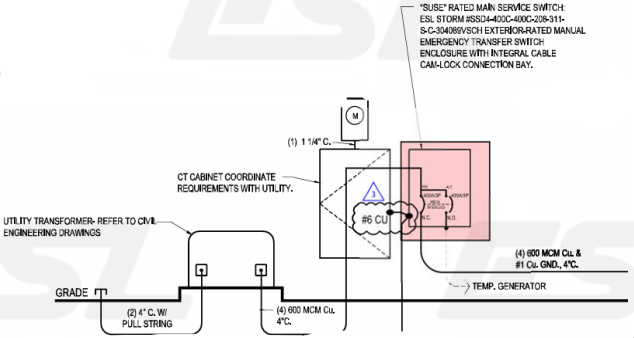
Industry Standard Language & Application

- **ESL TripleSwitch™ = Triple/3 Breaker Docking Station**— handles load bank + temp gen connections simultaneously; ideal for facilities that regularly test backup power
- **ESL StormSwitch™ = Manual Transfer Switch**— designed for temporary generator power connections; simpler configuration for emergency backup scenarios
- **Common Tag Call-Outs:** Docking Station, Temp Gen Connection, Temp Power, Manual Transfer Switch/MTS



Where to look on Drawings

- **Look for** single-lines showing emergency generator systems, ATS (automatic transfer switches), or load bank connections, generator rooms, exterior gen pads, or temp gen staging areas with cam-style connection points
- **Power needs**: Anywhere there is a permanent/temp generator for emergency or temporary back up power requirements



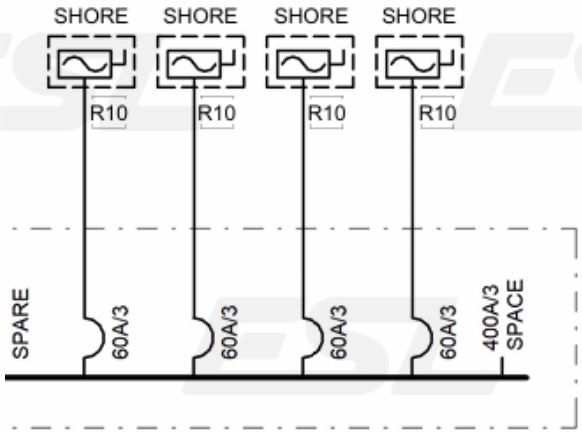
Spotting ESL Opportunities- ADA & Concession Stand Pedestal

Industry Standard Language & Application

- **ADA Pedestals:** Anytime electrical connections are intended for use by the public, performers, or staff in accessible areas of an entertainment venue — ADA compliance requirements apply
- **Concession Stand Pedestals:** Designed for food cart clusters and concession/food service stands throughout venue concourses, plazas, and event spaces
- **ADA Tag Call-Outs:** Shore Power, Power Pedestal, ADA Power Outlet, Accessible Power
- **Concession Tag Call-Outs:** Shore Power, Power Pedestal, Concession Stand Pedestal, Food Service Pedestal, Temporary Vendor Power

Where to look on Drawings

- **Look for:**
    - **ADA** - Fixture schedules referencing GFCI duplex receptacles at pedestal height or with 'accessible' designation
    - **Concession:** floor plans showing concourse power outlet clusters, plaza/exterior power points, or 'shore power' callouts for event vehicles/carts
- **Power needs**:
    - ADA- Near accessible seating areas, performer/crew accessible backstage zones, accessible viewing platforms
    - Concession areas: Look for grouped outlet symbols on foodservice floor plans



Questions

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