Cleaning Flooded Gear

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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 cleaning the manual S&C Metal-Enclosed Switchgear. Become familiar with the Safety Information on page 3 and Safety Precautions on page 4. 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 manual S&C Metal-Enclosed Switchgear. 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 a specific application. The application must be within the ratings furnished for the equipment. S&C Custom Metal-Enclosed Switchgear has a variety of ratings. For general ratings, refer to S&C Information Bulletin 621-451. For specific ratings, refer to the nameplate affixed to the product.

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 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 cleaning manual S&C Metal-Enclosed Switchgear.

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 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

Manual S&C Metal-Enclosed Switchgear 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.

When access to high-voltage bays is required, it should be restricted to qualified persons who observe the following procedures:

1. **QUALIFIED PERSONS.** Access to S&C Custom Metal-Enclosed Switchgear 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. **OPERATING MECHANISM AND BASE.** S&C Metal-Enclosed Switchgear contains fast-moving parts that can severely injure fingers. Do not remove or disassemble operating mechanisms or remove access panels unless directed by S&C Electric Company.
6. **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.
7. **GROUNDING.** The S&C Metal-Enclosed Switchgear must be connected to a suitable earth ground at the base of the utility pole, 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.
8. **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.
9. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
10. **PADLOCKS.** Non-removable manual handles in high-voltage compartment doors and hinged-padlockable covers, as well as hinged-bolted panels, have provisions for padlocks that must be in place and secured at all times unless work is being performed inside the enclosure. Padlocks must be installed and secured on manual switch operating handles at all times unless the switch is being operated.
11. **SNAPLOCKS.** Snaplocks must be in place and the keys must be removed.
12. **KEY INTERLOCKS.** Key interlocks (if applicable) must be in place. Check the operating sequence of key interlocks to verify proper sequencing. After the switchgear is installed, destroy all duplicate keys or make them accessible only to authorized persons so the key interlock scheme will not be compromised. Key interlocks are not security locks.
13. **MECHANICAL CABLE INTERLOCKS.** Mechanical cable interlocks are provided to prevent access to fuses unless the switch is open and to prevent operation of stored-energy switch operators when the enclosure door is open. Do not attempt to operate any switch when the enclosure door is open. Periodically, verify these interlocks are functional. Refer to the "Interlocks" section of S&C Instruction Sheet 621-500.
14. **EXCESSIVE FORCE**. Do not apply undue force to any handle when attempting to open or close a door or cover. The use of undue force may damage the handle or latching mechanism, or an interlock mechanism may be jammed. Do not attempt to close doors to reset interlocks. Instead, follow the instructions in the "Interlocks" section of S&C Instruction Sheet 621-500.
15. **PANELS AND SCREENS.** Make sure screens and hinged-bolted panels are bolted closed unless work is being performed inside the enclosure.
16. **FUSES.** Make sure fuses are disconnected from all power sources (including backfeed) before inspection or replacement.
17. **VOLTAGE TRANSFORMERS.** Disconnect all voltage transformers and voltage sensors when external voltage is used to test any secondary-side wiring or when heaters are energized for temporary storage. Do not disconnect voltage limiters from voltage sensors when the switchgear is energized.

This publication provides cleaning recommendations for manual S&C Metal-Enclosed Switchgear that has been flooded. Before the gear can be returned to service, contaminants must be removed; insulators, bus, and barriers must be cleaned; and moving contacts and switch quick-make, quick-break mechanisms must be lubricated.

⚠ DANGER

To avoid serious injury or death, equipment and cables must be de-energized and grounded in each bay prior to starting work.

Applicable instruction sheets, drawings, and wiring diagrams, along with documentation for low-voltage components of switchgear not of S&C manufacture, can be found in an envelope labeled "Installation and Operation Information Kit," located in a holder inside the appropriately labeled switchgear bay door.

If cleaning or maintenance is required beyond the scope of this publication, or if replacement parts and lubricants are needed, contact the nearest S&C Sales Office. Have the complete catalog number of the gear and date of shipment (as shown in the nameplate) available for reference.

Cleaning Procedure

This procedure must be followed in the order indicated.

STEP 1. Remove the interphase and end barriers in each bay. Discard barriers made of Benelex. Benelex interphase and end-barriers must be replaced with barriers made of GPO-3 fiberglass.

STEP 2. Remove and discard the arc compressors from each Mini-Rupter® Switch and the interrupters from each Alduti-Rupter® Switch, as applicable.

STEP 3. Thoroughly rinse the interior of each bay with clean water. Do not use a pressure washer.

STEP 4. Clean the bus, insulators, and GPO-3 interphase and end-barriers as follows:

(a) Wash with phosphate-free mild soap and water.

NOTICE

Do not use industrial-strength cleaning solutions such as Formula 409® or Simple Green®, which contain solvents. Solvent vapors can attack arc compressor components and fuse pull-rings, resulting in reduced interrupting performance or weakened parts.

(c) Rinse thoroughly with clean water.

(d) Dry with compressed air.

STEP 5. Lubricate each Mini-Rupter Switch and Alduti-Rupter Switch quick-make, quick-break mechanism with WD-40® or similar penetrating oil. Do not get penetrating oil on the insulators.

STEP 6. Lubricate each Mini-Rupter Switch and Alduti-Rupter Switch contact with Nye Rheolube™ or similar grease. Do not use lubricants containing solvents.

STEP 7. Install new arc compressors on each Mini-Rupter Switch and new interrupters on each Alduti-Rupter Switch.

STEP 8. Replace low-voltage devices, such as meters, relays, switches, fault indicators, and fuses.

STEP 9. Follow the equipment manufacturers' recommendations with respect to cleaning and reuse of medium-voltage devices, such as voltage transformers, current transformers, terminators, and surge arresters.

STEP 10. Reinstall all GPO-3 interphase and end-barriers.

STEP 11. Open each fuse and remove it from its hinge.

***For each SM-20 and SM-40 Power Fuse, do the following*:**

(a) Remove the end-fittings and S&C Silencer. Wash them with phosphate-free mild soap and water.

NOTICE

Do not use industrial-strength cleaning solutions such as Formula 409® or Simple Green®, which contain solvents. Solvent vapors can attack arc compressor components and fuse pull-rings, resulting in reduced interrupting performance or weakened parts.

(b) Thoroughly rinse the end-fittings and silencer with clean water.

(c) Dry the end fittings and Silencer with compressed air.

(d) Make sure that the latch on the upper end fitting pivots freely. If not, replace the end-fittings.

(e) Apply No-Ox-Id "A" or similar electrically conductive grease to the contact rod assembly. Do not get electrically conductive grease on the latch or pull-ring.

(f) Apply a light film of white petroleum grease to the surfaces of the latch and pull-ring where they touch during operation.

(g) Discard the SMU-20® or SMU-40® Fuse Unit. Also discard all spare fuse units.

For each SM-4Z, SM-5S, and SM-5SS Power Fuse, do the following:

(a) Remove the silencer, S&C Snuffler, or S&C Super Snuffler exhaust control device. Wash it with phosphate-free mild soap and water.

NOTICE

Do not use industrial-strength cleaning solutions, such as Formula 409® or Simple Green®, which contain solvents. Solvent vapors can attack arc compressor components and fuse pull-rings, resulting in reduced interrupting performance or weakened parts.

(b) Thoroughly rinse the exhaust control device with clean water.

(c) Dry the exhaust control device with compressed air.

(d) Discard the SM-4Z, SM-5S, or SM-5SS Holder and SM-4® or SM-5® Refill Unit. Also discard all spare refill units.

For each Fault Fiter® Electronic Power Fuse, do the following:

(a) Remove the holder. Wash it with phosphate-free mild soap and water.

NOTICE

Do not use industrial-strength cleaning solutions such as Formula 409® or Simple Green®, which contain solvents. Solvent vapors can attack arc compressor components and fuse pull-rings, resulting in reduced interrupting performance or weakened parts.

(b) Thoroughly rinse the holder with clean water.

(c) Dry the holder with compressed air.

(d) Make sure that the latch on the holder pivots freely. If not, replace the holder.

(e) Apply No-Ox-Id "A" or similar electrically conductive grease to the contact rod assembly. Do not get electrically conductive grease on the latch or pull-ring.

(f) Apply a light film of white petroleum grease to the surfaces of the latch and pull ring where they touch during operation.

(g) Discard the interrupting module and control module. Also discard all spare interrupting and control modules.

STEP 12. Perform a 60-Hz dielectric test on the switchgear using the test values shown in S&C Instruction Sheet 621-500.

Table 1. Replacement Parts and Lubricants

Part Number	Description
9999-044	Nye Rheolube, ¼-ounce tube
9999-130	Nye Rheolube, 7-pound can
0352-006	No-Ox-Id "A," 5-gallon can
0352-313	White petroleum grease, 5-gallon can
TR-24145	Anti-Oxidant Compound, 4-ounce tube
SA-40726	Mini-Rupter Switch arc compressor replacement kit
SA-30817R2	Alduti-Rupter Switch replacement interrupter, 4.8 kV
SA-30818R4	Alduti-Rupter Switch replacement interrupter, 13.8 kV, 600 A
SA-32664R2	Alduti-Rupter Switch replacement interrupter, 13.8 kV, 1200 A
SA-42790R1	Alduti-Rupter Switch replacement interrupter, 25 kV
SA-42790R1	Alduti-Rupter Switch replacement interrupter, 34.5 kV
3097	SM-20 Fuse Unit end-fittings
3090	SM-40 Fuse Unit end-fittings
86631R2	SM-4Z Holder, 4.8 kV
86632R2	SM-4Z Holder, 13.8 kV
86633R2	SM-4Z Holder, 25 kV
86634R2	SM-4Z Holder, 34.5 kV
86641R2	SM-5S Holder, 4.8 kV
86642R2	SM-5S Holder, 13.8 kV
86643R2	SM-5S Holder, 25 kV
86644R2	SM-5S Holder, 34.5 kV
86402R2	SM-5SS Holder, 13.8 kV
99110	Fault Fiter Holder, 4.16 kV
99112	Fault Fiter fuse holder, 13.8 kV
99113	Fault Fiter fuse holder, 25 kV
1023-332	Aluminum bus hardware, ½–13 × 1½ hexhead cap screw, galvanized
1023-812	Aluminum bus hardware, ½–13 hex nut, galvanized
CD-2262-2	Aluminum bus hardware, ½ Belleville washer
1323-304	Copper bus hardware, ½–13 × 1½ hexhead cap screw, stainless steel
1323-811	Copper bus hardware, ½–13 hex nut, stainless steel
2140-013	Copper bus hardware, ½ flat washer, brass
1340-058	Copper bus hardware, ½ lockwasher, stainless steel