Operation

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Qualified Persons

⚠ WARNING

Only qualified persons knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed
- The proper use of special precautionary techniques, personal protective equipment, insulated and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended only for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

NOTICE

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing the indoor Alduti-Rupter Switch. Become familiar with the Safety Information on page 4 and Safety Precautions on page 5. The latest version of this publication is available online in PDF format at **sandc.com/en/contact-us/product-literature/**.

Retain this Instruction Sheet

This instruction sheet is a permanent part of the Alduti-Rupter Switch. Designate a location where users can easily retrieve and refer to this publication.

Proper Application

⚠ WARNING

The equipment in this publication is only intended for use inside structural steel or metal enclosures or vaults and secure electrical rooms. The application must be within the ratings furnished for the equipment. Ratings for the indoor Alduti-Rupter Switch are listed in the ratings table in S&C Specification Bulletin 783-31. The ratings are also on the nameplate affixed to the product.

Warranty

The warranty and/or obligations described in S&C's Price Sheet 150, "Standard Conditions of Sale—Immediate Purchasers in the United States," (or Price Sheet 153, "Standard Conditions of Sale—Immediate Purchasers Outside the United States"), plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (OR PRICE SHEET 153).

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the product. Become familiar with these types of messages and the importance of these various signal words:

⚠ DANGER

"DANGER" identifies the most serious and immediate hazards that will likely result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ WARNING

"WARNING" identifies hazards or unsafe practices that can result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices that can result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that can result in product or property damage if instructions are not followed.

Following Safety Instructions

If any portion of this instruction sheet is unclear and assistance is needed, contact the nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website **sandc.com**, or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

NOTICE

Read this instruction sheet thoroughly and carefully before installing the Alduti-Rupter Switch.

Replacement Instructions and Labels

If additional copies of this instruction sheet are required, contact the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

⚠ DANGER

Alduti-Rupter Switches operate at high voltage. Failure to observe the precautions below will result in serious personal injury or death.

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to the Alduti-Rupter Switch must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels.
5. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded. Voltage levels can be as high as the peak line-to-ground voltage last applied to the unit. Units that have been energized or installed near energized lines should be considered live until tested and grounded.
6. **GROUNDING.** The Alduti-Rupter Switch must be connected to a suitable earth ground inside the enclosure, or to a suitable building ground for testing, before energizing the switchgear, and at all times when energized.

   The ground wire(s) must be bonded to the system neutral, if present. If the system neutral is not present, proper precautions must be taken to ensure the local earth ground, or building ground, cannot be severed or removed.
7. **SWITCH POSITION.** Always confirm the **Open**/**Closed** position of each switch.
   - Switches and terminal pads may be energized from either side.
   - Switches and terminal pads may be energized with the switches in any position.
8. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
9. **PADLOCKS.** The enclosure where the Alduti-Rupter Switch is to be installed must have provisions for padlocks that must be in place and secured at all times unless work is being performed inside the enclosure.
10. **EXCESSIVE FORCE.** Do not apply undue force to any handle when attempting to open or close the switch or the enclosure's door or cover. The use of undue force may damage the handle or latching mechanism.
11. **OPERATION.** Because circuit-making and circuit-breaking are involved in the normal operation of these switches, each switch includes an integral quick-make, quick-break mechanism for swift, positive closing and opening, independent of the speed of the operating handle. Keep hands clear of the mechanism during operation.

⚠ WARNING

Do not remove any of the precautionary signs affixed to the gear, e.g., "WARNING—High Voltage—Keep Out" or "Do not enter or operate this high-voltage equipment unless you are qualified." The responsibility for the presence of these or equivalent signs must be assumed by the purchaser, the installer, and the ultimate user.

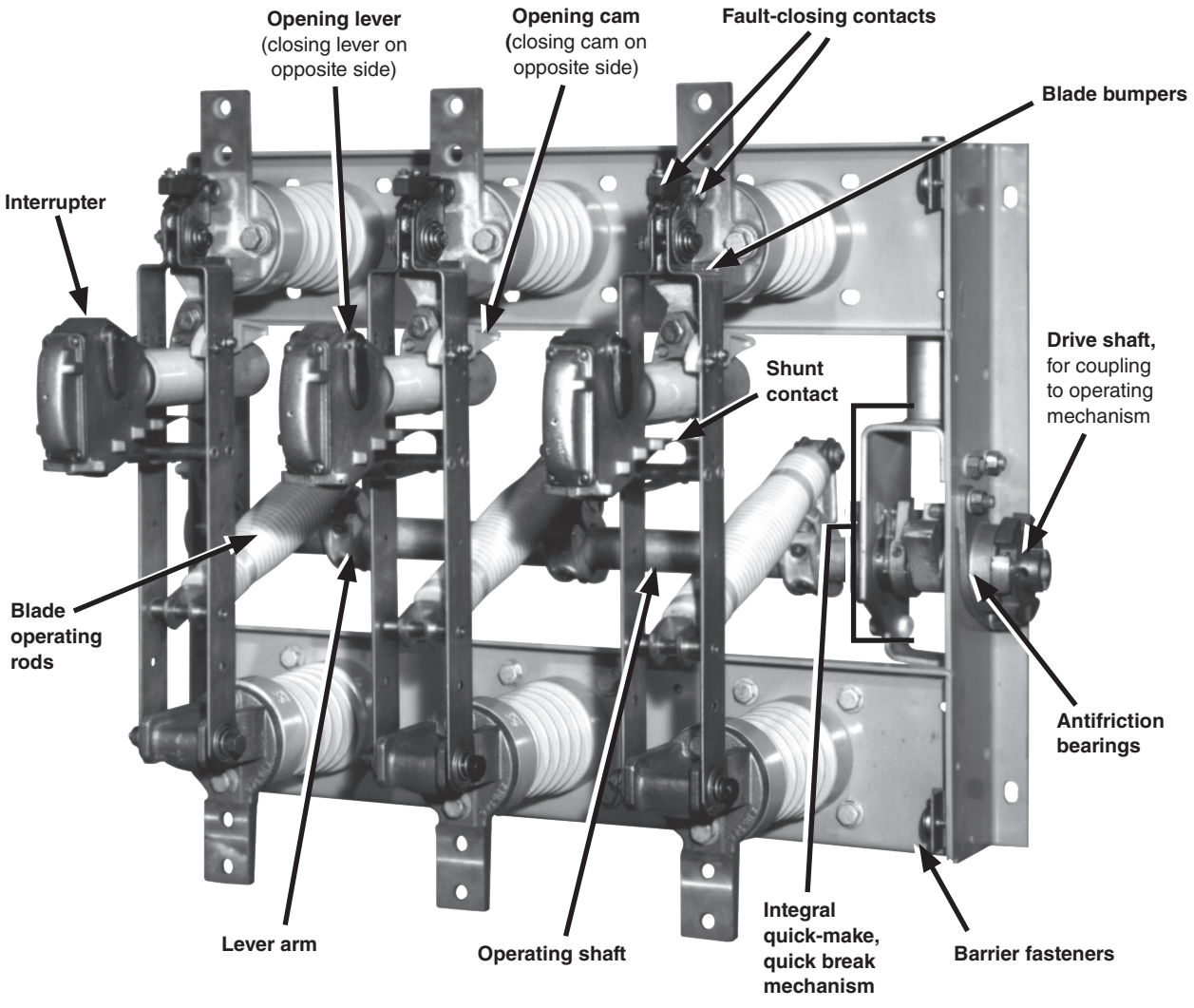
Become familiar with the parts of an Alduti-Rupter Switch as shown in Figure 1 and Figure 2 on page 7.

These instructions are for operation of indoor distribution Alduti-Rupter Switches with Power Fuses. (For re-fusing instructions, refer to the applicable instruction sheet for the fuse type being used.) Alduti-Rupter Switches are equipped for manual operation by means of a chain-coupled handle, a direct-coupled handle, or a pipe-coupled handle.

For instructions on operation of Alduti-Rupter Switches power operated by means of an S&C Type AS-30 Switch Operator, refer to S&C Instruction Sheet 629-500.

Security Provisions

Alduti-Rupter Switches are designed for installation in metal-enclosed switchgear (or in vaults) with provision for external operation. Because these enclosures are often in areas accessible to the general public as well as authorized but unqualified persons, care must be taken to alert such persons to the presence of high voltage within the enclosure by providing suitable signs, e.g., "WARNING—High Voltage—Keep Out" and "Do not enter or operate this high-voltage equipment unless you are qualified." It is the responsibility of the purchaser, the installer, and the ultimate user to ensure that such signs are attached and are not removed. Make sure that all access doors and all switch operating handles are securely locked when the gear is left unattended by qualified persons—even momentarily.



13.8-kV rating (4.8-kV rating is similar).

Figure 1. A typical 600-ampere Alduti-Rupter Switch, for indoor distribution.

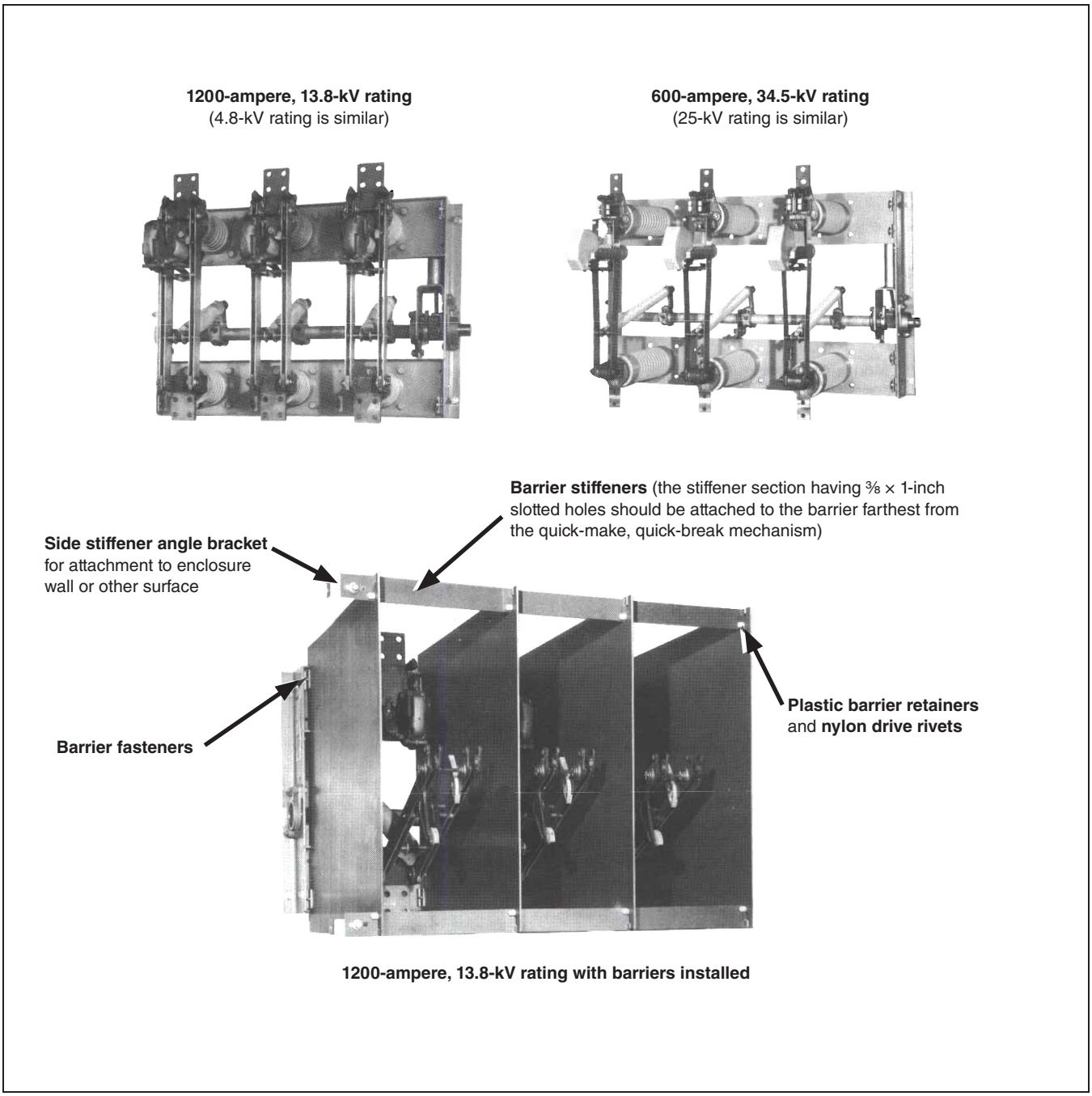


Figure 2. Examples of 1200-ampere and 600-ampere Alduti-Rupter Switches with and without barriers.

Construction and Performance

The indoor distribution Alduti-Rupter Switch is a three-pole, group-operated interrupter switch factory-assembled on a rugged base of welded construction. Included is an integral quick-make, quick-break mechanism for swift, positive opening and closing, independent of the speed of handle operation. This contributes to Alduti-Rupter Switch's ability to achieve fast circuit interruption and two-time duty-cycle fault-closing ratings.●

This ability permits quick restoration of service following a fault, without the need for an extended outage for replacement of switch parts or for temporary restoration of service through an alternate switch until replacement parts can be obtained. It also permits use of Alduti-Rupter Switches in fault-sectionalizing (lockout) schemes where switches are closed and then opened sequentially until the fault is isolated. The ability to open following a **Fault Closing** operation is of special importance where remote or automatic control is used.

The Alduti-Rupter Switch interrupts the circuit without external arc or flame. No oil or vacuum is used. The arc is entirely contained and extinguished within the air-filled interrupter. When the arc is established, both the trailer and liner of the interrupter yield deionizing gases that quickly quench the arc. The small radial clearance between the liner and trailer ensures efficient deionizing action even when interrupting low currents.

For any given blade position there is a predetermined position of the interrupter contacts. Special care has been given to coordination of the blade and interrupter contacts to prevent flashover during opening operations. The external gap between the line side and load side of the switch always exceeds the gap within the interrupter at the time of circuit interruption.

The interrupter is powered directly by the opening or closing movement of the blade. Springs are not relied on for contact separation, but they are used solely as positive open-closed detention devices. High-speed travel is provided instead by a speed-multiplying straight-line linkage.

Operating Mechanisms

Three-pole indoor distribution Alduti-Rupter Switches are furnished with operating mechanisms for manual operation by means of chain-coupled, direct-coupled, or pipe coupled handles.

Chain-coupled handles are used for the majority of applications, typically with single- and multi-bay metal enclosed switchgear installations, and permit switch operation from the front.

Direct-coupled handles are used for single-bay metal-enclosed switchgear or vault applications where side operation is desired.

Pipe-coupled handles are used only for application (generally in vaults) where the positioning of the handle, relative to the switch, does not permit linear coupling, i.e.,where bellcranks must be used.

● The two-time duty-cycle fault-closing rating defines the ability to close the switch twice against a three-phase fault with asymmetrical current in at least one phase equal to the rated value, with the switch remaining operable and able to carry and interrupt rated current.

Before Starting

⚠ WARNING

To avoid injury and equipment damage, follow these precautions:

1. Make sure each switchgear enclosure door, or the vault access door permitting access to high voltage, is closed and latched before energizing the circuit or operating any switch.
2. Make sure any grounding switch is opened, or other grounding means removed, before closing the associated interrupter switch(es).
3. Pull the operating-handle latch release knob before moving the handle, and avoid the use of undue force in attempting to operate a switch. Any undue force applied, such as by the use of an extension bar on the operating handle, may cause sever damage to the switch or mechanism.
4. Do not attempt to defeat the interlock scheme. An interlock mechanism can be jammed by an attempt to operate an associated switch while the switchgear door is unlatched. Verify the switching operation is in the sequence dictated by the key- or mechanical-interlock scheme provided.
5. Lock interrupter switches in the **Open** or **Closed** position as dictated by standard operating practice.
6. Open and close any manually operated switches with a continuous, unhesitating movement of the operating handle until a complete latched condition of the handle is achieved.
7. Keep clear of the blades during switch opening or closing. Switch blades are driven at high speed by a release of a quick-break quick-make stored energy mechanism.

To Open or Close the Switch

Complete the following steps to open or close the switch:

With the chain-coupled or direct-coupled manual operating handle:

STEP 1. Unlock the handle (key interlock or padlock), pull the latch-release knob, and move the handle away from its **Latched** position.

STEP 2. Swing the handle without hesitation through its full travel to open or close the switch.

STEP 3. Lock the handle.

With the pipe-coupled manual operating handle:

STEP 1. Unlock the handle by removing the padlock and locking bar, or by means of the key interlock, if applicable.

STEP 2. Swing the handle without hesitation through its full travel to open or close the switch.

STEP 3. Replace the locking bar and lock the handle with the padlock or key interlock.

⚠ WARNING

Make sure all doors and switch-operating handles are fully locked before leaving the installation site, even momentarily. Observe this precaution even in cases where the gear is accessible only to qualified persons.

Failure to secure gear before walking away can lead to property damage, personal injury, or death.

Before Walking Away

So the Alduti-Rupter Switch is ready for normal operation, make sure the following conditions exist:

- The voltage transformers are connected and their fuses are in place.
- Temporary grounds are removed.
- High-voltage fuses (SM-4Z, SM-5S, or SM-5SS) are closed and latched (disconnect-style) or secured in their clips (non-disconnect style), if applicable.
- The Alduti-Rupter Switch is in the correct **Open** or **Closed** position, as required by the system operation arrangement.
- The Alduti-Rupter Switch operating handle is locked.
- Screen doors, if furnished, are closed and bolted.
- Switchgear bay or vault access door is closed and padlocked (or interlocked).

Cleaning and inspection of switch (and fuse) support insulators and barriers should be performed periodically, at intervals based on environmental conditions. Also, S&C recommends occasionally exercising Alduti-Rupter Switches.

⚠ DANGER

When access to high-voltage compartments is required for inspection, service, or repairs, always observe the following precautions. **Failure to observe these precautions will result in serious personal injury or death.**

- Access to metal-enclosed gear must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
- Always follow safe operating procedures and rules.
- Before touching any device, always disconnect switches and fuses from all power sources (including backfeed), test for voltage, and properly ground.
- Always assume both sets of power terminals on any switch or fuse are energized unless proved otherwise by test, by visual evidence of open-circuit conditions on both sets of terminals, or by observing that both sets of terminals are grounded.
- Test for voltage on both sets of power terminals of any switch or fuse using proper high-voltage test equipment.
- After the gear has been completely disconnected from all sources of power and tested for voltage, install suitable grounding cables in all compartments.
- For maintenance of non-S&C equipment, follow the manufacturer's instructions.
- Make sure the enclosure is properly grounded to the station or facility ground. Do not return equipment to service unless such grounds are properly made.

⚠ WARNING

The voltage transformers must be disconnected when external voltage is used to test any secondary-side wiring and devices to avoid energizing the high-voltage conductors through the voltage transformers.

Failure to disconnect transformers may cause electric shock.

Complete the following steps for cleaning and inspecting:

STEP 1. Draw out the voltage transformers completely if draw-out type transformers are provided. Otherwise, remove the primary fuses of the voltage transformers and disconnect the secondaries by removing the secondary fuses or by disconnecting the secondary connections to the transformers. If secondary connections are disconnected, tape the ends of the leads to prevent inadvertent short circuits or contact with the transformer secondary terminals.

STEP 2. As a safety precaution, S&C recommends all voltage-transformer fuses be completely removed and kept out until just prior to final energizing of the switchgear. With unfused transformers, remove the secondary connections (as described in Step 1) until tests are completed.

STEP 3. Test for voltage. Qualified persons should be certain that they have, and know how to operate, the correct test equipment for determining the voltage on both sets of power terminals in any circuit breaker, power fuse, or interrupter-switch equipment.

STEP 4. After the electrical switchgear has been completely disconnected from all sources of power, properly connect grounding leads to both sides of the equipment, that is, to the source- and load-side power terminals or contacts of each phase of the equipment to be maintained.

⚠ WARNING

Make sure all doors and switch-operating handles are fully locked before leaving the installation site, even momentarily. Observe this procedure even in those cases where the gear is accessible only to qualified persons.

Failure to secure gear before walking away can lead to property damage, personal injury, or death.