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NAVFAC **IGS-16050 (MAY 2002)**

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-16050N**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

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SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS
05/02

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

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NOTE: This guide specification covers electrical general requirements, complete.

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NOTE: The following information shall be shown on the project drawings:

1. Extent and location of work to be accomplished.

2. Wiring, equipment, and accessories necessary for a complete installation.

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

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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PART 1 GENERAL

1.1 REFERENCES

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

ITALIAN LAWS AND NORMS

D.P.R. 547	(1955) Norms for Accident Prevention on Worksite
LAW 46	(1990) Safety Requirement for Electrical Systems

CEI - ITALIAN ELECTRICAL COMMITTEE

CEI 64-8	(1998) Electrical Systems with Rated Voltage Not Greater Than 1000V A.C. and 1500V D.C.

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI NORMS)

UNI 7545/7	(1976) Symbols for Danger Signs - Risk of Electric Shock
UNI 8744	(1986) Paints and Varnishes - Test of Anticorrosion Resistance at 100% Relative Humidity

1.2 RELATED REQUIREMENTS

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NOTE: To apply this guide specification to other divisions of the project specification, insert the appropriate division number and title to read such as: Division 11, "Equipment"; Division 13, "Special Construction"; Division 14, "Conveying Systems"; and Division 15, "Mechanical." Ensure that the appropriate sections having electrical equipment include the following paragraph:

"1.X RELATED REQUIREMENTS: Section 16050, "Basic Electrical Materials and Methods," applies to this section, with the additions and modifications specified herein."

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This section applies to certain sections of [Division 2, "Site Construction,"] [Division 11, "Equipment,"] [Division 13, "Special Construction,"] [and] [Division 14, "Conveying Systems"] [and] [Division 15, "Mechanical"]. This section applies to all sections of Division 16, "Electrical," of this project specification unless specified otherwise in the individual sections.

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in the relevant CEI Norms.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be [_____] kV primary, [single] [three] phase, [two] [three] [four] wire, [50] [60] [_____] Hz, and [_____] volts secondary, [single] [three] phase, [three] [four] wire, [TN-C] [TN-S] [TT] [IT] as per CEI 64-8. Final connections to the power distribution system at the existing [substation] [manhole] [_____] shall be made by the [Contractor as directed by the Contracting Officer] [Government].

1.5 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 is 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. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. 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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NOTE: Add to this listing other submittal descriptions that may be required in a specific project, only, if the descriptions found in Section 01330, "Submittal Procedures" must be supplemented or otherwise modified.

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Submittals required in the sections which refer to this section shall conform to the requirements of Section 01330 "Submittal Procedures" and to the following additional requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable federal, military, industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

1.5.1 Manufacturer's Catalog Data

Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.

1.5.2 Drawings

Submit drawings a minimum of 355 by 510 mm in size using a minimum scale of 1 mm per 100 mm[,except as specified otherwise]. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.5.3 Instructions

Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit printed copies of those instructions prior to installation. Installation of the item shall not proceed until manufacturer's instructions are

received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.

1.5.4 Certificates

Submit manufacturer's certifications as required for products, materials, finishes, and equipment as specified in the technical sections. Certificates from material suppliers are not acceptable. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

1.5.4.1 Reference Standard Compliance

All equipment shall be CE listed. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations, such as Istituto Galileo Ferraris, Istituto del Marchio di Qualità, CESI (Centro Elettrotecnico Sperimentale Italiano), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

1.5.4.2 Independent Testing Organization Certificate

In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.5 Operation and Maintenance Manuals

Comply with the requirements of Section 01781, "Operation and Maintenance Data" and the technical sections. Manual shall be in both English and in the local language.

1.5.5.1 Operating Instructions

Submit text of posted operating instructions for each system and principal item of equipment as specified in the technical sections.

1.6 QUALITY ASSURANCE

1.6.1 Material and Equipment Qualifications

Provide materials and equipment that are products of manufacturers

regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.6.2 Regulatory Requirements

Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of CEI Norms.

1.6.3 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.4 Service Support

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6.5 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.6.6 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer.

1.7 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

c. Safety precautions.

d. The procedure in the event of equipment failure.

e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.8 NAMEPLATES

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NOTE: Ask for manufacturer's catalog data submittals for nameplates in the technical sections to which these products apply.
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D.P.R. 547. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 3 mm thick, white with [black] [_____] center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 25 by 65 mm. Lettering shall be a minimum of 6 mm high normal block style.

1.9 WARNING SIGNS

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NOTE: Ask for manufacturer's catalog data submittals for warning signs in the technical sections to which these products apply.
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Provide warning signs for the enclosures of electrical equipment including substations, generators, and switchgear having a nominal rating exceeding 400 volts, in accordance with UNI 7545/7.

a. When the enclosure integrity of such equipment is specified to be in accordance with D.P.R. 547, provide a self-adhesive warning sign on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 180 mm by 250 mm with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 50 mm high letters and shall be in both English and in the local language. The word "DANGER" shall be in white letters on

a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background.

b. When such equipment is guarded by a fence, mount signs on the fence. Provide metal signs having nominal dimensions of 350 by 250 mm with the legend "DANGER HIGH VOLTAGE KEEP OUT" printed in three lines of nominal 75-mm high white letters on a red and black field and shall be in both English and in the local language.

1.10 CABLE TAGS IN MANHOLES, HANDHOLES, AND VAULTS

Provide tags for each cable or wire located in manholes, handholes, and vaults. [Tag only new wire and cable provided by this contract.] [Tag new wire and cable provided under this contract and existing wire and cable which are indicated to have splices and terminations provided by this contract.] [The first position on the tag shall denote the voltage. The second through [sixth] [_____] positions on the tag shall identify the circuit. [The next to last position shall denote the phase of the circuit and shall include the Greek "phi" symbol.] The last position shall denote the cable size.] [Tag legend shall be as indicated.] The tags shall be [polyethylene] [or] [sheet lead]. Do not provide handwritten letters. As an example, a tag could have the following designation: "20 NAS 1-8(Phase A)240," denoting that the tagged cable is on the 20kV system circuit number NAS 1-8, underground, Phase A, sized at 240 square millimeters.

1.10.1 Polyethylene Cable Tags

Provide tags of polyethylene that have an average tensile strength of 22 MPa; and that are two millimeter thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 77 degrees C. Provide 1.3 mm (minimum) thick black polyethylene tag holder. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 780 N. The cable tags shall have black block letters, numbers, and symbols 25 mm high on a yellow background. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tags' orientation.

1.10.2 [Lead Cable Tags

Provide tags of virgin sheet lead, one-piece wraparound strap type, slotted on one end for attaching the strap. Minimum size of tags shall be 25 mm wide by 1.2 mm thick and a length sufficient for die stamping the identification on one line and banding around the cable or wire, but not less than 250 mm long. Tags shall be die stamped with numbers, letters, and symbols not less than 6 mm high and approximately 0.4 mm deep in normal block style.]

1.11 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to relevant CEI 64-8, LAW 46, Norms and requirements specified herein.

1.11.1 Motors and Equipment

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NOTE: Sections in other divisions of the guide specifications vary greatly in how much detail the requirements for motors, controllers, and other devices which control mechanical equipment are covered. Some sections specify these requirements in detail, some sections must be supplemented by reference to Division 16, and other sections rely solely on reference to Division 16. The electrical designer or specifier must coordinate with the specifier of the sections outside of Division 16 to ensure that the sections do not include conflicting wording when specifying motors, controllers, and other devices which control mechanical equipment. If motor control centers are specified, retain the bracketed statements pertaining to specifying motor control centers in Division 16.

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NOTE: Include the last bracketed sentence if existing mechanical equipment requires disconnect switches, contactors and controllers.

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[Provide motors, controllers, [integral disconnects,] and contactors with their respective pieces of equipment [, except controllers indicated as part of the motor control centers shall be provided under Section 16402, "Interior Distribution System"]. Motors, controllers, [integral disconnects,] and contactors shall conform to Section 16402, "Interior Distribution System" [except motors, controllers, contactors, and disconnects for fire pumps shall be provided under Section 13920, "Fire Pumps"]. Extended voltage range motors shall not be permitted. Control voltage for controllers and contactors shall not exceed 220 volts nominal. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under the section that specified that motor or equipment. Where fuse protection is specifically recommended by the equipment manufacturer, provide fused switches in lieu of non-fused switches indicated. [As an exception to these requirements, provide disconnect switches, contactors, and controllers for existing motor-operated equipment under Section 16402, "Interior Distribution System."]]

1.11.2 Wiring and Conduit

Provide internal wiring for components of packaged equipment as an integral part of the equipment. Provide power wiring and conduit for field-installed equipment[, and motor control equipment forming part of motor control centers or switchgear assemblies, the conduit and wiring connecting such centers, assemblies, or other power sources to equipment] under Section 16402, "Interior Distribution System." Power wiring and conduit shall conform to Section 16402, "Interior Distribution System." Control wiring and conduit shall be provided under, and conform to the

requirements of the section specifying the associated equipment.

1.12 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. [When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.]

1.13 LOCKOUT REQUIREMENTS

Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with CEI 64-8. Mechanical isolation of machines and other equipment shall be in accordance with requirements of Division 15, "Mechanical."

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PAINTING OF EQUIPMENT

3.1.1 Factory Applied

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NOTE: This paragraph covers only the basic painting requirements for most electrical equipment. Include in the section specifying the equipment any special finishes for high or low temperatures and corrosive atmospheres. Retain the bracketed statement when switchgear and other equipment having specific paint requirements are specified.

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Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirement of corrosion resistance test as per UNI 8744 [and the requirements specified in the technical sections].

3.1.2 Field Applied

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in [Section 09900, "Paints and Coatings"][the section specifying the associated electrical equipment].

3.2 NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 9 meters 30 feet apart.

3.4 CABLE TAG INSTALLATION

Install cable tags in each manhole, handhole, and vault as specified, including each splice. Install cable tags over the fireproofing, if any, and locate the tags so that they are clearly visible without disturbing any cabling or wiring in the manholes, handholes, and vaults.

-- End of Section --