Instruction Booklet IB022005EN Effective November 2012

Instructions for Installation of Metal Clad Switchgear 38 kV, 150 BIL Outdoor Housings

Contents

Powering Business Worldwide

⚠CAUTION

THE METAL-CLAD SWITCHGEAR DESCRIBED IN THIS BOOK HAS BEEN DESIGNED AND TESTED TO OPERATE WITHIN ITS NAMEPLATE RATINGS. OPERATION OUTSIDE OF THESE RATINGS MAY CAUSE THE EQUIPMENT TO FAIL, RESULTING IN BODILY INJURY AND PROPERTY DAMAGE.

⚠PURPOSE

THIS INSTRUCTION BOOK HAS BEEN PREPARED TO HELP ENGINEERS AND TECHNICIANS INSTALL, OPERATE, AND MAINTAIN TYPE VAC-CLAD-W SWITCHGEAR. FOR INFORMATION ON THE APPLICATION OF THIS TYPE OF SWITCHGEAR, REFER TO THE PERTINENT ANSI STANDARDS AND TO EATON'S APPLICATION DATA 32-265.

⚠DANGER

ALL SAFETY CODES, SAFETY STANDARDS, AND SAFETY REGULATIONS MUST BE STRICTLY ADHERED TO WHEN INSTALLING, OPERATING, OR MAINTAINING THIS EQUIPMENT.

⚠DANGER

THE ONLY PEOPLE WHO SHOULD BE ALLOWED TO INSTALL, OPERATE, OR MAINTAIN THIS EQUIPMENT ARE THOSE WHO MEET THE QUALIFICATION REQUIREMENTS DESCRIBED IN THE NATIONAL ELECTRICAL SAFETY CODE.

TO PERFORM WORK ON THIS TYPE OF EQUIPMENT, ONE MUST BE TRAINED AND EXPERIENCED IN WORKING WITH HIGH VOLTAGE CIRCUITS. THEY SHOULD BE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND BE AWARE OF THE HAZARDS INVOLVED.

BEFORE ATTEMPTING TO DO ANY MAINTENANCE, ALWAYS BE SURE TO DE-ENERGIZE BOTH THE PRIMARY AND SECONDARY CIRCUITS.

BEFORE REMOVING A BOLTED-ON COVER, FIRST MAKE SURE THAT ALL THE CIRCUITS HAVE BEEN DE-ENERGIZED.

Purpose

The following instructions are to be used for the installation of outdoor switchgear assemblies. This manual is a supplement to IB02201004E that contains the basic test, operation and maintenance procedures.

Recommended Safety Practices

⚠WARNING

ALL SAFETY CODES, SAFETY STANDARDS, AND/OR REGULATIONS MUST BE STRICTLY OBSERVED IN THE INSTALLATION, OPERATION, AND MAINTENANCE OF THIS EQUIPMENT.

The only people who should be allowed to install, operate, or maintain its equipment are those who meet the qualification requirements described in the National Electrical Safety Code.

To perform work on this type of equipment, one must be trained and experienced in working with high voltage circuits. They should be familiar with the construction and operation of this equipment and be aware of the hazards involved.

Before attempting to do any maintenance, always be sure to de-energize both the primary and secondary circuits.

The exposure to the elements of internal components of any switchgear assembly should not be permitted.

Never leave a breaker in an intermediate position in its compartment. Always crank the breaker into the fully connected or withdrawn position.

Before removing a bolted-on cover, first make sure that all the circuits have been de-energized.

Never try to disconnect or open the secondary circuit of a current transformer that is carrying load current. In this situation, the transformer develops a dangerous high voltage. Before attempting work, either de-energize the circuit by opening the breaker or short-circuit the secondary of the current transformer.

⚠CAUTION

READ THIS ENTIRE MANUAL BEFORE ATTEMPTING TO INSTALL THE SWITCHGEAR. THROUGHOUT THIS MANUAL THERE WILL BE FIGURES WITH ITEMS LABELED WITH NUMBERS IN BALLOONS. THESE NUMBERS REFER TO THAT PARTICULAR ITEM THAT IS DRAWN OUT IN DETAIL WITH FRONT AND SIDE VIEWS, AND DIMENSIONS TO EASE IN THE IDENTIFICATION OF THAT PARTICULAR ITEM. THE DRAWINGS OF THESE ITEMS CAN BE FOUND ON PAGES 8 AND 9.

1: Receiving, Handling, and Storing of Outdoor and Indoor Switchgear

1.1 Receiving Switchgear

The switchgear is shipped to the customer as completely assembled as possible. Depending on the number of switchgear vertical sections, it may be necessary to ship in several groups to facilitate handling.

Each indoor switchgear group is bolted to wooden skids and covered. Each outdoor switchgear group is permanently bolted to a structural steel base and covered.

Each switchgear group and all cartons and crates are labeled with an order number and a shipping weight. On one of the groups there will be a shipping packet, securely attached, that contains the shipping list, drawings, and so on.

When the switchgear arrives at the installation site, check to make sure that all the parts described on the shipping list have been received. Do this before discarding the packing material to prevent losing parts. If the switchgear has been damaged, file a claim as soon as possible with the carrier and notify the nearest Eaton representative.

If the switchgear is going to be installed when it has been received, unpack it and handle it according to the procedure outlined in the following sections. If the switchgear is to be stored, inspect it to make sure the shipment is complete and undamaged. Repack it so it will be protected until it has been installed. Follow the instructions in the storing switchgear section for the proper storage procedures.

1.2 Storing Switchgear

⚠WARNING

FAILURE TO PROPERLY STORE AND TO PROTECT SWITCHGEAR MAY CAUSE DAMAGE TO EQUIPMENT. SUCH DAMAGE COULD CAUSE DEATH, SEVERE PERSONAL INJURY, OR PROPERTY DAMAGE WHEN EQUIPMENT IS ENERGIZED.

Packing for shipping is not suitable for storage. Part of the original packaging may be discarded when switchgear is removed from the carrier. Switchgear bus runs, because of their open connection ends, are particularly vulnerable to moisture and dirt during storage.

If the switchgear must be stored for a while, prepare a suitable storage space. Outdoor switchgear can be stored outdoors but bus run open end connection ends should be covered to protect from the elements until assembly is possible. Energize the switchgear heaters to keep moisture from forming inside the switchgear. A terminal block is factory wired for customer-supplied power connection to the heaters. Keep indoor switchgear indoors in a heated building that is clean and dry. The floor should be smooth and level to prevent strain and distortion in the equipment. Be sure the space is well drained so that there is no standing water.

Take steps to prevent the switchgear against dampness, cement dust, corrosive atmospheres, and extreme temperature changes. To control condensation, make sure the equipment is well ventilated. Install temporary space heaters if necessary.

Switchgear should be checked periodically for any signs of deterioration. It is the responsibility of the purchaser to ensure protection during storage.

1.3 Handling Switchgear Assemblies

⚠WARNING

SWITCHGEAR IS UNSTABLE AND HEAVY. MOVE EQUIPMENT WITH CAUTION. FAILURE TO FOLLOW PROPER HANDLING PROCEDURES COULD CAUSE EQUIPMENT TO TIP AND TO LEAD TO SEVERE PERSONAL INJURY OR DAMAGE TO EQUIPMENT.

The preferred method of handling all switchgear assemblies is by crane. Lifting members are bolted to the top of each shipping group. Put a crane hook through each of the four holes to lift and move the group. After the group has been moved into the installation position, remove the lifting members and discard them. **Figure 1** shows the lifting members for indoor, outdoor aisle-less, and outdoor common aisle switchgear. **Figure 2** shows the lifting members for outdoor sheltered aisle switchgear.

Notes: Indoor switchgear will not have sloped roof sheets, steel channels under units, or front and rear rain-resistant doors.

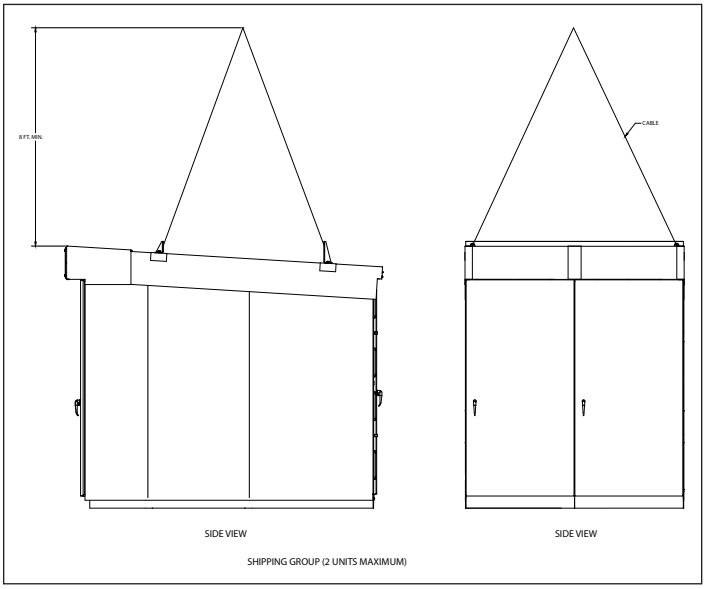


Figure 1. Lifting Angles for Outdoor Aisle-Less.

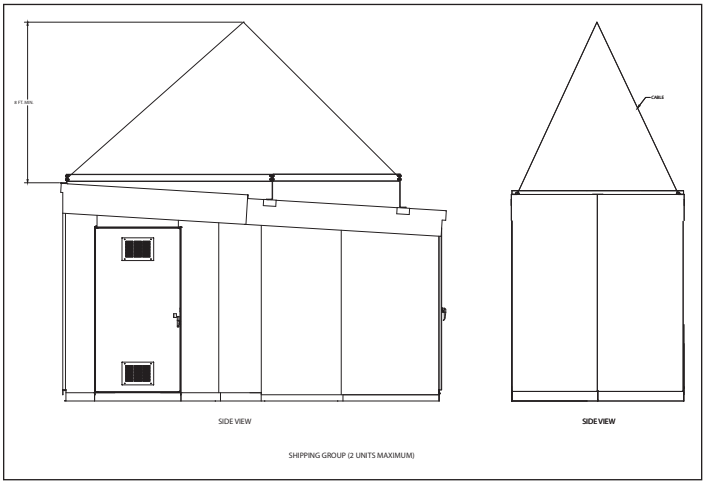


Figure 2. Lifting Angles for Outdoor Sheltered Aisle.

2: Installation of Switchgear

2.1 Installation of Indoor Switchgear

The following instructions are for the installation of indoor switchgear. All internal connections (for example, main bus and ground bus) are listed in the Instructions for VAC CLAD-W 38kV, 150BIL Switchgear Indoor Housing (IB02201004E)

1. Align the shipping groups side-by-side on the foundation. Finished foundation surface (including floor steel) must be flat, level, and in true plane.
   a. Remove the crating and packaging material from the groups of switchgear that are going to be installed.
   b. Let the shipping skids remain on each group until the group has been moved into its final installation position. (The skids help to protect the switchgear and to reduce the risk that it will be damaged or distorted during the move.)
   c. one first. Then install the other groups, working out from the middle. If an even number of groups is to be installed, start with either group on either side of the middle shipping break.

      If a unit substation or a power center is being installed, line up the power transformer and the adjacent switch gear group first. Set them in the position called for on the drawing of the base plan. Then install the rest of the groups.
   d. Handling the switchgear by crane is the preferred method. Move the first group into position. Line up the bolt holes in the base of the vertical sections with the bolt holes in the steel channels in the foundation. A few inches in front of the line-up, draw a baseline along the length of the intended location of switchgear. As the groups are maneuvered into place, keep the front of each group parallel to the baseline.
   e A bolt at each end of the wooden skids holds the skids to the base of the group. Lift the shipping group, remove the bolts, and discard the skids.
   f. Set the group into its installation position. Use a level to make sure the group is level both across its width and along its length. Use a plumb line to make sure the group is plumb. (To level or plumb the group, use shims at the points where the vertical sections will be bolted or welded to the floors.)

      Move each group into position and repeat the preceding steps. Use a come-along or other necessary means to pull the groups all the way together.
2. Bolt the groups together through the tie bolt holes.
   a. Remove the back covers from the vertical sections on each side of the shipping group. Install tie bolts between shipping groups. After all tie bolts are installed, tighten tie bolts down. There are ten tie bolt locations in the rear module (five in the front, five in the back) and eight tie bolt locations in the bus module (four in the front, four in the rear). Figure 3 shows the location of the tie bolts.

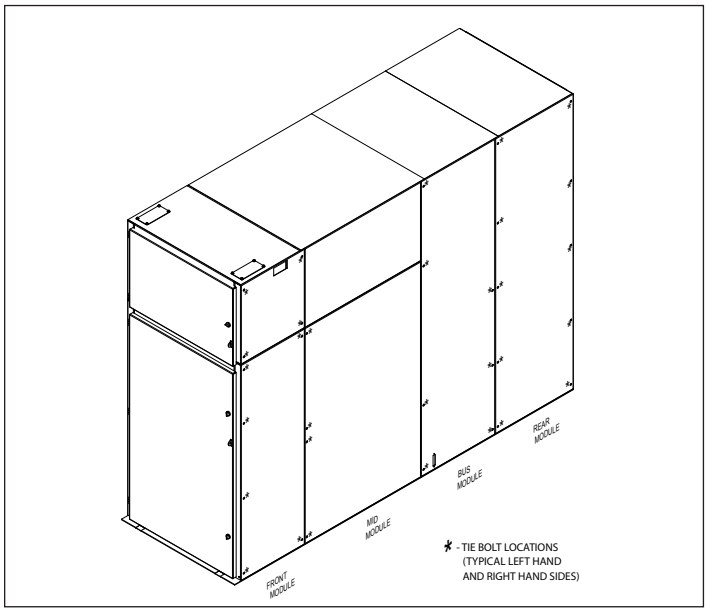


Figure 3. Tie Bolt Locations.

   b. Open the front panels on the vertical sections. Insert and tighten tie bolts between the front upright members. There are four tie bolt locations in the control module, five tie bolt locations in the front module, and four tie bolt locations in the mid module. Figure 3 shows the location of the tie bolts.
3. Bolt or weld the entire switchgear system to the channels in the foundation. Check the system again to make sure it is level and plumb.
4. Remove all the shipping blocks or braces. Examine all the meters, relays, etc. and remove any shipping blocks or braces. Remove lifting angles from top of the units and discard them.

2.2 Installation of Outdoor Aisle-less Switchgear

The following instructions are for the installation of outdoor aisle-less switchgear. All internal connections (for example, main bus and ground bus) are listed in the Instructions for VAC CLAD-W 38kV, 150BIL Switchgear Indoor Housing (IB02201004E).

1. Align the shipping groups side-by-side on the foundation.
   a. Remove the crating and packaging material from the groups of switchgear that are going to be installed.

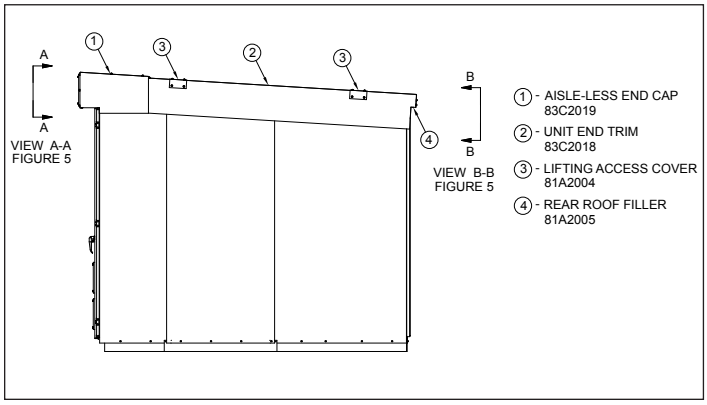


Figure 4. End Trim Cap and End Trim
(Style numbers are for hardware located in detail box).

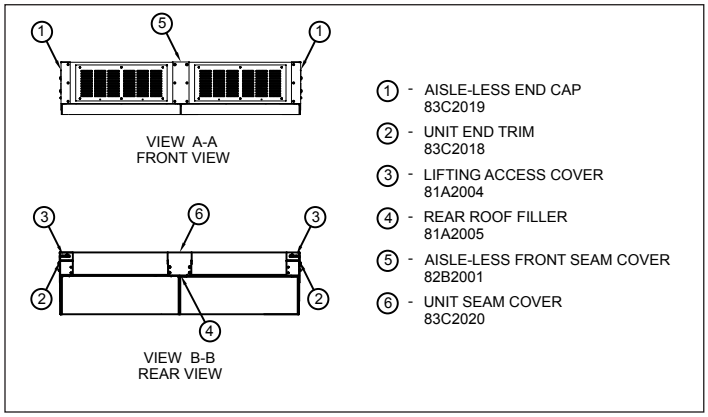


Figure 5. Front and Rear Filler Piece Locations.

b. Remove any overhanging seam covers and roof fillers from the groups of switchgear. These will be replaced at a later time (Step 5). **Figure 4** and **Figure 5** show the placement of the seam covers and roof fillers that may need to be removed and replaced during assembly.

c. If an odd number of groups is to be installed, install the middle one first. Then install the other groups, working out from the middle.

If an even number of groups is to be installed, start with either group on either side of the middle shipping break.

If a unit substation or a power center is being installed, line up the power transformer and the adjacent switchgear group first. Set them in the position called for on the drawing of the base plan. Then install the rest of the groups.

d. Handling the switchgear by crane is the preferred method.

Move the first group into position. Line up the bolt holes in the base of the vertical sections with the bolt holes in the steel channels in the foundation. A few inches in front of the line-up, draw a baseline along the length of the intended location of switchgear. As the groups are maneuvered into place, keep the front of each group parallel to the baseline.

e. A bolt at each end of the wooden skids holds the skids to the base of the group. Lift the shipping group, remove the bolts, and discard the skids.

f. Set the group into its installation position. Use a level to make sure the group is level both across its width and along its length. Use a plumb line to make sure the group is plumb. (To level or plumb the group, use shims at the points where the vertical sections will be bolted or welded to the floor.)

Move each group into position and repeat the preceding steps. Use a come-along or other necessary means to pull the groups all the way together.

2. Bolt the groups together through the tie bolt holes.

a. Remove the back covers from the vertical sections on each side of the shipping group. Install tie bolts between shipping groups. After all tie bolts are installed, tighten tie bolts down. There are ten tie bolt locations in the rear module (five in the front, five in the back) and eight tie bolt locations in the bus module (four in the front, four in the rear). **Figure 3** shows the location of the tie bolts.

b. Open the front panels on the vertical sections. Insert and tighten tie bolts between the front upright members. There are four tie bolt locations in the control module, five tie bolt locations in the front module, and four tie bolt locations in the mid module. **Figure 3** shows the location of the tie bolts.

3. Remove all the shopping blocks or braces. Examine all the meters, relays, and so on, and remove any shipping blocks or braces. Remove lifting angles from top of the units and discard them.

4. Attach tie down clamps to the foundation. For seismic applications, secure units to the foundation using tie down clamps. Secure the switchgear to the foundation with the supplied tie down clips per the outdoor aisle-less base plan.

5. Install the seam covers lifting hole access covers and roof fillers. Install filler pieces lifting hole access covers and unit seam covers using proper hardware from detail box. If unit end trim is not on each end of shipping group, install at this time using proper hardware from detail box. Refer to **Figure 4** and to **Figure 5** for the placement of these items.

6. Install all skirts around the bottom of the unit.

2.3 Installation of Outdoor Sheltered Aisle Switchgear

The following instructions are for the addition of a sheltered aisle to outdoor switchgear. The installation of the outdoor sheltered aisle is the same as that of the outdoor aisle-less except for the following additional instructions.

The outdoor sheltered aisle is shipped as completely assembled as possible. The aisle is already attached to the switchgear groups for ease of assembly.

1. After switchgear group is in its desired location, remove the lifting angle from the top of the switchgear. The lifting angles are attached to both the switchgear units and to the aisle.

2. With all the groups in place, tie bolt the aisle walls and switchgear units together. (There are 10 aisle wall tie bolt locations.) Refer to **Figure 3** on **Page 4** for the location of the unit tie bolt locations.

3. Install (if not already installed) the right- and left-hand end trim, right and left roof filler, right and left aisle unit filler, unit seam cover, mid roof filler, and rear filler. **Figure 6** and **Figure 7** show the placement of these items.

4. Install (if not already installed) the aisle seam cap, right and left aisle end trim cap, and end trim. Refer to **Figure 6** and to **Figure 7.**

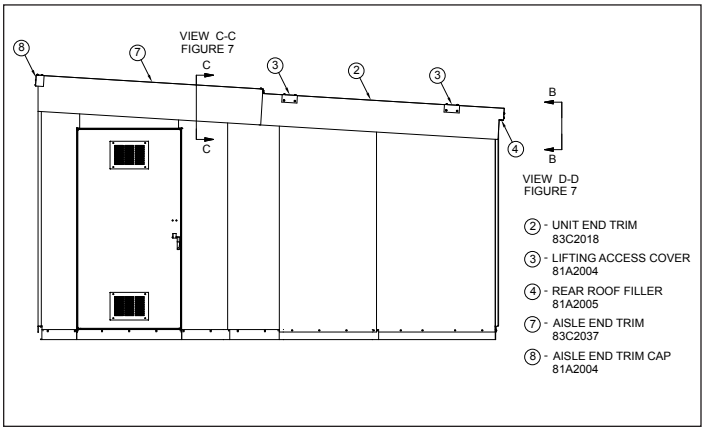


Figure 6. Unit and Aisle End Trim Locations.

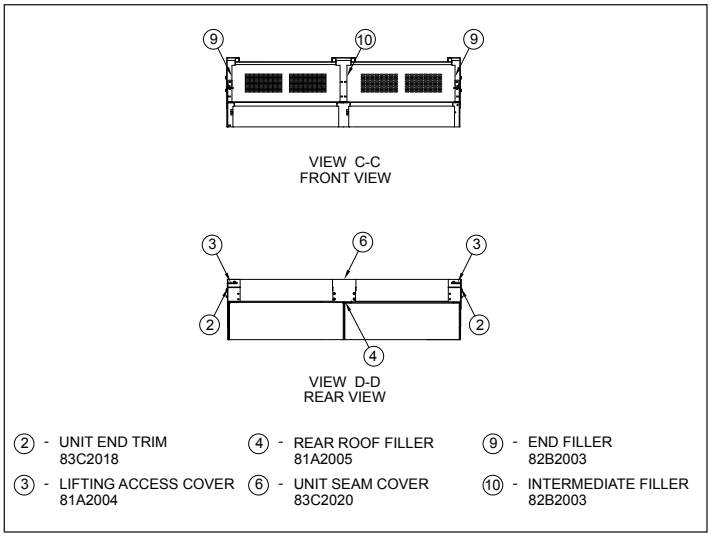


Figure 7. Filler Pieces and End Trim Locations.

5. For seismic applications, secure the aisle to the foundation using clamps pre-attached to the aisle and unit base channels. The clamps can be accessed through the floor panels on the aisle base. Rear unit clamps are supplied in the detail box. Secure the switchgear to the installation pad per the base plan supplied.
6. Install all skirts around the bottom of the unit.

3: Typical Weight of Units

Table 1. Typical Aisle-less Unit Weights (Pounds and Kilograms) ①

Type	Rating (Amperes)	Weight (lbs.)	Weight (kg)
42W Breaker	1200	4500	2041
	2000	4600	2087
	2500	4755	2157
	3000	4755	2157
42W Aux	1200	4400	1996
	2000	4500	2041
	2500	4655	2112
	3000	4655	2112
42W Blank	1200	3320	1506
	2000	3420	1551
	2500	3575	1622
	3000	3575	1622
48W	1200	5660	2567
	2000	5760	2613
	2500	5915	2683
	3000	5915	2683
60W	1200	7500	3402
	2000	7600	3447
	2500	7755	3518
	3000	7755	3518

① See circuit breaker instruction book for breaker weights.

Table 2. Typical Sheltered Aisle Unit Weights (Pounds and Kilograms) ①

Type	Rating (Amperes)	Weight (lbs.)	Weight (kg)
42W Breaker	1200	5700	2586
	2000	5800	2631
	2500	5955	2701
	3000	5955	2701
42W Aux	1200	5600	2540
	2000	5700	2586
	2500	5855	2656
	3000	5855	2656
42W Blank	1200	4520	2050
	2000	4620	2096
	2500	4775	2166
	3000	4775	2166
48W	1200	6860	3112
	2000	6960	3157
	2500	7115	3227
	3000	7115	3227
60W	1200	8900	4037
	2000	9000	4082
	2500	9155	4153
	3000	9155	4153

① See circuit breaker instruction book for breaker weights.

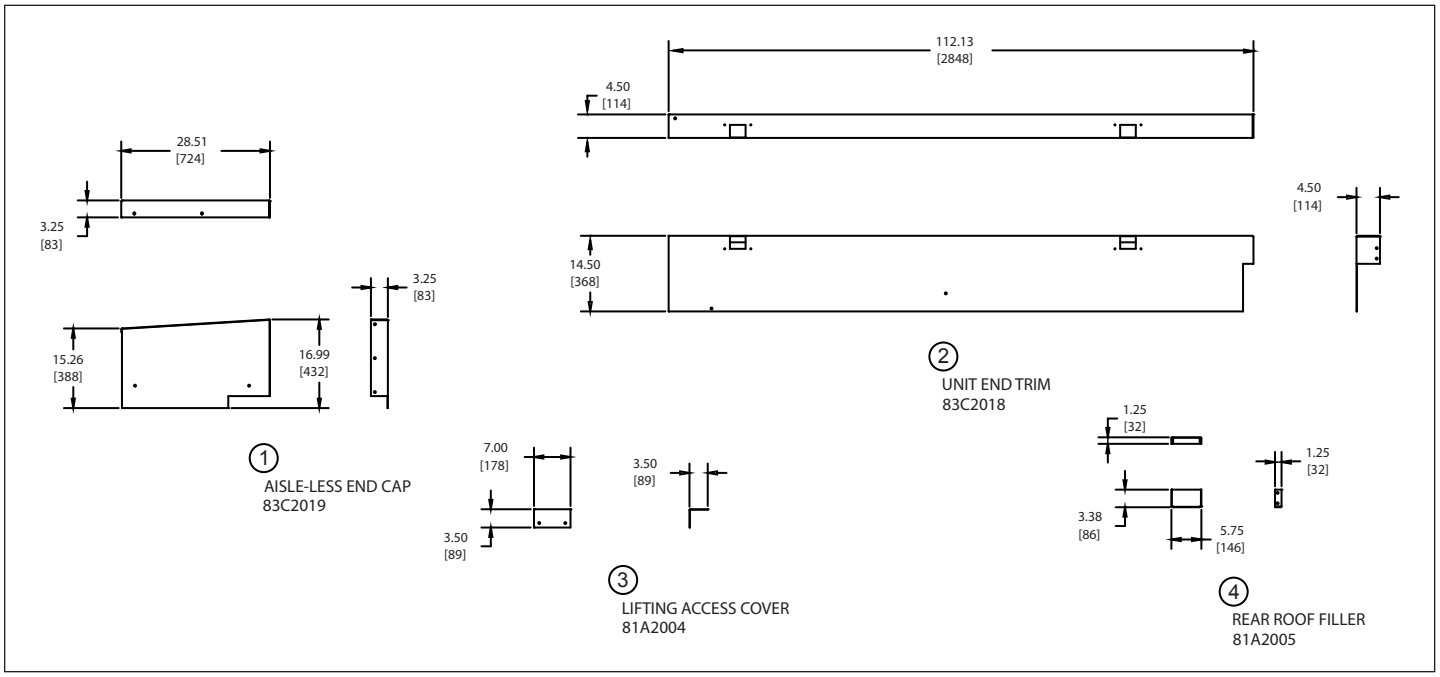


Figure 8. Parts With Brief Description and Dimensions.

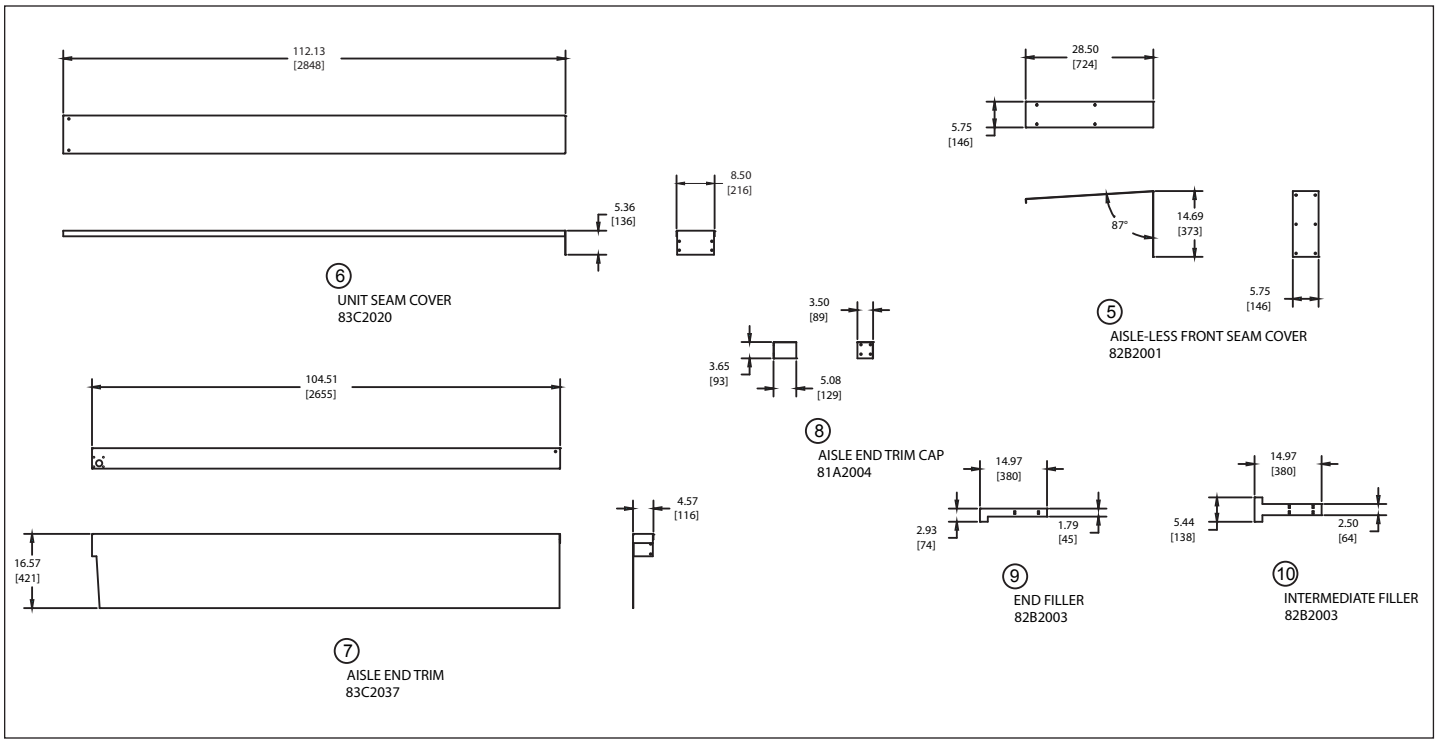
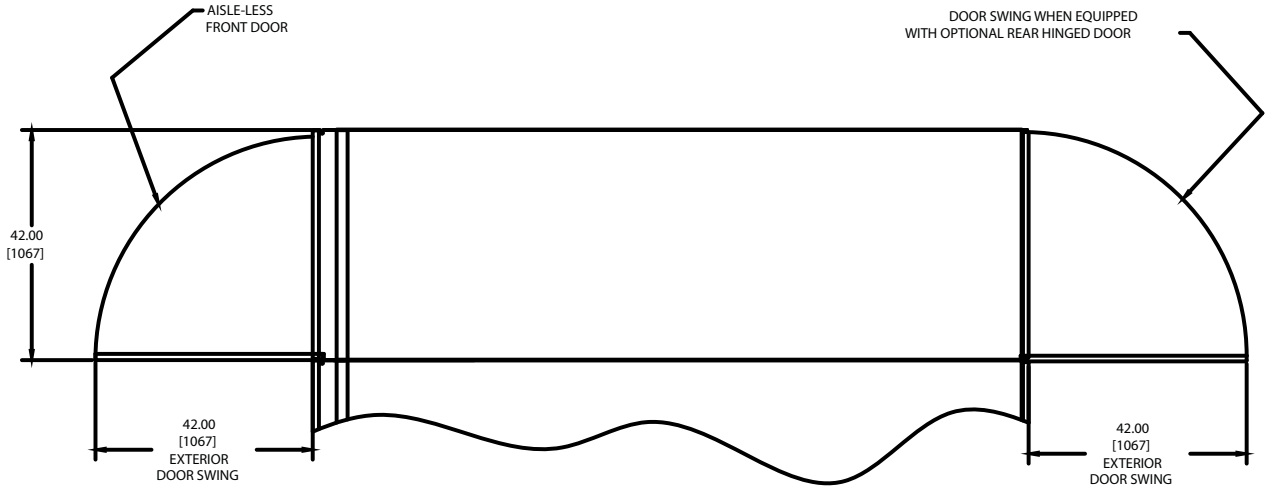
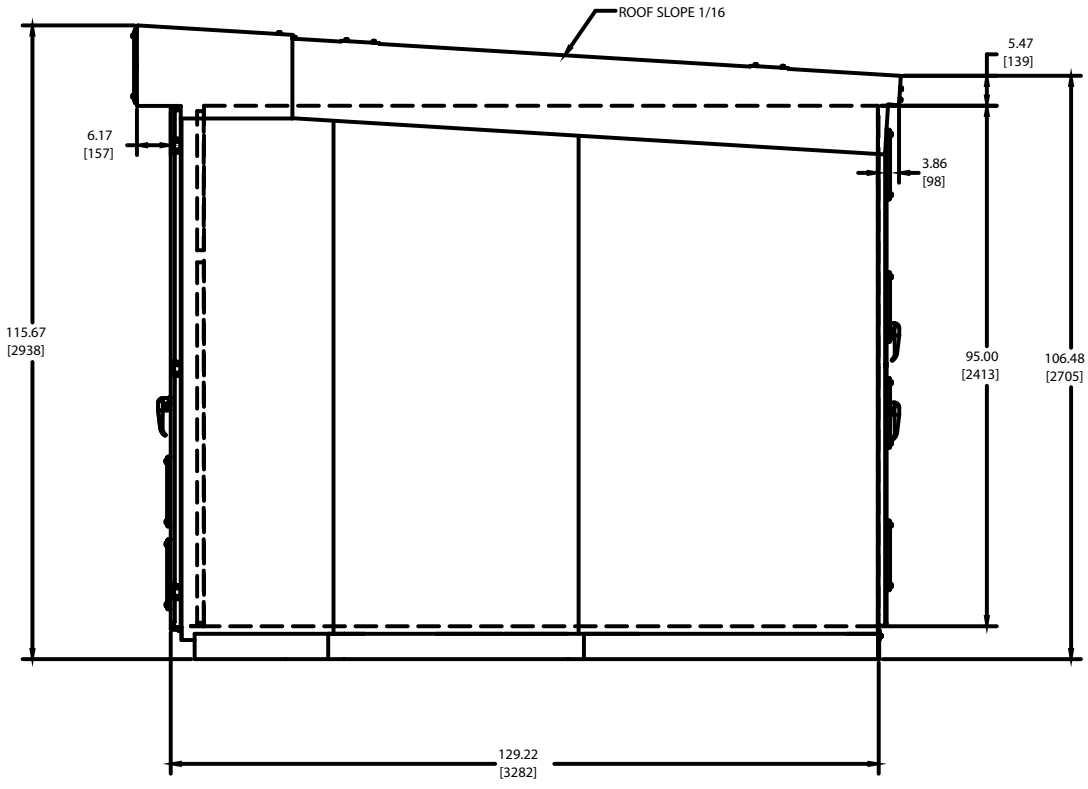


Figure 9. Parts With Brief Description and Dimensions (cont'd).



PLAN VIEW



RIGHT SIDE VIEW

Figure 10. Outdoor Aisle-less Right Side View With Dimensions.

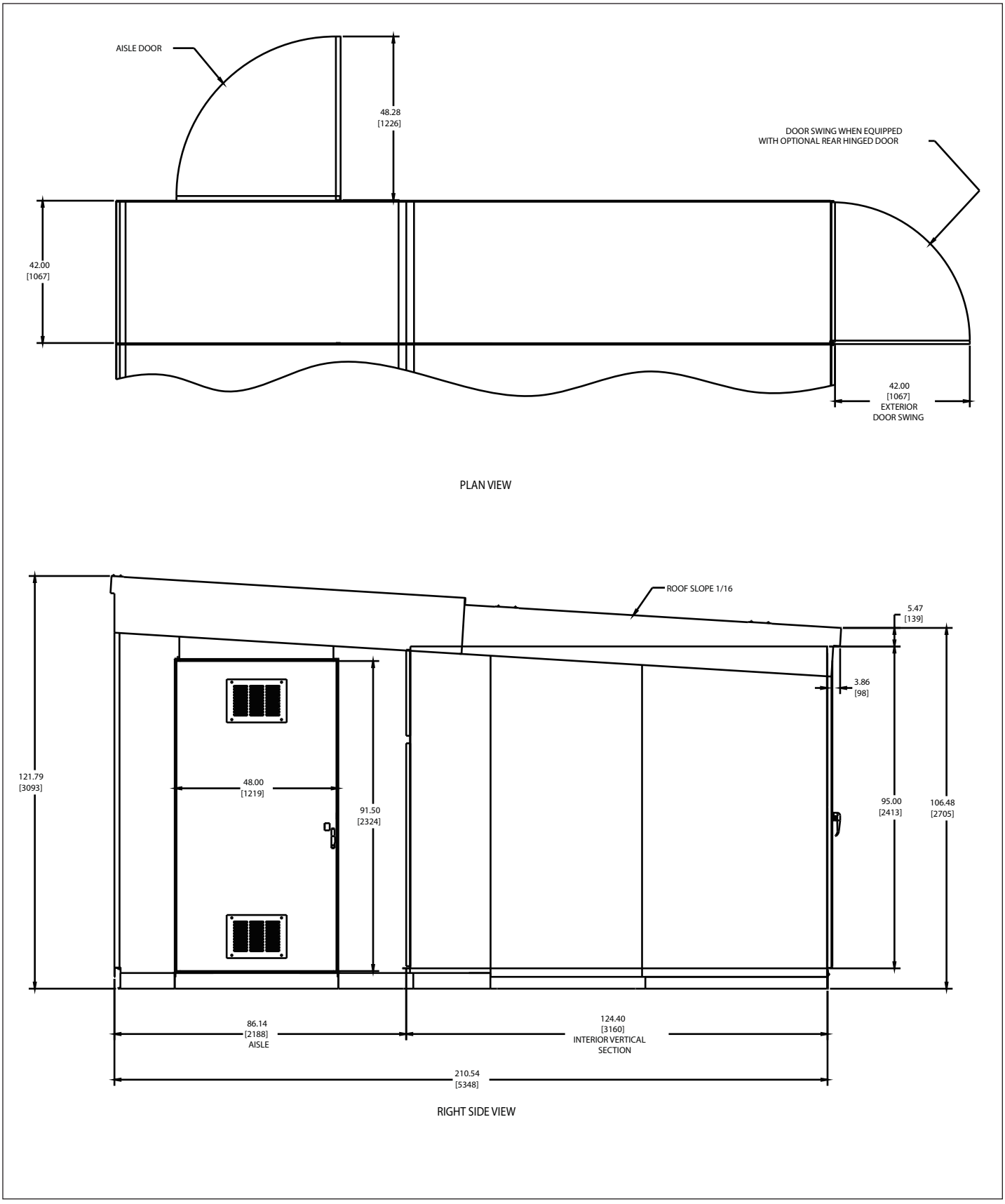


Figure 11. Outdoor Sheltered Aisle Right Side View With Dimensions.

Notes:

Notes:

Instructions for Installation of Metal Clad Switchgear 38 kV, 150 BIL Outdoor Housings

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