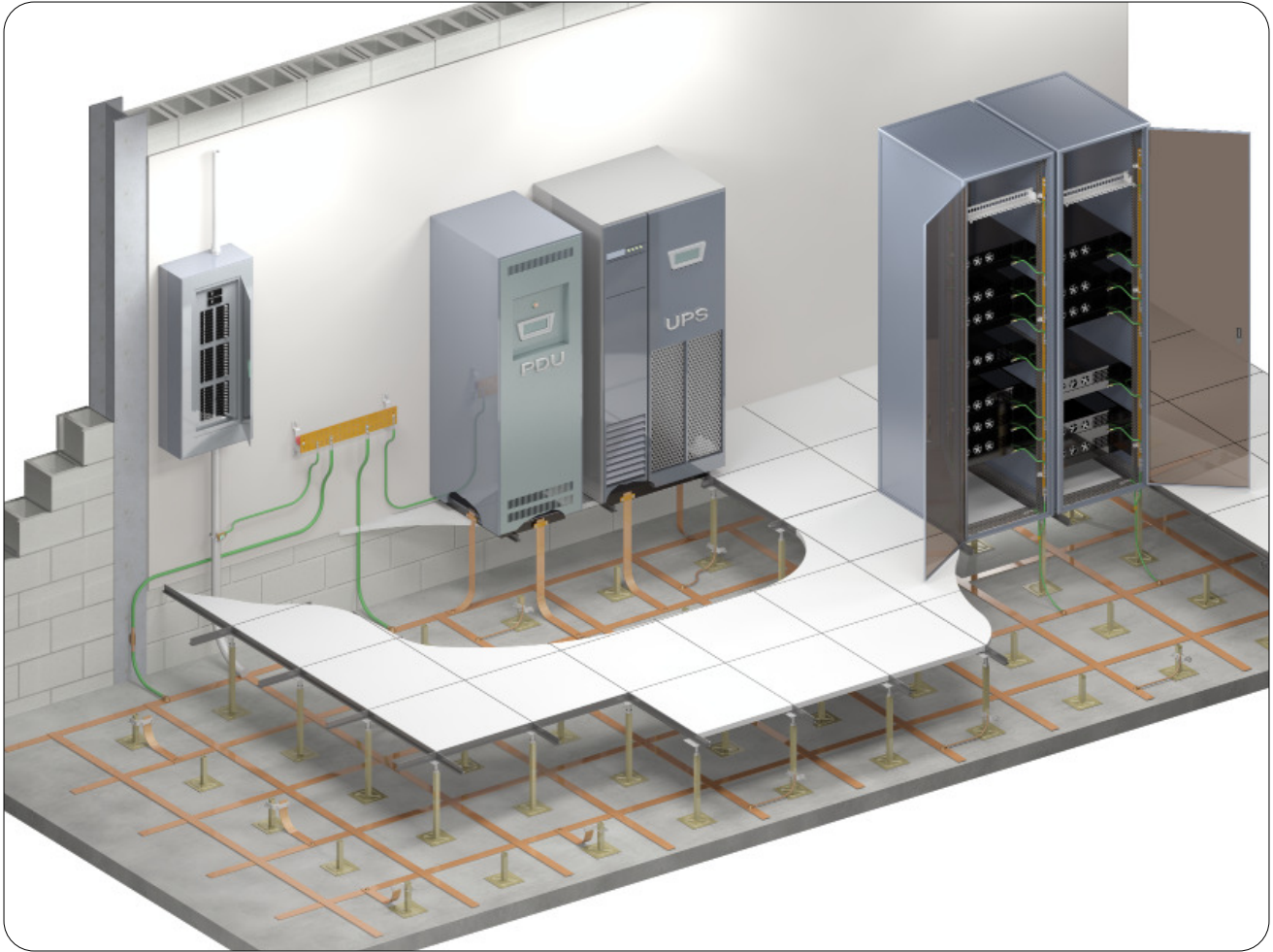


Supplemental Bonding Grids



High Frequency Bonding of Data Centers

HARGER[®]

grounding • exothermic • lightning protection

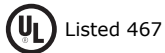
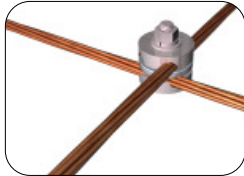
Round Conductor Applications

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.

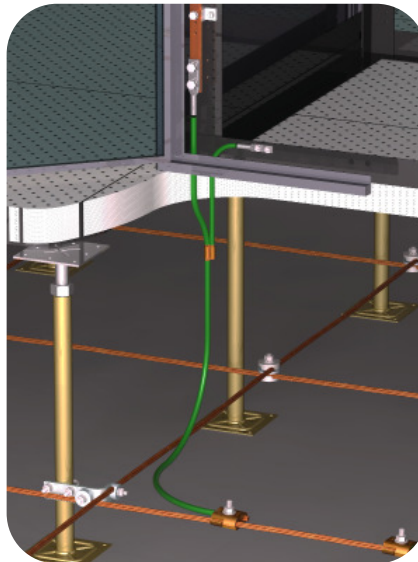


Computer Room Grounding Clamp



Part No.	Conductor Size (AWG)
CRGC2	#2

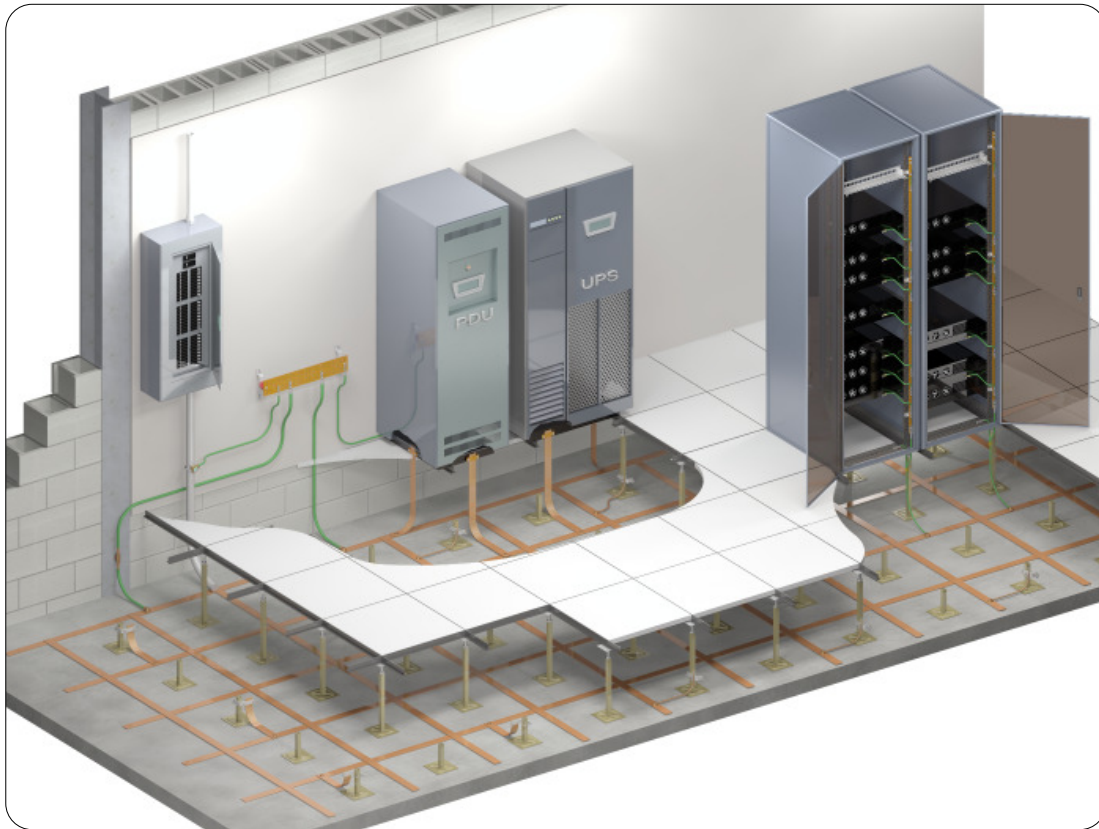
- Used when welded connections are not feasible.
- Unique design allows clamps to form connections at most any angle.
- Specific uses include fabrication under an existing computer room floor.
- Electro-tin plated brass.



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

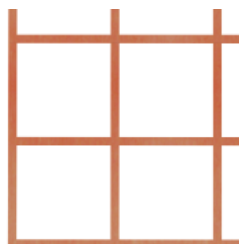
Manufactured from 2" wide x 26 gauge copper strip and welded together forming a 2' x 2' grid pattern. Standard SRG sizes range between 4' to 18' wide and the weight per roll is usually limited to a maximum of 250 pounds. Other flat strip sizes and grid spacing are available.

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)

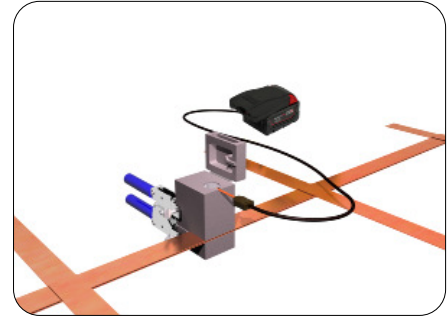
O.C. Spacing
(in inches)

Flat Strip Applications

Exothermic Connections SRG to SRG

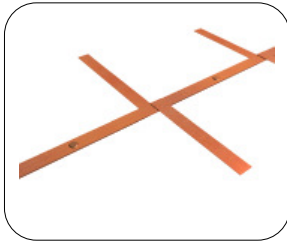
The Ultraweld SRG mold and weld metal are used to weld (bond) adjacent mats together in the field.

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

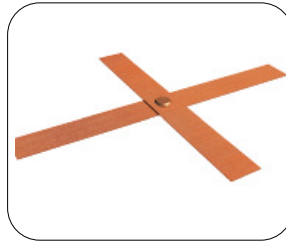


MH1 Handle Clamp required for all molds except the VHO pedestal molds.

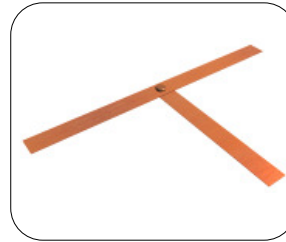
The SRG mold can be used to make all required strip to strip connections.



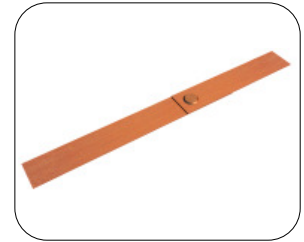
Adjacent SRG Mats
Welded Together



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.



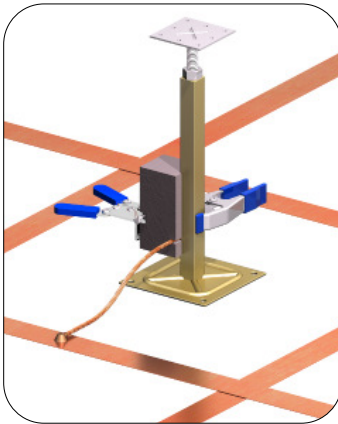
Flat Strip Applications

Pedestal Bonding to SRG - Exothermic

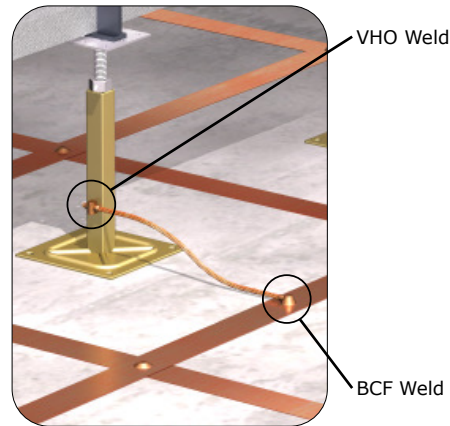
Connect pedestals per specification, typically every 6th in each direction, to the SRG using #6 AWG 7 strand copper conductor. The bond wire can either be exothermically welded to the pedestal (preferred method) or mechanically attached using a UL Listed Pedestal Ground Clamp.

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.

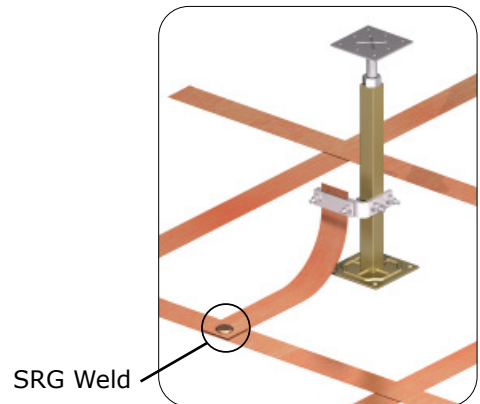


GPC2FSSQ



GPC2FSRD

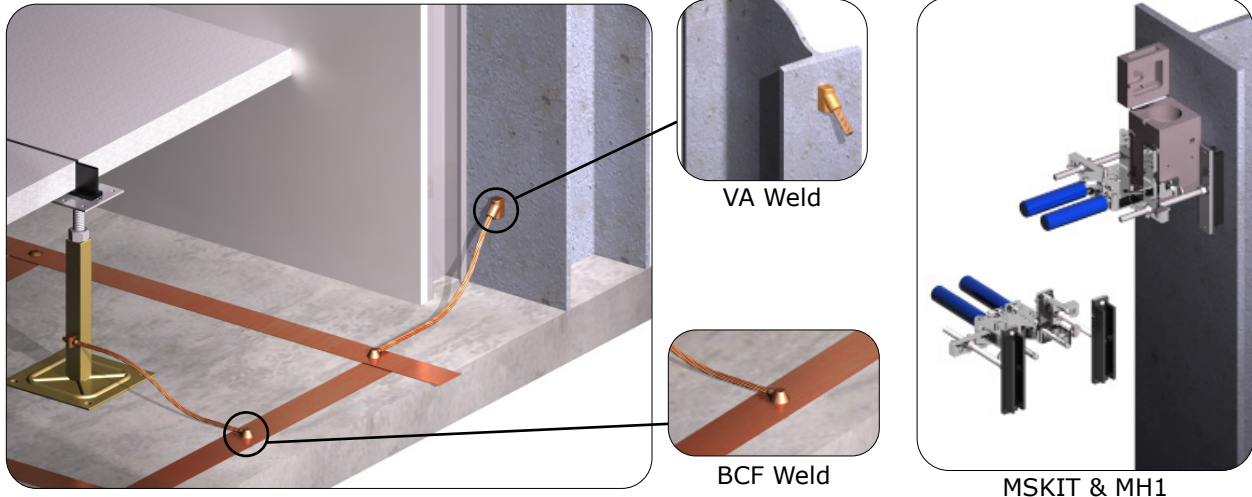
Part No.	U-Bolt Type	Pedestal Size	Conductor Size
GPC2FSSQ	Square	Up to 1"	2" Flat Strip
GPC2FSRD	Round	1"	2" Flat Strip



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.

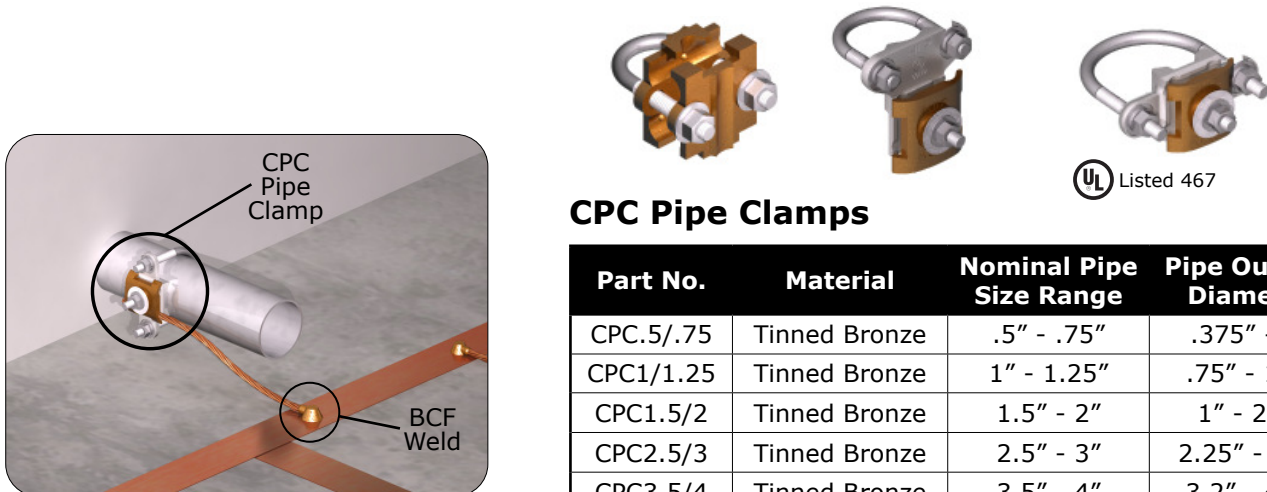


Mold	Connection	Weld Metal		Handle Clamp
		UltraShot	NUWTube	
VA6B*	#6 Conc. to Building Steel	US45	NUWTUBE45	MH1
VA4B*	#4 Conc. to Building Steel	US45	NUWTUBE45	MH1
VA2B*	#2 Conc. to Building Steel	US45	NUWTUBE45	MH1
BCF61.5016B	#6 Conc. to SRG	US25	NUWTUBE25	MH1
BCF41.5016B	#4 Conc. to SRG	US32	NUWTUBE32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



NOTE: See table above for BCF molds.

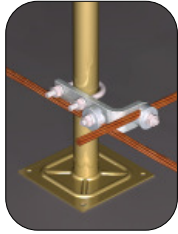
CPC Pipe Clamps

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

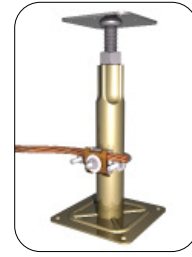
Pedestal Bonding to SRG - Ground Pedestal Clamps



 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

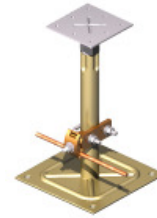
- Listed to UL467 for electrical grounding.
- Electro tin plated copper includes stainless steel hardware.
- Accommodates up to 4 conductors.
- Fits up to 1" pedestal (1-1/8" outside diameter).

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
GPC2/0RD1.75	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.

Harger Lightning & Grounding

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