

Instruction and Installation Guide

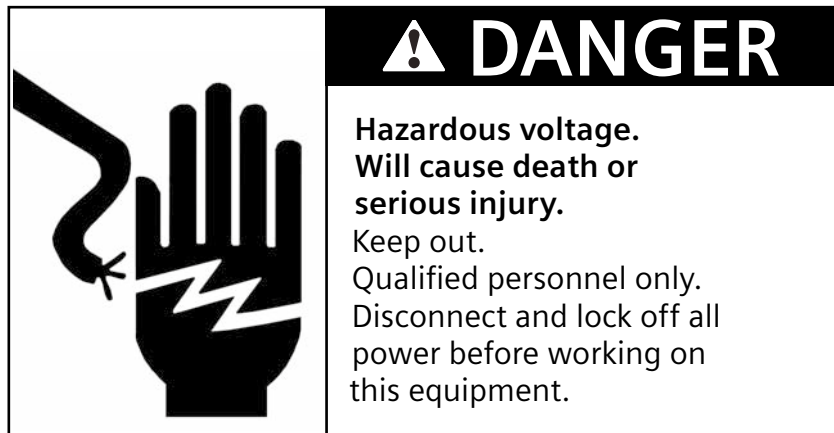


Type 2A Arc Resistant tiastar Motor Control Center

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IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Siemens reserves the right to make changes in the specifications shown herein or to make improvements at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

NOTE

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens sales office. The contents of this instruction manual should not become part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Siemens Industry, Inc. The warranty contained in the contract between the parties is the sole warranty of Siemens Industry, Inc. Any statements contained herein do not create new warranties or modify the existing warranty.



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Type 2A Arc Resistant tiastar Motor Control Center

Introduction and safety

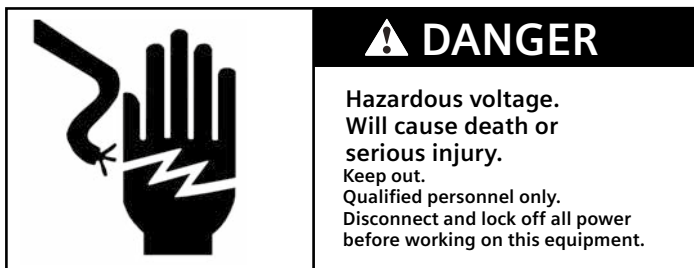
Introduction

Type 2A Arc Resistant tiastar Motor Control Center is designed to meet all applicable UL, ANSI, NEMA and IEEE standards. It is designed and performance tested to IEEE Std C37.20.7-2007 to provide an additional degree of protection from internal arc faults. Successful application and operation of this equipment depends as much upon proper installation and maintenance by the user as it does upon the careful design and construction by Siemens.

The purpose of this Instruction Manual is to assist the user in developing safe and efficient procedures for the installation, maintenance and use of the equipment. This Instruction Manual acts a supplement to CCIM-TIAST-1115 tiastar Motor Control Center Instruction Guide.

Application of Arc Resistant tiastar Motor Control Center meeting the requirements of IEEE Std C37.20.7-2007 does not eliminate the requirements of **Personal Protection Equipment (PPE)**.

Contact the nearest Siemens representative if any additional information is desired.



Qualified person

For the purpose of this manual and product labels, a **Qualified Person** is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, this person has the following qualifications:

- Training and authorization to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Training in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses, face shields, flash clothing, etc., in accordance with established safety procedures.
- Training in rendering first aid.

Signal words

The signal words "**Danger**," "**Warning**" and "**Caution**" used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as:

Danger – Indicates an imminently hazardous situation which if not avoided, **will** result in death or serious injury.

Warning – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Working on equipment

Before performing work user personnel must adhere to the following.

1. Disconnect and lockout incoming power and control voltage sources before beginning work on this or any other electrical equipment.
2. Check all power and control circuit terminals with a voltmeter to make certain that the equipment is totally de-energized.
3. Ensure that only Qualified Personnel be instructed and authorized to use the defeater mechanism to gain access to a de-energized compartment.
4. Never attempt to withdraw unit or disconnect any terminations when the defeater mechanism has been used to open the compartment door.
5. If any unit is removed from a MCC section, replace that unit door with a blank "screw down" cover to maintain Arc Resistant ratings.

Field service operation

Siemens can provide the following support services for tiastar Motor Control Centers.

Call 1-800-241-4453 to obtain additional information and schedule an appointment.

- Start-up and commissioning
- Component and system testing
- Maintenance (scheduled and preventative)
- Repair and refurbishing
- On-site operational training



Type 2A Arc Resistant tiastar Motor Control Center

General description



Figure 1. Front view of arc resistant tiastar Motor Control Center

Introduction

Siemens Type 2A arc resistant tiastar Motor Control Center is designed to provide an additional degree of protection for personnel performing normal operating duties in proximity to the energized equipment. Such duties include opening or closing breakers, reading of instruments, or other such activities that do not require the opening of doors or removal of covers. It is designed and performance tested to IEEE std C37.20.7 to provide an additional degree of protection from internal arc faults.

Plenum system is an assembly of parts/sub-assemblies to be used with Siemens arc resistant MCC, which is designed to transfer the products of an Arc Flash (smoke, particulate matter, heat, etc.) away from the immediate vicinity of the MCC when such an incident occurs. This system carries these products and exhausts them to a safer location- usually outside of the room in which the MCC is located. Thus using plenum system gives an added degree of protection to personnel and other equipment around the gear which has been involved in the Arc Flash incident.

This instruction manual acts as a supplement to CCIM-TIAST-1115 tiastar Motor Control Center Instruction Guide.

Should additional information be desired, including replacement instruction books, contact your Siemens representative.

Scope

These instructions cover the installation and maintenance of Siemens Type 2A arc resistant tiastar Motor Control Center. A typical Type 2A arc resistant tiastar Motor Control Center is shown in Figure 1.

Instruction and installation details of standard motor control centers have already been discussed in CCIM-TIAST-1115 tiastar Motor Control Center Instruction Guide. This manual discusses the special features and maintenance associated with arc resistant motor control centers.

This document also provides general guidelines on the configuration, sizing, fabrication and assembly of a plenum system for Siemens arc resistant MCCs. Detailed dimensioned prints have been included for some critical components of the assembly, however it is the responsibility of the end user to follow these guidelines for the manufacture and assembly of the remaining components for assuring safe and effect functionality of the plenum.

General Description

Type 2A arc resistant tiastar Motor Control Center is an assembly of an indoor enclosure with a horizontal bus system with insulating boots at the end sections, removable rear covers secured to the enclosure with U-nuts, and screwed down wire way doors.

An expansion chamber (min 12" high) is required for each arc resistant MCC section.

A minimum 38 inch clear aisle space must be maintained in front of the motor control center. If accessible space is used on the sides or rear of the motor control center provide a minimum 38 inches. A 112 inch minimum ceiling height must be maintained for proper functioning of arc resistant motor control center.

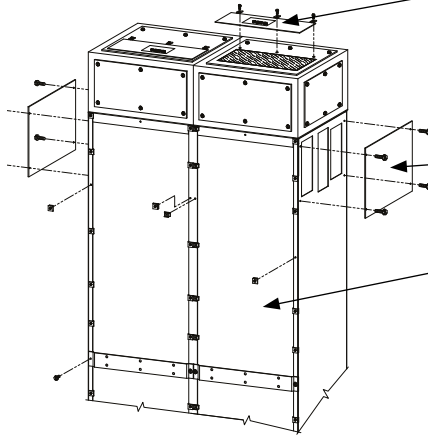
The arc resistant ratings are listed on the motor control center rating label. Ratings are given for:

1. Accessibility type
2. Arcing short-circuit current and voltage, and
3. Arcing duration
4. Minimum ceiling height and minimum aisle space

Type 2A Arc Resistant tiastar Motor Control Center

Special instructions

tiastar Motor Control Center – Rear



Top cover plate pressure relief flaps

- To relieve internal pressure, flaps open outward in the event of an arc fault.

End Covers

- Heavy gauge to withstand pressure from internal arcing faults.

Rear Covers

- Extra screws to withstand pressure from internal arcing faults.
- U-nuts to provide extra threads.
- Screws thread into u-nuts which prevent stripping of threads and provide extra strength to backplate.

Figure 2. Rear isometric view of motor control center

tiastar Motor Control Center – Front

- Top wire way doors and vertical wire way door are screwed down to withstand pressure.
- Doors with ventilation have plates or flaps to deflect gasses and debris escaping from the MCC.
- Blank spaces, 16" wide are limited to 6" or 12" height and are bolted to withstand pressure.

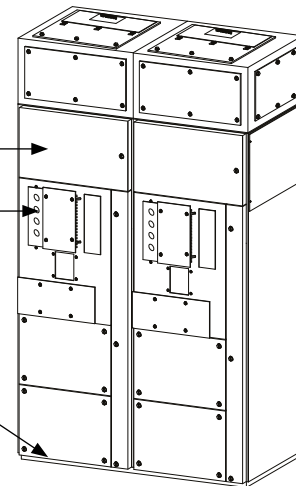
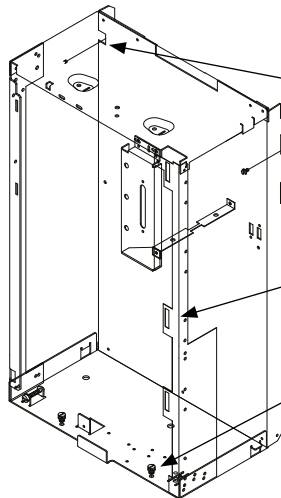


Figure 3. Front isometric view of motor control center

30" – 60" unit compartment



30" – 60" unit compartment parts (plug-in only)

- Unit is screwed to the wireway backplate/ structure.
- Heavy gauge right side angle with door fastener slots.
- Unit is bolted through the bottom plate in two locations.

Figure 4. Isometric view of 30" – 60" compartment



Type 2A Arc Resistant tiastar Motor Control Center

Installation

MCC dimensions, room requirements and other considerations

1. Clear space must be maintained in front, sides and above the tiastar Motor Control Center. If a rear and/or side aisle is used, it must be a minimum of 38". The details are as shown:
2. Expansion chamber flaps must be closed under normal operating conditions.
3. Clear space of 9" required over expansion chamber flaps.
4. All internal flaps on ventilated units should be open under normal operating conditions and should be free to swing closed in the event of an arc flash incident.
5. Ensure that all screws are in place and tightened before energizing the equipment.

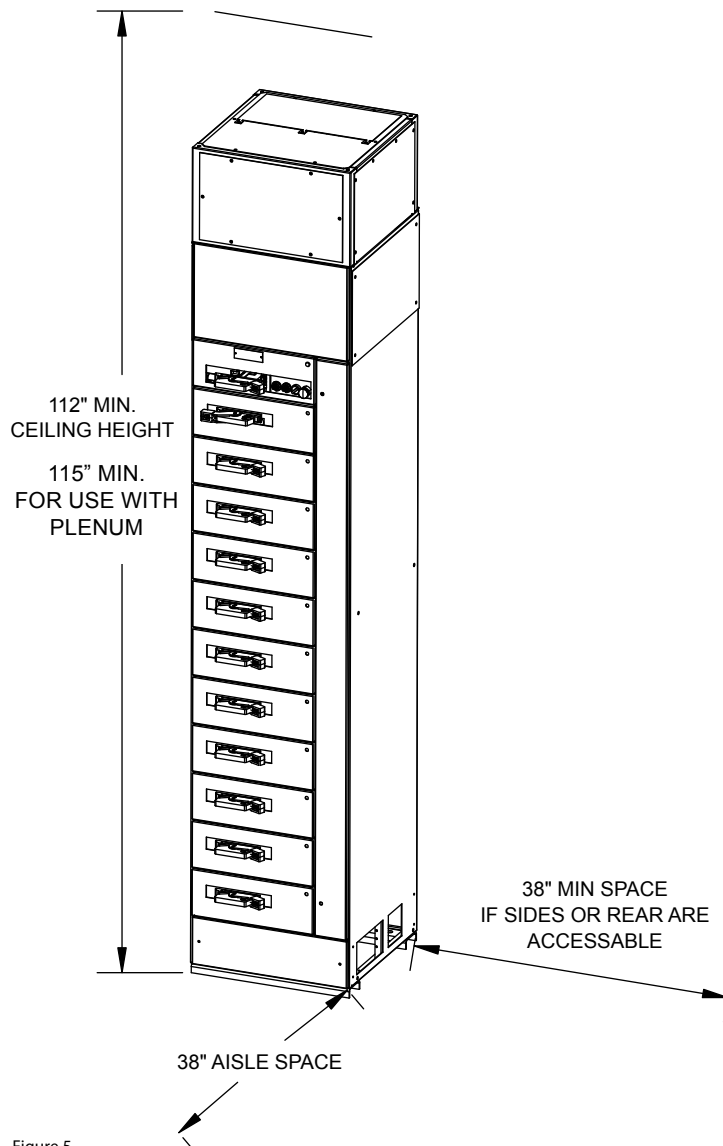


Figure 5

Restricted top conduit entry:

Restricted top conduit entry: Use of special expansion chamber on top of Arc Resistant MCC restricts the available conduit size per figure below.

These conduit openings have to be cut into the expansion chamber top plate.

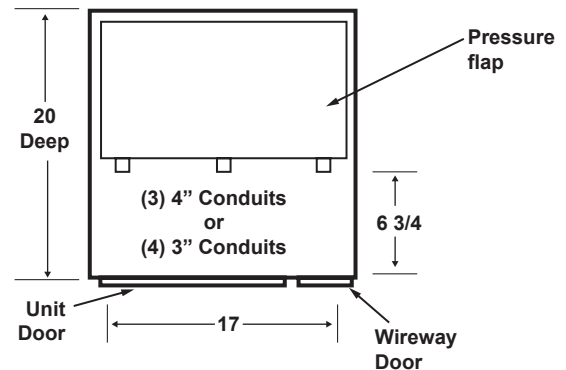


Figure 6. Top conduit opening for Arc Resistant MCC

- Use of conduit for cable entry recommended
- If conduit is not used then a means of sealing around cables either with a listed gland or listed industrial fire barrier is required.

Type 2A Arc Resistant tiastar Motor Control Center

Expansion chamber installation

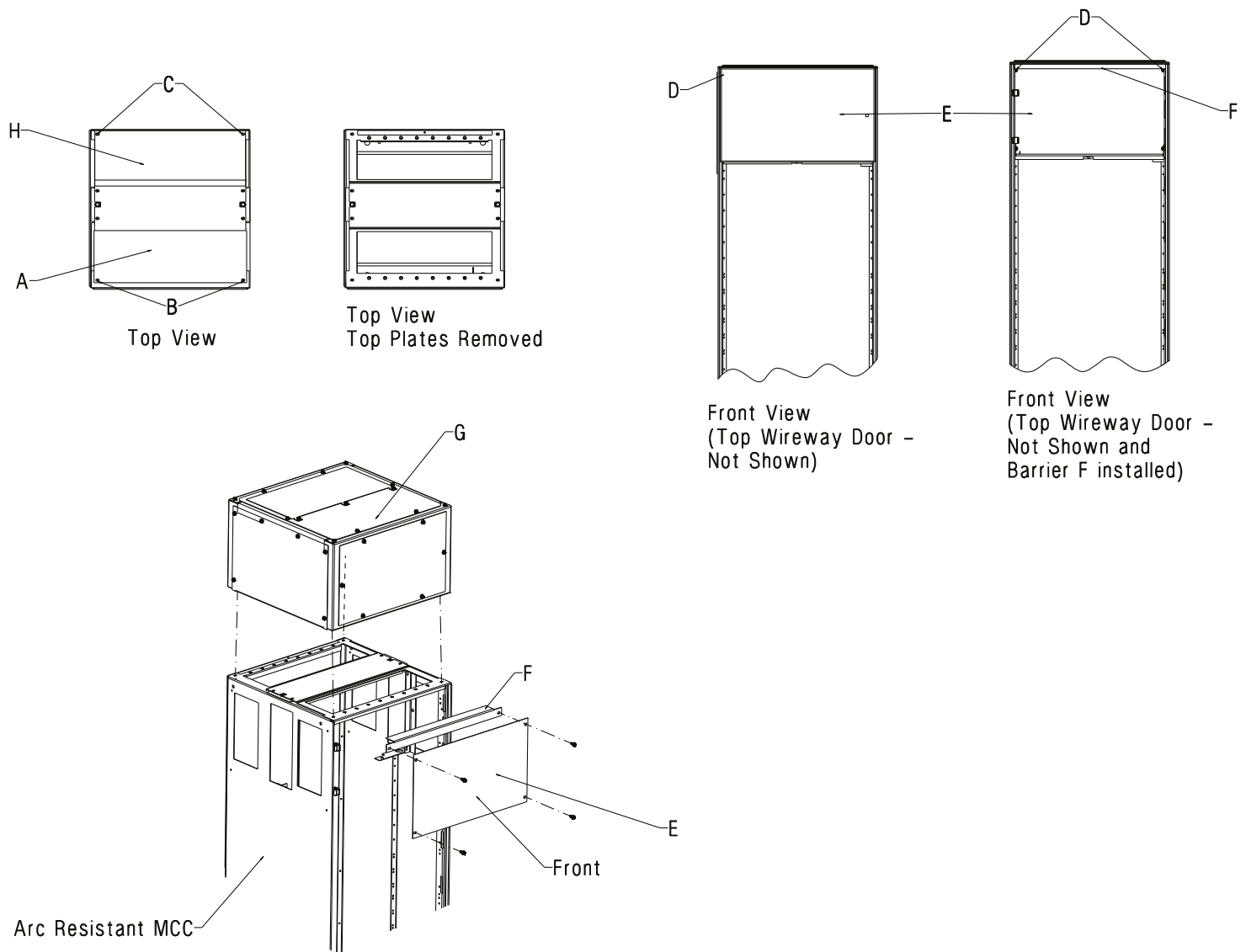


Figure 7

Refer to Figure 7 for the following procedure.

1. Remove top front conduit plate (A) from motor control center structure by removing two screws (B).
2. Remove two rear screws (C) and top rear conduit plate (H)
3. Remove the top two screws holding on the bus insulator cover (E).
4. Install barrier (F) and replace the screws from step 3.
5. Remove entire top plate assembly of expansion chamber(G) along with pressure flap.
6. Place expansion chamber on MCC and screw down using four 1/4-20 x 3/4" taptite screws.
7. Replace top plate assembly that was removed in step five.

Type 2A Arc Resistant tiastar Motor Control Center

Plenum/duct design guidelines

Relevant definitions (see Drawing 1)

1. Plenum: Expansion chamber on top of MCC section.
2. Exhaust Duct: Channel/ tube to carry the gasses away from MCC. It is attached to the plenum on one side and duct end assembly on the other side.
3. Duct end assembly: Assembly at the end of the exhaust duct consisting of pressure flap, mesh and shroud. Duct end assembly will protrude outside the E house or building housing the MCC (see Drawing 4 and Drawing 5).
4. Pressure flap: Flap at end of the duct designed to open in an Arc Flash incident.
5. Plenum system: Entire assembly constituting of the plenum, exhaust duct and duct end assembly

Overall configuration of plenum system (see Drawing 1)

As shown in the attached drawing the plenum can have 4 general initial orientations:

- A. Plenum system oriented towards the front of the MCC lineup
- B. Plenum system oriented towards the back of the MCC lineup
- C. Plenum system oriented towards the left of the MCC lineup
- D. Plenum system oriented towards the right of the MCC lineup

The duct can have multiple turns in any direction as needed to reach its desired exhaust location.

Details of Plenum construction (see Drawing 2)

As shown in drawing 1, the plenum is mounted to the top of the MCC structure.

Specifically it gets mounted to the transition (adapter) plate with 5/16-18 machine screws. The adapter plate is part of the Arc Resistant MCC structure. The exhaust duct attaches to the plenum as shown in drawing and depending upon the location of the exhaust duct, one or more plenums can have suitable openings and bolt patterns for the duct to attach to. The size of the opening should be the same as or more than corresponding interior dimensions of the exhaust duct so as to not cause any hindrance to the travel of the pressure wave and passage of smoke and gasses. Adjacent plenums bolt to each other using hole pattern on flanges with 5/16-18 hardware.

Details of side cover (see Drawing 3)

New side covers are needed when using the plenum instead of a regular expansion chamber. The drawing D67705396 details the side covers to be used on both sides for the assembly based for "front" and "back" configurations. For left and right configurations

since the plenum exhaust duct would be extending towards one side of the MCC lineup, suitable modifications can be made to that particular side cover keeping the mounting hole patterns shown in region 'A'.

Details of exhaust duct (see Drawing 4)

The exhaust duct is attached to the plenum on one side and is attached to the pressure relief valve on the other side. The minimum cross section that an exhaust duct can have is 270 sq. in. with one of the dimensions being at least 15 in. The material used for construction is 13GA steel (min thickness). The exhaust duct should not have any interior restrictions or hindrances which might block the flow of gasses and the pressure wave through it. The exhaust duct can have as many turns and twist as needed to get to the intended exhaust location provided the interior cross section is maintained. There are no restrictions on the length or the orientation of the exhaust duct.

Alternate construction: Instead of the 13Ga steel mentioned in the previous paragraph, one can also use an HVAC duct made per ASHRAE standards and of 24GA steel (min thickness) to attach to the plenum and the duct end assembly.

Duct end assembly (see Drawing 5)

The duct end assembly is attached to the other end of the exhaust duct away from the MCC. It consists of pressure flap, mesh and shroud. The interior cross section area of duct and the material used in the duct end assembly (except the flap and shroud) should be the same as that of the exhaust duct. As seen in drawing the pressure flap is closed under normal operating conditions and is hinged at the bottom which enables it to open freely when it senses a pressure wave inside the duct. Gravity helps in keeping flap open once it has opened. Shroud over the flap keeps rain, snow and other contaminants from falling directly over the pressure flap. Wire mesh under the flap prevents rodents from crawling inside the exhaust duct once flap is opened and thus provides additional protection.

Restricted area near duct end assembly outside the building (see Drawing 5)

In order to keep personnel and equipment safe in the event of an Arc Flash incident, the immediate vicinity of the exhaust of the duct is to be kept clear of personnel and other flammable material. Strong pressure waves are generated during an Arc Fault which are carried through the plenum and the duct outside the building. Thus the immediate surroundings of the pressure relief valve are to be kept clear so that this pressure wave dissipates before causing any harm to equipment or personnel.

Type 2A Arc Resistant tiastar Motor Control Center

Plenum/duct design guidelines

Additional Notes:

- a. Make sure all bolted connections are securely tightened.
- b. Make sure the duct is adequately supported.
- c. Ensure that there are no openings in either the plenum or duct assembly. If after assembly of sheet metal parts such opening exist, these should be inspected and closed with appropriate gaskets and/or caulk.
- d. Ensure that the pressure relief device flap is always closed in the normally operating condition and is free to rotate on its hinges in case of an Arc Fault.

Type 2A arc resistant tiastar Motor Control Center Plenum/duct drawings

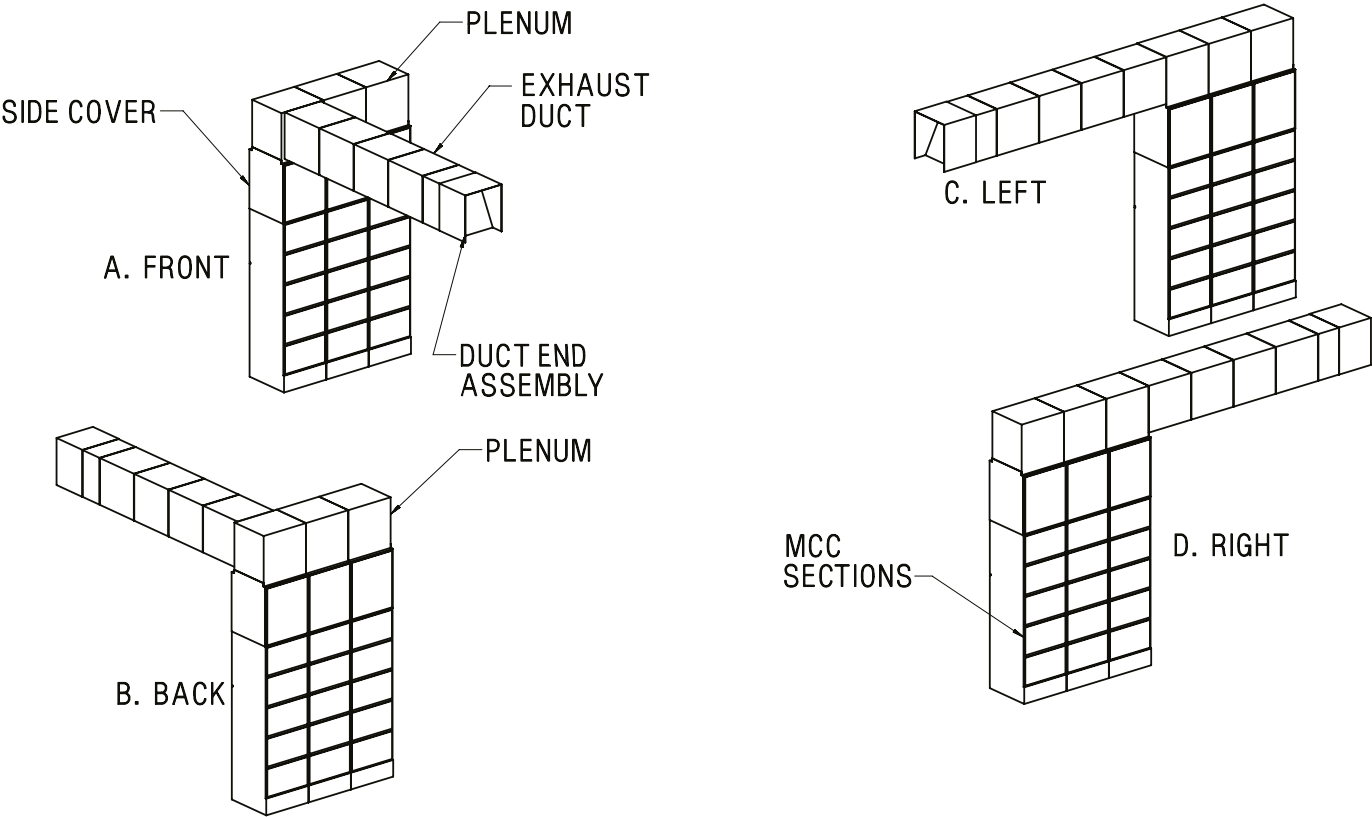
1. Drawing 1 Overall configuration of Plenum and duct
2. Drawing 2 Details of Plenum construction
3. Drawing 3 Details of Side Cover
4. Drawing 4 Design guidelines for Duct and Pressure relief device
5. Drawing 5 Design guidelines for restricted area near pressure relief device outside building



Type 2A Arc Resistant tiastar Motor Control Center

Drawings

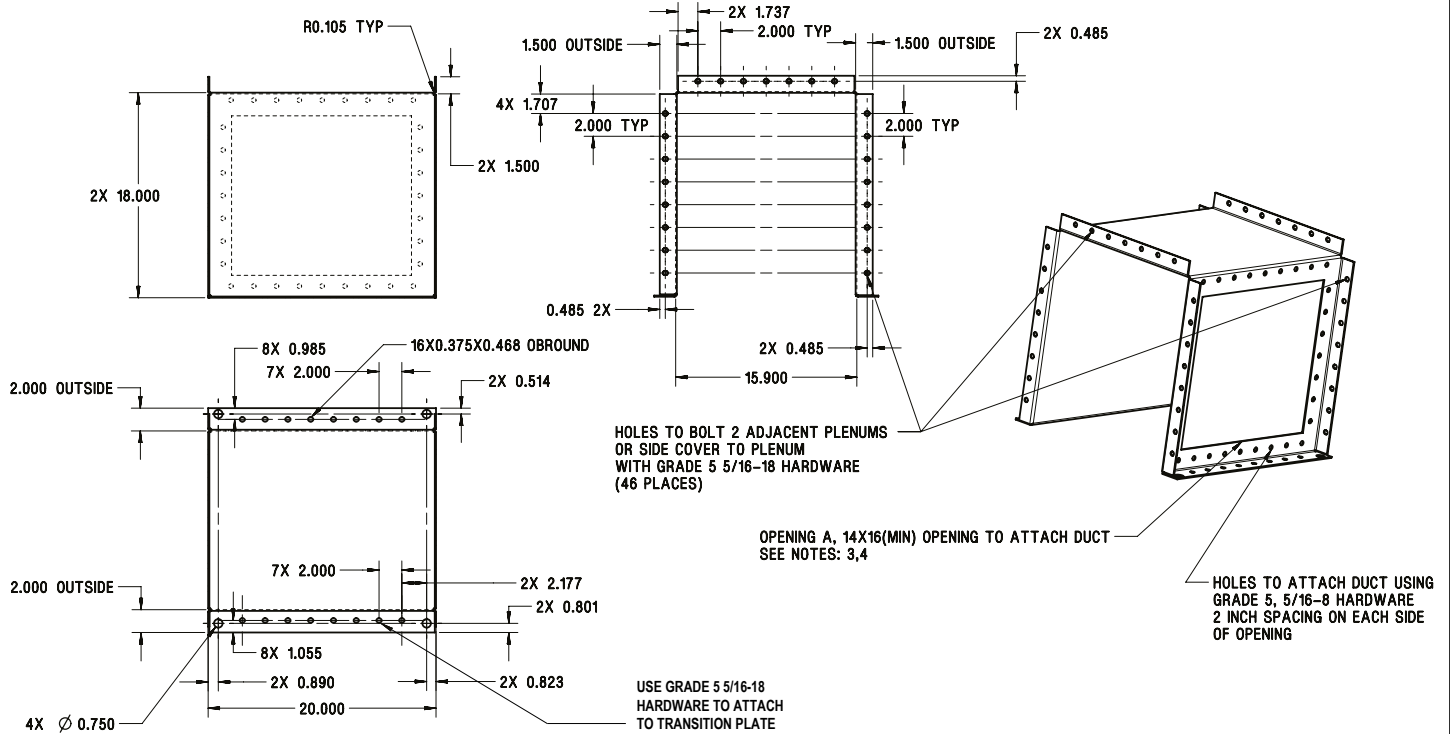
DRAWING 1



Type 2A Arc Resistant tiastar Motor Control Center

Drawings

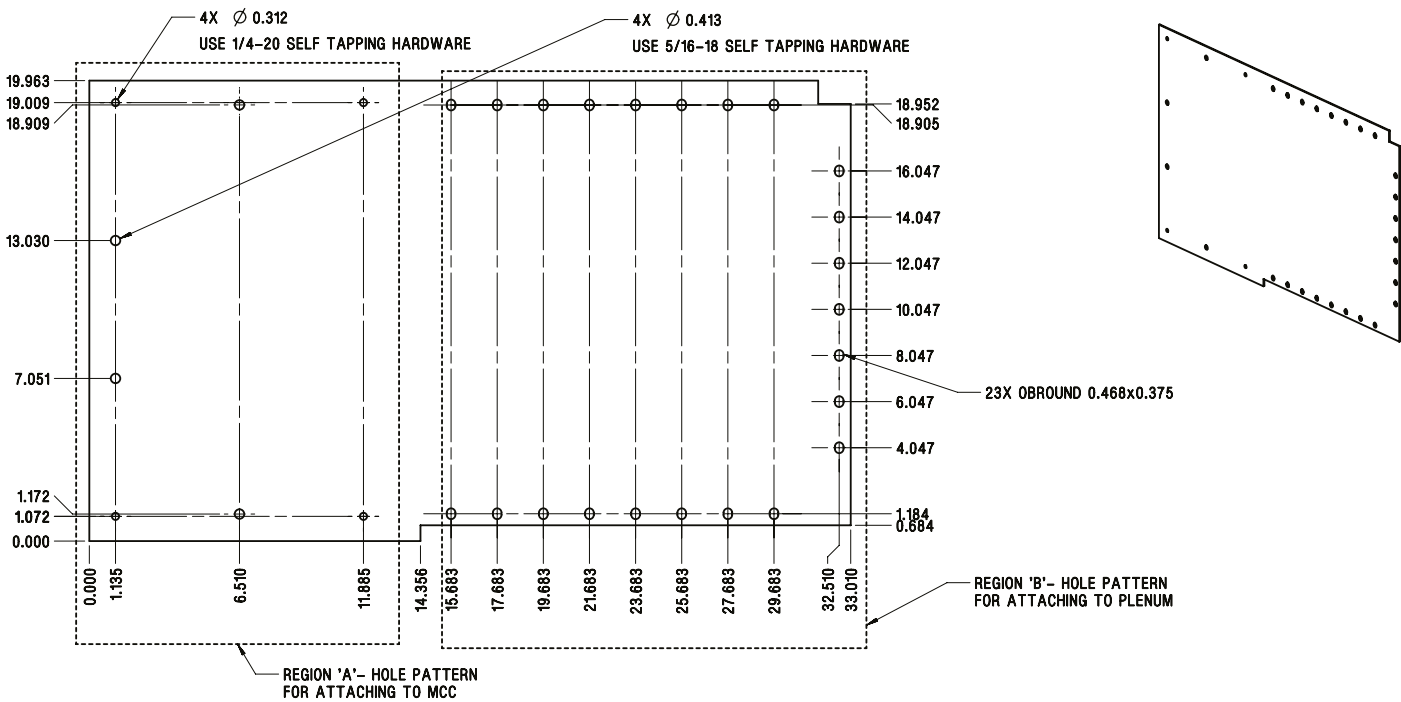
DRAWING 2



Type 2A Arc Resistant tiastar Motor Control Center

Drawings

DRAWING 3

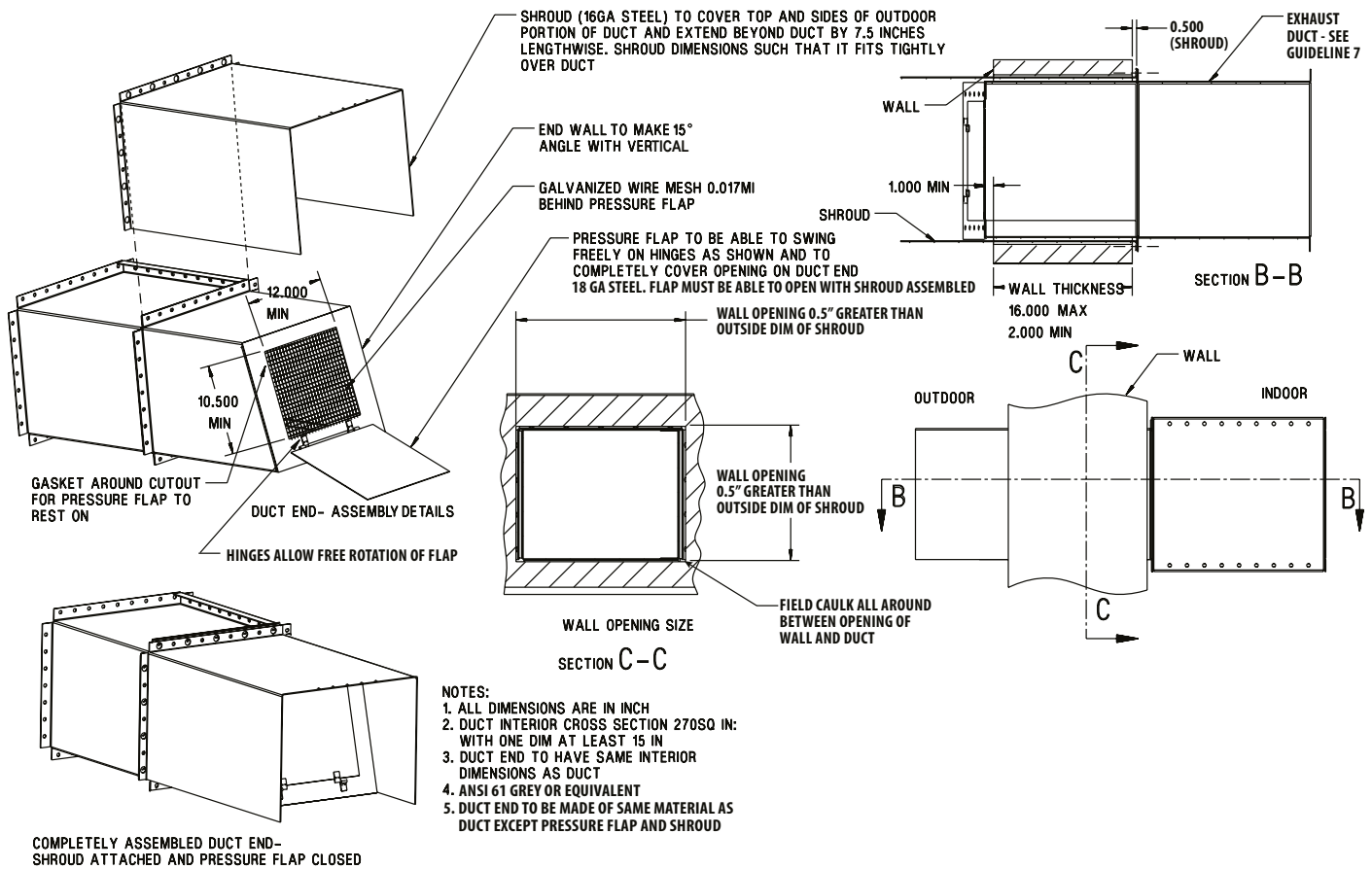


NOTE:
1. 12GA STEEL
2. PAINT ANSI GREY 61 OR EQUIVALENT
3. ALL DIMENSIONS ARE IN INCHES

Type 2A Arc Resistant tiastar Motor Control Center

Drawings

DRAWING 4



Type 2A Arc Resistant tiastar Motor Control Center Drawings

DRAWING 5

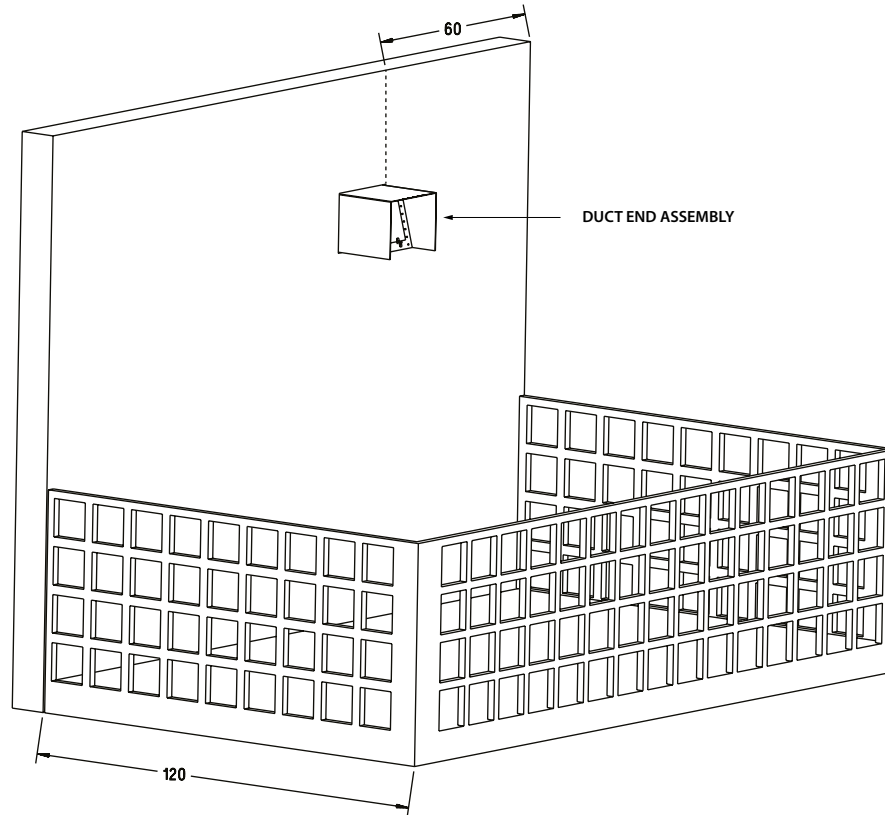


FIGURE SHOWS THE MINIMUM RECOMMENDED CLEARANCE FROM THE EXHAUST OF THE PLANUM. WHEN THE EQUIPMENT IS OPERATING, THIS AREA SHOULD BE KEPT CLEAR OF PERSONNEL AND/OR COMBUSTIBLE MATERIALS.

NOTE: ALL DIMENSIONS ARE IN INCHES

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