



MP HUSKY™
CABLE TRAY & CABLE BUS



CABLE BUS

Engineered to Outperform



Decade after decade, for 60 years and running, MP HUSKY continues to be the trusted and proven name in Cable Bus and Cable Tray. With more systems installed in more industries and environments than any other manufacturer, you can rest assured MP HUSKY has the experience and capability to meet your most demanding requirements. As we begin another decade, MP HUSKY is stronger than ever and positioned to lead the industry with the latest innovations, eco-friendly products, and engineering and manufacturing technologies. Our focus continues to remain on providing unmatched customer support, investing in our people, protecting the environment, and providing the most technologically advanced and engineered systems. *MP HUSKY - Engineered to Outperform.*

Decade after Decade Engineered to Outperform



Significant Cost Savings

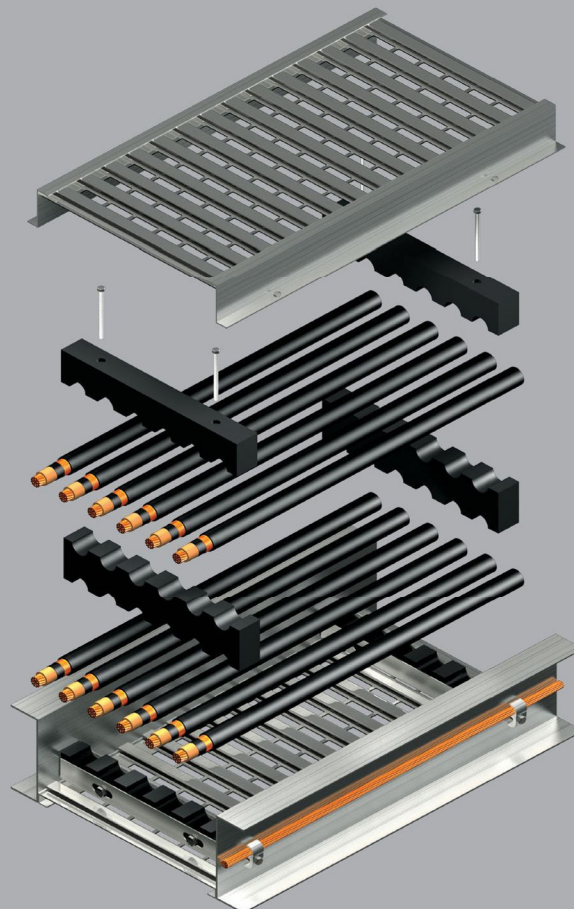
Free Air Rating allows greater ampacity with less copper - *up to 40% less copper!*

Most Reliable

MP HUSKY Cable Bus utilizes continuous runs of power cable (no faulty splices) between terminations. *More installations in more industries than any other manufacturer.*

Lowest installation costs with parallel conductors for entire run. Our system does not interleave or transpose cables in the bus housing, this means it costs less to install.

Field proven for 60 years in the most extreme environments: Corrosive, Heavy Salt, Chemical, Cold (N. Canada), Hot (Saudi Arabia) and tropical locations.



Tested. Proven. Trusted.

Actual Heat Rise, Short Circuit and Load Testing performed on widest range of system ratings.

CSA Certified

CSA Certified to C22.2 #27 (Busways) & C22.2 #201 (Metal Encl. HV Busways)
UL Classified for grounding

Certainty of Design

Cable Support Blocks provide continuous maintained spacing and short circuit bracing (100kA standard).

DuraBlock Polymer Cable Support Blocks with 50+ years life expectancy..

Greater Flexibility

No Delays. Easily adjusted in the field for changes and unforeseen obstacles.

Most Reliable

Lowest Cost

Most Flexible

Maintenance-Free

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MP HUSKY Cable Bus Systems are engineered and manufactured for superior reliability as well as to utilize less conductive material, providing significant savings versus non-segregated phase bus duct, conduit and wire, and other electrical feeders. As copper prices have continued to remain at historically high levels, the savings clients realize are even greater and more important. No matter how you look at it, MP HUSKY Cable Bus outperforms other electrical busways in reliability, cost and flexibility. See for yourself why more owners, engineers and buyers choose MP HUSKY Cable Bus Systems over the competition.

Introduction

Cable Bus is an electrical busway that consists of an assembly of fully insulated conductors mounted in a ventilated metal housing, utilizing cable support blocks to maintain cable phasing, spacing and short circuit protection. The welded aluminum alloy enclosure is provided in custom lengths, with each piece sized to fit the specific installation. The system includes all necessary equipment connections, flanges, cable, wall entrance seals, fire stops, elbows, offsets, terminal lugs, termination kits, and assembly hardware. A complete set of match-marked layout drawings shows the location of each section and accessories, for a simple and fast installation.

Superior Reliability

60 years of engineering, design and manufacturing of Cable Bus systems with installations in nearly every environment, MP HUSKY Cable Bus is proven and tested to be the most reliable system on the market.

Five key features contributing to superior reliability:

1. High quality cables are continuous from termination to termination, eliminating faulty splices.
2. MP HUSKY Cable Bus utilizes factory insulated conductors that are designed and manufactured to withstand the harshest outdoor environments. Since our system design is not affected by moisture and is ventilated for indoor and outdoor applications, it does not require heater strips, filter breathers, or thermostats that competitive technologies require, leaving less parts to fail.
3. Each system's phasing arrangement is verified by computer-generated Inductive Reactance Calculations to ensure optimal load balance.
4. The system's short circuit capacity is tested to over 100,000 RMS sym. amps. Engineered polymer support blocks provide maximum performance and will not decay, rot or lose structural integrity from exposure to weather, unlike wood or fiberglass.
5. Top and bottom covers are ventilated for optimum cooling of conductors to achieve a free air rating. Actual Heat Rise Tests prove system design.

Lowest Cost

In most electrical applications over 1,000 amperes, Cable Bus costs significantly less than non-segregated bus duct, cable in tray or conduit and wire systems. As ampacity and/or the cost of copper increases, the cost savings of Cable Bus over other systems is even greater.

Since Cable Bus is continuous there are no power losses from intermediate splices or connections. Cable Bus has a lower impedance and lower voltage drop because its conductors are properly phased, spaced and secured in a pre-engineered system. This reduces operating costs by providing long-term energy savings. The use of parallel conductors, combined with our free air rating, allows you to operate fully and efficiently with less conductor than would be called for with other types of systems.

Unmatched Flexibility

MP HUSKY Cable Bus is easily adjusted to accommodate misplaced equipment and unforeseen obstacles during construction, with little or no delay in the project. Whereas rigid non-segregated phase bus duct must be exact to make equipment terminations, MP HUSKY provides additional cable and Cable Bus housing to accommodate changes that often occur in the field. If the placement of equipment requires a different bus length, supplemental Cable Bus sections can be quickly adjusted in the field to the required length.



Features & Benefits

Reliable

- Our system utilizes continuous runs of power cable (no faulty splices) from termination to termination.
- MP HUSKY utilizes high quality, factory insulated cables.
- DuraBlock Polymer cable support blocks (Fire Rated & Std) will not decay, rot or lose structural integrity for 50+ years.

Lowest Cost

- Free Air Rating allows greater ampacity with less copper, achieving significant cost savings.
- Substantial savings on materials and installation costs compared to other systems.
- In addition to utilizing the least amount of space, radiused fittings provide easier, more cost effective and precise connections.

Flexible & Adaptable

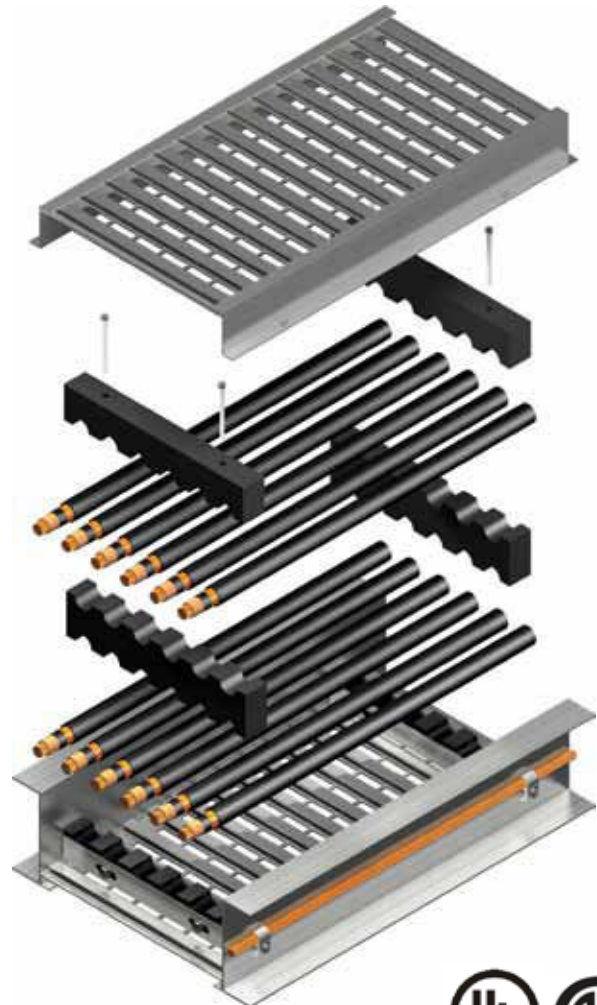
- Unlike non-segregated bus duct, MP HUSKY Cable Bus systems are easily adjusted in the field to accommodate misplaced equipment that often occur during construction.
- Easily routed around unforeseen field obstructions (i.e. piping, structural steel, equipment, etc.)
- Our extensive custom fabrication capabilities ensure that we can manufacture a system to meet all of your difficult coordination challenges.

Free Air Rating for Conductors

- Up to 40% less conductive material (copper or aluminum) is needed to carry full rated current.
- Minimum temperature rise due to ventilated enclosure and maintained cable spacing by custom support blocks.
- Maximum ampacity in accordance with ICEA listings for 90 degree Celsius rated conductors.

Indoor or Outdoor Applications

- Utilized for indoor or outdoor applications.
- No special finishes are required with housing available in Aluminum, Stainless Steel and HDGAF.
- Excellent protection against adverse environments including Paper Mills, Fossil, Chemical Plants, cold, hot and tropical locations.



Testing and Certification

- Certified to CSA 22.2 #27 (Busways) and 22.2 #201 (Metal Enclosed High Voltage Busways)
- UL Classified as an equipment ground.
- Actual Heat Rise Tests on widest range of system ratings.
- Actual Short Circuit Tests up to 120kA RMS Symmetrical.
- Actual Heat Rise Test verifying MP HUSKY Cable Bus in trench applications.
- Actual Load Tests confirm structural capability of housing, including up to 20' spans

Match-Marked Layout Drawings

- Cable Bus system layout drawings are shipped complete with match-marked numbers that correspond to each Cable Bus section.
- Product labels utilize large items numbers to facilitate quick product location and installation.



Features & Benefits

Labor Savings

- Cables run in parallel throughout entire bus housing.
- Our system does not interleave or transpose cables in the bus housing.
- Lightweight, ventilated enclosure that two men can easily lift 12' or 24' sections into position.
- No special heavy erection equipment required.

Safe

- MP HUSKY Cable Bus is an all welded rigid construction.
- Contractors are free of shock hazards - no exposed bus elements, only insulated conductors used.
- Ventilated design prevents entry of foreign objects.
- Support block design assures proper cable support and complete restraint during short circuit conditions.

Less Support Material

- Design criteria accomplishes high load carrying ability on long spans with minimal support material.
- Flush bottom design allows for use of standard support material.

Complete System

- MP HUSKY Cable Bus systems are complete with all necessary fittings for direction and elevation changes.
- Termination boxes, equipment seals, firestops and bus flanges (including weatherproof boxes-NEMA 4X).
- Lugs, termination kits and adapter bus bars.



Factory Fabricated - All Welded

- Bottom cable support block is factory pre-installed in Cable Bus Housing.
- Entire system is factory fabricated to fit the specific requirements of each individual project.
- All welded constructed for maximum strength.
- All welders are AWS Certified (Certified Welding Inspector on site).

Engineering Services

- Experienced and knowledgeable engineering group that can handle difficult coordination challenges.
- Job specific testing and application engineering.
- Engineering support prior to and during engineering & construction, as well as during and after start-up.
- Other engineering services available.

Proper Phase Balance

- MP HUSKY utilizes an Inductive Reactance Program to achieve the proper cable spacing and phasing arrangement that ensures low impedance and low voltage drop.
- Balanced load carrying of conductors prevents over-heating of cables.
- Cable support blocks provide continuous maintained spacing.

Vertical Bracing System

- Stainless steel bolts not required during installation
- Makes vertical and horizontal pulls easier, thus reducing labor costs

Technical Information

Selection of the proper Cable Bus system must be undertaken with care to assure that it compliments the design of the overall electrical power system.

Electrical Design

To ensure an efficient, dependable, high quality installation, every MP HUSKY Cable Bus System is fully engineered with particular emphasis placed on cables, system balance, short circuit capability, and grounding requirements. Each one of these key design considerations must be analyzed separately to determine how they affect the overall system design.

Parallel Conductors

Parallel conductors (more than one per phase) can be used to an advantage in Cable Bus 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.



Voltage Drop

Proper system design dictates that voltage drop be considered for both the power feeders separately as well as the entire power system. A voltage drop of 3-4% for power feeders and an overall of 5% or less for the entire system are considered to be within acceptable limits. Cable Bus is designed for low-voltage drop. Voltage drop data is available upon request, for your specific system.

Shielding

Shielding is used on power cables to confine the dielectric field of the conductor to the cable insulation. Shielded Power Cables are used in Cable Bus for applications above 2500 volts and when any of the following conditions exist:

1. Where cables are subject to soot or other heavy deposits that may form paths to ground.
2. Where electrostatic discharge can effect nearby computerized control cables or other low level signals.
3. Concern for personnel safety.

When installing shielded cable the metallic shielding must be solidly grounded and the installation must be studied to determine the best grounding method. This is necessary as voltage is induced in the shield of a single conductor cable carrying alternating current due to mutual inductance between its shield and any other conductor in its vicinity. This induced voltage can result in two conditions:

1. Metal shields bonded or grounded at multiple points creates shield to ground circulating currents. The magnitude of the circulating currents depends on the mutual inductance to the other cables, the current in these conductors, and the resistance of the shield.
2. Shields bonded or grounded at only one point will have a voltage build up in the sheath but will eliminate circulating currents.

The length of the circuit and the load conditions will indicate which of the above shielding methods is required for any particular reason. MP HUSKY's engineers can provide shield voltage calculations to aid the client in choosing the best grounding method.





Technical Information

System Balance

Cable Bus is a power distribution system using insulated single conductor power cables with support blocks that maintain cable spacing. Each phase consists of one or more cables connected in parallel. The complete assembly is enclosed in a ventilated aluminum or steel enclosure for support and protection.

Parallel conductor transmission lines, using widely spaced conductors, have been in use for many years. The electrical coupling between the conductors of a parallel conductor system, which is a function of the geometry of the location of the conductors, can cause an imbalance in the conductor currents. In a widely spaced overhead transmission line transposition of conductors can economically be used to balance the conductor currents.

The spacing of the conductors in Cable Bus is one cable diameter, (i.e. one to three inches), as compared to the typical value of thirty feet used in overhead lines. This close spacing and the relatively short lengths, as compared to hundreds of miles for overhead lines, make the transposition of conductors within the bus housing a difficult challenge and sometimes practically impossible.



The objective of the Cable Bus design is to obtain the optimum balance for an electrical circuit using parallel conductors (no transposition) with close spacing. MP HUSKY has developed an Inductive Reactance Program which solves for the line and phase currents of a parallel conductor system using a mathematical model of the transmission line parameters. Through the use of computer programs and verification by laboratory and field testing, MP HUSKY has designed Cable Bus Systems with minimal imbalance.

MP HUSKY Cable Bus is designed for balance of conductors within a phase (intra-phase) and balance between the phases (inter-phase). Many phasing arrangements will provide inter-phase balance of currents due to the load impedance, but the majority of these phasing arrangements provide intra-phase current imbalance.

MP HUSKY's Cable Bus design provides a phasing arrangement that achieves inter-phase current balance, as well as intra-phase current balance, therefore reducing the amount of parallel conductor imbalance to a minimum.



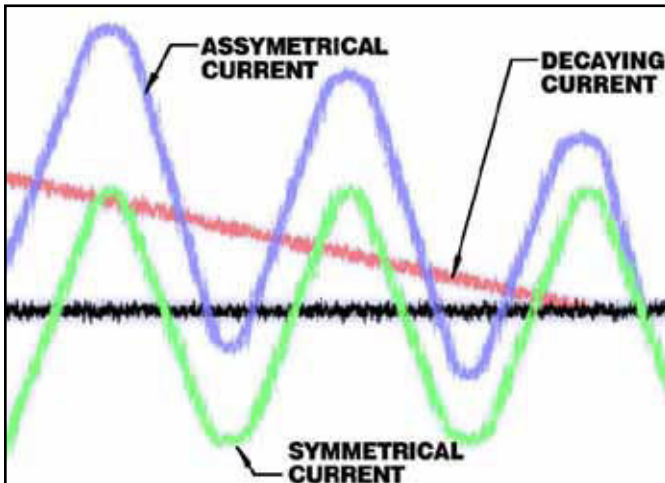
Short Circuit Capacity

A Cable Bus system must be able to withstand the dangerous mechanical forces created by short circuit currents. These forces are transmitted from the conductors to the cable supports. In the case of Cable Bus, the support elements include the support blocks and enclosure.

Short circuit currents are made up of two parts; a symmetrical AC component and a rapidly decreasing DC component, (Fig. 5 on next page). A Cable Bus system must be selected so that its mechanical strength will withstand the maximum instantaneous current and to a lesser degree the 5-8 cycle resultant symmetrical current. The symmetrical current is the actual value that a high voltage breaker will interrupt.

Technical Information

Since Cable Bus is often used for main feeder connections, (e.g. substation, generator or transformer 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 feeds large motors and the motor contribution to short circuit must also be considered. Numerous tables are available listing motor contributions for various operating conditions.



Available fault currents can be limited to some extent by conductor impedance. The impedance can be in the form of either conductor length, size or a combination of both.

The MP HUSKY Cable Bus design ignores these added conductor impedance; instead the worst fault conditions are always assumed. For design consideration a three phase short circuit current will result in the maximum mechanical forces for design considerations.

If Cable Bus is fed directly from the utility company service then short circuit current data will be available from the utility.

Where motor contributions are considered, the fault current due to the motor feedback will be a function of the voltage and is usually expressed as multiples of the motor full load current. NEMA standards are available which list these factors. Certified tests have been conducted to determine the short circuit performance of Cable Bus using various supporting arrangements.

Short Circuit Testing

The Cable Bus systems were tested on a 600 volt, 3 phase, 60Hz circuit having a power factor of less than 0.20. 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.

Each test was conducted for a minimum of six cycles. Oscillograms recorded the phase currents during the test. Still photographs and high speed color motion pictures were taken relevant to the test.

MP HUSKY Cable Bus has been subjected to currents of 39,000, 67,500, 85,000, 100,000, 120,000, 125,000, 150,000, 175,000 and 200,000 RMS symmetrical amperes with asymmetrical currents greater than 200,000 amperes. Cable Bus withstood the mechanical forces of the test without any damage to the cables, support blocks or enclosure.



MP HUSKY 4000Amp, 5kV Cable Bus system with open air termination to GSU transformer.



Technical Information

Grounding

A Cable Bus system must afford protection to life and property against faults caused by electrical disturbances. Lightning, electrical system failures, as well as failures in the system connected 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.

There are two distinct divisions to the system and equipment grounding problem. The system ground is the connection of the distribution system to earth by means of a neutral or grounded conductor and system grounding serves to limit the voltage, which might appear on the circuit due to lightning or accidental contact.

Cable Bus systems should be grounded to the substation structure and thus to the substation ground grid and to the building steel by means of the Cable Bus support materials. Cable Bus should also be grounded to the equipment or switchgear enclosure.



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.

MP HUSKY's Cable Bus enclosure is rated to carry 1600A ground current. Extra ground current capacity can be provided by the application of external ground conductors bonded to each section of Cable Bus housing.



Flexibility

MP HUSKY Cable Bus systems are flexible and adaptable to the many unexpected circumstances that occur during construction. Every size and rating of Cable Bus provided is supplied with up to 5% extra cable as well as one spare length of housing including cover, cable support blocks and hardware. This enables the installer to adjust our system in the field to unexpected changes or field obstructions with little or no delay of the project. And our compact design and radius bends allow our system to maneuver around and fit in tight clearance applications.



Quality Assurance

Our Quality Policy

At MP HUSKY we are committed to producing only the highest quality products that meet or exceed our customers' expectations and requirements. Our goal is to achieve 100% customer satisfaction by delivering the best products and services on-time and defect free. We will achieve this individually and corporately through tested and proven processes and controls, in our Quality System, and with a constant focus and effort on continuous improvement.

MP HUSKY's Cable Bus System are certified to CSA C22.2 #27 (Busways) & CSA C22.2 #201 and UL Classified as an Equipment Ground.



Item	Standards
MP HUSKY Quality Program	<ul style="list-style-type: none"> ANSI / ASQC Q9001-2000 (ISO 9001 Compliant) ASME NQA-1-2004 ANSI N45.2
Cable Manufacturers: General Cable, Okonite, Kerite, Prysmian, & others -Quality Assurance -Manufacturing Standards	ISO9001 Includes ICEA, CSA, ANSI, IEEE
Certification	CSA Certified to C22.2 No. 27 (Busways) and C22.2 No. 201 (Metal Enclosed High Voltage Busways) CSA Certified to C22.2 No. 126.1-02 for Enclosure Grounding UL Classified for Grounding
Load Test Standards	NEMA VE-1/CSA Tray Standards
Cable Bus Support Standard	NEMA VE-2
Heat Rise Standards	ANSI C37.20, C37.24, actual test results available upon request
Cable Ampacity Standards	<ul style="list-style-type: none"> IPCEA P-46-426; ICEA S-66-524; IEEE S-135 CSA CEC Part 1 & C22.2; Canadian CEC Table 1 & Table 5A United States NEC 310-17 & 310.69
Fault Bracing Standards	NEC Article 370
Short Circuit Certification	Eaton High Power Test Labs, copy of test report available upon request
Grounding	UL, CSA, NEC
Welding	<ul style="list-style-type: none"> AWS D1.1 (American Welding Society Structural Welding Code: Steel) AWS D1.3/D1.2: (American Welding Society Structural Welding Code: Aluminum) AWS C1.1/ANSI American Welding Society Recommended Practices for Resistance Welding ASME QW 100.1 American Society of Mechanical Engineers Welding Procedure Specifications (Procedure Qualifications Record) Certified Welding Inspector—QC1-96 (On Staff) 100% of MP HUSKY welders are AWS Certified.



Ampacity Comparisons

This table illustrates the greater current carrying capacity of MP HUSKY Cable Bus as compared to alternate methods. The increased capacity is due to free air ventilation and engineered cable spacing and balance phasing arrangement.

Based on NEC & ICEA Tables at 90 degrees Celsius in 40 degree Ambient.

	Conductor Size	MP HUSKY Cable Bus	Interlocked Armored Cable (in Tray)	Three Single Conductor Cables in Conduit (in Air)
600V System	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 System	500 MCM	695 Amps	425 Amps	473 Amps
	750 MCM	900 Amps	525 Amps	579 Amps
	1000 MCM	1061 Amps	590 Amps	659 Amps
15kV System	500 MCM	685 Amps	470 Amps	481 Amps
	750 MCM	885 Amps	570 Amps	588 Amps
	1000 MCM	1040 Amps	650 Amps	677 Amps
600V Systems (Canadian)	500 MCM	594 Amps	355 Amps	355 Amps
	750 MCM	760 Amps	450 Amps	450 Amps
	1000 MCM	900 Amps	526 Amps	526 Amps



MP HUSKY's Cable Bus System is certified to CSA C22.2 #27 (Busways) and C22.2 #201.



Customer Testimonials

"Simply stated, your product is our first choice for new and/or service entrance upgrades. We have been involved in way too many bus duct failures. When given a choice by our customers, we will always try to use MP HUSKY Cable Bus."

Industrial Electrical Contractor

"We have used MP HUSKY Cable Bus for numerous installations at our facilities. It is the obvious choice for us because first of all, it is much more forgiving and flexible than bus duct. If you have a wall penetration that is off by a few inches or a transformer or switchgear that is off by a few inches, MP HUSKY Cable Bus can easily accommodate such changes whereas with bus duct, you have to be perfect. Secondly, MP HUSKY Cable Bus is more cost effective due to the obvious cost advantages in the system which include: no derating of the cables, thus you utilize less copper, lower losses due to proper phasing arrangement of conductors, and the ease of installation".

Owner/Engineer

Voltage & Ratings

MP HUSKY Cable Bus Typical Voltage & Current Ratings

69kV											
45kV											
25kV											
15kV											
5kV											
600V											
	800A	1200A	1600A	2000A	2500A	3000A	3500A	4000A	5000A	6000A	7000A

KEY

	Definite Cost Savings on these Available Ratings
	Possibly Available or Economical, Consult Factory
	Typically Outside Practical or Economical Range

MP HUSKY Cable Bus Features:

- Engineered System with the industry exclusive Inductive Reactance Calculations available upon request for the design engineer.
- High fault capacity. Cable Bus is certified up to 200kA RMS Symmetrical.
- Lowest installation costs of any cable bus duct on the market, with the industry exclusive straight cable runs. No cable transpositions within the housing, regardless of run length. Installation savings of 10% to 25%, depending on run length and cable size.
- Widest available range of Voltage Class and Ampere Ratings in the industry.
- CSA Certified to C22.2 No. 201 & C22.2 No. 27.
- UL Classified as an equipment ground.
- For CSA equivalent data please contact the factory.



Common Cable Bus Systems

600V

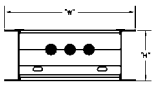
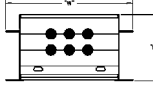
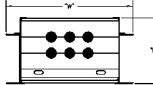
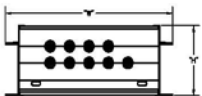
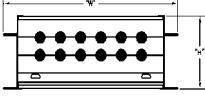
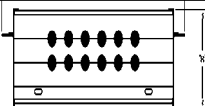
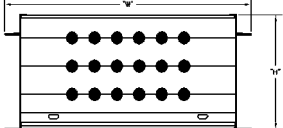
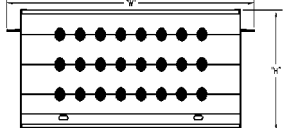
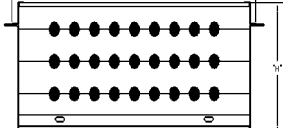
Typical Cross Section	System Ampacity	Height (H)	Width (W)	# of Conductors per Phase
	800A	6"	12-1/2"	1-750 MCM
	1200A	8"	12-1/2"	2-500 MCM
	1600A	8"	12-1/2"	2-750- MCM
	2000A	8"	21-1/2"	4-500 MCM
	2500A	8"	21-1/2"	4-500 MCM
	3000A	8"	21-1/2"	4-750 MCM
	4000A	10"	21-1/2"	6-750 MCM
	5000A	10"	27-1/2"	8-750 MCM
	6000A	10"	27-1/2"	9-750 MCM

- Systems shown are 3 Phase / 3 Wire without system ground and are rated for 90°C operating temperature.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For additional amperage and voltage requirements please contact the factory
- For CSA equivalent data please contact the factory.
- **CSA Certified to C22.2 No. 27**
- **UL Classified as equipment ground.**



Common Cable Bus Systems

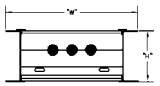
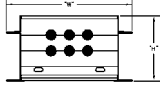
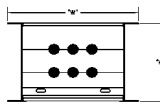
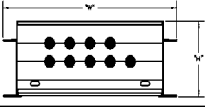
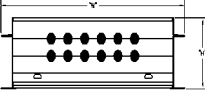
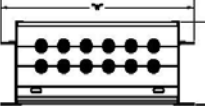
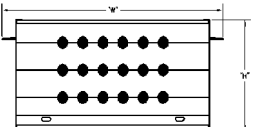
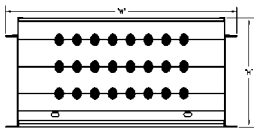
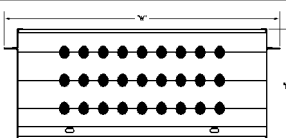
5kV

Typical Cross Section	System Ampacity	Height (H)	Width (W)	# of Conductors per Phase
	800A	6"	15-1/5"	1-750 MCM
	1200A	8"	15-1/2"	2-500 MCM
	1600A	8"	15-1/2"	2-750- MCM
	2000A	8"	21-1/2"	3-500 MCM
	2500A	8"	21-1/2"	4-500 MCM
	3000A	8"	27-1/2"	4-750 MCM
	4000A	12"	27-1/2"	6-750 MCM
	5000A	12"	30-1/2"	7-750 MCM
	6000A	12"	32-1/2"	8-750 MCM

- Systems shown are 3 Phase / 3 Wire without system ground.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For additional amperage and voltage requirements please contact the factory.
- For CSA equivalent data please contact the factory.
- **CSA Certified to C22.2 No. 201.**
- **UL Classified as an equipment ground.**



**Common Cable Bus Systems****15kV**

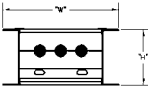
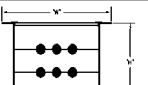
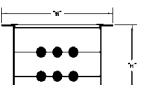
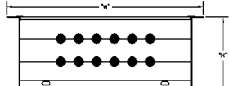
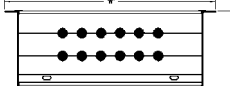
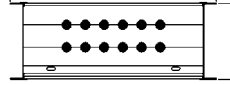
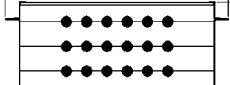
Typical Cross Section	System Ampacity	Height (H)	Width (W)	# of Conductors per Phase
	800A	6"	15-1/2"	1-750 MCM
	1200A	8"	15-1/2"	2-500 MCM
	1600A	10"	15-1/2"	2-750- MCM
	2000A	8"	21-1/2"	3-500 MCM
	2500A	8"	27-1/2"	4-500 MCM
	3000A	10"	27-1/2"	4-750 MCM
	4000A	12"	27-1/2"	6-750 MCM
	5000A	12"	32-1/2"	7-750 MCM
	6000A	12"	35-1/2"	8-750 MCM

- Systems shown are 3 Phase / 3 Wire without system ground.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For additional ampereage and voltage requirements please contact the factory.
- For CSA equivalent data please contact the factory.
- **CSA Certified to C22.2 No. 201.**
- **UL Classified as an equipment ground.**



Common Cable Bus Systems

35kV

Typical Cross Section	System Ampacity	Height (H)	Width (W)	# of Conductors per Phase
	800A	6"	15-1/2"	1-750 MCM
	1200A	10"	15-1/2"	2-500 MCM
	1600A	10"	15-1/2"	2-750- MCM
	2000A	10"	27-1/2"	4-500 MCM
	2500A	10"	27-1/2"	4-500 MCM
	3000A	10"	27-1/2"	4-750 MCM
	4000A	14"	27-1/2"	6-750 MCM

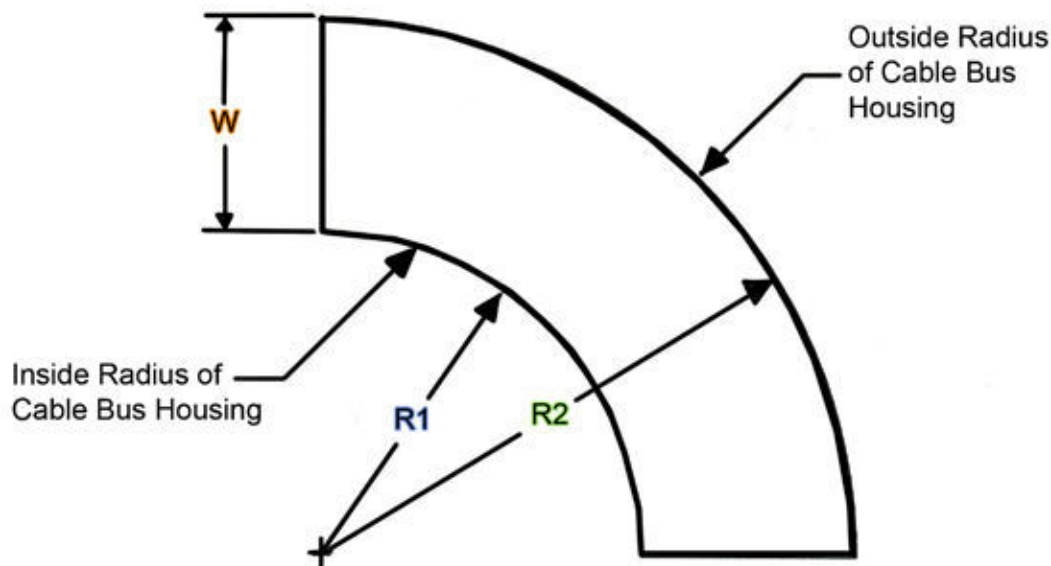
- Systems shown are 3 Phase / 3 Wire without system ground.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For additional amperage and voltage requirements please contact the factory.
- For CSA equivalent data please contact the factory.
- **CSA Certified to C22.2 No. 201.**
- **UL Classified as an equipment ground.**





System Cross Sections & Dimensions

90 ° Horizontal Radius Fitting

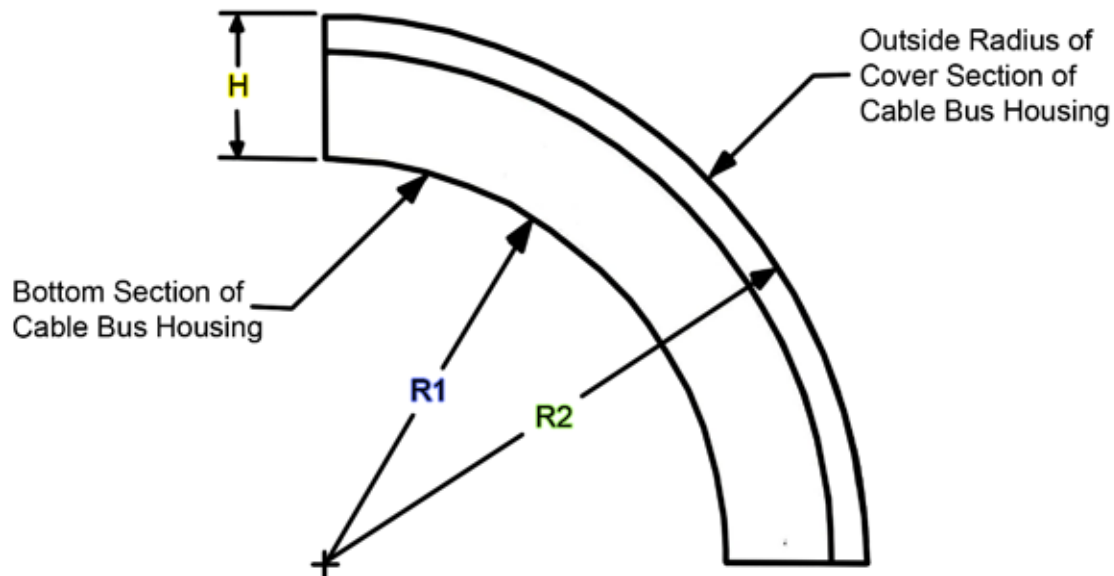


Nominal Radius	Cable Bus Width "W"	Inside Radius "R1"	Outside Radius "R2"
12"	9"	12"	21"
	12"	12"	24"
	18"	12"	30"
	24"	12"	36"
18"	9"	18"	27"
	12"	18"	30"
	18"	18"	36"
	24"	18"	42"
24"	9"	24"	33"
	12"	24"	36"
	18"	24"	42"
	24"	24"	48"

*Radii shown are to outside flange. Cable radius will be nominal radius or greater.

System Cross Sections & Dimensions

90 ° Vertical Outside Radius Fitting



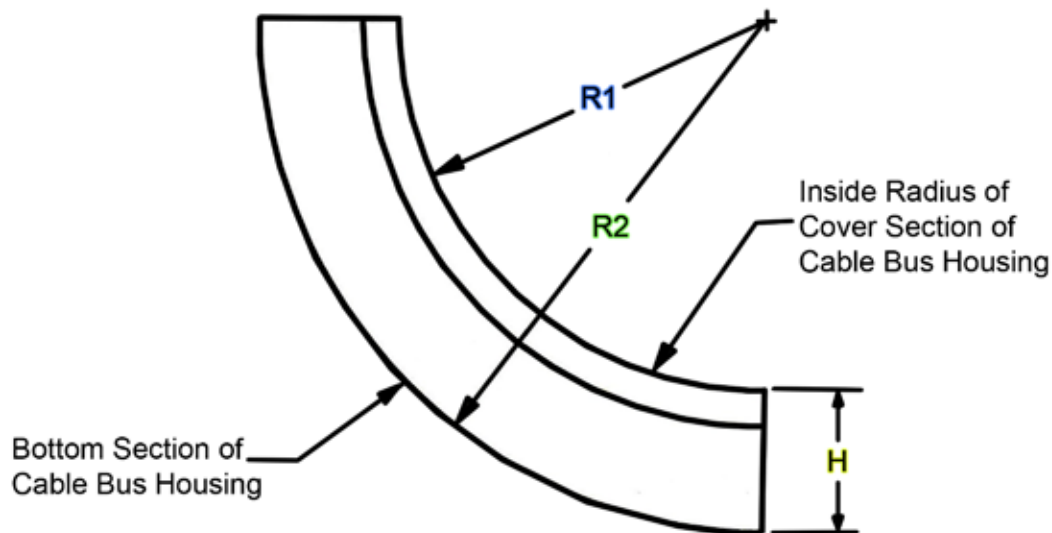
Nominal Radius	Cable Bus Height "H"	Inside Radius "R1"	Outside Radius "R2"
12"	6"	11-3/4"	17-3/4"
	8"	11-3/4"	19-3/4"
	10"	11-3/4"	21-3/4"
	12"	11-3/4"	23-3/4"
18"	6"	18"	24"
	8"	18"	26"
	10"	18"	28"
	12"	18"	30"
24"	6"	22-1/2"	28-1/2"
	8"	22-1/2"	30-1/2"
	10"	22-1/2"	32-1/2"
	12"	22-1/2"	34-1/2"

*Cable radius will be greater than nominal radius.



System Cross Sections & Dimensions

90 ° Vertical Inside Radius Fitting



Nominal Radius	Cable Bus Height "H"	Inside Radius "R1"	Outside Radius "R2"
12"	6"	11-3/4"	17-3/4"
	8"	9-3/4"	17-3/4"
	10"	7-3/4"	17-3/4"
	12"	5-3/4"	17-3/4"
18"	6"	18"	24"
	8"	16"	24"
	10"	14"	24"
	12"	12"	24"
24"	6"	22-1/2"	28-1/2"
	8"	20-1/2"	28-1/2"
	10"	18-1/2"	28-1/2"
	12"	16-1/2"	28-1/2"

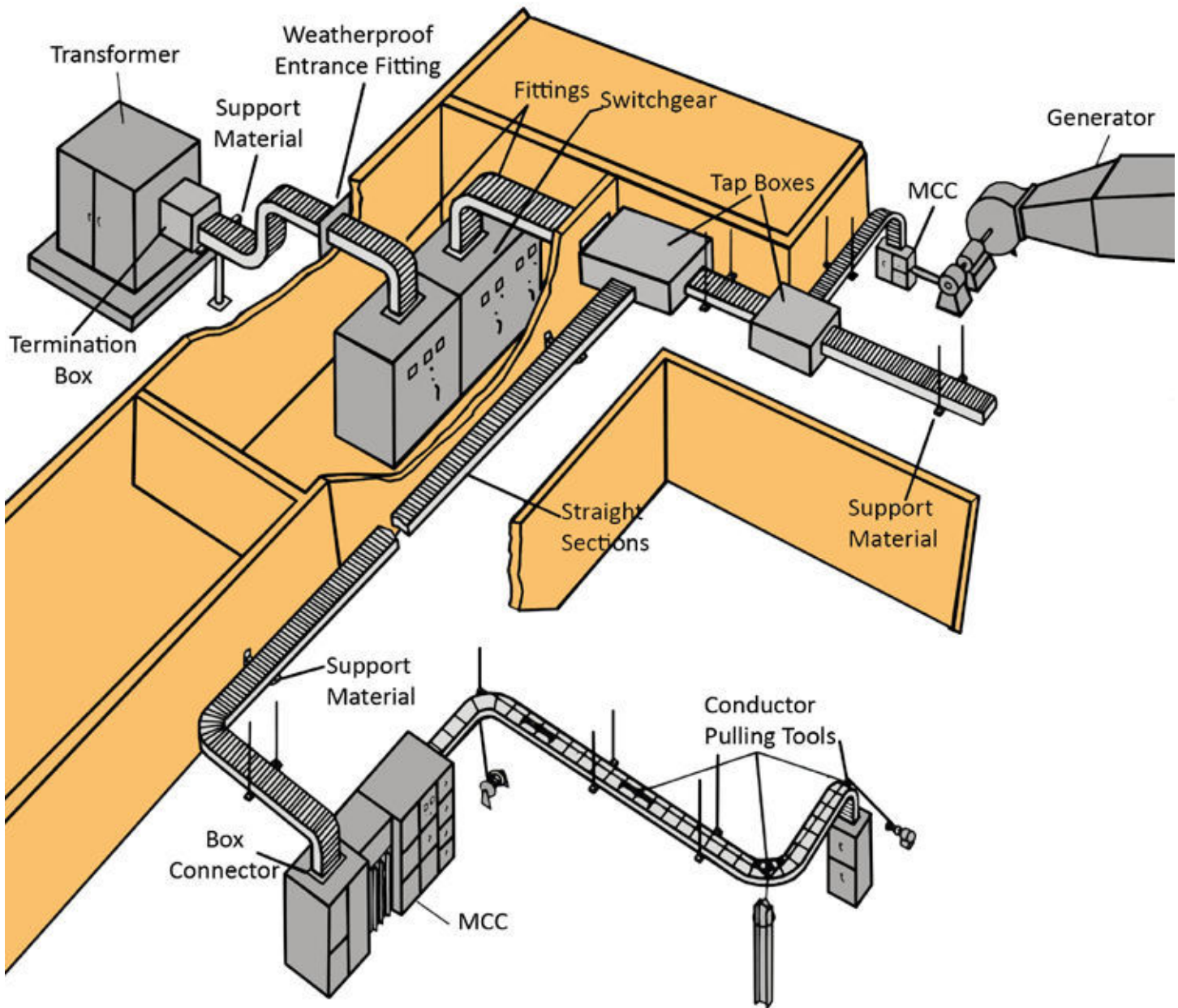
*Cable radius will be greater than nominal radius.

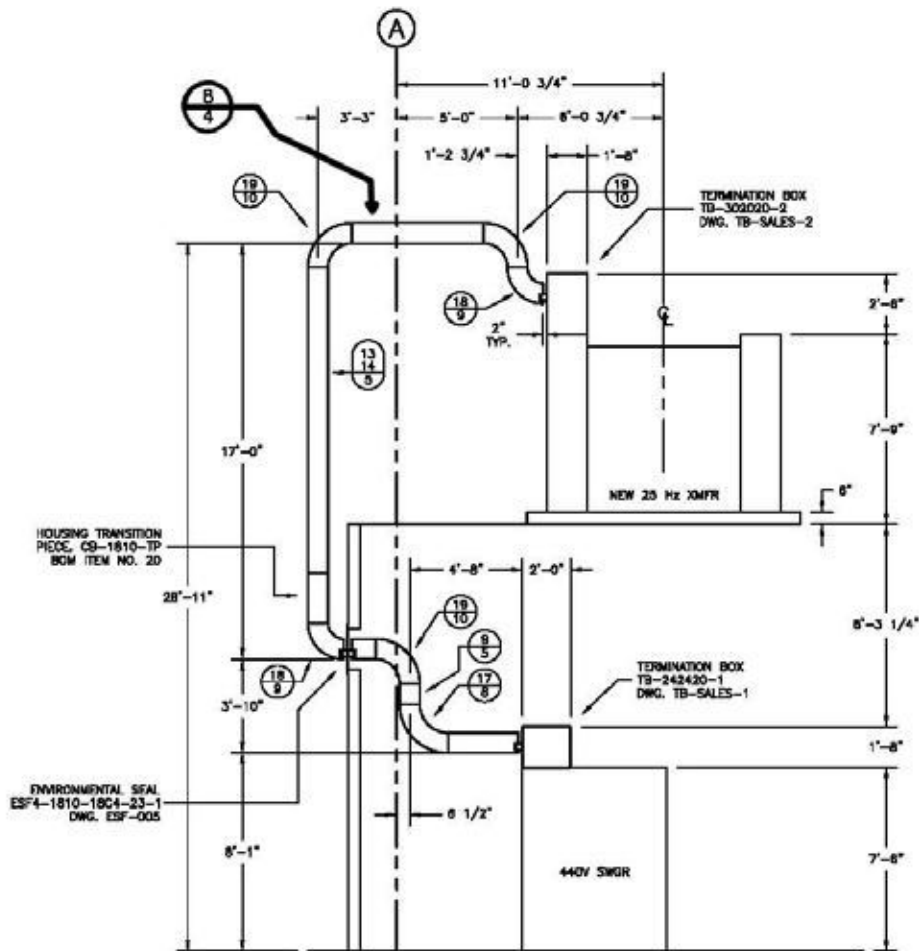
Cable Bus System Layout

Primary Feeders —

- Distribution Stations
- High Rise Buildings
- Load Centers

Secondary Feeders — Equipment





MASTER SHIPPING LIST

ITEM	QTY	CATALOG NO	DESCRIPTION
1	1	INSTALLATION MANUAL	MISC PIECE
2	4	CIL	CABLE IDENTIFICATION
3	1	ACB36E-18-53	HORIZONTAL CABLE BUS

4	1	ACB36E-18-65	HORIZONTAL CABLE BUS
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5	1	ACB18E-18-150	VERTICAL CABLE BUS
6	1	ACB18E-18-31	VERTICAL CABLE BUS
7	1	C4V-18-53	STRAIGHT COVER

8	1	C4V-18-65	STRAIGHT COVER
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9	1	C4V-18-150	STRAIGHT COVER
10	1	C4V-18-31	STRAIGHT COVER



MP HUSKY

204 Old Piedmont Hwy, Greenville, SC 29605 (864) 234-4800 www.mphusky.com

WARNING! DO NOT USE AS A WALKWAY, LADDER, OR SUPPORT FOR PERSONNEL. USE ONLY AS A MECHANICAL SUPPORT FOR CABLES, TUBING, AND RACEWAYS.

C4V-18-75

PO# SAMPLE

PO# SAMPLE

ITEM: 0008

QTY: 2

Ship to:

Customer Name

Customer Address

Customer Address



GROUPED BY: JASB/WATTS JACKSONS INC. 848 TO 75 LUMINITY 40 EQUIPMENT DR. JASB CONDUCTOR SHUT OUT



FINAL PRINT

MAY 6, 2009
M.P.★HUSKY, CORP.

MPHUSKY CABLE BUS
LAYOUT AND SECTIONS
25Hz XMFR MODIFICATIONS
HOME TOWN, U.S.A.

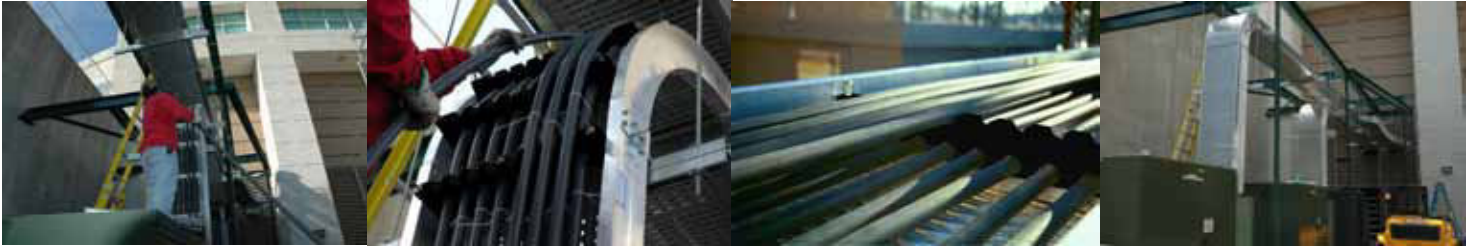


MP HUSKY

CABLE TRAY & CABLE BUS

DATE: MAY 6, 2009 DR: TOD
CUST. P.O. N/A
SCALE: 1/4"=1' DWG.
REV. B JOBNO-101

Installation



The following techniques are suggested to pull cables into place:

- Cables with an OD larger than 2" can be pulled by pulling eye or a basket grip.
- If the strain does not elongate or damage the insulation then short lengths and small diameter cables may be pulled with a basket grip only.
- Long lengths of conductor (up to 1,000 ft.), with as many as a dozen bends, should be pulled in one continuous operation at a speed of 20 to 25 ft. per minute. It may be necessary to employ a braked reel to reduce sagging of the conductor between horizontal rollers.



The most economical spacing of horizontal rollers depends on the weight of cable to be pulled. In general, the spacing of horizontal rollers should range between approximately 10 ft. for cable weighing over 8 pounds per foot and 16 feet for cable weighing less than 2 pounds per foot.

Ease of installation:

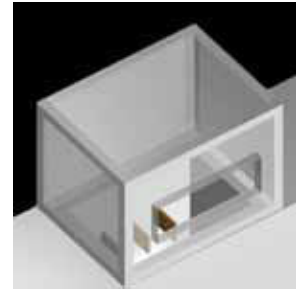
- Typical weight of Cable Bus is 5-7 lbs. per ft. (typical weight of bar bus is 25-114lbs. per ft.)
- 12 ft. sections can easily be installed by two men - no heavy equipment (cranes, booms, lifts) are required.
- Complete installation instructions and match-marked layout drawings make installation easy to understand and fast.



System Components

Termination Boxes

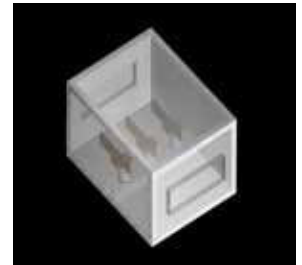
Transformer Termination Boxes, Switchgear/MCC Top Hats and other junction boxes designed and supplied by MP HUSKY guarantee the needed space to properly transpose the phases and terminate the conductors to the electrical equipment. Standard termination boxes are aluminum welded angle frame construction with bolted removable side panels and welded fixed panels as needed. Painted steel and stainless steel are also available. Outdoor boxes are NEMA 4X and use gasketed removable panels, fully seam welded fixed panels, and an ESF type seal to ensure a water-tight enclosure.



Tap Boxes

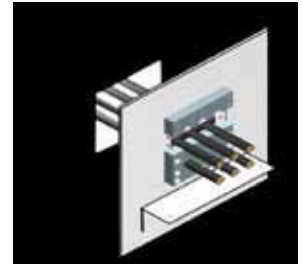
Tap boxes allow for intermediate load tapping. The design provides system voltage rated air separation between live parts and adjacent surfaces to eliminate the necessity of tapping all energized components. The tap box consists of:

- Aluminum framed enclosure
- Removable covers (gasketed for outdoor applications)
- Porcelain or Epoxy post stand off insulators
- Plated Bus bars



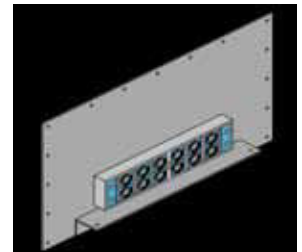
Watertight Seals (Environmental Seal Flange -ESF)

These fittings form a seal with walls and can also be used for floor penetrations that must be watertight. Conductors are sealed with RTV silicone sealant. Entrance fittings are furnished with all necessary hardware.



MCT Firestop / Watertight Seal

MCT seals are used when a fire rated and watertight seal is required. Neoprene modules are inserted after the cables are installed for ease of pulling. They are UL listed for a 2 hour fire rating and come with all necessary hardware.



Electrical Connectors

Two Hole Long Barrel Compression type lugs and Silicon bronzed termination hardware are supplied with each project to ensure a long lasting, reliable connection with electrical equipment.

Cable Termination Kits

Heat or Cold Shrink Termination materials are supplied for all medium voltage Cable Bus Systems and are rated for both indoor and outdoor use.



MP HUSKY's Cable Bus System is certified to CSA C22.2 #27 (Busways) and C22.2 #201. UL Classified as an equipment ground.



Industries We Support

- Airports
- Automotive
- Banking
- Cement
- Chemical Plants
- Construction
- Data Centers
- Food & Beverage
- Government/Military
- Hospitals
- Industrial
- Institutions
- Metal Industry
- Mining
- Nuclear
- Off-Shore
- Oil & Gas
- Petrochemical
- Pharmaceutical
- Plastics
- Power Plants
- Pulp & Paper
- Refineries
- Renewable Energy
- Schools
- Sporting Venues
- Steel Industry
- Textiles
- Universities
- Waste Water






Clients and Partners (partial listing)

ABB	Exxon/Mobil	One Source
AMEC	EYP - Hewlett Packard	PP&L
American Electric Power	First Solar	PSE&G
Alabama Power Company	Fisher Body	Phelps-Dodge Corporation
ALCOA	Florida Power & Light	Progress Energy
Alfatech	Fluor Corporation	Redwood City Electric
AMOCO	FMC Corporation	Rexel
Andritz Hydro Power	Georgia Electric Energy	Rexham Corporation
Archer Daniels Midland	GE Engineering	Rosendin
Arkansas Light & Power	GE Power	Santee Cooper
AT&T	Georgia Pacific	Sargent & Lundy
AVCO Corporation	Georgia Power	Saudi Aramco
Bantrel	GEXPRO	S&C Electric
Bechtel	Goodyear Tire & Rubber	SCE & G
BE&K	Graybar	Shaw Group
Black & Veatch	Grede Foundries	Shell
BMW Manufacturing	Hill Electric	Shermco
BP (British Petroleum)	Hitachi	Siemens
Burns & McDonnell	Houston Power & Light	SNC Lavalin
Burns & Roe	International Paper	Southern Company Services
Calpine	Irving Oil	Southwestern Pub. Svc. Co.
Carborundum Co.	J.I. Case	Summit Electric
CB&I	Jacobs Engineering	Suncor
Central Hudson G&E	John Deere Company	Syncrude
Central Illinois Public Services	Kaiser Aluminum	Technip
CH2M Hill	Kellogg, Brown & Root	Texas Utility Services
Chemico	Kentucky Utilities	The Harris Group
Chevron	Kiewit	TIC
Chrysler Corporation	LA County Sanitation	Toyota
Cleveland Electric	LA Dept of Power & Light	Toyo Tire
Canadian Natural Resources Ltd.	LG&E	Transalta Energy
Colt Engineering	Lockwood Greene	Truland
CONOCO	Lower Colorado River Authority	TVA
Corning	MA Electric Company	TXU Energy
Cupertino Electric	Marathon	Union Carbide
Dashiell Corporation	Mayer Electric	Union Electric
Day & Zimmerman	MC Dean	URS
Dayton Power & Light	MJ Electric	Utah Power & Light
Detroit Edison	Michelin	VA Tech Hydro
Dow Chemical	Miller Electric	Valero
Dow Corning	Milliken	Virgin Island Power & Light
DPR Construction	Mirant	WE Energies
DSME	Medical Univ. of SC	Weyerhaeuser
Duke Energy	Mustang Engineering	Wisconsin Power & Light
DuPont	NASA	World Waste International
Duquesne Light Co.	NCPP	Worley Parsons
Dynaelectric	Northrop Grumman P.P.G.	Xerox
Equinox	O'Neal	Zachry Engineering

Project Profiles

	<p>Industry: Data Center</p> <p>Location: United States</p> <p>Project Type: Power Distribution</p> <p>MPH Project Value: \$646,700</p> <p>Work Scope: Low voltage power distribution from transformers to switchgears and generators to switchgears. 600v-5000A and 4000A Cable Bus systems were supplied. To meet customers delivery schedule, the Cable Bus was expedited and released in two separate releases to accommodate the customers installation needs. The work done on this project served as the model on the future second and third phase of the project.</p>
	<p>Industry: Solar</p> <p>Location: North America</p> <p>Project Type: Renewable Energy</p> <p>MPH Project Value: \$373,350</p> <p>Work Scope: One of the largest Solar Farms in North America. Special Applications: Approximately one hundred 600V / 1800A short runs used as equipment ties connecting the inverter to the transformer.</p>
	<p>Industry: Paper Mill</p> <p>Location: United States</p> <p>Project Type: Modernization Project</p> <p>MPH Project Value: \$397,000</p> <p>Work Scope: 600V - 4000A and 5kV - 3000A Cable Bus Systems. Connections were transformer to switchgear leads. Stainless steel Cable Bus housing was used for the bleach plant and aluminum housing for used for the paper machine area.</p>
	<p>Industry: Power Generation</p> <p>Location: United States</p> <p>Project Type: Hydro Electric</p> <p>MPH Project Value: \$601,540</p> <p>Work Scope: Medium voltage power distribution from 15kV transformer to switchgear. Engineers from MP HUSKY met with site engineers and walked and measured the future routing around numerous pre-existing obstacles. Special applications: The Cable Bus ran through a tunnel stacked four high while following the wall around corners and down stairs, making a complex routing. MP HUSKY designed, tested and furnished special housing to meet these requirements.</p>
	<p>Industry: Utility</p> <p>Location: China</p> <p>Project Type: New Power Generation</p> <p>MPH Project Value: \$1,137,432</p> <p>Work Scope: 6 x 350MW generating units. Cable Bus Systems were furnished for 15kV - 2500A and 3000A systems. Generator leads, transformer to switchgear and switchgear tie bus connections.</p>

Project Profiles

	<p>Industry: Data Center</p> <p>Location: United States</p> <p>Project Type: Feeder System</p> <p>MPH Project Value: \$2,500,000</p> <p>Work Scope: Replacement of 44 underground conduit feeder systems with 600V - 3200A and 600V - 4000A Cable Bus. New Cable Bus feeders connected generators to switchgear and were routed above ground.</p>
	<p>Industry: Cement Plant</p> <p>Location: Nigeria</p> <p>Project Type: Cogeneration</p> <p>MPH Project Value: \$480,000</p> <p>Work Scope: 15kV - 2700A, 35kV - 1200A and 600V - 6000A Cable Bus Systems for Turbine Generator leads. Transformer to switchgear connections.</p>
	<p>Industry: Food Industry</p> <p>Location: United States</p> <p>Project Type: Main Feeder</p> <p>MPH Project Value: \$50,000</p> <p>Work Scope: 600V - 4000A Cable Bus System. Utilized a special transmission box design to transition from our Cable Bus to an underground transformer vault, which fed from a pad mounted transformer. Power was then provided to indoor switchgear.</p>
	<p>Industry: Wastewater</p> <p>Location: United States</p> <p>Project Type: New Plant</p> <p>MPH Project Value: \$75,235</p> <p>Work Scope: 2—600V / 2400A and 2—600V / 1600A systems. Four bus runs with ties from Switchgear Tie Cubicle to Switchgear Transition Cubicle. Provided bus housing, cable, vertical and horizontal elbows, environmental floor seals and terminations.</p>
	<p>Industry: Ethanol</p> <p>Location: United States</p> <p>Project Type: Power Distribution</p> <p>MPH Project Value: \$49,411</p> <p>Work Scope: Four identical bus runs— 480V / 3200A. Provided bus housing, cable, vertical elbows, environmental wall seals, termination boxes at transformer ends, box connectors at switchgear ends, and terminations.</p>

Project Profiles

	<p>Industry: Utility</p> <p>Location: United States</p> <p>Project Type: FGD Scrubber, Coal</p> <p>MPH Project Value: \$2,287,000</p> <p>Work Scope: Power Distribution for Flue Gas Desulphurization Project using over 25 Cable Bus runs. The main transformers had double windings rated at 7kV & 15kV. MP HUSKY supplied two 3000A Cable Bus runs from each transformer to the main switchgear house. From there, we supplied 2000A & 1200A Cable Bus runs out to five unit switchgear houses. These Cable Bus runs parallel each other along a pipe bridge and then drop off to each of the unit switchgear houses. Some of these runs exceed 1,000 feet in length.</p>
	<p>Industry: Petrochemical</p> <p>Location: Canada</p> <p>Project Type: Main Power Distribution</p> <p>MPH Project Value: \$634,000</p> <p>Work Scope: Design of three 15kV Cable Bus runs, two bus runs at 3000A and one bus run at 4000A. These bus runs tie the main transformers to 3 different switchgear houses located at various points in the plant. Cable Bus lengths were over 1,000 ft. each. Special Requirements: MP HUSKY designed a special housing to accommodate the 20ft. spans used on the pipe racks. This design allowed the Cable Bus housing to be installed on the pipe racks at a manufacturing facility in Edmonton and then shipped to the project site.</p>
	<p>Industry: Medical</p> <p>Location: Samoa</p> <p>Project Type: Power Distribution</p> <p>MPH Project Value: \$184,300</p> <p>Work Scope: Nine bus runs running from a generator to generator switchboard and then from the switchboard inside the switchgear building. The bus systems ranged in size from 800A to 4000A. The bus inside the switchgear building had to be carefully engineered in order to run several bus runs in a sloped roof building. The bus runs had to be designed with varying degree elbows ranging from 15 degree to 90 degree. This was necessary in order to avoid roof obstructions, as well as the six bus runs inside the building. Special Conditions: MP HUSKY provided on site support in America Samoa to assist the customer with installation.</p>
	<p>Industry: Petrochemical</p> <p>Location: Canada</p> <p>Project Type: Oil Sands Extraction</p> <p>MPH Project Value: \$5,000,000+</p> <p>Work Scope: Medium voltage cogeneration feeders (15kV-5000A), plant wide main medium voltage feeders (35kV—5kV—3000A), and low voltage loads and motor controls (600V). Special Requirements: Harsh environment (-40°C minimum), mildly corrosive particles in air.</p>
	<p>Industry: Sports Arena</p> <p>Location: United States</p> <p>Project Type: Main Feeder</p> <p>MPH Project Value: \$188,000</p> <p>Work Scope: Three 600V—4000A cable bus runs to replace bar bus system. Items provided include bus housing and cable, horizontal and vertical elbows, environmental seal flanges, termination boxes with environmental seal flange at the indoor switchgear equipment end, terminations and lugs.</p>

Purchaser's Drawing Requirements

In order for MP HUSKY to proceed with the design of their Cable Bus Systems, the following drawings and information needs to be submitted:

1. Drawings & Submissions, Special Requirements - Engineer will provide any special client title block data electronically to MP HUSKY and MP HUSKY will add to their drawings.
2. Equipment layouts, plans and elevation, tied to coordinate points, column lines or site survey lines.
3. Certified equipment drawings, showing location of termination points and available termination space, as follows:

Transformers

- Plan and elevation drawings with center lines.
- Location of the bushing and throat flange relative to the transformer base and center lines.
 - Transformer height from the base to top of cover mounted bushing
 - Horizontal distance from transformer center line to bushing center line of cover mounted bushing
 - Transformer height from base to horizontal center line of sidewall mounted bushing
 - Horizontal distance from transformer center line to bushing extension of sidewall mounted bushing
- Bushing drilling pattern and hole spacing

Switchgear

- Plan and elevation outline drawings with center lines.
- Side section drawings showing cable termination space.
- Location of the bus bars relative to the switchgear base and center lines.
- Bus bar drilling pattern hole spacing.
- Location (e.g. bottom, top or side) and size of the entry opening into the switchgear.

Generators

- Plan and elevation outline drawings with generator center line and tap box center line.
- Side section drawings showing cable termination space.
- Location of the bus bars relative to the generator base and center lines.
- Bus bar drilling pattern and hole spacing.
- Location (e.g. bottom, top or side) and size of the entry opening in generators termination box.

Buildings

- Plan and elevation outline drawings with center lines.
 - Outer wall location, construction details, entry locations and fire ratings
 - Dimensioned plan, elevation and section views showing duct entry locations
 - Room elevation above grade
- Equipment layouts referenced against coordinate points, column lines or site survey grid.
- If Cable Bus entry is from below, through the building floor, the following issues apply:
 - Time rating of fire barriers
 - Floor construction details
 - Method for Fire Barrier mounting - directly to the underside of the steel floor or a throat to which a barrier can be attached

Pipe Racks

- Rack positions on the site layout - referenced to the same grid as the switchgear and transformers.
- Rack construction drawings, plan and elevation with center lines.
- Sections views of the Pipe Racks.



Typical Specification

1.0 General

- 1.1 A complete metal enclosed bus system shall be provided; including all necessary fittings, tap boxes, enclosure connectors, entrance fittings, insulated conductors, electrical connectors, terminating kits, and other accessories as required.
- 1.2 The bus system shall be suitable for indoor or outdoor use with conductor spacing and ventilation maintained throughout the system.
- 1.3 All elements of the bus enclosure shall be so designed as to eliminate any sharp edges or projections that may injure personnel or conductor insulations.
- 1.4 The bus system shall be Cable Bus, as manufactured by MP HUSKY.

2.0 Construction

- 2.1 All load carrying members of the bus system shall be fabricated from extrusions of aluminum alloy 6063-T6. The maximum allowable stress used in designed shall be 10,000 PSI.
- 2.2 Bus enclosure fittings shall have a radius of 24 inches, unless the minimum bending radius of the conductor requires a larger fitting radius.
- 2.3 The top and bottom enclosure sections shall be corrugated to provide mechanical strength and slotted for ventilation. The top cover shall be fastened to the enclosure with self tapping screws spaced approximately 2 feet on centers and shall be removed for inspection. The bottom section shall be factory installed by welding.
- 2.4 Splice joints between sections of the bus enclosure shall be the high pressure splined bolted type of a design which avoids any structural weakness at the connection and does not exceed the electrical resistance specified under Section 3.4 of this specification.
- 2.5 Conductor support blocks shall be designed in segments to maintain a minimum of one conductor diameter in both the horizontal and vertical planes, as required for free air conductor rating. Horizontal runs will have blocks spaced every 36" and vertical runs every 18". Conductor support blocks shall be made of industrial polymer or fire-retardant polymer meeting Class A (Type I) when tested to ASTM E84-09a, NFPA #255 and UL #723.

3.0 Electrical

- 3.1 All current carrying conductors shall have insulation rated for 90°C operating temperature in accordance with ICEA publication #P-46-426 and interim STD #1 to ICEA publication #S-66-524 for the ampacity and voltage specified.
- 3.2 The conductors shall be phased and supported to maintain low impedance and assure the mechanical strength necessary to prevent cable movement or damage under short circuit currents up to 100,000 RMS symmetrical amps.
- 3.3 Conductors shall be of continuous length and be pulled in after the bus enclosure is in place. Electrical connectors shall be used only at the termination of conductor runs or, if necessary, at tap points. All electrical connectors shall be provided by MP HUSKY.
- 3.4 The bus enclosure shall have a continuous current rating of not less than 1,000 amperes (50°C Rise) and the resistance across the enclosure section splice shall not exceed 50 microhms.
- 3.5 The bus enclosure shall be grounded at sufficient intervals for the purpose of preventing a potential above ground on the bus enclosure in the event of a fault.
- 3.6 The conductors shall be arranged in a phasing pattern which exhibits minimal inter-phase and intra-phase imbalance.
- 3.7 Conductor temperature rise calculations and current balance calculations can be provided in support of Section 3.6 of this specification.
- 3.8 All transposing of cables must occur at termination points. Transposing of cables will not be done in the bus housing.



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