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USACE / NAVFAC / AFCEA UFGS-16145 (August 2004)  
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Preparing Activity: NAVFAC Superseding  
UFGS-16145N (February 2003)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 25 June 2004

Latest change indicated by CHG tags.

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# UNIFIED FACILITIES GUIDE SPECIFICATIONS

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## SECTION 16145

### 480 V PIER POWER OUTLET ASSEMBLIES 08/04

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NOTE: This guide specification covers the requirements for pier power outlet assemblies for naval stations.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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NOTE: This guide specification does not cover all work required to provide a complete distribution system. Use this guide specification in conjunction with:

Section 16410N AUTOMATIC TRANSFER SWITCHES,  
Section 16360 SECONDARY UNIT SUBSTATION,  
Section 16361N PRIMARY UNIT SUBSTATION,  
Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION,  
Section 16303N UNDERGROUND ELECTRICAL WORK,  
Section 16402 INTERIOR DISTRIBUTION SYSTEM,  
Section 16510 INTERIOR LIGHTING, and  
Section 16520 EXTERIOR LIGHTING.

Before preparing plans and specifications for a specific project, consult Unified Facilities Criteria (UFC) 4-150-02, Design: Dockside Utilities

for ships' demand and service requirements.

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NOTE: The following information should be indicated on the project drawings or specified in the project specifications.

1. Single-line diagram showing buses and pier receptacles.
2. Type of cable, number, and size of conductors for each power circuit; and how power cables are to terminate.
3. Nominal voltage and current ratings.
4. Location of pier electrical distribution system components including power outlet assemblies.
5. If manholes, handholes, and vaults are required for a project, show on plans and specify in appropriate specification sections.

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## PART 1 GENERAL

### 1.1 REFERENCES

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NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ASTM INTERNATIONAL (ASTM)

ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
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#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
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#### U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-C-18480	(Rev B; Notice 1) Coating Compound, Bituminous, Solvent, Coal-Tar Base
MIL-C-24368/1	(Rev B) Connector Assemblies; Plug, Power Transfer, Shore to Ship and Ship to Ship,

500 Volts, 500 Amperes, 60 Hertz, Symbol  
Number 1160

MIL-C-24368/2 (Rev B) Connector Assemblies; Receptacle,  
and Receptacle-Cabled, Power Transfer,  
Shore to Ship and Ship to Ship, 500 Volts,  
500 Amperes, 60 Hertz, Symbol Number 1161

MIL-C-24643/3 (Rev D) Cable, Electrical, 600 Volts,  
Types LSSHOF, LSDHOF, LSTHOF, and LSFHOF

MIL-C-915/6 (Rev K) Cable, Power Electrical, 600  
Volts, for Outboard Use Only (Not for  
Inboard Use), Type THOF

## 1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, applies to this  
section with additions and modifications specified herein.

## 1.3 SUBMITTALS

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NOTE: Submittals must be limited to those necessary  
for adequate quality control. The importance of an  
item in the project should be one of the primary  
factors in determining if a submittal for the item  
should be required.

A "G" following a submittal item indicates that the  
submittal requires Government approval. Some  
submittals are already marked with a "G". Only  
delete an existing "G" if the submittal item is not  
complex and can be reviewed through the Contractor's  
Quality Control system. Only add a "G" if the  
submittal is sufficiently important or complex in  
context of the project.

For submittals requiring Government approval on Army  
projects, a code of up to three characters within  
the submittal tags may be used following the "G"  
designation to indicate the approving authority.  
Codes for Army projects using the Resident  
Management System (RMS) are: "AE" for  
Architect-Engineer; "DO" for District Office  
(Engineering Division or other organization in the  
District Office); "AO" for Area Office; "RO" for  
Resident Office; and "PO" for Project Office. Codes  
following the "G" typically are not used for Navy  
projects.

Submittal items not designated with a "G" are  
considered as being for information only for Army  
projects and for Contractor Quality Control approval  
for Navy projects.

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Government approval is required for submittals with a "G" designation;  
submittals not having a "G" designation are [for Contractor Quality Control

approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

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NOTE: Revise or amplify these paragraphs where  
necessary to cover project requirements.  
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Power outlet assembly[; G][; G, [\_\_\_\_]]

#### SD-03 Product Data

Power receptacles[; G][; G, [\_\_\_\_]]

Pushbutton controls[; G][; G, [\_\_\_\_]]

#### SD-06 Test Reports

Power receptacle and plug assembly tests[; G][; G, [\_\_\_\_]]

Before delivery of materials, submit certified copies in [triplicate] [\_\_\_\_] of the test reports required in referenced publications for [\_\_\_\_]. [However, factory tests and inspections will be required for [\_\_\_\_].]

### 1.4 QUALITY ASSURANCE

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NOTE: Note that pier substation primary [switch] [circuit breaker], [main secondary circuit breaker,] and each individual secondary circuit breaker connected to a 500 ampere power outlet assembly require remote tripping and closing capability from the pier power outlet assembly. This will require coordination between the switchgear and pier specifications. The following should be added to the various indicated sections of the substation specifications:

1. Low-voltage circuit breakers: The circuit breaker trip circuit shall operate on 120 volts ac supplied from the auxiliary section. Provide circuit breakers with auxiliary switches required for breaker operation plus one spare "a" and one spare "b" switch. An "a" switch is closed when the breaker is closed, whereas the required "b" switch is closed when the breaker is open. Provide breaker with provisions for remote tripping and closing from the pier power outlet assembly.

2. High-voltage oil switch: Provide a remote operating mechanism for tripping the switch from the pier-mounted power outlet assembly. Control wiring between the switch and the outlet assembly shall be supplied.

3. High-voltage vacuum switch: Provide a stored-energy operation to allow remote tripping and closing of the vacuum switch from the pier power outlet assembly.

Most ships require momentary, parallel operation with the shore power system to transfer the ships load from the generators to the shore power system.

In addition, some ships may require long term parallel operation with the shore transformers. If long term paralleling is required, the design engineer should perform fault current calculations to verify the adequacy of the shore and shipboard circuit breakers. If long term parallel operation is required, the design engineer should incorporate into his design a means to prevent the ship(s) from delivering power back through the substation transformer into the primary distribution system.

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Provide materials and equipment listed by Underwriters Laboratories (UL) or approved by Factory Mutual Research Corporation (FM), when such equipment is listed by UL or approved by FM.

## PART 2 PRODUCTS

### 2.1 POWER OUTLET ASSEMBLY

Power outlet assembly includes enclosure, power receptacles, pushbutton controls, and related wiring.

#### 2.1.1 Enclosure

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NOTE: Stainless steel enclosures are recommended. For less severe environments, such as fresh water piers, hot-dipped galvanized steel conforming to ASTM A 123 may be used instead of stainless steel. If hot-dipped galvanized is used, add ASTM A 123 in article entitled "REFERENCES."

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Enclosure shall be [ 9.52 mm 3/8 inch Type 304L stainless steel, conforming to ASTM A 167 welded construction. Apply coal-tar base coating compound conforming to MIL-C-18480 to underside of enclosure.] [reinforced concrete with Type 304L stainless steel, conforming to ASTM A 167 front receptacle plate and back access plate.] [Provide lifting eyes on enclosure.] Enclosure shall be designed for outdoor service with ventilation openings and gasketing to ensure weatherproof assembly during inclement weather conditions. External doors shall have provisions for padlocking.

#### 2.1.2 Power Receptacles

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NOTE: Verify that indicated plug and receptacle are used by the activity. If not, replace specified plugs and receptacles with appropriate information for plugs and receptacles used by the activity.

Control circuit switches normally supplied with MIL-C-24368/2 receptacles are rated 450 volts, 2 amperes, 60 hertz. Verify that this rating is adequate to carry the load of the feeder circuit breaker shunt trip coil.

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Rated for 500 volts, 500 amperes, 60 hertz, three-pole, continuous duty operation. Power receptacle assembly shall conform to MIL-C-24368/2. Provide receptacle assembly with factory potted cable pigtails. Cable pigtails shall be a minimum of 1220 mm 4 feet in length and 3-1/c Type LSSHOF-500 cables conforming to MIL-C-24643/3. Provide each receptacle with provisions for interlocking the receptacle with its respective feeder circuit breaker so that breaker will trip automatically if an attempt is made to remove the plug from the receptacle and when the receptacle cover is opened. Provide one matching plug assembly conforming to MIL-C-24368/1 with each receptacle. Provide plug assembly with factory potted cable pigtails. Cable pigtails shall be a minimum of 3050 mm 10 feet in length and [1-3/c Type THOF-500] [3-1/c Type LSTHOF] cables conforming to [MIL-C-915/6] [MIL-C-24643/3]. Turn plug assemblies over to the Contracting Officer.

#### 2.1.3 Pushbutton Controls

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**NOTE: Wiring between the control station and the vault circuit breaker must be provided.**

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Provide with pushbuttons and pilot lights to monitor and control, that is, open and close, the pier substation primary [switch] [or] [circuit breaker,] [main secondary circuit breaker,] and each individual secondary circuit breaker connected to a 500 ampere power outlet assembly.

Pushbuttons shall be heavy duty, watertight, with two momentary contact pushbuttons, one marked "CLOSE" and one marked "TRIP." Provide red lens pilot light to indicate when circuit breaker is closed. Pilot light shall be a combination lamp with resistor or diode type as required to provide approximately 50,000 hours burning life.

- a. Pushbutton control enclosure: [Stainless steel,] [glass-reinforced thermoplastic,] NEMA 4, watertight, corrosion-resistant unit with gaskets for bolted mounting onto the power outlet assembly enclosure as indicated.
- b. Contacts: Rated for 10 amperes continuously at 600 volts.
- c. Pushbuttons: Color-coded, weatherproof, provided with the control stations. Pushbuttons shall have a weatherproof rubber shroud color-coded as follows:
  - (1) Close pushbutton - Red
  - (2) Trip pushbutton - Green
- d. Pushbutton mounting plate: Primary [circuit breaker] [switch] pushbutton mounting plate shall have a weatherproof red enamel finish. Main secondary circuit breaker pushbutton mounting plate shall have a weatherproof blue enamel finish. Each secondary

circuit breaker pushbutton mounting plate shall have a weatherproof gray enamel finish.

- e. Nameplates: [Laminated plastic] [Stainless steel] provided at the locations indicated with the following legends:

- (1) "EMERGENCY TRIP - MAIN PRIMARY [BREAKER] [SWITCH]"
- (2) "EMERGENCY TRIP - MAIN SECONDARY BREAKER"

Provide nameplates for the individual power outlet assemblies and reference the circuit breaker feeding the assembly.

## 2.2 SOURCE QUALITY CONTROL

### 2.2.1 Power Receptacle and Plug Assembly Tests

Conduct design, production, and quality assurance tests, as required by MIL-C-24368/1 and MIL-C-24368/2, at the manufacturer's plant during fabrication and assembly of power receptacle and plug assemblies. After completion of tests, inspect assemblies. There shall be no evidence of damage to the receptacle or plug assembly. Assemblies shall be satisfactory for immediate return to service at full ratings without maintenance or repair. [Contracting Officer or his designated representative will witness the tests.] [A factory-certified report of the specified tests previously performed on identical units of each rating will be acceptable.]

## PART 3 EXECUTION

### 3.1 INSTALLATION

Install exterior electrical systems including power outlet assemblies, as specified herein. Completely install components at the location indicated. Electrical installations shall comply with NFPA 70.

### 3.2 POWER OUTLET ASSEMBLY GROUNDING

Ground in accordance with NFPA 70. Maximum resistance from assembly to ground shall be 3 ohms.

### 3.3 FIELD QUALITY CONTROL

#### 3.3.1 Field Tests and Inspections

Perform field tests and trial operations, and conduct field inspections, except final field inspection. Provide labor, test equipment, and incidentals required for the tests. Contracting Officer or his designated representative will witness field tests and trial operations, and conduct final field inspections. Notify the Contracting Officer of the proposed dates and times of inspections and trial operations [5] [\_\_\_\_\_] working days prior to beginning inspections and trial operations. Field tests shall demonstrate that equipment is in good operating condition and will function not less than five times.

#### 3.3.2 Retesting

Rectify deficiencies found and completely retest work affected by such deficiencies.



### 3.3.3 Engineering Services

Provide engineering inspection of installed pier power outlet assemblies, including exterior systems and components, as specified herein. Certify that each system component is complete, in good condition, properly installed, connected, and adjusted, in accordance with drawings, specifications, and manufacturers' installation instructions.

### 3.3.4 Instructing Government Personnel

Furnish the Government's operating personnel with training related to operation and preventive maintenance of pier power outlet assemblies. Conduct training at the construction site or at a location designated by the Officer in Charge of Construction. Provide training for a minimum of [one 8-hour working day] [\_\_\_\_\_].

### 3.4 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of English unit measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The English and metric units for the measurements shown are as follows:

<u>PRODUCTS</u>	<u>ENGLISH UNITS</u>	<u>METRIC UNITS</u>
Stainless steel enclosure	3/8 inch	9.52 mm

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