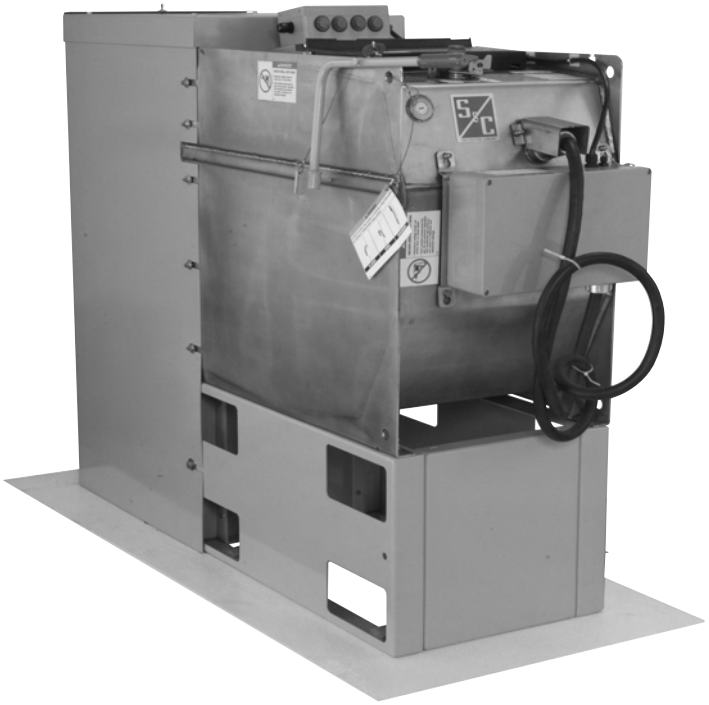
Instructions for Installation

Table of Contents



Qualified Persons

⚠ WARNING

The equipment covered by this publication must be installed, operated, and maintained by qualified persons who are knowledgeable in the installation, operation, and maintenance of underground electric power distribution equipment along with the associated hazards. A qualified person is one who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from non-live 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 the special precautionary techniques, personal protective equipment, insulating 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

Thoroughly and carefully read this instruction sheet before installing or operating your Wind Turbine Style Vista Switchgear. Familiarize yourself with "SAFETY INFORMATION" on pages 3 and 4. The latest version is available online in PDF format at www.sandc.com.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your Wind Turbine Style Vista Switchgear. Designate a location where you can easily retrieve and refer to this publication.

Proper Application

⚠ CAUTION

The equipment in this publication must be selected for a specific application. The application must be within the ratings of the equipment. Ratings for this gear are listed on a ratings label on the top of the switchgear.

Warranty

The warranty and/or obligations described in S&C's standard conditions of sale, as set forth in Price Sheet 150, 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 immediate purchaser's or end user's exclusive remedy and a fulfillment of all seller's liability. In no event shall seller's liability to immediate purchaser or end user exceed the price of the specific product which gives rise to 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, 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 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.

Understanding Safety-Alert Messages

There are several types of safety-alert messages which may appear throughout this instruction sheet as well as on labels attached to the Wind Turbine Style Vista Switchgear. Familiarize yourself with these types of messages and the importance of the various signal words, as explained below.

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website www.sandc.com. Or call S&C Headquarters at (773) 338-1000; in Canada, call S&C Electric Canada Ltd. at (416) 249-9171.

NOTICE

Thoroughly and carefully read this instruction sheet before installing your Wind Turbine Style Vista Switchgear.

Replacement Instructions and Labels

If you need additional copies of this instruction sheet, contact your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd. Instruction sheets can also be viewed on S&C's website: www.sandc.com.

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

Location of Safety Labels

Reorder Information for Safety Labels

Location	Safety-Alert Message	Description	Number
A	⚠ DANGER	Hazardous Voltage—Always Consider Circuits and Components Live . . .	G-6700
B	⚠ DANGER	Never Drill Into Tank—Hazardous Voltage, Contains Pressurized SF_6 Gas	G-6682
C	⚠ DANGER	Keep Away—Hazardous Voltage (“Mr. Ouch”)★	G-6699
D	⚠ WARNING	Check Gas Pressure Before Operating Switchgear	G-6686
E	⚠ WARNING	Always Visually Confirm Blade Position★	G-6693

★ This label is located on the side of the gear and is not visible in this photo.

⚠ DANGER

Switchgear contains high voltage. Failure to observe the precautions below will result in serious injury or death.

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

1. **QUALIFIED PERSONS.** Access to switchgear must be restricted only to qualified persons. See "Qualified Persons" 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 "CAUTION," "WARNING," or "DANGER" labels.
5. **ENERGIZED BUSHINGS.** Always assume that the bushings are energized unless proved otherwise by test, by visual evidence of an open-circuit condition at the fault interrupter, or by observing that the fault interrupter is grounded.
6. **BACKFEED.** Bushings, cables, and fault interrupter may be energized by backfeed.
7. **DE-ENERGIZING, TESTING, AND GROUNDING.** Before touching any bushings or components inside the switchgear tank that are to be inspected, replaced, serviced, or repaired, always disconnect the fault interrupter from all power sources (including backfeed), test for voltage, and properly ground.
8. **TESTING.** Test the bushings for voltage using the voltage-indication feature (if furnished) or other proper high-voltage test equipment before touching any bushings or components that are to be inspected, replaced, serviced, or repaired.
9. **GROUNDING.**

   ► Make sure that the switchgear tank is properly grounded to the station or facility ground.

   ► After the switchgear has been completely disconnected from all sources of power and tested for voltage, properly ground the fault interrupter before touching any bushings or components that are to be inspected, replaced, serviced, or repaired.
10. **FAULT-INTERRUPTER POSITION.**

    ► Always confirm the open/close/grounded position of the fault interrupter by visually observing the position of the blades.

    ► Fault interrupter may be energized by backfeed.

    ► Fault interrupter may be energized in any position.
11. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized bushings.

Inspection and Handling

Packing

Wind Turbine Style Vista Switchgear is shipped in a wooden crate.

At the first opportunity, remove all packing materials (cardboard, paper, foam padding, etc.) from the outside of the switchgear. This will prevent the finish on the elbow cover assembly from being damaged by rainwater absorbed by the packing materials and will also prevent wind-induced abrasion from loose cardboard.

Inspection

Examine the shipment for external evidence of damage as soon after receipt as possible, preferably before removal from the carrier's conveyance. Check the bill of lading to make sure that all shipping skids, crates, and containers listed thereon are present.

If there is visible loss and/or damage:

1. Notify the delivering carrier immediately.
2. Ask for a carrier inspection.
3. Note condition of shipment on all copies of the delivery receipt.
4. File a claim with the carrier.

If concealed damaged is discovered:

1. Notify the delivering carrier within 15 days of receipt of shipment.
2. Ask for a carrier inspection.
3. File a claim with the carrier.

Also notify S&C Electric Company in all instances of loss and/or damage.

Storage

If the Wind Turbine Style Vista Switchgear cannot be immediately installed, ensure that it is stored in a clean, warm, dry environment. If this is not possible, shelter the switchgear in a tent-like covering which will allow adequate ventilation, but prevent entry of rain, snow, and contaminants through any openings.

Removal of Elbow Cover Assembly

1. Loosen the seven thumbscrews on the front cover.
2. Remove the front cover.
3. Remove the four hex-head cap screws on the top cover.
4. Remove the four hex nuts on the underside of the top cover.
5. Remove the top cover.
6. Loosen the six hex nuts on the right side cover. See Figure 1.
7. Remove the right side cover by pulling it forward. See Figure 2.
8. Repeat Steps 6 and 7 for the left side cover.

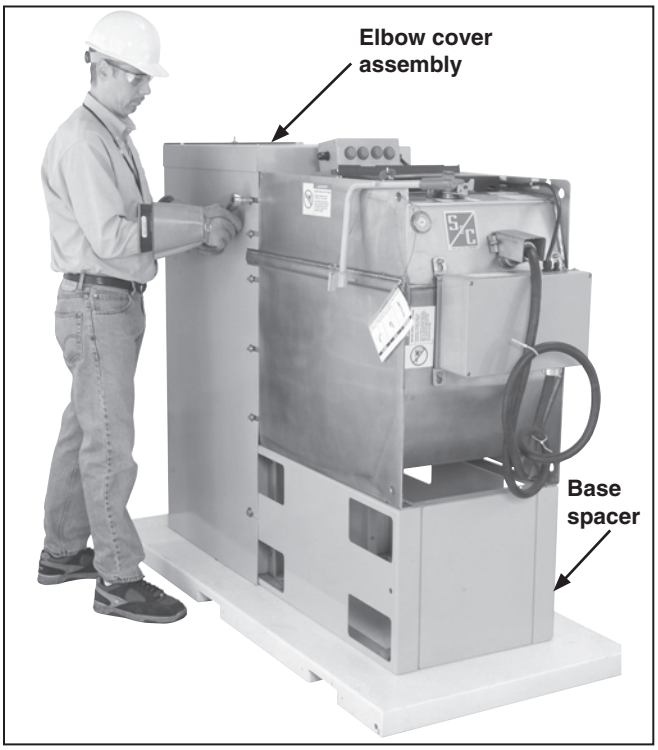


Figure 1. Loosen the six hex nuts on the right side cover.

Figure 2. Remove the right side cover by pulling it forward.

Handling

⚠ WARNING

When handling Wind Turbine Style Vista Switchgear with an overhead hoist, observe standard lifting practices as well as the general instructions below. **Failure to follow these precautions can result in serious personal injury or equipment damage.**

1. Use 6-foot or longer hoist slings of equal length to prevent damaging the switchgear during lifting.
2. Arrange the hoist slings so as to distribute the lifting forces equally between the lifting tabs. See Figure 3.
3. Avoid sudden starts and stops.

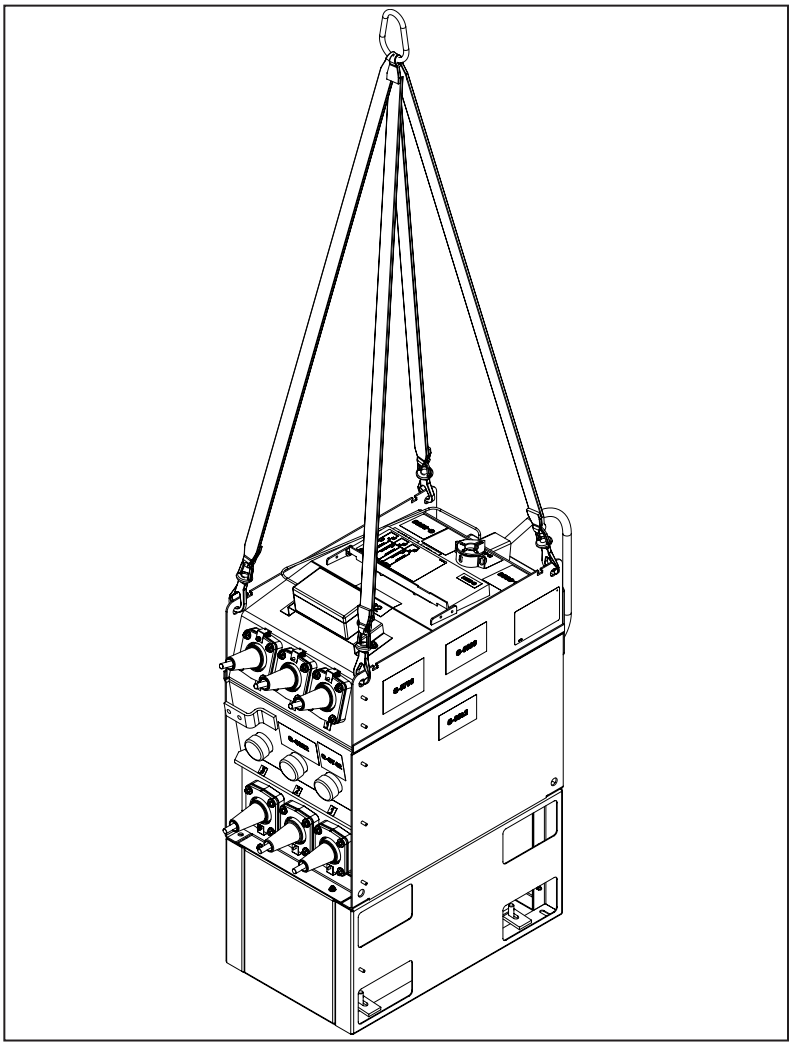


Figure 3. Hoist slings.

Switchgear Placement

1. Remove the switchgear from its crate and lift the gear into place, observing the precautions given under "Handling" on page 8.
2. Secure the switchgear to the pad using the anchor brackets provided.
3. Refer to the catalog dimensional drawing furnished with the switchgear and verify that the base spacer is positioned correctly and that the base spacer is properly aligned with respect to the anchor bolts.
4. Secure the base spacer to the pad using the anchor brackets provided. See Figure 4.

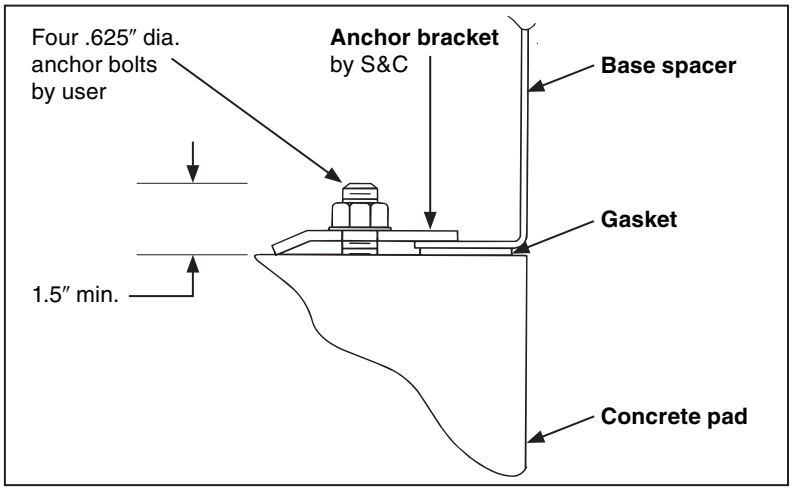


Figure 4. Anchor bracket.

Cables

Refer to "CABLE CONNECTIONS" on page 11.

Grounding

1. Connect the cable concentric-neutral ground wires to the grounding system as appropriate.
2. Connect the ground pad of the switchgear to the system ground facility in accordance with the user's standard grounding practice. See Figure 5.
3. Use the equivalent of 4/0 copper (or cable sized in accordance with the user's standard practice) in either a single or multiple connection to realize the maximum momentary rating of the switchgear. For a multiple connection, cables smaller than 1/0 copper or equivalent should not be used.

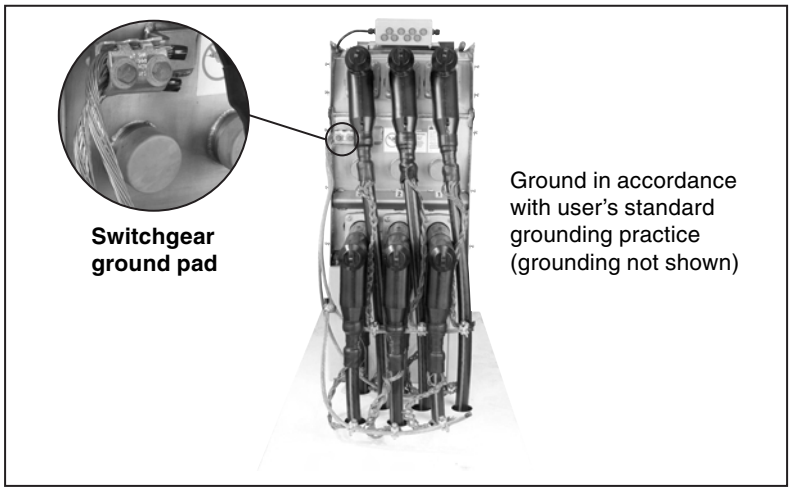


Figure 5. Switchgear ground pad.

Replacement of Elbow Cover Assembly

1. Slide the right side cover over the six studs. See Figure 6.
2. Tighten the six hex nuts that were retained on the studs. See Figure 7.
3. Repeat Steps 1 and 2 for the left side cover.
4. Lift top cover into place.
5. Replace and tighten the four hex-head cap screws on the top cover.
6. Replace and tighten the four hex nuts on the underside of the top cover.
7. Lift front cover into place.
8. Tighten the seven thumb screws that were retained on the front cover.

Figure 6. Slide the right side cover over the six studs.

Figure 7. Tighten the six hex nuts that were retained on the studs.

Completing the Installation

1. A resilient closed-cell gasket on the bottom flange of the switchgear protects the finish from being scratched during installation and isolates it from the alkalinity of a concrete foundation. This gasket also helps to seal the enclosure to the foundation to guard against entry of rodents, insects, or weeds, and to discourage tampering.
2. Wipe down the exterior of the elbow cover assembly with a clean, damp cloth. Refinish any scratches or abrasions with S&C touch-up finish and red-oxide primer which are available in aerosol spray cans. See page 15 for ordering information. No other finish or primer is approved. The area to be touched up should be cleaned to remove all oil and grease. Sand the area, removing any traces of rust that may be present, and make sure that all edges are feathered before applying primer.

⚠ DANGER

Before energizing the switchgear, replace the shipping caps on all bushings and bushing wells with elbows or insulated protective covers or plugs. **Failure to replace the shipping caps with elbows or insulated protective covers or plugs can result in a flashover and serious personal injury or death.**

1. Remove the shipping covers from the bushings and bushing wells. See Figure 9.

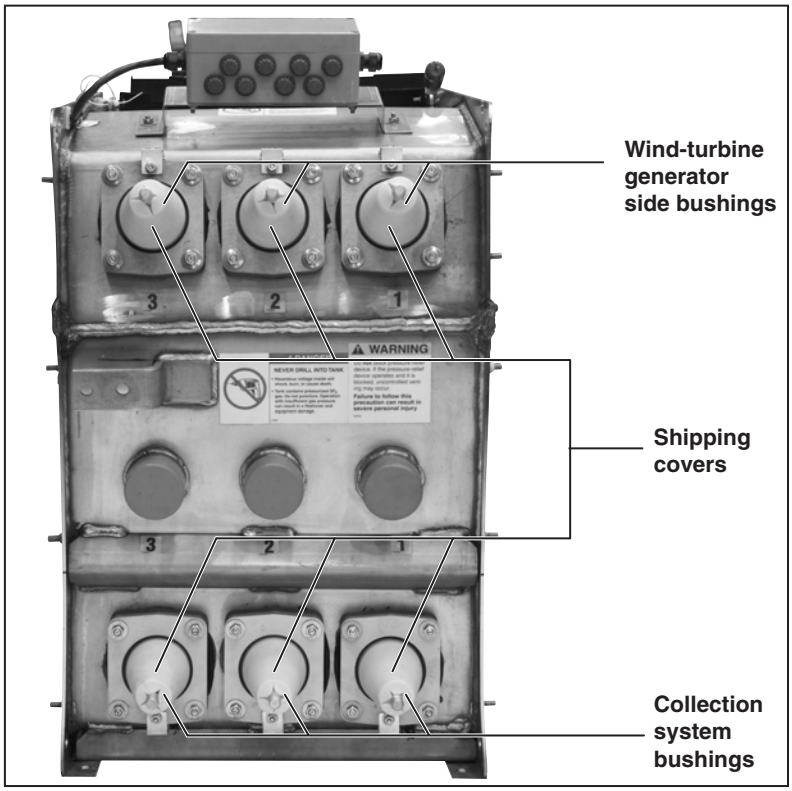


Figure 9. Shipping covers.

⚠ CAUTION

ALWAYS follow proper cable installation practices. When installing cable to be attached to the switchgear, provide a strain-relief segment to minimize the load on the bushings. Cables must be allowed to expand and flex without putting a significant load on the bushings. **Failure to follow these precautions can result in damage to the bushings and bushing wells and subsequent leakage of the SF_6 insulating gas.**

2. Assemble the elbow connectors to the cables following the elbow connector manufacturer's instructions. See Figure 10.

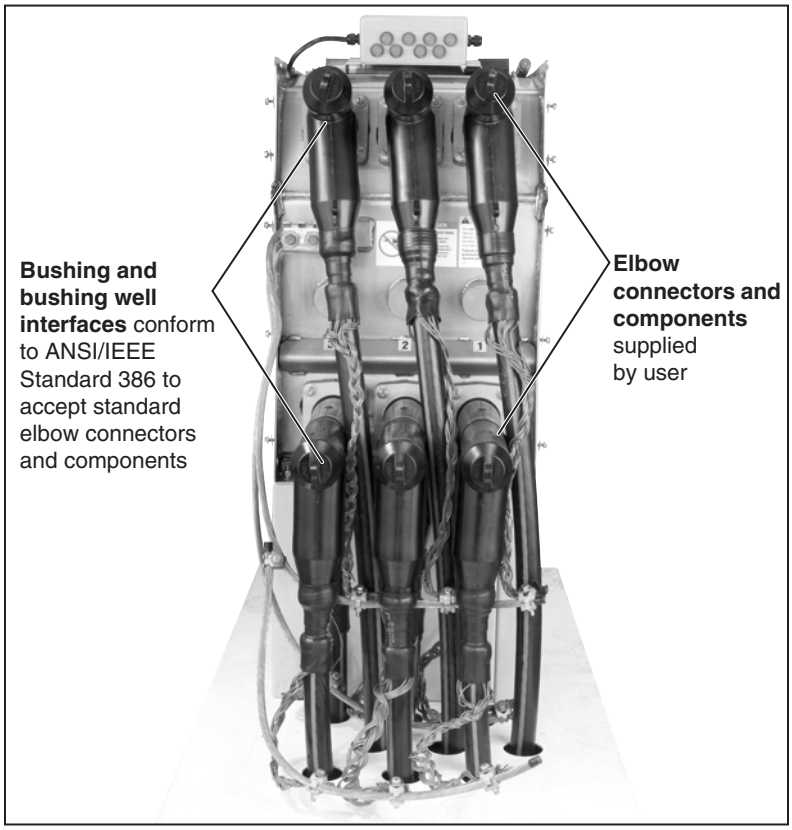


Figure 10. Elbow connectors.

Routine Switchgear Testing

For the convenience of users who normally perform electrical tests on system components such as switchgear, appropriate withstand test values for Wind Turbine Style Vista Switchgear are given in the table below. These test values are significantly greater than the normal operating voltage of the switchgear and are near the flashover voltage of the gear. They should be applied only when the switchgear is completely de-energized and disconnected from all power sources.

⚠ WARNING

When performing electrical withstand tests on Wind Turbine Style Vista Switchgear, always observe the following precautions. **Failure to observe these precautions can result in a flashover, injury, and equipment damage.**

1. Completely de-energize the switchgear and disconnect it from all power sources.
2. Install insulated caps or other appropriate separable connector components capable of withstanding the test voltage.
3. Verify that the SF_6 pressure gauge is in the green zone.

MAXIMUM INSULATION TEST VOLTAGES

Vista Switchgear Rating, kV			Withstand Test Voltage, kV	
50 Hz	60 Hz	Impulse (BIL)	Power Frequency①	Dc②③
12	15.5	95	27	42
24	27	125	40	62
36	38	150	50	82

① The power-frequency withstand test voltages listed in the table are approximately 80% of the design values for new equipment.

② The dc withstand test voltages listed in the table are approximately 80% of the design values for new equipment.

③ Dc withstand test voltages are given for reference only for those users performing dc withstand tests. The presence of these values does not imply a dc withstand rating or performance requirements for the switchgear. A dc withstand design test is specified for new equipment because the switchgear may be subjected to dc test voltage when connected to the cable. The dc withstand test values listed in the table are approximately equal to the ac peak test voltage.

Fault-Interrupter Testing

When performing dielectrical tests on Wind Turbine Style Vista Switchgear, the vacuum fault interrupter will not be subject to voltage across the open gap because the disconnect switch will isolate the vacuum interrupter from the test voltage. Since the vacuum interrupter will not be energized across the open gap, there is no exposure to X-rays that are normally associated with high-voltage testing of vacuum devices. Routine testing of the vacuum fault interrupter is not recommended. For those users who desire to test the vacuum interrupter, contact the nearest S&C Sales Office for specific instructions.

Cable Testing and Fault Locating

Dc testing of installed cables is performed to determine the condition of the cables and to locate faults. Industry standards, like IEEE 400, "IEEE Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field," describe such testing and should be referenced for selection of the test procedures. Dc testing also includes cable "thumping," i.e., the sudden application of dc voltage from a large capacitor for the purposes of fault locating, which causes transients and voltage doubling at the end of the open cable. When the cables are attached to the switchgear, the gear will also be subjected to the dc test voltages.

⚠ WARNING

The dc withstand capability of the switchgear may be reduced due to aging, damage, gas leakage, or electrical or mechanical wear. Therefore, the dc test voltage must be selected such that it does not exceed the withstand limits of the switchgear. **Application of the dc test voltages greater than the withstand capability of the switchgear can result in a flashover, injury, and equipment damage.**

In addition, always verify that the SF_6-gas pressure gauge is in the green zone before proceeding with any test.

⚠ DANGER

Do not exceed the test voltages given in the table on page 13. Exceeding the test voltages can cause a flashover of the isolating gap or phase-to-phase insulation of the switchgear. **This can lead to a power-frequency fault in the gear or of the dc test source and result in severe personal injury or death.**

Cables connected to Wind Turbine Style Vista Switchgear may be dc tested as follows:

- **With the switchgear energized and the switch blade in the open position.** The maximum test voltage should not exceed the "Dc Cable Thumping Voltage" indicated in the table below. *Cables must be de-energized before connecting them to the dc fault-locating equipment.*
- **With the switch blade in the grounded position, grounding the cables connecting the wind turbine generator to the switchgear.** The maximum test voltage should not exceed the "Dc Cable Test Voltage" indicated in the table below. *Cables must be de-energized before connecting them to the dc test equipment.*

After testing, the dc fault-locating or test equipment should be used to discharge any stored charge on the cables before regrounding the cables.

⚠ WARNING

When testing cables connected to energized switchgear, proper isolation of the pwer-frequency source and dc test source must be maintained. Follow the recommendations of the dc fault-locating or test equipment.

The user's operating and safety procedures should be followed for grounding a cable, connecting the dc test source, isolating the dc test source (in case of flashover), ungrounding the cable, applying the dc test source, discharging the cable, and regrounding the cable.

MAXIMUM CABLE TEST AND CABLE THUMPING VOLTAGES

Vista Switchgear Rating, kV			Dc Cable Test Voltage, kV	Dc Cable Thumping Voltage, kV①
50 Hz	60 Hz	Impulse (BIL)		
12	15.5	95	30	15
24	27	125	40	20
36	38	150	40	20

① The dc cable thumping voltage is 50% of the dc cable test voltage because of voltage doubling that will occur at the open end of the cable which is assumed to be a unit of Wind Turbine Style Vista Switchgear. If the open end of the cable is grounded, the dc cable thumping voltage applied to the cable and switchgear can be increased to the dc cable test voltage.

WIND TURBINE STYLE VISTA SWITCHGEAR RATINGS①②				
Voltage, kV			Current, Amperes (RMS)	
System Class	Max	BIL	Main Bus Cont. Current	Short-Circuit, Sym.
15.5 (12)	15.5 (15.5)	95 (95)	600 (630)★■	12 500 (12 500)
			600 (630)	25 000 (25 000)
27 (24)	29 (29)	125 (125)	600 (630)★■	12 500 (12 500)
			600 (630)	25 000 (25 000)
38 (36)	38 (38)	150 (150	600 (630)★■	12 500 (12 500)
			600 (630)	25 000 (25 000)

FAULT-INTERRUPTER RATINGS (If applicable)①②				
Voltage, kV	Current, Amperes, RMS			
System Class	Cont., Load Dropping, and Load Splitting③	Ten-Time Duty-Cycle Fault-Closing, Sym.		Ten-Time Duty-Cycle Fault-Interrupting, Sym.
		Into Closed Position	Into Grounded Position	
15.5 (12)	200 (200)▲	12 500 (12 500)	12 500 (12 500)	12 500 (12 500)
	600 (630)	25 000 (25 000)	●	25 000 (25 000)
27 (24)	200 (200)▲	12 500 (12 500)	12 500 (12 500)	12 500 (12 500)
	600 (630)	25 000 (25 000)	●	25 000 (25 000)
38 (36)	200 (200)▲	12 500 (12 500)	12 500 (12 500)	12 500 (12 500)
	600 (630)	25 000 (25 000)	●	25 000 (25 000)

LOAD-INTERRUPTER SWITCH RATINGS①② (If applicable)			
Voltage, kV	Current, Amperes, RMS		
System Class	Cont., Load Dropping, and Load Splitting③	Ten-Time Duty-Cycle Fault-Closing, Sym.④	Mom. and One-Second, Sym.
15.5 (12)	600 (630)★	12 500 (12 500)	12 500 (12 500)
	600 (630)	●	25 000 (25 000)
27 (24)	600 (630)★	16 000 (16 000)	12 500 (12 500)
	600 (630)	●	25 000 (25 000)
38 (36)	600 (630)★	16 000 (16 000)	12 500 (12 500)
	600 (630)	●	25 000 (25 000)

① ANSI ratings have been assigned in accordance with the applicable portions of IEEE C37.71, C37.72, and C37.73. IEC Ratings have been assigned in accordance with the applicable portions of IEC 265-1 for a Class A switch.

② Refer to the nearest S&C Sales Office for other possible ratings.

③ Parallel or loop switching. Fault interrupters and load-interrupter switches can switch the magnetizing current of transformers associated with the load-dropping rating. Unloaded cable switching rating: 10 amperes at 15.5 kV, 20 amperes at 29 kV and 38 kV.

④ Applicable to fault closing into closed or grounded position.

★ 200 (200) amperes when switchgear is furnished with optional 200-ampere bushing wells at load-interrupter switch terminals, Catalog Number Suffix "-M4."

■ 200 (200) amperes when optional 600-ampere bushings at fault interrupter terminals, Catalog Number Suffix ("-M2" or "-M3") is not specified.

▲ 600 (630) amperes when switchgear is furnished with optional 600-ampere bushings at fault interrupter terminals, Catalog Number Suffix "-M2" or "-M3."

● 25 000 (25 000) amperes symmetrical three-time duty-cycle fault-closing rating; 16 000 (16 000) amperes symmetrical ten-time duty-cycle fault-closing rating.

OPTIONAL FEATURES

Item		Suffix Added to Switchgear Catalog Number
Potential Indication with Test Feature. Includes liquid-crystal display which indicates presence of voltage on each phase, and solar panel to supply power for testing of complete voltage-indication circuit and phasing circuit (if furnished)	*Without* provisions for low-voltage phasing	-L1
	With provisions for low-voltage phasing	-L2
Remote Low-Pressure Alarm①—includes internal contact for remote low-pressure indication, with wiring to outside of tank	With wires routed on tank for future customer connections	-R11
	With wires terminated in an enclosure furnished with a terminal block for customer connections	-R2
External Trip Provisions, allows three-pole tripping of fault interrupter via a trip signal from a remote location or an external relay. Requires 120-Vac control power②③	In addition to standard overcurrent control	-R31
	In lieu of standard overcurrent control and current transformers	-R41
Key Interlock on Fault Interrupter④		-X1

① This option must be specified if future remote supervisory features, including remote low-pressure indication, are planned.

② Refer to the nearest S&C Sales Office if compatibility with control power other than 120 Vac is required.

③ The user-supplied trip-initiating signal must be a momentary contact. Refer to the nearest S&C Sales Office if an application requires the use of a latching contact.

④ Motor operator cannot be fitted on fault interrupter with key interlock.

ACCESSORIES

Item		Catalog Number
Shotgun Clamp Sticks for use with separable connectors	6′–5½″ length	9933-150
	8′–5½″ length	9933-151
Storage Bag for Shotgun Clamp Stick, heavy canvas	6′–6″ length	9933-152
	8′–6″ length	9933-153
Overcurrent-Control Adapter Cable—required for programming overcurrent control	For connecting control to user-furnished personal computer in the field, having a 9-pin (DB9) serial communication port and a PS/2 (mouse) port	TA-2367
	For connecting control (removed from is enclosure) to user-furnished personal computer in the shop, having a 9-pin (DB9) serial communication port and a PS/2 (mouse) port	TA-2368
	For connecting control to user-furnished personal computer having a USB port. Kit includes USB cable, adapter cable, driver CD-ROM, and installation instructions	TA-3153
Portable Motor Operator for operation of fault interrupter from a remote location. Includes carrying case, 50 foot cable with remote controls, and power supplied by	User-furnished 24-volt battery and battery charger	38320R1
	S&C-furnished 24-volt battery and battery charger	38322R1
	S&C-furnished AC input power supply	38323R1

TOUCH-UP KIT COMPONENTS—Aerosol Coatings①

Item	Catalog Number
S&C Light Gray Outdoor Finish	9999-080
S&C Red-Oxide Primer	9999-061

① In 12-ounce cans.

Printed in U.S.A.