

PART 1 GENERAL

- 1.01 Where no product listed by an approved national testing laboratory for the application is available, provide with certification of performance, function and rating from a Facilities Services approved independent testing agency or laboratory.
- 1.02 Provide three spare fuses of each size and type for new transformers, distribution and control panels, motor starters, etc. Provide a wall-mounted spare fuse cabinet in main electrical room for all new work and where one is not present in existing facilities. Bussman SFC - FUSE-CAB 24WX30HXA12D, Cooper B-Line 242412 FC or other manufacturer meeting the requirements of the design standards.
- 1.03 Main disconnects for facilities with a service greater than 75kVA:
- A. Shunt-trippable from a lockbox located per Fire Department requirements.
 - 1. Shunt trip shall be the KNOX-VAULT 4500 Series Power Shutdown, Brand Name Only.
 - 2. Key for shunt trip box shall be cored to the University Fire Department KNOX key.
 - 3. Shunt trip located per direction of the University Fire Department.
 - 4. Shunt trip may be flush mount or surface mount.
 - 5. Tamper switch not required.
 - B. Fusible switch.
 - C. Disconnect located exterior of the building envelope. Discuss final location with UAF FS and the Authority Having Jurisdiction.
 - D. Power supplies (such as Emergency Power Supplies and Uninterruptible Power Supplies) inside the building envelope which distribute their power to other areas of the building shall have a shunt trip at the location of the building service disconnect which isolates the AC/DC output of that power supply to the room in which it is located.
- 1.04 Water, Condensate and BTU Meters: Provide conduits from the meters to the nearest Power Monitor provided under Division 26 Power Monitoring and Control.
- 1.05 The campus priority feeders and facility standby and emergency distribution systems shall serve only the following loads. It may be necessary to implement a layered, automated and/or manual load management scheme in the event of a power supply disruption in order to maintain system integrity or operation.

- A. Emergency egress lighting systems (including emergency lighting inverters and battery chargers).
 - B. Refrigeration equipment for preservation of specimens or research projects.
 - C. Selected HVAC equipment, such as heating pumps and other equipment as determined by Owner, whose operation is necessary to prevent damage to building and/or protect life or safety and/or support equipment for refrigeration or other equipment for preservation of specimens or research projects.
 - D. Fire Alarm and Powered Fire Sprinkler Components.
 - E. Fume Hood fans as required by NFPA 45
 - F. HVAC Direct Digital Control (DDC) panels.
 - G. Telecommunications' phone and network equipment as determined by FS/DDC.
- 1.06 Large buildings shall have at least two power distribution systems:
- A. Normal power for non-essential loads.
 - B. Priority power for essential services per requirements stated elsewhere in this document.
 - C. Provide redundant/ parallel distribution system, with redundant utility connections, for buildings where operations cannot be interrupted.
 - D. Where there are two distribution systems in a buildings, a means of supplying one from the other shall be provided, preferably by a tie breaker.
- 1.07 Provide external connection point for portable generator to highest priority power distribution system. Typically, this will be the emergency and/or standby power distribution system.
- A. Require demonstration for the operation the automatic and/or manual transfer switches.
 - B. Size disconnect per determined loads.
 - C. Minimum size disconnect: 200A
 - D. Disconnect/transfer switch to be four (4) pole, so that neutral connection will be switched.


- 1.08 Provide shunt trip disconnects and fire alarm interface for elevator machinery rooms when required by work in other divisions or by applicable codes such as (NFPA 13, 72 and ASME) Coordinate requirement and location with other divisions.
- 1.09 Include 20% spare capacity in panelboards. Load branch circuits to no more than 80% capacity. In flush-mount panelboards, provide enough spare conduits to utilize spare capacity.
- 1.10 All DDC (BMS) control panels shall be provided with uninterruptible power supplies. Source may be central or isolated battery back-up with power conditioning. Design for a minimum run time of 30 minutes.
- 1.11 National Electrical Code (NEC) requirements for “Dedicated Equipment Space” shall apply to all operable electrical equipment. Intent is to widen the requirement of NEC 110.26 F to include equipment other than switchboards, panelboards, distribution boards, and motor control centers to include disconnects, transfer switches, variable frequency drives, and similar equipment. Show all dedicated spaces on the mechanical and electrical drawings.
- 1.12 Equipment cover retaining screws: Screws or mating threaded holes or retaining devices which are stripped, damaged, or non-functional will be repaired or replaced at no expense to FS/DDC, such that equipment will retain manufacturer’s designed arc fault explosion capability.
- 1.13 Fasteners
 - A. In wet or corrosive environments all exposed fasteners, screws, bolts, washers, nuts, and anchors are to be commercial grade stainless steel. Contractor to substitute manufacturer’s non-stainless-steel fasteners, screws, bolts, washers, nuts and anchors with appropriate stainless steel substitute, unless approved otherwise in writing by the FS/DDC.
 - B. Fasteners shall not be installed such a manner that they may cause damage to conductors or personnel, as in the case of self-tapping screws holding labels on the cover of a panelboard. Where installed, they will be replaced at no cost to FS/DDC with a type fastener acceptable to FS/DDC.
- 1.14 New buildings: Perform an analysis to determine if lightning protection shall be installed.
- 1.15 Seismic restraint: Equipment to be seismically restrained per applicable codes and best practices.
- 1.16 Voltage drop Minimums and Maximums:
 - A. Maximum 5% drop from building service to outlet.

- B. Minimum and maximum system utilization voltages shall not exceed the values given in the current revision of IEEE Std. 241-1990. Minimum acceptable voltage at outlet 110 V and proportionately for other voltage systems.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

- 3.01 All materials shall be installed in a neat, orderly, and secure fashion, as required by these specifications and commonly recognized standards of good workmanship. The norms for execution of the work shall be in conformity with NEC, Chapter 3, and the National Electrical Contractors' Association National Electrical Installation Standards, for which the FS/DDC's judgment shall be final.
- 3.02 Install equipment, supports, and similar equipment with cutting edges or points removed or permanently protected.
- 3.03 Connections on conductors 60 Amperes or larger shall be connected using a torque wrench.
- 3.04 Protect all electrical equipment prior to and during installation. Equipment damaged will be replaced at the discretion of the FS/DDC at no cost to the University. FS/DDC will determine if accumulation of debris in equipment constitutes damage to equipment. The term "damage" includes actions, such as construction debris in equipment, which may reduce the useful life of the equipment.
- 3.05 Unless otherwise noted, conductors from different sources, such as panels, shall not be contained in the same raceway.
- 3.06 Do not use multi-pole breakers to supply individual branch circuits in laboratories, telecommunications rooms, server rooms, or other areas where circuit trips may interrupt operation of critical equipment.
- 3.07 Exterior electrical enclosures: Doors shall be at least 6 inch above finished grade to allow door to open after ice accumulation.
- 3.08 Arc flash labels: use the following label format:

 WARNING	
Arc Flash and Shock Hazard	
Appropriate PPE Required	
88 inches	Flash Hazard Boundary
16 cal/cm²	Flash Hazard at 18 inches
Category 3	Arc-rated FR Shirt & Pants & Arc Flash Suit
208 VAC	Shock Hazard when cover is removed
00	Glove Class
42 inches	Limited Approach
Avoid Contact	Restricted Approach
Avoid Contact	Prohibited Approach
Location:	DISC-NL005
NACC	NACC, Inc. 803 ALUMNI, FAIRBANKS AK 99999 (907)555-5555 or 1-800-555-5555
<small>CHARACTER DESIGN LIMITED LIABILITY</small>	
Job#: 1218201	Prepared on: 10/04/11 By: Engineer
Warning: Changes in equipment settings or system configuration will invalidate the calculated values and PPE requirements. Software used is by: SKM Systems Analysis, Inc.	

Where NACC is name of company performing Arc Flash and Shock Hazard calculations.

END OF SECTION