

**SECTION C-2:**

**ELECTRICAL  
SPECIFICATIONS**



Exponential  
Engineering  
Company

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## **PART 1 POWER SUPPLY SPECIFICATION**

### **1.01 POWER SUPPLY DESIGN**

- A. The project shall be designed by a Nebraska Licensed Professional Engineer to comply with all City of Kimball, County, and State requirements and shall furnish the following at a minimum:
  - 1. AC Power System – 120/240VAC
  - 2. DC Power System – 125VDC
- B. Deliverables:
  - 1. Provide Construction Drawings and Specifications sealed by a Nebraska Licensed Professional Engineer.
  - 2. Drawings shall include but not be limited to the following:
    - a. One-Lines
    - b. AC and DC Panel Details
    - c. Battery and Charger Details and sizing calculations

## **PART 2 STATION SERVICE POWER**

### **2.01 STATION SERVICE POWER DESIGN**

- A. The connection to the city distribution lines and emergency generator for station service and the station AC system shall be designed and sealed by a Nebraska Licensed Professional Engineer and shall comply with the following:
  - 1. Institute of Electrical and Electronics Engineers (IEEE):
    - a. 48 – Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV.
    - b. C37.04 – Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.
    - c. C37.11 – Standard Requirements for Electrical Control for High-Voltage Circuit Breakers Rated on A Symmetrical Current Basis.
    - d. C37.20.2 – Standard for Metal-Clad and Station-Type Cubicle Switchgear.
    - e. C37.20.3 – Standard for Metal-Enclosed Interrupter Switchgear (1kV to 38kV).
    - f. C37.20.7 – Guide for Testing Switchgear Rated Up to 52kV for Internal Arcing Faults.
    - g. C57.13 – Standard Requirements for Instrument Transformers.
    - h. C37.90 – Standard for Relays and Relay Systems Associated with Electric Power Apparatus.
  - 2. National Electrical Code (NEC)
- B. The station service transformer will be pad-mounted outside the building and the control power will be brought inside the building to energize the AC panel(s). The size and layout of the panel(s) are to be determined by the Contractor and coordinated to accommodate the Owner's needs and to meet all code requirements. In addition, the connection must meet the following minimum requirements
  - 1. Performance Requirements:
    - a. Design for power circuits that operate motors and battery charging systems.
    - b. Design for lights, fans, emergency systems, and all auxiliary loads at the site.
- C. Station Service Transformer

1. Contractor shall furnish Station Service transformer as indicated in the drawings.
  - a. Transformer to be furnished with taps: -5%, -2.5%, 0%, +2.5%, +5%
  - b. Secondary winding shall be 120/240VAC, single phase, 60Hz, 3 wire.
2. Size to adequately serve the following simultaneous loads:
  - a. Heater loads in all switchgear sections
  - b. Lighting loads in all switchgear sections
  - c. Battery charger full output
  - d. Generator startup, cooling, hydraulics
- D. Emergency Generator
  1. Furnish generator to allow emergency operation of plant loads including startup.
  2. Fuel type shall be approved by OWNER
  3. Rating shall be 120/240VAC, single phase, 60Hz, 3 wire.
- E. Automatic Transfer Switch (ATS)
  1. Furnish ATS for secondary transfer between 12.47kV utility source and Emergency Generator.
- F. AC System
  1. Furnish 120/240VAC system completely wired.
  2. Furnish 120/240VAC panel served by the ATS.
    - a. Bus Rating: to be determined by Contractor
    - b. Main Breaker: to be determined by Contractor
    - c. Feeder Breakers: to be determined by Contractor
      - 1) Individual AC breaker per switchgear section – heater, lights, receptacles
      - 2) 20% Spare breakers

## **PART 3 STATION BATTERY POWER**

### **3.01 STATION BATTERY AND DC POWER DESIGN**

- A. The DC system and station battery system shall be designed and sealed by sealed by Nebraska Licensed Professional Engineers and shall comply with the following:
  1. National Electric Code (NEC)
- B. The station batteries and DC panel will power the protective functions of the switchgear. The size and layout of the panel(s) are to be determined by the Contractor and coordinated to accommodate the Owner's needs and to meet all code requirements. In addition, the connection must meet the following minimum requirements
  1. Performance Requirements:
    - a. Design for protection circuits for the switchgear and generators.
    - b. Design for minimal operation during loss of station service power.
- C. DC System
  1. Furnish 125VDC system completely wired.
  2. Furnish 125VDC panel served by the station batteries and battery charger.
    - a. Rating: 125V
    - b. Bus Rating: to be determined by Contractor
    - c. Main Breaker: to be determined by Contractor

- d. Feeder Breakers: to be determined by Contractor
  - e. Two DC breakers per switchgear breaker – trip and close circuits
  - f. 20% Spare breakers
  - g. OPTIONAL: If the remote racking option is selected, one DC breaker per switchgear breaker shall be supplied for remote racking motors.
3. Furnish 125VDC Battery Charger
- a. Input AC Rating: 120VAC
  - b. Nominal DC Output: 125VDC
  - c. AC and DC Current Rating: to be determined by Contractor
4. Furnish 125VDC Station Batteries
- a. Nominal DC Voltage: 125VDC
  - b. Amphour Rating: to be determined by Contractor
  - c. Function: Batteries shall be of sufficient size to sustain the following load profile:
    - 1) 480 minutes of load from all DC loads.
    - 2) Four operations of all circuit breakers – trip, close, trip, close
5. Furnish Battery Rack
- a. Shall include method for spill containment.

END OF SECTION