



FLOODED BATTERY RACKS

SELECTION GUIDE FOR RDB & RDC SERIES, STANDBY POWER RACKS

- Non-seismic and Earthquake Protected (EP1, EP2), IEEE-693
- 1-Tier, 2-Tier, 3-Tier, 2-Step
- D, DJ, DJU, J, K, and L/XT Cell Types
- Heavy Gauge Steel Construction



Shown: L-Series, 2-tier, EP, painted rail, back-to-back installation, with standard 2-rail and optional third (center) support rail.

RDB & RDC RACK FEATURES AND BENEFITS

C&D Technologies RDB and RDC racks offer a variety of quality and value-added features. Most notably, both rack series take advantage of a “common-frame” design among the Standard, EP1, and EP2 series for all but the RDC 3 Tier EP2 rack. This allows the racks to be field upgradeable by simply installing additional bracing, while not having to remove any batteries! Additionally, the racks use a “C-Channel” frame cross-section that is more robust than competitive designs. The RDB EP racks are qualified to meet UBC 1994 Section 1630 seismic loading conditions. The RDC EP racks are qualified to IBC 2009 Section 1613. Other features, such as built-in grounding provisions, are listed below.

RDB 693 racks are qualified to IEEE 693-2005. C&D strives to be the leader in supplying the best quality racks to support its highly regarded flooded product line. The RDB and RDC racks offer a range of quality features while maintaining a competitive price structure.

STANDARD RACK FEATURES:

- 1-Tier, 2-Tier, 3-Tier, and 2-Step styles in Standard and Custom Lengths
- Strut Rails with Flame Retardant Polyethylene Rail Covers, Provide Electrical Isolation
- Rugged “C-Channel” Frame Design
- Welded Steel Frames with an Acid Resistant, Electrostatically Applied Epoxy Powder Coat, Telephone Gray
- Electrical Grounding Provisions Built into Base of Each Frame
- Flame Retardant PVC Battery Spacers Included with EP Racks (L-Racks Only) Spacers for all Other Sizes are Open-Cell Styrene (Styrofoam). Optional flame-retardant foam spacers also available.
- Rails Accommodate Clip Nuts for Bolt-on Accessories
- Simplified Installation with Accessible Anchor Bolt Locations
- Racks are Shipped Unassembled

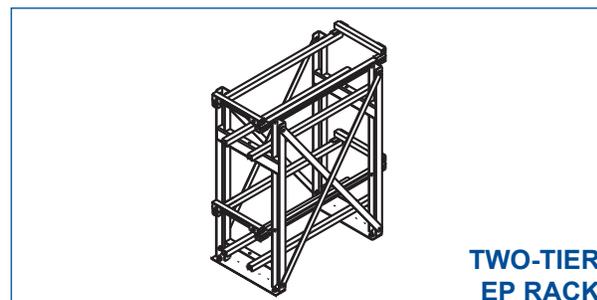
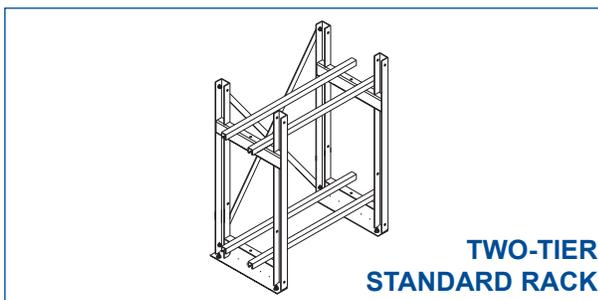
RACK SEISMIC OPTIONS:

- RDB EP Racks Qualified to Meet Maximum UBC 1994 Seismic Requirements, Section 1630, for Essential and Above Grade, Zones 1-4. RDB models can be upgraded to UBC 1997. Contact C&D for information.
- RDC EP Racks are Qualified to Meet Maximum IBC 2009 Seismic Requirements, Section 1613, for Essential, Top of Building, Site Class D, up to $S_g=300\%$. Available For L/XT Cells only.
- RDB 693 Racks are Qualified to Meet Maximum IEEE 693 2005 requirements are available for some models.

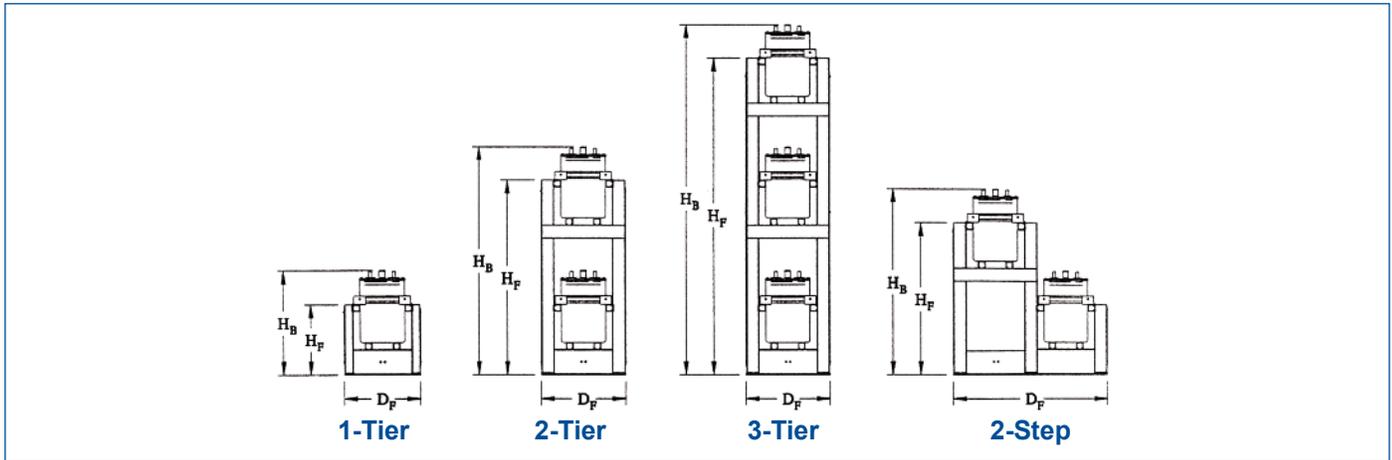
OPTIONAL RACK FEATURES:

- Third “Center” Support Rail (L-Series Only)
- Field Upgradeable from STD to EP1 to EP2

RACK DETAILS



RACK DETAILS AND DIMENSIONS



Battery Type	Series	Configuration	D_F in. (mm)	H_F in. (mm)	H_B in. (mm)
D	RDB0700	1-Tier	15.13 (381)	13.50 (342)	18.44 (468)
	RDB0701	2-Tier	15.13 (381)	37.00 (940)	41.94 (1065)
	RDB0702	3-Tier	16.13 (410)	60.50 (1537)	65.44 (1662)
	RDB0703	2-Step	28.00 (711)	29.50 (749)	34.44 (875)
DJ, J, DJU, K	RDB0800	1-Tier	18.19 (462)	16.69 (424)	22.50 (571)
	RDB0801	2-Tier	20.19 (513)	45.88 (1165)	51.69 (1313)
	RDB0802	3-Tier	20.31 (516)	75.06 (1907)	80.88 (2054)
	RDB0803	2-Step	37.13 (943)	35.88 (911)	41.69 (1059)
	RDB0800	1-Tier	18.19 (462)	16.69 (424)	25.94 (659)
	RDB0801	2-Tier	20.19 (513)	45.88 (1165)	55.12 (1400)
	RDB0802	3-Tier	20.31 (511)	75.06 (1906)	84.31 (2141)
	RDB0803	2-Step	37.13 (943)	35.88 (911)	45.12 (1146)
L, XTL	RDC0900	1-Tier	24.06 (611)	19.00 (483)	30.31 (770)
	RDC0901	2-Tier	24.06 (611)	54.00 (1372)	65.81 (1672)
	RDC0902	3-Tier	25.06 (637)	83.50 (2121)	94.82 (2408)
	RDC0903	2-Step	44.75 (1137)	41.00 (1041)	52.31 (1329)
XTH	RDC0900	1-Tier	24.06 (611)	19.00 (483)	30.61 (777)
	RDC0901	2-Tier	24.06 (611)	54.00 (1372)	66.11 (1679)
	RDC0902	3-Tier	25.06 (637)	83.50 (2121)	95.11 (2415)
	RDC0903	2-Step	44.75 (1137)	41.00 (1041)	52.61 (1336)

NOTES:

- Consult engineering assembly drawings for more detailed dimensions and specific rack weights.
- Rack depth does not include thickness of cross bracing and hardware.
- The 800 series RDB racks will support either DJ, DJU, J or K cell types. Spacer blocks are included to position cell restraint rails for the J-series, EP racks.
- Typical clearance: 2 in. (51 mm) minimum around rack perimeter, 36 in. (914 mm) typical aisle clearance.
- Multiple rack configurations: Back-to-back racks may be bolted together. 5 in. (127 mm) minimum separation required between end-to-end EP rack installations. End-to-end Standard rack installations need no minimum separation.

RDB SERIES EARTHQUAKE PROTECTED (EP) RACKS

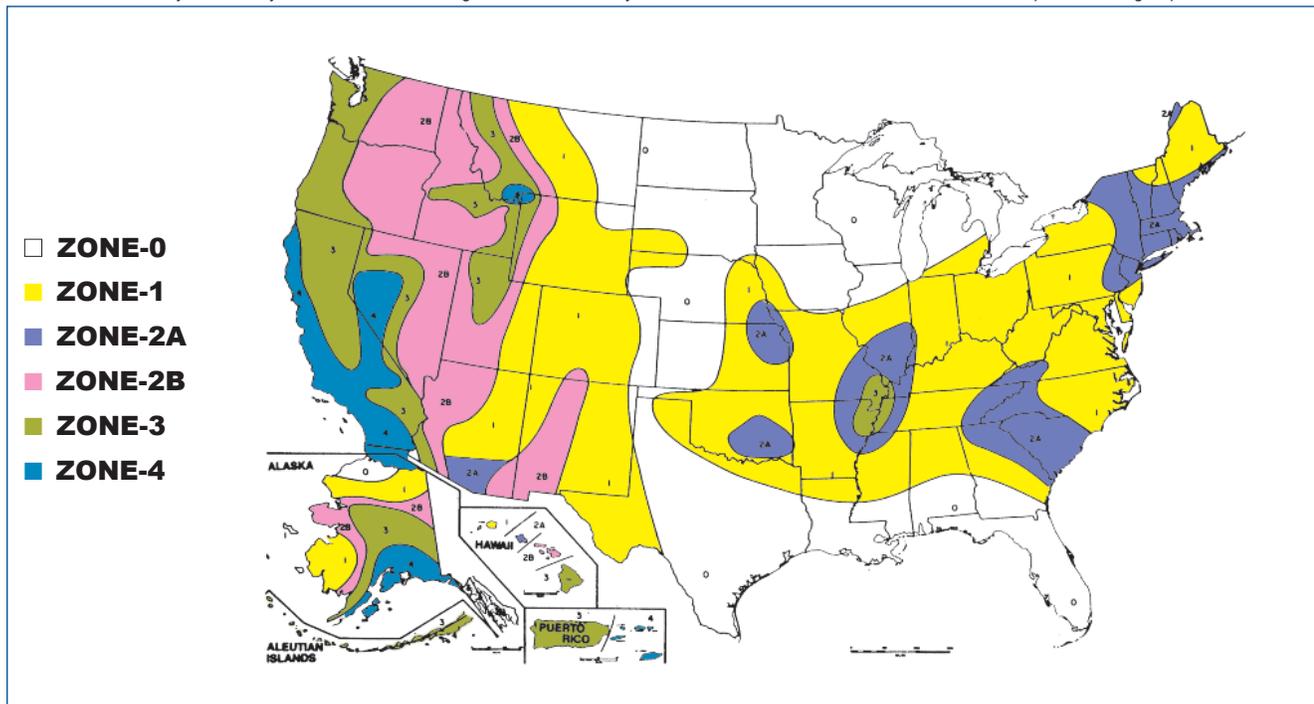
C&D offers a complete line of steel standby battery racks for use in locations that are subject to seismic disturbances. Two Earthquake Protected battery storage rack categories (EP1 and EP2) are offered to suit a variety of seismic loading conditions. These designs have been qualified to the 1994 Uniform Building Code (UBC), Chapter 16, Division III, "Earthquake Design", Section 1630, "Lateral Force on Elements of Structures, Nonstructural Components and Equipment Supported by Structures."

SELECTING THE RIGHT RDB RACK EP CATEGORY:

1. Determine the UBC seismic zone corresponding with the exact geographic location of the installation site. See map below.
2. Determine if the installation is (a) essential or non-essential and (b) located above grade or located at or below grade.
3. Choose the C&D seismic RDB rack category from the chart below which is qualified for that location.

SEISMIC ZONE MAP OF THE UNITED STATES (REFERENCE 1994 UBC)

C&D recommends that you consult your local or state building commission to verify the seismic zone factor and to check on local and special building requirements.



C&D BATTERY RACK SELECTION BASED ON UBC SEISMIC LOADS (G)

UBC Seismic Zone	Non-essential, at or below grade (g)	Non-essential, above grade OR Essential at or below grade (g)	Essential above grade (g)	Use C&D Battery Rack Type:
ZONE-0	0.000	0.000	0.000	Standard
ZONE-1	0.075	0.113	0.169	EP1 (Qualified to 0.45 g)
ZONE-2A	0.150	0.225	0.338	
ZONE-2B	0.200	0.300	0.450	
ZONE-3	0.300	0.450	0.675	EP2 (Qualified to 0.90 g)
ZONE-4	0.400	0.600	0.900	

C&D recommends that you consult your local or state building commission to verify the seismic zone factor and to check on local and special building requirements. RDB racks can be upgraded to UBC 1997 essential at or below grade contact C&D.

RDC SERIES EARTHQUAKE PROTECTED (EP) RACKS

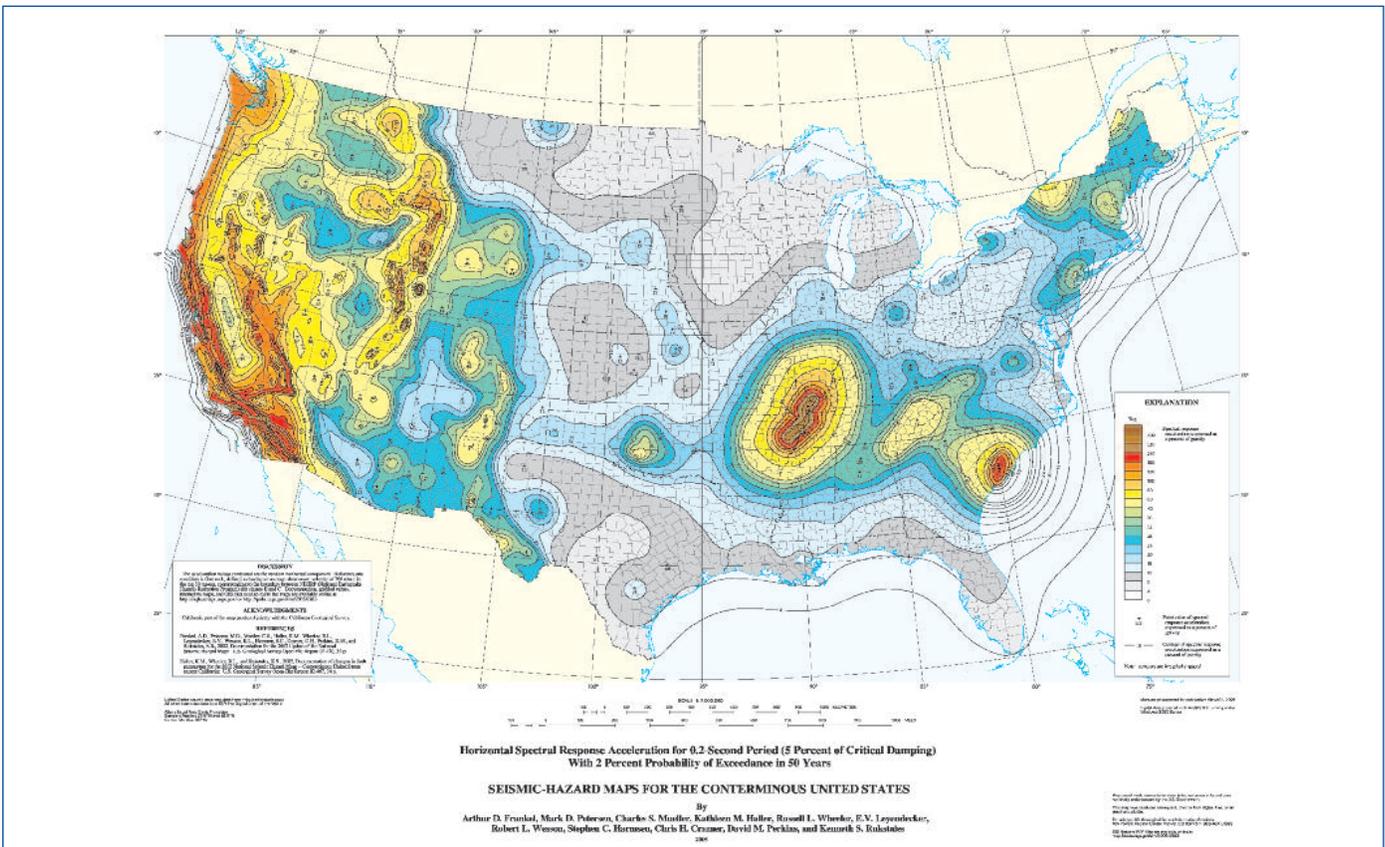
C&D now offers a complete line of IBC 2009 certified stand-by battery racks, the RDC series, for the XT and L Series Batteries. Two Earthquake Protected battery storage rack categories (EP1 and EP2) are offered to suit a variety of seismic loading conditions. These designs have been qualified to the 2009 International Building Code (IBC), Chapter 16, "Structural Design", Section 1613, "Earthquake Loads." The qualification also covers the 2000, 2003, and 2006 versions of IBC as well as UBC 1994 and UBC 1997.

SELECTING THE RIGHT RDC RACK EP CATEGORY FOR IBC

1. Determine the IBC parameters required for the site. If all the site IBC parameters are below the IBC Input Parameters shown in the table below for a specific EP rack, then that rack will meet the IBC requirements of the site.
2. If any IBC input parameters exceed the parameters shown in the table, the resultant Horizontal and Vertical g's will need to be calculated by a qualified professional engineer (PE). Select the EP rack category from the table below where all three g values listed exceed the three PE calculated g values of the site.

Application	Height Location in Building	IBC Input Parameters			IBC 2009/2006 Certification g - levels			Use C&D RDC Rack Type
		Mapped MCE spectral response Accel at short periods S_s	Site Class	Corresponding S_{ds}	Load Combination Horizontal Force (g's)	Load Combination Vertical Up + Dead Load (g's)	Load Combination Vertical Down + Dead Load (g's)	
ESSENTIAL	TOP OF BLDG	1.375	D	0.917	0.471	0.769	1.131	EP1
ESSENTIAL	TOP OF BLDG	3.000	D	2.000	1.029	0.614	1.286	EP2

HORIZONTAL SPECTRAL RESPONSE ACCELERATION FOR 0.2 SEC PERIOD, S_s (2005)*



* Map above shown for reference only. Consult IBC 2009 for the most up to date Acceleration Maps for use in analyses.

SELECTING THE RIGHT RDC RACK EP CATEGORY FOR UBC 1994/1997:

1. Determine the UBC Seismic Zone required for your geographic area (see map on page 4)
2. Determine if the installation is (a) Essential or Non-Essential and (b) located above grade or located at or below grade.
3. Choose the C&D seismic RDC rack category from the chart below which is qualified for that location.

UBC Siesmic Zone	Max Non-essential, at or below grade (g)	Max Non-essential above grade OR Essential at or below grade (g)	Max Essential above grade (g)	Use C&D RDC Series Battery Rack Type:
UBC 1994				
Zone-0	0.000	0.000	0.000	Standard
Zone-2B or less	0.200	0.300	0.450	EP1 (Qualified to 0.471 g)
Zone-4 or less	0.400	0.600	0.900	EP2 (Qualified to 1.029 g)
UBC 1997				
Zone-0	0.000	0.000	0.000	Standard
Zone-2B or less	0.140	0.267	0.400	EP1 (Qualified to 0.471 g)
Zone-4 or less	0.330	0.629	0.943	EP2 (Qualified to 1.029 g)

IEEE-693 QUALIFIED RDB RACKS

C&D now offers several RDB rack models qualified to the IEEE-693 2005 standard. The following 2 Tier and 2 Step racks have been qualified:

- RDB0801-693 HIGH
- RDB0803-693 HIGH
- RDB0901-693 HIGH
- RDB0903-693 HIGH

The RDB design was enhanced to make these racks compliant to the IEEE-693 standard. See rack drawings for detailed information.

RDB0801-693 and RDB0803-693 racks have been qualified for use with all DJ and KCR models.

RDB0901-693 and RDB0903-693 racks have been qualified for use with all LCR, LCUN and 4LCY models.

For other battery models, contact C&D Technologies to confirm compliance.

RACK ORDERING INFORMATION

UBC 1994 QUALIFIED RDB RACK ORDERING INFORMATION

Battery	Rack Model	Series		Length	Seismic Qualification Category
					UBC 1994
D - Series	RDB	0700	1-Tier	3 ft. and Larger	(blank) = Non-Seismic, EP1, or EP2
		0701	2-Tier		
		0702	3-Tier		
		0703	2-Step		
DJ, DJU, J, K - Series	RDB	0800	1-Tier	3 ft. and Larger	(blank) = Non-Seismic, EP1, or EP2
		0801	2-Tier		
		0802	3-Tier		
		0803	2-Step		

IBC 2009 QUALIFIED RDC RACK ORDERING INFORMATION

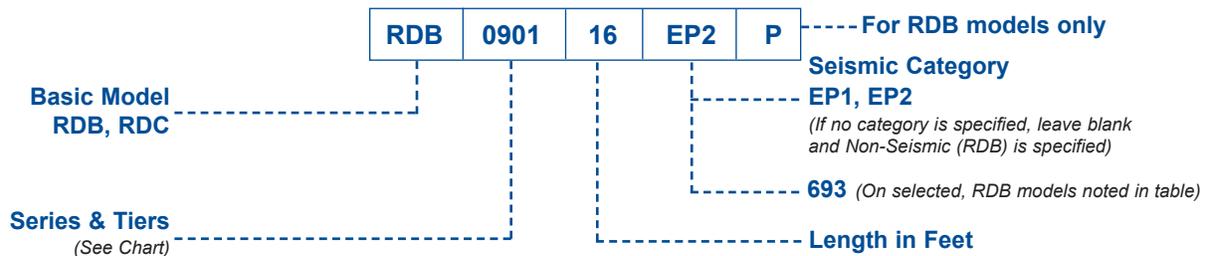
Battery	Rack Model	Series		Length	Seismic Qualification Category*
					IBC 2009
L, XT - Series	RDC	0900	1-Tier	3 ft. and Larger	(blank) = Non-Seismic, EP1, or EP2
		0901	2-Tier		
		0902	3-Tier		
		0903	2-Step		

RDC Racks are also qualified to UBC 1994 and 1997, IBC 2000, 2003 and 2006.

IEEE-693 QUALIFIED RDB RACK ORDERING INFORMATION

Battery	Rack Model	Series		Length	Seismic Qualification Category
					IEEE-693 2005
DJ, DJU, J, K - Series	RDB	0801	2-Tier	3 ft. and Larger	693
		0803	2-Step		
L, XT-Series	RDB	0901	2-Tier	3 ft. and Larger	693
		0903	2-Step		

MODEL NUMBER AND DESCRIPTION — EXAMPLE



EXAMPLES:

1. RDB0700-09P : D-Series, RDB 1-Tier, 9 feet
2. RDB0802-10 EP1P : J or K Series, RDB 3-Tier, 10 feet, EP1 (note "P" on end of P/N)
3. RDC0901-11EP2: LSeries, 2Tier, 11 Feet, EP2
4. RDB0901-12-693 XT or L Series, 2 Tier, 12 feet, IEEE-693

NOTES:

1. Calculate Rack Rail Lengths as follows:

Number of units (jars) per row x (unit length "L" +0.5 inch) - 0.5 inch

Example: for 12 LCT-1680 units per row, "L" = 10.63 (from spec sheet)

so the rack length = 12 x (10.63 + 0.5) - 0.5 = 133.06 inches = 11.09 feet

Round up to nearest full foot = 12 feet

Number of units (jars) per row x (unit length "L" +13 mm) - 13 mm

Example: for 12 LCT-1680 units per row, "L" = 270 (from spec sheet)

so the rack length = 12 x (270 + 13) - 13 = 3383 mm

2. Add 5 inches (127 mm) to overall rack length to account for worst-case battery end restraint protrusion (EP only), where space is critical.

RACK ORDERING INFORMATION

THIRD-RAIL KIT — (PURCHASE SEPARATELY FOR L/XT SERIES ONLY)

3R	Number of Tiers	Length
3R	1T	3 ft.
3R	2T	and
3R	3T	larger

EXAMPLE:

3R2T-12: Third rail kit, 2-tier, 12 feet, Painted

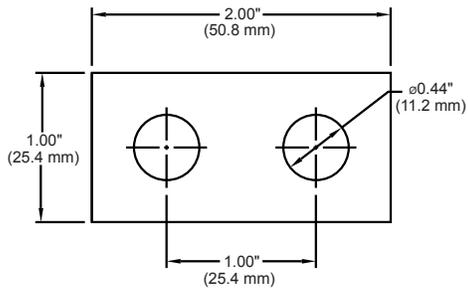
NOTE:

For RDB Rack Assembly Instructions, refer to RS-937.

For more information on Spill Containment, refer to 12-201.

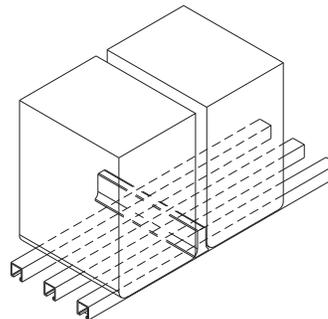
FRAME GROUND PROVISION

(Located at the base of each frame)



CELL SPACER AND THIRD CENTER RAIL

L/XT Series Only



MISCELLANEOUS

ENGINEERING NOTES:

EP racks are qualified to specific lateral forces (g) as determined from the following formulas:

Lateral force formula per Section 1630 of the 1994 UBC:

$$F_p = Z I_p C_p W_p$$

where,

F_p = total design lateral seismic force as defined by section 1630.2

I_p = occupancy importance factor as defined by Table 16-K — Occupancy Category
 = 1.00 for standard occupancy structures
 = 1.50 for essential facilities which includes all facilities providing emergency response (hospitals, fire & police stations, aviation control towers, etc.)

Z = seismic zone factor as defined by Table 16-I — Seismic Zone Factor Z and applied to Figure 16-2 — Seismic Zone Map of the United States
 zone 1 = 0.075 zone 3 = 0.30
 zone 2A = 0.15 zone 4 = 0.40
 zone 2B = 0.20

C_p = horizontal force factor as defined by Table 16-O — Horizontal Force Factor, C_p
 = 1.50 for flexible items (above grade)
 = 1.00 for at or below grade installations

W_p = weight

SEISMIC QUALIFICATION CERTIFICATES

SEISMIC QUALIFICATION CERTIFICATE	
COMPANY C&D Technologies, Inc.	ITEMS Redundant Protected Battery Racks, Chargers 1 & 2, Per 1. Cells
PARTICULARS Site: Research	REV. REQUIREMENTS Uniform Building Code, 1994 Edition, Section 1600
<p>THIS IS TO CERTIFY THAT THE ITEMS IDENTIFIED HEREIN HAVE BEEN ANALYZED AND/OR TESTED AND ARE IN COMPLIANCE WITH THE SEISMIC REQUIREMENTS INCLUDING APPLICABLE CODES, SPECIFICATIONS, AND STANDARDS AS IDENTIFIED IN THE ABOVE-MENTIONED DOCUMENTS. SUPPORTING DOCUMENTATION WILL BE FORWARDED OR RETAINED IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS.</p>	
	SIGNED: <i>[Signature]</i> DATE: 5-20-06 FDI ENGINEERING
<p>REMARKS: The C&D battery racks, part numbers RSD-900, RSD-901, RSD-902, and RSD-903, are qualified to withstand seismic lateral acceleration as defined in Section 1601 of the 1994 Uniform Building Code. Categories 1 and 2 are designed to meet the requirements of Zones 3 and 4 respectively. The analysis, including applicable drawings and section levels, is documented in the FDI report identified below.</p>	
FDI REPORT NO. A-3-06	REV. 1
FDI ENGINEERING P.O. BOX 912 DUNN, NC 28335	

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