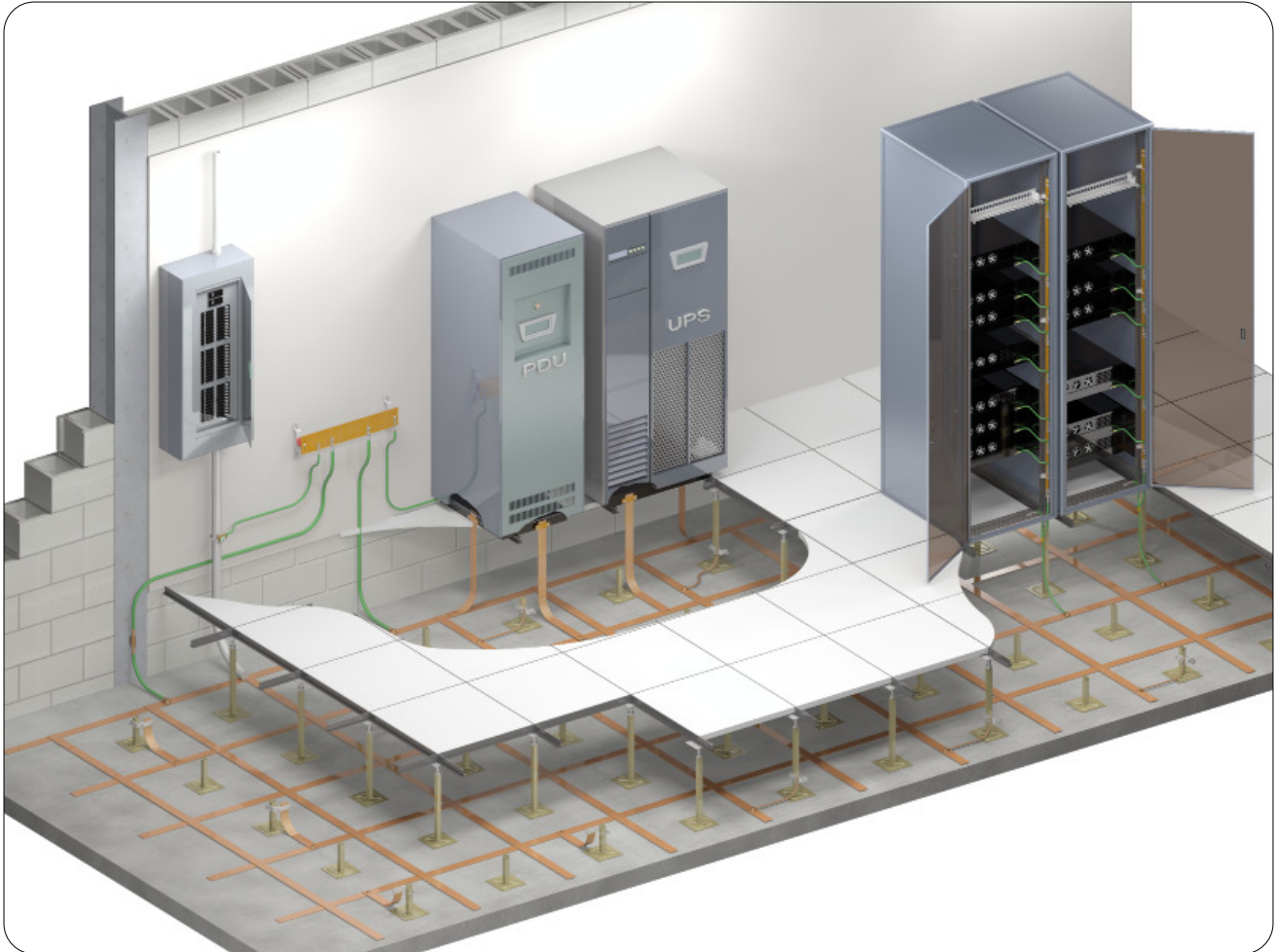


# Supplemental Bonding Grids



## High Frequency Bonding of Data Centers

**HARGER**<sup>®</sup>

grounding • exothermic • lightning protection

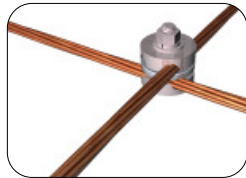
# Round Conductor Applications

## Introduction

“When retrofitting an existing facility it may be necessary to install a wire signal reference grid suspended from the raised floor pedestals. A Signal Reference Grid may be fabricated from standard, bare round wire joined together via welding, brazing, compression or a suitable grounding clamp arrangement at each of the crossing points.” (IEEE Std. 1100-2005) Harger’s lines of prefabricated wire mesh and complete line of UL Listed Computer Room & Ground Pedestal Clamps provide alternative solutions to flat strip SRGs.

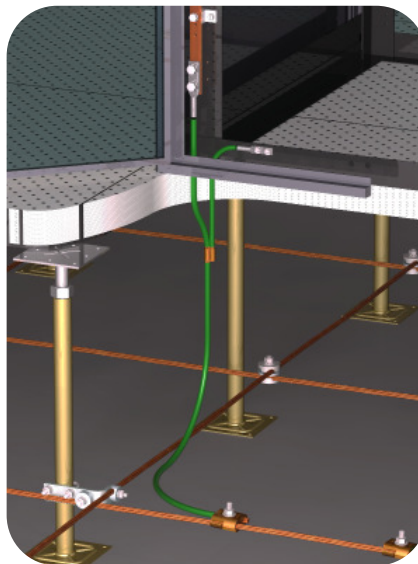


## Computer Room Grounding Clamp



| Part No. | Conductor Size (AWG) |
|----------|----------------------|
| CRGC2    | #2                   |

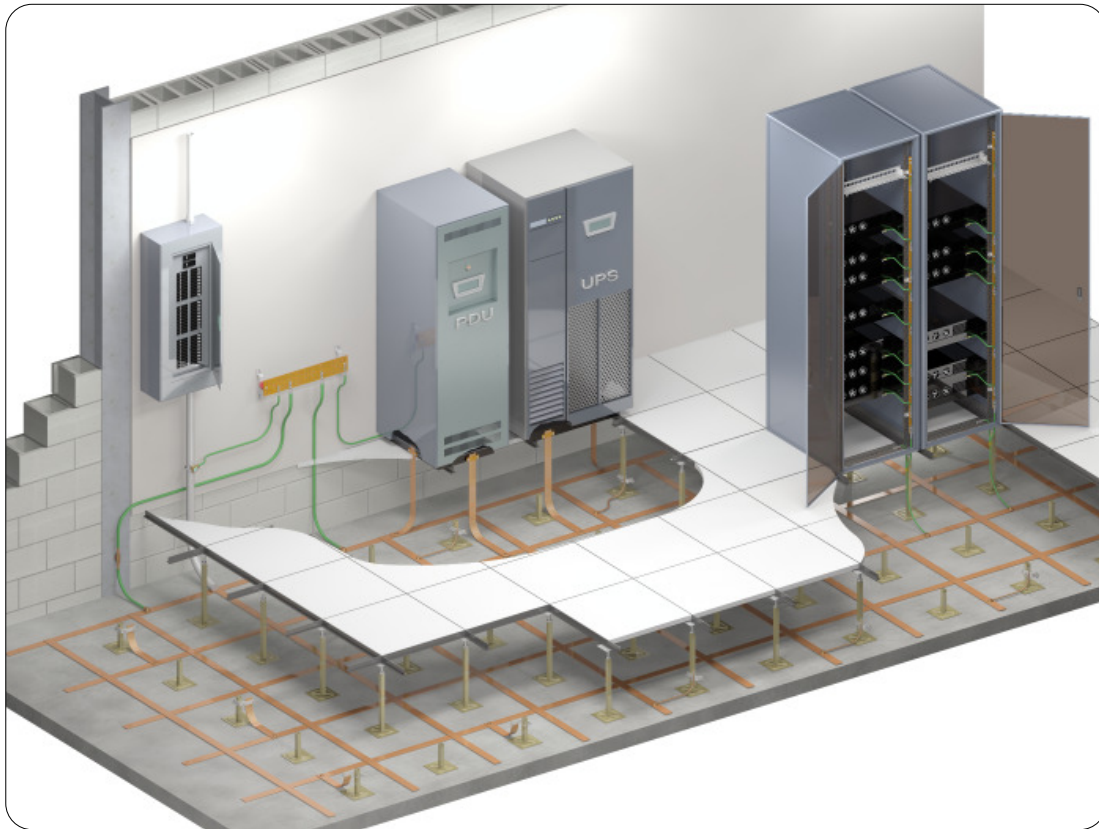
- Used when welded connections are not feasible.
- Unique design allows clamps to form connections at most any angle.
- Specific uses include fabrication under an existing computer room floor.
- Electro-tin plated brass.



# Flat Strip Applications

## Introduction

The HARGER Supplemental Bonding Grid is a low impedance network of conductors, which establish an equipotential plane for high frequency transients. Because signal voltages are low their sensitivity to transient noise is very high - typically 1 volt for digital systems. Proper grounding and bonding of sensitive electronic systems including computer installations require careful consideration of all frequencies from DC to over 100 megahertz. Recommendations on HARGER Supplemental Bonding Grids are in accordance with IEEE Std. 1100-2005, *IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment*. SRG's may be constructed from either Flat Strip or Round Copper Conductor. Signal Reference Grids (SRG) are also known as Mesh-BN's, System Reference Potential Planes (SRPP) and Supplementary Bonding Grids. The flat strip SRG is the highest performance and most economical solution to high frequency bonding for a facility with a new raised floor installation.



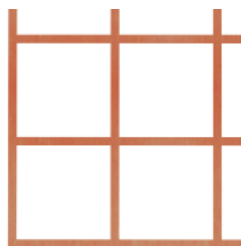
## Flat Strip SRG Mats

Manufactured from 2" wide x 26 gauge copper strip and welded together forming a 2' x 2' grid pattern. Standard SRG sizes range between 4' to 18' wide and the weight per roll is usually limited to a maximum of 250 pounds. Other flat strip sizes and grid spacing are available.

## Supplemental Bonding Grids\*

| Part No.  | Description                 |
|-----------|-----------------------------|
| SRG105024 | 10' x 50', 24" O.C. Spacing |
| SRG125024 | 12' x 50', 24" O.C. Spacing |

- 2" x .016" flat copper conductor
- \* Commonly stocked sizes



## Part Numbering Example

**SRG 12 46 24**

SRG Mesh

Width  
(in feet)

Length  
(in feet)

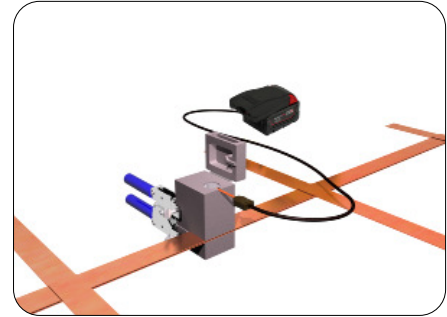
O.C. Spacing  
(in inches)

# Flat Strip Applications

## Exothermic Connections SRG to SRG

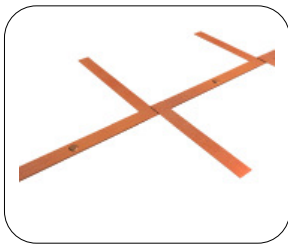
The Ultraweld SRG mold and weld metal are used to weld (bond) adjacent mats together in the field.

| Mold     | Flat Strip | Weld Metal |           | Handle Clamp |
|----------|------------|------------|-----------|--------------|
|          |            | UltraShot  | NUWTube   |              |
| SRG2016K | 2" x .016" | US32       | NUWTUBE32 | MH1          |

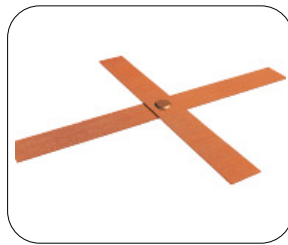


MH1 Handle Clamp required for all molds except the VHO pedestal molds.

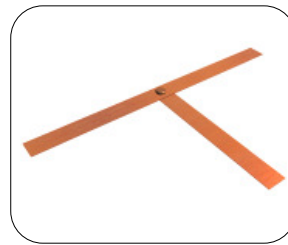
The SRG mold can be used to make all required strip to strip connections.



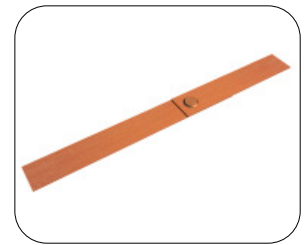
Adjacent SRG Mats Welded Together



Cross



Tee



Splice

## Equipment Bonding to SRG - Low Impedance Risers (LIR)

Use Low Impedance Risers (LIR) to connect each equipment enclosure to the SRG. Two LIR's are spaced widely apart per each piece of equipment. The LIR's must be of different lengths so they will have different self-resonant frequencies quarter wavelength multiples.

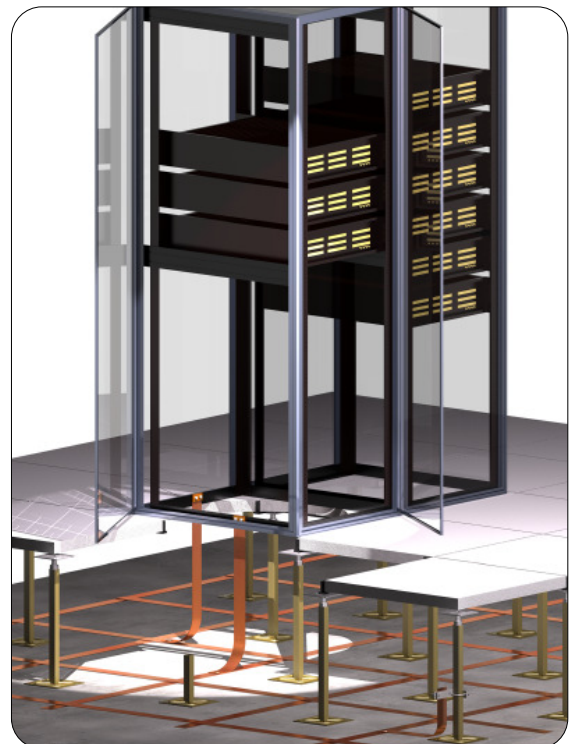


### Low Impedance Riser Kits

| Part No. | Material               | Length |
|----------|------------------------|--------|
| LIR18KIT | 2" x .016" Flat Copper | 18"    |
| LIR24KIT | 2" x .016" Flat Copper | 24"    |

- Riser kits include flat strip riser, sandwich plate, fasteners and antioxidant.
- For Riser only drop the KIT suffix from the part number.

Note: Use Ultraweld Mold SRG2016K with US32 or NUWTUBE32 Weld Metal and MH1 Handle Clamp to connect the LIR to the SRG.





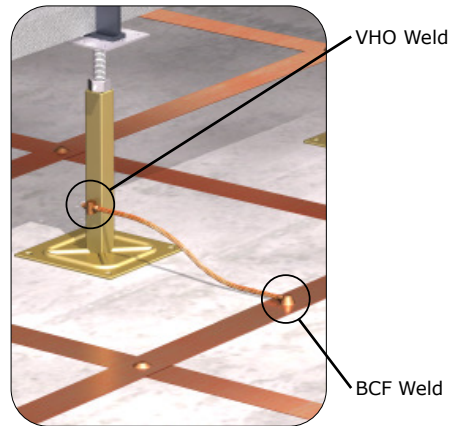
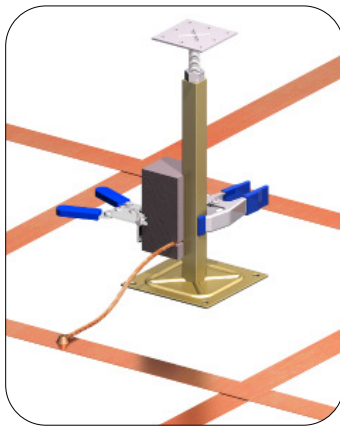
# Flat Strip Applications

## Pedestal Bonding to SRG - Exothermic

Connect pedestals per specification, typically every 6th in each direction, to the SRG using #6 AWG 7 strand copper conductor. The bond wire can either be exothermically welded to the pedestal (preferred method) or mechanically attached using a UL Listed Pedestal Ground Clamp.

## Exothermically Welded Pedestal Connections

| Mold        | Connection                     | Weld Metal |           | Handle Clamp |
|-------------|--------------------------------|------------|-----------|--------------|
|             |                                | UltraShot  | NUWTube   |              |
| VHO61SQMX   | #6 Conc. to 1" Square Pedestal | US25       | NUWTUBE25 | MH4          |
| VHO61RDMX   | #6 Conc. to 1" Round Pedestal  | US25       | NUWTUBE25 | MH4          |
| BCF61.5016B | #6 Conc. to SRG                | US25       | NUWTUBE25 | MH1          |



MH4 required for mounting all VHO molds to the raised floor pedestal during welding.

## Flat Strip Pedestal Ground Clamp

Flat copper strip may be used to bond the raised floor pedestals to the SRG. Typically a 2" wide 26 gauge (0.016") copper strip is used.

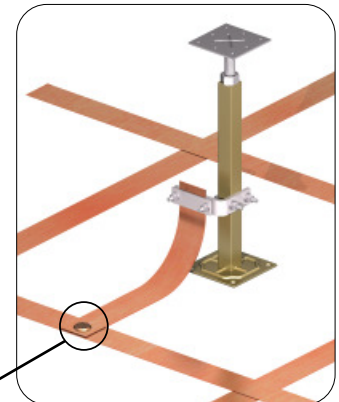


GPC2FSSQ



GPC2FSRD

| Part No. | U-Bolt Type | Pedestal Size | Conductor Size |
|----------|-------------|---------------|----------------|
| GPC2FSSQ | Square      | Up to 1"      | 2" Flat Strip  |
| GPC2FSRD | Round       | 1"            | 2" Flat Strip  |

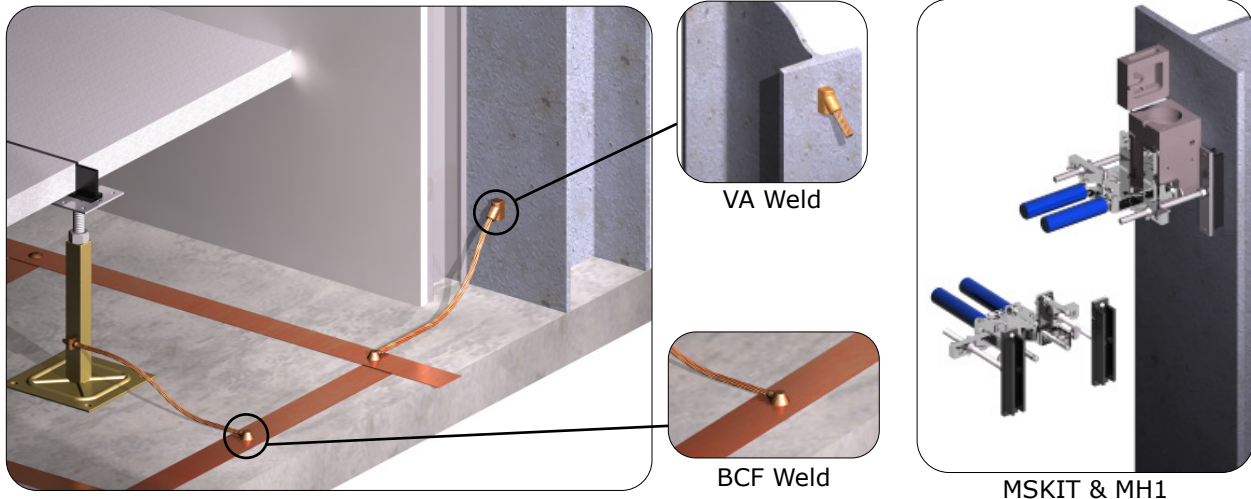


SRG Weld

# Bonding Applications

## Exothermic Connections for Bonding to Building Steel

All columns within and at the perimeter of the computer room shall be bonded to the SRG. The most common conductor used for this application is a #6 AWG 7 strand copper. The cable should take the shortest path between the building steel and the Supplemental Bonding Grid.



| Mold        | Connection                 | Weld Metal |           | Handle Clamp |
|-------------|----------------------------|------------|-----------|--------------|
|             |                            | UltraShot  | NUWTube   |              |
| VA6B*       | #6 Conc. to Building Steel | US45       | NUWTUBE45 | MH1          |
| VA4B*       | #4 Conc. to Building Steel | US45       | NUWTUBE45 | MH1          |
| VA2B*       | #2 Conc. to Building Steel | US45       | NUWTUBE45 | MH1          |
| BCF61.5016B | #6 Conc. to SRG            | US25       | NUWTUBE25 | MH1          |
| BCF41.5016B | #4 Conc. to SRG            | US32       | NUWTUBE32 | MH1          |
| BCF21.5016B | #2 Conc. to SRG            | US32       | NUWTUBE32 | MH1          |

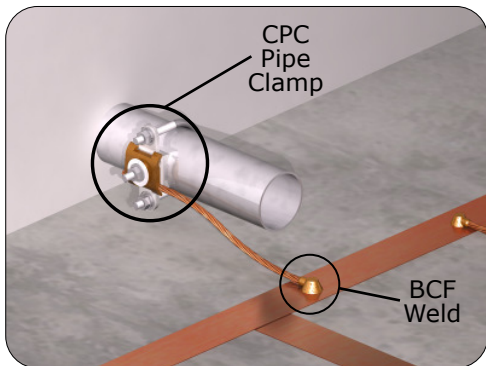
\* MSKIT used with MH1 Handle Clamp to secure VA molds to building steel.

## Bonding Pipes & Conduit

All metal pipes and conduit penetrating the Data Center area must be bonded to the Supplemental Bonding Grid. This is accomplished by using a UL Listed grounding pipe clamp which attaches the bonding conductor to the pipe, the other end is exothermically welded to the SRG. The most common conductor used for this application is a #6 AWG 7 strand copper.



### CPC Pipe Clamps



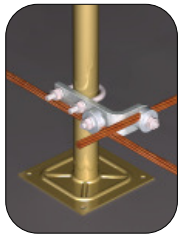
NOTE: See table above for BCF molds.

| Part No.  | Material      | Nominal Pipe Size Range | Pipe Outside Diameter |
|-----------|---------------|-------------------------|-----------------------|
| CPC.5/.75 | Tinned Bronze | .5" - .75"              | .375" - 1"            |
| CPC1/1.25 | Tinned Bronze | 1" - 1.25"              | .75" - 1.7"           |
| CPC1.5/2  | Tinned Bronze | 1.5" - 2"               | 1" - 2.4"             |
| CPC2.5/3  | Tinned Bronze | 2.5" - 3"               | 2.25" - 3.5"          |
| CPC3.5/4  | Tinned Bronze | 3.5" - 4"               | 3.2" - 4.5"           |
| CPC5/6    | Tinned Bronze | 5" - 6"                 | 5.63" - 6.63"         |

• Pipe clamps have a conductor range of #6 AWG through 250 MCM.

# Round Conductor Applications

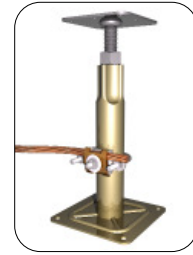
## Pedestal Bonding to SRG - Ground Pedestal Clamps



 Listed 467



 Listed 467



| Part No. | U-Bolt Type | Pedestal Size | Conductor Size (AWG) |
|----------|-------------|---------------|----------------------|
| GPC6SQ   | Square      | Up to 1"      | #6                   |
| GPC6RD   | Round       | 1"            | #6                   |
| GPC4SQ   | Square      | Up to 1"      | #4                   |
| GPC4RD   | Round       | 1"            | #4                   |
| GPC2SQ   | Square      | Up to 1"      | #2                   |
| GPC2RD   | Round       | 1"            | #2                   |

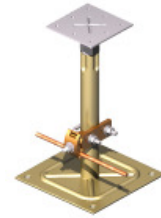
- Listed to UL467 for electrical grounding.
- Electro tin plated copper includes stainless steel hardware.
- Accommodates up to 4 conductors.
- Fits up to 1" pedestal (1-1/8" outside diameter).

| Part No.  | Material      | Pedestal Size | Conductor Size |
|-----------|---------------|---------------|----------------|
| CPC.5/.75 | Tinned Bronze | .5" - .75"    | .375" - 1"     |
| CPC1/1.25 | Tinned Bronze | 1" - 1.625"   | .75" - 1.7"    |
| CPC1.5/2  | Tinned Bronze | 1.5" - 2.375" | 1" - 2.4"      |

- Includes stainless steel hardware.
- Accepts 3 conductors from #6 AWG up to 250 MCM.
- Fits both round and square pedestal legs up to 1-1/8" outside diameter.



 Listed 467



| Part No.     | U-Bolt Type | Pedestal Size   | Conductor Size |
|--------------|-------------|-----------------|----------------|
| GPC2/ORD1.75 | Round       | 1-1/8" - 1-3/4" | 2/0 & #6 AWG   |

- Accommodates cross runs without adding an additional connector. Accommodates 4 conductors in total.
- Electro-tin plated copper.
- Includes stainless steel hardware.

| Part No. | Electro tin plated |
|----------|--------------------|
| GP1MCI   | No                 |
| TGP1MCI  | Yes                |

- Heavy duty bronze clamp includes stainless steel hardware.
- Accepts 2 conductors #6 AWG solid through 2/0 stranded.
- Fits both round and square pedestal legs up to 1-1/8" outside diameter.



Approximately 35 miles from Chicago, the corporate office and 65,000 square foot facility is located in Grayslake, Illinois.



Another 75,000 square foot manufacturing plant, approximately 110 miles south of Raleigh, is located in Fairmont, North Carolina.

Established in 1960, Harger manufactures high quality products and combines them with exceptional customer service and technical expertise. Harger has the resources and partnerships to support your needs from planning stages to project completion.

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