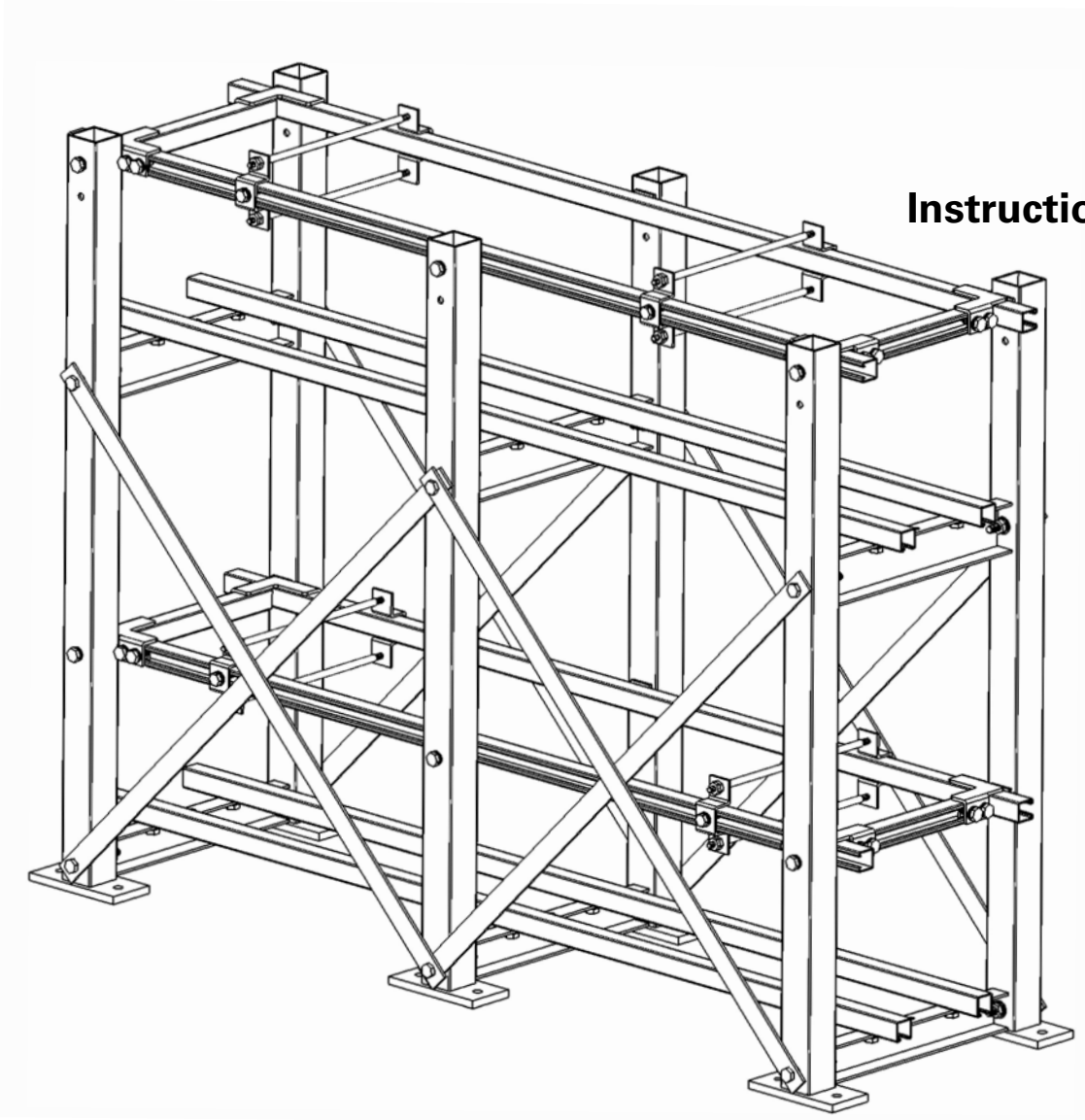


Standard and Seismic Battery Racks



Instruction Manual



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INSTRUCTIONS for ASSEMBLING and MAINTAINING STANDARD and SEISMIC BATTERY RACKS

Read all instructions carefully and observe all warnings before installation.

See Safety, Storage, Installation, Operation and Maintenance Manual for battery information.

1. GENERAL INFORMATION

EnerSys® stationary battery racks are available for standard (ZONE 0) and seismic (ZONE 2 and 4) applications as defined in the Uniform Building Code (UBC) or International Building Code (IBC) or IEEE693. Racks are supplied unassembled. The basic components consist of: frames, cross braces, support rails, hardware, double-sided tape and plastic channels. Seismic racks also include: side rails, end rails, corner brackets, foam spacers, rail spacers, shims and cell clamp assemblies.

The styles of standard racks supplied by EnerSys are shown in Figure 1.1.

2. SAFETY PRECAUTIONS

- Assemble racks according to the instructions in this document WITHOUT DEVIATIONS.
- Refer to UBC, IBC, IEEE693, OSHA and EPA regulations and local ordinances pertaining to battery installation and storage.
- Refer to the SAFETY PRECAUTIONS contained in the EnerSys Safety, Storage, Installation, Operation and Maintenance Manual for Flooded Lead Acid Batteries.
- For standard racks, cross braces must be installed before loading cells on the rack. DO NOT remove cross braces on a rack with cells already installed.
- Seismic racks will have cross braces on the front and back of the rack and some rack styles will also have middle cross braces. DO NOT remove front and back cross braces at the same time while installing cells or after cells are installed. Only remove the front set to install cells and reinstall as soon as cells are in place on the rack.

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY OR DAMAGE.

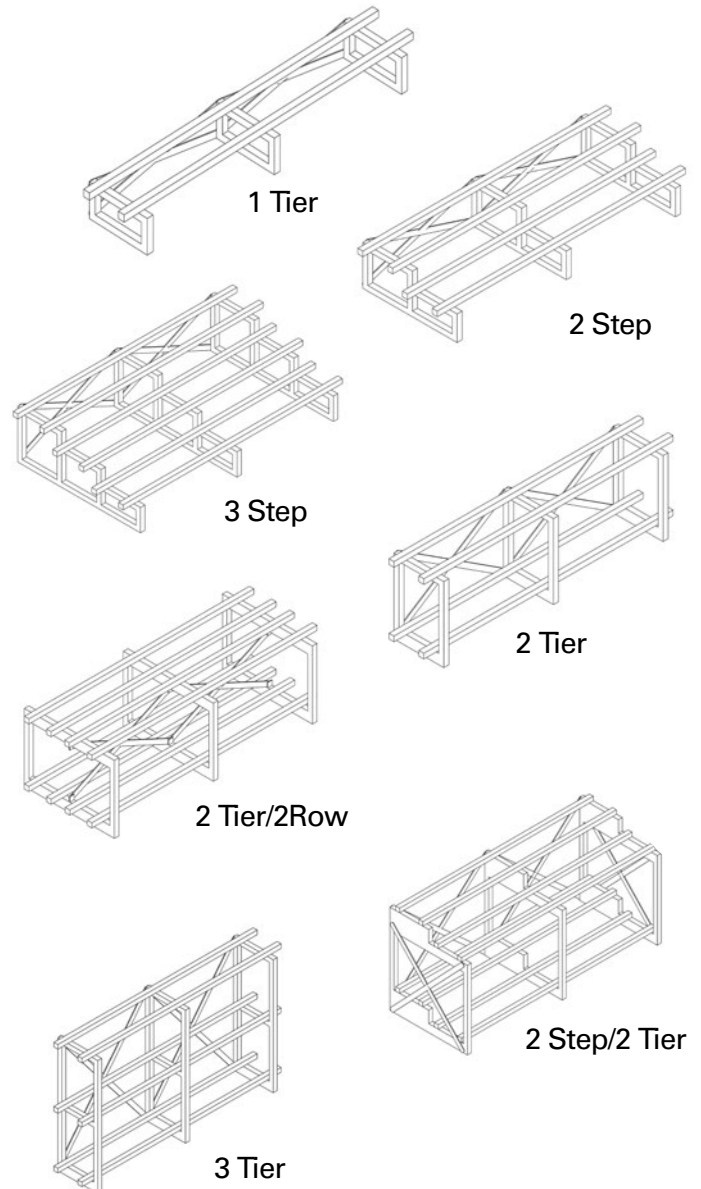


Figure 1.1: Types of Standard Racks

Seismic racks vary in availability but are manufactured in the same styles as shown in Figure 1.1

3. SERVICE INFORMATION

Should you require installation supervision, service, parts, accessories or maintenance, EnerSys has a service organization to assist with your new rack purchase. Contact your nearest EnerSys representative or call the corporate number listed on the back of this manual and ask for EnerSys Service.

4. INSPECTION OF BATTERY RACK COMPONENTS

Upon receipt, check each package against the packing list to ensure all components and quantities are correct. Inspect for visual damage while the carrier representative is still on-site. Make note of any damage or file a damage report if necessary. If any part has not been received or has been damaged, DO NOT proceed with installation until all parts are available.

5. INSTALLATION CONSIDERATIONS

If you have any questions concerning the following installation considerations, contact your EnerSys sales representative.

- 5.1 Consider available floor space, including aisles for cell installation, maintenance and possible cell replacement.
- 5.2 Aisle spacing should be in accordance with the NEC. ALL OTHER APPLICABLE CODE REQUIREMENTS SHOULD ALSO BE CONSIDERED.
- 5.3 Minimum clearance between seismic racks and any objects (including walls, equipment and other racks) is to be 4 in. (100 mm).
NO SEISMIC RACKS ARE TO BE BUTTED TOGETHER END-TO-END OR BACK-TO-BACK.
- 5.4 Batteries should be installed in a clean, cool and dry environment where there is minimal temperature variation. DO NOT locate batteries near HVAC ducts or exhausts, heat sources or direct sunlight.
- 5.5 The location of installation should be kept at ambient temperature, between 72°F (23°C) - 78°F (26°C). Higher temperatures will reduce operating life and lower temperatures will reduce battery performance.
- 5.6 Adequate ventilation must be provided. DO NOT install in an airtight enclosure or room with no ventilation.
- 5.7 Rack-to-rack cable connectors provided by EnerSys are based on a rack spacing of 4 in. (100 mm); any length over this is the responsibility of the installer.
- 5.8 The floor/mounting platform must be reasonably level. Shimming up to 0.25 in. (6 mm) maximum may be used to have cell support rails level both front-to-back and side-to-side. Shims and shimming hardware is user supplied.
- 5.9 The floor/mounting platform must be capable of supporting the weight of the battery and rack system, as well as any auxiliary equipment. ALL APPLICABLE CODE REQUIREMENTS SHOULD BE CONSIDERED.
- 5.10 Floor Anchoring and its design are the responsibility of the purchaser. Anchoring should meet all local, state, and federal codes and industry standards.
- 5.11 When rack grounding is required for NEC and/or local codes, scratch paint as necessary keeping the exposed metal to a minimum. Grounding lug and cable is user supplied. Ohmmeter readings between each component and a common point on the frame must indicate continuity to ensure proper grounding.

6. INSTALLATION EQUIPMENT AND SUPPLIES

Before working with the battery system, ensure the tools and equipment listed below are available.

- Chalk line
- Floor anchors (user-supplied)
- Concrete drill (for Floor Anchors)
- Floor shims (user-supplied)
- Level
- Ohmmeter (for ground testing)
- Open end/box wrenches (SAE dimensions)
- Ratchet set w/sockets (SAE dimensions)
- Square
- Tape measure
- Torque wrench (10-100 ft-lb.)

Bolt Diameter	Torque		Hex Head (Socket) Size
	in.	Nm	
3/8	20	27	9/16
1/2	50	68	3/4
5/8	100	136	15/16

Table 1 – Torque Specifications

7. FLOOR AND ANCHORING

Battery racks should be properly anchored to the floor for safety purposes. For seismic battery racks, use all frame holes to maintain seismic certification.

FLOOR ANCHORING AND ITS DESIGN IS THE RESPONSIBILITY OF THE PURCHASER. Contact your EnerSys representative if you have any questions.

To Layout Battery Rack:

- 7.1** Refer to the rack assembly drawing for the frame and anchor bolt layout.
- 7.2** Mark locations for anchor bolts using the holes in the bottom of each frame as a template.
- 7.3** Install floor anchors in pre-determined locations as indicated in the manufacturer instructions. (If necessary, move frame to drill and install anchor bolts).
- 7.4** Shimming up to 0.25 in. (6 mm) maximum can be used to level the rack. Shims are customer supplied.
- 7.5** Torque anchor bolts to manufacturer instructions.

8. CELL INSTALLATION CONSIDERATIONS

Know the location and polarity orientation of each cell prior to installation. Diagram connections to avoid repositioning of cells once installed (see CONNECTING CELLS in Safety, Storage, Installation, Operation and Maintenance Manual for Flooded Lead Acid Batteries).

On multi-tier racks with more cells on one row than another, install larger number of cells on bottom row.

- Install rear side rail before installing cells. Locate side rail so overhang is equal on both ends of rack. Install plastic channel.
- Make sure all bolts are torqued as indicated in Table 1 before installing cells.

Refer to Safety, Storage, Installation, Operation and Maintenance Manual for Flooded Lead Acid Batteries for cell unpacking and handling instructions.

9. RACK ASSEMBLY

The following steps show how to assemble standard and seismic battery racks for flooded lead acid batteries. Also refer to the assembly drawing supplied with the rack shipment for specific details of the rack purchased.

9.1 CROSS BRACE TO FRAME ASSEMBLY

DO NOT REMOVE more than one set of cross braces at one time with cells installed on the rack for safety concerns. Standard racks have one row of cross braces on the back or middle of the rack as seen in Figure 1.1. Seismic racks have multiple rows of cross braces.

It may be helpful to install all cross braces to make the rack square and then remove one set at a time to install cells.

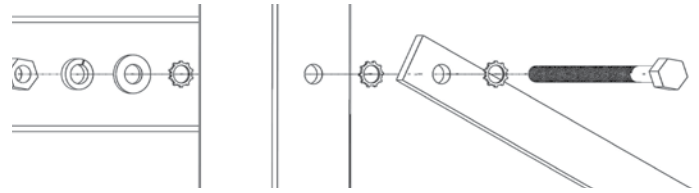


Figure 9.1.1: Typical single cross brace to frame assembly

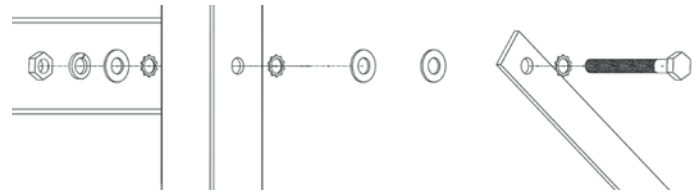


Figure 9.1.2: Optional single cross brace to frame assembly

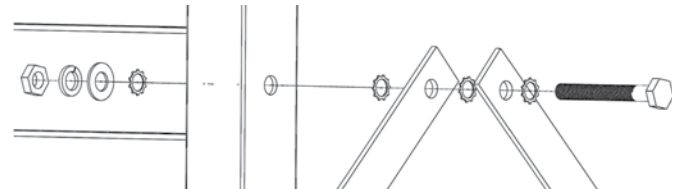


Figure 9.1.3: Typical dual cross brace to frame assembly

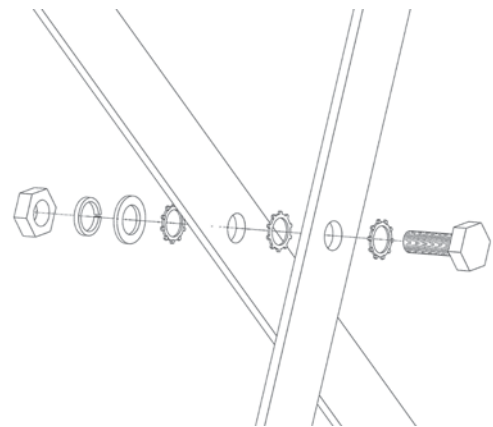
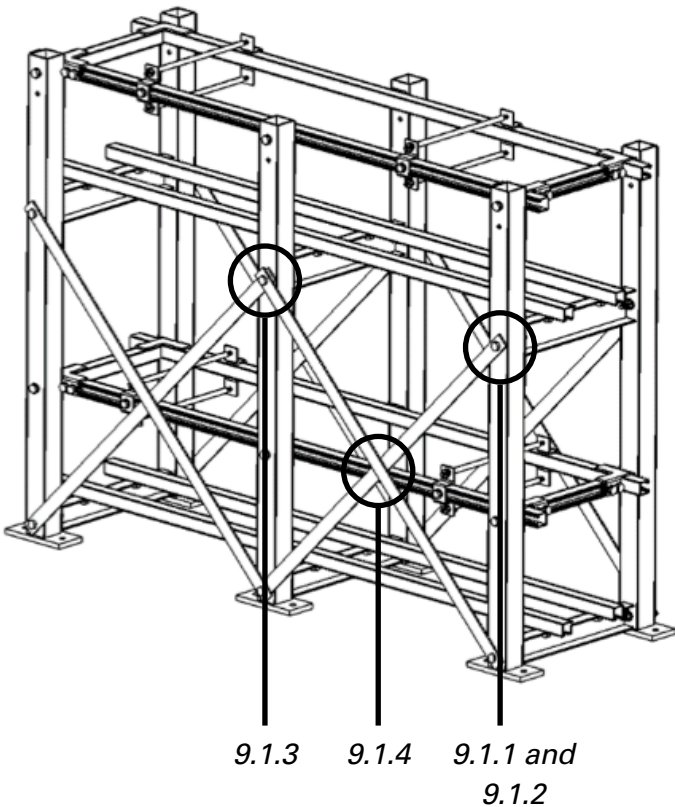


Figure 9.1.4: Brace to brace assembly (if applicable)



9.1.3 9.1.4 9.1.1 and
9.1.2

Different styles of seismic racks include frame extensions which need to be installed with the rear cross braces.

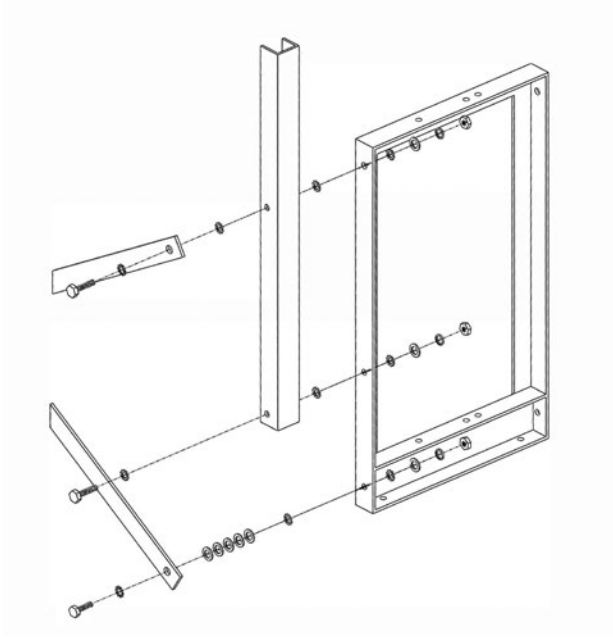


Figure 9.1.5: Cross brace to rear rail support (frame extension) to frame assembly

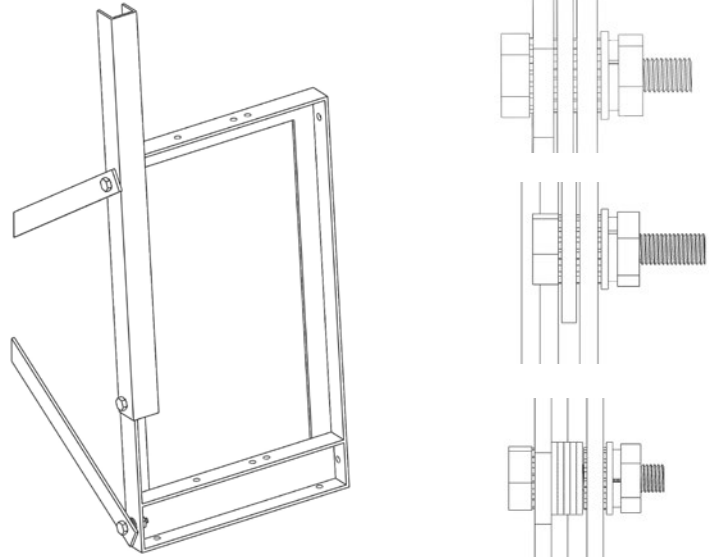


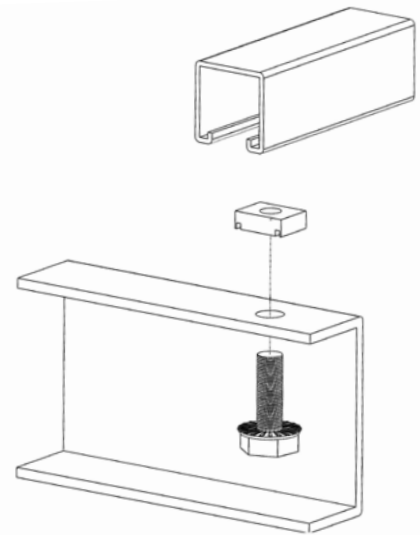
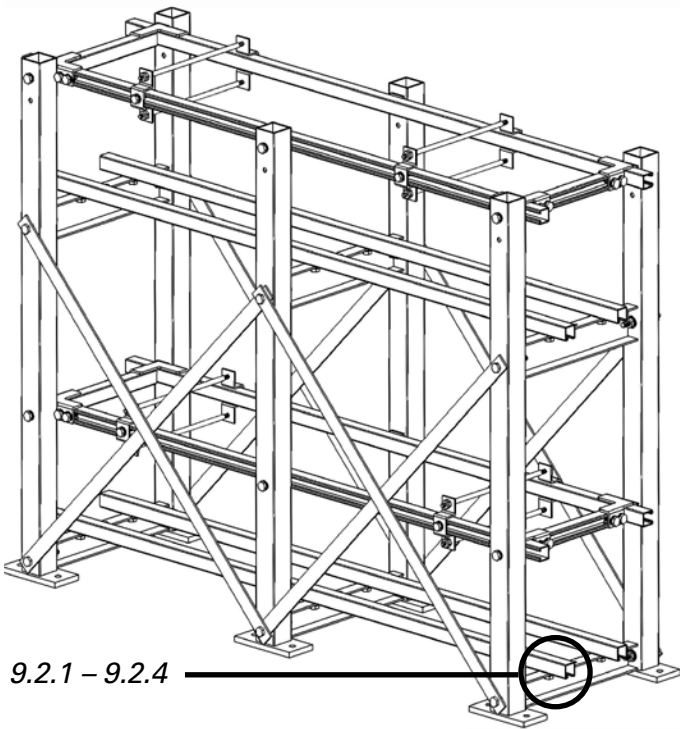
Figure 9.1.6: Cross brace to rear rail support to frame assembly (Washers are not needed but are to be used as spacers to keep the cross braces from bending)

9.2 INSTALL SUPPORT RAILS

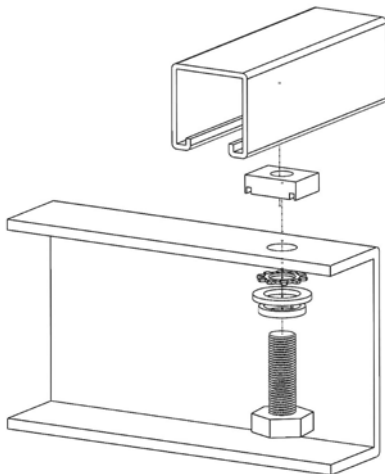
It is recommended that the rails of the upper tiers on multi-tier racks not be installed until jars are placed on low tiers for safety concerns. Overhang on both sides of the frame should be equal. Torque all bolts according to Table 1.

NOTE: Figure 9.2.1 shows step 1 for standard rack assembly whereas Figure 9.2.2 shows Step 1 for seismic rack assembly.

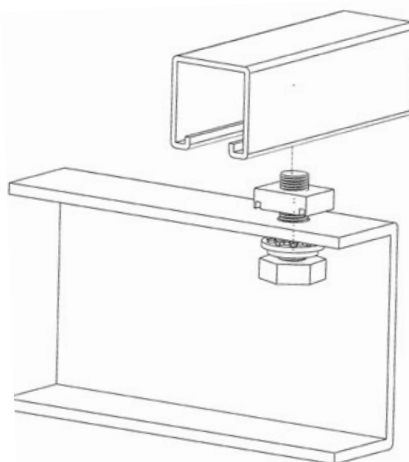
Standard racks are supplied with whiz bolts, while seismic racks are supplied with hex bolts, lock washers, flat washers and star washers.



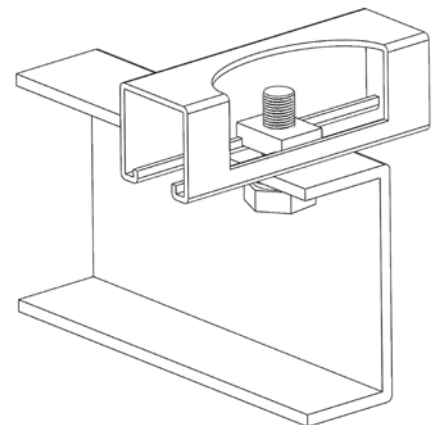
*Figure 9.2.1:
Step 1 (Standard Rack) -
Support rail to frame*



*Figure 9.2.2:
Step 1 (Seismic Rack) -
Support rail to frame*



*Figure 9.2.3:
Step 2 - Support rail to
frame assembly*



*Figure 9.2.4:
Step 3 - Support rail to
frame assembly*

9.3 INSTALL REAR SIDE RAILS FOR SEISMIC RACKS

NOTE: Shimming between the frame and the side rail may be needed so that the side rail sits as close to the cells as possible without exerting pressure on the jars. Clearance equal to the typical thickness of a credit card is allowable between the side rails and battery jars. Shims can be installed at the end of assembly for best fit.

NOTE: It is recommended that the rails of the upper tiers on multi-tier racks not be installed until jars are placed on low tiers for safety concerns. Overhang on both sides of the frame should be equal. Torque all bolts according to Table 1.

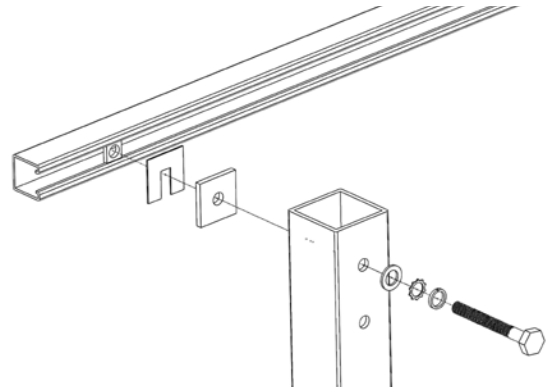


Figure 9.3.1: Typical side rail to frame assembly with spacer and shim placement shown, when applicable (Refer to Support Rail Assembly)

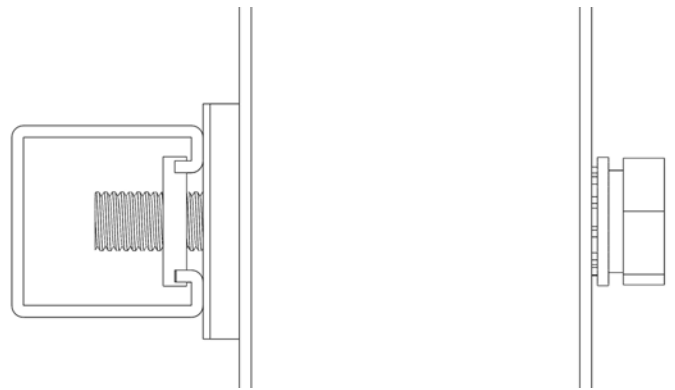
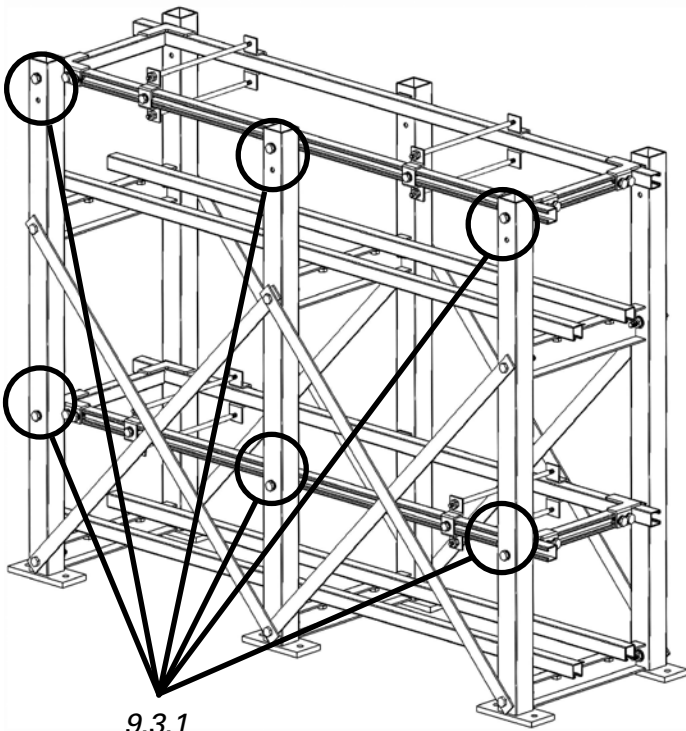


Figure 9.3.2: Side rail to frame assembly with spacer and shim placement shown, when applicable (Refer to Support Rail Assembly)



9.4 INSTALL PLASTIC CHANNEL TO RAILS

NOTE: All rails which are in contact with battery jars must have the plastic channel to protect the surface of the jar. Plastic channels will need to be cut to length according to where the rails contact the battery jars.

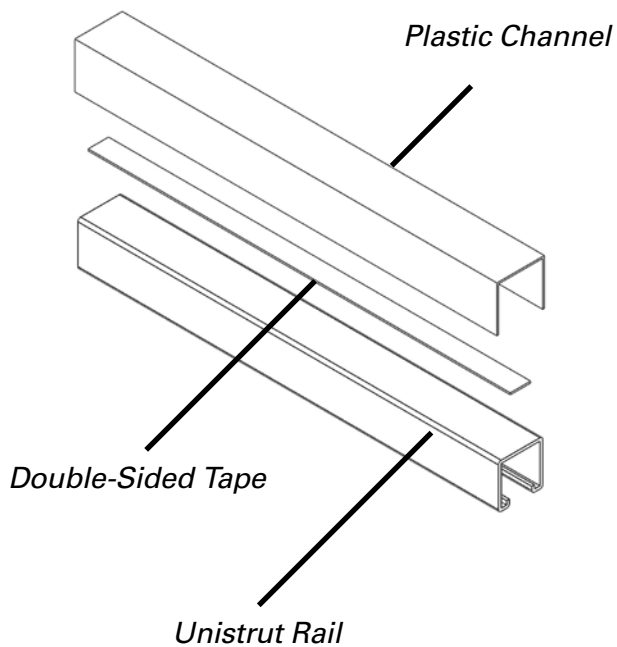


Figure 9.4.1: Typical rail and plastic channel assembly

9.5 CELL INSTALLATION

It is important to know the location and polarity orientation of each cell prior to installation. Before installing cells, be sure to:

- Install rear side rail (for Seismic Racks)
- Locate side rail (for Seismic Racks) and support rails so overhang is equal on both ends of the rack
- Install plastic channels
- Make sure all bolts are torqued as indicated in Table 1

NOTE: Install all bottom tier cells and cross braces before installing cells on other tiers. The bottom tier should contain the largest number of cells. Refer to EnerSys Safety, Storage, Operation, and Maintenance Manual for Flooded Lead Acid Batteries for installation and battery safety precautions.

9.6 INSTALL FRONT SIDE RAILS FOR SEISMIC RACKS

NOTE: Shimming between the frame and the side rail may be needed so that the side rail sits as close to the cells as possible without exerting pressure on the jars. Clearance equal to the typical thickness of a credit card is allowable between the side rails and battery jars. Shims can be installed at the end of assembly for best fit.

NOTE: It is recommended that the rails of the upper tiers on multi-tier racks not be installed until jars are placed on low tiers for safety concerns. Overhang on both sides of the frame should be equal. Torque all bolts according to Table 1.

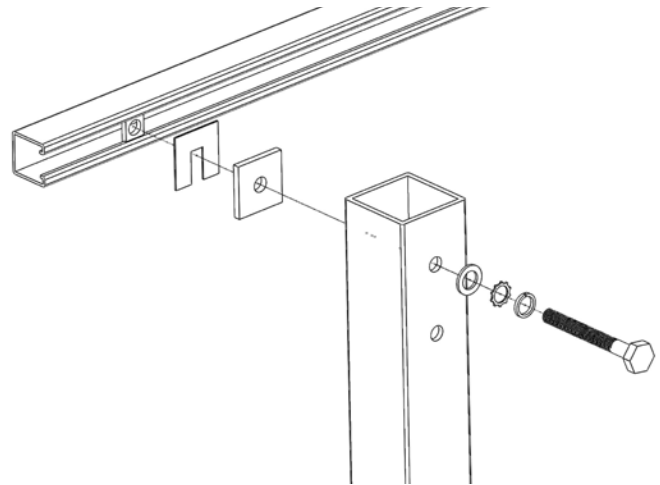
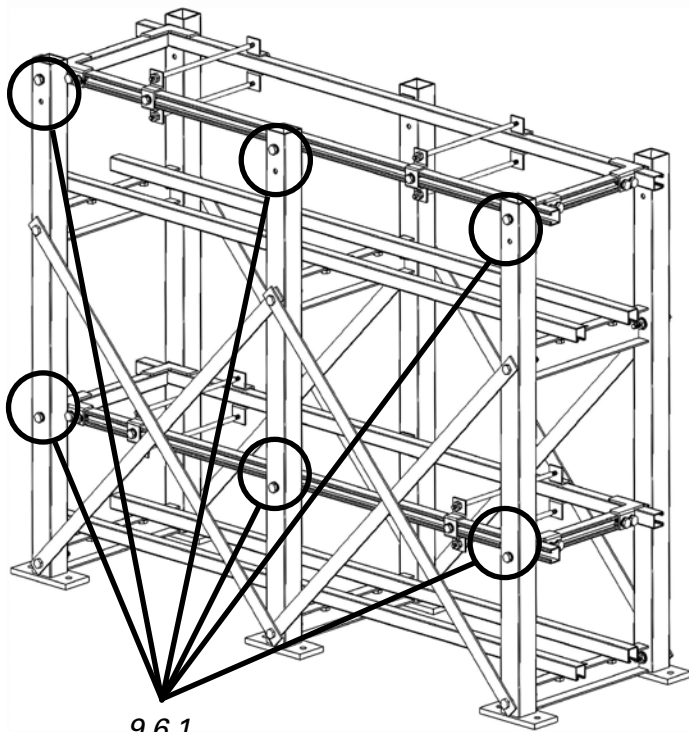


Figure 9.6.1: Typical side rail to frame assembly with spacer and shim placement shown, when applicable (Refer to Support Rail Assembly)



9.6.1

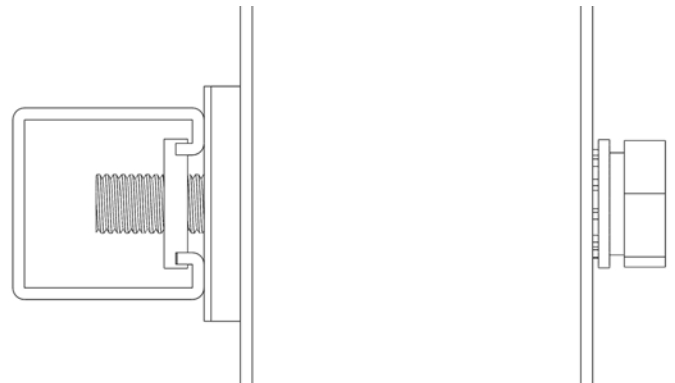


Figure 9.6.2: Side rail to frame assembly with spacer and shim placement shown, when applicable (Refer to Support Rail Assembly)

9.7 FRONT RAIL SUPPORT TO RAIL ASSEMBLY (IF APPLICABLE)

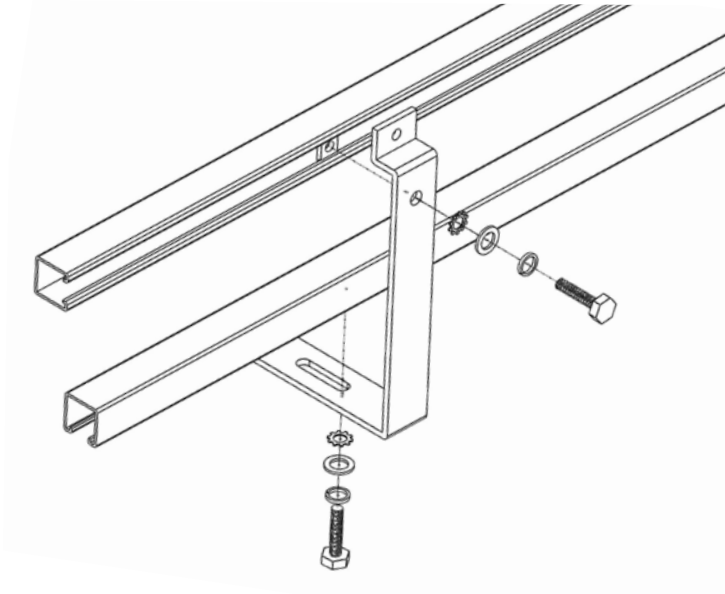


Figure 9.7.1: Front rail support to rail assembly

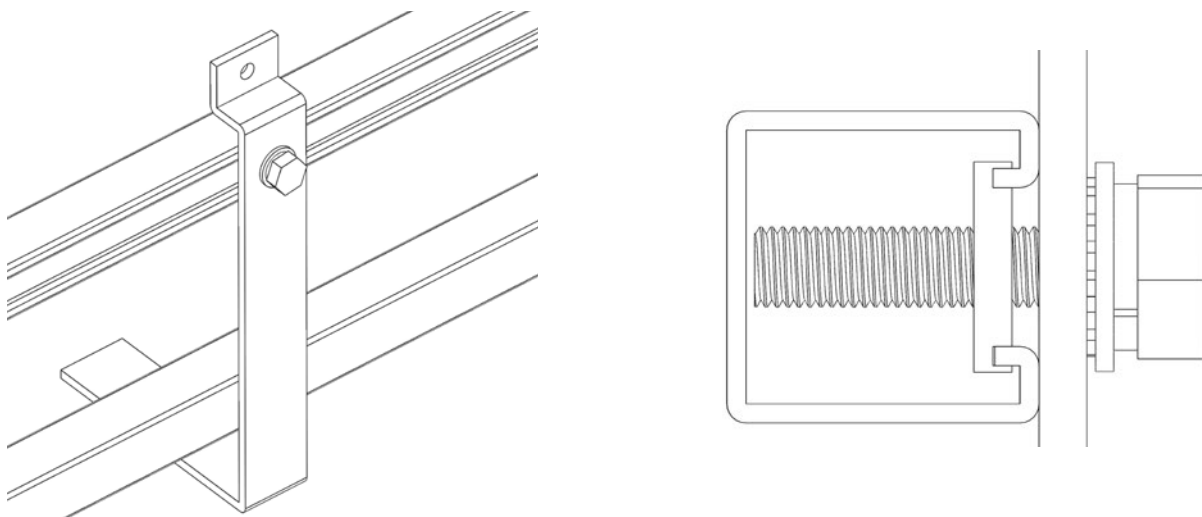


Figure 9.7.2: Front rail support to rail assembly

9.8 FRONT CROSS BRACE TO FRAME ASSEMBLY FOR SEISMIC RACKS

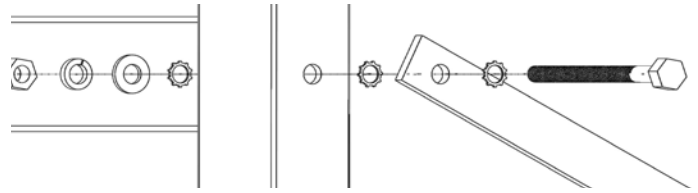
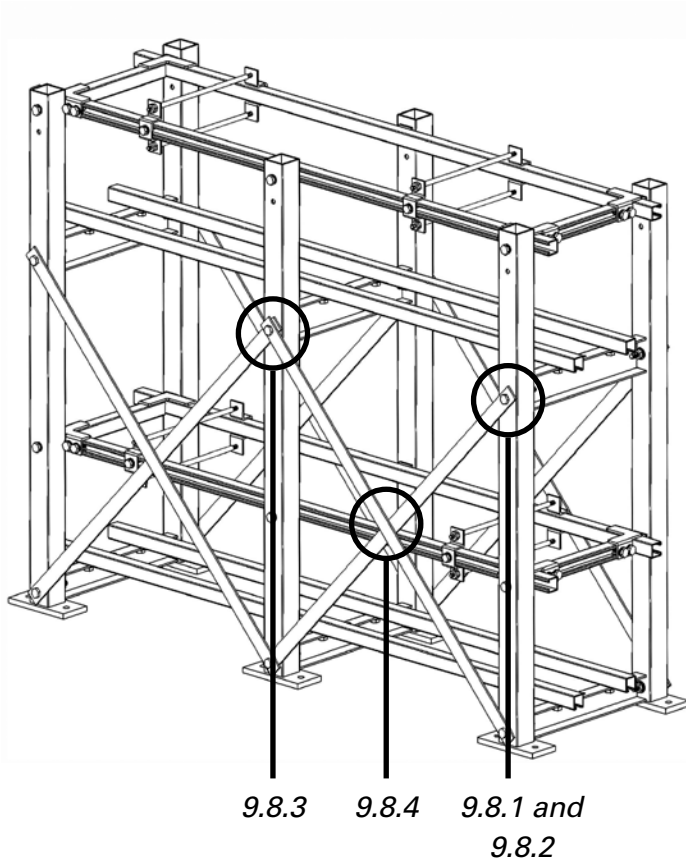


Figure 9.8.1: Typical cross brace to frame assembly

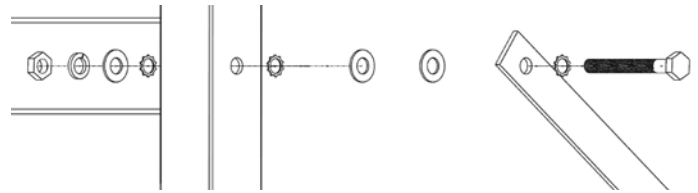


Figure 9.8.2: Optional cross brace to frame assembly

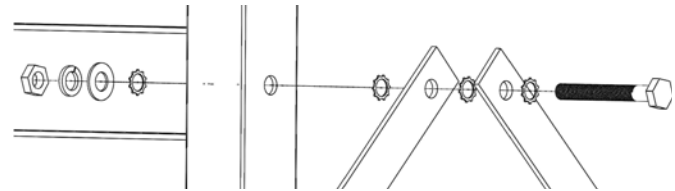


Figure 9.8.3: Cross brace to frame assembly when three or more frames are to be used

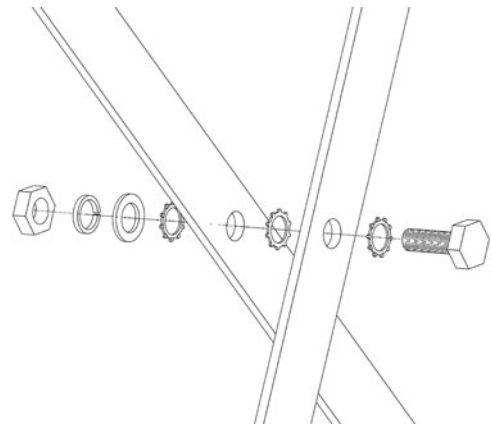


Figure 9.8.4: Brace to Brace Assembly (if applicable)

9.9 INSTALL CORNER BRACKETS AND END RAILS FOR SEISMIC RACKS

NOTE: Shimming between the frame and the side rail may be needed so that the side rail sits as close to the cells as possible without exerting pressure on the jars. Clearance equal to the typical thickness of a credit card is allowable between the side rails and battery jars. Shims can be installed at the end of assembly for best fit.

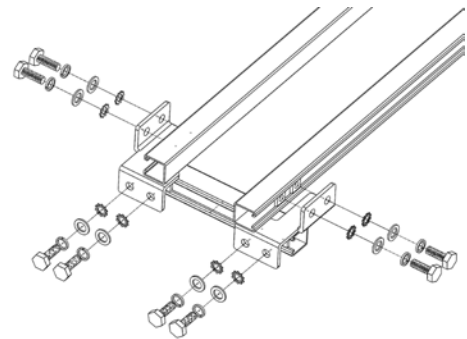
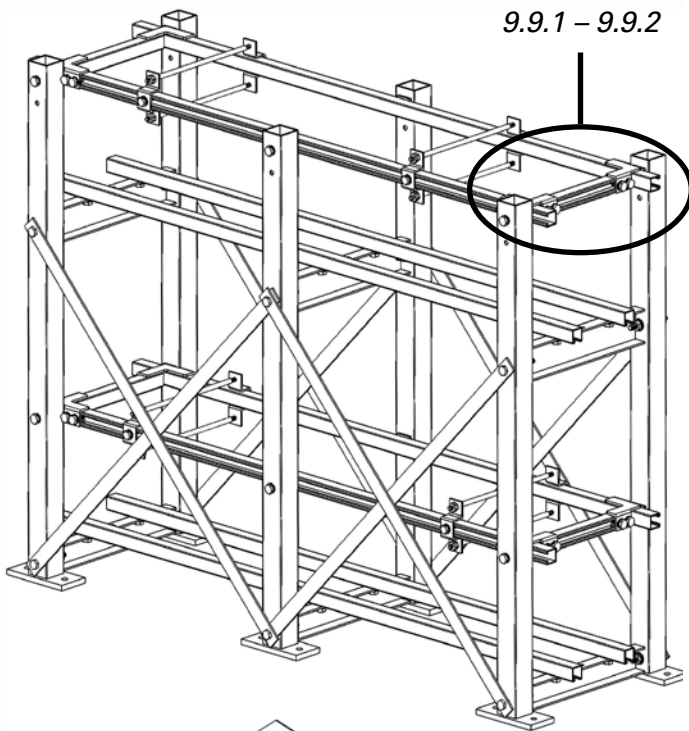


Figure 9.9.3: Corner bracket to rail assembly
(Refer to Support Rail Assembly)

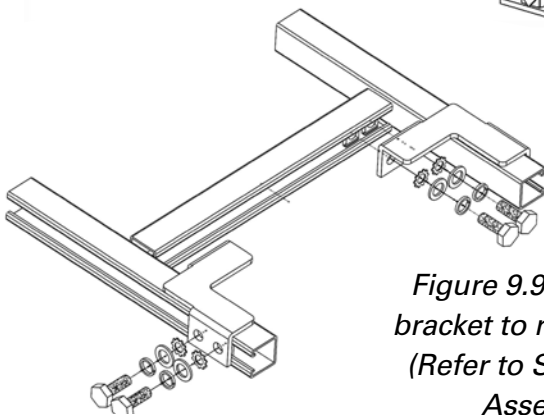


Figure 9.9.1: Corner bracket to rail assembly
(Refer to Support Rail Assembly)

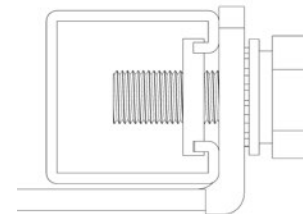


Figure 9.9.4: Corner bracket to rail assembly for all brackets
(Refer to Support Rail Assembly)

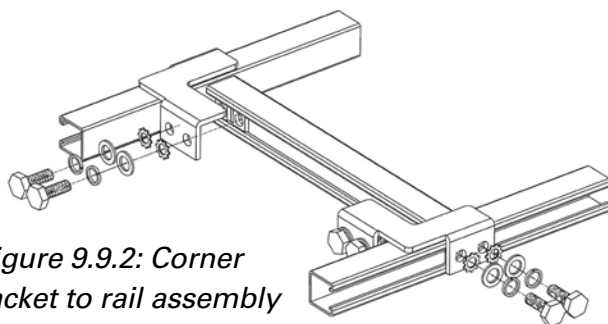


Figure 9.9.2: Corner bracket to rail assembly
(Refer to Support Rail Assembly)

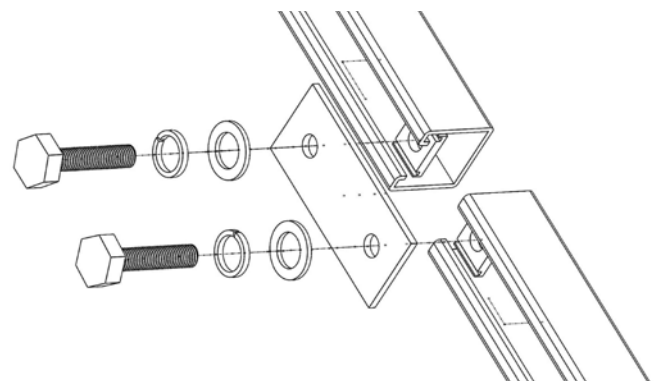
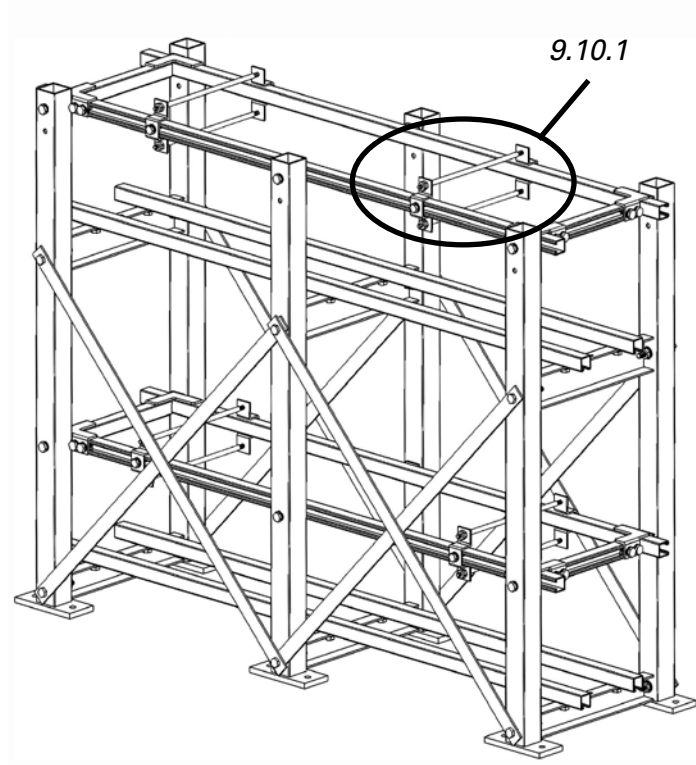
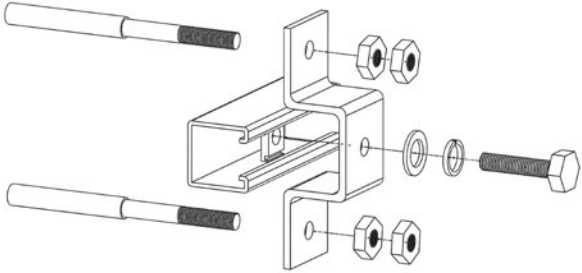


Figure 9.9.5: End to End Rail Connection Assembly. Only for non-seismic racks
(Refer to Support Rail Assembly)

9.10 INSTALL CELL CLAMP



NOTE: Rods that stretch from each side of the clamp are not meant to apply any pressure to the cell jars. They are in place to keep space between cells and act as a spacer.



*Figure 9.10.1: Cell clamp to side rail assembly
(Refer to Support Rail Assembly)*

10. GLOSSARY OF TERMS

Cell Clamp Assembly	Assembly connected to side rails and positioned according to battery weight to help reduce battery movement during a seismic event.
Corner Brackets	Brackets used to attach end rails to side rails to prevent battery movement during a seismic event.
Cross Brace	Bracing used to connect rack frames together.
End Rails	Attached to corner brackets to prevent batteries from falling off end of rack during a seismic event.
EPA	Environmental Protection Agency
Foam Spacers	Spacers used between batteries to prevent batteries from hitting each other during a seismic event.
Frame	Main support structure of battery rack.
Inter-Cell Connectors	Electrical conductors used to connect adjacent cells on the same row of a rack.
Inter-Rack Cable Connectors	Electrical conductors used to connect cells on two separate racks.
NEBS™	Network Equipment Building Systems
NEC	National Electric Code
OSHA	Occupational Safety & Health Administration
Shims	Metal spacers used to bring side rail close to battery or to level rack due to uneven flooring.
Side Rails	Rails on side of frames used to prevent cells from falling off rack in a seismic event.
Support Rails	Rails connected to base of frame to support batteries
UBC	Uniform Building Code



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