

CONSTRUCTION STANDARD SPECIFICATION

SECTION 16310

15KV METAL - ENCLOSED STAND-UP OR PADMOUNTED SWITCHGEAR

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PART 1 - GENERAL

1.01 SUMMARY

- A. The extent of the switchgear work is indicated by the construction drawings and by requirements of this specification.
- B. The Contractor will be responsible for the entire installation and testing of the S & C type switchgear.
- C. Related Documents:
 - 1. Sandia's Standard Specifications
 - a. Section 02200, "Earthwork"
 - b. Section 02584, "Underground Ducts and Utility Structures"
 - c. Section 03300, "Cast-In-Place Concrete"
 - d. Section 16124, "Medium Voltage Cable"
 - e. Section 16475, "Primary Systems Safety Requirements"
 - 2. Sandia's Standard Drawings
 - a. WP5019STD – S&C Switchgear Configuration and Clearance
 - b. WP5020STD – S&C Pad Mount Switchgear Details
 - c. WP6010STD – S&C Pad Mount Equipment List and Details

1.02 REFERENCES

- A. Code, standards, or other documents referred to in this Specification are to be considered as part of it. In the event of conflict between this specification and the referenced documents, or between several referenced documents, the more stringent requirement shall be followed.
- B. The following codes and standards are referenced:

1. National Electrical Manufacturer's Association (NEMA)
2. American National Standards Institute (ANSI)
3. National Fire Protection Association-70 (NFPA-70)

1.03 QUALITY ASSURANCE

- A. Contractor Qualified with at least ten years of successful installation experience on projects with electrical installation work similar to that work required for project.

PART 2 - PRODUCTS

2.01 SWITCHGEAR

- A. The switchgear will be manufactured by S & C Electric Company.
- B. The 15KV metal enclosed stand-up switchgear will usually be the System II modular type and the padmount switchgear will usually be the PMS or the PMH type.
- C. The type and the options, such as motor operated switch, will be indicated on the drawings.

PART 3 - EXECUTION

3.01 GENERAL

- A. All construction work shall be done in a thorough and conscientious manner in accordance with the Specifications, Construction Drawings, and the requirements referenced in Section 1.02.
- B. Install switchgear and accessory items in accordance with the manufacturer's written installation instructions.
- C. Install switchgear so that the installation complies with requirements of NEMA, ANSI, and NFPA-70 standards.
- D. The Contractor shall follow the primary systems safety procedures as specified in Section 16475, "Primary System Safety Requirements".
- E. The Contractor must examine areas and conditions under which the switchgear is to be installed and notify the SDR in writing of those conditions detrimental to proper completion of the work. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to the contractor.

3.02 SWITCHGEAR DELIVERY, STORAGE AND HANDLING

- A. The Contractor will deliver switchgear from a SNL designated location within Sandia National Laboratories/Kirtland Air Force Base to the job site. Contractor shall provide all lifting and transporting equipment. Contractor shall contact SDR for location of switchgear.
- B. The Contractor will notify the SDR prior to moving if there is any damage to switchgear.
- C. Handle switchgear carefully to prevent internal damage, breakage, denting, and scoring of enclosure finish.
- D. Do not install damaged switchgear.
- E. Protect units from dirt, fumes, water construction debris and traffic.

3.03 CONCRETE WORK

- A. Coordinate size and location of concrete pads per construction drawings.
- B. Install concrete pads per requirements of Section 03300, "Cast-In-Place Concrete".

3.04 CONDUIT AND CABLE

- A. Coordinate size of conduit and cable per construction drawings.
- B. Install conduit per requirements of Section 02584, "Underground Ducts and Utility Structures" and 02200, "Earthwork" and per Standard Drawings WP5019STD, WP5020STD, and WP6010STD.
- C. Install medium voltage cable per requirements of Section 16124, "Medium Voltage Cable".

3.05 GROUNDING

- A. Install ground grid and ground rods per construction drawings.
- B. Ground switchgear ground bus and enclosure per manufacturer's recommendation and per construction drawings.

3.06 INSTALLATION OF SWITCHGEAR

- A. Remove temporary lifting eyes, and brackets and temporary blocking of moving parts from switchgear units and components.
- B. Assemble switchgear units and components per manufacturer's recommendations.

- C. The stand-up switchgear must be aligned properly. Make sure that the switchgear-bay doors open and close without binding. Binding indicates enclosure distortion that must be corrected by additional shimming.
- D. Anchor switchgear per manufacturer's recommendations and per construction drawings.
- E. Tighten bus connections and mechanical fasteners. Do not tighten factory-made connections employing Belleville washers unless they are visibly loose.
- F. Adjust S & C switchgear operating mechanism per S & C's recommendations.
- G. On stand-up type switchgear, strip heaters shall be connected to an adequate power source and energized before placing switchgear in service.
- H. Upon completion of installation, touch up scratches and mars of finish to match original finish.

3.07 INSPECTION AND TESTING

- A. The Contractor shall inspect and test all Contractor-furnished or SNL-furnished switchgear as follows:
 - 1. Compare equipment nameplate information with latest single line diagram and report discrepancies.
 - 2. Check for proper anchorage, required area clearances, physical damage, and proper alignment. Refer to Standard Drawing WP5019STD for proper clearances for PMH/PMS type switchgear.
 - 3. Inspect all doors, panels and sections for paint, dents, scratches, fit, and missing hardware.
 - 4. Contractor shall furnish and install one set (3 per set) of fuse refills and also provide one set of spare fuse refills per each fused section or cubicle. The fuse refill size will be per construction drawings. This requirement applies to SNL furnished and contractor furnished switchgear.
 - 5. Inspect all bus connections for high resistance. Use low resistance ohmmeter, or check tightness of bolted bus joints by calibrated torque wrench method. Do not tighten factory-made connections employing Belleville washers unless they are visibly loose. Refer to manufacturer's instructions for proper torque levels.
 - 6. Test all electrical and mechanical interlock systems for proper operation and sequencing.
 - a. Closure attempt shall be made on locked open devices. Opening attempt shall be made on locked closed devices.
 - b. Key exchange shall be made with devices operated in off-normal positions.
 - 7. Clean entire switchgear using manufacturer's approved methods and materials.

8. Inspect insulators for evidence of physical damage or contaminated surfaces.
9. Verify proper barrier and shutter installation and operation.
10. Exercise manually operated and power-operated switches.
11. Inspect all indicating devices for proper operation.
12. Perform insulation resistance tests (Megger) on each bus section, phase-to-phase and phase-to-ground for one (1) minute.

NOTE: Before performing tests, make certain that the high-voltage conductors are not connected (i.e., are de-energized and properly isolated). Test for voltage and isolate and tag all circuits in accordance with established system-operating procedures. In addition, if applicable, remove the primary fuses and disconnect all secondary connections from all voltage transformers and disconnect all surge arrestors.

Values of insulation resistance less than specified below shall be investigated.

Voltage Rating	Minimum Test Voltage	Recommended Minimum Insulation Resistance In Megohms
5,000 V	2,500 V DC	1,000
15,000 V	2,500 V DC	5,000

13. Visually check integrity of ground.
- B. The Contractor shall arrange and pay for the services of a factory-authorized S & C representative to perform tests and inspect the installation of **power operated** stand-up or padmounted switchgear unless noted otherwise.

As a minimum, the tests should include the following:

1. Perform all inspection and tests as described in 3.07, A.
2. If secondary control wiring is specified, all terminals should be checked for tightness, and the jumpers between terminal blocks of adjacent bays should be reconnected at points where "shipping splits" occur.
3. Verify operation of all auxiliary equipment.
4. Test protective relays on power operated switchgear per manufacturer's recommendations to assure settings as indicated on construction drawings.
5. The S & C factory representative will verify that the switchgear is ready to energize.
6. The factory-authorized S & C representative shall submit written reports of observations and tests to the SDR. The report shall include any defective material or workmanship.

- C. Labeling. The contractor shall label switchgear with 3-7/8" pressure sensitive reflective black and yellow flat foil-type labels, manufactured by "Almetek." Refer to Standard Drawing WP5019STD for label location on padmounted switchgear. Refer to construction drawings for switch numbers.

3.08 TRAINING

- A. The Contractor shall arrange and pay for the services of a S & C factory-authorized service representative to train SNL's maintenance personnel on the power operated stand-up or padmounted switchgear unless noted otherwise.
- B. Conduct a minimum of four hours training operation and maintenance of the power-operated switchgear. The training should include both operations and maintenance procedures.
- C. Schedule training with the SDR with at least fourteen days advance notice.

END OF SECTION 16310