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## WL Arc Resistant Low Voltage Switchgear Product guide

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# WL Arc Resistant Low Voltage Switchgear

## Features, Benefits and Ratings

### Enhanced safety

Siemens now offers arc resistant, metal-enclosed, low voltage switchgear designed to provide an additional degree of protection for personnel performing normal operating duties in proximity to the energized equipment. Such duties include opening or closing circuit breakers, closed door circuit breaker racking, reading instruments, or other activities that do not require cover removal or opening doors (other than auxiliary/instrument compartment doors).

### Why arc resistant switchgear

Standard metal-enclosed switchgear is designed to withstand the mechanical forces generated by bolted faults on the load terminals until a power circuit breaker or other protective device can interrupt the flow of fault current. This capability is verified by short-circuit and short-time withstand tests on the equipment and interruption tests on the power circuit breakers. During a bolted fault, the voltage at the fault location is essentially zero and the fault energy is dissipated throughout the power system. The arc generated within the power circuit breaker during interruption is cooled and extinguished by the circuit breaker arc chutes. The minimal out gassing of arc byproducts from the arc chutes is contained by the switchgear as verified by interruption tests.

Siemens arc resistant low voltage switchgear provides an added degree of protection over standard metal-enclosed switchgear. In addition to bolted faults, Siemens WL arc resistant low voltage switchgear is designed and performance tested to ANSI/IEEE C37.20.7 to provide protection from the hazards of internal arcing faults. An internal arcing fault can be caused by insulation degradation, insulation contamination, entrance of vermin, foreign objects coming into contact with the energized bus, or any other unplanned condition that creates an electrical discharge path through air. During an arcing fault, the voltage at the fault location is essentially the system voltage and the fault energy is focused within the switchgear enclosure. Arc temperatures can exceed 20,000 degrees Kelvin, rapidly heating the air and vaporizing metal parts. The expanding plasma creates severe mechanical and thermal stress in the equipment which can blow open doors and covers and burn through or fragment the enclosure.

### Standard features

- ANSI/IEEE Type 2B Arc Resistant to protect personnel at the front, back and sides of the equipment.
- UL Listed, performance tested and classified as arc resistant in accordance with ANSI/IEEE C37.20.7.
- Reinforced enclosure to withstand pressure from internal arcing faults.
- Internal venting system with pressure dams and pressure vents to channel the flow of arc fault gases and vent these gases out the top of the gear and away from personnel.
- Reinforced and gasketed front doors with additional hinges and latching means.

- One piece circuit breaker compartment doors with insert panels for control devices such as fuses, indicating lights and circuit breaker control switches when required.
- Reinforced bolted rear covers.
- Insulated/Isolated bus bar system.
- Integrally designed circuit breaker door sealing frame that allows the user to rack a circuit breaker to connect, test or disconnect position without having to install additional hardware (bellows, shrouds, etc) and still maintain arc resistant rating of the apparatus.
- Shutters in circuit breaker compartments.
- Riser Base with integrated arc plenum.
- Four high power circuit breaker stacking capability. No additional stacking/configuration restrictions.
- All section configurations available. Available in solidly grounded or resistance grounded configurations.
- Non-fused non current-limiting circuit breakers allow full power coordination.

### Recommended optional features

- Overhead plenum with exhaust duct. The system is designed to transfer the byproducts of the arcing event (smoke, particulate matter, heat, etc.) away from the immediate vicinity of the low voltage switchgear when an internal arcing fault occurs. Typically, the exhaust duct will vent the byproducts to a location usually outside of the room in which the low voltage switchgear is located. The overhead plenum is attached to the roof of the low voltage switchgear, and can be exhausted in any direction ((left, right, forward, backward) away from the switchgear assembly or unit substation.
- Dynamic Arc Flash Sentry (DAS). DAS employs the unique dual parameter setting capability of the ETU776 trip unit, coupled with the ability to easily toggle to a lower arc flash parameter set. A normal operation parameter set can be optimized for selective trip coordination, while the second set is optimized for lower arc flash energy levels. The dynamic action comes from the ability to switch from the normal operation set to the arc flash limiting set based on the presence of personnel as they approach the flash protection boundary.
- Zone Selective Interlocking (ZSI). If WL circuit breakers are arranged in several levels and minimum delays are desired, it is advisable to use the ZSI module. The circuit breakers are interconnected by these modules. In the event of a short-circuit, all circuit breakers communicate to determine and isolate the exact short-circuit location. Thus, only the closest upstream circuit breaker will be opened. The ZSI module provides the complete range of selectivity with the short delay time of  $t_{zsi} = 50$  ms. By shortening the delay time, the ZSI module significantly reduces arc duration, stress and damage in the event of a short-circuit in the switchgear.
- High resistance grounding. Reduces available fault current during ground faults thereby reducing arc energy.

## Ratings

- ANSI/IEEE Type 2B accessibility
- Maximum internal arcing short-circuit current: 100kA @ 508V and 85kA @ 635V
- WL power circuit breaker frames range from 800A to 6000A
- 3 and 4 pole WL power circuit breakers
- Maximum arcing duration: 500 msec
- Vertical bus continuous current ratings to 6000A
- Horizontal bus continuous current ratings to 6000A
- Maximum voltage: 635V
- 3 Phase 3 Wire, 3 Phase 4 Wire
- 50/60 Hz

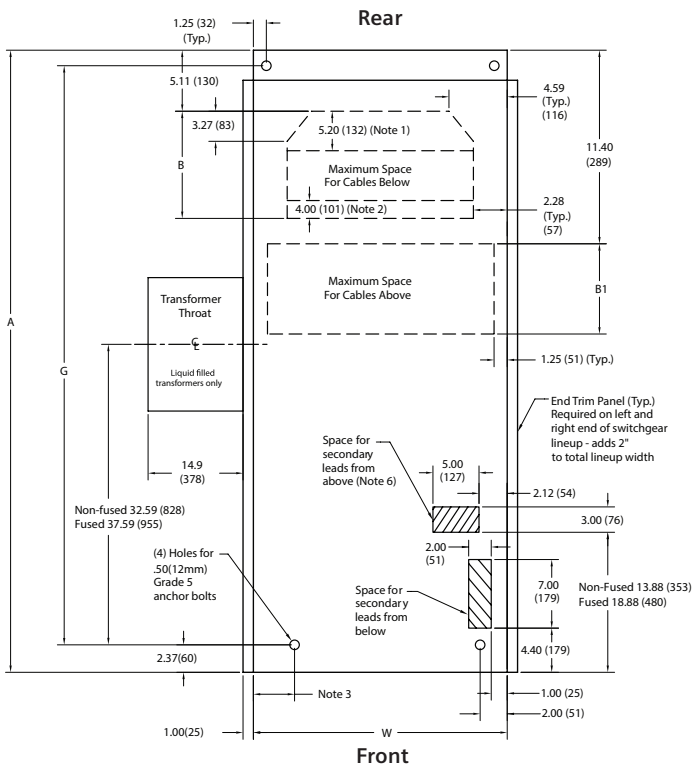
## Enclosure type

- NEMA 1 indoor

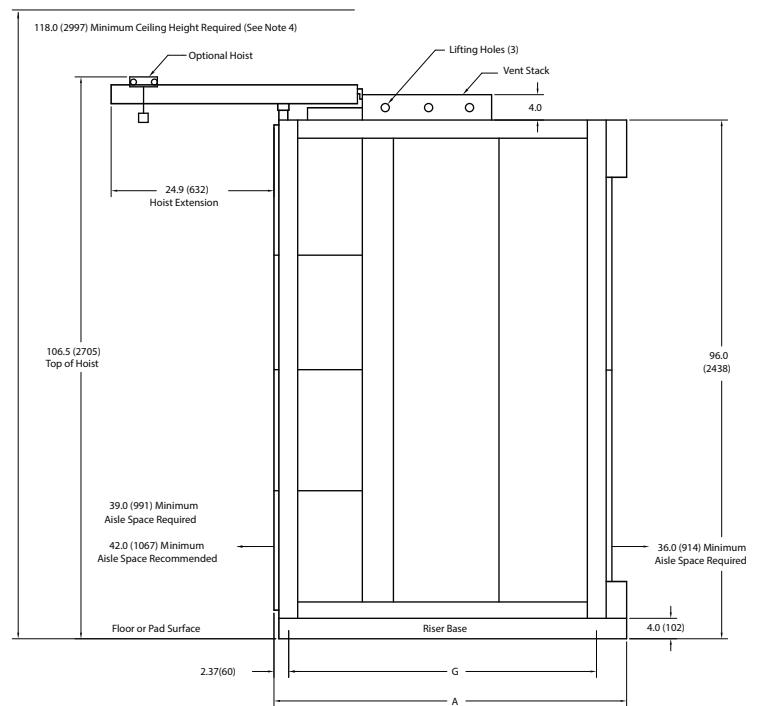
## Industry standards

- UL-1558
- ANSI/IEEE C37.20.1
- ANSI C37.51
- ANSI/IEEE C37.20.7

## Dimensional data



Plan view (WL Arc Resistant Switchgear without Optional Overhead Plenum)



Side view

A = Equipment Depth + 2.6 (66)

Anchor Bolt Spacing

G = Equipment Depth - 0.88 (22)

|            | Equipment minimum width W |
|------------|---------------------------|
| 3 Pole FS2 | 22 (559)                  |
| 3 Pole FS3 | 32 (813)                  |
| 4 Pole FS2 | 32 (813)                  |
| 4 Pole FS3 | 40 (1016)                 |

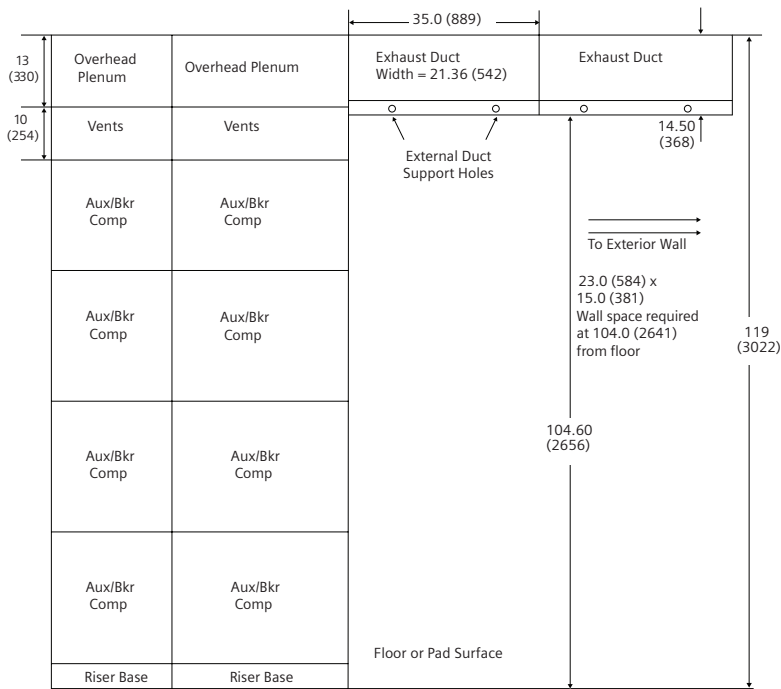
| Equipment depth     | Cable direction below B   | Cable direction above B1 |
|---------------------|---------------------------|--------------------------|
| 60 (1524) Non-fused | 20.00 (508) <sup>1</sup>  | 13.68 (347)              |
| 65 (1651) Fused     | 20.00 (508) <sup>1</sup>  | 13.68 (347)              |
| 70 (1778) Non-fused | 30.00 (762) <sup>1</sup>  | 23.68 (601)              |
| 75 (1905) Fused     | 30.00 (889) <sup>1</sup>  | 23.68 (728)              |
| 80 (2032) Non-fused | 40.00 (1016) <sup>1</sup> | 33.68 (855)              |
| 80 (2032) Fused     | 35.00 (889) <sup>1</sup>  | 28.68 (728)              |

<sup>1</sup> Space available for cables below is reduced by 5.20 inches when a lower neutral bus is present.



# WL Arc Resistant Low Voltage Switchgear

## Dimensional data



Front View: WL Arc Resistant Switchgear with Overhead Plenum

Note: Dimensions shown in inches and (mm). Drawings are not to scale.

1. Space available for cables below is reduced by 5.20 inches when a lower neutral bus is present.
2. Space available for cables below is reduced by 4.00 inches if an 800-3200A circuit breaker is located in the bottom compartment. Reductions per notes 1 & 2 are additive. Example: cables below + lower neutral + 2000A circuit breaker in bottom compartment = B - 9.20
3. 4.10 (104) if W = 22; 4.60 (117) if W = 32, W = 40
4. 118 (2997) minimum room ceiling height is required for ventilation of arc products for LV Arc resistant switchgear without overhead plenum.
5. 120 (3048) minimum room ceiling height is required for LV Arc resistant switchgear with overhead plenum.
6. Not applicable for Overhead plenum application. Consult Factory for guidelines for secondary leads from above solutions.
7. Custom designed exhaust duct is provided when the exit is towards the front to clear the overhead hoist. Cross-sectional area of the exhaust duct remains same as shown in figure. Wall cutout required is same at 104 (2641) from floor.
8. Siemens to provide weatherproof box to be installed outside the exterior wall over the exhaust duct exit.
9. The area outside the exhaust duct vent needs to be kept clear of personnel and equipment due to the potential for pressurized exhaust gases being expelled in the area as a result of arc fault in the switchgear. An area of 4 feet X 4 feet centered on exhaust duct vent needs to be clear at all times.
10. Exhaust duct is not self supporting, recommended support every 6 linear feet minimum. The duct supports are not supplied by Siemens and must be supplied by the purchaser or the installing contractor.
11. LV Arc Resistant switchgear with and without overhead plenum should be installed on a solid surface to maintain the arc ratings.

### Guide form specifications

- A. This section supplements Section 16435 – Low Voltage Switchgear unless otherwise noted.
- B. Comply with requirements of latest revision of ANSI/IEEE C37.20.7 – Guide for Testing Metal-Enclosed Switchgear Rated up to 38kV for Internal Arcing Faults.
- C. Arc Resistant Electrical Ratings:
  1. Nominal System Voltage: [600 V] [480 V] [240 V] [208 V]
  2. Maximum Design Voltage: [635 V] [508 V] [254 V]
  3. Accessibility Type: 2B
  4. Internal Arcing Short-Circuit Current: [85kA @ 635V] [100 kA@ 508V]
  5. Arcing Duration: 500 msec
- D. Arc Resistant General Construction:
  1. Indoor NEMA 1 enclosure
  2. Riser Base with arc plenum
  3. Insulated/Isolated bus bar system
  4. [Removable rear panels with captive screws.] [Hinged rear doors with captive hardware.]
  5. Wires that connect directly to the bus bar cannot be brought directly into the front switchgear compartments (blank, auxiliary, breaker, etc.). The wires and the devices they connect to must be located in the rear bus or cable compartment. One exception to this rule is when the devices that connect directly to the bus bar have current limiting fuses that are located in the bus or cable compartment. As an example, control power transformers and voltage transformers can be installed in a front compartment provided their associated current limiting fuses are located in the rear of the switchgear (bus or cable compartment).
  6. Shutters in power circuit breaker compartments.
  7. One piece circuit breaker compartment doors with insert panels for fuses, indicating lights and control switches when required.

**WARNING:** This equipment contains hazardous voltages. Death, serious personal injury, or property damage may result if safety instructions are not followed. Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices, and maintenance procedures provided with the equipment. The successful and safe operation of this equipment is dependent upon proper handling, installation, operation and maintenance.

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