LISTEN. THINK. SOLVE.®

# ArcShield™ Arc Resistant

## Medium Voltage Motor Control Centers

PUBLIC

Allen-Bradley • Rockwell Software

Rockwell Automation

v1-_17-a

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# Agenda

Rockwell Automation

- What is Arc Resistance?
- ArcShield Overview
- ArcShield One-High Overview
- ArcShield Two-High Overview
- Dimensions


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# Agenda

Rockwell Automation

**What is Arc Resistance?**

ArcShield Overview

ArcShield One-High Overview

ArcShield Two-High Overview

Dimensions


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# Providing you the widest product offering of arc resistant products…

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- 200, 400, 600 and 800*A Frames
- Full Voltage Non-Reversing Controllers
- Full Voltage Reversing Controllers
- Multi-Speed Controllers
- Reversing Controllers
- Solid State Reduced Voltage Controllers
- 400A Feeder Load Break Switch
- Incoming Cabling Sections
- Power Factor Correction Capacitor Enclosures
- Variable Frequency MV Drives



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# Arc Flash Statistics – United States

- Five (5) to ten (10) arc flash explosions occur in electrical equipment every day
- Each year more than 2,000 people are treated in burn centers with severe arc flash injuries
  - This number doesn't include cases in which the victim is sent to an ordinary hospital or clinic for medical treatment.
  - Instead, these statistics include incidents involving injuries so severe the victims require treatment from a special burn unit


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# Arc Flash

- An ***arc flash*** hazard is defined in NFPA 70E as a **"dangerous condition associated with the release of energy caused by an electric arc."**
- An arc flash hazard analysis must be done before a person is permitted to approach any exposed electrical part that has not been placed in an electrically safe work condition, such as equipment de-energized by lockout and tag out. (NFPA-70E, Z-462)
- The equipment owner has responsibility of performing or acquiring the resources to perform the analysis
- This analysis will define;
  - The system maximum short circuit current
  - The arc incident energy level, adjacent to particular electrical equipment
  - Definite the level of personal protective equipment when working on the equipment
  - Arc resistant equipment reduces the PPE to its lowest level!!! (ref- NFPA70E, Z462)


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# Arc Resistant

- ***Arc Resistant*** is a term related to equipment designed for controlling arc flash exposure
- It is defined by the level to which an arc flash is:
  - Extinguished or Controlled
  - Channeled away from personnel
  - Prevented from propagating
- Specific testing is done to meet the requirements of each level of “arc resistant accessibility,” based on the appropriate codes and standards
- Electrical equipment manufacturer is responsible to perform testing


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# ArcShield: Standard Safety Features

- ArcShield units include the inherent safety features of standard MV controllers:
  - Visual unit isolation via standard power cell viewing window
  - Heavy duty mechanical interlocking
  - Grounded isolation switch blades when open
  - Dead Front power cell when door is open



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# ArcShield™ : Standard Safety Features

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- Isolated Low Voltage Compartment
  - Test and troubleshooting power cell with no exposure to medium voltage
  - Easy access to all low voltage components

- Isolated Power Cell Compartment(s)
  - Isolated from other compartments for better fault containment
  - Easy access for cable installation and stress cones

- Horizontal Power Bus
  - Located in the center rear of the enclosure
  - Access from front or rear
  - Tin or optional silver plated copper
  - 1200A, 2000A, 3000A


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# ArcShield: Standard Safety Features

- ArcShield units also include these safety features of standard MV controllers:
  - Fixed vacuum contactor for highest MTBF
  - Off-line capabilities for testing
  - Isolated compartments
    - LV, Power Cell, Bus
  - Remote monitoring & diagnostics using IntelliCENTER software




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# ArcShield™ Overview

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- ArcShield™, safety by design:
  - Heavy gauge steel for all doors as well as side, roof, and back sheets (12 ga)
  - Robust door hinges & multi-point latches
  - Reinforced structure (brackets & plates)
  - Arc venting system on the unit roof
  - No impact on load and line cable entry
  - Reinforced low voltage panel **<u>to shield personnel if arc flash occurs with the low voltage door open</u>**


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# ArcShield™ Overview

- ArcShield™ enclosure also provides NEMA Type 12 protection, including plenum components
- Additional standard and custom plenum components are available
  - Standard 18”, 36” lengths available
  - 90 and 45º elbows
  - Environmental end seals
  - Custom plenum pieces available on request (contact factory)
- Alternative arc chimney also available
  - Directs arc energy into the open area above the structures


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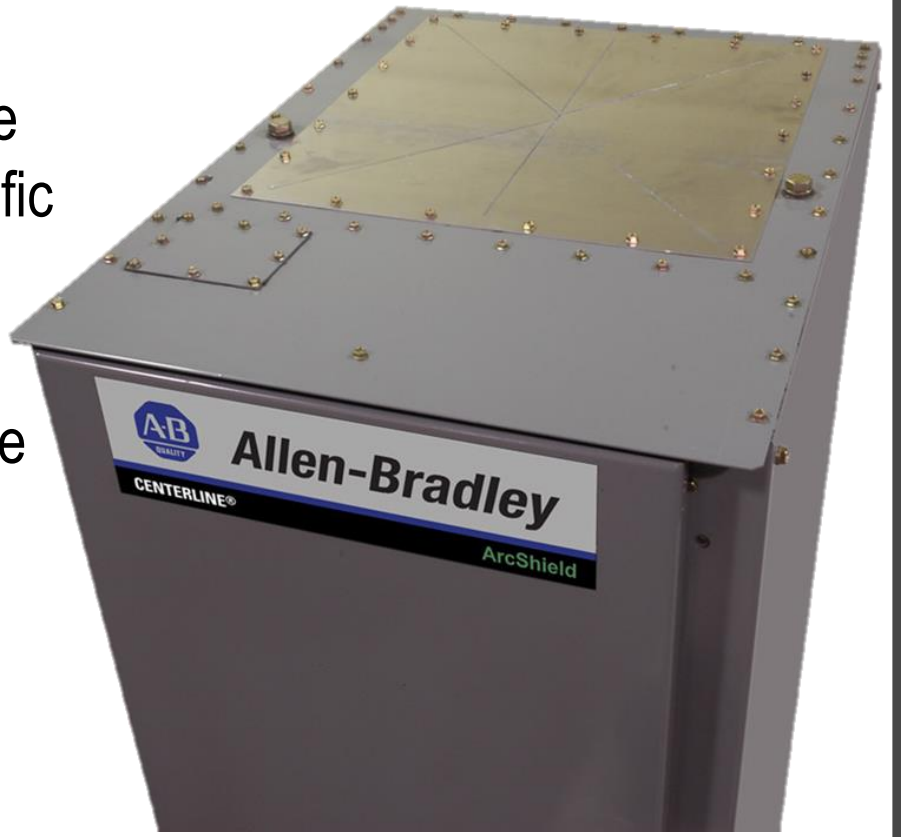
# ArcShield Overview

- Special arc vent mounted on the structure's top
  - Special laser etched pressure plate designed to open under very specific internal arc pressures
- Offset to rear of structure (allows use of top/front mounted LV wire ways)
- Structures can be flush rear mounted
- Front accessible
- Top or bottom load and line cable entry/exit supported





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# ArcShield Overview

- ArcShield meets Type 2B Accessibility,
  - Personnel are shielded at the front, rear and sides of enclosure
  - Arc Protection is maintained even with LV door open
  - Plenum or chimney arc discharge system is required, directs arc flash energy away from personnel
- ArcShield™ underwent rigorous testing to IEEE Std. C37.20.7- variable options available:
  - 40 kA (@ 7.2 kV max.), for ½ second (with insulated or uninsulated power bus)
    - Minimum total MCC width 26”
  - 50 kA (@ 7.2 kV max.), for ½ second (with uninsulated power bus only)
    - Minimum total MCC width 72”


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# Same Core Safety Features as Non-Arc Resistant Structures

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- Non-load break isolation switch
  - Fully interlocked with MV door and vacuum contactor
- Over current protection
  - Clip-on or Bolt-on power fuses
- Vacuum contactor
  - 400 or 800 Amp
- Bar or donut current transformers
- Control power transformer with primary and secondary fusing
- Optional potential transformers for metering
- Generous low voltage control panel

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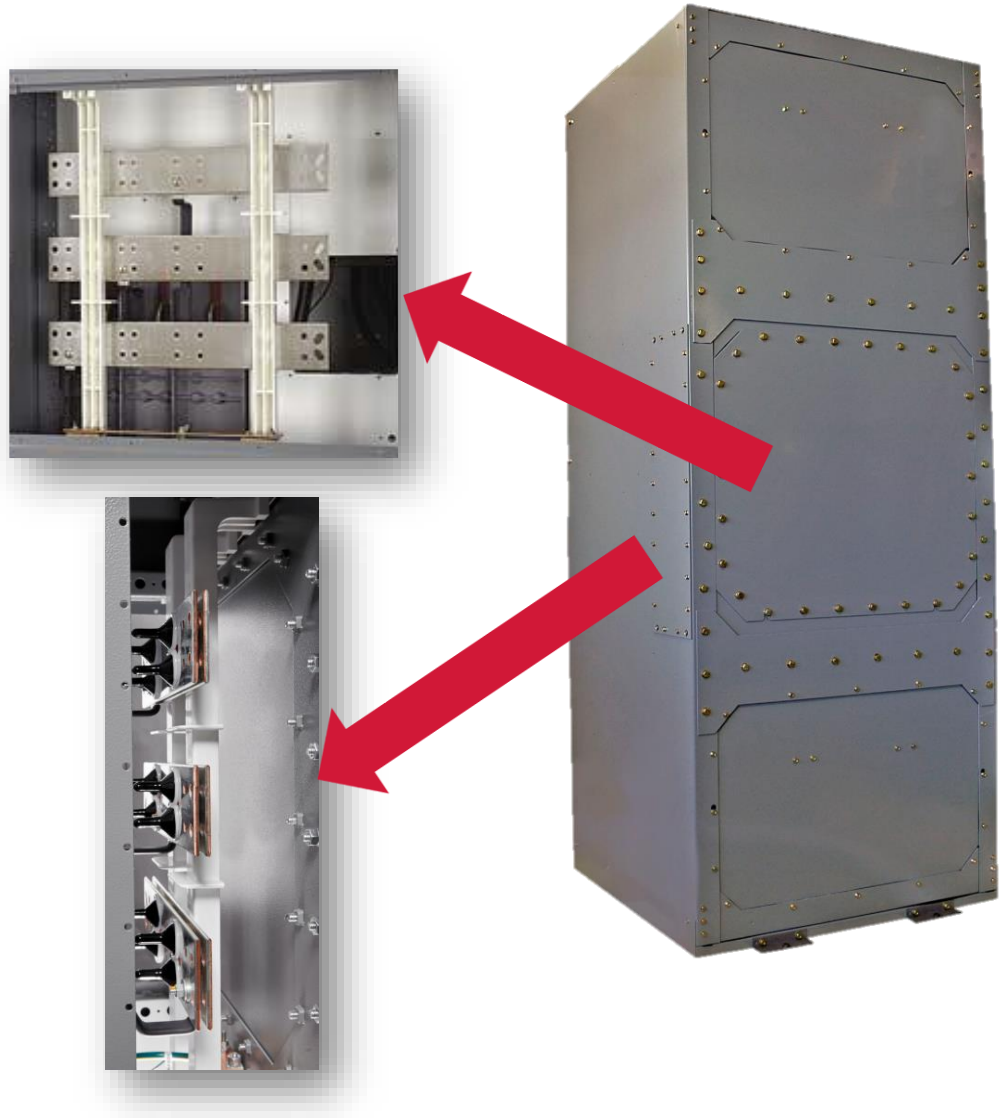
# Full Access to Rear Bus

- Three removable rear cover plates for superior levels of access
- Removable side access plates on each side provide full side access to power bus

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# Agenda

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What is Arc Resistance?

ArcShield Overview

**ArcShield One-High Overview**

ArcShield Two-High Overview

Dimensions


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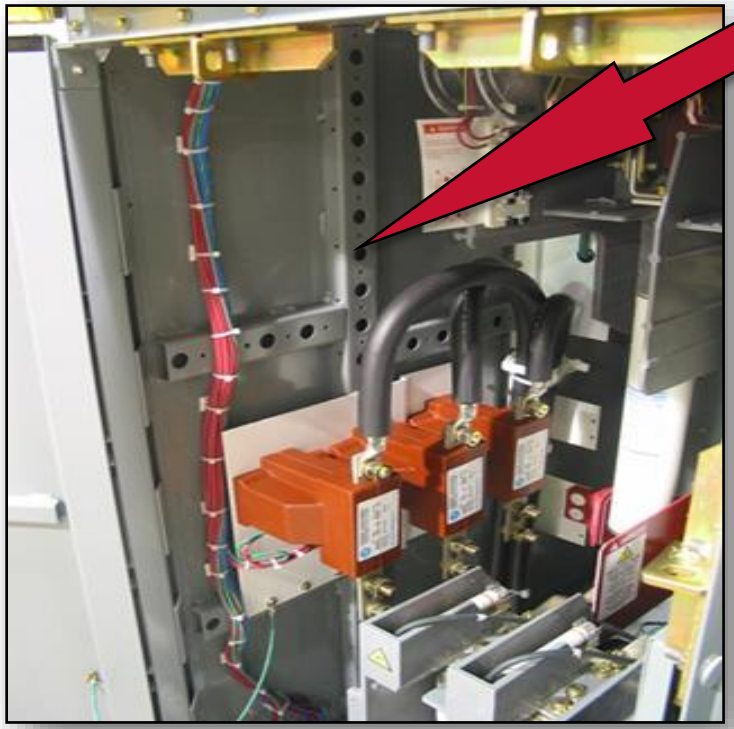
# ArcShield, 26” One-High Overview

- Reinforced structure (stiffener brackets & plates)



- Power Cell (showing left-hand side sheet)

Rear View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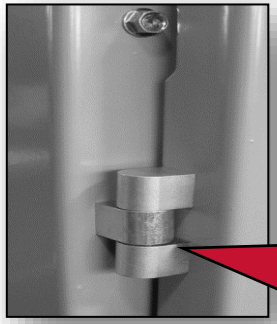
# ArcShield, 26” One-High Overview

- Power cell door is designed to contain arc flash and the pressures associated




- Robust door hinges (6)
- Door secured with bolts and internal latches (interlocked with isolation switch)
- Multi-point door latch
- Reinforced (brackets)
- Sealed with gasket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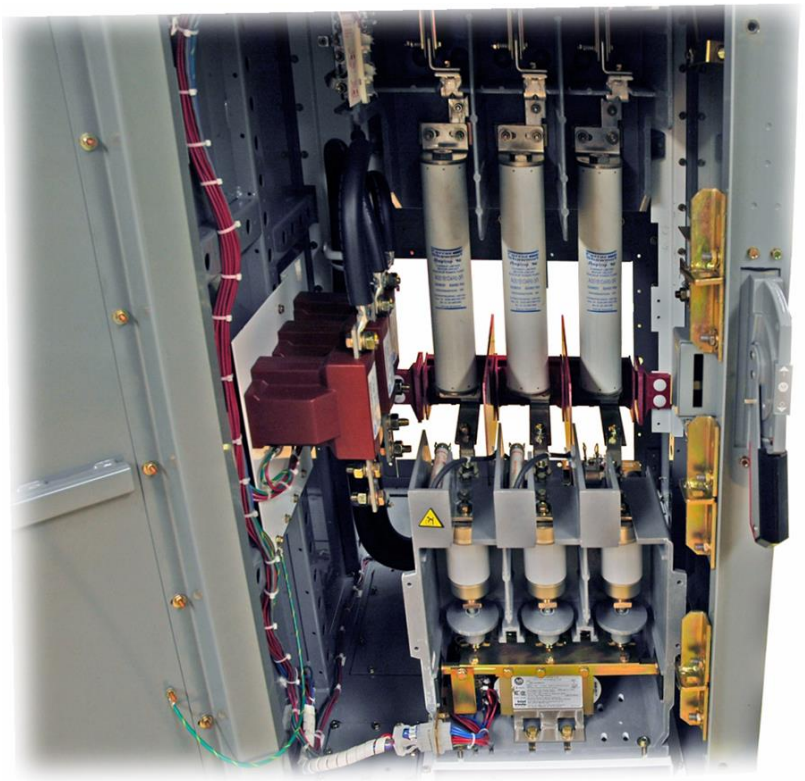
# ArcShield,  26” One-High Overview

- Standard power cell layout is the same for ArcShield



ArcShield Power Cell

**(Rear panel removed for clarity)**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# ArcShield, 26” One-High Overview

- Reinforced low voltage panel **shields personnel if arc flash occurs with the LV door open**
- Two-point latch system


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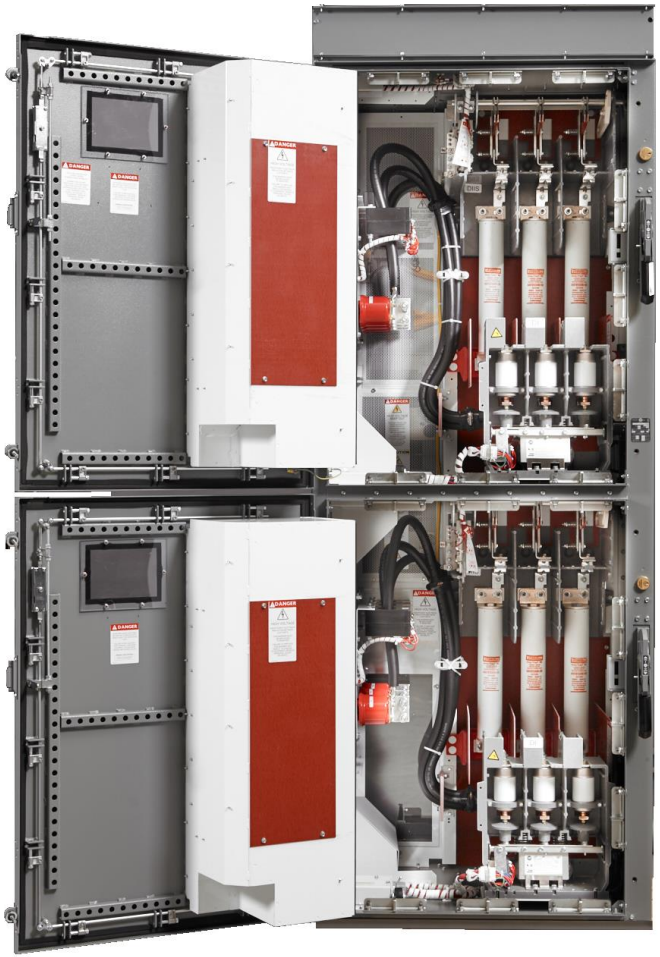
# ArcShield, 36” Two-High Overview

- Two isolated and independent power cells
- Non-load break isolation switch in each power cell
- Over current protection
  - Clip-on or Bolt-on power fuses
- 400A Vacuum contactor
- Donut or optional bar current transformers
- Control power transformer with primary and secondary fusing
- Optional potential transformers for metering
- Superior load cable access



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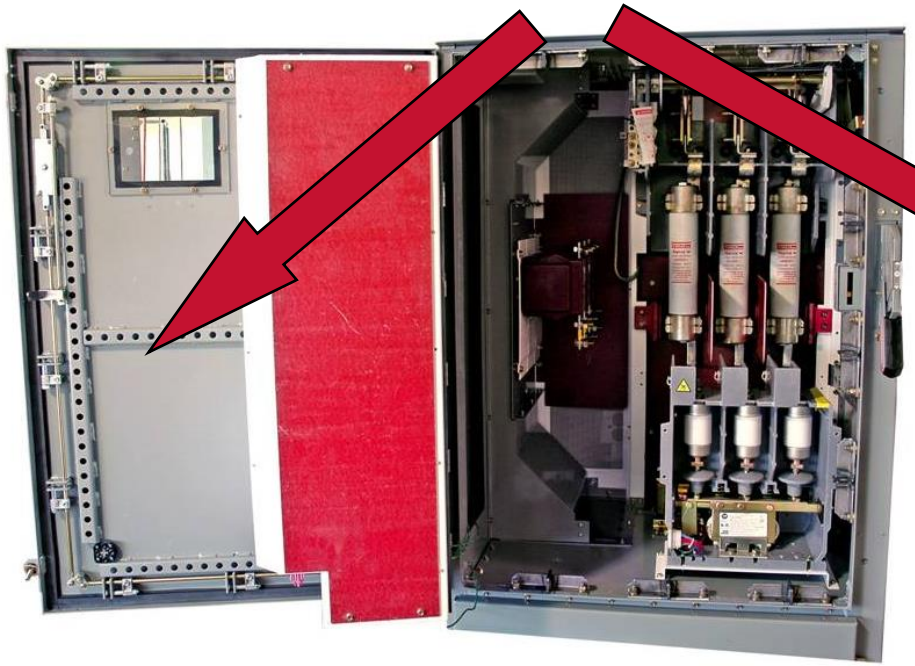
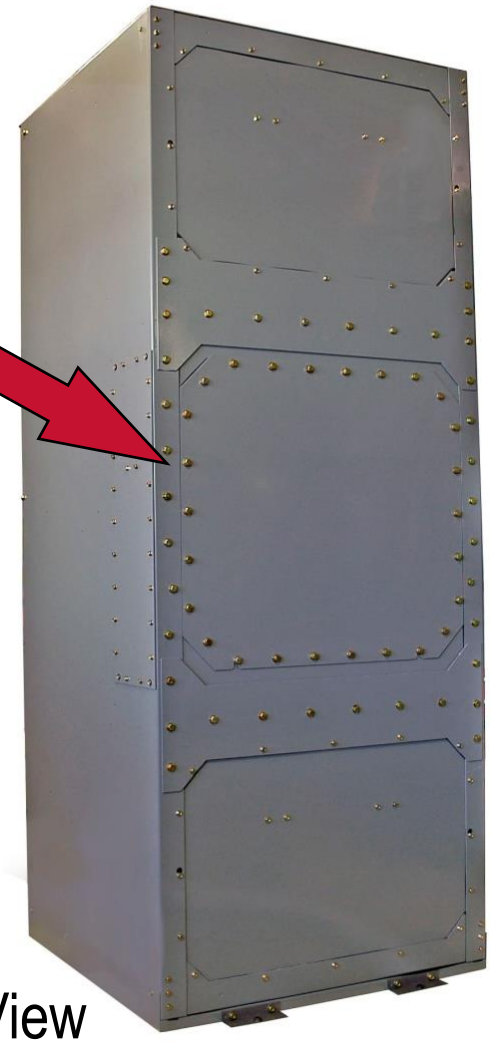
# ArcShield™, 36” Two-High Overview

- Reinforced structure (stiffener brackets & plates)



Two-High Power Cell

- Same layout as standard units
- LV panel and door are integrated into the power cell door



Rear View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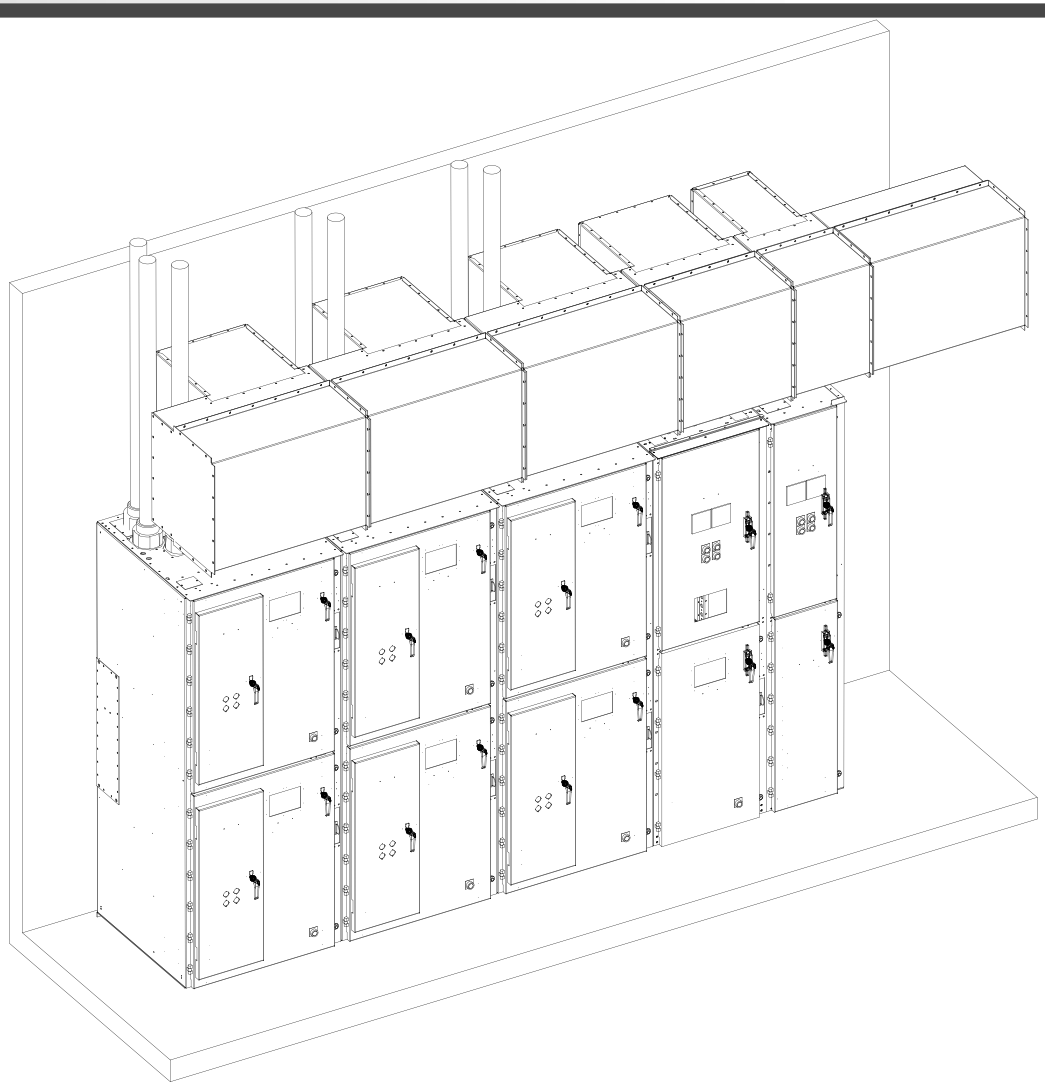
# ArcShield, Plenum Discharge Top & Bottom Cable Entry/Exit Support



## Plenum System

- Channel arc discharge to safe area above MCC
- Top or bottom exit/entry supported
- Many competitors cannot support top exit cables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# ArcShield
# Plenum Options/Extras

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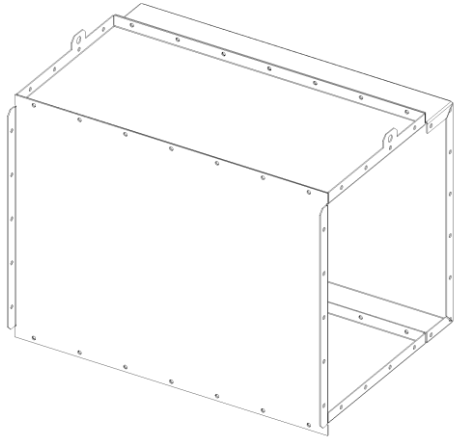
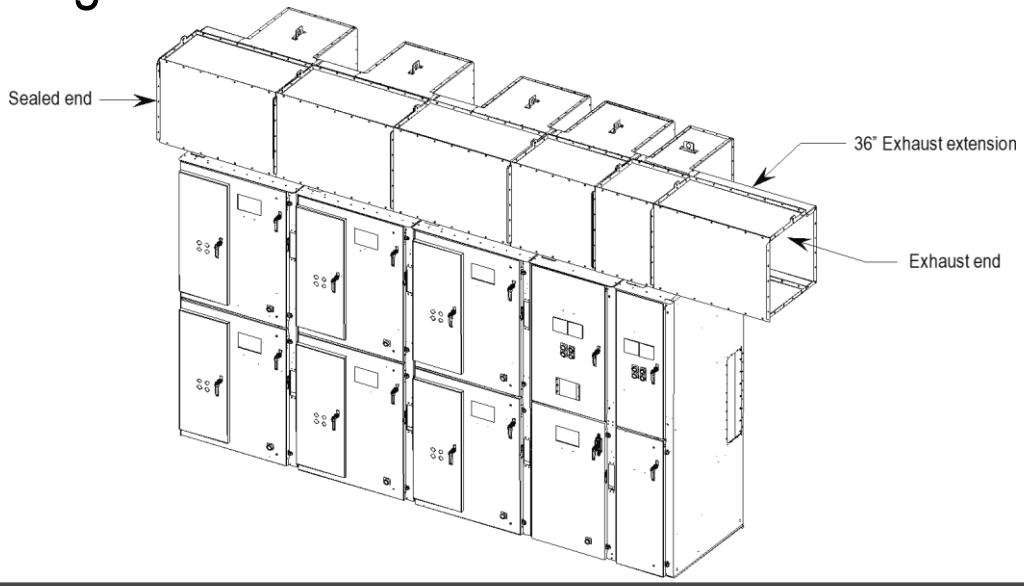
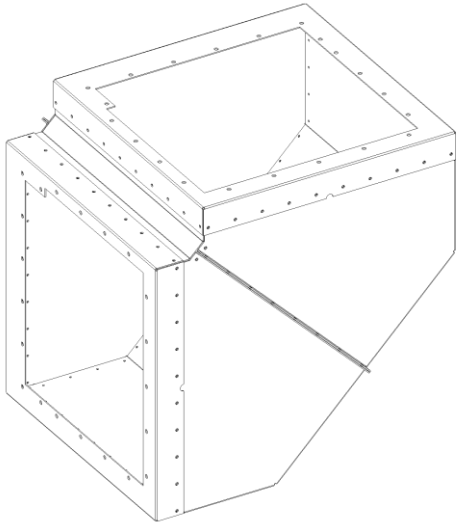
## Optional Extras for Plenum Construction

- 18”, 26” and 36” long extensions
- Universal 90 degree elbow
- External environmental seal
- Bug/Rodent Screen
- Custom designs available



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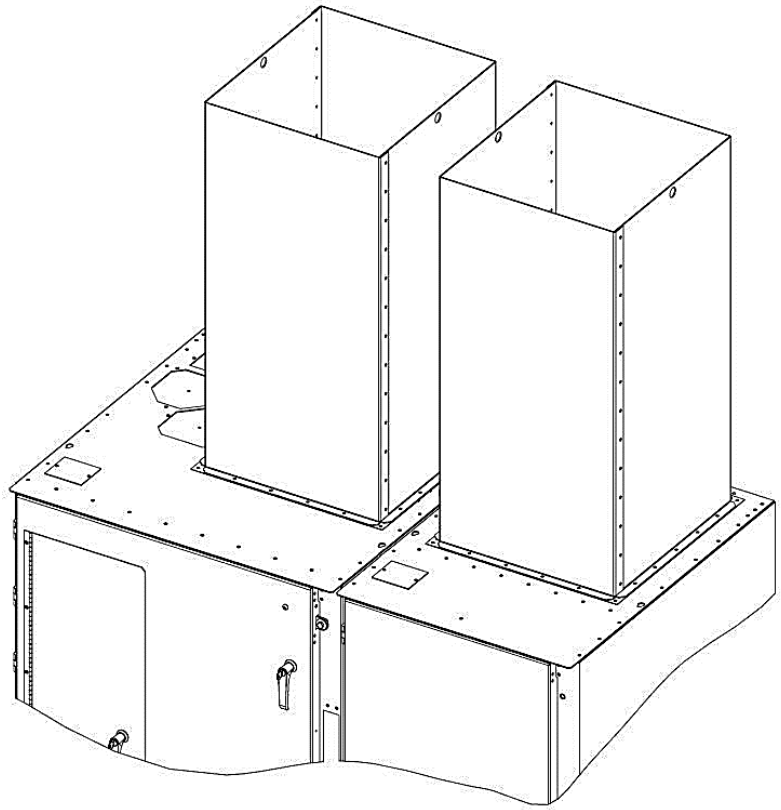
# ArcShield, Chimney Discharge Top & Bottom Cable Entry/Exit Support



## Chimney System

- Channel arc discharge to safe area above MCC
- Requires clear space above
- Top or bottom exit/entry supported
- Many competitors cannot support top exit cables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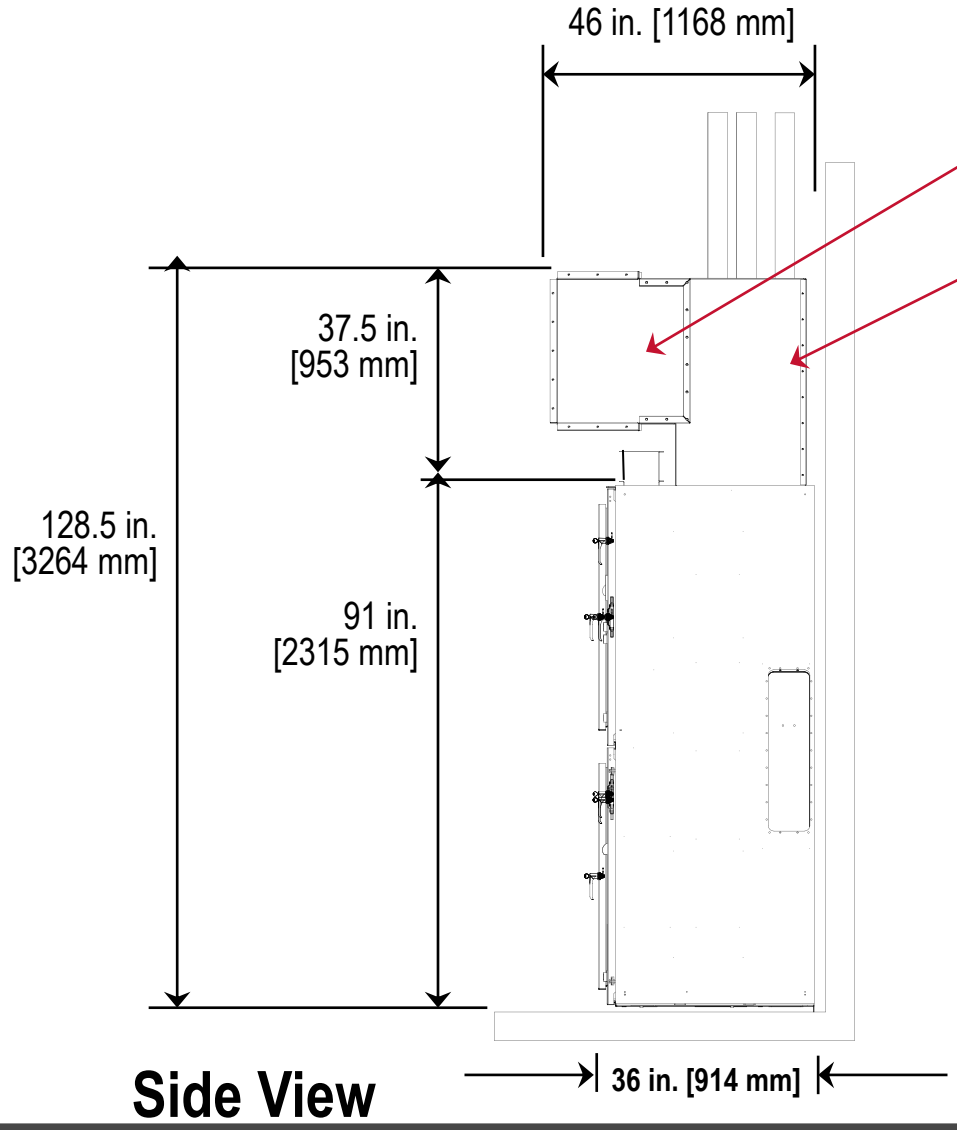
# ArcShield - Plenum Discharge Common Unit Dimensions




Side View

**No rear access required**

**Most of our MV arc resistant controllers have the same footprint as our non- arc resistant designs!!**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# ArcShield- Chimney Discharge (optional) Common Unit Dimensions

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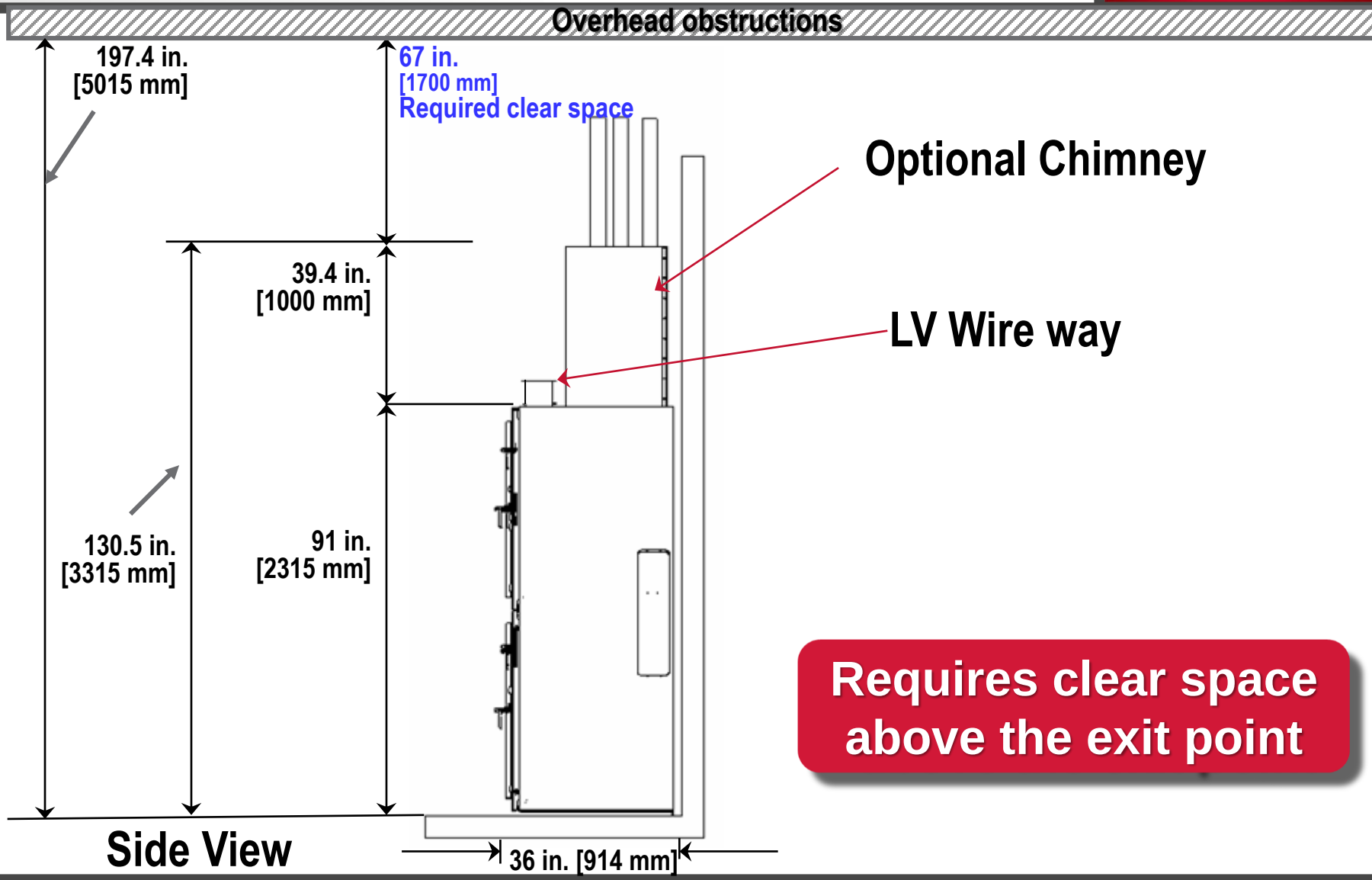


**Requires clear space above the exit point**


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Arc Resistant solutions for real world problems…


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