

## **COORDINATION, SHORT CIRCUIT AND ARC FLASH STUDY (ADDENDUM 3)**

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### **1. GENERAL**

#### **1.1 Description**

- .1 Provide a coordination/protective study, short circuit study and arc flash study of all equipment specified herein and submit for review.
- .2 Coordination, Short Circuit and arc flash study to comply with minimum Canadian Electrical Code requirements and provide all warning labelling. Provide arc flash labels for all high voltage, 600V, and 208V equipment. Labels to indicate incident energy levels for each piece of equipment.
- .3 Include the following:
  - .1 600 V air circuit breaker over current, overload, and ground fault devices.
  - .2 600 V distribution panels and 120/208 V panelboards and switchgear connecting feeder cables and bus duct.
  - .3 Any additional data necessary for successful completion of the coordination and short circuit study.
  - .4 Study shall be inclusive for new distribution equipment.
- .4 Data shall clearly state the operating time in cycles of each breaker and indicate whether the time current curves for relays are inclusive of breaker tripping times or otherwise.
- .5 Prepare a summation chart showing all ratings and settings with easy reference to the appropriate curve.
- .6 Symmetrical and asymmetrical fault current calculations shall be submitted to verify the correct choice of the protective elements of the system.
- .7 Prepare a systems single line diagram on which the resultant short circuit values, device numbers and equipment ratings are shown.
- .8 Include a list of recommended settings for each relay.
- .9 Set all protective devices to recommended settings.

#### **1.2 Qualifications**

- .1 This study shall bear the stamp of a Professional Engineer registered in the Province of Manitoba.
- .2 Refer to City of Winipeg Electrical Design Guide for Coordination, Short Circuit and Arc Flash Study requirements.
- .3 The design shall comply with the following.
  - .1 CAN/CSA C282 Emergency Electric Power Supply for Buildings.

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- .2 CSA Z462 Workplace Electrical Safety (Z462).
- .3 IEEE 1584 Guide for Performing Arc-Flash Hazard Calculations (IEEE 1584).
- .4 IEEE 141 IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (IEEE 141, or the Red Book).
- .5 IEEE 241 IEEE Recommended Practice for Electric Power Systems in Commercial Buildings (IEEE 241, or the Grey Book).
- .6 IEEE 242 IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (IEEE 242, or the Buff Book).
- .7 IEEE 399 Recommended Practice for Industrial and Commercial Power System Analysis (IEEE 339, or the Brown Book).
- .8 IEEE 519 Recommended Practice and Requirements for Harmonic Control in Electric Power Systems.
- .9 IEEE 551 IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial & Commercial Power Systems (IEEE 551, or the Violet Book).
- .10 IEEE 1015 Recommended Practice For Applying Low Voltage Circuit Breakers Used in Industrial and Commercial Power Systems (IEEE 1015, or the Blue Book).
- .11 IEEE 1250 IEEE Guide for Identifying and Improving Voltage Quality in Power Systems.
- .12 ANSI / IEEE C37.10 IEEE Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis (IEEE C37.10).
- .13 ANSI / IEEE C37.13 IEEE Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures (IEEE C37.13).

#### **1.3 Submittals**

- .1 Submittals as per Division 1.
- .2 Submit the complete study for review prior to carrying out calibration and verification.
- .3 Submit typed results of coordination and short circuit study in maintenance manuals.

#### **2. PRODUCTS (NOT USED)**

#### **3. EXECUTION**

##### **3.1 General**

- .1 Provide Preliminary Power and arc flash study for review by the Contract Administrator.
- .2 Provide Final Power and arc flash study based on as-built conditions of the equipment.
- .3 Contractor to adjust device settings based on the study.

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**3.2 Labelling**

- .1 Provide electronic arc flash labels for review by the Contract Administrator.
- .2 Upon approval, provide print out copies of all arc flash labels.
- .3 Affix arc flash labels to the associated equipment.

**3.3 Contract Closeout**

- .1 Provide in accordance with Section 01 78 00 - Closeout Submittals.

**END OF SECTION**