



**General Switchgear & Controls**  
**T&D Switches**

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***Outdoor Weatherproof Building  
for Electrical Equipment***



**General  
Switchgear &  
Controls Ltd**

**Arc Resistant Switchgear  
&  
Integrated Factory Assembled Buildings**

Factory Assembled  
Factory Pre-commissioned  
Fully Tested Arc Resistant Designs  
Proven Long Distance Transport Capability  
Five Days for Site Erection  
Reduces On-Site Cost



## ***Outdoor Weatherproof Building for Electrical Equipment***

GSC Outdoor Metal Buildings provide a totally enclosed environment for switchgear, bus duct, & control equipment.

### ***Main Features Include:***

- Custom designed to Customer Technical Specifications.
- All Equipment, services, wiring and controls installed and tested in factory.
- Oversized building divided into “Shipping Splits” for over-the-road transportation.
- Minimal on-site assembly and hook-up time.

### ***Structural Design Features:***

- Rigid structural steel base frame with steel floor plate for support of heavy equipment and floor loads.
- Building superstructure self-framing using heavy gauge steel panels for walls and roofs, thus allowing maximum use of internal space.
- Standard building features include a clean external appearance, with no fastening visible, completely weatherproof for long service and low maintenance.
- Structural design based on National Standards for structural steel design and loads in accordance with state or provincial codes.
- Structure designed for lifting with a mobile crane.



## ***Outdoor Weatherproof Building for Electrical Equipment***

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## **Outdoor Weatherproof Building for Electrical Equipment**

### **1. INTRODUCTION**

General Switchgear & Control Ltd. Manufactures Custom engineered, completely factory assembled and tested totally enclosed outdoor weatherproof metal buildings to house electrical equipment for industrial and utility applications.

The following different types of enclosures are available:

- Non Walk-in Aisle less
- Walk- in Single Aisle
- Walk-in Common Aisle
- Integrated power distribution & control center

All our buildings utilize modular design and rugged construction to accommodate present as well as future requirements. All electrical equipment is installed, connected and

tested at our facility before shipment. The completed building is then transported to site in one or more sections. Once on site, these buildings are ready for customer's field wiring and immediate commissioning.

### **2. BENEFITS AND COST SAVINGS**

- One stop ordering from General Switchgear & Control Ltd.
- Custom design and engineering to meet standard or custom specifications.
- Complete responsibility by General Switchgear & Controls Ltd. for the project co-ordination of the building and the electrical equipment.
- Pier or pad mounted facility eliminates the need of expensive concrete foundations.
- Factory controlled assembly, wiring and testing.
- Minimal on site installation.
- Field wiring (incoming and outgoing)

can be completed within the enclosure and hence weather related delays can be eliminated.

- Total cost savings compared to concrete block buildings.
- Potential Tax Savings.





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### **3. STANDARDS**

The design, manufacture and testing comply with the applicable requirements of the following codes and standards:

#### **Canadian Standards Association(CSA)**

##### **CAN/CSA-G40.20-M**

General Requirements for Rolled or welded structural Quality Steel

##### **CAN/CSA-G40.21-M**

Structural Quality Steels

##### **CAN/CSA-G164-M**

Hot Dip Galvanizing of Irregularly Shaped Articles

##### **CAN/CSA-G16.1-M**

Steel Structures of Buildings-Limit States Design

##### **CAN/CSA-S136-M**

Cold Formed Steel Structural Members

##### **CSA W47.1**

Certification of Companies for Fusion Welding of Steel Structures.

##### **CSA W48.1-M**

Mild Steel Covered Arc-Welding Electrodes

##### **CSA W59-M**

Welded Steel Construction (Metal-Arc Welding)

#### **American Society of Testing and Materials (ASTM)**

##### **A307**

Carbon Steel Externally Threaded Standard Fasteners

**A325**High strength Bolts for Structural Steel Joints

##### **A572**

High Strength Low-Alloy Columbian-Vanadium Steels of Structural Quality

#### **Other Codes and Handbooks**

OHSA Construction Regulations (O.Reg.213/91) particularly Sections 150-180

National Building Code of Canada,1990 and the supplement to the National Building Code of Canada

Canadian Institute of Steel Construction Handbook of Steel Construction,5<sup>th</sup> Ed. 1992

Ontario Hydro-Craning and Rigging Handbook.

### **4. FRAMING**





## ***Outdoor Weatherproof Building for Electrical Equipment***

General Switchgear & Controls Ltd. provides two type of framing for steel building system.

### **Truss Frame**

This type of design is employed for larger buildings and when equipment installed is heavy and a single point lift with spreader bars is required. In this design the primary trusses spanning the width of the building are spaced on a pre-determined bay length and support the secondary structural members and walls.

### **Self-Framing**

The majority of our buildings are designed using self-framing, self supporting method. This type of building utilizes the cladding as primary load bearing for the roof and/or wall elements, also functioning as a weather barrier. It may be either a single or multi-span structure.

## **5. STRUCTURE BASE**

The base frame is designed for the static and dynamic load requirements. Welded bracing provides adequate strength for handling the complete assembly with the base lifting lugs. The base frame consists of structural steel, A36 channel or I-beam and

angled structural sections as required meeting the design load conditions. The underside of the base frame is coated with a corrosion resistant undercoating for protection against corrosion or alternatively hot dipped galvanized.

The base is designed for installation on concrete pier or pad provided by customer. Concrete Slab, crushed rock or other kinds of foundation are also acceptable depending on the site soil condition. Removable lifting lugs are provided on the base for lifting/handling. Single point lifting of the completed building is possible by using slings and spreader bar.

## **6. FLOOR**

The floor plate is constructed from 3/16 or ¼ inch steel plate welded to the main and cross member of the base frame and is designed to support heavy equipment and floor loads. Removable cover plates are provided to gain access at the bottom of the base frame, if required. The floor plate is designed for a floor live load of 50 PSF to 250PSF with a concentrated load of 2,000lbs. The floor is finished with anti skid paint as a standard. Checkered and anti-skid floor plates can also be provided, if required.



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### **7. WALLS**

The exterior walls are made from 11 gauge sheet steel. The wall sections are uniquely formed at the sides, top and bottom to provide the required strength & rigidity without the use of a framed structure. The wall frames are bolted inside to the base frame; roof and adjacent wall frame and thus provide a clean & smooth external appearance with no fastening visible from outside.

A weatherproof gasket is provided between the panels, base frame and roof to provide complete weather seal protection for long service and low maintenance.

The walls are designed to withstand a wind loading of 125 miles per hour.

The formed wall and roof sections are designed to install fibre-glass insulation inside the enclosure.

The interior walls are made from 14 gauge sheet steel and bolted to the wall section to provide smooth appearances inside.

The walls are reinforced with angles or channels as required in those areas where heavy equipment is mounted on the wall .e.g. Distribution panel, transformer, ventilation fan, etc.

### **8. ROOFS AND CEILING**

The roof panels are made of 11 gauge sheet steel and are formed. Adjacent roof panels are gasketed and bolted. Rain caps are provided over the joints of the sloping roof, thus virtually eliminating water or ice build-up.

The roof sections are designed for a live load of 40 PSF and concentrated load of 300lbs. The roof is also designed for snow load and rain load of 45 PSF.

Roof trusses are formed from 11 gauge sheet steel and are sloped to provide a pitch of 2-3 degrees.

The interior ceiling is made from 16 gauge pre-finished white sheet steel panels and fixed to the flange of the truss. Fibre glass insulation is provided between the roof and the ceiling, if required

#### **Electrical Lighting**

Fluorescent lighting, twin-tube, 4ft. fixtures with diffusers provide 50 ft. candles of light at 5ft. above the floor level for the switchgear and other equipment. Manual 3-way light switches are provided at each personnel door entrance.



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### **Emergency Lighting**

The battery operated emergency lights are provided near each of the personalized door. The emergency light will switch-on automatically in case of loss of AC supply and will maintain light for 1-1/2 hours. Exit signs (LED type) if specified are provided at the top of each personalized door. High pressure sodium type external lamps are provided above each entrance door. External Lights are controlled by photo-electric cell.

### **9. DOORS**

Two access doors are provided one at each end of the building and sized 36" x 84". Doors are double-walled construction, 1-3/4" thick with fibre glass insulation and made from 16 gauge steel reinforced with a welded frame.

The doors are provided with heavy duty stainless steel hinges, door closer, aluminum threshold, weather stripping and panic hardware, consisting of a key lock cylinder on the outside and a defeating panic bar on the inside for emergency exit.

Fire rated doors with CSA or UL label can be provided if specified.

### **Equipment Access Doors**

Hinged, bolted and gasketed rear doors are provided behind each frame of switchgear or other equipment which requires access at the rear for cabling or maintenance purposes. This arrangement reduces the size of the building.

All external doors are gasketed, fibre glass insulated and drip shields are provided above the door.

### **10. INSULATION**

Fibre glass insulation can be provided in the walls, roof, floor and access doors when specified. Interior walls and ceilings are provided as standard when fibre glass insulation is specified to provide smooth internal appearance.

### **Receptacle**

Two Duplex receptacle 120 volt, 15 amp are provided at convenient locations. External weatherproof receptacle with ground fault interrupter can be provided on the outside of building, if specified.

### **11. HVAC**

#### **Heating**

The heating of the building is provided by electrical wall heaters of 1500 Watts to





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maintain an interior temperature of 21degree C. The heaters are thermostatically controlled.

### **Ventilation**

Exhaust fans and hooded louvers are supplied as standard to provide adequate ventilation within the building.

### **Air Conditioning**

Air Conditioning system (HVAC), if required can be provided to maintain an internal temperature of 21degree C. The air conditioner will be sized based on the ambient site temperature, the size of the building, insulation system of the building and the heat dissipated by the electrical equipment within the building.

## **12. ELECTRICAL WIRING**

All electrical work is completed in the factory so that when the building arrives on site all that is required is to reconnect the shipping splits and connect the external cables and buses as required.

Electrical raceways consist of cable tray, conduit or other approved raceways as required are provided within the building to facilitate interconnection between the electrical equipment.

All electrical work is carried out in accordance with the Canadian Electrical

Code (C22.1) and National Electrical Code(NEC).

If specified, the critical and non-critical wiring can be segregated or shielded.

## **13. GROUNDING**

A Bare 4/0 copper cable or ¼ x 2 copper bus is provided around the building perimeter and bonded to the building steel approximately every 5 ft. This perimeter ground bus or cable is used to connect to the frame of the electrical equipment in the building.

Two connection points are provided for the connection to the customer's ground.

## **14. PAINT FINISH**

### **Base Frame**

The base frame is cleaned & washed to remove rust, scale, dirt, oil and grease and then coated with corrosion resistant paint or galvanized

### **Walls & Roof Panels**

The exterior walls and roof panels are washed with a solution of phosphate, then rinsed and cleaned to remove all traces of dirt, oil and grease.

The panels are then powder painted



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with 3 mils of paint in either ASA#61 grey, green or other custom colour as specified.

The interior walls are precoated with white paint (other colours available)

**Floor**

The floors are coated with grey anti-skid paint.

**15. TYPICAL EQUIPMENT INSTALLED**

Typical equipment installed and special features which can be provided in a building are as follows:

- Medium and Low Voltage Switchgear
- Medium and Low Voltage MCC
- Batteries and Chargers
- Dry type Transformer
- HVAC
- Control, Metering and Relay Panels
- PLC Panels
- UPS System
- Fire Detection/Extinguishing System
- Telephone Equipment
- Emergency Generator
- Seismic rating=Zone 1
- Windows
- Pressurized building Class 1, Group D, Div. 2 application
- Bus/Cable Ducts

**16. STANDARD DIMENSIONS**

The maximum dimensions for an outdoor building shipped by GSC is one piece, 14 ft wide, 12 ft high and 50 ft long.

Oversize buildings are also manufactured by GSC but are shipped in two or more sections for ease of transportation.

**Typical Switchgear Size**

Equipment	Unit Width in.	Unit Depth in.	Space required in front in.
5/15KV Metal Clad SwGr.	36	96	66
5/15KV Metal Enclosed SwGr.	36	60	48
5KV MCC	40	36	48
600 V SwGr.	24-30	60	48
600V MCC	20	20	30

**NOTE:** Code requires a minimum distance of 40inch.(1 metre) in front of the switchgear(in addition to the space required for a fully racked-out circuit breaker) to provide a path to exit from working space when there are two exits in the building.

The equipment dimensions together with minimum draw out space and code requirement may be used to select the width of the building



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The switchgear are generally rear accessible from outside by the means of hinged/bolted door and this will reduce the required width of the building.

Approximately 6 inches on each end of the equipment line-up is required between the equipment and the building end walls.

### **17. DRAWINGS**

The following drawings are provided for approval.

- a) Equipment layout and arrangement drawing.
- b) Base plan and foundation plan
- c) Architectural drawing to include plan, elevation and cross-sections, floor opening etc. of the building
- d) Electrical drawings (Schematic) of the complete electrical system and related wiring diagrams
- e) Installation instructions
- f) Lifting method for site installation
- g) Bill of Materials

All engineering design drawings can be provided with approval stamp by a professional engineer, if required.

### **18. SHIPMENT**

The building can be shipped as one complete unit if the dimensions do not

exceed the regulations of the road transport authority. Approximate dimensions for one piece shipment are 14ft. wide, 12ft. high and 50ft. long.

The building if shipped in sections, the open area of each section will be covered with plastic sheet and braced temporarily using 2 x 4's to prevent damage during shipment.

Components and accessories will be packed separately with identifying tag.

### **19. TESTING**

To the extent possible, the completed equipment will be tested before shipment.

#### **The Following test are performed:**

Continuity and functional check of all wiring.

- Test all of the building services provided.
- Functional verification of all control devices and closing and opening of power device.
- Mechanical and grounding check.
- Insulation resistance check as applicable.
- Certified test report will be supplied, if required.



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### **20. QUALITY ASSURANCE**

General Switchgear & Controls Ltd.  
Conforms to the requirements of CSA  
Z 299.3 quality assurance program.

We have also developed our own  
Quality Assurance program, which is  
documented in our Q.A. manual. This  
clearly defines our dedication to  
produce quality products. If required,  
the equipment can be supplied to  
conform to CSA Z 299.2 quality  
control requirements.

### **21. POST SCRIPT - CONCEPT/ PHOTOS**

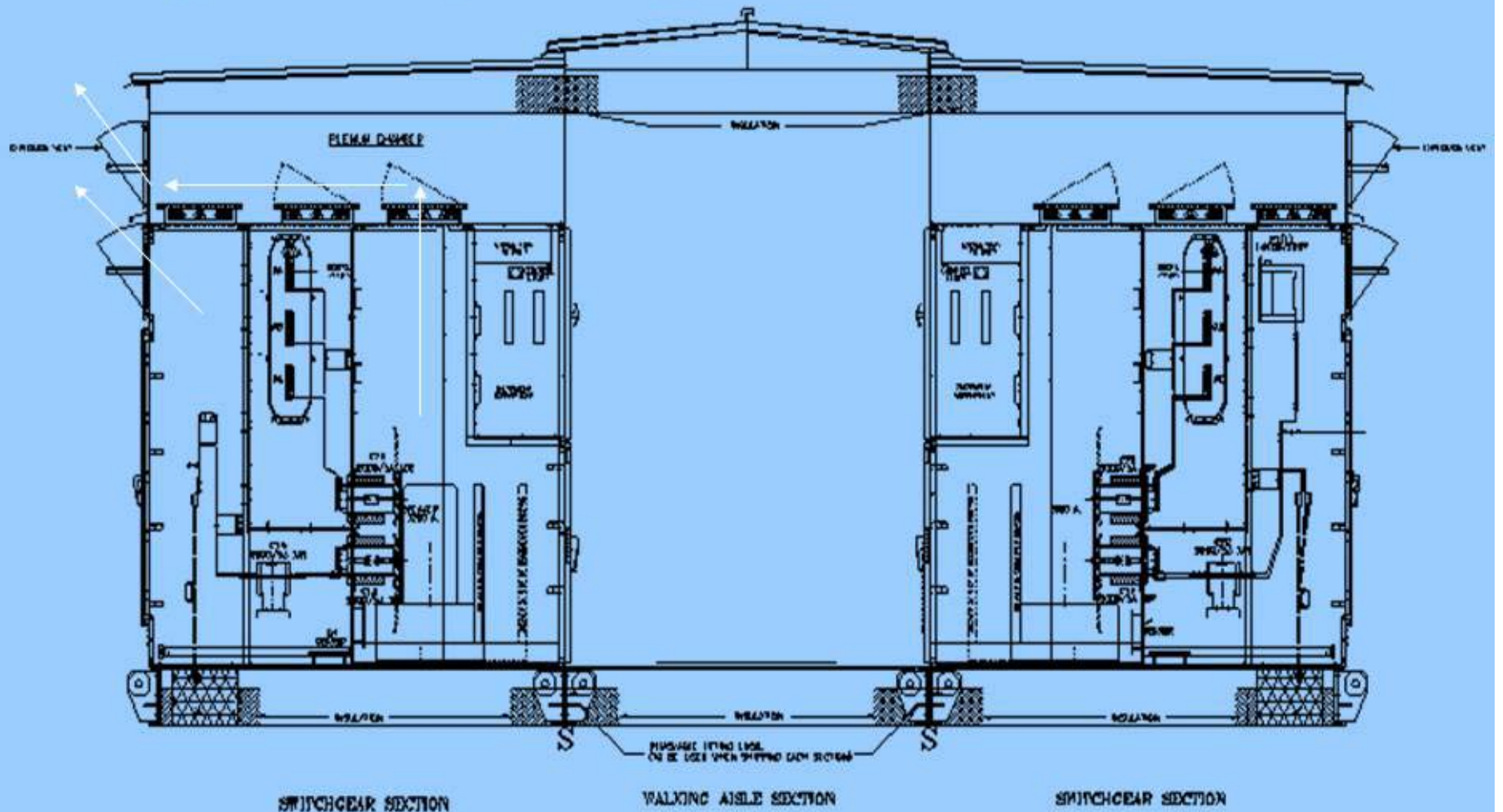
Please see pages 13 to 18



# Arc Resistant Switchgear & Integrated Building

## Arc is Directed into Plenum Chamber & Safely Outside

### Integrated Switchgear Building Cross Section



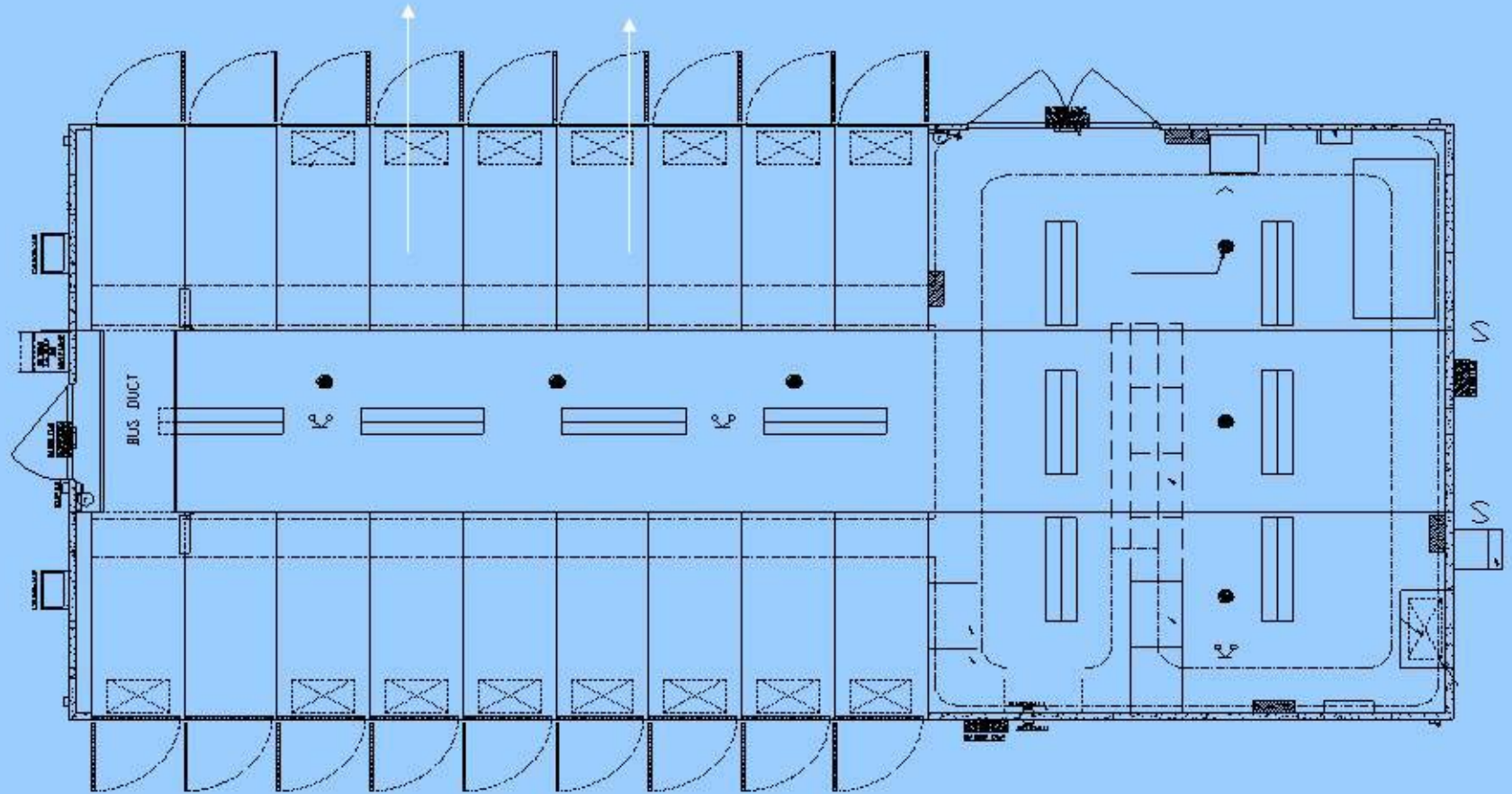


# Arc Resistant Switchgear & Integrated Building



**Each Cell Is Separate Arc is directed outside on a per Cell Basis**

## Integrated Switchgear Building Plan View





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***15kV Type C Arc Resistant Switchgear in a House Being Fully Assembled in the Factory- Switchgear Line Up, Control Area***



***15kV Type C Arc Resistant Switchgear In a House Three Shipping Sections Fully Assembled at Site 3000 miles later***





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***25kV Type C Arc Resistant Switchgear In a House, Switchgear Being Assembled on House Base—House Walls Being Placed***



***25kV Type C Arc Resistant Switchgear In a House, Aisle & Switchgear Section Connected—Load Break Sw Cell Seen on Right***



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***25kV Type C Arc Resistant Switchgear In a House  
After Factory Commissioning—Aisle Being Separated For Shipment***



***25kV Type C Arc Resistant Switchgear In a House, Switchgear Section  
After Shrink Wrapping—Being Moved Out For Loading***



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## ***Outdoor Weatherproof Building for Electrical Equipment***

***27.6 kV Contracts Arc Resistant Switchgear In a House  
Each as Two Shipping Sections Assembled & In Service At Site***

