MN/DOT SPECIFICATION FOR A ROADWAY LIGHTING SERVICE CABINET

LIGHTING SERVICE CABINET TYPE: B

06/09/2016

SPECIFICATIONS FOR A LIGHTING SERVICE CABINET

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1. GENERAL

1.1. The Roadway Lighting Service Cabinet (Type B) and all sub-assemblies shall be listed by a National Recognized Testing Laboratory (NRTL) as defined by the U.S. Department of Labor. The testing laboratory must be listed by OSHA in its scope of recognition for the applicable tests being conducted as required by this specification. A list of recognized testing labs for products sold in the United States may be found on the U.S. Department of Labor's web site:
http://www.osha.gov/

1.2. Shall be listed and labeled by a NRTL as being in compliance with UL508 and UL508A, suitable for use as service equipment and approved for outdoor use.

1.3. Shall have a NEMA 3R rating for the enclosure.

1.4. Shall provide electrical service for freeway or street lighting.

1.5. Shall provide photoelectric control for freeway or street lighting.

1.6. Shall be in compliance with the current edition of the National Electrical Code.

1.7. Shall be in compliance with current edition of the National Fire Protection Association (NFPA) 70E Standard for Electrical Safety In the Workplace.

2. CABINET ENCLOSURE

2.1. Shall be a wood pole mounted rain tight enclosure.

2.2. Shall have 6 inch mounting tabs on the top and bottom of the cabinet for securing the cabinet to the wood pole or other mounting surface or structure.

2.2.1. Mounting tabs shall have 3 (Three) evenly spaced ½ Inch drilled holes.

2.3. Shall be rectangular in shape.

2.4. Shall have outside dimensions of 30 inches high, by 24 inches wide, by 12 inches deep.

2.5. Shall have the roof of the cabinet extend beyond the outer edge of the front door. This overhang will reduce the amount of water that could potentially collect at the sealed top of the cabinet door opening.

2.5.1. Shall have Cross-Brakes in the roof.

2.6. Shall have a removable internal panel for mounting all of the electrical components required in the cabinet.

2.7. Shall have external shell, doors and dead front doors or panels fabricated from minimum 0.125 inch aluminum. The 0.125 inch thick aluminum shall conform to the requirements of ASTM B 209 for 5052-H32 aluminum sheet.

2.8. Shall exhibit good workmanship and good aesthetic appearance.

2.9. Shall have all exterior seams for both the cabinet and door(s) continuously welded. All exterior welds shall be ground smooth and all sharp edges removed.

2.10. Shall have an anodized finish. Anodized finish applies to the dead front door and all internal aluminum panels and covers.

After fabrication the aluminum surfaces must have anodic coating as per MIL-A-8625C for Type II, Class I Coating except:

The outer surface coating is 0.018 mm (0.0007 in);

The coating weighs 27 mg per 645 mm^2;

The coating is sealed by immersion in a 100 degrees C. aqueous 5 percent nickel acetate solution for 15 minutes, or submersion in room temperature fluoride based sealant for a minimum of 8 minutes followed by an immediate hot water dip of 5 minutes. The water temperature in the hot water dip tank must be a minimum of 72 degrees C.

Before applying the anodic coating, the aluminum shall be:

Etched with inhibited alkaline cleaner at 70 degrees C for 5 minutes;

Rinsed with cold water;

Immersed in a 50 percent (by volume) nitric acid solution for 2 minutes at 20 degrees C;

Rinsed with cold water.

2.11. Shall have all external hardware, including all nuts and bolts for the cabinet enclosure, constructed of stainless steel. For external door hinge requirements see section 2.17.6.

2.12. Shall have all internal hardware constructed of zinc plated steel.

2.13. Shall have all sharp edges in any wire way covered to prevent damage to conductor insulation.

2.14. Shall ensure that adequate clearance is maintained for conductors entering or exiting the cabinet.

2.15. Shall provide the required wire routing bend radius space as defined by the National Electrical Code Article (300.34).

2.16. Shall have a 1/32 inch weep hole in the bottom of the cabinet to provide for water drainage.

2.17. Shall have two circular windows at the right upper back corner of the cabinet for the photocell.

2.17.1. One window shall be on the back cabinet wall and the other shall be on the right wall of the cabinet.

2.17.2. The windows shall have a diameter of 3.5 inches.

2.17.3. The windows shall be of 0.125 inch thick Lexan and be installed in a manner that does not sacrifice the weather-tightness or the security of the cabinet.

2.18. Shall provide a hinged anodized aluminum dead front door to protect against accidental contact with live electrical parts.

2.18.1. No components or switches shall be mounted directly to the dead front door.

2.18.2. The anodized aluminum dead front door must have cutout provisions for breakers and the luminaire control/test by-pass switch.

2.18.3. Shall open to the right.

2.18.4. Shall be hinged on the right.

2.18.5. Shall have 2 (two) ¼ turn latches on the left side to secure the door in the closed position.

2.18.6. Shall have the functions of all switches, breakers and devices that protrude thru the dead front door labeled.

2.18.7. Shall have a see thru covered opening to allow viewing of the transient suppression status indicator.

2.18.8. Shall have the following white background label installed with ¼ inch tall black font:

PLACE MnDOT REQUIRED AVALIABLE FAULT CURRENT CALCULATION LABEL BELOW

2.18.8.1. Shall be located on the upper half of the dead front door.

2.18.8.2. Shall have a 6 inch by 6 inch blank area below the label reserved for the contractor's available fault current calculation label to be added by others.

2.19. Shall have a front door that meets the following requirements:

2.19.1. Shall have a door that allows easy access for all equipment installed in the cabinet.

2.19.2. Shall have a door that opens to the right.

2.19.3. Shall have 2 louvers in the lower half of the front door for ventilation.

2.19.3.1. Shall have screening on the inside of the cabinet to prevent insect intrusion.

2.19.4. Shall have the door secured with the following requirements:

2.19.4.1. Shall have a door that is equipped with a three-point locking mechanism which operates from a single easy-turning handle. The upper and lower locking points of the three-point locking mechanism shall each have a pair of nylon rollers.

2.19.4.2. Shall have a handle that is constructed from Aluminum or Stainless Steel. This handle shall be a minimum of 16 mm (.625 inch) diameter or 13 mm (.5 inch) square.

2.19.4.3. Shall have a handle that has provisions for pad locking. The pad locking provision is required so the cabinet is in compliance with Occupational Safety & Health Administration (OSHA) Standard 1910.147 The control of hazardous energy (lockout/tagout).

2.19.4.4. Shall have a handle which opens the door with a clockwise turning motion. This motion shall not interfere with the key for the lock, or any other enclosure mechanism.

2.19.4.5. Shall have a door lock that does not interfere with the rotation of the door handle. This lock shall be a standard police lock and key. The lock must work with existing police keys having a 1.75 inch long shank

2.19.4.6. Shall have one key provided with each cabinet.

2.19.4.7. Shall have a lock that is designed to prevent the latch from being pushed or pried back from the outside to gain unauthorized entry

2.19.5. Shall have a lock access hole that has an aluminum swing away cover to prevent entry of rain and snow. The swing away cover shall completely cover the access hole with a minimum of .125 inch overlay on all sides of the opening.

2.19.6. Shall have external door which is attached to the enclosure with 2 lift off hinges.

2.19.6.1. Shall have hinges constructed of stainless steel or other non-corroding material.

2.19.6.2. Shall have hinges fastened to the door and cabinet with stainless steel bolts.

2.19.6.2.1. If the bolts are accessible from the exterior of the cabinet the bolts must be tamper proof.

2.19.7. Shall have door openings which have an outdoor rated NRTL listed neoprene gasket to form a complete seal with the enclosure.

2.20. Shall have a rain-tight vent assembly at the top of the cabinet to provide ventilation.

2.20.1. Shall be baffled to resist the entrance of water into the cabinet.

2.20.2. Shall provide drainage to the exterior of the cabinet for any water entering the vent.

2.20.3. Shall be designed to prevent insect intrusion.

3. CABINET ELECTRICAL COMPONENTS AND WIRING

3.1. Shall have copper conductors only. Aluminum conductors are unacceptable.

3.2. Shall have sufficient slack in all conductors in the cabinet to allow for expansion and contraction of the conductors.

3.3. Shall not have any butt spliced conductors.

3.4. Shall have an enclosed photoelectric control (see PHOTOELECTRIC CONTROL section 4).

3.5. Shall have 10 point Ground bus with cu/al rating to accommodate #14 thru #2 stranded or solid conductors.

3.6. Shall have a 10 point Neutral bus cu/al rating to accommodate #14 thru #2 stranded or solid conductors.

3.7. Shall have separate neutral and ground buss.

3.8. The ground rod conductor shall always be connected to the ground bus. A green insulated bonding jumper shall be run from the ground bus to the neutral bus.

3.9. Shall have provisions for proper grounding of the neutral bus to a ground rod located within the area of the lighting service cabinet enclosure.

3.10. Shall have tin or silver plated copper bus bars rated for both copper and aluminum conductors.

3.11. Shall have a 2-pole, 60 AMP, 120/240 VAC rated lighting contactor.

3.11.1. Shall be 2-pole.

3.11.2. Shall be normally open.

3.11.3. Electrically held.

3.11.4. Shall be rated for tungsten filament and ballast loads.

3.11.5. Shall have an operating coil rated at 120VAC.

3.11.6. Shall have a label that clearly states the contactor is rated for a minimum 22,000 SCCR.

3.11.7. Shall be wired to the load side of the main circuit breaker and the line side of the luminaire breakers.

3.12. All wiring shall be a minimum of #14 AWG, THHN, or THWN unless otherwise specified.

3.13. Shall have the following 120/240 VAC 60 Hz circuit breakers:

3.13.1. Shall be thermo-magnetic.

3.13.2. Shall be full size breakers. No half high, dual or tandem circuit breakers are acceptable.

3.13.3. Shall have one, 2 pole 60 AMP Breaker (labeled Main)

3.13.3.1. Shall be rated for 60 Amps of continuous current at 40 degrees C.

3.13.3.2. Shall carry a minimum 22,000 Short Circuit Current Rating (SCCR)

3.13.4. Shall have two , 2 pole 20 AMP Breakers (Labeled Luminaire 1 and 2)

3.13.4.1. Shall be rated for 20 Amps of continuous current at 40 degrees C.

3.13.4.2. Shall carry a minimum 22,000 (SCCR)

3.13.4.3. Shall be capable of accommodating 4 AWG copper conductors.

3.13.5. Shall have one, 1 pole 15 AMP Breaker (Labeled Photocell Control)

3.13.5.1. The photo cell control circuit breaker shall be rated for 15 Amps of continuous current at 40 degrees C.

3.13.5.2. The photo cell control circuit breaker shall carry a minimum 22,000 (SCCR)

3.13.6. One, 2 pole 20 AMP labeled (TVSS)

3.13.6.1. The circuit breaker shall be rated for 20 Amps of continuous current at 40 degrees C.

3.13.6.2. The TVSS circuit breaker shall carry a minimum 22,000 (SCCR)

3.13.6.3. Shall be connected to the load side of the main circuit breaker.

3.13.7. Cabinets shall have one, 1 pole 20 AMP Breaker (Labeled Convenience Receptacle)

3.13.7.1. Shall be thermo-magnetic.

3.13.7.2. Shall be full size breakers. No half high, dual or tandem circuit breakers are acceptable.

3.13.7.3. The photo cell control circuit breaker shall be rated for 15 Amps of continuous current at 40 degrees C.

3.13.7.4. The convenience receptacle circuit breaker shall carry a minimum 22,000 SCCR.

3.13.7.5. Connected to the main power bus and the line side of the convenience receptacle.

3.14. Shall have machine printed labels that are water proof and smudge proof and rated for outdoor use. Silk–Screening of the panels would be acceptable.

3.15. Shall have all circuit breaker loads labeled with on and off positions, and identified with the load which it is carrying.

3.15.1. Shall have all circuit breakers clearly labeled in a manner that will not deteriorate due to moisture or age.

3.16. The cabinet shall carry a minimum overall rating of 22,000 SCCR.

3.17. Shall be in compliance with current edition of the National Fire Protection Association (NFPA) 70E Standard for Electrical Safety In the Workplace.
Each external cabinet door shall be labeled with the following:

Warning
Potential Arc Flash Hazard
PPE Required

Labels shall be placed on the external door and the dear front door.

4. TRANSIENT VOLTAGE SURGE SUPRESSION

4.1. A transient Voltage Surge Suppressor shall be located in the cabinet behind the dead front door.

4.1.1. The suppressor shall be listed by a Nationally Recognized Testing Laboratory (NRTL) as being compliant with UL 1449 Third Edition.

4.1.2. The suppressor for 120/240 VAC (RMS) service cabinets shall be Advanced Protection Technologies Inc. SPDEE model number S50A120V2PN or (MnDOT approved equal).

4.1.3. The neutral input shall be connected directly to the neutral bus.

4.1.4. The ground connection shall be connected directly to the ground bus.

4.1.5. All connections shall be made using the 10AWG wire provided with the suppressor, no splices or terminations in these conductors will be acceptable. The wires for these connections shall be as short and straight as possible and they shall have no more than one bend with a radius of no less than 2 inches.

4.1.6. The suppressor shall be located and mounted so viewing of the status indications may be accomplished without removing any panels or covers. Viewing the status of the transient suppression status indicator will not require opening the dead font door.

4.1.7. Location of the suppressor in the cabinet shall facilitate easy replacement in the future.

4.2. Shall be wired to a dedicated two pole 20 amp circuit breaker labeled TVSS.

5. CONVENIENCE RECEPTACLE

5.1. Shall have a 120 VAC (RMS) convenience receptacle in accordance with the NEC Article 210.64.

5.2. Shall Be a Ground Fault Circuit Interrupter (GFCI) type.

5.3. Shall be a 20 Amp receptacle.

5.4. Shall be grounded.

5.5. Shall be accessible when the front exterior door is open and the dead front door is closed and latched.

5.6. Shall be mounted a minimum of 2 feet above the bottom of the cabinet.

5.7. Shall not be mounted to the dead front door.

5.8. Shall have a label on the dead front door that reads "Convenience Receptacle"

6. PHOTOELECTRIC CONTROL

6.1. Shall Control AC power being delivered the lighting contactor control coil.

6.2. Shall provide a 3- pole, 3-wire locking type mounting receptacle for photoelectric control. This photo control receptacle must be in full compliance with ANSI C136.10 – 2006.

6.2.1. Shall have a rotatable photocell socket such that the photo sensing input of the photocell may be rotated to face either window.

6.2.2. Shall be designed to provide adequate clearance to easily install or remove the photocell.

6.3. Shall include a photoelectric control in accordance with the specification found on the Mn/DOT WEB site titled "Photo Cells".

Approved photoelectric controls can be found on the Mn/DOT Approved Products List for Lighting:

http://www.dot.state.mn.us/trafficeng/products/index.html#light

6.4. Shall provide a 2-position test switch with "AUTO" and "TEST" positions to allow by-passing the photocell to turn roadway lights on for testing.

6.4.1. Shall have an Auto/Test Switch that is a heavy duty, single, double throw, two position rotary switch.

6.4.1.1. The test switch shall operate as follows:

6.4.1.1.1. One switch position shall be labeled "AUTOMATIC" and the other switch position shall be labeled "TEST".

6.4.1.1.2. In the "AUTOMATIC" position, the test switch shall connect the coil of the lighting contactor to the AC+ (SWITCHED) from the photoelectric control, providing photoelectric control of the lighting circuit.

6.4.1.1.3. In the "TEST" position, the test switch shall connect the coil of the lighting contactor to the AC+ (UNSWITCHED) from the photoelectric control, providing power to the lighting circuit regardless of the state of the photoelectric control.

6.4.1.2. The test switch shall be Allen Bradley 800-TH2A, Schneider Electric 9001KS11BH13 (or approved equal)

6.4.2. Shall have the functions of the switch labeled on the dead front panel. See Section 3.11

6.5. Shall have power to operate the photo control being fed from the 15 AMP (Photocell Control) circuit breaker to protect the photocell, test switch, and contactor coil circuit.

6.5.1. Shall be labeled Photocell Control.

6.5.2. Shall have the function of the switch position labeled on the dead front door.

7. CABINET SCCR RATING

7.1. The Type B Service Cabinets shall have a minimum overall rating of 22,000 SCCR.

7.2. The use of current limiting fusing to achieve the SCCR rating is not acceptable.

7.3. Shall be labeled in accordance with article 110.22 of the NEC.

7.3.1. The label should read as follows:
CAUTION- SERIES COMBINATION SYSTEM RATED 22,000 AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED

8. EXTERNAL LABELING

8.1. Only MN/DOT approved and required safety labels may be applied to the exterior of the cabinet.

8.1.1. Shall have machine printed labels that are water proof and smudge proof and rated for outdoor use.

8.2. The manufacturer may not apply a company logo or company name to the exterior of the cabinet.

9. CABINET DRAWING SUBMITTAL

9.1. The manufacture must provide individual detailed drawings of the cabinet and sub-assemblies prior to submitting the cabinet for approval.

9.1.1. The individual drawings shall include but will not be limited to the following:

9.1.1.1. Detailed dimensional drawings of the exterior of the cabinet.

9.1.1.2. Detailed dimensional drawings of all internal compartments and panels of the cabinet

9.1.1.3. Detailed drawings of all safety covers and locations if required.

9.1.1.4. Detailed drawing of where all safety and manufacturer labeling must be placed.

9.1.2. Any modifications to the drawings Mn/DOT deems necessary must be completed by the manufacturer and final drawings provided to the department and approved by Mn/DOT prior to the cabinet being placed on the Mn/DOT APL.

10. ALLIANT ENERGY APPROVAL

Once the cabinet has been placed on the MN/DOT approved products list the manufacturer must submit and get their product listed on the Allaint Energy's APL at no cost to the Department. The manufacturer must obtain Alliant energy approval within one year of being placed on the MN/DOT APL.
Failure to comply with this requirement will result in the listed product being removed from the MN/DOT Approved Products List.

Additional information regarding Allaint Energy's Approved Products List (Electric Service Equipment) may be found by following the link below.

http://www.alliantenergy.com/index.htm

11. CABINET MODIFICATIONS

Once the cabinet has been accepted by MN/DOT as meeting the requirements of this specification and placed on the MN/DOT APL no substitution of materials or modification of the cabinet design will be allowed unless the manufacturer has received written permission from Mn/DOT allowing the substitution or change.
Failure to comply with this requirement will result in the listed product being removed from the MN/DOT Approved Products List.

12. CABINETS SUPPLIED TO MNDOT CONSTRUCTION PROJECTS

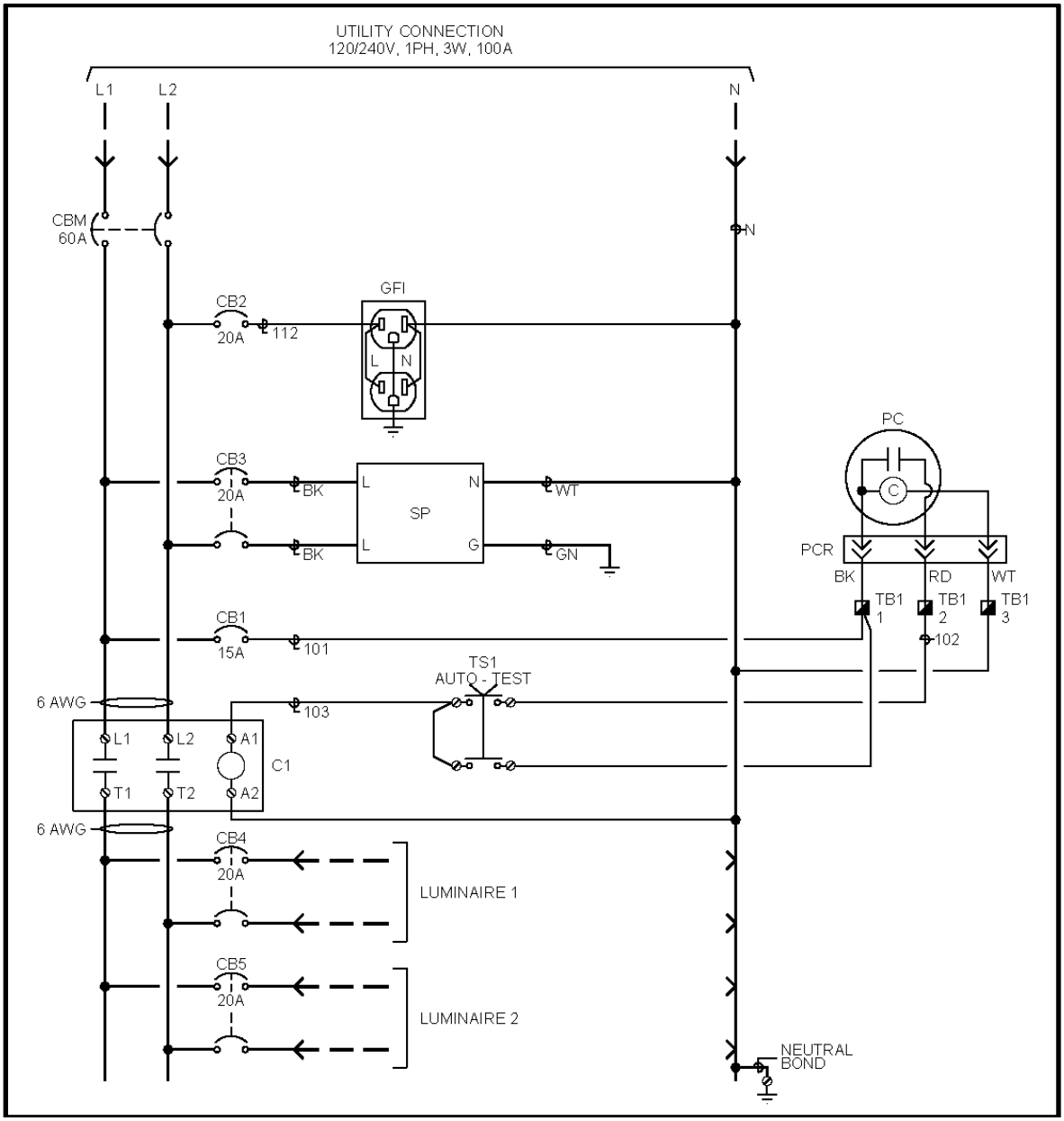
12.1. All versions of the Type B lighting cabinets must be supplied with the full complement of lighting branch circuit breakers as defined above.

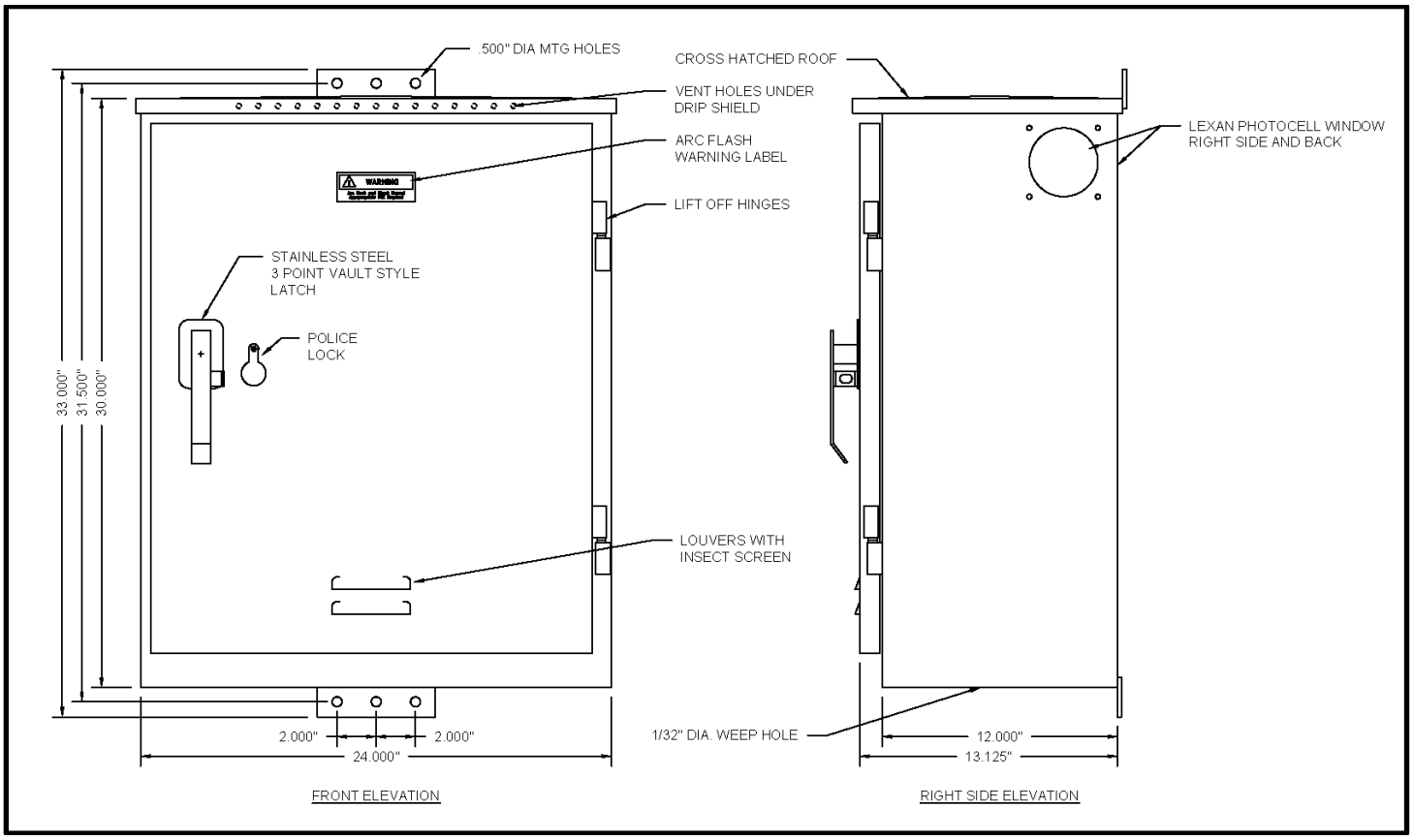
12.2. Each Type B lighting cabinet shall have 2 lighting branch circuit breakers.

Appendix A

13. Detail

All example drawings or schematics provided in this section of the specification are for reference only.




.500" DIA MTG HOLES
VENT HOLES UNDER DRIP SHIELD
ARC FLASH WARNING LABEL
LIFT OFF HINGES
STAINLESS STEEL 3 POINT VAULT STYLE LATCH
POLICE LOCK
LOUVERS WITH INSECT SCREEN
33.000"
31.500"
30.000"
2.000"
2.000"
24.000"
FRONT ELEVATION
CROSS HATCHED ROOF
LEXAN PHOTOCELL WINDOW RIGHT SIDE AND BACK
1/32" DIA. WEEP HOLE
12.000"
13.125"
RIGHT SIDE ELEVATION