



SIEMENS



Rear Connected WL Low Voltage Switchgear

Instruction and installation guide
11-C-9100-01 Rev. 5

usa.siemens.com/switchgear

	<p style="text-align: center;">⚠ DANGER</p> <p>Hazardous voltage. Will cause death or serious injury.</p> <p>Keep out. Qualified personnel only. Disconnect and lock off all power before working on this equipment.</p>
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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.

QUALIFIED PERSON

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

- (a) is trained and authorized to de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.
- (b) is trained in the correct care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
- (c) is trained in rendering first aid.

NOTE

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

- (a) is trained and authorized to de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.
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Rear Connected WL Low Voltage Switchgear

Introduction and Safety

Introduction

Type WL low voltage switchgear is designed to meet all applicable UL, ANSI, NEMA and IEEE standards. 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. 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.

Dangerous procedures

In addition to other procedures described in this manual as dangerous, user personnel must adhere to the following:

1. **Always work on de-energized equipment. Always de-energize a breaker, and remove it from the switchgear before performing any tests, maintenance or repair.**
2. **Always discharge energy from closing and opening (tripping) springs before performing maintenance on circuit breakers.**
3. **Always let an interlock device or safety mechanism perform its function without forcing or defeating the device.**

Field service support

Siemens Industrial Services Division can provide the following support services for Type WL low voltage switchgear. 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

Rear Connected WL Low Voltage Switchgear

General Description



Figure 1. Typical indoor Type RCS switchgear

Introduction

The successful performance of rear-connected switchgear depends as much on proper installation and maintenance as it does on good design, careful manufacture and correct application.

Siemens type WL metal-enclosed switchgear is precision built equipment designed to function efficiently under normal operating conditions. It is designed and manufactured to operate within the ANSI C37 standards for Metal-Enclosed-Low Voltage Switchgear. Performance requirements of these standards have been met or exceeded by these designs. The principal standard which applies is:

C37.20.1 Metal-Enclosed Low Voltage Switchgear

The instructions included in this manual are provided to aid you in obtaining longer and more economical service from your Siemens switchgear. For proper installation and operation, this information should be distributed to your operators and engineers.

By carefully following these instructions, difficulties should be avoided. However, they are not intended to cover all details of variations that may be encountered in connection with the installation, operation and maintenance of this equipment.

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

Scope

These instructions cover the installation, operation and maintenance of Siemens type WL metal-enclosed low voltage switchgear assemblies, using Type WL low voltage power circuit breakers. The equipment described in this manual consists of indoor or outdoor designs for application up to 600 Volts. A typical indoor Type WL switchgear assembly is shown in **Figure 1**.

Standard construction details of the switchgear, auxiliary equipment and necessary accessories are given in the appropriate sections. Special mechanical and electrical devices, furnished in accordance with purchase order requirements, are covered by supplementary instructions submitted with this instruction book. Ratings described in this manual are in accordance with UL, NEMA, IEEE and ANSI standard requirements.

The equipment furnished has been designed to operate in a system having the circuit capacity specified by the purchaser. If for any reason the equipment is later used in a different system, or if the short-circuit capacity of the system is increased, the bus bracing (momentary) and short time ratings of the switchgear, the interrupting capacity of the circuit breakers and the bus capacity must be checked. Failure on the part of the user to receive approval of intended changes from Siemens may cause voiding the warranty.

General description

The switchgear described in this manual is of the front-connected metal-enclosed type. The switchgear sections described are comprised of full depth structural frames and components providing separate compartments for drawout breakers, buses, and auxiliary equipment. In addition, the section main bus and intersection bus work may be isolated (optional) from the primary entrance cable area with segregating barriers. Interlocks are provided, where necessary, to insure proper sequence and safe operation.

Type WL indoor switchgear consists of one or more vertical sections secured together as a single group. It is completely operational when installed and connected to purchaser's power supply. When connected directly to a power transformer, a 14.9" (381.4mm) wide transition section may be provided to adjust connections to the proper elevation. Circuit breaker compartments are provided with hinged access doors for installing or removing circuit breakers. Auxiliary compartments are designed with hinged panels for mounting of instruments, relays and switches.

Type WL outdoor switchgear is similar to indoor switchgear, except that it is enclosed in a weather resistant (NEMA 3R) steel housing. The equipment is designed so that weather conditions will not affect operation of the switchgear. In the walk-in outdoor enclosure, an illuminated service aisle is provided at the front of the switchgear allowing inspection and maintenance without exposure to the elements. An access door is provided at each end of the aisle wall in the walk-in outdoor enclosure with panic bar latch release inside the aisle. The rear of each vertical section is equipped with a door for access to the primary cable entrance area.

Rear Connected WL Low Voltage Switchgear

Receiving, handling and storage

Receiving

Each shipping section of switchgear is securely blocked and braced for shipment. It is crated, boxed or covered as required by shipping conditions. Whatever method of shipment is employed, every precaution is taken to insure its safe arrival. If special handling is required, it is so indicated on the shipment. All moving parts are secured; however, relatively delicate instruments are included which requires that each section be handled carefully until installed in its final location. The maximum shipping split length for indoor vertical structures is 110 inches (2794 mm) and the maximum shipping split length for outdoor vertical structures is 66 inches (1676 mm). **Figure 2** shows a maximum length shipping split composed of five 22 inch (559 mm) indoor vertical structures.

NOTE: When circuit breakers are shipped installed in their respective compartments, they are secured in the fully connected position.

Identification

In the case of unit substations, the low voltage circuit breakers may be key interlocked with the transformer primary switches. Check substation numbers on packaging of switchgear and primary switches with those noted on applicable general arrangement and floor plan drawings. These numbers insure that all components applying to a particular substation are correctly located before uncrating.

When there are multiple shipping sections, each may be identified by a tag giving a drawing number which also appears on the purchaser's copy of the shipping list. The shipping list also describes the content of the crate or package as section or unit No. 1-2-3 etc. Refer to the general arrangement drawing for location of each shipping section within a group lineup. Use this information to simplify the assembly operation and avoid unnecessary handling.

Inspection and unpacking

Inspect the equipment as soon as possible after receiving for any damage that may have occurred in transit. Before unpacking, examine the package itself as a damaged package may indicate an area of damage within. Be careful when unpacking equipment. The use of sledge hammers and crowbars may damage the finish, if not the equipment itself. Use nail pullers. After unpacking, examine the equipment for any possible damage.

Check the shipping manifest to be certain that all items have been received. Do not destroy any packing material until all items listed on shipping manifest have been accounted for. Small packages of parts can be lost in packing material. Do not remove identification tags from apparatus until the switchgear is completely installed.

If there are any shortages, or damage not previously noted, make certain it is noted on the delivery receipt and contact the carrier immediately. Notify the Siemens sales office of any shortage or damage.

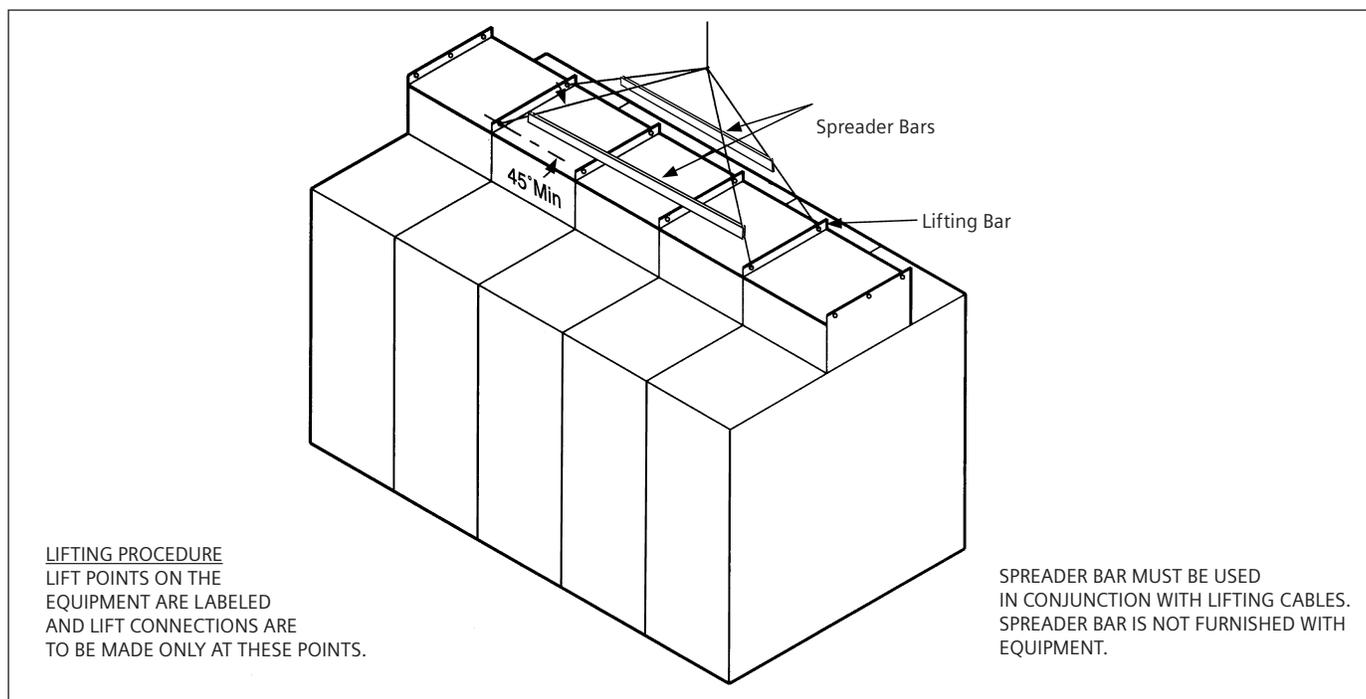


Figure 2. Lifting indoor switchgear

Rear Connected WL Low Voltage Switchgear

Receiving, handling and storage

Shipping damage claims

Important: The way visible shipping damage is treated by consignee prior to signing the delivery receipt can determine the outcome of the damage claim to be filed.

Notifications to carrier within the 15 day limit on concealed damage is essential if loss resulting from unsettled claims is to be eliminated or minimized.

1. When shipment arrives, note whether equipment is properly protected from the elements. Note trailer number on which the equipment arrived. Note blocking of equipment. During unloading make sure count agrees with delivery receipt.
2. Make immediate inspection for visible damage upon arrival, and prior to disturbing or removing packaging or protective wrapping. This should be done prior to unloading when possible. When total inspection cannot be made on the vehicle prior to unloading, close inspection during unloading must be maintained and visible damage noted on the delivery receipt. Take pictures when possible.
3. Any visible damage must be noted on the delivery receipt and acknowledged with the driver's signature. The damage should be detailed as much as possible. It is essential that annotation "Possible internal damage, subject to inspection" be included on delivery receipt with damage noted, the shipment should not be signed for by the consignee or his agent.
4. Notify the Siemens sales office immediately of any damage.
5. Arrange for a carrier inspection of damage immediately.

Important: Do not move equipment from the place it was set when unloading. Also, do not remove or disturb packaging or protective wrapping prior to carrier damage inspection. Equipment must be inspected by carrier prior to handling after receipt. This eliminates loss due to claims by carrier that equipment was damaged or further damaged on site after unloading.

6. Be sure equipment is properly protected from any further damage by covering it properly after unloading.
7. If practical, make further inspection for possible concealed damage while carrier inspector is on site. If inspection for concealed damage is not practical at the time the carrier inspector is present, it must be done within 15 days of receipt of equipment. If concealed damage is found, the carrier must be notified and inspection made prior to taking any corrective action to repair. Also notify the Siemens sales office immediately.

8. Obtain the original of the carrier inspection report and forward it along with a copy of the noted delivery receipt to the Siemens sales office. Approval must be obtained by Siemens from the carrier before any repair work can be performed. Before approval can be obtained, Siemens must have the documents. The carrier inspection report and/or driver's signature on the delivery receipt does not constitute approval or repair.

Note: Any adverse judgement as to whether the equipment was properly loaded or properly prepared by shipper for over-the-road travel cannot be made at the destination. Shipments are not released from the factory without a clear bill of lading, blocking and tarping of the equipment before it leaves the Siemens factory. Therefore, if the equipment is received in a damaged condition, this damage to the equipment had to occur while enroute due to conditions beyond Siemens control. If the procedure outlined above is not followed by the consignee, purchaser, or his agent, Siemens cannot be held liable for repairs. Siemens will not be held liable for repairs in any case where the work was performed prior to authorization from Siemens.

Lifting and moving

There are a number of methods that can be used in handling the switchgear which, when properly employed, will not damage the switchgear sections. The handling method used will be determined by conditions and available equipment at the installation site. Lifting with a crane is the preferred method of handling, however, overhead obstructions or low ceilings often dictate the method to be used.

Lifting switchgear

	⚠ WARNING
	Heavy weight. Can cause death, serious personal injury or property damage.
	Observe all handling instructions in this instruction manual to prevent tipping or dropping of equipment.

Both indoor and outdoor switchgear are lifted in the same manner. Both types have holes in the top of the equipment for attaching lift cables. These lift holes are located at the division between vertical sections within a shipping group. The maximum shipping group is five vertical sections, excluding the transition box to liquid transformers if involved (this is not considered a vertical section). Lift points on the equipment are labeled and lift connections are to be made only at these points. (See Figure 3).

Rear Connected WL Low Voltage Switchgear

Receiving, handling and storage

A drawing packet is provided with each lineup of switchgear. Location of drawing packet is identified at the front top of each switchgear section. This packet includes a general arrangement drawing of the switchgear lineup, plus a drawing with installation and handling instructions for the equipment. A copy of this instruction manual is included. Review this information carefully before moving equipment.

The angle of the lift cable relative to a horizontal plane must not be less than 45 degrees. (See **Figures 2 and 3**). Also note the tension on each cable of a four cable lift at 45 degrees is 70.7% efficient, that is, 1/4 of the total load divided by .707 will equal the force in pounds on each cable. Lesser angles could damage the switchgear.

Make certain the crane used is of adequate height and capacity. A safe estimate of required crane capacity would be 4000 lbs. (1820 kg) per vertical section for indoor equipment, and 5000 lbs. (2275 kg) per vertical section for outdoor equipment.

Moving switchgear with rollers

Moving switchgear in an obstructed area where a crane cannot be employed can be accomplished by the use of rollers (indoor enclosure only); however, this must be done before the wooden shipping skid is removed. If pipes are used as rollers they should be of sufficient diameter that they will roll with ease without digging into the skid. In placing rollers under the skid, or removing them, it will be necessary to lift the switchgear shipping group by either crane or a fork lift truck. If a fork lift truck is used to lift indoor switchgear, it must be used with utmost caution to avoid possible damage to switchgear.

Outdoor switchgear: Use of a fork lift truck to handle or move switchgear is NOT recommended. Outdoor switchgear should be lifted only from above, using the attachment points shown in **Figure 3**.

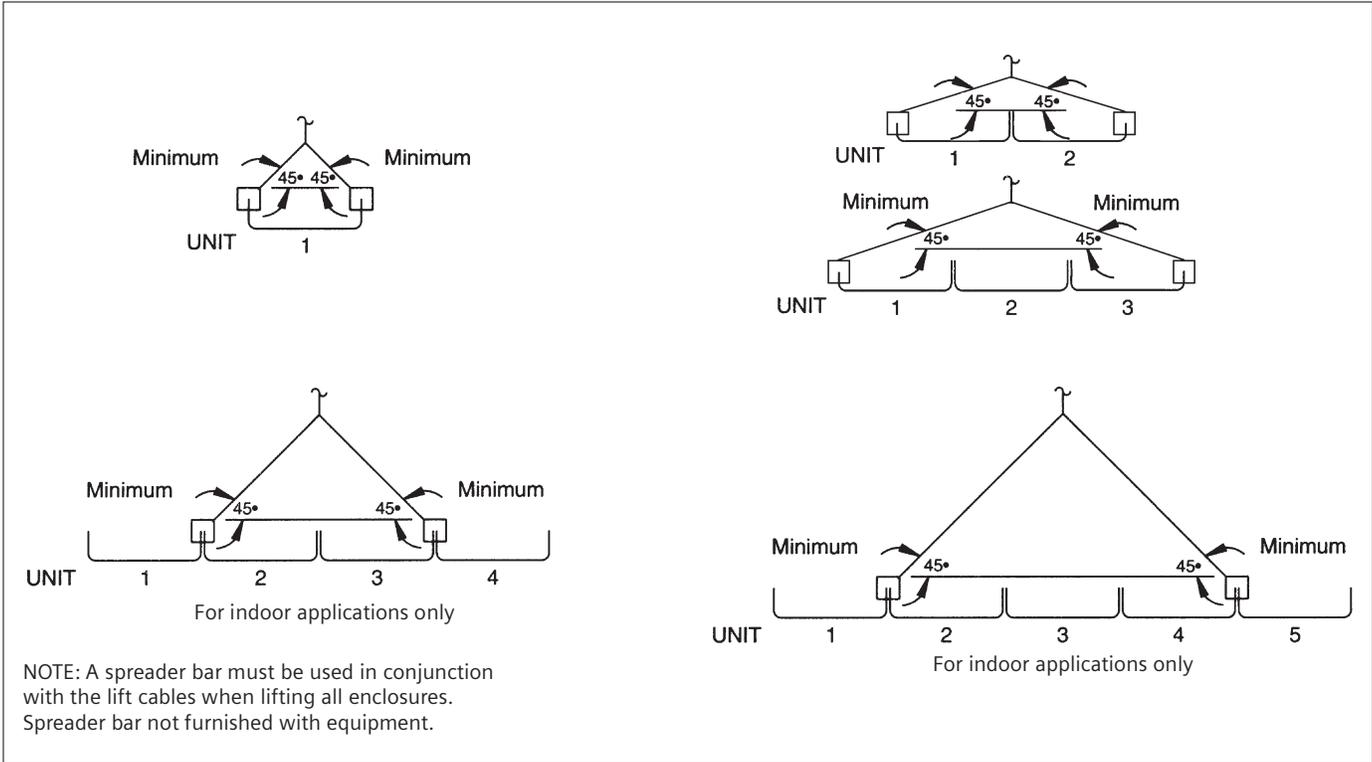


Figure 3. Lifting points (indoor or outdoor)

Rear Connected WL Low Voltage Switchgear

Receiving, handling and storage

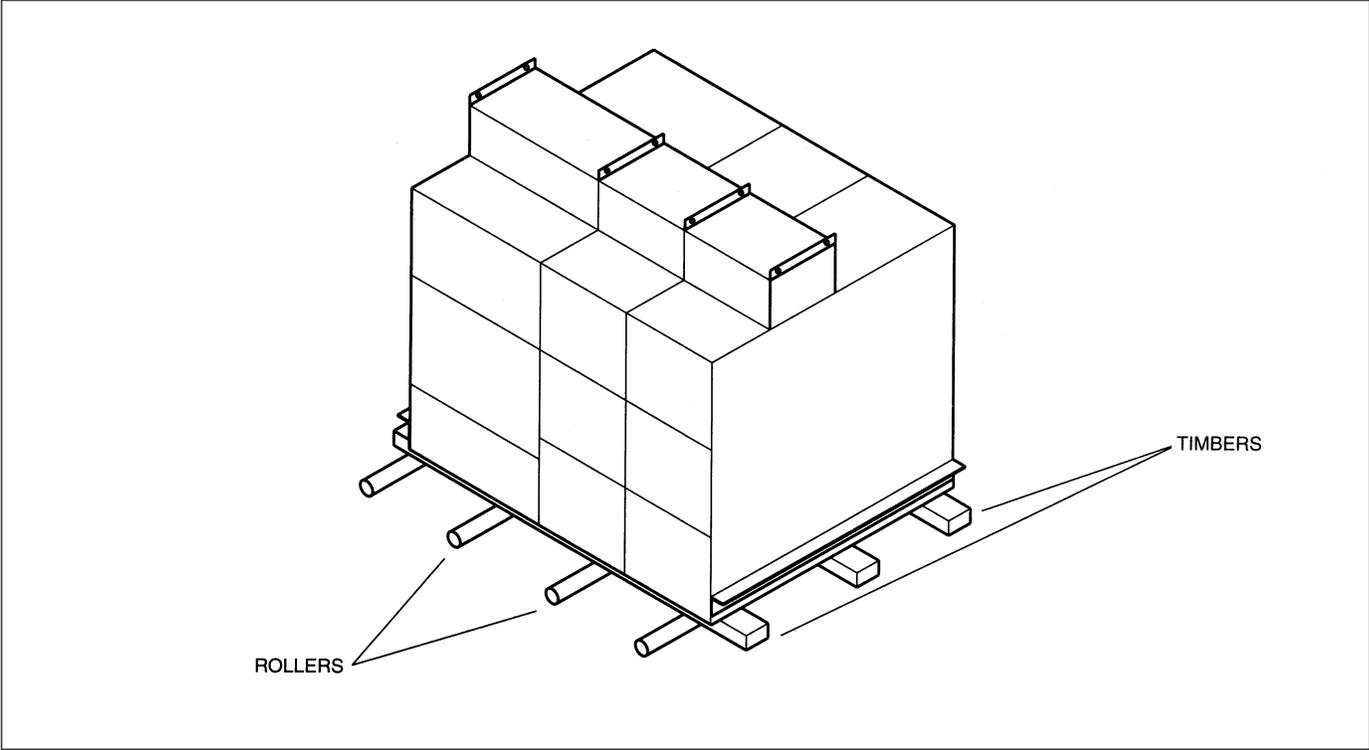


Figure 4. Use of rollers to move switchgear (indoor enclosure only)

Rear Connected WL Low Voltage Switchgear

Receiving, handling and storage

Final movement of assembly

Proper final movement and connection of the assembly requires that several items be completed.

1. Preplan sequence of installation movements and connections.
2. Where equipment must be slid into final location, start with the left end shipping group and continue in sequence. Secondary conduits which stub-up above floor level may block sliding in either direction. End trim must be removed before attempting slide units into place.
3. Protect equipment and external items from damage during movements. Be sure to have smooth, unobstructed surfaces where the equipment is to be slid. Keep access openings clear.
4. Prepare for the connections across shipping splits before the equipment is moved into final position. Note the mounting position and orientation of any items removed during installation, and save hardware for use in installation.
5. Thread coiled wires across shipping splits into interunit wire trough prior to moving equipment into its final position.
6. Where top lift capability is available, the shipping skid and other packaging materials may be removed before the last move into the final position.
7. Where top lift capability is not available, protect the switchgear bottom with support timbers and move with jacks and rollers just to the side of its final position. Remove rollers, shipping skid, and other packaging materials and remove jacking facilities. Clear any obstructions. The equipment may be slid sideways to join the shipping split. Any sliding force must be carefully applied across the bottom 4 inches (100mm) of the switchgear side with proper cribbing to fully distribute the force across the full depth of side. The end trim covers must be removed from the last section to keep them from being crushed when sliding the equipment. Replace end trim when gear is in its final position. Watch for conduit stubbing as equipment is slid into place. See Figure 5.

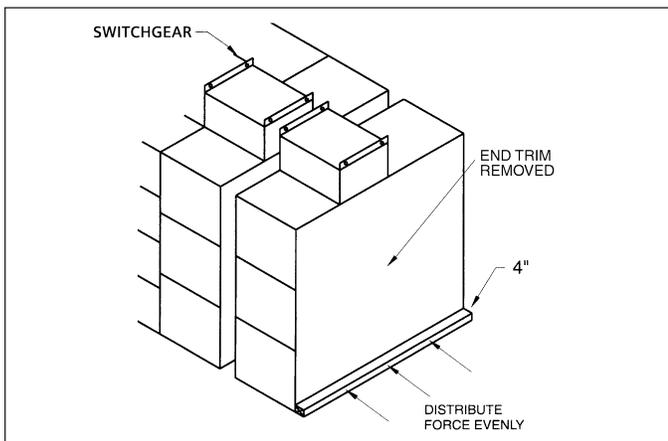


Figure 5. Final positioning of switchgear in obstructed areas without a crane

8. Be sure to install roof channels on outdoor switchgear to make the equipment weather resistant. Refer to Installing shipping sections (walk-in) on page 21.
9. See "installation" section for additional important information.

Storage – Indoor switchgear

When switchgear is not to be installed immediately, it should be unpacked, inspected within 15 days of receipt and stored in a clean dry location. Indoor switchgear should be stored in an atmospherically controlled environment until installation. The switchgear should be kept clean and dry. Humidity shouldn't exceed 80% and temperature should be between 40 degrees F and 110 degrees F. Temperature fluctuations should be avoided. Corrosive environments should be avoided – including environments with high concentrations of cement dust. Indoor switchgear is neither weather resistant nor drip resistant. Therefore, it should be stored indoors. If it is to be stored outdoors, or in a humid, unheated area, provide an adequate covering, and place a heat source of at least 250 watts output within each vertical section to prevent condensation. Space heaters are not standard equipment on indoor switchgear. Lubricate any moving parts such as hinges, shutters, etc., if storage is for an extensive period of time.

	! DANGER
	Hazardous voltage. Will cause death or serious injury.
	Before using external source to energize space heaters, disconnect space heater circuit from normal supply to prevent back-energization of control power transformer.

Storage – Outdoor switchgear

When storing outdoor switchgear in an area exposed to the weather or to humid conditions, energize the space heaters provided within the sections and make certain that louvers and vents are uncovered to allow air to circulate. The heater circuit is typically accessible by opening the rear door of the switchgear. Refer to the switchgear wiring diagram to determine where space heater connections can be made. Lubricate any moving parts such as hinges, shutters, etc., if storage is for an extensive period of time. Be sure to install roof channels during storage to make the equipment weather resistant. Refer to Installing outdoor shipping sections (walk-in) on page 21.

If the outdoor lineup consists of multiple shipping groups, it is neither weather resistant or drip resistant and it is strongly recommended that the equipment be stored indoors. If it must be stored outdoors, an adequate covering must be provided to protect the equipment from the weather.

Rear Connected WL Low Voltage Switchgear Installation

Preparation for installation

Prior to installation of switchgear, study this instruction manual and the switchgear drawings, such as general arrangement, one line diagram, schematic drawings, wiring diagrams, installation instruction drawing, panel arrangement, electrical bill of material, nameplate engraving list, and accessories drawing. Special attention should be given to the foundation information contained in this manual as well as the information provided on the equipment drawings. Be sure that the foundation conforms to the requirements described in this manual and the general arrangement drawing.

Foundation – General requirements

Prior to installation of the switchgear careful design, planning and construction of the foundation or base on which the switchgear will rest must be made. A thorough analysis and careful construction may alleviate many problems at the time of installation, and during operation. It is important that a true and level surface be provided, that is capable of supporting the weight of the switchgear and other related equipment.

If the switchgear cannot be lowered over conduits because of head room or other restrictions, conduit couplings may be grouted in flush with foundation, and conduit nipples added after the switchgear is in place.

Conduits should be capped during construction to prevent entry of dirt, moisture and vermin.

Indoor foundations

As it is difficult to obtain a true and level floor on a concrete slab, it is highly recommended that 3" (minimum) sill channels be grouted into the floor as shown in **Figure 6**. The surface of the sills should be slightly above floor level. The surfaces of the

sills must be level and in the same horizontal plane within 1/16" (1.6mm). There should be no projection above the plane within the area covered by the switchgear. If the floor or sills do not meet this requirement, it will be necessary to use shims when installing the switchgear on the mounting surface. When shims are required, insure that they are installed at the front, middle and rear of the equipment as a minimum.

Outdoor foundations

Concrete slab, sill channels, piers or pilings, whichever type of foundation is used, must have smooth and level surfaces and be in the same horizontal plane within 1/16" (1.6mm). If these conditions are not met, it will be necessary to use shims when installing the switchgear.

For outdoor switchgear, support shall be provided at each end and at the side of every vertical section. Refer to **Figures 7a** and **7b** and the switchgear general arrangement drawing for location of support and anchoring points. If pilings are used, the diameter is to be determined by purchaser; however, they should not be less than 12" (305mm) diameter for sufficient contact, room for anchor bolts, and grouting in of bed plates (if used). All shipping splits must be properly supported.

Any conduits which are installed in concrete must be perpendicular to switchgear mounting surface. Conduits should extend a maximum of 1" on indoor equipment and 3" on outdoor equipment above the equipment mounting surface. This will allow the conduit to enter the vertical section and exclude entry of water and rodents.

Note: For seismic installations, refer to installation furnished with the equipment.

Rear Connected WL Low Voltage Switchgear Installation

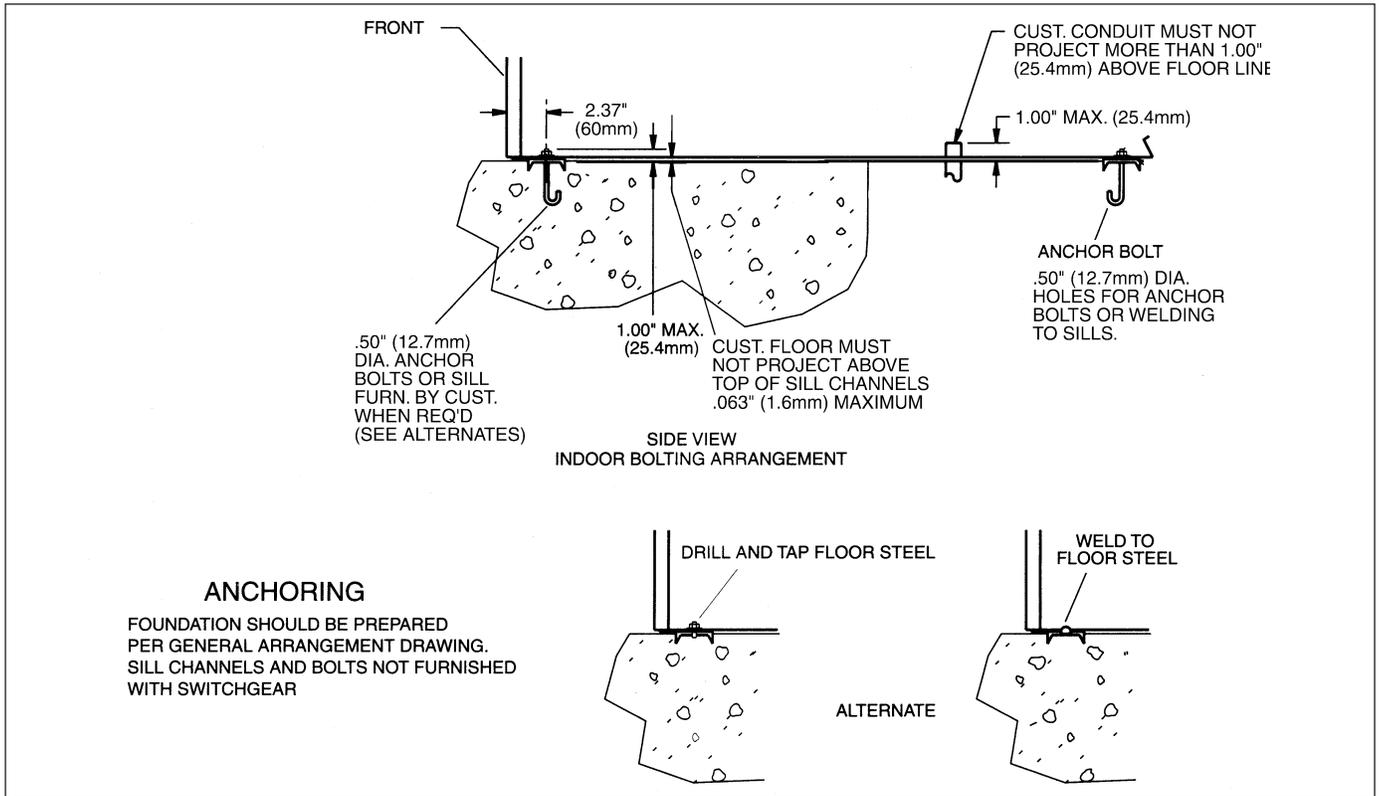


Figure 6. Anchoring indoor switchgear
Refer to 12-C-9115-01 for seismic installation.

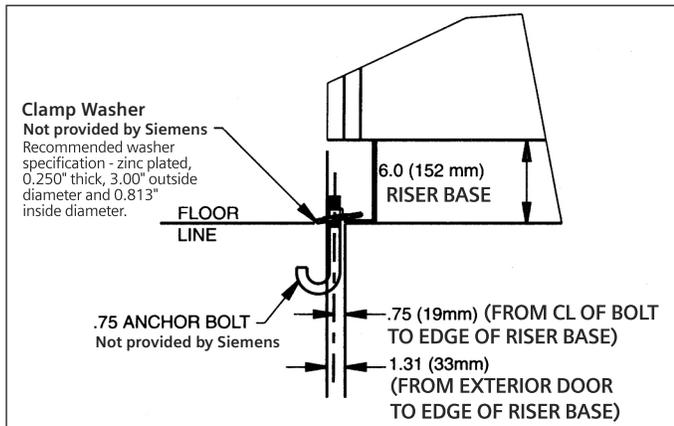


Figure 7a Anchoring non walk-in switchgear
Refer to 12-C-9115-02 for seismic installation.

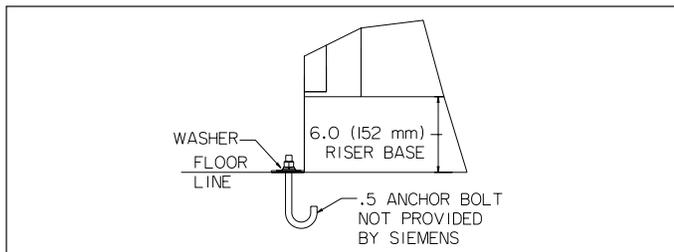


Figure 7b Anchoring walk-in outdoor switchgear
Refer to 12-C-9115-02 for seismic installation.

Weights of vertical sections

The following estimates may be used in foundation loading calculations. These estimated weights are for each vertical section within a shipping group. The estimates are based on maximum conditions; actual equipment weights will probably be lower.

Indoor

22" wide with 4 breakers	2850 lbs. (1300kg)
32" wide with 2 breakers	3050 lbs. (1385kg)
32" wide with 1 breaker and fuse carriage	3150 lbs. (1430kg)
Transition box	680 lbs. (310kg)

Outdoor

22" wide with 4 breakers	4300 lbs. (1950kg)
32" wide with 2 breakers	4650 lbs. (2110kg)
32" wide with 1 breaker and fuse carriage	4750 lbs. (2155kg)
Transition box	680 lbs. (310kg)

Add 900 lbs. for end walls for outdoor walk-in (weight is for both ends). Refer to shipping documents for actual weights.

These estimates should be increased for unusual secondary or auxiliary equipment, impact loading, or for seismic conditions, if required.

Rear Connected WL Low Voltage Switchgear Installation

Indoor Floor Plan – View of Bottom
 without optional riser base
 (not applicable to arc resistant switchgear)

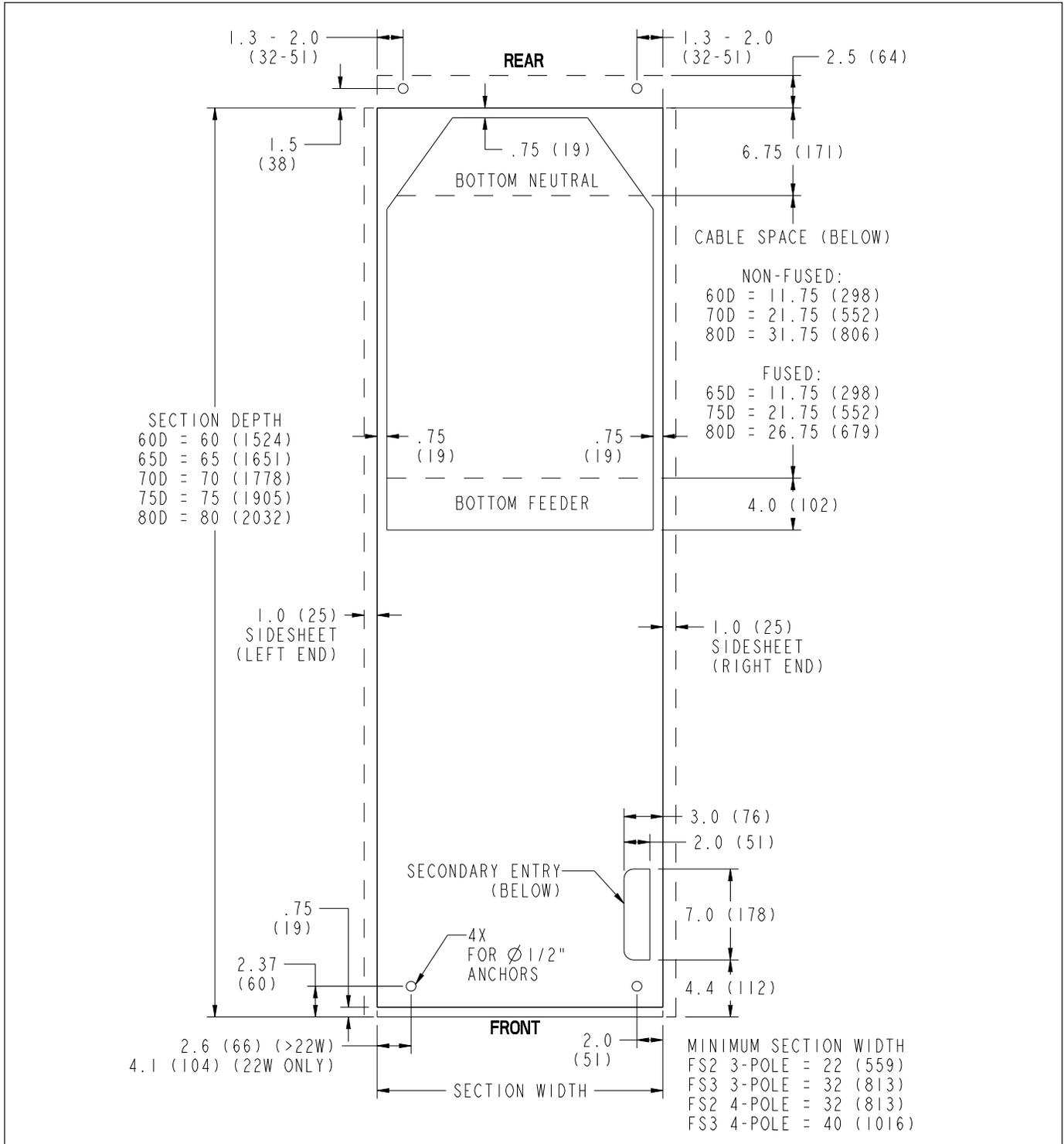


Figure 8.1

Rear Connected WL Low Voltage Switchgear Installation

Indoor Floor Plan – View of Bottom
with optional riser base
(not applicable to arc resistant switchgear)

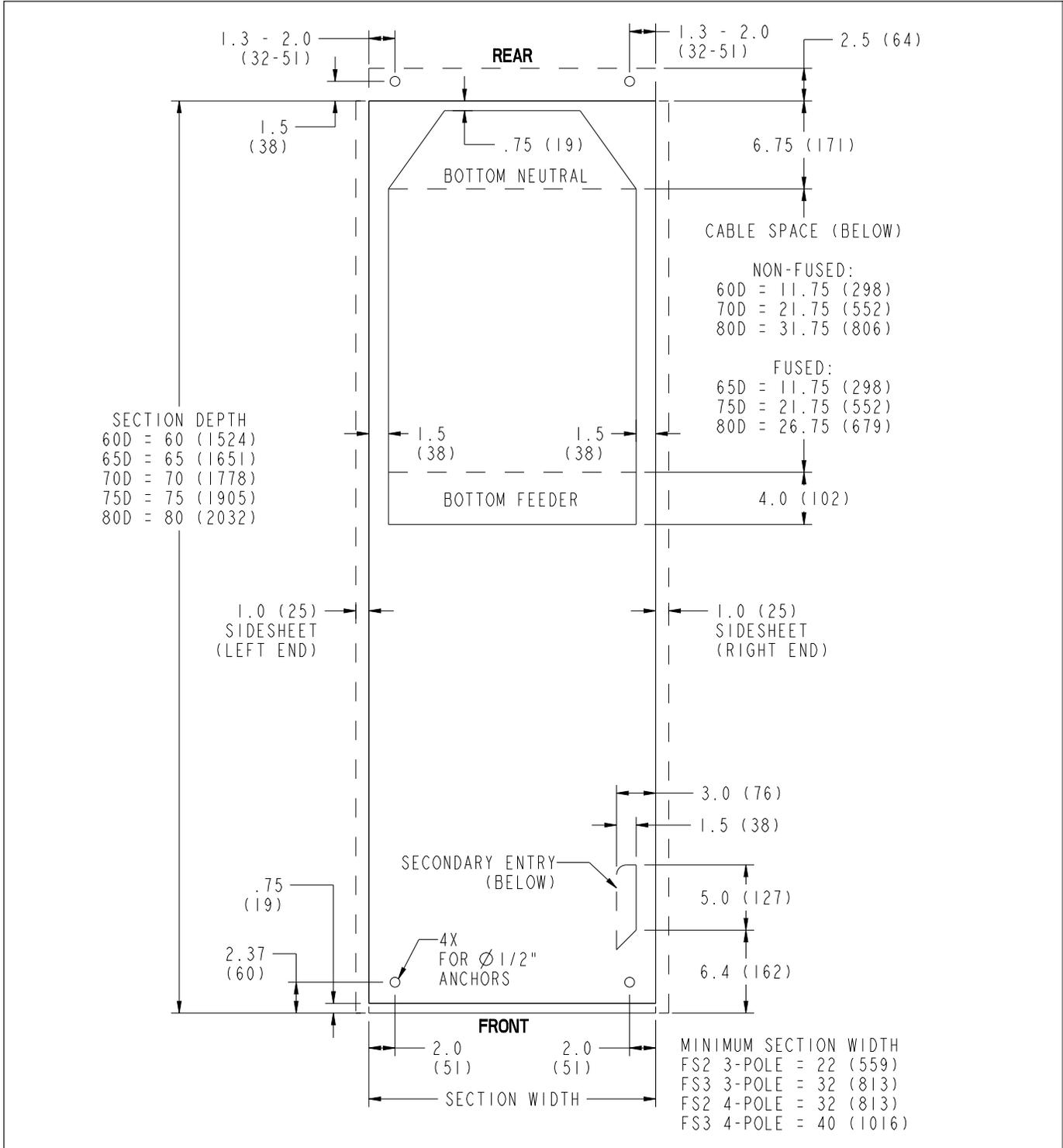


Figure 8.2

Rear Connected WL Low Voltage Switchgear Installation

Indoor Floor Plan – View of Top
(not applicable to arc resistant switchgear)

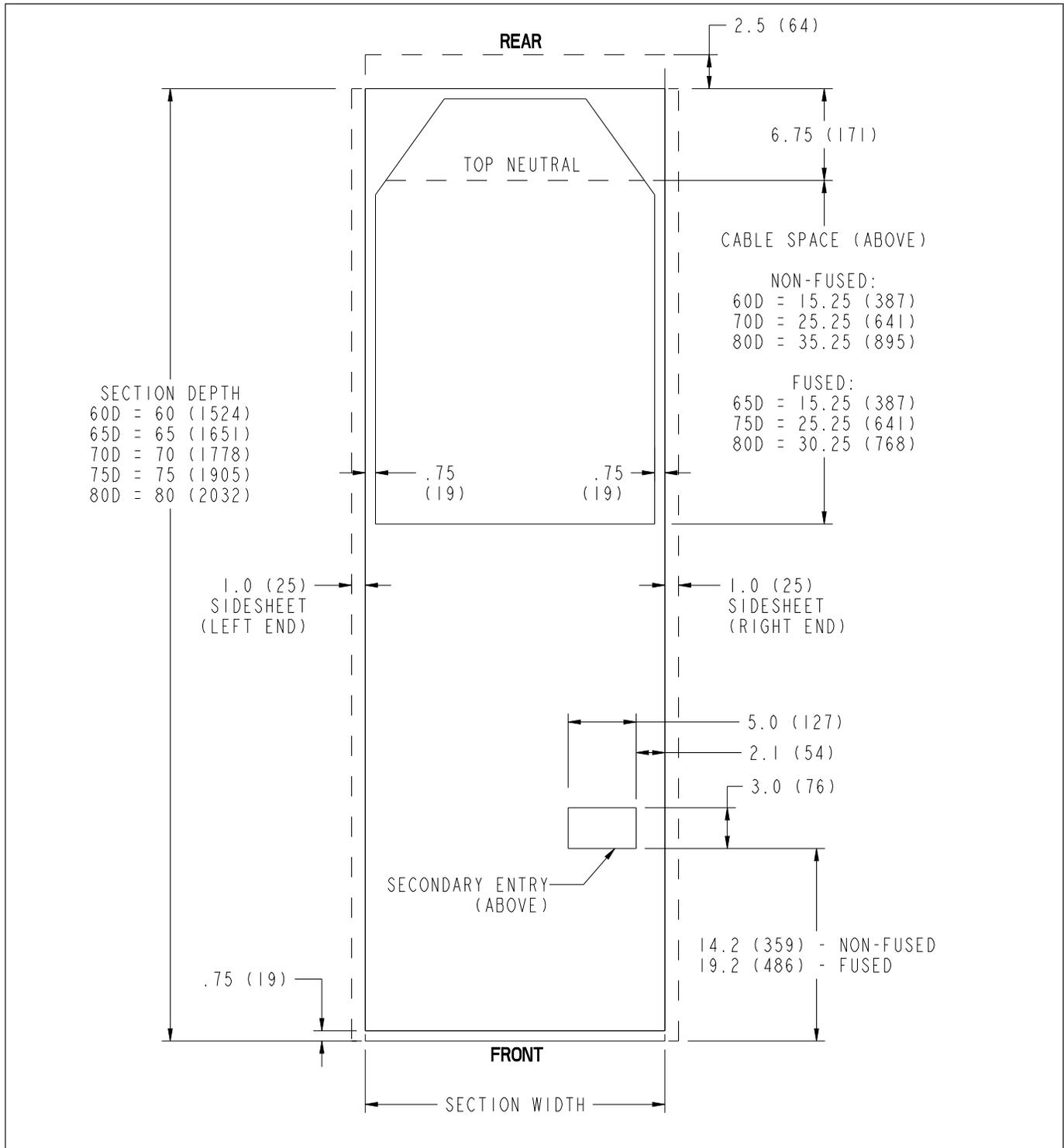


Figure 8.3

Rear Connected WL Low Voltage Switchgear Installation

**Indoor Floor Plan – Side View, Right Side
without optional riser base
(not applicable to arc resistant switchgear)**

Per NEC, minimum ceiling height is 12" above the vent stack for non-combustible ceilings (non-combustible as defined by NEC or AHJ) and 36" above the vent stack for any ceiling other than non-combustible.

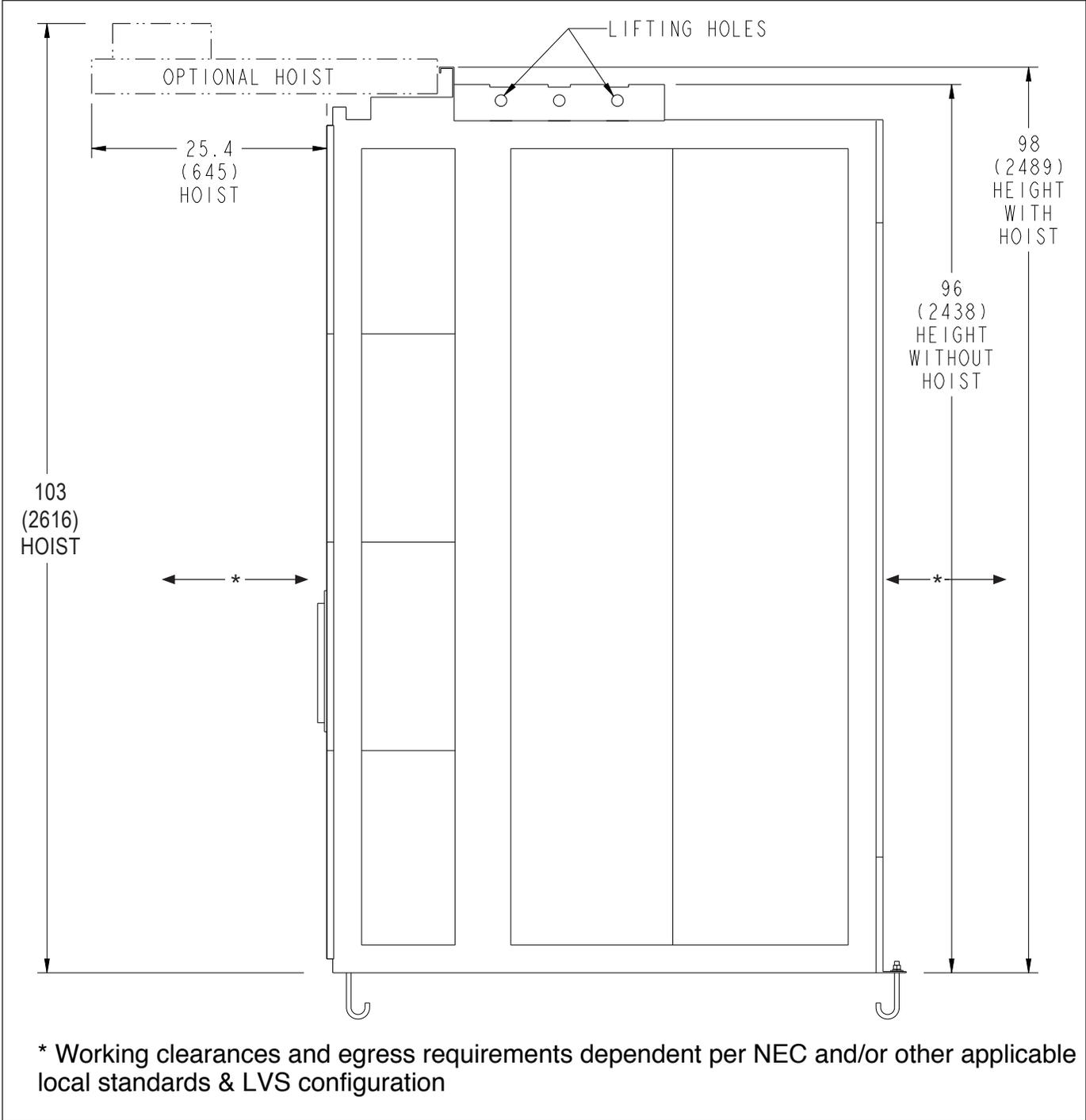


Figure 9.1

Rear Connected WL Low Voltage Switchgear Installation

Indoor Floor Plan – Side View, Right Side with optional riser base (not applicable to arc resistant switchgear)

Per NEC, minimum ceiling height is 12" above the vent stack for non-combustible ceilings (non-combustible as defined by NEC or AHJ) and 36" above the vent stack for any ceiling other than non-combustible.

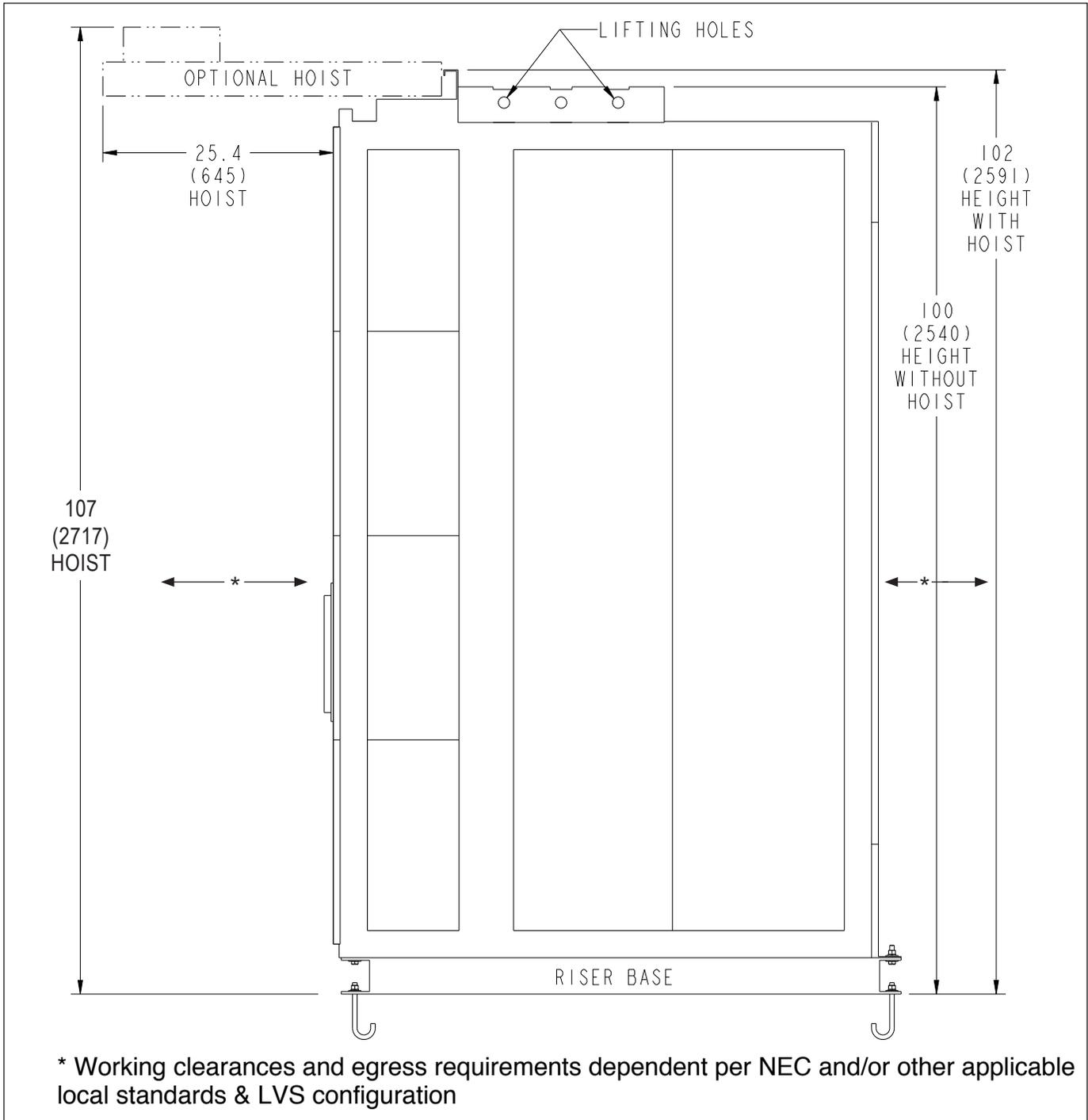


Figure 9.2

Rear Connected WL Low Voltage Switchgear Installation

Siemens RC-LVS Cable Conduit Entry – Indoor Recommended Maximum # of 4" conduits

Section Size	Below ^{1, 3}		Standard Above ^{2, 4}		Arc Resistant Above ⁵	
	Area (WxD)	Qty	Area (WxD)	Qty	Area (WxD)	Qty
22W x 60D	19 x 11.75	6	20.5 x 15.25	6	20.5 x 13.75	6
22W x 70D	19 x 21.75	9	20.5 x 25.25	12	20.5 x 23.75	12
22W x 80D	19 x 31.75	15	20.5 x 35.25	18	20.5 x 33.75	15
22W x 65D (FUSED)	19 x 11.75	6	20.5 x 15.25	6	20.5 x 13.75	6
22W x 75D (FUSED)	19 x 21.75	9	20.5 x 25.25	12	20.5 x 23.75	12
22W x 80D (FUSED)	19 x 26.75	12	20.5 x 30.25	15	20.5 x 28.75	12
32W x 60D	29 x 11.75	10	30.5 x 15.25	10	30.5 x 13.75	10
32W x 70D	29 x 21.75	15	30.5 x 25.25	20	30.5 x 23.75	20
32W x 80D	29 x 31.75	25	30.5 x 35.25	30	30.5 x 33.75	25
32W x 65D (FUSED)	29 x 11.75	10	30.5 x 15.25	10	30.5 x 13.75	10
32W x 75D (FUSED)	29 x 21.75	15	30.5 x 25.25	20	30.5 x 23.75	20
32W x 80D (FUSED)	29 x 26.75	20	30.5 x 30.25	25	30.5 x 28.75	20
38W x 60D	35 x 11.75	12	36.5 x 15.25	12	36.5 x 13.75	12
38W x 70D	35 x 21.75	18	36.5 x 25.25	24	36.5 x 23.75	24
38W x 80D	35 x 31.75	30	36.5 x 35.25	36	36.5 x 33.75	30
38W x 65D (FUSED)	35 x 11.75	12	36.5 x 15.25	12	36.5 x 13.75	12
38W x 75D (FUSED)	35 x 21.75	18	36.5 x 25.25	24	36.5 x 23.75	24
38W x 80D (FUSED)	35 x 26.75	24	36.5 x 30.25	30	36.5 x 28.75	24
40W x 60D	37 x 15.75	12	38.5 x 15.25	12	38.5 x 13.75	12
40W x 70D	37 x 25.75	24	38.5 x 25.25	24	38.5 x 23.75	24
40W x 80D	37 x 35.75	36	38.5 x 35.25	36	38.5 x 33.75	30

Note: Additional Conduit space may be available:

1 If no bottom neutral is present

2 If no top neutral is present

3 If no bottom feeder is present

4 Standard & Arc Resistant (With Overhead Plenum)

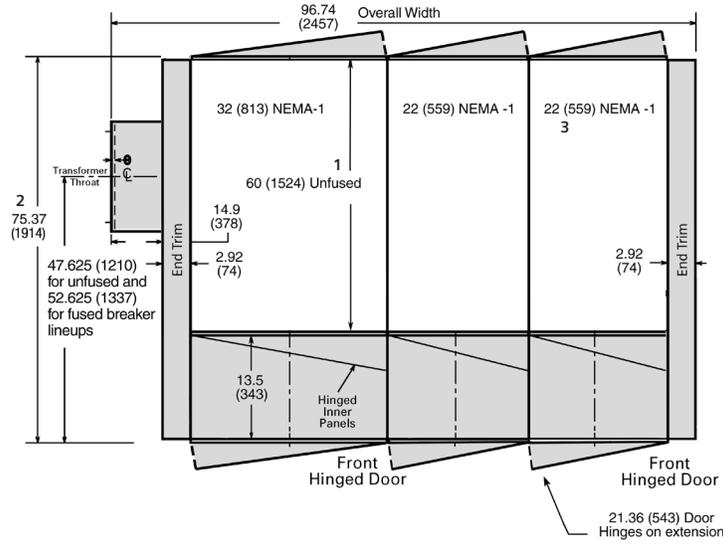
5 Arc Resistant (Without Overhead Plenum)

Alternate special layouts may be able to yield additional conduit positions

Figure 10

Rear Connected WL Low Voltage Switchgear Installation

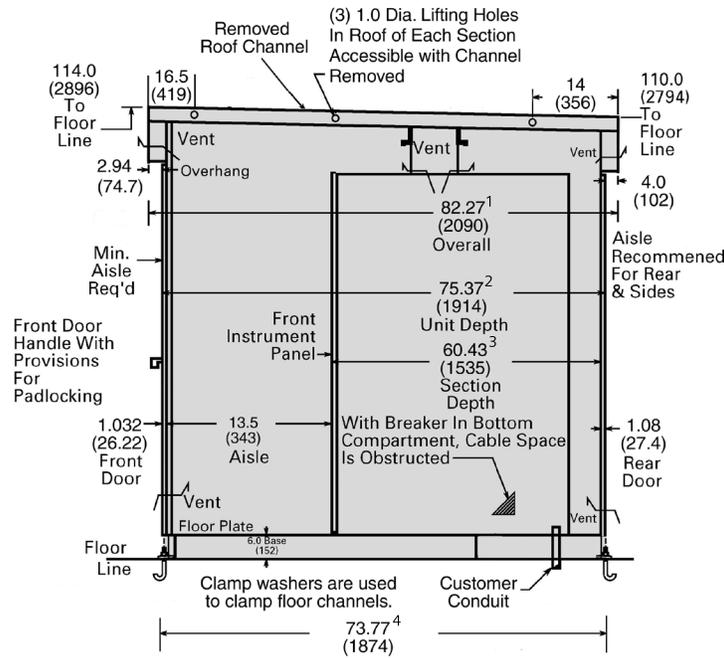
Outdoor non-walk-in floor plan



- 1 60 is representative for a 60" deep switchgear internal structure. For other internal structure depths (65 or 75) add extra depth to 60" that is shown.
- 2 75.37 is representative for a 60" deep internal structure. For other internal structure depths (65 or 75) add extra depth to 75.37 that is shown.

- 3 Refer to appropriate indoor plan view for available customer conduit information.

Outdoor non-walk-in side view



Dimensions shown in inches (mm)

- 1 82.27 dimension is based on 60" internal frame structure and if a deeper internal frame structure is used (65 or 75) the extra depth should be added to the 82.27 dimension.
- 2 75.37 dimension is based on 60" internal frame structure and if a deeper internal frame structure is used (65 or 75) the extra depth should be added to the 75.37 dimension.

- 3 60.43 dimension is based on 60" internal frame structure and if a deeper internal frame structure is used (65 or 75) the extra depth should be added to the 60.43 dimension.
- 4 73.77 dimension is based on 60" internal frame structure and if a deeper internal frame structure is used (65 or 75) the extra depth should be added to the 73.77 dimension.
- 5 Refer to drawing 12-C-9115-02 for seismic installation instructions.

Figure 12 Typical outdoor non-walk-in floor plan and side view

Rear Connected WL Low Voltage Switchgear Installation

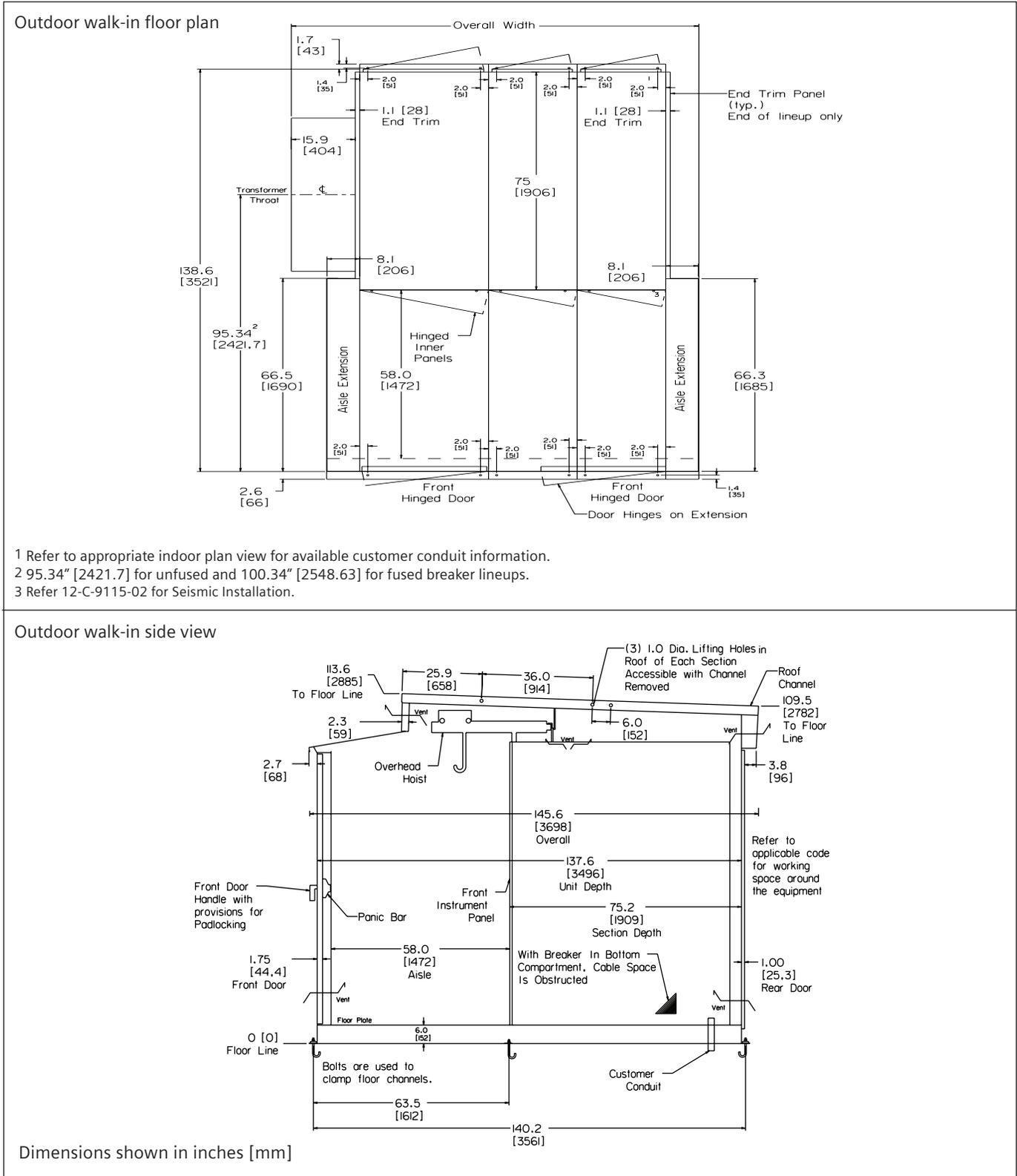


Figure 13 Typical outdoor walk-in floor plan and side view

Rear Connected WL Low Voltage Switchgear Installation

Installing shipping sections

The proper method of installation depends on whether the switchgear has been shipped as one complete group, or in two or more shipping sections. The general arrangement drawings will indicate the shipping sections, vertical section numbers and their location within the switchgear lineup. Sections are assembled and wired in accordance with the arrangement as in the final installation.

Mounting surfaces (sills, slab, piers or pilings) must be level and in the same plane. Conduits must be properly located and installed so that they will clear the floor plate cutouts. Mounting surfaces must be swept free of stones, chips and other debris.

Setting shipping sections

After checking each shipping section for its proper location sequence, as shown on the general arrangement drawing, move the first section of the switchgear to its location. When a throat-connected transformer is part of the installation and in its current location, the switchgear is positioned next to the transformer as shown in **Figures 20 and 21**. The switchgear shipping section should be kept high enough to just clear any conduits, and then moved toward the transformer throat to conform to the dimensions shown on the general arrangement drawing.

Align the switchgear with the anchor bolt locations and (simultaneously) with the conduit locations. With all points aligned and with conduit caps and floor plate covers removed, carefully lower the section to its permanent location.

It is important that the first section be accurately positioned and leveled as each successive section will depend on the first.

Leveling of the switchgear

The floor, sills, piers, or pilings must be true and in a level plane. Within the area of the switchgear, there should be no projections (such as pebbles, concrete or debris) protruding above this plate.

To make certain that there has been no distortion of the switchgear in shipping or handling, each shipping section should be checked with a plumb line after it is resting on the permanent (level) foundation. A plumb line dropped from the top front corner at each end of the shipping section should verify that the section is vertical within 1/8" (3.2mm). Out-of-plumb conditions greater than 1/8" (3.2mm) usually indicate an uneven base, and shimming may be required.

Leveling indoor switchgear

Each section is provided with four anchor bolt locations, as shown in **Figures 8 and 9**. Examine these anchor bolt locations to make certain that the section is in firm contact with the mounting surface in the area of the anchor bolt. In the absence of firm contact, shims must be added adjacent to the anchor bolt holes. These shims will prevent distortion of the section when anchor bolts are drawn tight. Shims should be approximately three inches square, and sufficient shims should be installed to provide firm contact between the section and the shimmed foundation. Tighten anchoring hardware, and check for plumb. The act of tightening of the anchoring hardware should not cause any distortion of the section. If the section does distort, add additional shims as required. Ensure that the switchgear frame is in firm contact with the mounting surface at the front, rear and centerpost positions. Shim as required in each section.

If the lineup consists of more than one shipping section, each successive shipping section should be installed in a similar manner. Move the second section into place, being certain that the front panels are aligned with those of the first section. Check for plumb as was done for the first section. Insert hardware for bolting the two sections together, but do not tighten. Repeat the leveling, shimming and tightening of anchoring hardware as on the first section. After this is complete, tighten the hardware holding the two shipping sections together. Repeat this procedure for each shipping section in the line-up.

Leveling outdoor switchgear

Plumbing and leveling outdoor equipment is basically the same as for indoor. When resting on its permanent foundation, the sections should be plumb within 1/8" (3.2mm). Unlike indoor switchgear, outdoor equipment is anchored using studs or J-bolts grouted into the foundation, and with clamp washers gripping the switchgear base (in case of non-walk-in switchgear). Examine the area adjacent to each anchor bolt to make certain that the base is in firm contact with the mounting surface. If these are areas adjacent to these studs which are not in firm contact with the mounting surface, shims must be added as described for indoor units. These shims must prevent distortion of the base when anchor hardware is tightened. With all points of contact checked, and shipping section properly located, tighten anchor hardware. Ensure that the switchgear base is in firm contact with the mounting surface at the front instrument panel location (refer to **Figure 12**). Shim as required at sides of shipping section.

Rear Connected WL Low Voltage Switchgear Installation

Installing outdoor shipping sections (walk-in)

If the lineup consists of more than one shipping section, each successive shipping section should be installed in the similar manner. Move the second section within few inches of the first section such that there is enough room to remove the hardware and nut plate on the mating side depth channel joint of both floor bases as shown in **Figure 13.1**.

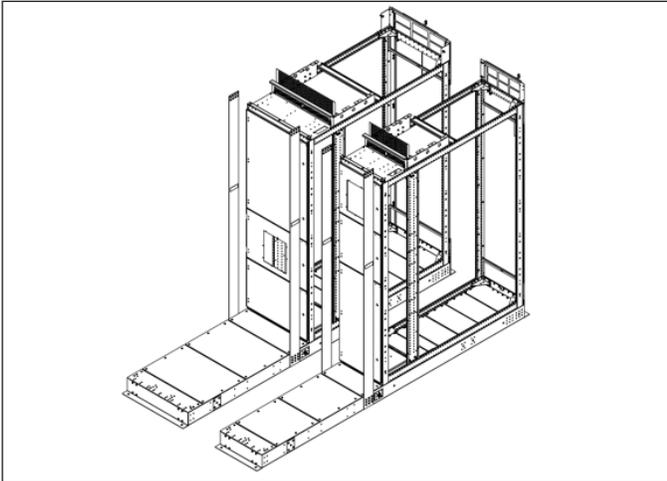


Figure 13.1 Move sections to proximity (enclosure is hidden for clarity)

If the second section has an entry/exit door, remove the vertical post that supports the door frame as shown in **Figure 13.2**. Add shims under the door during this process to support the structure and keep it until the two sections are properly joined.

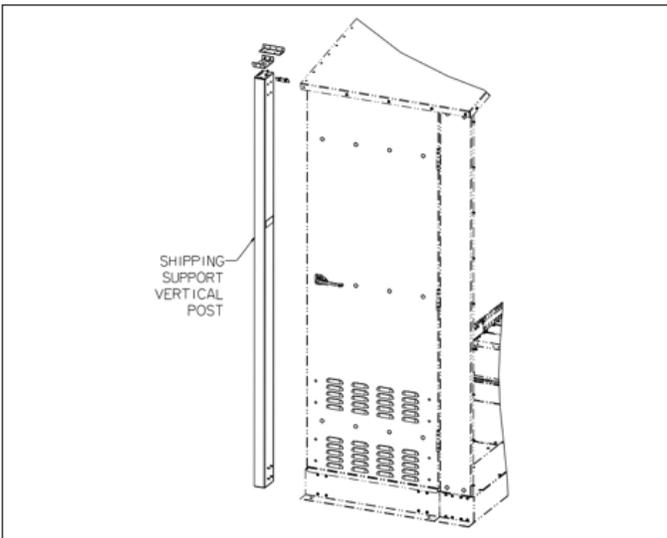


Figure 13.2 Door frame supporting post separated from section.

Slide the second section into place, being certain that the front panels are aligned with those of the first section. Check for plumb as was done for the first section. Remove the floor segments (marked with ▲ symbol in **Figure 13.3**) on both adjoining sections and insert hardware for bolting the two

bases together, at locations circled in **Figure 13.3**. Insert hardware in vertical frames at locations marked by oval in **Figure 13.3**. Do not tighten the hardware yet.

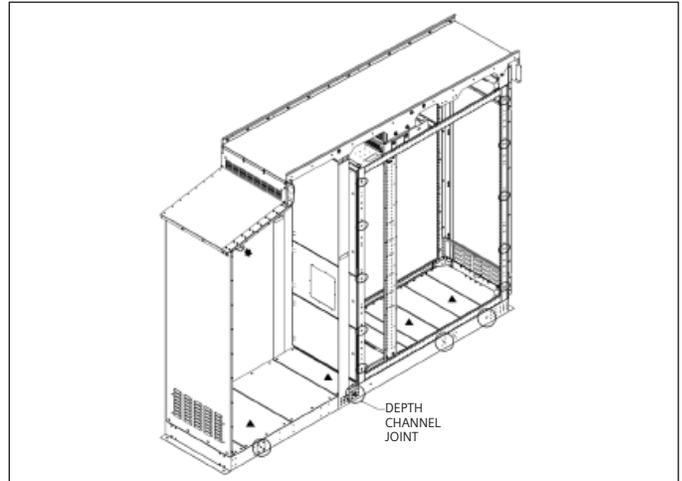


Figure 13.3 Bolting locations

At depth channel joint, use one of the nut plates removed earlier as shown in **Figure 13.4**.

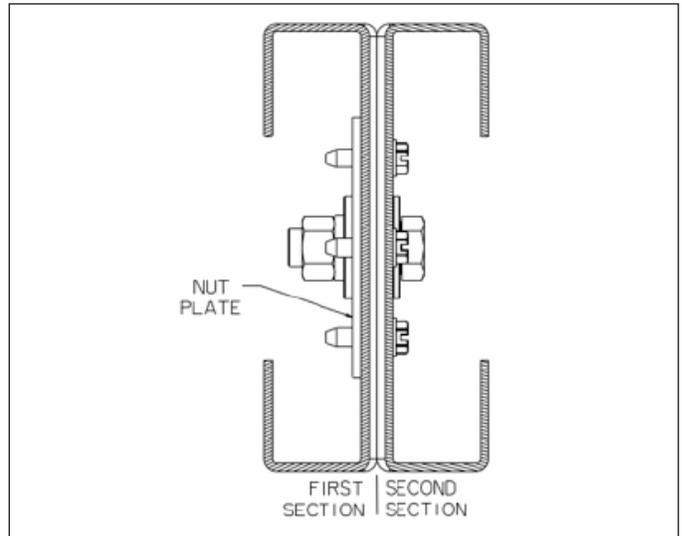


Figure 13.4 Bolting at depth channel joint

Repeat the leveling, shimming and tightening of anchoring hardware as on the first section. After this is complete, tighten the hardware holding the two shipping sections together. Join the front frame of two sections with provided brackets at location marked by ★ symbol in **Figure 13.3**. Add hardware all along the seam line in the front, top and rear surfaces. Cover the rear seam line with the splice provided with first section. Repeat this procedure for each shipping section in the lineup.

Rear Connected WL Low Voltage Switchgear Installation

Check the supports under the switchgear to be sure that no shipping split (junction between two shipping sections) is unsupported. If proper support is not present, correct as needed.

Remove the roof channels from the shipping brackets and install as shown in **Figure 13.5**.

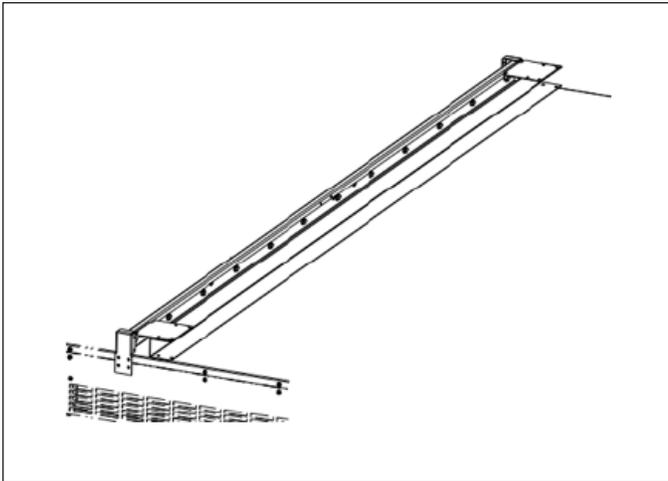


Figure 13.5a Roof channels as shipped.

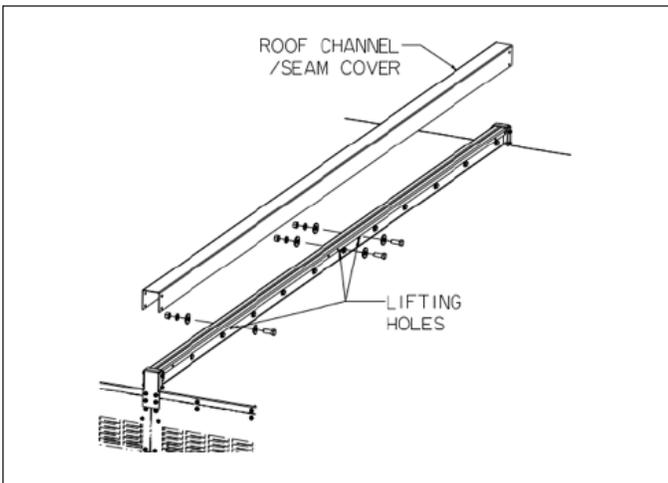


Figure 13.5b Remove roof channel and shipping bracket, cover the lifting holes with provided hardware

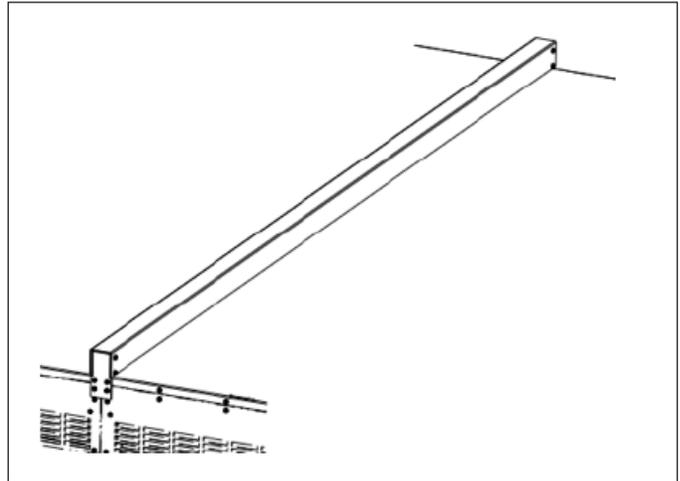


Figure 13.5c Install the roof channel for rain proofing

Installation of traveling crane/hoist

	! DANGER
	<p>Heavy weight. Can cause death, serious personal injury or property damage. Install traveling crane per the following instructions and tighten all hardware.</p>

The traveling crane is furnished as standard equipment on walk-in outdoor switchgear, and is shipped installed. For indoor switchgear installations, the traveling crane is an optional accessory. When this option has been ordered, the crane is shipped loose with the accessories.

WL Standard and heavy Duty Hoist – Installation and Operational Manual, Siemens Document No: 11-E-9340-01 should be referenced for more information. The hoist and track is not available in our non walk-in outdoor enclosure, portable breaker lifting device must be used.

Important: Be sure that the crane is properly lubricated before use, as outlined in the “Maintenance” section of the manual.

Rear Connected WL Low Voltage Switchgear Installation



Extension of existing switchgear

Provisions have been made for future extension of switchgear lineups. The main bus has been terminated with silver-plated copper pads with the necessary holes to splice to the new installation.

Extending indoor switchgear

To extend indoor switchgear, remove the end plate, line up and anchor the new equipment, as covered in the first part of this instruction book, make up the primary and secondary connections, and mount the end plate at its new location.

Extending outdoor switchgear *

Before extending the length of outdoor switchgear a new section of foundation should be installed and ready, with anchoring studs and the required conduits in place.

To expand outdoor switchgear, remove the existing end roof channel and the end plate from both aisle and vertical section. It also will be necessary to relocate the aisle door panel (mounted in the aisle wall) and replace it with a new aisle wall panel which will be shipped with the new equipment. If the new section is not the same width as the existing end section, the front door frame may need to be relocated or replaced. Furthermore, the front roof may need to be replaced. Align the new switchgear with the existing lineup, using the same procedure as discussed earlier in this section.

Tighten the anchoring hardware. Make up primary and secondary connections. Relocate the aisle wall door panel to the end of aisle and install the new aisle panel and frame (if/when provided). Install the front roofs (if/when provided) and channels at the split between the existing and new sections. Remount the end plates and reinstall the end channel.

*Consult factory for any such specific request on Walk-in Switchgear.

Rear Connected WL Low Voltage Switchgear

Electrical connections

Primary connections

Bus bars and connectors

Horizontal bus bars, risers and various connectors are fabricated using silver-plated copper bus bar as a standard and available in tin-plated copper as an option. Typical bus arrangement is as illustrated in **Figure 14**.

When copper bus is provided, all joints are of bolted construction, and completely assembled at factory except for shipping split splices and termination points to other equipment. Contact areas are silver-plated or tin-plated and may be coupled to tin-plated bus bars or silver-plated bus bars.

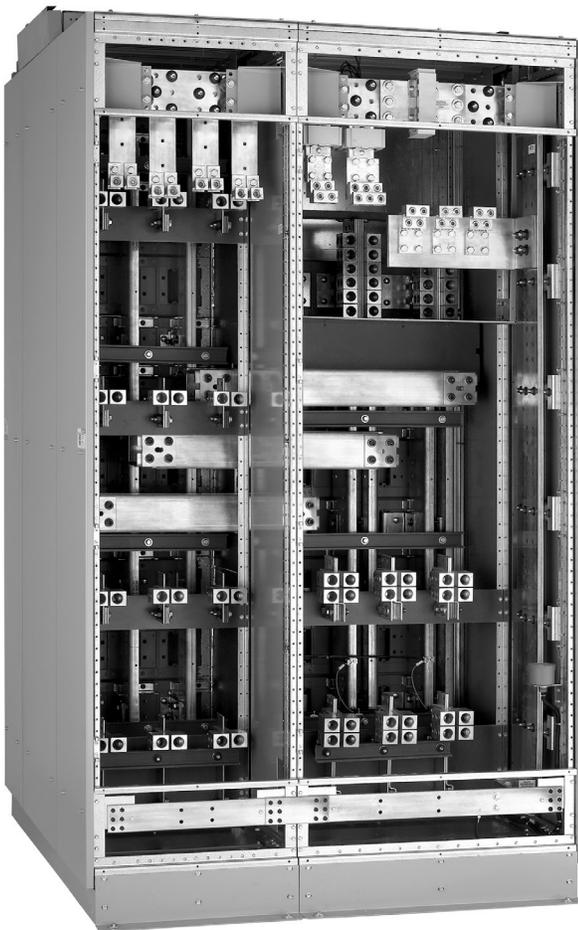


Figure 14. Typical bus bar arrangement



Bolted bus joints

When bus joints are field assembled, the following procedure shall be used.

1. All surfaces must be free of dust dirt, and other foreign material.
2. **Do not use any abrasive cleaner on plated contact surfaces.** Cleaning normally is not necessary and should not be done unless parts are badly tarnished. If cleaning is necessary, use a mild cleaner and thoroughly rinse parts to remove all residue.
3. Assemble all joints with parts dry. Do not use any grease or oxide inhibiting compounds.
4. Refer to **Figures 15, 16 and 17** for method of bolting joints, and follow hardware tightening instructions which follow.
5. Horizontal main bus joints with two or four laminations of through bus (**Figures 16 and 17**) may be serviced as follows:
 - a. Remove four bolts, splice plate and shim plates (Step 2).
 - b. Torque inner bolts (Step 1) with a long 3/8" hex bit. Move sliding nut plate on inside of "C" beam to left to torque left side inner bolts. Move sliding nut plate to right to torque right side inner bolts.
 - c. Reinstall outer four bolts, splice plate and shim plates and torque.

Rear Connected WL Low Voltage Switchgear

Electrical connections

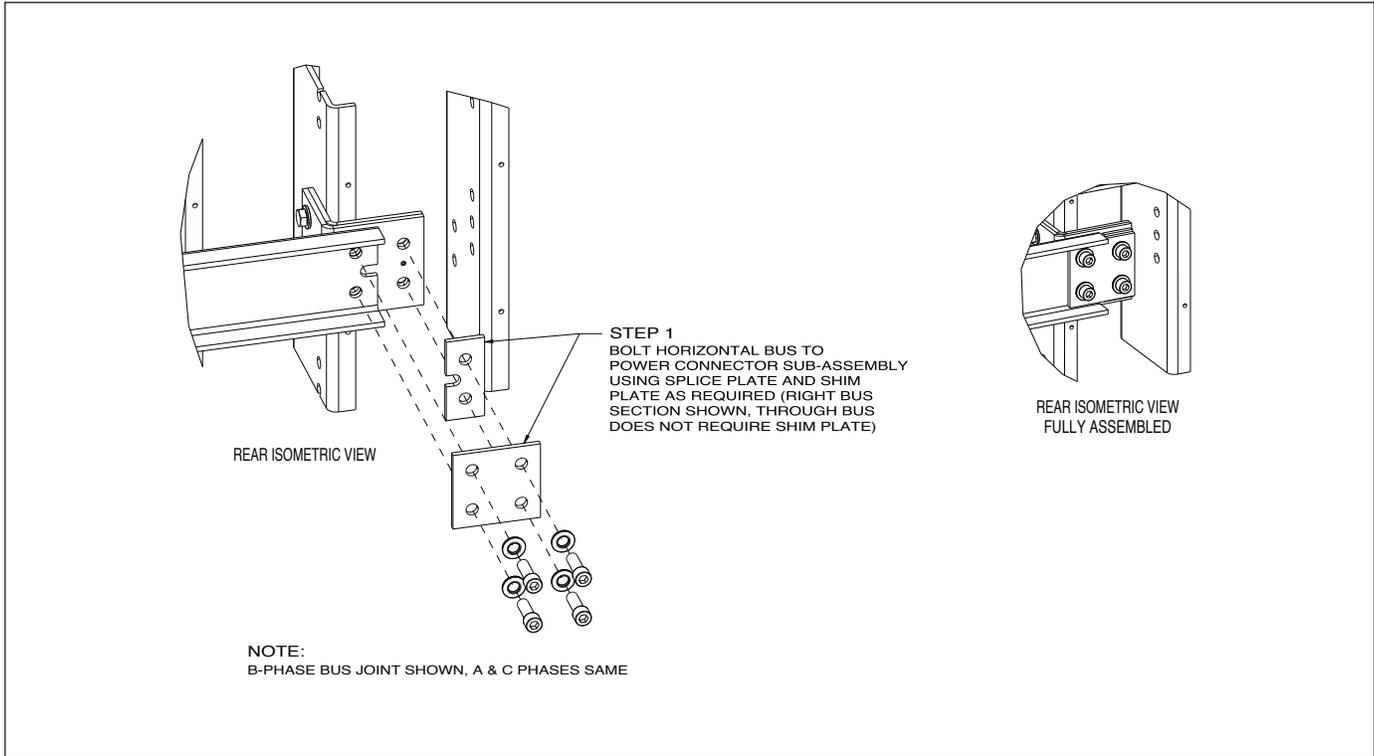


Figure 15. One lamination through bus

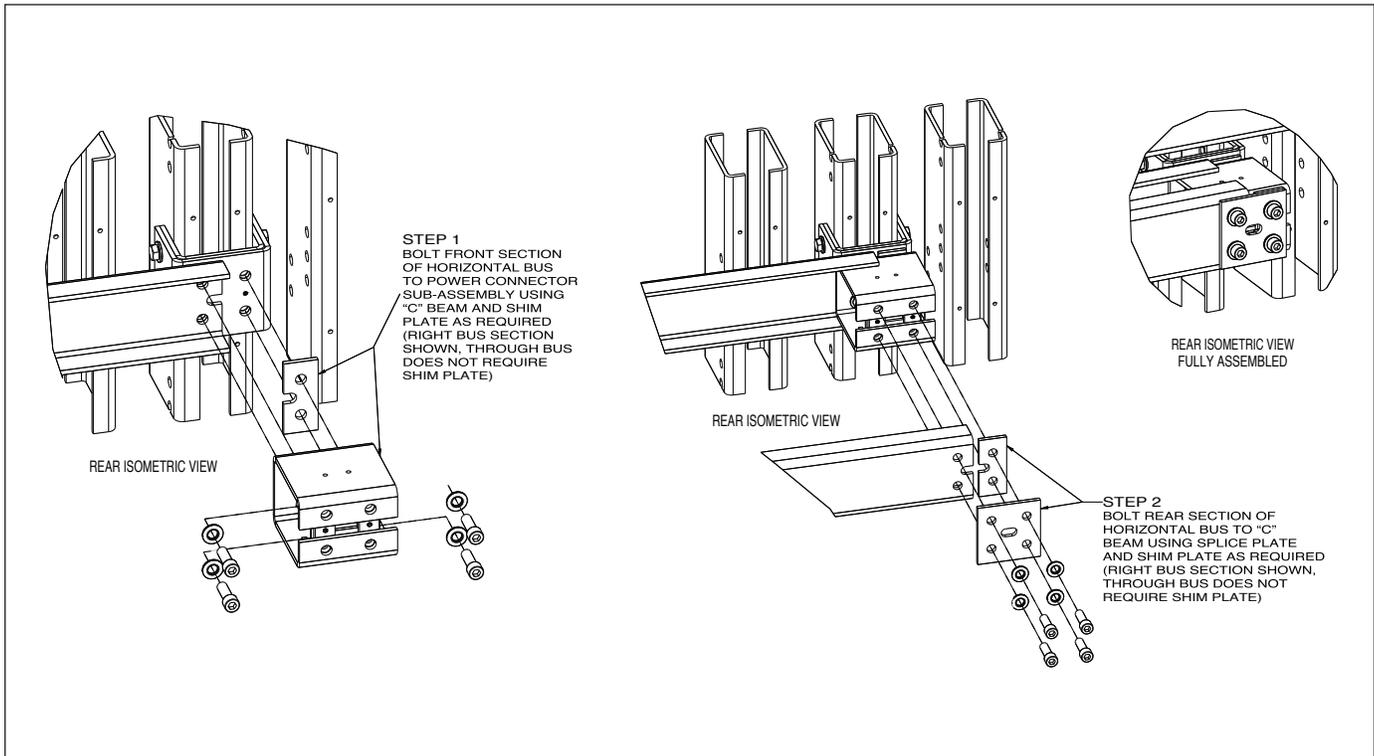


Figure 16. Two lamination through bus

Rear Connected WL Low Voltage Switchgear

Electrical connections

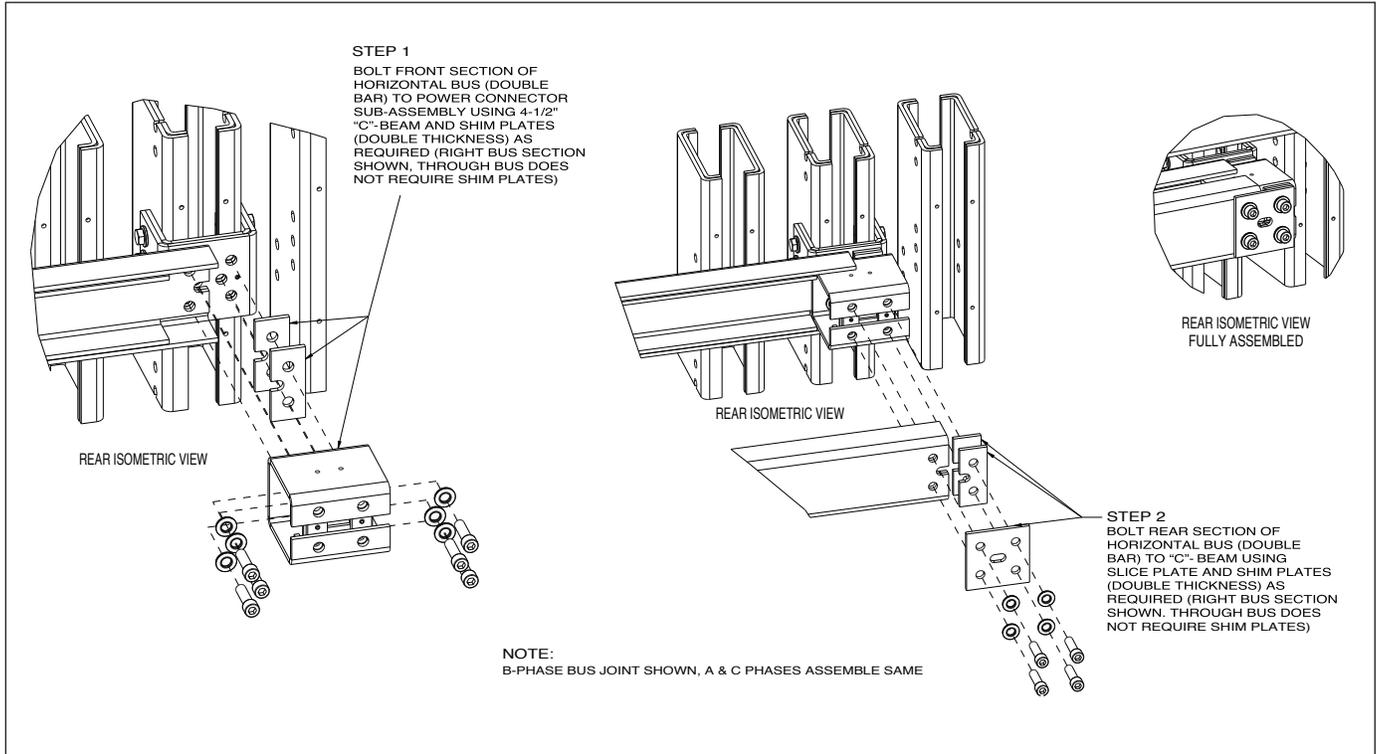


Figure 17. Four lamination through bus

Rear Connected WL Low Voltage Switchgear

Electrical connections

Hardware tightening instructions

All bus joint hardware furnished is zinc-plated, high strength steel. Cap screws are 1/2-13 SAE Grade 5, while nuts are SAE Grade 2. Sizes and grades other than these are not to be used. Refer to **Figure 18** for required hardware torque values. When purchaser's specifications require, special hardware (e.g., stainless steel) may be provided. For such applications, consult the factory for proper torque range.

Torque hardware as described above. Do not exceed the maximum torque value given. Forces within the torque range will produce a low resistance joint, without cold flow of material.

Connection to power transformer

Before making the primary connections to a liquid transformer, it will be necessary to remove the transition box cover for access. See **Figure 20**. The joints connecting power transformers to the switchgear are the same as joints previously described, except that braided flexible connectors are used to make certain that strain transmitted to the transformer bushings is minimal and as an aid to alignment. See **Figure 19**. Connections to dry type transformers are normally made within the transformer enclosure.

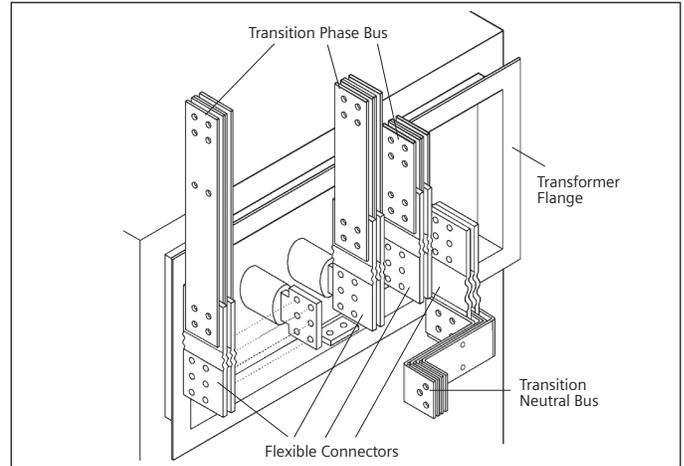


Figure 19. Transformer throat connection (lower bus shown, upper bus similar)

Transformer connector arrangements are shipped with flexible connectors attached to either the switchgear assembly or the transformer assembly. The flexible connectors contain the required hardware to make the connections to the transformer terminals. Carefully observe how the flexible connectors are mounted to the switchgear (placement of bolts, nuts, washers and spacers) then remove the flexible connectors or carefully spread them to prevent damage to the transformer terminals or connectors while the switchgear is brought into final position. Carefully connect the flexible connectors to the transformer and switchgear terminals, and torque all connections.

Torque values for low voltage equipment Electrical joint hardware exceptable terminals	
Thread Size	Torque 1) (LB-Ft)
1/4-20	6-9
3/8-16	20-30
M10	40-50
1/2-13	40-50

Values shown are for non lubricated threads.

Field wire connectors – Tightening torque	
Torque all wire connectors, where not marked on the device or component, to the values indicated in the table below	
Hex Socket Set Screw Size (Across Flats)	Torque (Lb-In)
7/32"	150
1/4"	200
5/16"	275
3/8"	375
1/2"	500
9/16"	600

Torque values for self-threading screws in plastic	
Thread Size	Torque (Lb-In)
#8	10-12
1/4-14	45-55

Figure 18. Torque values

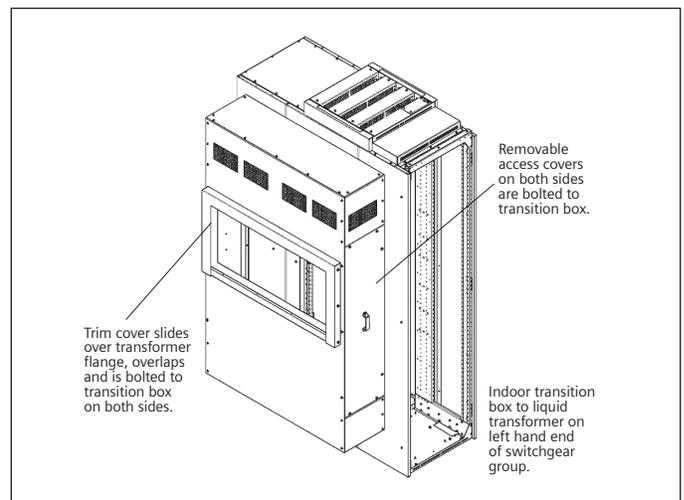


Figure 20. Transformer box

Rear Connected WL Low Voltage Switchgear

Electrical connections

Primary power cable connections

Because of considerable variations in purchaser requirements and available cables, Siemens furnishes mechanical terminal lugs only, unless specified otherwise by the purchaser.

Important: Clearance between bare phase conductors and to ground should be at least one inch. If this requirement is not met, the connections should be insulated with electrical insulating tape to achieve the required dielectric levels.

Primary and secondary cables should enter the switchgear through the space shown on the General Arrangement drawing. Always arrange cables in smooth curves and anchor securely to cable supports to relieve strain on termination, and to control cable movement under short-circuit conditions.

Figure 21 shows the recommended cable lashing installation for supply and load cables. If cable entry is from above, drill the top plate or roof plate to suit.

Before the cable connections are made, phase rotation should be checked.

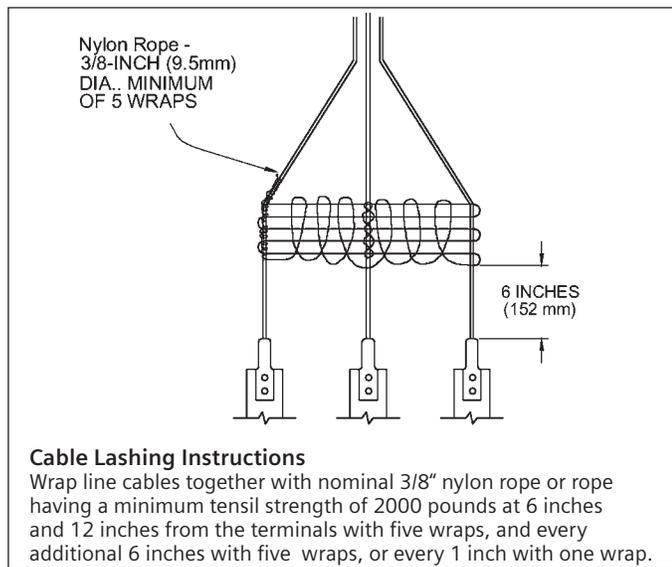


Figure 21. Cable Lashing Instructions

Control wiring

Terminal blocks are provided in the front of the switchgear for purchaser's control wiring connections. Refer to the master wiring diagram for wire designations. Wiring between sections at shipping splits is connected and tagged as shown on the master wiring diagram for purchaser's ease in field connection. Shipping split wiring connections are made in an area on top of the switchgear near the front of the section. A removable cover allows access to these connections.

For ventilated dry transformer installations, a conduit is furnished for wiring between switchgear and the temperature control system box on the transformer. This conduit is installed and wired by the purchaser in the field.

For liquid filled transformer installations, the conduit is furnished with the transformer for connecting to the switchgear in the field.

Current transformers

	⚠ DANGER
	<p>Hazardous voltage. Will cause death or serious injury.</p> <p>Do not open-circuit the secondary of an energized current transformer. Always short-circuit the secondary of any transformer before performing maintenance on current transformer wiring.</p>

Current transformers for metering are generally mounted on the stationary primary disconnect studs in the circuit breaker compartment and are readily accessible for inspection and replacement.

Current transformers for electronic trip device use are called "tripping transformers." They are mounted in the circuit breaker except when a ground fault trip element or neutral metering element is furnished for a four wire application. In this case, a fourth tripping transformer is mounted in the cable compartment on the neutral bus or in the link between the neutral bus and the ground bus. This will be shown on the one line diagram.

Ground connections

A common ground bus is incorporated in all sections for properly grounding the switchgear after installation. Provisions for connecting this ground bus to the station ground must be made by purchaser in a reliable manner. Ground per requirements of NEC.

Cleaning

	⚠ DANGER
	<p>Hazardous voltage. Will cause death or serious injury.</p> <p>Keep out. Qualified personnel only. Disconnect and lock off all power before working on this equipment.</p>

When switchgear installation is complete and all electrical connections have been made, but prior to energizing, or installing circuit breakers, all equipment must be thoroughly cleaned using a vacuum cleaner to make certain they are free of construction dust, chips or other debris. Do not use pressurized air (ie., an air hose) to blow dirt and debris out of the switchgear as this can cause foreign items to lodge in areas from which removal will be difficult. Do not use solvents without reading "Cleaning of Insulation" in the "Maintenance" section.

Rear Connected WL Low Voltage Switchgear

Inspection and tests



⚠ DANGER

Hazardous voltage. Will cause death or serious injury.

Keep out.
Qualified personnel only.
Disconnect and lock off all power before working on this equipment.

Inspection and testing

Before the equipment is energized, it must be thoroughly inspected and tested. Correct any deviations before energization.

Inspection

Check the following points:

1. Power connections and secondary control connections properly made and checked for shorts and undesired grounds.
2. Electrical disconnecting contacts, machined parts, shutters, etc., checked for lubrication and operation.
3. Blocking supports and other temporary ties removed from breakers, instruments, relays, etc.
4. Proper fuses correctly placed.
5. After external connections have been made, check that temporary wiring jumpers (used on the secondaries of current transformers tied to external devices, as shown on wiring diagrams) have been removed.
6. Ground connections properly made.
7. All equipment which has been removed during assembly has been replaced.
8. Trip devices and/or relays coordinated with other protective devices on the system. Refer to protective device instructions before making any adjustments. Consult the local utility before making any connections to the power supply system.
9. Storage battery fully charged and battery charger operating correctly (For DC control source only).
10. Interlocks performing properly.
11. Circuit breakers checked and prepared per instruction manuals.
12. All filters in vent area are clean and free of shipping or construction material.
13. All tools removed from equipment, and equipment clean.

Testing

1. A megger test is made on the high voltage circuit to be sure that all connections made in the field are free of undesired grounds. A megger test is also advisable on the control circuit.
2. A dielectric test, if possible, should be made on the high voltage (power) circuit for one minute at the appropriate test voltage. (Voltage transformers, control power transformers, surge arresters, and surge capacitors must be disconnected during this test).

Rated voltage of circuit	Test voltage
480 or 600 volts	75% of 2200 = 1650 VAC
208 or 240 volts	75% of 1500 = 1125 VAC
Secondary and control circuits	75% of 1500 = 1125 VAC



⚠ CAUTION

Excessive test voltage may result in damage to equipment.

Do not perform dielectric voltages exceeding the rating of the tested equipment.

Note: Certain control devices, such as motors and motor circuits, should be tested at 675V AC. Electronic devices should be tested at the voltages specified in the instruction manual for the electronic device.

In accordance with ANSI C37.20.1, Field Dielectric Tests are also recommended when new units are added to an existing installation, or after major field modifications. The equipment should be put in good condition prior to the field test. It is not expected that equipment shall be subjected to these tests after it has been stored for long periods of time or has accumulated a large amount of dust, moisture, or other contaminants without being first restored to good condition.

3. With circuit breaker in the TEST position make the following tests on each unit:
 - A. Trip and close the circuit breaker manually, and electrically if breaker is electrically operated.
 - B. Use a trip test set or other suitable source of current to trip the circuit breaker through the trip device.
 - C. If protective relays are provided, trip electrically operated circuit breaker by passing sufficient current for voltage, (if applicable) through the coils of protective relays.
 - D. Trip and close electrically operated circuit breakers from any remote control locations.
 - E. Operate auxiliary device (e.g., MOC or TOC switches) to confirm correct operation.
 - F. Test the phase sequence of polyphase high voltage circuits, particularly those used for motor starting.
 - G. Perform other tests and checks in accordance with the circuit breaker and trip device instruction manuals.
 - H. Test for correct phasing across the bus tie circuit.
4. Current transformer circuits are tested for continuity. As shown in **Figure 22**, with the switchgear installed but not energized, disconnect the "grounded" lead at the current transformer secondary terminal block connection, and pass a measurable amount of current not to exceed five amperes through the lead to ground. Pass sufficient current to observe operation of relays and instruments. Manipulate the instrument switches and observe the phasing. Repeat with each transformer. Do this for metering and relaying current transformers only – not breaker tripping transformer.

Rear Connected WL Low Voltage Switchgear

Inspection and tests

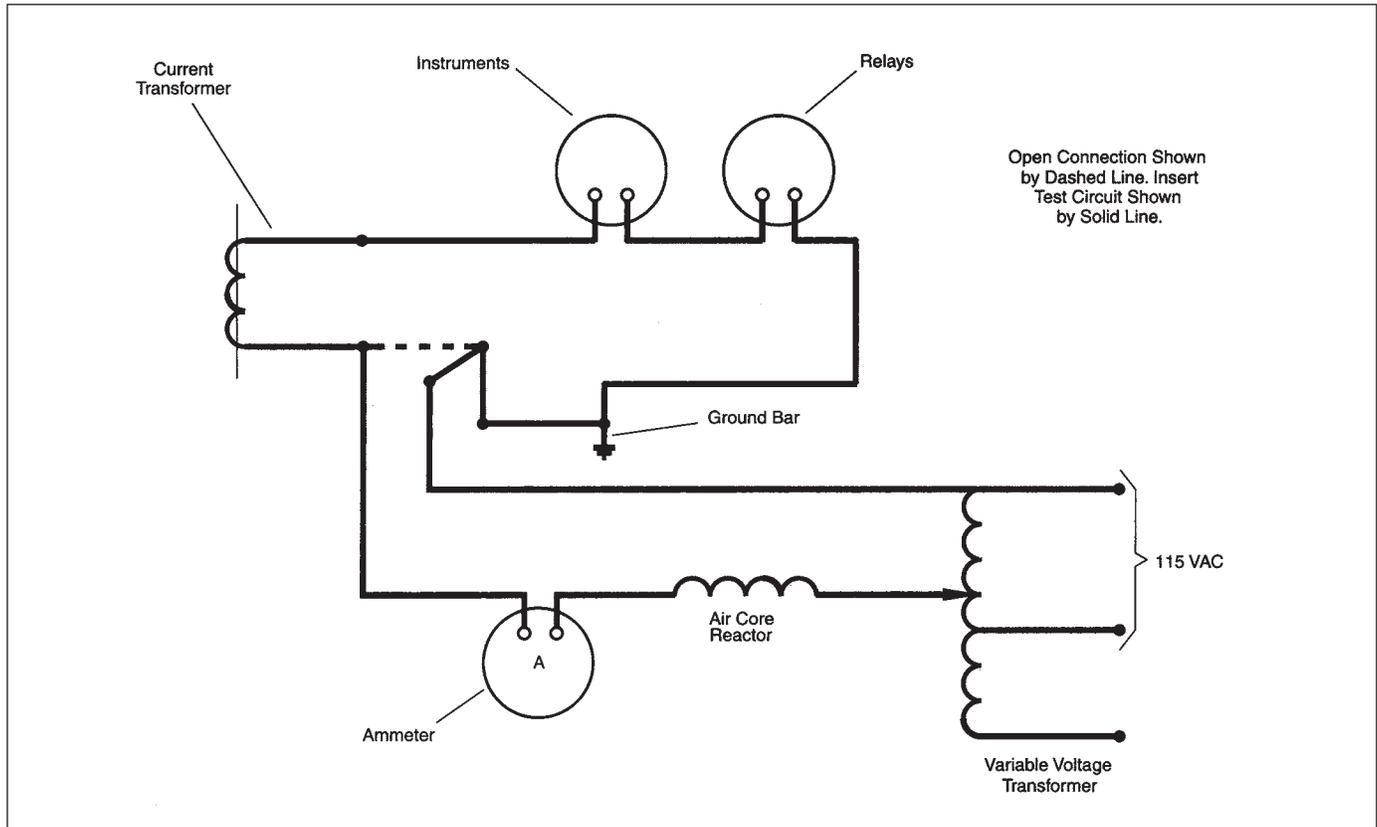


Figure 22. Current transformer testing

Placing equipment into service

To place equipment in service for the first time, proceed as follows:

1. Check that all circuit breakers are open and all contact circuits energized.
2. Connect incoming power source to equipment.
3. Check all instruments, relays, meters, etc., during this time.
4. Connect as small a load as possible and observe instruments.
Note: Allow several minutes before connecting additional load.
5. Gradually connect more load to the equipment while observing instruments until the full load is connected.
6. Check for overheating of primary and secondary circuits and satisfactory operation of all instruments during the first week of operation.

Rear Connected WL Low Voltage Switchgear Maintenance

Introduction and maintenance intervals

Periodic inspections and maintenance are essential to obtain safe and reliable operation of the switchgear. When Type WL switchgear is operated under "Usual Service Conditions," maintenance and lubrication is recommended at five-year intervals. "Usual" and "Unusual" service conditions for Low Voltage Metal-enclosed Switchgear are defined in ANSI C37.20.1. Generally, "usual service conditions" are defined as an environment in which the equipment is not exposed to excessive dust, acid fumes, damaging chemicals, salt air, rapid or frequent changes in temperature, vibration, high humidity, and extremes of temperature.

The definition of "usual service conditions" is subject to a variety of interpretations. Because of this, you are best served by adjusting maintenance and lubrication intervals based on your experience with the equipment in the actual service environment.

Regardless of the length of the maintenance and lubrication interval, Siemens recommends that circuit breakers should be inspected and exercised annually.

	 DANGER
<p>Hazardous voltage. Will cause death or serious injury.</p> <p>Keep out. Qualified personnel only. Disconnect and lock off all power before working on this equipment.</p>	

For the safety of maintenance personnel as well as others who might be exposed to hazards associated with maintenance activities, the safety related work practices of NFPA 70E, parts II and III should always be followed when working on electrical equipment. Maintenance personnel should be trained in the safety practices, procedures and requirements that pertain to their respective job assignments. This manual should be reviewed and retained in a location readily accessible for reference during maintenance of this equipment.

The user must establish a periodic maintenance program to ensure trouble-free and safe operation. The frequency of inspection, periodic cleaning and preventative maintenance schedule will depend upon the operation conditions. NFPA Publication 70B, "Electrical Equipment Maintenance" may be used as a guide to establish such a program. **A preventative maintenance program is not intended to cover reconditioning or major repair, but should be designed to reveal, if possible, the need for such actions in time to prevent malfunctions during operation.**

Recommended hand tools

The switchgear uses standard SAE fasteners, although some devices (particularly instruments), may have metric fasteners.

Recommended maintenance and lubrication

Periodic maintenance and lubrication should include all the tasks shown in Table 1.

 WARNING
<p>Failure to properly maintain the equipment can result in death, serious injury or product failure, and can prevent successful functioning of connected apparatus.</p> <p>The instructions contained herein should be carefully reviewed, understood and followed.</p> <p>The maintenance tasks in Table 1 must be performed regularly.</p>

Table 1. Maintenance tasks

<ol style="list-style-type: none"> 1. Before any maintenance work is performed within primary compartments, make certain that the equipment is completely de-energized, tested, grounded, tagged and properly identified and released for work in an authorized manner. 2. Before starting work on the switchgear, the following should be completed on any equipment that will affect the area of the work. <ol style="list-style-type: none"> A. Disable remote control and automatic transfer schemes. B. De-energize all direct and backfeed power and control sources test and ground. C. Disconnect all voltage and control power transformers. D. Open all disconnects. 3. Include the following items in your inspection procedure: <ol style="list-style-type: none"> A. Check general condition of switchgear installation. B. Inspect switchgear interior for accumulation of dust, dirt or any foreign matter, and clean as needed. C. Clean air filters by washing in any mild household detergent. D. Examine indicating lamps and replace as required. E. Check terminal block contacts for loose connections. F. Check instrument and control switches and inspect their contacts. G. Check for proper condition of instrument transformers. Replace burned out fuses, if any. Check primary and secondary connections. H. Remove dust from all insulators and insulation. I. Inspect bus bars and connections for proper condition. If bus bars are overheating, check for poor or loose connections or for overload. J. Check wiring for loose connections. K. Examine automatic shutters (if any) for proper operation. L. Check MOC and TOC switches (if provided) and their operating mechanisms for proper operation, and check their contacts. M. Examine all safety interlocks for correct function. N. Perform the following circuit breaker maintenance. Refer to WL breaker operators manual for detailed maintenance instructions. <ul style="list-style-type: none"> <u>Annual Inspection/Maintenance</u> <ol style="list-style-type: none"> (1) Exercise circuit breaker through several open/close cycles. Electrically operated breaker should be exercised electrically. Look/listen during open/close cycles for evidence of slow or erratic operation. (2) Test the tripping system using appropriate breaker test set. (3) Clean any accumulation of dirt or dust from the circuit breaker. (4) Inspect cradle rails and breaker finger clusters for adequate lubrication. Re-lubricate as required. <u>Five Year Inspection/Maintenance</u> <ol style="list-style-type: none"> (1) Perform all annual inspection/maintenance items (1) through (4). (2) Remove all lubricant from cradle rails and finger clusters. Re-lubricate with Siemens Part No. WLBGREASE. (3) Inspect arc chutes and contacts for erosion and replace as necessary. O. Check space heaters and thermostat (if equipped) for proper operation. P. Maintain other equipment per the relevant instruction manual requirements. Q. Lubricate mechanisms, contacts, and other moving components. R. Replace, reassemble, re-insulate, return all items to proper operating conditions and remove grounds prior to energization.
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The list of tasks in **Table 1** does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures. 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 use of unauthorized parts in the repair of the equipment, or tampering by unqualified personnel will result in dangerous conditions which can cause death, serious injury or equipment damage. Follow all safety instructions contained herein.

Lubrication

Lubrication is most essential in maintaining the performance of switchgear and should not be treated indifferently. It will aid in protecting the switchgear from corrosion and wear, and will help assure that all operating mechanisms work freely. Lubrication intervals should be adjusted to suit the operating conditions. Lubrication is required at more frequent intervals under severe operating conditions when exposed to contaminated atmosphere.

Siemens electrical contact lubricant, Kluber Isoflex Topas NB 52 (Siemens Part No. WLBGREASE), is not only an excellent contact lubricant, but also a fine general purpose grease for mechanical parts. This grease has very good thermal stability to cover the wide range of conditions to which switchgear may be exposed, and aids in protecting silver-plated contact surfaces from tarnish. The following areas or parts must be lubricated:

1. Wiping electrical contacts
2. Mechanical devices
3. Circuit breakers

Siemens WL circuit breakers are shipped with a special lubricant applied, as required, at the factory. This lubricant, Kluber Isoflex Topas NB 52 (Siemens Part No. WLBGREASE), should not be mixed with other lubricants, as they may interact and lose essential properties.

Wiping electrical contacts

The silver-plated contact surfaces of primary disconnects and secondary disconnects, when properly lubricated, will greatly outwear contacts without grease, and will be protected from severe tarnishing. After wiping off old grease, apply a thin film of electrical contact lubricant, Kluber Isoflex Topas NB 52 (Siemens Part No. WLBGREASE) periodically.

Important: If optional shutters are included with the equipment, refer to the applicable section in the WL Breaker Operator's Manual and study the operation of the shutter before attempting to open the shutter. The shutter must be open in order to allow lubrication of the primary disconnects in the switchgear.



Electrical contact lubricant should be applied to:

1. Primary disconnects
2. Secondary disconnects

In extremely corrosive atmospheres, it is recommended that a heavier coating be applied (0.03-0.06 inches thick). With this heavier coat, grease will migrate more readily to areas wiped clean by contact finger movement.

Mechanical devices

After wiping off old grease, moving parts should be lubricated with Siemens electrical contact lubricant, Kluber Isoflex Topas NB 52 (Siemens Part No. WLBGREASE). The following parts or assemblies should receive a light coating of lubricant.

1. Hinges
2. Traveling crane (hoist) – apply a heavy coat of lubricant to the gears

Circuit breakers

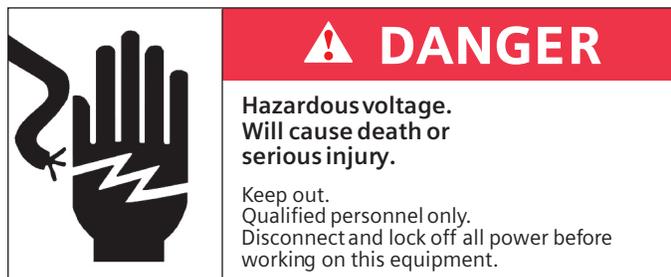
Circuit breakers should be lubricated as described in the instruction manual for the circuit breakers.

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Cleaning insulation

Most of the plastics and synthetics used in insulation systems are attacked by solvents containing aromatics or halogenated hydrocarbons. The use of these may cause crazing and deformation of the material reducing the dielectric strength.

ISOPROPYL ALCOHOL IS THE ONLY RECOMMENDED SOLVENT CLEANER.



Corrosive atmosphere

This switchgear is designed to give top performance when installed in normal indoor locations. Where abnormal conditions, such as corrosive atmospheres, are encountered, special precautions must be taken to minimize their effect. Exposed metallic surfaces, bus bars, disconnect switches, primary and secondary disconnecting contacts, wire ends, instrument terminals, etc., must all be protected. At each maintenance inspection, all of the old grease should be wiped off of the contacts and new lubricant applied to all sliding surfaces. Apply the material in a layer .03-.06" (1-2mm) thick. Use only Siemens Electrical Contact Lubricant, Part No. WLBGREASE. Other exposed components can be protected with a coat of glyptol or other corrosion-resistant coating. When old grease becomes dirty, wipe the part clean and apply new grease immediately.

Relays and instruments

To insure satisfactory operation of relays and instruments, do not leave device covers off longer than necessary. When a cover has been broken, cover the device temporarily and replace broken glass or plastic as soon as possible.

Equipment surfaces

Inspect the painted surfaces and touch up scratches as necessary. Touchup paint is available from Siemens.

Note: This guide does not purport to cover all details in equipment, or to provide for every possible contingency. Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchaser's purpose, the matter should be referred to the local Siemens sales office. The contents of this guide shall not become part of or modify any prior or existing agreement, commitment or relationship.

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Siemens Industry, Inc.
3617 Parkway Ln
Peachtree Corners, GA 30092

For more information, please contact
our Customer Support Center.

Phone: 1-800-241-4453

E-mail: info.us@siemens.com

usa.siemens.com/switchgear

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