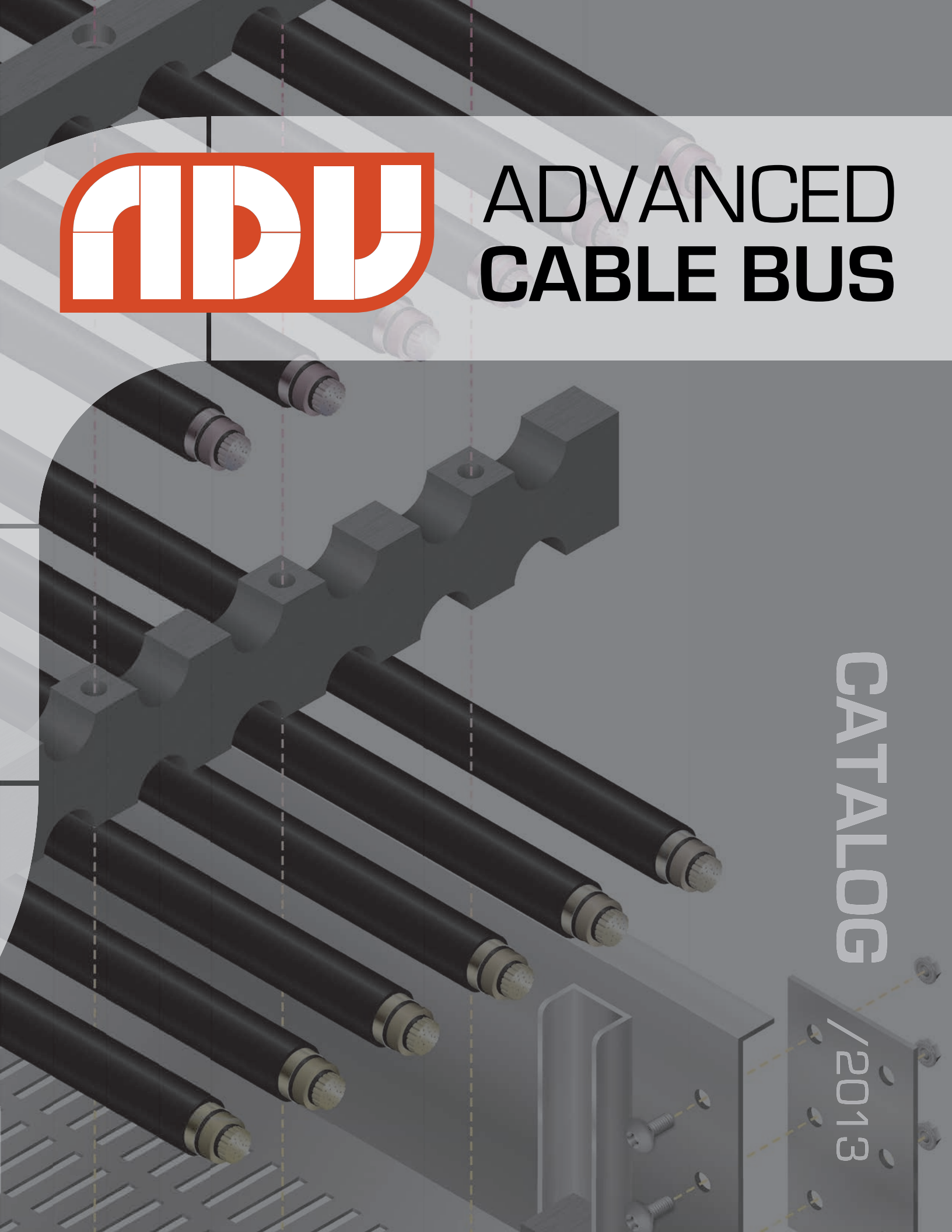


ADVANCED CABLE BUS

CATALOG /2013

ADVANCED CABLE BUS

RELIABLE, ALL-WEATHER, MAINTENANCE-FREE POWER DISTRIBUTION SYSTEMS
CUSTOM DESIGNED & MANUFACTURED IN THE UNITED STATES OF AMERICA

ABOUT US

Advanced Cable Bus, Inc. was founded in 2007 by an experienced, technically-savvy and team-oriented group of electrical engineers with over 50 years of combined experience in the power distribution industry. We design and manufacture safe, reliable, maintenance-free Cable Bus systems for a variety of applications. We are dedicated to promoting the best interests of our clients and their businesses by providing customized solutions that maximize efficiency and minimize cost. Expert technical support and personalized customer service guide each project to completion, ensuring satisfactory results. We look forward to working with you.

CONTACT US

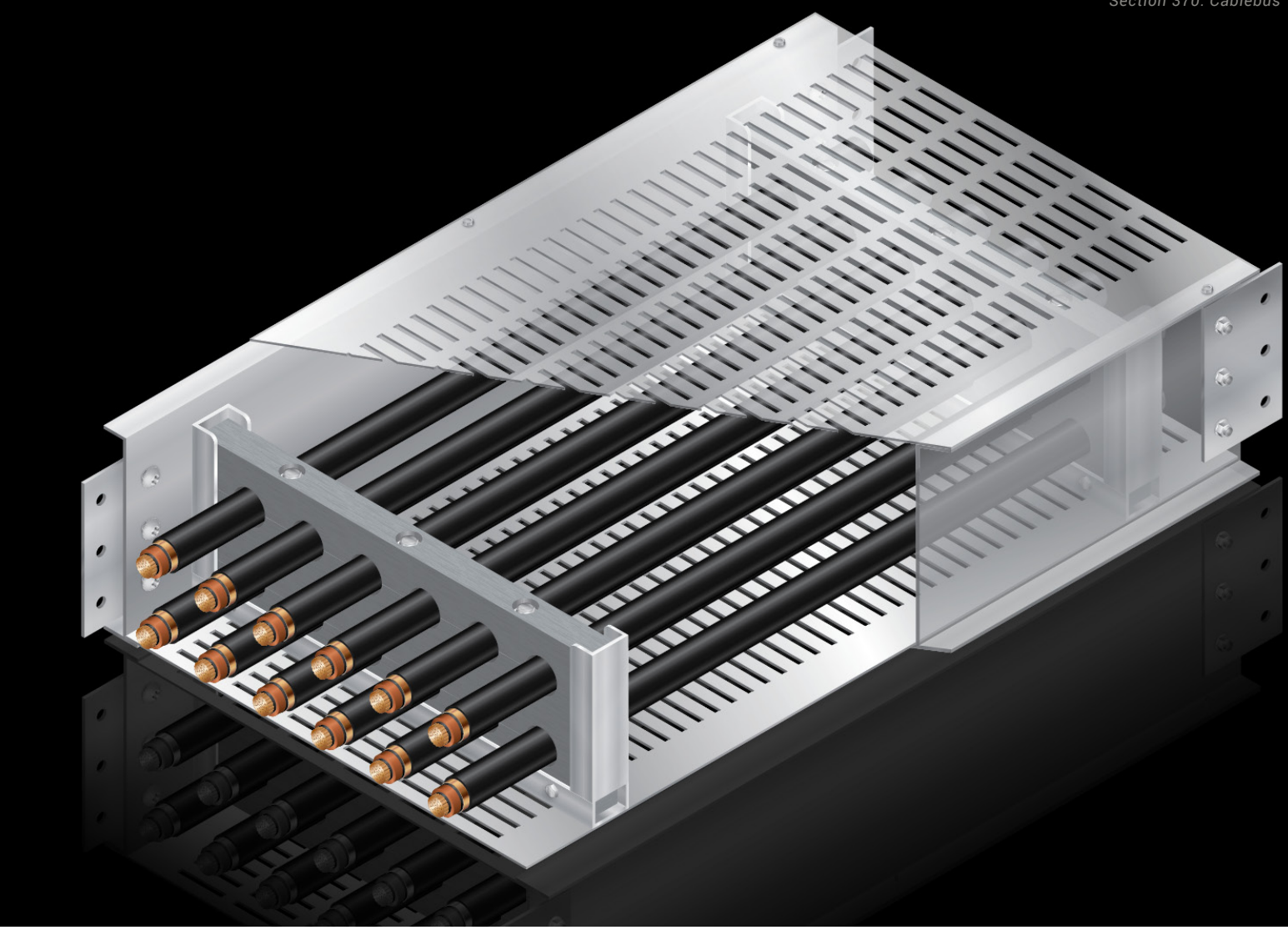
PHONE ..... +1 (864) 990-5499
TOLL-FREE ..... +1 (866) 578-8527
FAX ..... +1 (864) 569-0766
EMAIL ..... sales@advcablebus.com
ADDRESS ..... Advanced Cable Bus, Inc.
P.O. Box 14128
Greenville, SC 29610
LOCATION ..... 3514 Old Buncombe Road
Greenville, SC 29617
United States of America

contents

WHAT IS CABLE BUS?

"An assembly of insulated conductors with fittings and conductor terminations in a completely enclosed, ventilated protective metal housing. Cablebus is ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer in accordance with instructions for the specific job. The assembly is designed to carry fault current and to withstand the magnetic forces of such current."

— NATIONAL ELECTRIC CODE (NEC 2011)
Section 370: Cablebus

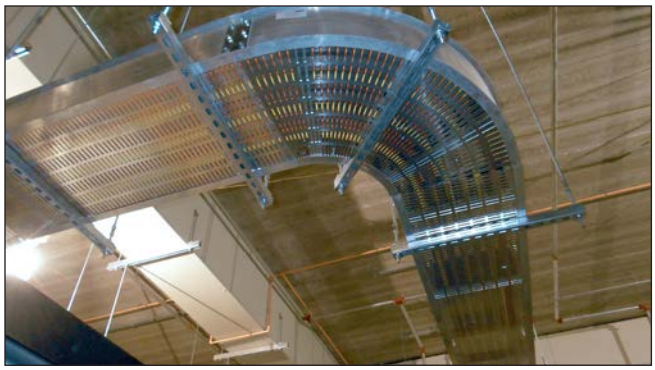


CABLE BUS is a system for distributing power from one electrical apparatus to another using insulated power cables inside of a protective metal housing. Cable Bus is designed to carry large amounts of electrical power for use within power generation and industrial plants for service entrances, main feeders, distribution applications, and retrofits for existing power systems. Each Advanced Cable Bus system is custom designed and manufactured to meet your specific job requirements.

Uniform conductor spacing is maintained by our custom-manufactured cable support blocks, which are themselves held in place by the U-form short-circuit braces welded into each enclosure section. The combination of the cable support blocks and the short-circuit braces allows our systems to withstand short-circuit forces of up to 100kA RMS symmetrical, keeping personnel and equipment safe if a fault occurs.

Advanced Cable Bus manufactures enclosure covers that are 50% ventilated. The ventilation and conductor spacing allow our systems to operate at free air rating. Each cable can conduct more power without a corresponding rise in temperature. Accordingly, Cable Bus systems employ fewer cables than cables in tray or cables in conduit, which impacts project costs significantly.

Advanced Cable Bus systems have an ampacity range from 800A to 6000A, and voltage ratings of 480V, 600V, 5kV, 15kV, 25kV, 35kV, and occasionally up to 69kV. Typical applications include connections between transformers and switchgear, tie connections between two pieces of switchgear, between motor control centers and large motors, or between generators and generator breakers or generator step-up transformers. We commonly work on industrial facilities and other types of applications where a large amount of current is needed. ■



THE CABLE BUS ADVANTAGE

RELIABLE, FAIL-SAFE POWER

For over five decades, Cable Bus has demonstrated its superior reliability in the power generation, mining, petrochemical and paper industries, as well as countless others. Cable Bus systems function beautifully in conditions ranging from heavy pollution to extremes of temperature, humidity and UV light. From humid tropics to arid deserts and frozen tundras, Advanced Cable Bus systems are custom-engineered to operate reliably in any climate, anywhere in the world.

COST-EFFECTIVE & ENERGY EFFICIENT

With material and installation costs up to 40% less than conventional, non-segregated phase bar bus, cable tray with armored cables, or conduit and wire systems, Cable Bus is often the most cost-effective way of distributing electricity.

FLEXIBLE & VERSATILE

We take pride in providing the most accurately designed and manufactured systems on the market. However, during the course of a project, unexpected circumstances can occur. In order to keep the project on track and avoid delays, all our systems are furnished with an extra housing section that can be cut to fit if the need arises. The power cables we supply also include a complimentary 5% in additional length to accommodate any discrepancies encountered in the field.

EASY TO INSTALL

Advanced Cable Bus systems are easy to install compared to other systems. No heavy lifting equipment or special tools are required. Two men can easily lift housing sections into place. Every job is engineered and designed to fit the specific application with all Cable Bus sections, elbows and accessories factory precut to fit your project needs. Long vertical sections are easily installed using our short-circuit braces, which allow the cable support blocks to be installed without any fasteners until all the power cables have been pulled into place. Interleaving or crossing of conductors within the Cable Bus enclosure is not required with our systems.

MAINTENANCE-FREE

Advanced Cable Bus systems are completely maintenance-free. Unlike traditional, non-segregated phase bus duct systems, there are no splices, no connections to re-torque, and no space heaters or thermostats to install or replace. ■

Custom Engineered for Maximum Performance

TYPICAL **APPLICATIONS**

MAIN INCOMING & DISTRIBUTION FEEDERS

These include main feeders to facilities, whether they are medium or low voltage systems. These include feeders at industrial plants, mining and metal facilities, oil & gas and oil sands facilities, data center facilities, and UPS feeds.

POWER GENERATION PLANTS

Cable Bus can be used as main generation feeds, station service feeds, auxiliary feeds, and excitation feeds.

POWER DISTRIBUTION SUBSTATIONS

For many utilities, Cable Bus is the preferred choice for feeders connecting the power transformers' LV terminals to the switchgear lineups before the power gets distributed to the distribution circuits.

RENEWABLE ENERGY SOLUTIONS

Solar Plant collector substation links between collector transformers and switchgears.

SOLUTIONS **BY INDUSTRY**

OIL, OIL SANDS & GAS

Historically, Cable Bus has been used at extraction plants, refineries, processing plants, and distribution plants everywhere from the Middle East to Texas; South America to the Arctic.

MINING & METALS

Because of its flexibility and reliability, Cable Bus is a great fit for projects where there may be uncertainty in job site final dimensions. The low losses and balanced line parameters result in better voltage drops and power quality.

ELECTRICAL UTILITIES

Applications for electric utilities include generator main power feeds, station service feeds, FGD feeds, auxiliary feeds, and excitation system feeds.

INDUSTRIAL LOADS

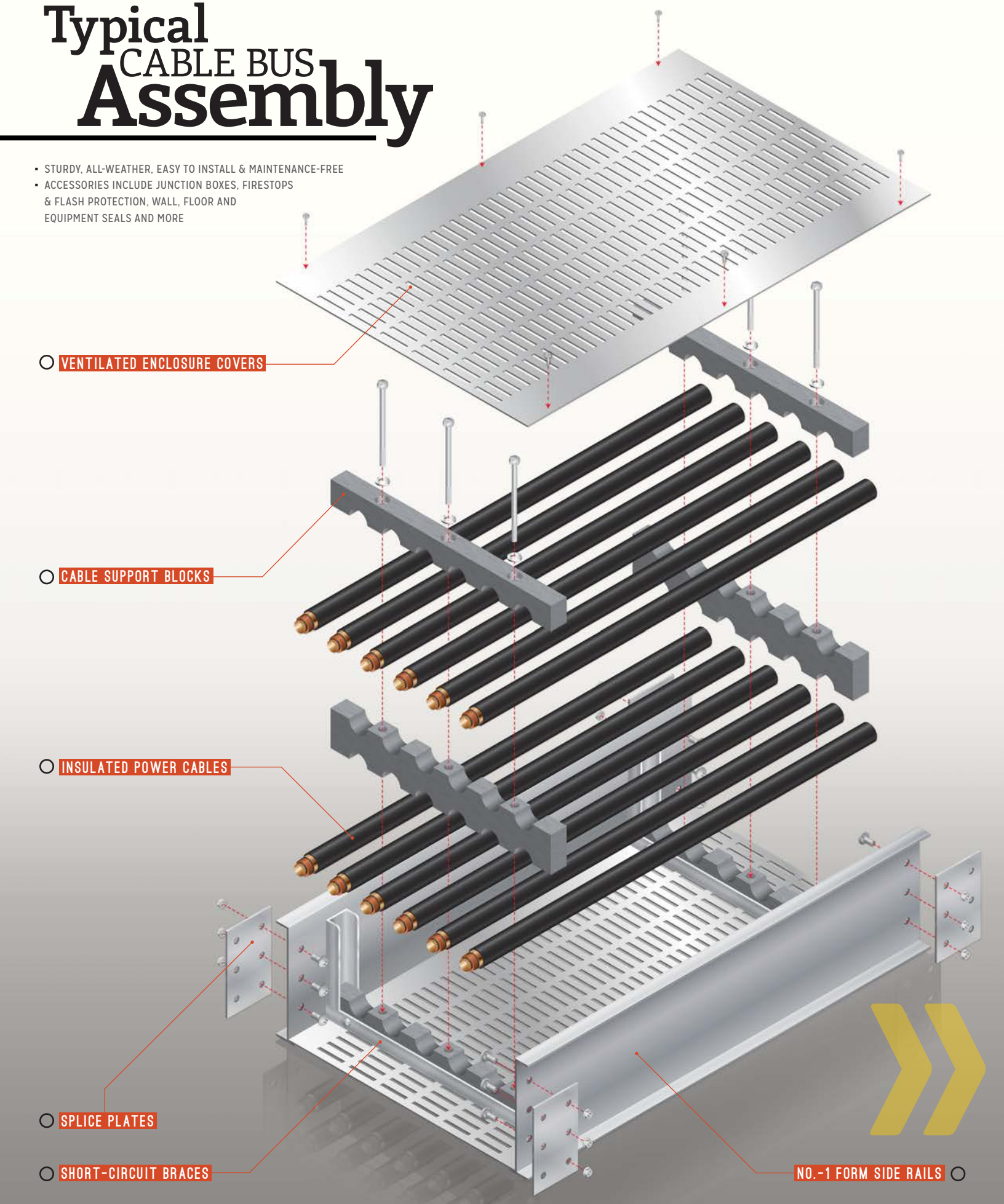
Cable Bus provides economical options for a wide range of voltage and current ratings, especially for main distribution or industrial load feeders.

PUBLIC BUILDINGS

Cable Bus's flexibility allows for feeder designs to fit into a wide range of building design aesthetics and follow odd routes at smaller cross-sections than other types of feeders.

Typical CABLE BUS Assembly

- STURDY, ALL-WEATHER, EASY TO INSTALL & MAINTENANCE-FREE
- ACCESSORIES INCLUDE JUNCTION BOXES, FIRESTOPS & FLASH PROTECTION, WALL, FLOOR AND EQUIPMENT SEALS AND MORE



SYSTEM DESIGN & CONSTRUCTION

6063-T6 ALUMINUM ENCLOSURES

Each Advanced Cable Bus system begins with a compact enclosure design. Once the initial goal of maintaining equal and constant spacing of the system's conductors is reached, the height and width of the enclosure can be customized to suit our clients' spatial requirements.Spacing the conductors appropriately allows the power cables in our systems to operate with a free air rating at maximum ampacity. This reduces the total number of conductors per system, which in turn allows us to minimize the dimensions of the enclosure that houses them.

Every Advanced Cable Bus system is custom designed and manufactured per client specifications. Our standard, all-welded enclosures are made of structural grade 6063-T6 aluminum alloy, which is extremely sturdy and weather-resistant. All our welds are made inside the enclosure, lending a cleaner, more aesthetically pleasing look to the entire system.

Anodized aluminum and steel (hot-dip galvanized after fabrication) enclosures are also available. Please contact our office for more information.

INSULATED POWER CABLES

Single conductor, insulated power cables form the core of every Advanced Cable Bus system. Our systems are designed to employ cable types that are approved for both indoor and outdoor use, ensuring a safe, reliable power supply, regardless of environmental conditions.

Great care is taken to select the proper cables for your project, and Advanced Cable Bus only furnishes cable from manufacturers with outstanding reputations for quality and service. Conductors are selected in reference to each client's specified system voltage class, insulation and jacketing materials, and desired flame test rating. The number of cables used in each system is determined based on the amperage, voltage drop and maximum operating temperature requirements.

Power cables are shipped on large, wooden reels for easy transport, handling and installation.

Top and bottom covers of the Cable Bus enclosure are 50% ventlated to maximize the free air rating of the power cables inside.

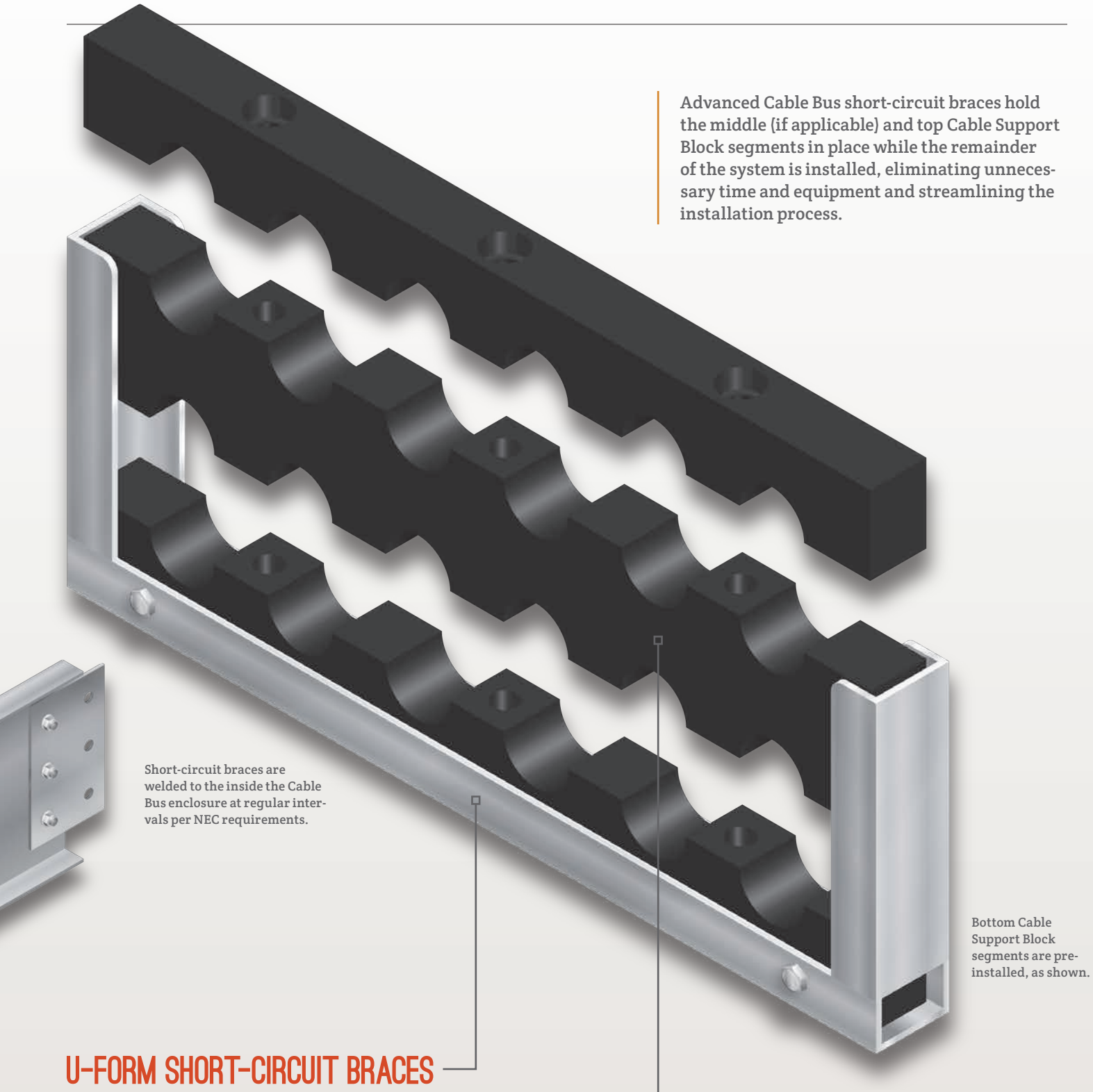
VENTILATED ENCLOSURE COVERS

The top and bottom covers of our enclosures are flat, slotted aluminum sheets with ¼" by 2" openings and 50% open area for maximum ventilation. The bottom covers are factory welded in place to the enclosure side rails, while the top covers are fastened to the housing with self-drilling screws and are easily removable for system inspection. Our short-circuit braces are factory welded to the side rails as well for additional mechanical strength and a more compact housing.

NO.1-FORM ENCLOSURE SIDE RAILS

Advanced Cable Bus system enclosures are manufactured using extruded, structural grade 6063-T6 aluminum side rails. Our uniquely-shaped side rails create a stronger enclosure, which allows for longer spans (up to 20 feet). These longer spans can drastically reduce the amount of support material required for your project.

Advanced Cable Bus short-circuit braces hold the middle (if applicable) and top Cable Support Block segments in place while the remainder of the system is installed, eliminating unnecessary time and equipment and streamlining the installation process.



Short-circuit braces are welded to the inside the Cable Bus enclosure at regular intervals per NEC requirements.

Bottom Cable Support Block segments are pre-installed, as shown.

U-FORM SHORT-CIRCUIT BRACES

Our industry exclusive, U-shaped short-circuit braces lend additional strength and rigidity to the Cable Bus enclosure. Constructed from 6063-T6 aluminum and factory welded to the enclosure side rails, the short-circuit braces serve a dual purpose. Though their primary functions are support and protection, they serve to streamline the Cable Bus installation process as well.

Short-circuit braces hold the cable support blocks in place, helping to maintain conductor spacing. Together with the cable support blocks, they allow our systems to withstand short-circuit mechanical forces of up to 100kA RMS.

Short-circuit braces are also helpful during installation: they allow the power cables and cable support blocks to be installed without the hassle of temporarily installing block clamping bolts until after all of the cables are in place. This is true for both horizontal and vertical bus runs.

CABLE SUPPORT BLOCKS

Each system's power cables are firmly supported within the Cable Bus enclosure by our cable support blocks. Our standard cable support blocks are made from treated hard-rock maple wood, which is primed and coated with fire retardant paint. High-density polyethylene (HDPE) cable support blocks are also available.

Our cable support blocks are high-strength, non-conductive, non-tracking, non-hygroscopic, and will not degrade at high temperatures or in the presence of pollution or ultraviolet light. Our systems are designed to withstand a wide range of environmental conditions and are extremely reliable, boasting an average service life of over 40 years.

ACCESSORIES & CUSTOMIZATION

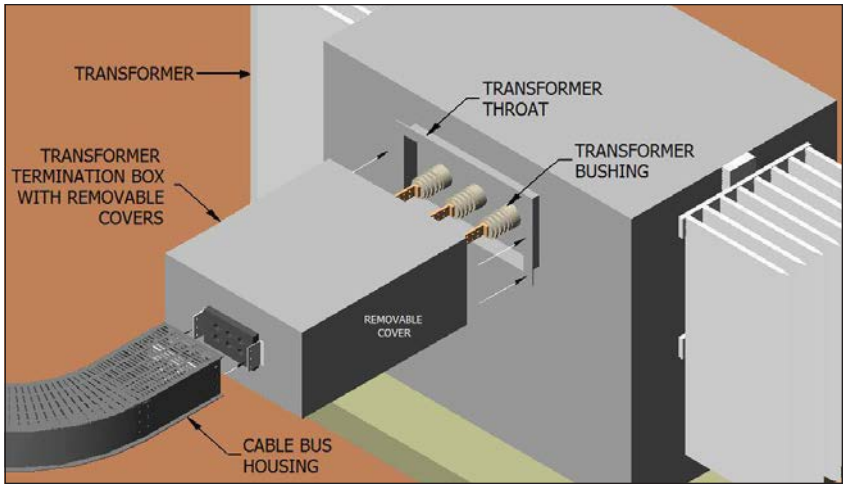
Every project is unique. We provide the necessary equipment to ensure your project is accomplished in a cost-effective, timely manner, and your Cable Bus system runs reliably as soon as it's powered-up. In addition to all of the accessories listed below, we can provide flash barriers (for Arc Resistant Switchgear), flexible joints (when vibration is an issue) and copper bus bars. We are here to provide the engineering, expertise and equipment to see that your project is a success. Our default enclosure material is high-strength, 6063-T6, structural grade aluminum alloy. The No. 1 Form Side Rails are extruded, and the Top and Bottom Covers are flat, ventilated sheets. Aluminum enclosures can be powder-coated or anodized. Stainless steel, and hot-dipped, galvanized (after fabrication) steel are also available.

STANDARD ACCESSORIES

Termination Boxes

We can design and build junction boxes to meet your unique system requirements. Tap Boxes, transformer Termination Boxes and switchgear/MCC top hats can all be customized to provide the necessary space to complete the installation. The boxes are constructed from aluminum angle frames—seam welded for outdoor applications, stitch welded for indoor applications—and have removable panels for easy access.

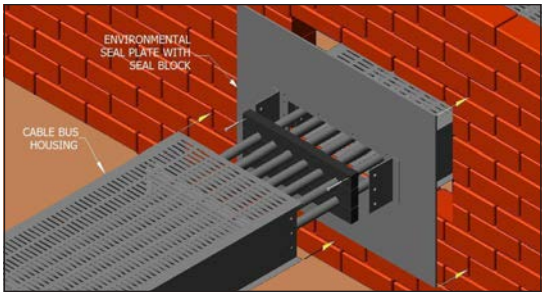
Advanced Cable Bus Termination Boxes ensure sufficient space is available to terminate conductors to electrical equipment. Outdoor boxes use gasketed, removable panels, fully seam welded fixed panels, and an HDPE equipment seal block to ensure a watertight enclosure.



MCT Firestops

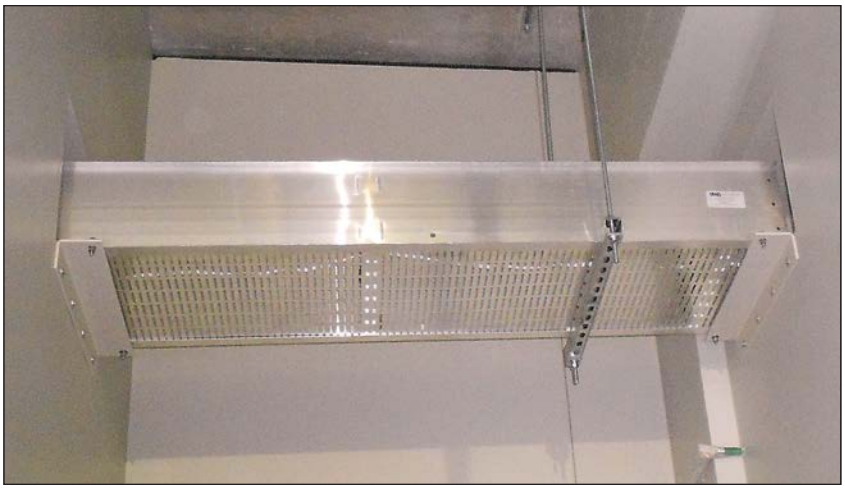
We use MCT (Multi Cable Transit) type Fire Stops to provide a 2-hour rated, UL listed fire barrier. MCT seals are used when an absolutely watertight fitting is required. All installation hardware included.

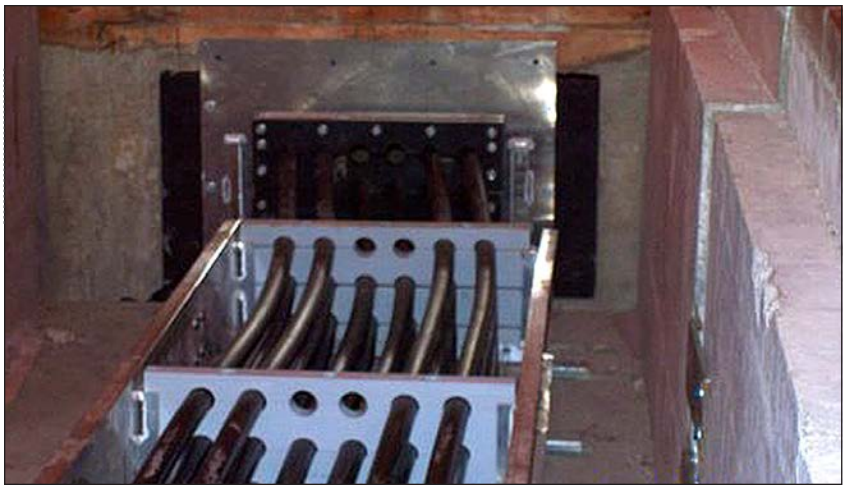
IMMEDIATE RIGHT—Installed Advanced Cable Bus system featuring a ***firestop/wall seal***.



Environmental Seals

Our Environmental Seals form a watertight seal with walls when a fire barrier is not required. They can also be used for floor penetrations that must be watertight. We have the standard square opening type seals with seal blocks, as well as cable gland type seals available. For the square opening type, conductors are sealed with Silicone sealant. Entrance fittings are furnished with all necessary hardware. Neoprene or high-density polyethylene (HDPE) blocks are inserted after the cables are installed for ease of pulling. Environmental seals with cable glands will consist of the seal plates with openings made for each cable, and cable glands provided for each cable's passage through the seal. Selection of seal type will depend on application type and the Cable Bus configuration, as different types of seals will have different drawbacks and strengths.

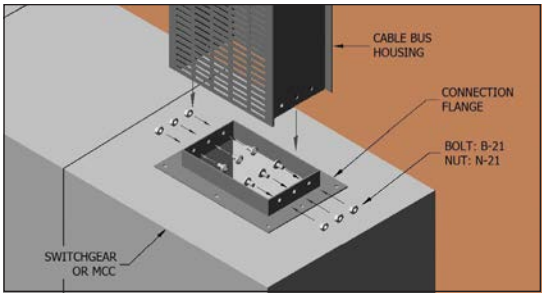




IMMEDIATE LEFT—Installed Advanced Cable Bus system featuring two sequential ***wall penetrations/seal***s with ***firestops***.
LOWER LEFT—Installed Advanced Cable Bus system (in a trench) featuring a ***wall penetration/seal***.

Connection/Bus End Flanges

Connection Flanges are used to connect the Cable Bus housing to the indoor electrical equipment (switchgear, motor control center, etc.) These flanges are open flanges and do not provide any environmental protection.



CABLE ACCESSORIES

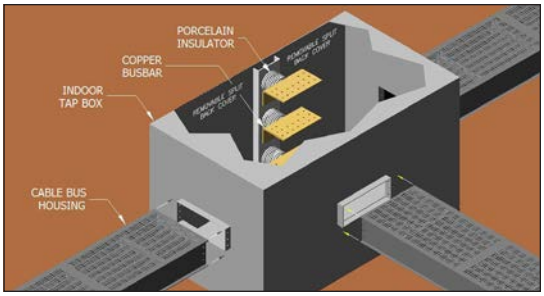
Termination Lugs

NEMA standard Two- and Four-Hole Long Barrel compression lugs are used to terminate the power cables to the bus bars inside of electrical equipment. Each termination comes complete with Silicon Bronze termination hardware to attach the lugs to the termination points and ensure a reliable connection.

Termination Kits

Termination Kits are available in both heat shrink and cold shrink types and can be used either indoors or outdoors. Termination Kits are provided for projects that use medium voltage cables rated 5kV and over. The type of termination kits can be specified by the client or stated in the project technical specifications.

SPECIAL ACCESSORIES



Tap Boxes

Tap Boxes allow for intermediate load tapping. The design provides system voltage rated air separation between live parts and adjacent surfaces to eliminate the necessity of tapping all energized components. Typical Tap Boxes consist of an aluminum-framed enclosure, removable covers (gasketed for outdoor applications), porcelain or epoxy post stand-off insulators, and bus bars.

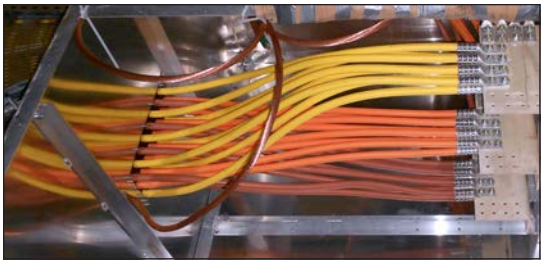
RIGHT—Installed Cable Bus system featuring a custom ***tap box***.

Flexible Connectors

Flexible connectors are provided for Cable Bus enclosure bends or connections where there are small and uncertain angles, or if there are expected vibrations at the connection point. The flexible connectors are manufactured as two connection flanges placed back-to-back with a rubber bellows between them that will act as the flexible element.

Adapter Bus Bars

Adapter bus bars are items that may be required when the available terminal points of an equipment do not fit with the cable terminals. This situation sometimes occur when the project involves retrofitting older equipment or connecting Cable Bus to an equipment that was previously connected to rigid bus ducts. Adapter bus bars are designed and fabricated in order to accommodate the equipment's terminal hole pattern on one side, and the hole pattern of the cable termination lugs on the other end.



ABOVE—Factory standard ***flexible connector*** for seismically active job sites or vibration concerns.
LEFT—Interior of a typical ***tap box*** showing conductors and terminations.

ENGINEERING CALCULATIONS & TESTS

THE ENCLOSURE OF A CABLE BUS SYSTEM IS DESIGNED TO WITHSTAND UP TO 100 KA SYMMETRICAL SHORT-CIRCUIT CURRENT.

The cable configuration is designed to balance the current in each individual conductor and allow the cables to operate at their highest efficiency, where losses and imbalances between individual conductors are minimized. To ensure an efficient, dependable, high-quality installation, every Advanced Cable Bus system is fully engineered with particular emphasis placed on power cables, phasing arrangement and system balance, short-circuit capacity, and grounding requirements. Each one of these key design considerations must be analyzed separately to determine how it affects the design of the overall electrical system.

SHORT-CIRCUIT CAPACITY

A Cable Bus system must be able to withstand the mechanical forces created by short-circuit currents. These forces are transferred from the conductors to the cable supports. The support elements in an Advanced Cable Bus system include the cable support blocks, Short-circuit braces and enclosure.

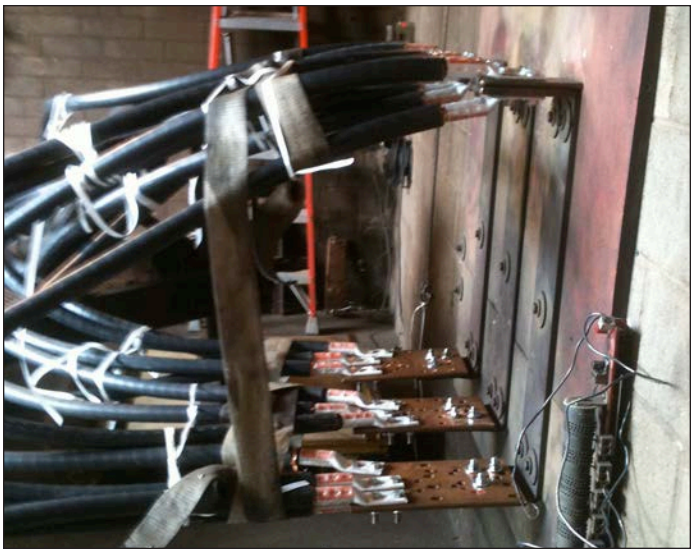
Short-circuit currents are made up of two parts: a symmetrical AC component and a rapidly decreasing DC component. Cable Bus systems are designed to have the mechanical strength to withstand the maximum instantaneous current and the symmetrical current which may last several cycles. The symmetrical current is the actual value that the circuit breaker will interrupt.

Since Cable Bus systems are often used for main feeder connections (e.g. substation or generator to switchgear, load centers and high voltage machines), the available short-circuit current will be that of the utility or generator supply through the transformers. In some cases, the Cable Bus system feeds large motors, and the motor contribution to potential short-circuit forces must also be considered. Numerous tables are available listing motor contributions for various operating conditions.

SHORT-CIRCUIT TESTS & DATA

The tests performed on a prototype 15kV 4000A Cable Bus were conducted similar to the tests outlined in IEEE C37.23. The tests were conducted on a 3 phase, 60 Hz circuit. One end of the Cable Bus was connected to the source terminals, and the other was short-circuited to create a three phase bolted fault.

Advanced Cable Bus systems have been subjected to currents of 100,000 RMS symmetrical amperes with instantaneous peaks greater than 200,000 amperes. The Cable Bus system withstood the mechanical forces of the test without any damage to the cables, support blocks or enclosure. We are also able to supply type test reports, which demonstrate the short-circuit withstand capabilities and temperature rise data of a prototypical Cable Bus system.



ABOVE—A short-circuit test being run on an Advanced Cable Bus system.

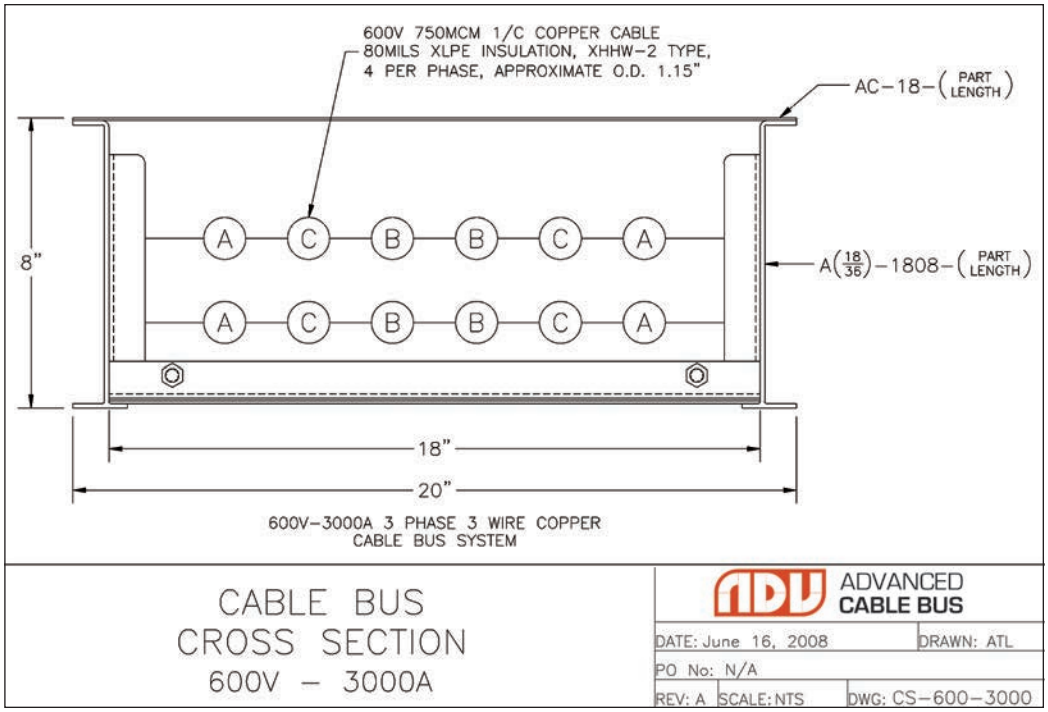
ABOVE—A temperature rise test being run on an Advanced Cable Bus system.

TEMPERATURE RISE TESTS & DATA

Temperature rise testing based on the IEEE C37.23 standard is performed on Cable Bus prototypes in order to demonstrate the Cable Bus system's ability to operate without exceeding temperature rise limits. These tests also act as proof that the ampacity calculations and temperature rise calculations are a valid approximation of the physical system. The testing is done at a third-party lab and is witnessed. For system ratings that were not tested, Advanced Cable Bus can provide heat-rise calculations, based on the client's installation configuration, showing the temperature rise of the conductors. Test reports of physically tested systems are available upon request. Please contact the factory for more information.

CABLE BUS SYSTEM CALCULATIONS

Inductive Reactance calculations are available for every project. Based on the Carson's Line method of calculation and written using MATLAB codes and actual cable data, the Inductive Reactance Program outputs include the amount of current distributed through each cable, voltage drops, power losses, three-phase impedance and symmetrical component impedances. Please contact the factory for more information.



SYSTEM BALANCE & PARALLEL CONDUCTORS

The spacing of the conductors in a Cable Bus system is one cable diameter (i.e. one to three inches). The objective of the Cable Bus design is to obtain the optimum balance for an electrical circuit using parallel conductors with no transposition and minimal imbalance.

Advanced Cable Bus is designed for balance of conductors within a phase (intra-phase) and balance between the phases (interphase). Many phasing arrangements will provide inter-phase balance of currents due to the load impedance, but the majority of these phasing arrangements do not provide intra-phase current imbalance. The Advanced Cable Bus design provides a phasing arrangement that achieves interphase current balance, as well as intra-phase current balance, therefore reducing the amount of parallel conductor imbalance to a minimum. This helps prevent hot spots in the electrical circuits that can be caused by cables in the same phase being unbalanced.

Parallel conductors (more than one per phase) can be used to an advantage in Cable Bus systems where large conductor sizes are encountered. The ampacity per circular mil of conductor decreases as the circular mil of conductor increases. Smaller conductors running parallel are more flexible during installation and have greater current carrying capability than fewer, larger conductors.

GROUNDING CONSIDERATIONS

An Advanced Cable Bus system must protect both life and property against faults caused by electrical disturbances. Lightning, electrical system failures and failures in the system's corrective equipment all constitute possible fault hazard locations. For this reason, all metal enclosures of the system, as well as non-current carrying or neutral conductors, should be tied together and reduced to a common potential. This includes the structural steel of the building, water, steam and gas piping.

All Advanced Cable Bus systems should be grounded to the substation or building ground grid through the Cable Bus support materials. Cable Bus should also be grounded to the equipment or switchgear enclosure by means of the connection accessory.

It is an accepted fact that ground currents tend to concentrate near power conductors and that cable enclosures take a large portion of the ground currents; therefore, it is important to consider Cable Bus as a major carrier of ground currents. The Cable Bus enclosure is designed to be able to carry large ground currents and is grounded in accordance with NEC 250. ■

ABOVE—Cable Bus system with ***external grounding cable*** and ***firestop/wall seal***.

CABLE BUS VS. ALTERNATIVES

■ **CABLE BUS IS A COMPETITIVE** alternative to conventional, non-segregated phase bar bus, cable tray with armored cable, and conduit and wire systems. This is because of its lower cost, higher reliability, greater flexibility, easier installation and longer life expectancy.

■ **THE TABLE TO THE RIGHT** quantifies the difference in ampacity accommodated by Cable Bus systems, as compared to cables in tray and cables in conduit. Cable Bus accommodates significantly higher ampacities than both alternatives for every system rating and conductor size listed.

AMPACITY COMPARISON: *Advanced Cable Bus vs. the Field*

SYSTEM RATING	CONDUCTOR SIZE	ADVANCED CABLE BUS SYSTEMS	INTERLOCKED, ARMORED CABLE IN TRAY	3 SINGLE-CONDUCTOR CABLES IN CONDUIT/AIR
600V	500 MCM	637 AMPS	405 AMPS	477 AMPS
	750 MCM	805 AMPS	500 AMPS	598 AMPS
	1000 MCM	960 AMPS	585 AMPS	689 AMPS
5kV	500 MCM	688 AMPS	425 AMPS	473 AMPS
	750 MCM	889 AMPS	525 AMPS	579 AMPS
	1000 MCM	1061 AMPS	590 AMPS	659 AMPS
15kV	500 MCM	678 AMPS	470 AMPS	481 AMPS
	750 MCM	872 AMPS	570 AMPS	588 AMPS
	1000 MCM	1040 AMPS	650 AMPS	677 AMPS

When compared with conduit-and-wire

systems and cables-in-tray systems, Cable Bus systems will require fewer cables or smaller cables in order to carry the same current rating. This is because Cable Bus systems are designed with maintained spacing and ventilation that allows the cables to operate with the free-air rating ampacity, higher than the allowable ampacities for other systems. Cable Bus systems also use less conductor mass than the bus duct systems of the same rating.

The cost of installing a Cable Bus

system is comparable to installing similarly sized cables in tray. The main difference is that Cable Bus systems include cable support blocks and top covers on the enclosures. Cables in tray, on the other hand, often require fasteners to hold cables in place. Cables in tray also require greater quantities of cable to transmit the same amount of power. The main labor savings for Cable Bus systems compared to cables-in-tray and conduit-and-wire systems is the reduction in number of cables being installed.

The cost of enclosures for Cable Bus systems is often higher than for cables in tray or cables in conduit. Whereas the latter systems are produced as bulk commodities, Cable Bus systems are uniquely engineered per project. These higher enclosure costs, however, are more than offset by the smaller sizes and lesser quantities of conductors that Cable Bus systems require.

Cable Bus is the only type of installation for which the manufacturer's design guarantees the conductor currents will have the best possible balance of individual conductor loading.

Additionally, Cable Bus has marked flexibility in routing and design. Odd lengths, uncertain connection points, and non-standard elbow angles are not an issue. Cable Bus systems can also feature hinged splice plate, to accomodate movement if necessary. Additional cable and extra enclosure parts are supplied standard with every project to accomodate for any last minute variations encountered in the field.

Similarly to other power distribution feeder systems, Cable Bus can be used for medium- as well as low-voltage applications. Cable Bus systems can be designed to carry 5,000 Amps and higher, similar to bus ducts and cables in conduits.

Enclosure size is the area in which Cable Bus systems really begin to pull away from the pack. The largest Cable Bus system thus far measured 26" (66.04 cm) wide × 12" (30.48 cm) tall. A bus duct system with comparable ratings typically measures 36" (91.44 cm) wide × 18" (45.72 cm) tall. Cables in tray with ratings up to 5,000 Amps often require multiple tray runs. At higher current ratings, cables in conduit require additional space due to the additional conduit runs needed.

Fault current withstand testing for Cable Bus systems follows the same standard as bus duct systems; the two systems therefore have comparable fault current withstand capabilities. By contrast, cables in tray and cables in conduit require special cable cleats or special installation techniques in order to meet higher short-circuit withstand parameters.

Cable Bus systems are similar to bus duct systems in that all engineering drawings and electrical calculations corresponding to the finished Cable Bus run(s) are provided standard to the customer.

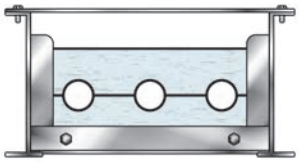
In sum, the strength, durability, and reliability of Cable Bus systems are similar to those of rigid bus ducts, but Cable Bus systems are more compact and flexible. ■

TYPICAL SYSTEM CROSS-SECTIONS & DIMENSIONS

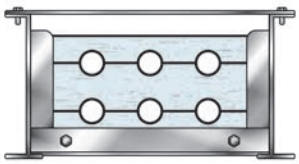
600V ENCLOSURE DIMENSIONS BY AMPACITY

FIGURE	TYPICAL AMPACITY	ENCLOSURE HEIGHT	NOMINAL (BOTTOM COVER) WIDTH	TOP COVER WIDTH	NUMBER OF POWER CABLES	CONDUCTOR SIZE
A	800 Amps	6"	10"	12"	3	300 MCM
B	1200 Amps	6"	10"	12"	6	500 MCM
B	1600 Amps	6"	10"	12"	6	750 MCM
C	2000 Amps	6"	16"	18"	12	500 MCM
C	2500 Amps	6"	16"	18"	12	500 MCM
D	3000 Amps	6"	18"	20"	12	750 MCM
E	3500 Amps	10"	16"	18"	15	750 MCM
F	4000 Amps	10"	18"	20"	18	750 MCM
G	4500 Amps	10"	20"	22"	21	750 MCM
H	5000 Amps	10"	24"	26"	24	750 MCM
I	6000 Amps	10"	24"	26"	27	750 MCM

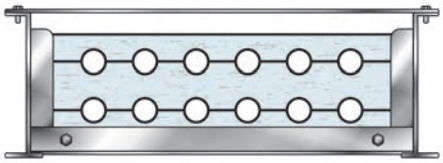
A



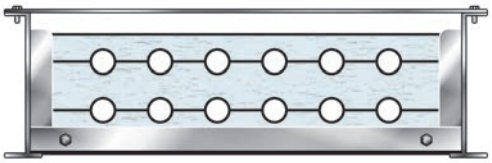
B



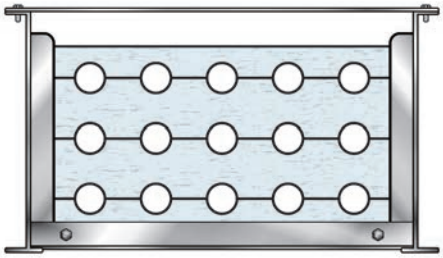
C



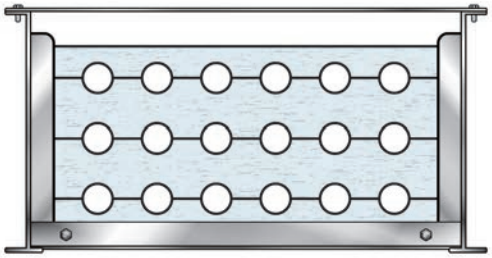
D



E



F

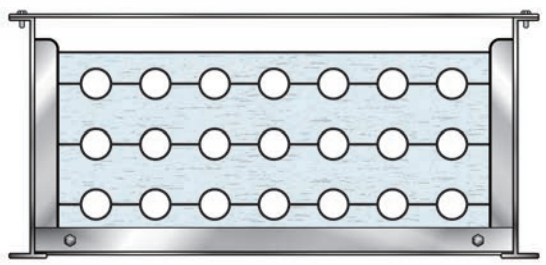


5KV ENCLOSURE DIMENSIONS BY AMPACITY

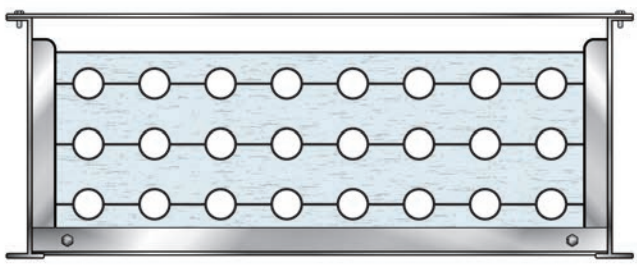
FIGURE	TYPICAL AMPACITY	ENCLOSURE HEIGHT	NOMINAL (BOTTOM COVER) WIDTH	TOP COVER WIDTH	NUMBER OF POWER CABLES	CONDUCTOR SIZE
A	800 Amps	6"	10"	12"	3	300 MCM
B	1200 Amps	6"	10"	12"	6	500 MCM
J	1600 Amps	8"	10"	12"	6	750 MCM
K	2000 Amps	8"	18"	20"	12	500 MCM
K	2500 Amps	8"	18"	20"	12	500 MCM
L	3000 Amps	8"	20"	22"	12	750 MCM
M	3500 Amps	10"	18"	20"	15	750 MCM
N	4000 Amps	10"	24"	26"	18	750 MCM
O	4500 Amps	10"	24"	26"	21	750 MCM
P	5000 Amps	10"	26"	28"	24	750 MCM

NOTE: All cross-sections and dimensions are based on ***3 Phase/3 Wire systems***, without system ground, with a standard operating temperature of 90°C (194°F) in a 40°C (104°F) ambient environment. For information on other system ratings and non-standard site conditions, please contact our factory.

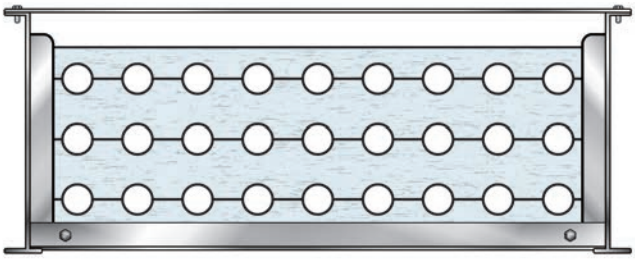
G



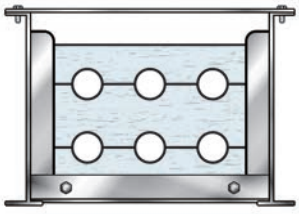
H



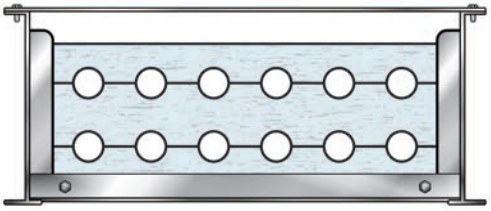
I



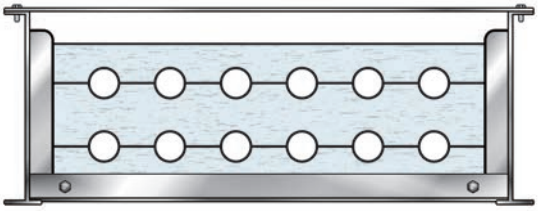
J



K



L

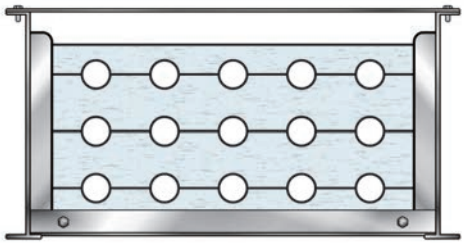


15KV ENCLOSURE DIMENSIONS BY AMPACITY

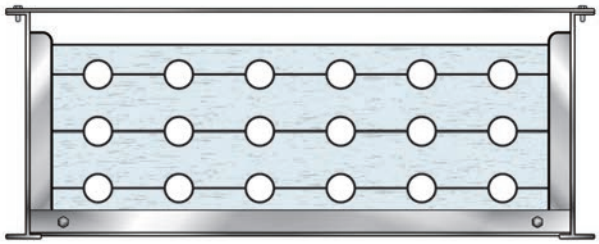
FIGURE	TYPICAL AMPACITY	ENCLOSURE HEIGHT	NOMINAL (BOTTOM COVER) WIDTH	TOP COVER WIDTH	NUMBER OF POWER CABLES	CONDUCTOR SIZE
A	800 Amps	6"	10"	12"	3	300 MCM
J	1200 Amps	8"	10"	12"	6	500 MCM
Q	1600 Amps	8"	12"	14"	6	750 MCM
R	2000 Amps	8"	24"	26"	12	500 MCM
R	2500 Amps	8"	24"	26"	12	500 MCM
R	3000 Amps	8"	24"	26"	12	750 MCM
S	3500 Amps	12"	18"	20"	15	750 MCM
T	4000 Amps	12"	24"	26"	18	750 MCM
U	4500 Amps	12"	24"	26"	21	750 MCM
V	5000 Amps	12"	28"	30"	24	750 MCM

NOTE: All cross-sections and dimensions are based on ***3 Phase/3 Wire systems***, without system ground, with a standard operating temperature of 90°C (194°F) in a 40°C (104°F) ambient environment. For information on other system ratings and non-standard site conditions, please contact our factory.

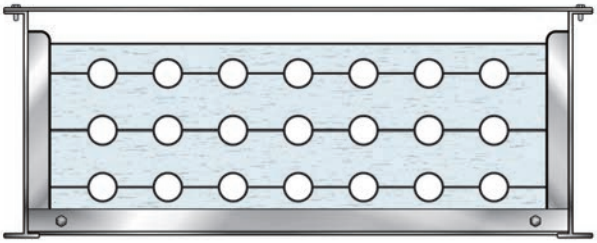
M



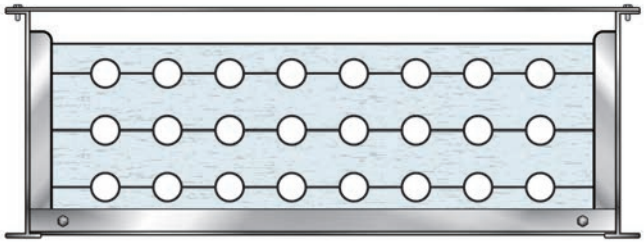
N



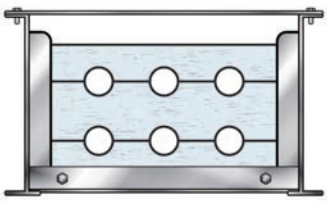
O



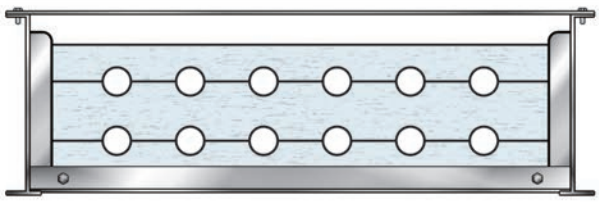
P



Q



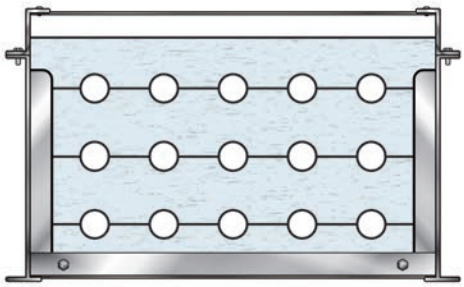
R



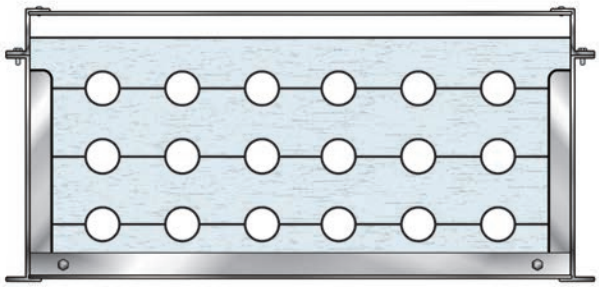
35KV ENCLOSURE DIMENSIONS BY AMPACITY

FIGURE	TYPICAL AMPACITY	ENCLOSURE HEIGHT	NOMINAL (BOTTOM COVER) WIDTH	TOP COVER WIDTH	NUMBER OF POWER CABLES	CONDUCTOR SIZE
W	800 Amps	6"	12"	14"	3	500 MCM
Q	1200 Amps	8"	12"	14"	6	500 MCM
X	1600 Amps	8"	18"	20"	9	500 MCM
R	2000 Amps	8"	18"	20"	12	500 MCM
R	2500 Amps	8"	24"	26"	12	500 MCM
S	3000 Amps	12"	18"	20"	15	500 MCM
T	3500 Amps	12"	24"	26"	18	500 MCM

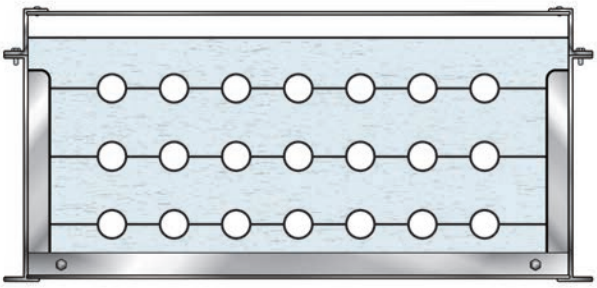
S



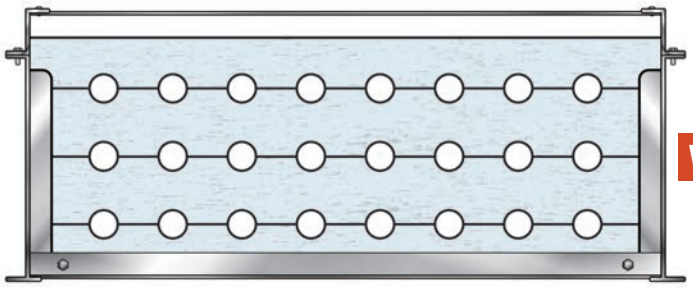
T



U



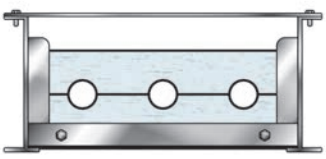
V



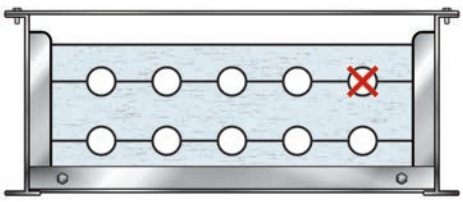
FIGURES S, T, U, and V: The side members of our 12" tall Cable Bus enclosures are assembled in two parts. ***"Z" members*** are used to increase the height of our standard No. 1 Form Side Rails without compromising structural integrity or electrical continuity.

FIGURE X: There are 9 power cables in our ***35kV-1600A and 35kV-2000A*** systems. The 10th bore in the cable support blocks is left empty.

W



X



TYPICAL ELBOW/OFFSET DIAGRAMS & DIMENSIONS

● ***HORIZONTAL & VERTICAL ELBOWS ARE CURVED*** to follow the bending radius of the power cables perfectly. The inside radius of the elbows is determined according to the minimum bending radius of the selected power cables and design space requirements. Standard horizontal and vertical elbows come in 15°, 30°, 45°, 60° and 90° bends. Custom elbows are also available to meet your specific job requirements.

● ***THE INSIDE RADIUS OF AN ELBOW*** shall not be less than the minimum bending radius of the power cables it will house. This is true for both horizontal and vertical elbows. Corresponding inside and outside radii listed in the tables above are typical for elbows of all degree measures.

TYPICAL HORIZONTAL ELBOW DIMENSIONS

NOMINAL WIDTH	TOP COVER WIDTH	INSIDE RADIUS	OUTSIDE RADIUS
10"	12"	12"	22"
10"	12"	18"	28"
10"	12"	24"	34"
10"	12"	36"	46"
12"	14"	12"	24"
12"	14"	18"	30"
12"	14"	24"	36"
12"	14"	36"	48"
16"	18"	12"	28"
16"	18"	18"	34"
16"	18"	24"	40"
16"	18"	36"	52"
18"	20"	12"	30"
18"	20"	18"	36"
18"	20"	24"	42"
18"	20"	36"	54"
20"	22"	12"	32"
20"	22"	18"	38"
20"	22"	24"	44"
20"	22"	36"	56"
24"	26"	12"	36"
24"	26"	18"	42"
24"	26"	24"	48"
24"	26"	36"	60"

NOTE: The ***nominal width*** of a ***horizontal elbow*** refers to the width of the ***bottom cover*** of the Cable Bus enclosure. Corresponding top covers are 2" wider, enabling them to span the 1" flange at the top of each No. 1-Form Side Rail. The positions of these flanges are indicated on the ***Typical 90° Horizontal Elbow*** diagram (opposite page) by dashed lines. Top and bottom cover widths are listed in the table above for your convenience.

TYPICAL VERTICAL ELBOW DIMENSIONS

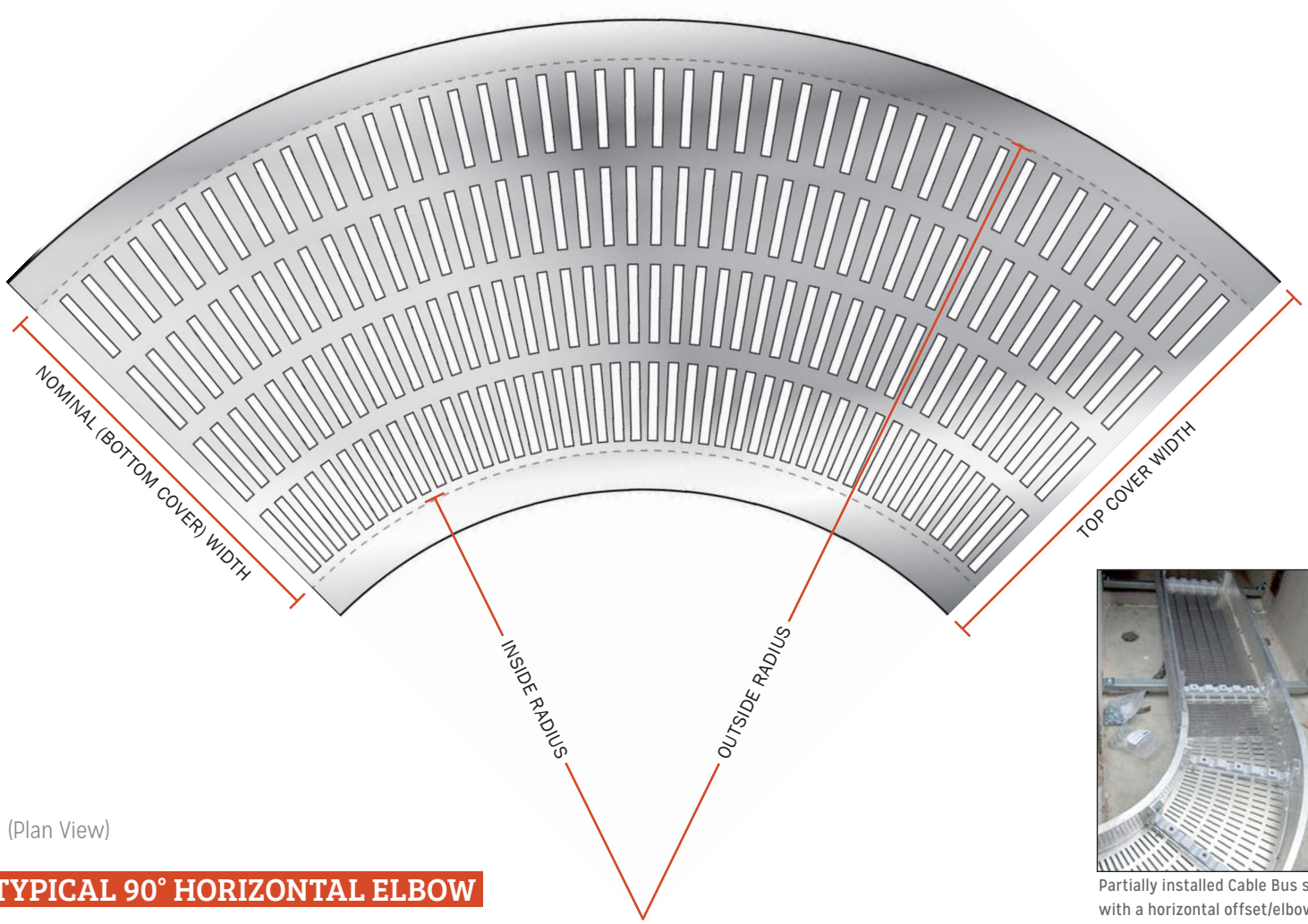
ENCLOSURE HEIGHT	INSIDE RADIUS	OUTSIDE RADIUS
6"	12"	18"
6"	18"	24"
6"	24"	30"
6"	36"	42"
8"	12"	20"
8"	18"	26"
8"	24"	32"
8"	36"	44"
10"	12"	22"
10"	18"	28"
10"	24"	34"
10"	36"	46"
12"	12"	24"
12"	18"	30"
12"	24"	36"
12"	36"	48"

VERTICAL OUTSIDE ELBOW:

The top cover of the Cable Bus enclosure is positioned along the *outside radius* of the elbow, as shown on the *Typical 90° Vertical Outside Elbow* diagram (opposite page, left).

VERTICAL INSIDE ELBOW:

The top cover of the Cable Bus enclosure is positioned along the *inside radius* of the elbow, as shown on the *Typical 90° Vertical Inside Elbow* diagram (opposite page, right).



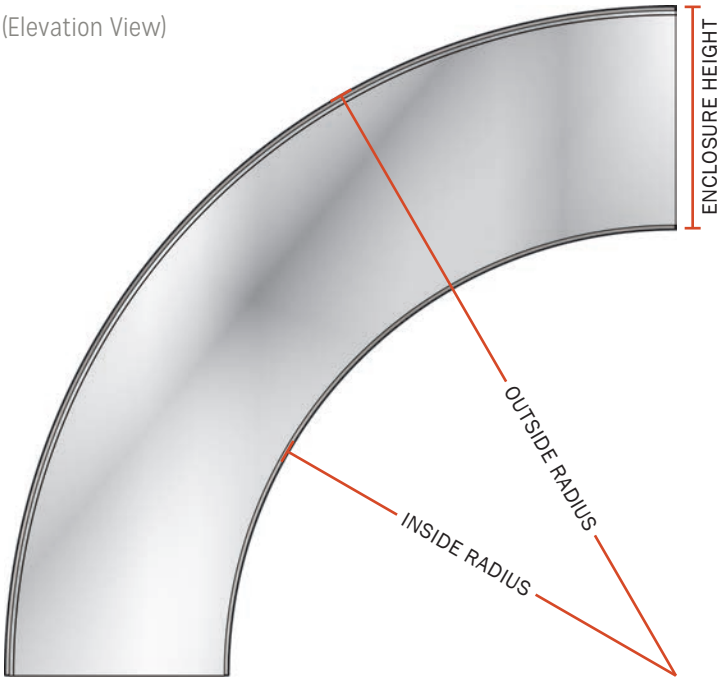
(Plan View)

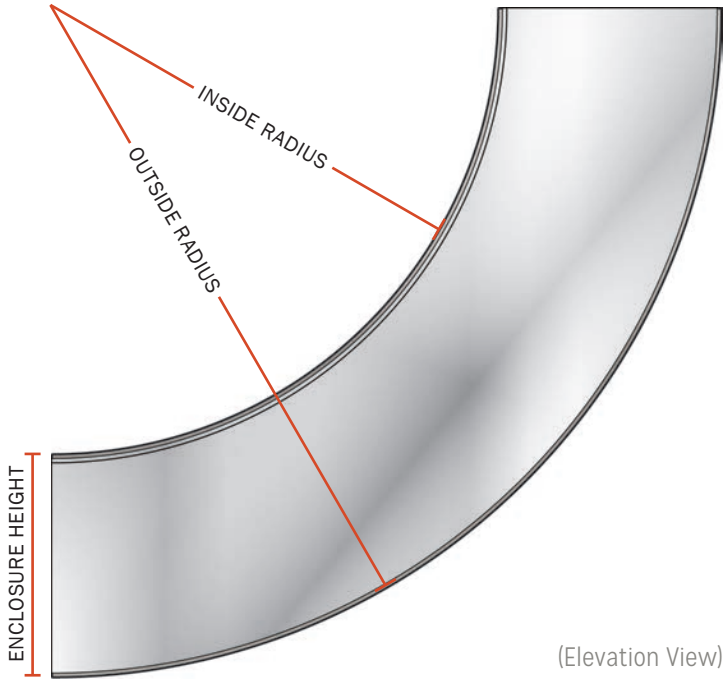
TYPICAL 90° HORIZONTAL ELBOW

Partially installed Cable Bus system with a horizontal offset/elbow.

TYPICAL 90° VERTICAL OUTSIDE ELBOW

(Elevation View)





(Elevation View)

TYPICAL 90° VERTICAL INSIDE ELBOW

STANDARD CABLE BUS SYSTEM SPECIFICATIONS

GENERAL CABLE BUS SPECIFICATIONS

1. A complete, metal-enclosed Cable Bus system will be provided, including enclosure sections, insulated conductors, and all necessary accessories. Accessories may include, but are not limited to: fittings, equipment seals, wall/floor seals, fire stops, termination boxes, tap boxes, connection (bus end) flanges, termination lugs, termination kits, grounding accessories, and installation hardware.

   The Cable Bus system and all of its components will be suitable for indoor and outdoor use. Adequate ventilation, and a minimum distance of one (1) cable diameter between conductors, will be maintained throughout the system.

2. All elements of the Cable Bus enclosure will be fabricated so as to eliminate any sharp edges that might damage conductor insulation or injure personnel.

3. The Cable Bus system will be designed and manufactured in the United States of America by Advanced Cable Bus, Inc.

CONSTRUCTION SPECIFICATIONS

1. The Cable Bus enclosure will be aluminum*, of welded construction and ventilated design, with No. 1 Form Side Rails manufactured from extruded, 6063-T6 aluminum alloy. The maximum allowed stress to be used in design is 10,000 PSI.

2. Top and bottom covers of the Cable Bus enclosure will be slotted for ventilation. Ventilation openings will comprise 50% of the covers' surface area, and openings will be sized to prevent a quarter-inch (¼") rod from penetrating the Cable Bus enclosure. Top covers will be fastened to the Cable Bus enclosure with No. 10 self-drilling screws, spaced 24 inches (on centers), allowing the covers to be easily removed for system inspection. Bottom covers will be factory installed and welded to the adjacent Side Rails to form an integral part of the Cable Bus enclosure.

3. Each system's elbows (offsets) will be designed to accommodate the cable type selected for that system. In no instance will the inside radius of an elbow be less than the minimum bending radius of the cable it will house.

4. The splice joints that span adjoining sections of the Cable Bus enclosure will be reinforced with high-pressure bolts to ensure that structural integrity is maintained.

5. Cable support blocks will be designed in segments, and will maintain a minimum distance of one (1) cable diameter between conductors in both vertical and horizontal planes. This spacing will allow the Cable Bus system to obtain a Free Air rating.

   The Cable Bus enclosure will be designed with cable support blocks throughout, spaced 36 inches (on centers) in horizontal straight sections, and 18 inches (on centers) in vertical straight sections and elbows. The cable support blocks will prevent the power cables from moving and/or incurring damage during short-circuit conditions. Cable Bus systems will be rated to withstand short-circuit forces of 100kA (100,000 amperes) RMS symmetrical.

ELECTRICAL SPECIFICATIONS

1. The Side Rails of the Cable Bus enclosure will be capable of carrying a continuous current rating of 1kA (1,000 amperes) without exceeding a 40°C temperature rise above ambient. Resistance across Cable Bus enclosure splice joints will not exceed 50 microhms. The Cable Bus enclosure will be grounded at sufficient intervals to prevent potential above ground from occurring in the event of a fault.

2. Current conductors will be single conductor cables, insulated for an operating temperature of 90°C (in wet or dry locations) in accordance with ICEA P-46-426 interim STD #1 & 2 of ICEA publication #S-66-524, based on the specified system voltage and amperage.

3. Conductors within the Cable Bus enclosure will have a specific phasing arrangement designed to minimize current imbalance between conductors, maintain a low-impedance power system, and minimize inter-phase and intra-phase imbalance.

4. Interleaving of conductors within the Cable Bus enclosure will not be permitted. All current-carrying conductors are to be continuous (without any intermediate splices), and are to be pulled into place after the Cable Bus enclosure has been installed. Electrical connections will be made at equipment and/or tap points only. All cable termination materials will be furnished by Advanced Cable Bus, Inc.

5. Current balance and temperature rise calculations will be made available upon request, in support of Advanced Cable Bus, Inc. Electrical Specifications #2 & 3 (above).

* Anodized aluminum and steel (hot-dip galvanized after fabrication) enclosures are also available. Please contact our office for more information.

QUALIFICATIONS, STANDARDS & PROTOCOLS

● ***CABLE BUS IS DEFINED*** by the National Electric Code (Article 370) for use in the US, and the design and testing of Cable Bus systems by Advanced Cable Bus, Inc. is based on the IEEE C37.23 standard which covers the testing for busways, switchgear, and controlgear for short-circuit and temperature rise. Cable Bus subcomponents are also designed and manufactured in accordance with their respective standards.

● ***ADVANCED CABLE BUS, INC.*** can make design modifications within the listed parameters in order to meet client specifications and accommodate special requirements. Please note that Cable Bus systems can be sold and installed in locations that require compliance with IEC standards as well. Although there are no IEC standards that explicitly cover Cable Bus systems, Advanced Cable Bus can select components based on their adherence to relevant IEC standards and design a suitable system. Please contact the factory for additional information.

DESIGN STANDARDS FOR CABLE BUS SYSTEMS & COMPONENTS

SYSTEM OR COMPONENT	QUALIFICATIONS & STANDARDS
Cable Bus System–**DESIGN & AMPACITY**	NEC 370 NEC Table 310.15(B)(17) CSA CEC Tables 1 and 5A IPCEA P-46-426, IEEE 835 NEMA VE-1, NEMA VE-2
Cable Bus System–**SHORT-CIRCUIT & TEMPERATURE RISE**	IEEE C37.23 CSA CEC Part 1, C22.2 No. 27-10 (see below)
POWER CABLES *Actual specifications vary on a project-by-project basis. List to the right is partial and includes medium voltage and low voltage cables.*	ASTM B-3, ASTM B-496 ICEA S-95-658, ICEA S-93-639, ICEA S-97-682 AEIC CS8 NEMA WC-70, NEMA WC-74 UL 44, UL 854, UL 1581, UL 1072 IEEE 383, IEEE 1202 CSA FT1 and FT4, CSA C68.3
FIRE-RATED WALL PENETRATIONS	*Qualifications and test reports available from:* UL CSA American Bureau of Shipping (ABS) Det Norske Veritas (DNV) Lloyd's Register of Shipping US Navy
CABLE TERMINATION LUGS	UL 468A-468B CSA Listed & Approved
SYSTEM GROUNDING	NEC 250
MEDIUM VOLTAGE CABLE TERMINATION	IEEE 48

UNDERWRITERS LABORATORIES, USA

Underwriters Laboratories (UL) does not have a classification file specifically for Cable Bus systems. However, there are UL classifications for all of the component parts, including power cables, cable terminations, fire-stops, and Cable Bus enclosure parts.

Cable Bus enclosure side-rails are tested and classified by UL as grounding path in accordance with NEMA VE1 and NEC 392.60.

CANADIAN STANDARDS ASSOCIATION

In 2019, CSA published the 2019 version of CSA C22.2 No. 273-14 (R2019) standard for Cable Bus, and the Canadian Electrical Code includes rules for Cable Bus installation and applications (12-2250 through 12-2260). Since 2010, CSA has formed a committee to review and revise the standard for Cable Bus, and the committee membership has several Cable Bus manufacturers, including Advanced Cable Bus, Inc.

Advanced Cable Bus, Inc. is in the process of obtaining certification for CSA C22.2 No. 273-14 (R2019). While the certification remains in process, each Cable Bus installation in Canada will require a special inspection by CSA or another approved certifying body, such as Intertek, FM, or QPS. The inspection work is scheduled by Advanced Cable Bus, Inc. upon completion of installation at no additional cost to our customers.

QUALITY CONTROL & QUALITY ASSURANCE

Advanced Cable Bus employs a Quality Management System (QMS) based on ISO-9001 guidelines.

Our QMS program includes checkpoints and checklists for all projects and business activities, from proposal stages through delivery and system installation.

System components not manufactured by Advanced Cable Bus are purchased from suppliers with proven QA programs and ISO-9001 certification (if available).

QMS documents are available upon request.

On-site inspection of projects is available if specified in contract terms.

Rigorous inspections coupled with expert support ensure customer satisfaction.

ADVANCED CABLE BUS PAST PROJECTS

OIL SANDS FACILITIES

INSTALLATION TYPE » Main power feeds for oil sands extraction and processing (medium- and low-voltage distribution)

CLIENTS » Multiple firms and users throughout the United States and Canada

SIZE » Multiple Projects totaling over USD $1 million

SYSTEM RATINGS » 35kV, 15kV, 8kV, 5kV & 600V Service Feeders, 1200A–4000A

Several oil sands companies have specified Cable Bus as their preferred electrical feeder system. This preference is based on Cable Bus' design features, cost, and ability to withstand extreme outdoor climate conditions without requiring constant maintenance. Companies whose facilities feature Cable Bus systems include: Shell Canada, Canadian Natural Resources Limited, Suncor, Husky Oil, and Petro Canada.

TELECOM, HEALTHCARE & OTHER DATA CENTERS

INSTALLATION TYPE » Main, back-up. and UPS feeders

CLIENTS » Multiple electrical contractors

SIZE » Multiple projects totaling over USD $3 million

SYSTEM RATINGS » 600V service feeders, 3000A–5000A

A data center's power supply normally includes primary and back-up feeders for supply circuits and UPS systems. Some projects utilize Cable Bus as a back-up power supply, while others utilize Cable Bus as a primary feeder as well. Companies whose facilities feature Cable Bus systems include: AT&T, T-Mobile, Google, and Microsoft.

Advanced Cable Bus, Inc. has manufactured Cable Bus systems for various data centers in the Southeastern US. For especially long circuit lengths in new construction projects, Advanced Cable Bus has performed calculations to ensure that the supplied design meets the required voltage-drop and power-loss requirements.

PRECIOUS METAL MINES IN LATIN & NORTH AMERICA

INSTALLATION TYPE » Mining facility main power feeds (medium and low voltage distribution load feeders)

CLIENTS » Multiple engineering firms in North America; projects sites in North and Latin America

SIZE » Multiple projects totaling over USD $2.5 million

SYSTEM RATINGS » 35kV, 15kV, 8kV, 5kV & 600V Service Feeders, 1200A–4000A

Cable Bus has become a preferred option for several engineering groups in the US and Canada, and Advanced Cable Bus, Inc. has been selected to supply Cable Bus for several large mining projects. In Latin America, Cable Bus systems were specified with the goal of having reliable electrical feeders made of materials suitable to function in a tropical climate. Cable Bus was used for the mining processing plant's main 35kV feeders, and distribution feeders at 15kV, 8kV, 5kV, and 600V, including motor control feeders. Other served loads include milling and crushing motor loads, and lighting/heating loads.

HYDROELECTRIC AND THERMAL MAIN POWER PLANT FEEDERS

INSTALLATION TYPE » Main generator feeders for hydroelectric and thermal plants
CLIENTS » Multiple engineering firms and end users throughout the US and Canada
SIZE » Multiple projects totaling over USD $1 million
SYSTEM RATINGS » 35kV and 15kV Feeders, 2500A–4000A

Power plants that require long feeder circuits or flexibility in routing have used Cable Bus as the feeder of choice. Thermal plants throughout North America have used Cable Bus, as well as hydroelectric plants in locations such as South America, Southeast Asia, and North America.

PHOTOELECTRIC POWER PLANT COLLECTOR FEEDERS

INSTALLATION TYPE » Connection links from photovoltaic solar arrays to step-up transformers
CLIENTS » Multiple engineering firms throughout US
SIZE » Multiple Projects totaling over USD $250,000
SYSTEM RATINGS » 2kV and 600V

Photovoltaic plants often consist of multiple arrays of PV panels that are collected and fed to step-up transformers before being connected to the main outgoing feeders. Cable Bus has been used for the link between the collector switchgear and the step-up transformers in several PV plant installations throughout the Western US. The feeders are usually short in length, and the selection of Cable Bus for the feeder link is based on short-circuit withstand qualities and cost.

MANITOBA MUSEUM OF HUMAN RIGHTS

INSTALLATION TYPE » Public building main power feeder
CLIENT » Meg-A-Ron Engineering
SIZE » Medium (3 Cable Bus runs)
SYSTEM RATINGS » 600V Main Incoming, 1600A & 2500A

The main power feeders for the new Museum of Human Rights in Winnipeg, Manitoba are comprised of multiple bus runs from transformer secondaries across a service road. The Cable Bus runs cross the service road via underground prefabricated trenches. The Museum design and construction, starting in 2009, is one of the most innovative in Canada. It required flexibility for its electrical feeders, as well as reliability and low cost, which led to Cable Bus as the choice for main feeders.

Clients & Partners *(Partial List)*

- ABB
- AMEC
- Andritz Hydro
- AT&T
- BE&K
- Black & McDonald
- Burndy
- Burns & McDonnell
- CNRL (Canada)
- CH2M Hill
- Chevron
- Colt Engineering
- Dashiell Corporation
- Day & Zimmerman
- Duke Energy
- Duquesne Light Co.
- Fluor Corporation
- General Cable
- Georgia Pacific
- GEXPRO
- Graybar
- Hatch Engineering
- Hill Electric
- Jacobs Engineering
- Kellogg, Brown & Root
- Mayer Electric
- Mirant
- Mustang Engineering
- Okonite
- Progress Energy
- Pyramid Corporation
- Rexel
- Roxtec
- Service Wire
- SNC Lavalin
- Sonepar
- Southwire
- Stuart C. Irby
- Suncor
- Syncrude
- Targa Resources
- Terrane Metals Corp.
- TIC
- Transalta Energy
- Truland
- Tyco Electronics
- Worley Parsons
- Zachry Engineering

ADVANCED CABLE BUS

REQUEST FOR QUOTE

- Xerox this form and fill it out as completely as possible
- Fax the completed form to our office at +1 (864) 569-0766
- Or, visit *www.advcablebus.com/quotes* to submit your request online

CONTACT INFORMATION

FULL NAME: _____

ENGINEERING FIRM: _____

TELEPHONE: _____

FACSIMILE: _____

E-MAIL: _____

ADDRESS: _____

_____

TODAY'S DATE: _____

PROJECT INFORMATION

PROJECT NAME: _____

PROJECT LOCATION: _____

_____

BID DUE DATE: _____

DATE MATERIAL NEEDED: _____

SYSTEM INFORMATION

SYSTEM VOLTAGE: _____

SYSTEM AMPERAGE: _____

SYSTEM TYPE(S):

- ☐ 3 Phase / 3 Wire
- ☐ 3 Phase / 4 Wire, Full Neutral
- ☐ 3 Phase / 4 Wire, _____ % Neutral
- ☐ Single Phase AC
- ☐ 2 Pole DC
- ☐ Other (please specify):

CONDUCTOR MATERIAL: ☐ Copper ☐ Aluminum

CABLE SPECS *(shielding, jacketing, etc.)*: _____

_____

GROUNDING REQUIREMENTS: _____

CABLE BUS FOOTAGE: _____ Total Feet

_____ Vertical Feet

_____ Horizontal Feet

PARTS & ACCESSORIES

For each item listed below, please indicate the quantity required.

Horizontal Elbow(s):

_____ 90° _____ 60° _____ 45° _____ 30° _____ 15°

Vertical Elbow(s):

_____ 90° _____ 60° _____ 45° _____ 30° _____ 15°

Wall Penetration Seal(s): _____

Wall Penetration Seal(s), Fire Rated: _____

Floor Penetration Seal(s): _____

Floor Penetration Seal(s), Fire Rated: _____

Equipment Seal(s): _____

Equipment Seal(s), Fire Rated: _____

Tap Box(es), Indoor: _____

Tap Box(es), Outdoor: _____

Termination Box(es), Indoor: _____

Termination Box(es), Outdoor: _____

ADDITIONAL INFORMATION

If you have any additional information or specifications to include, please do so below.

_____

_____

_____

_____

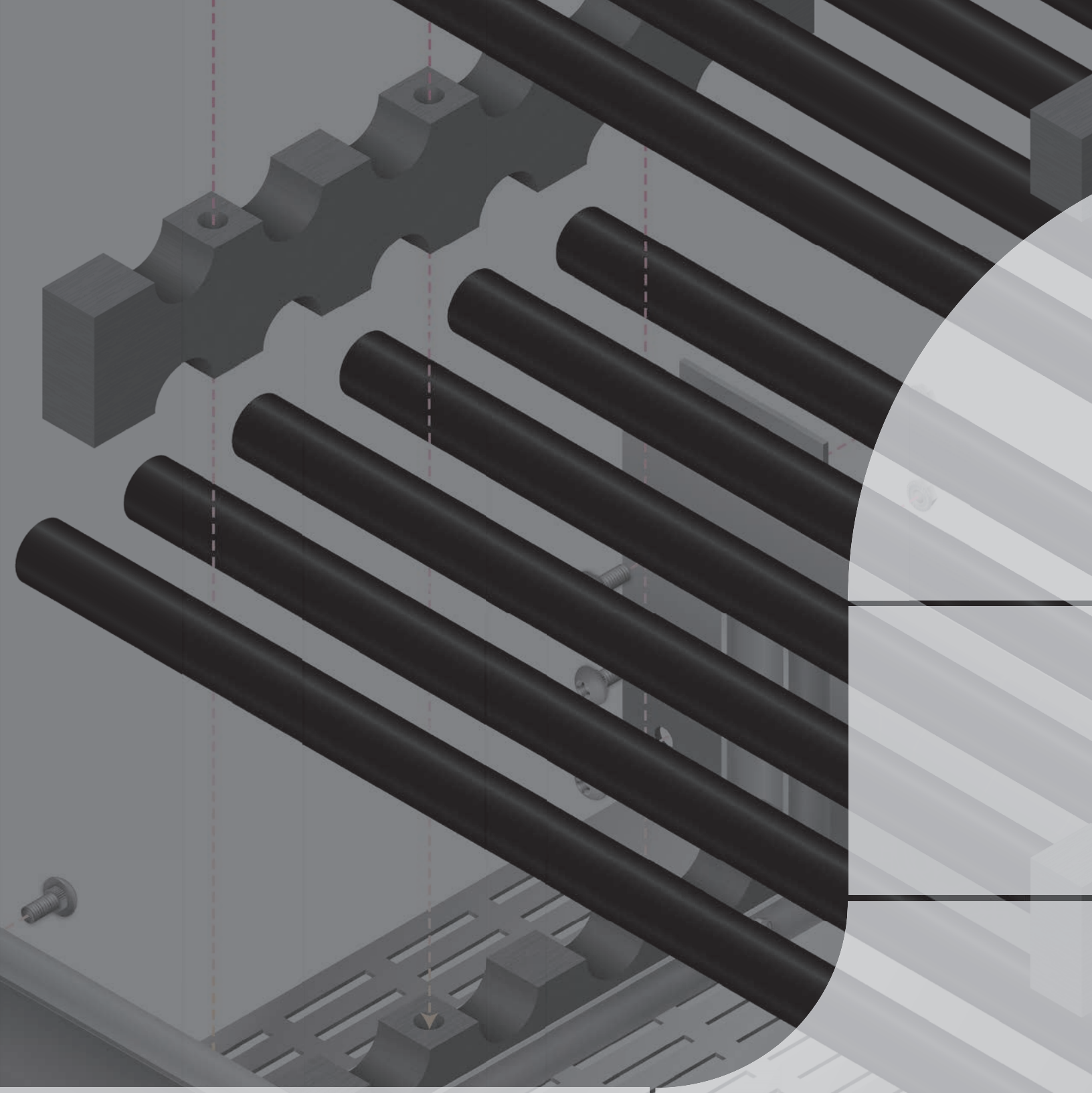
PHONE: +1 (864) 990-5499

TOLL-FREE: +1 (866) 578-8527

FACSIMILE: +1 (864) 569-0766

EMAIL: sales@advcablebus.com

ADDRESS: Advanced Cable Bus, Inc.
P.O. Box 14128
Greenville, SC 29610 USA



- **Advanced Cable Bus, Inc.**
  P.O. Box 14128
  Greenville, SC 29610 U.S.A.

- **Phone:** +1 (864) 990-5499
- **Toll-Free:** +1 (866) 578-8527
- **Fax:** +1 (864) 569-0766

- **www.advcablebus.com**

MADE IN U. S. A.