

SHORE POWER



— Ship to Shore —

SOLUTIONS

Military and Commercial

ESL
POWER SYSTEMS

eslpwr.com

Shore Power

ESL has established itself as a world leader in the design and manufacturing of safety-interlocks, including ship-to-shore power connection solutions. Our team works with customers worldwide to build custom engineered solutions for military and commercial applications such as:

- US Navy/NATO Ships & Bases
- USCG Ships & Bases
- Container Ships & Ports
- Barges
- Yachts & Marinas
- Cruise Ship Terminals

Increases in maritime shipping and environmental pollution concerns have created a demand for ship-to-shore power solutions that comply with environmental restrictions in ports and harbors. Cold-ironing, a process of ships shutting down on-board generation and then plugging into shore-side power while in berth, can greatly reduce air pollution in neighboring areas.

According to some estimates, cold ironing removes more than three tons of nitrogen oxides (NOx) and 350 pounds of particulate matter from the air in large metropolitan areas. The US Military has used this method for many decades to reduce on-board manpower requirements while in port.

With a continuous commitment to Safety, Innovation, Value, and Customer Service, ESL forges the way in ship-to-shore power connection technology.



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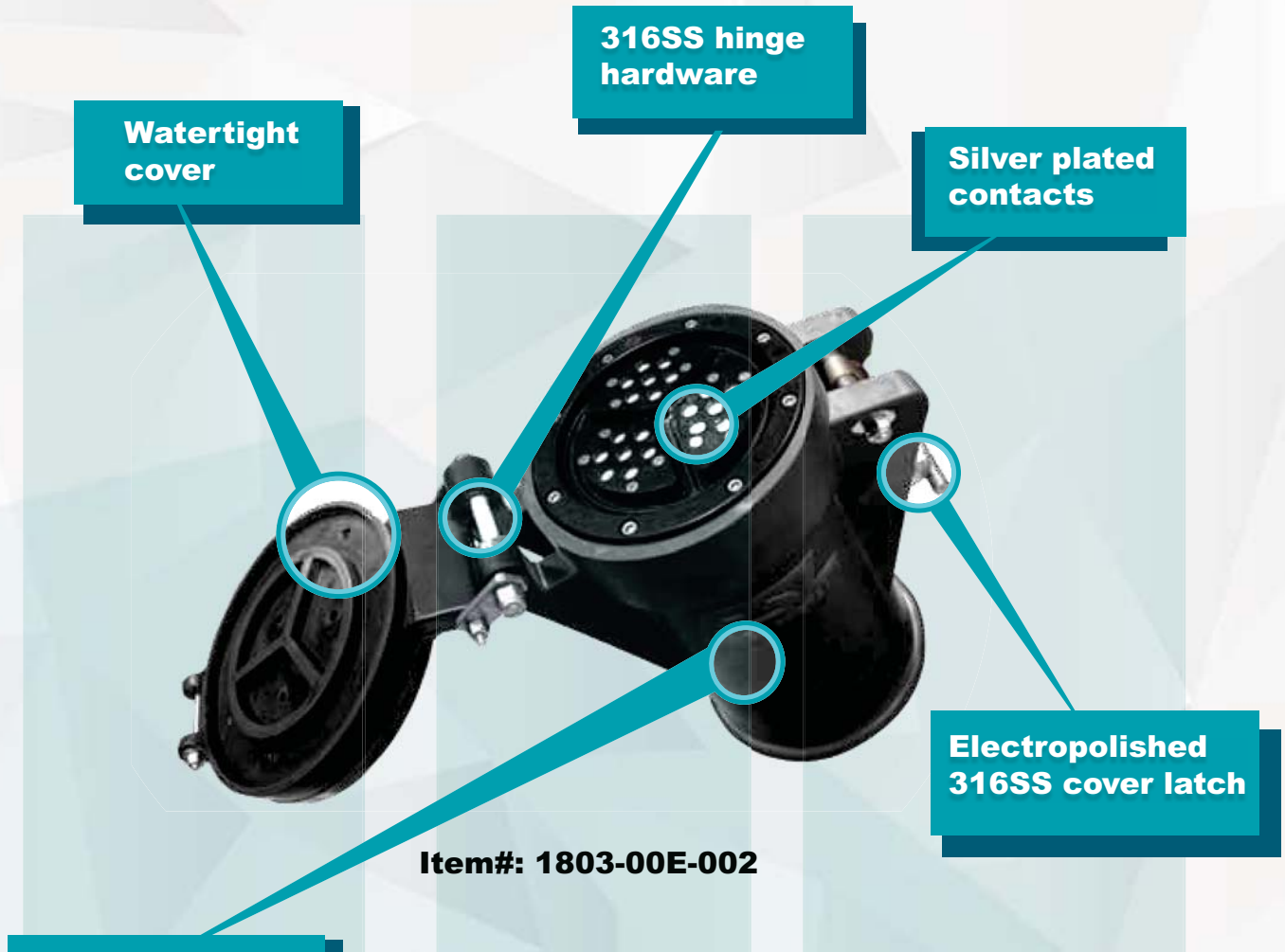
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MIL-C-24368/1 Shore Power Plug

ESL's MIL-C-24368/1 shore power plugs have NAVSEA qualification approval and are listed under QPL-24368. ESL builds the most durable MIL-C-24368/1 plugs on the market; we are the only manufacturer using 316SS electropolished castings and all 316SS hardware. This reduces corrosion and increases longevity in harsh marine environments under extreme and demanding use.

ESL Shore power plugs can be supplied factory-potted with 400MCM or 500MCM customer-specified cable types in lengths up to 1000'. The plug or individual plug components can also be furnished for on-site assembly or repair.

ESL provides world-wide support to customers who need mating and disconnect capabilities for US/NATO shore-power capable vessels. Our commitment to high inventory levels and a responsive production team ensures quick delivery in order to support customer critical needs.



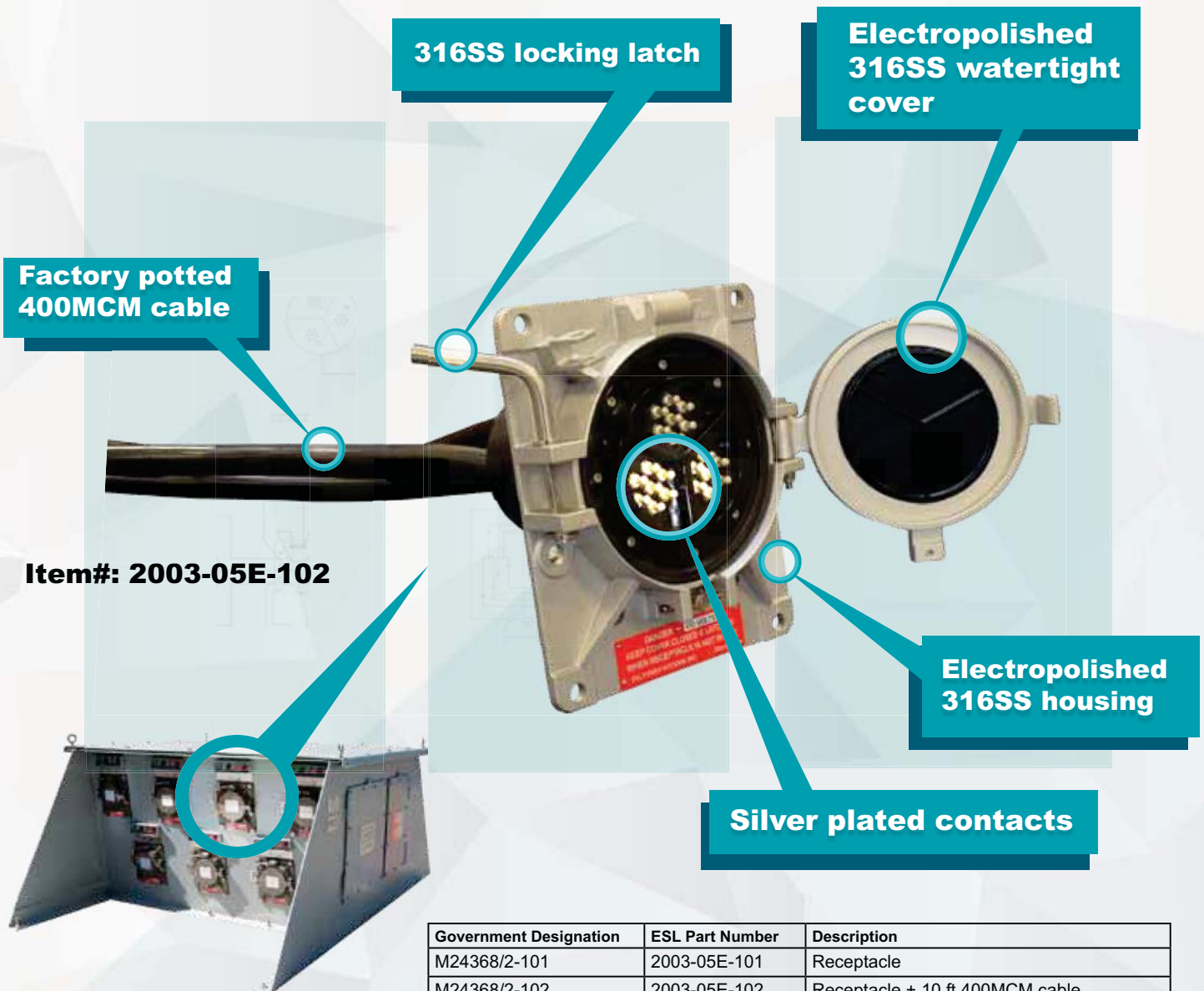
Item#: 1803-00E-002

Government Designation	ESL Part Number	Description
M24368/1-002	1803-00E-002	Plug
M24368/1-003	1803-00E-003	Plug + 10ft THOF-500 cable
M24368/1-003	1803-00E-003-L*	Plug + L = specified cable length

MIL-C-24368/2 Shore Power Receptacle

Like our plug, ESL's MIL-C-24368/2 receptacle is manufactured with the highest quality materials. Only ESL fabricates the heavy cast housing and cover from electropolished 316SS.

These ESL shore power receptacles are typically supplied factory-potted with 400MCM or 500MCM customer-specified cable type in various lengths. MIL-C-24368/2 receptacles can be supplied with 1 or 2 microswitches to enable a safe and convenient means to electrically interlock upstream breakers and connect/disconnect power.



Item#: 2003-05E-102

Item#: 2218-75

Government Designation	ESL Part Number	Description
M24368/2-101	2003-05E-101	Receptacle
M24368/2-102	2003-05E-102	Receptacle + 10 ft 400MCM cable
M24368/2-103	2003-05E-103	Receptacle + 10 ft SHOF-500 cable
M24368/2-104	2003-05E-104	Receptacle + 10 ft THOF-400 cable
M24368/2-105	2003-05E-105	Receptacle + 10 ft THOF-500 cable
M24368/2-106	2003-05E-106	Receptacle + 10 ft TSGU-400 cable
M24368/2-107	2003-05E-107	Receptacle + 10 ft TSGA-400 cable

Ship-to-Shore Power Cables

ESL manufactures military shore power cable assemblies in a variety of connector configurations, cable types, and lengths per customer specifications. Our commitment to high stocking levels for ESL's MIL-C-24368/1 plugs and our agreements with cable manufacturers ensures our customers the best possible lead times. ESL can assist with any of your shore power cable assembly requirements.



Item#: 0920-01-L*

Features:

- 500MCM 3C, enhanced THOF-500E cable
- 500A 500VAC MIL-C-24368/1 plugs at each end
- Complies with NAVSEA specifications
- Up to 1000' lengths



Item#: 0921-22-L*

Features:

- 500MCM 3C, enhanced THOF- 500E cable
- 500A 500VAC Mil-C-24368/1 plug on one end
- (3) 690A 600VAC single-pole connectors on other end



Item#: 0905-81-L*

Features:

- 2/0 3C SHD-GC 15kV cable
- 200A 15kV male power plug on one end, female on the other end



Item#: 0921-20-L*

Features:

- Set of (3) reels each with 500MCM LSSHOF-500 1C cable
- 690A 600VAC single-pole connector on each end; black/black, red/red, blue/blue
- (Only blue/blue reel shown)

*L = required length

Shore Power Adapters & Pass-through Boxes

Cable adapters typically have two different types of connectors/terminations to allow for the interconnection of different shore power configurations. Shore power pass-through boxes provide the ability to connect multiple MIL-C-24368/1 cables when longer distances need to be reached. Pass-through adapter boxes also allow the interconnection of MIL-C-24368/1 plugs to 690A single-pole connector cables.

ESL specializes in custom design and manufacturing of unique ship-to-shore cables and multi-gang adapters. Contact us with your specified cable type and receptacle configuration for a quote.

Cable Adapter

Item#: 0921-18-L*

- MIL-C-24368/1 plug with 236MCM cable
- 690A 600VAC single-pole connectors



500A Pass-through Box

Item#: 5200-05

- 12GA 304SS Type 4X, powder coated enclosure
- (2) MIL-C-24368/2 receptacles factory potted with interconnecting 500MCM cable



MIL-C Phase Rotation Tester

Item#: 1476-16

- For testing of MIL-C-24368/2 receptacles to confirm all phases are properly energized



Front



Back

1600A Multi-gang Pass-through Adapter Box

Item#: 5201-37-US

- 12GA 304SS Type 3RX, powder coated enclosure with forklift pockets
- (4) MIL-C 24368/2 receptacles internally connected to (4) sets of 690A 600VAC single-pole receptacles

ESL's Safety-interlocked M

Ultrabright LED Indicators

- Power available
- Receptacle energized

Safety-interlock Mechanism

- Prevents "making or breaking" under load
- Maximum operator safety

UL 489 Listed Molded Case Circuit Breaker

- 400A (450A & 500A available)
- 100% rated breakers available
- Approved for branch circuits
- Various interrupting capacities available

Emergency Shut Off Button

Item#: 5200-19



ESL's MIL-C Power Module provides a "plug and play" unit consisting of a receptacle, manual disconnect (for short-circuit and over-current protection available), and LED indicator light.

MIL-C Power Module



Item#: 1701-75AB

1/2" OD Stainless Steel Actuator Rod

- Manual disconnect (push-pull)
- Superior corrosion resistance
- Withstands extreme use/abuse

All Stainless Steel Faceplate and Framework

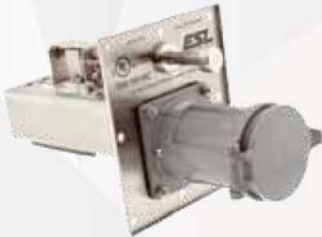
ESL's MIL-C-24368/2 Receptacle

- Corrosion resistant 316SS
- Watertight cover protects contacts from contamination
- Accepts all MIL-C-24368/1 plugs

Provides the operator with an integrated (1) ESL QPL listed MIL-C-24368/2 rod, safety-interlocked circuit breaker protection (various kAIC ratings) and more.

ESL Shore Power Safety-interlocked Modules

- Benefits**
- Prevents connection/disconnection while energized
 - Interlocked UL Listed molded case circuit breakers
 - Short circuit and over current protection
 - Multiple configurations (contact factory for other options)



AMP	VAC	Item#
100	120	1701-59B
Mates with		
Russellstoll® DF116MP000 male plug		



AMP	VAC	Item#
60	480	1702-41
Mates with		
Russellstoll® DS6404MP male plug		



AMP	VAC	Item#
200	480	1700-98AC
Mates with		
Crouse-Hinds® AP20467 or Appleton® AP200343 male plug		



AMP	VAC	Item#
200	480	1701-69A
Mates with		
Meltric® male inlet No. 63-68043-T132		



AMP	VAC	Item#
200	480	1701-71A
Mates with		
Meltric® male plug No. 37-28043-HP-T132		



AMP	VAC	Item#
200	400	1702-06
Mates with		
Russellstoll® DS2404MP000 plug		



AMP	VAC	Item#
400	480	1701-94A
Mates with		
Series 16 single-pole plugs		



AMP	VAC	Item#
400	480	1701-75B
Mates with		
MIL-C-24368/1 male plug		

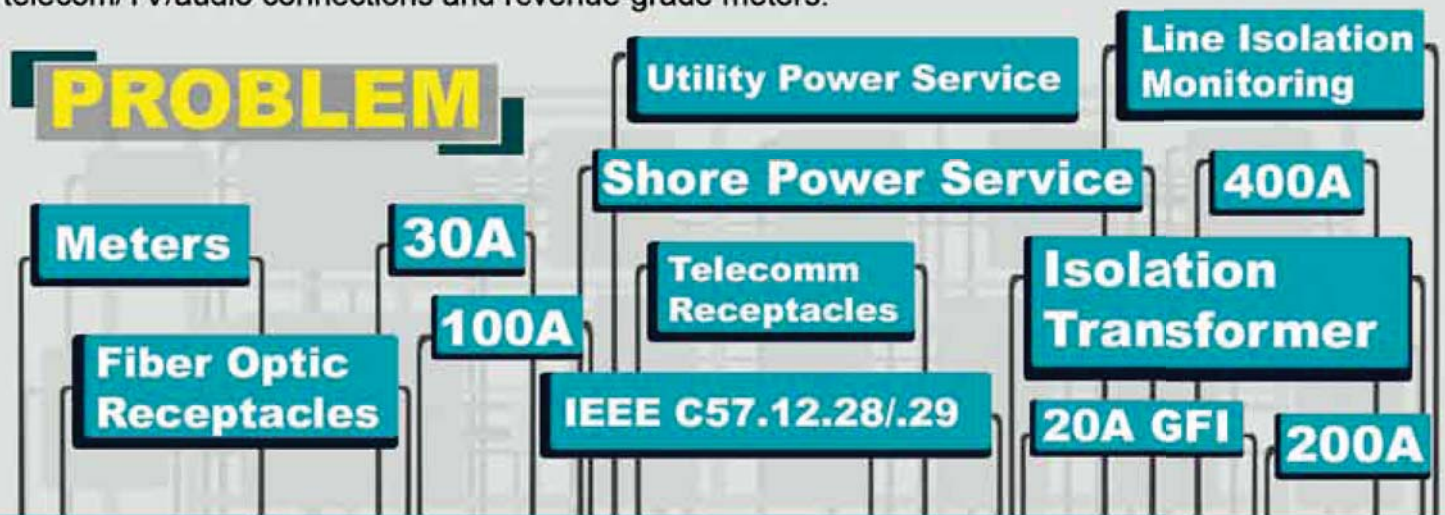


AMP	VAC	Item#
400	480	1702-43
Mates with		
Cavotec® PC5-SX04/SX05 plugs		

Russellstoll® is a registered trademark of Thomas & Betts International LLC. Crouse-Hinds® is a registered trademark of Cooper Industries, LLC. Meltric® is a registered trademark of MELTRIC Corporation. Cavotec® is a registered trademark of CAVOTEC SA

DESIGNING A SHORE POWER MOUND (SHORE TIE)

When configuring a ship-to-shore power mound, multiple electrical and communication services may need to be included to meet military or commercial requirements unique to the site and the anticipated ships. Some of the services that might be required include: Ship (480VAC) power service, utility/convenience (120/208VAC) power service, line insulation monitoring systems, isolation transformers, visual/audio alarms, surge protection, disconnects, fiber optic connectors, telecom/TV/audio connections and revenue-grade meters.



The quantity and impact of individual components, enclosures, conduit runs and interconnect wiring that is needed in a project can get excessively complex. In addition, there is the labor cost associated with installing the individual components. Do you have the available wharf deck space for all of these pieces?

ESL customizes military-grade Shore Power Mound Assemblies that offer a factory-wired "all-in-one" cost saving solution by minimizing the installation process, foot print, and labor expenses that are incurred when piece-mealing together the required components.

ESL's knowledgeable staff can offer technical and design expertise in order to assist you with your project.



SOLUTION

USCG-style Shore Power Mound Assemblies with Safety-interlocked Receptacles

ESL's modular safety-interlocked receptacles are designed to provide the operator with a "de-energized" receptacle during the insertion and retraction of a compatible male plug, preventing making or breaking of the circuit under load. These safety-interlocked receptacles are available in a variety of amperages/voltages and can be housed in your choice of heavy gauge, seam-welded stainless steel ESL enclosures.

Typical Features*:

- Complies with USCG Configuration Standard Technical Order (CSTO) - Shore Ties
- 12GA Type 304 or 316 stainless steel Type 3RX (vented) or 4X (sealed) enclosure
- Powder coated "Coast Guard White" certified to meet IEEE C57.12.28/.29 requirements
- ESL safety-interlocked 200A 480VAC receptacles
- Line insulation monitor (LIM) wired to local strobe lights and alarm horn with silence push button
- Integrated Type 4X telecom cabinet
- Single phase control transformers
- 480D:450D isolation transformers
- Surge protection device



Front

Item#: 5201-42



Back



Item#: 5201-11A

**Additional features available.
Consult factory.*

USCG-style Shore Power Mound Assemblies with Safety-interlocked Receptacles

Item#: 5201-31-US



Front



Back

Typical Features:

- 12GA Type 304 or 316 stainless steel Type 3RX (vented) or 4X (sealed) enclosure
- Powder coated "Coast Guard White" certified to meet IEEE C57.12.28/.29 requirements
- 200A safety-interlocked receptacles
- MIL-C-24368/2 safety-interlocked 500A receptacle with push button controls and motor operated circuit breaker
- GFCI 120V convenience outlets
- 30A twist lock industrial receptacles
- Telecom compartments/receptacles
- 12-channel Delphi® fiber optic connectors
- Digital voltmeter with selector switch
- Single phase control transformer (480:120/240)

Compact Footprint



Item#: 5200-47-ST7-8



Item#: 5201-35A

Delphi® is a registered trademark of Borland International Inc.

Navy/NATO Shore Power Mound Assemblies with Single-pole Connectors



Item#: 5200-62A

Features:

- 12GA Type 316 stainless steel Type 3RX (vented) enclosure
- Powder coated exterior finish certified to meet IEEE C57.12.28/.29 requirements
- (12) 10GA 316SS cam plates, each with (3) with 690A single-pole angled receptacles
- Power panel and enclosed 200A circuit breaker for industrial use with 200A, 60A, 30A and 20A duplex receptacles
- UL50 labeled enclosure
- 7.5kVA 480:120/240VAC transformer
- Internal cable support framework
- E-Stop button with protective cover
- Type 4X push button and LED indicator lights
- Internal and external ground bars
- Removable insulated top



Navy/NATO Shore Power Mound Assemblies with Single-pole Connectors

Typical Features:

- 3-phase removable 10GA 316SS cam plates with 690A 600VAC single-pole angled receptacles
- 12GA Type 304 or 316 stainless steel Type 3RX (vented) or 4X (sealed) enclosure
- Powder coated exterior finish certified to meet IEEE C57.12.28/.29 requirements
- Type 4X push button and LED indicator lights
- Internal/external ground bus
- Protective rack structures
- Cable support cages
- UL50 labeled enclosure
- Anti-condensation heater
- Interlocking microswitches
- Power meter

Item#: 5200-78



Item#: 5200-35



Item#: 5201-30



Navy/NATO Shore Power Mound Assemblies with MIL-C-24368/2 Receptacles

Typical Features:

- 10GA Type 304 or 316 stainless steel Type 3RX (vented) or 4X (sealed) enclosure
- Powder coated exterior finish certified to meet IEEE C57.12.28/29 requirements
- 500A 500VAC MIL-C-24368/2 receptacles
- Internal cable support framework
- 200A and 100A 480VAC 3Ø ESL safety-interlocked modules
- Integrated fiber optic, cable TV, telephone cabinet
- Duplex GFCI receptacles
- Type 4X push button and LED indicator lights

Item#: 5200-23



Item#: 2220-55



Item#: 2218-75



Item#: 5200-23

ESL offers custom solutions for your power mound needs. For more information on how we can help with your project contact us at sales@eslpwr.com

Medium Voltage Applications

As cold ironing projects for larger ships have increased exponentially in the last decade, the need for medium voltage temporary connections has grown. Medium voltage shore power offers the ability to power larger loads using fewer/lighter cables than 480VAC systems. ESL's long history of providing safe and reliable medium voltage products to many industries ensures our customers the added benefit of experience, quality and value.

Navy/NATO Power Mound **Item#: 5200-94**

- 12GA Type 304 or 316 stainless steel Type 3RX (vented) or 4X (sealed) enclosure
- Powder coated exterior finish certified to meet IEEE C57.12.28/.29 requirements
- (4) 500A 4160VAC receptacles with trapped key interlock
- Single pole 15kV deadbreak connectors
- Remote control (for upstream breaker)
- Removable insulated top



Medium Voltage Disconnect Cabinet **Item#: 5100-46B**

- Safety-interlocked 7.2kV marine grade receptacle
- Medium voltage fused disconnect and grounding switch
- Redundant mechanical and electrical safety-interlocks
- Designed to provide 4.16kV service to rubber-tired gantry cranes
- Compact footprint

Telecommunication & CATV Cabinets for Wharf Decks

From network communications to cable TV solutions for military, shipboard and specialty applications, ESL can custom design any enclosure to meet your Telecom needs. ESL's 36,000 square foot facility houses all facets of design and fabrication, and is certified to meet IEEE C57.12.28/29 coating requirements.

Typical Features:

- 12GA Type 304 stainless steel Type 4X (sealed) enclosure
- Powder coated exterior finish certified to meet IEEE C57.12.28/.29 requirements
- Marine-grade plywood back panels
- Fiber-optic connectors
- 110 telco blocks
- Surge protection devices
- Circuit breakers
- 20A GFCI duplex receptacles
- Internal/external ground pads
- Protective cage



Item#: 5100-44A2

Item#: 5101-29



USCG-style Line Insulation Monitoring Cabinets

An insulation monitoring device checks the un-grounded system between an active phase conductor and earth. It is intended to provide an alarm (light and sound) and/or disconnect the power supply when the resistance between a phase and earth ground drops below a set value.

Typical Features:

- 12GA Type 304 or 316 stainless steel Type 4X, powder coated enclosure
- Line insulation monitor (LIM)
- Up to 650A main circuit breaker
- Line termination bus assembly
- Surge protection device
- Phase loss relay
- Under/over voltage relay
- Bypass switch for line insulation monitor
- Red and green indicator lights for the bypass switch
- Control power transformer with fusing
- Amber & red strobe lights
- Horn
- Wall-mount or pad-mount

Item#: 5101-52



Item#: 5101-51



Shore Power Transfer Switches & Temporary Connection Solutions

ESL's shore power transfer switches and connection boxes allow customers the flexibility to power vessels from different sources (i.e. utility grid or generators) or to temporarily configure an existing shore power system to energize non-typical ships.



15kV Junction Box

Item#: 5100-58A

- 12GA 304SS Type 4X powder coated enclosure
- 200A, 15kV class loadbreak junction and elbows
- Heater with integral fan and thermostat
- Internal ground bar
- UL50 labeled enclosure

2000A 600VAC Connection Box with Circuit Breaker

Item#: 5201-43-US

- 100kA @ 480VAC withstand
- Type 3RX deadfront enclosure
- Copper bus bar and ground pads



2000A Shore Power Transfer Unit (manual bus transfer)

Item#: 5200-97B

- 12GA Type 304 stainless steel Type 3RX (vented) enclosure
- Powder coated exterior finish certified to meet IEEE C57.12.28/.29 requirements
- (5) 500A MIL-C-24368/2 receptacles
- (8) 10GA 316SS cam plates, each with (3) 690A single-pole color coded receptacles
- 120V/250W anti-condensation heater



Industrial & Commercial Solutions

For over 25 years, ESL has focused on the design and manufacturing of safety-interlocked shore power solutions for shipyards, commercial ports and yacht marinas. ESL offers comprehensive customized design solutions upon request. For more information on how we can help you with your project contact us at sales@eslpwr.com.

Typical Features*:

- Type 304 or 316 stainless steel Type 3RX (vented) or 4X (sealed) enclosure
- ESL Safety-interlocked modules with integral molded case circuit breaker in various receptacle configurations
- Main circuit breakers with external operating handles
- Hinged padlockable doors
- Digital power meter
- UL Listed assemblies available

Item#: 2214-05



Item#: 2219-23



Item#: 2223-45



**Additional features available. Consult factory.*

Commercial Ports

Features:

- 12GA Type 304 stainless steel Type 4X, powder coated enclosure
- (2) 380A 7.2kV shore power receptacles
- Earthing switch
- Fiber optic box
- Trapped key interlock



Item#: 5200-29E

Item#: 5201-47



Front

Features:

- 12GA Type 304 stainless steel Type 3RX, powder coated enclosure
- 200A 480VAC safety-intelocked outlets
- 125A 480VAC safety-intelocked outlets
- 63A 480VAC safety-intelocked outlets

Commercial Marinas



Back

- 50A 125/250VAC twist-lock receptacles
- 30A 125VAC twist-lock receptacles
- 20A 125VAC straight blade receptacles
- 250W anti-condensation heater

Additional features available. Consult factory.

Ship Side or Shore Side Retrofit Projects

Vessels built in foreign yards may have voltage/frequency requirements that do not match the shore side infrastructure. Ships can be retrofitted with vessel-side equipment to connect to the available shore power system; or the shore side can be modified to accept the ship's power system. ESL provides customers with cost-effective equipment upgrade or rebuild options on the ship side or shore side, so downtime is minimized.

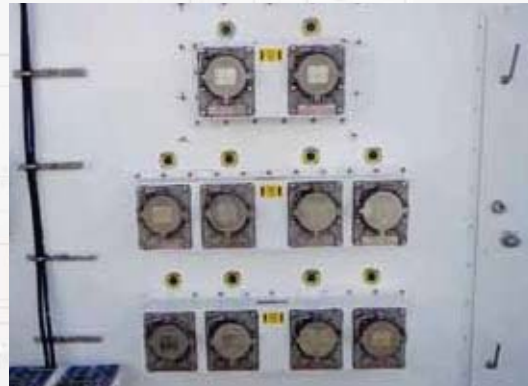
Item#: 5201-10



Features:

- 15kV control system
- 316SS construction
- Trapped key interlock scheme
- Pushbuttons (trip, close)
- Pilot lights (open, closed, power on)

Item#: 5201-19



Features:

- Ship-side retrofit with (10) new MIL-C-24368/2 receptacles in 2-gang and 4-gang top hats
- Powder coated in compliance with IEEE C57.12.28/.29 coating requirements

Item#: 5200-49



Features:

- (8) 500A MIL-C-24368/2 receptacles
- Open phase & phase rotation testers behind watertight window
- 12GA Type 304 stainless steel Type 3RX enclosure

Item#: 4200-03



Features:

- 500A 15kV 3-phase receptacles
- 3/8" HD Galvanized mounting plate
- 3-position key operated switch



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