



Single Cell Range

including LCE P – LBE P

Delivering quality

ALCAD

ALCAD Single Cell Range

Alcad have nearly 100 years' experience in the development and manufacture of pocket plate cells and batteries.

Today, they offer the widest range of high quality nickel-cadmium batteries available throughout the world and this publication details the Single Cell ranges of pocket plate products.

Alcad nickel-cadmium batteries are the battery of choice for many applications. Their outstanding features are :

- operation over a temperature range between -20°C to $+50^{\circ}\text{C}$ (-4°F to $+122^{\circ}\text{F}$), with extremes of -50°C to $+70^{\circ}\text{C}$ (-58°F to $+158^{\circ}\text{F}$) for short periods
- life in excess of 25 years in many applications
- good performance at low temperatures
- resistance to high temperature ageing
- resistance to electrical abuse
- resistance to shock and vibration
- simple maintenance
- low installation cost
- low life-cycle cost

The major design features of the Alcad Single Cell ranges are :

- fully welded internal construction of steel components
- strong welded polypropylene containers as standard
- flame retardant welded containers, as option
- flip-top flame arresting vents as standard

Alcad supports these Single Cell ranges with :

- quality approved manufacture to ISO 9001
- Single Cell batteries have been developed in line with the safety requirements of EN-50272-2 and components used (such as insulated cable connectors and end lug covers) are defined to ensure high protection against electric shocks (IP2 level).
- full recycling service to protect the environment

The Alcad Single Cell ranges meet, and exceed, the requirements of the IEC 60623 standard.

The Single Cell portfolio comprises three ranges of high, medium and low rate discharge types.

L type

The L type range has the thickest plates and is designed for applications where the battery is required to provide a reliable source of energy over relatively long discharge periods.

Normally, the current is relatively low in comparison with the total stored energy and the discharges are generally infrequent. Typical uses are power back-up and bulk energy storage.

M type

The M type range is designed for applications where the batteries are usually required to sustain electrical loads for between 30 minutes to 3 hours or for « mixed » loads which involve a mixture of high and low discharge rates.

The applications can have frequent or infrequent discharges. The range is typically used in power back-up applications.

H type

The H type range uses very thin plates and is designed for applications where there is a demand for a relatively high current over short periods, usually less than 30 minutes in duration.

The applications can have frequent or infrequent discharges. The range is typically used in starting and power back-up applications.





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Float-corrected data

Many nickel-cadmium batteries are used in stationary standby power applications where discharges occur infrequently and the battery is continuously charged by a float or constant potential charge. Under these circumstances there is a modification in the level of the discharge curve and allowances must be made for this when sizing the battery.

In order to simplify this process, the data Alcad supplies in this publication already takes into account this phenomenon. The data published by Alcad is the performance after prolonged floating and it can be used directly in battery sizing calculations.

This phenomenon occurs with all nickel-cadmium batteries, but some other manufacturers of nickel-cadmium batteries may not take this effect into account in published data.

When calculating for deep discharges (0.65 V and 0.85 V) it is not necessary to take this effect into account.

Single Cell Construction features

Connector cover
In line with EN 50272-2 (safety) with IP2 level.

Plate group bus
Connects the plate tabs with the terminal post. Plate tabs and terminal posts are projection welded to the plate group bus.

Plate
Horizontal pockets of double-perforated steel strips.

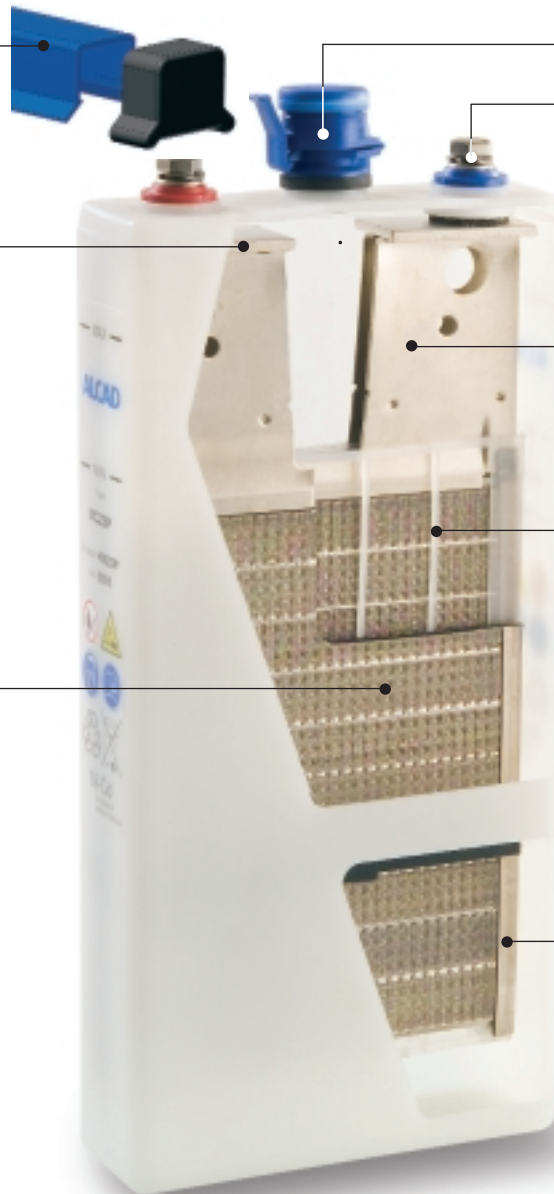
Flame-arresting vent

Terminal seal
This is mechanically clipped and provides an excellent seal. This minimises carbonation deposits.

Plate tab
Spot welded to the plate side frames, to the upper edge of the pocket plate and to the plate group bus.

Separating grids
These separate the plates and insulate the plate frames from each other. The grids allow free circulation of electrolyte between the plates.

Plate frame
Seals the plate pockets and serves as a current collector.



The Alcad Single Cell ranges fully comply and exceed the IEC 60623 standard requirements.

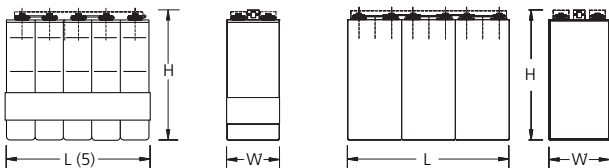
Cell dimensions and internal resistance

LE Range

LE cells are normally supplied as single cells, taped together into blocks or assembled in steel crates.

Cell type	Capacity at the 5h rate (Ah)	Volume of liquid electrolyte above plates (cc)	Approx. weight per cell		Overall height		Width per cell		Length per cell		Internal resistance* (mOhm)	Electrolyte height between Min - Max (mm)
			(kg)	(lb)	(mm)	(ins)	(mm)	(ins)	(mm)	(ins)		
LCE10P	10	146	1.6	3.6	275	10.83	121	4.76	42	1.65	14.4	35
LCE15P	15	146	1.7	3.7	275	10.83	121	4.76	42	1.65	9.60	35
LCE22P	22	143	1.9	4.1	275	10.83	121	4.76	42	1.65	6.55	35
LCE30P	30	143	2.0	4.3	275	10.83	121	4.76	42	1.65	4.80	35
LCE40P	40	235	3.1	6.8	275	10.83	121	4.76	66	2.60	3.60	35
LCE47P	47	238	3.0	6.6	275	10.83	121	4.76	66	2.60	3.06	35
LCE62P	62	235	3.3	7.3	275	10.83	121	4.76	66	2.60	2.32	35
LCE75P	75	559	6.0	13.1	358	14.09	192	7.56	68	2.68	2.33	50
LCE90P	90	552	6.6	14.6	358	14.09	192	7.56	68	2.68	1.94	50
LCE110P	110	552	6.6	14.6	358	14.09	192	7.56	68	2.68	1.59	50
LCE145P	145	546	7.2	15.9	358	14.09	192	7.56	68	2.68	1.21	50
LCE185P	185	771	9.6	21.1	358	14.09	192	7.56	93	3.66	0.95	50
LCE220P	220	765	10.2	22.5	358	14.09	192	7.56	93	3.66	0.80	50
LCE235P	235	771	12.1	26.7	414	16.30	192	7.56	93	3.66	0.77	50
LCE280P	280	765	12.8	28.3	414	16.30	192	7.56	93	3.66	0.65	50
LCE330P	330	1020	16.6	36.5	414	16.30	192	7.56	122	4.80	0.55	50
LCE375P	375	1015	17.2	37.8	414	16.30	192	7.56	122	4.80	0.48	50
LBE415P	415	1090	18.3	40.3	405	15.94	195	7.68	146	5.75	0.44	50
LBE460P	460	1180	19.8	43.7	405	15.94	195	7.68	159	6.26	0.39	50
LBE510P	510	1290	21.4	47.2	405	15.94	195	7.68	171	6.73	0.35	50
LBE550P	550	1400	23.0	50.7	405	15.94	195	7.68	183	7.20	0.33	50
LBE600P	600	1590	26.7	58.9	405	15.94	195	7.68	206	8.11	0.30	50
LBE650P	650	1680	28.2	62.2	405	15.94	195	7.68	219	8.62	0.28	50
LBE700P	700	1770	29.7	65.5	405	15.94	195	7.68	232	9.13	0.26	50
LBE750P	750	1880	31.3	69.0	405	15.94	195	7.68	244	9.61	0.24	50
LBE830P	830	2100	34.5	76.1	405	15.94	195	7.68	268	10.55	0.22	50
LBE925P	925	2360	39.6	87.3	405	15.94	195	7.68	304	11.97	0.20	50
LBE1020P	1020	2580	42.8	94.4	405	15.94	195	7.68	328	12.91	0.18	50
LBE1100P	1100	2800	46.0	101.4	405	15.94	195	7.68	352	13.86	0.16	50
LBE1200P	1200	3060	51.1	112.7	405	15.94	195	7.68	389	15.31	0.15	50
LBE1300P	1300	3300	54.3	119.7	405	15.94	195	7.68	413	16.26	0.14	50
LBE1400P	1400	3500	57.5	126.8	405	15.94	195	7.68	437	17.20	0.13	50
LBE1500P	1500	3900	64.2	141.5	405	15.94	195	7.68	486	19.13	0.12	50
LBE1600P	1600	4090	67.4	148.6	405	15.94	195	7.68	510	20.08	0.11	50
LBE1660P	1660	4200	69.0	152.1	405	15.94	195	7.68	522	20.55	0.11	50

*Rigid connector included



LCE10P - LCE375P
Taped block length =
cell length x no of cells + 2mm/0.1 in.

LBE415P - LBE1660P

Cell connection bolt per pole:	LBE415P to LBE550P:	2 x M10	
LCE10P to LCE62P:	M6	LBE600P to LBE830P:	3 x M10
LCE75P to LCE90P:	M8	LBE925P to LBE1100P:	4 x M10
LCE110P to LCE280P:	M10	LBE1200P to LBE1400P:	5 x M10
LCE330P to LCE375P:	2 x M10	LBE1500P to LBE1660P:	6 x M10

LE Range Cell performance

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.00 V/cell

Cell type	C ₅ Ah	HOURS					MINUTES									SECONDS		
		10 h	8 h	5 h	3 h	2 h	90 min	60 min	45 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
LCE10P	10	1.03	1.28	2.00	3.20	4.23	5.10	6.46	7.50	8.96	10.1	10.9	12.0	14.4	17.9	19.8	25.5	28.7
LCE15P	15	1.54	1.91	3.00	4.80	6.35	7.65	9.69	11.3	13.4	15.1	16.3	18.0	21.6	26.8	29.7	38.3	43.1
LCE22P	22	2.26	2.81	4.40	7.04	9.31	11.23	14.2	16.5	19.7	22.2	23.9	26.4	31.7	39.3	43.6	56.1	63.2
LCE30P	30	3.08	3.83	6.00	9.60	12.7	15.3	19.4	22.5	26.9	30.3	32.6	36.0	43.2	53.6	59.4	76.6	86.2
LCE40P	40	4.10	5.10	8.00	12.8	16.9	20.4	25.8	30.0	35.9	40.3	43.5	48.0	57.6	71.4	79.3	102	115
LCE47P	47	4.82	5.99	9.40	15.0	19.9	24.0	30.4	35.3	42.1	47.4	51.1	56.4	67.7	83.9	93.1	120	135
LCE62P	62	6.36	7.91	12.4	19.8	26.2	31.6	40.1	46.5	55.6	62.5	67.5	74.4	89.3	111	123	158	178
LCE75P	75	7.58	9.47	15.0	24.0	32.1	37.8	46.5	52.9	61.6	69.3	73.2	79.2	90.0	113	121	154	171
LCE90P	90	9.09	11.4	18.0	28.8	38.5	45.4	55.8	63.5	74.0	83.1	87.8	95.0	108	135	145	185	205
LCE110P	110	11.1	13.9	22.0	35.2	47.1	55.5	68.3	77.6	90.4	102	107	116	132	166	177	226	251
LCE145P	145	14.6	18.3	29.0	46.4	62.0	73.1	90.0	102	119	134	142	153	174	218	234	298	331
LCE185P	185	18.7	23.4	37.0	59.2	79.1	93.3	115	131	152	171	181	195	222	278	299	380	422
LCE220P	220	22.2	27.8	44.0	70.4	94.1	111.0	137	155	181	203	215	232	264	331	355	452	502
LCE235P	235	24.2	30.0	47.0	75.2	98.3	115.7	142	163	189	211	226	248	271	329	353	423	455
LCE280P	280	28.8	35.7	56.0	89.6	117	138	169	194	225	252	269	296	323	392	420	504	542
LCE330P	330	34.0	42.1	66.0	106	138	163	199	229	266	297	317	348	380	461	495	594	639
LCE375P	375	38.6	47.8	75.0	120	157	185	226	260	302	337	360	396	432	524	563	675	726
LBE415P	415	42.7	52.9	83.0	133	174	204	250	288	334	373	398	438	478	580	623	747	804
LBE460P	460	47.4	58.7	92.0	147	193	227	278	319	370	414	442	486	530	643	690	829	891
LBE510P	510	52.5	65.0	102	163	213	251	308	354	411	459	490	539	588	713	766	919	988
LBE550P	550	56.7	70.1	110	176	230	271	332	382	443	495	528	581	634	769	826	991	1065
LBE600P	600	61.8	76.5	120	192	251	295	362	417	483	539	576	634	691	839	901	1081	1162
LBE650P	650	67.0	82.9	130	208	272	320	392	451	523	584	624	686	749	909	976	1171	1259
LBE700P	700	72.1	89.3	140	224	293	345	422	486	564	629	672	739	806	979	1051	1261	1355
LBE750P	750	77.3	95.6	150	240	314	369	453	521	604	674	720	792	864	1049	1126	1351	1452
LBE830P	830	85.5	106	166	266	347	409	501	576	668	746	797	876	956	1161	1246	1495	1607
LBE925P	925	95.3	118	185	296	387	456	558	642	745	832	888	977	1066	1294	1388	1666	1791
LBE1020P	1020	105	130	204	326	427	502	616	708	821	917	979	1077	1175	1426	1531	1837	1975
LBE1100P	1100	113	140	220	352	460	542	664	764	886	989	1056	1162	1267	1538	1651	1981	2130
LBE1200P	1200	124	153	240	384	502	591	724	833	966	1079	1152	1267	1382	1678	1801	2161	2324
LBE1300P	1300	134	166	260	416	544	640	785	903	1047	1169	1248	1373	1498	1818	1951	2342	2517
LBE1400P	1400	144	179	280	448	586	689	845	972	1127	1259	1344	1478	1613	1958	2101	2522	2711
LBE1500P	1500	155	191	300	480	628	739	905	1042	1208	1349	1440	1584	1728	2098	2252	2702	2904
LBE1600P	1600	165	204	320	512	670	788	966	1111	1288	1439	1536	1690	1843	2237	2402	2882	3098
LBE1660P	1660	171	212	332	531	695	817	1002	1153	1336	1493	1594	1753	1912	2321	2492	2990	3214

Cell performance **LE Range**

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.05 V/cell

Cell type	C ₅ Ah	HOURS					MINUTES									SECONDS		
		10 h	8 h	5 h	3 h	2 h	90 min	60 min	45 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
LCE10P	10	1.02	1.26	1.96	3.10	3.94	4.53	5.62	6.29	7.36	8.53	9.20	10.2	10.7	14.4	16.2	21.1	23.8
LCE15P	15	1.53	1.89	2.94	4.65	5.90	6.79	8.43	9.44	11.0	12.8	13.8	15.2	16.0	21.6	24.3	31.6	35.6
LCE22P	22	2.24	2.78	4.31	6.82	8.66	9.96	12.4	13.8	16.2	18.8	20.2	22.4	23.4	31.7	35.6	46.4	52.3
LCE30P	30	3.06	3.79	5.88	9.30	11.8	13.6	16.9	18.9	22.1	25.6	27.6	30.5	32.0	43.2	48.5	63.3	71.3
LCE38P	40	4.08	5.05	7.84	12.4	15.7	18.1	22.5	25.2	29.4	34.1	36.8	40.7	42.6	57.6	64.7	84.4	95.0
LCE47P	47	4.79	5.93	9.21	14.6	18.5	21.3	26.4	29.6	34.6	40.1	43.3	47.8	50.1	67.7	76.0	99.1	112
LCE62P	62	6.32	7.83	12.2	19.2	24.4	28.1	34.8	39.0	45.6	52.9	57.1	63.0	66.1	89.4	100	131	147
LCE75P	75	7.50	9.38	14.7	23.5	29.3	33.5	39.4	44.0	50.4	56.9	60.8	65.8	73.3	90.7	100	127	140
LCE90P	90	9.00	11.3	17.6	28.2	35.2	40.2	47.2	52.8	60.5	68.3	73.0	79.0	87.9	109	120	152	168
LCE110P	110	11.0	13.8	21.6	34.5	43.0	49.2	57.7	64.5	73.9	83.4	89.2	96.6	107	133	147	186	205
LCE145P	145	14.5	18.1	28.4	45.4	56.7	64.8	76.1	85.1	97.4	110	118	127	142	175	194	245	270
LCE185P	185	18.5	23.1	36.3	58.0	72.4	82.7	97.1	109	124	140	150	162	181	224	247	312	345
LCE220P	220	22.0	27.5	43.1	68.9	86.1	98.4	115	129	148	167	178	193	215	266	294	371	410
LCE235P	235	24.0	29.8	46.5	72.9	90.9	102.4	121	135	154	170	176	195	230	264	289	347	377
LCE280P	280	28.6	35.5	55.4	86.8	108	122	145	161	184	202	210	233	274	315	344	413	449
LCE330P	330	33.7	41.9	65.3	102	128	144	170	190	216	239	247	274	322	371	406	487	529
LCE375P	375	38.3	47.6	74.3	116	145	163	194	216	246	271	281	312	366	422	461	554	601
LBE415P	415	42.3	52.7	82.2	129	161	181	214	239	272	300	311	345	405	467	511	613	665
LBE460P	460	46.9	58.4	91.1	143	178	200	238	265	302	333	344	383	449	517	566	679	737
LBE510P	510	52.0	64.7	101	158	197	222	263	294	335	369	382	424	498	574	627	753	817
LBE550P	550	56.1	69.8	109	171	213	240	284	317	361	398	412	457	537	619	677	812	882
LBE600P	600	61.2	76.1	119	186	232	261	310	346	394	434	449	499	586	675	738	886	962
LBE650P	650	66.3	82.5	129	202	251	283	336	374	426	470	487	541	635	731	800	960	1042
LBE700P	700	71.4	88.8	139	217	271	305	362	403	459	506	524	582	684	787	861	1033	1122
LBE750P	750	76.5	95.2	149	233	290	327	387	432	492	542	562	624	733	844	923	1107	1202
LBE830P	830	84.7	105	164	257	321	362	429	478	544	600	622	690	811	934	1021	1225	1330
LBE925P	925	94.4	117	183	287	358	403	478	533	607	669	693	769	904	1040	1138	1366	1483
LBE1020P	1020	104	129	202	316	394	444	527	588	669	737	764	848	996	1147	1255	1506	1635
LBE1100P	1100	112	140	218	341	425	479	568	634	722	795	824	915	1074	1237	1353	1624	1763
LBE1200P	1200	122	152	238	372	464	523	620	691	787	867	899	998	1172	1350	1476	1772	1923
LBE1300P	1300	133	165	257	403	503	566	672	749	853	940	973	1081	1270	1462	1599	1919	2084
LBE1400P	1400	143	178	277	434	541	610	723	806	918	1012	1048	1164	1368	1575	1722	2067	2244
LBE1500P	1500	153	190	297	465	580	654	775	864	984	1084	1123	1247	1465	1687	1845	2214	2404
LBE1600P	1600	163	203	317	496	619	697	827	922	1050	1157	1198	1331	1563	1800	1968	2362	2565
LBE1660P	1660	169	211	329	515	642	723	858	956	1089	1200	1243	1380	1621	1867	2042	2451	2661

LE Range Cell performance

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.10 V/cell

Cell type	C _c Ah	HOURS					MINUTES									SECONDS		
		10 h	8 h	5 h	3 h	2 h	90 min	60 min	45 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
LCE10P	10	1.00	1.23	1.88	2.67	3.36	3.88	4.64	5.20	5.85	6.50	6.90	7.77	9.07	11.6	13.3	17.4	19.8
LCE15P	15	1.50	1.84	2.82	4.00	5.04	5.82	6.96	7.80	8.78	9.75	10.4	11.7	13.6	17.4	20.0	26.2	29.8
LCE22P	22	2.20	2.70	4.14	5.87	7.39	8.54	10.2	11.4	12.9	14.3	15.2	17.1	20.0	25.6	29.3	38.4	43.6
LCE30P	30	3.00	3.68	5.64	8.01	10.1	11.6	13.9	15.6	17.6	19.5	20.7	23.3	27.2	34.9	40.0	52.3	59.5
LCE40P	40	4.00	4.90	7.53	10.7	13.4	15.5	18.6	20.8	23.4	26.0	27.6	31.1	36.3	46.5	53.4	69.8	79.3
LCE47P	47	4.70	5.76	8.84	12.5	15.8	18.2	21.8	24.4	27.5	30.5	32.4	36.5	42.6	54.7	62.7	82.0	93.2
LCE62P	62	6.20	7.60	11.7	16.5	20.8	24.1	28.8	32.2	36.3	40.3	42.8	48.2	56.2	72.1	82.7	108	123
LCE75P	75	7.43	9.10	14.0	20.0	24.9	28.3	33.6	35.9	40.4	44.5	45.0	50.0	58.3	73.4	82.1	103	115
LCE90P	90	8.91	10.9	16.8	24.0	29.8	33.9	40.3	43.1	48.5	53.4	54.0	59.9	70.0	88.0	98.5	123	139
LCE110P	110	10.9	13.3	20.5	29.4	36.5	41.5	49.3	52.6	59.3	65.2	66.0	73.3	85.5	108	120	150	169
LCE145P	145	14.4	17.6	27.0	38.7	48.1	54.7	65.0	69.4	78.2	86.0	87.0	96.6	113	142	159	198	223
LCE185P	185	18.3	22.4	34.4	49.4	61.3	69.8	82.9	88.5	99.7	110	111	123	144	181	202	253	285
LCE220P	220	21.8	26.7	41.0	58.7	72.9	83.0	98.6	105	119	130	132	147	171	215	241	301	339
LCE235P	235	23.5	28.8	44.2	61.3	75.9	84.8	102	112	119	129	141	157	162	215	235	286	313
LCE280P	280	28.0	34.3	52.7	73.0	90.4	101.0	121	134	142	153	168	186	194	257	280	341	373
LCE330P	330	33.0	40.4	62.1	86.1	107	119	143	158	168	181	198	220	228	302	330	402	440
LCE375P	375	37.5	45.9	70.6	97.8	121	135	162	179	191	205	225	250	259	344	374	457	500
LBE415P	415	41.5	50.8	78.1	108	134	150	179	199	211	227	249	276	287	380	414	505	554
LBE460P	460	46.0	56.4	86.6	120	149	166	199	220	234	252	276	306	318	422	459	560	614
LBE510P	510	51.0	62.5	96.0	133	165	184	220	244	259	279	306	340	353	467	509	621	680
LBE550P	550	55.0	67.4	103	143	178	198	238	263	280	301	330	366	380	504	549	670	734
LBE600P	600	60.0	73.5	113	157	194	216	259	287	305	328	360	400	415	550	599	731	800
LBE650P	650	65.0	79.6	122	170	210	235	281	311	330	356	390	433	449	596	649	791	867
LBE700P	700	70.0	85.8	132	183	226	253	302	335	356	383	420	466	484	642	699	852	934
LBE750P	750	75.0	91.9	141	196	242	271	324	359	381	410	450	500	518	687	749	913	1000
LBE830P	830	83.0	102	156	217	268	299	359	397	422	454	498	553	574	761	829	1011	1107
LBE925P	925	92.5	113	174	241	299	334	400	443	470	506	555	616	639	848	924	1126	1234
LBE1020P	1020	102	125	192	266	329	368	441	488	518	558	612	679	705	935	1019	1242	1360
LBE1100P	1100	110	135	207	287	355	397	475	526	559	602	660	733	760	1008	1099	1339	1467
LBE1200P	1200	120	147	226	313	388	433	518	574	610	657	720	799	829	1100	1198	1461	1601
LBE1300P	1300	130	159	245	339	420	469	562	622	661	711	780	866	899	1192	1298	1583	1734
LBE1400P	1400	140	172	263	365	452	505	605	670	711	766	840	932	968	1283	1398	1705	1867
LBE1500P	1500	150	184	282	391	485	541	648	718	762	821	900	999	1037	1375	1498	1826	2001
LBE1600P	1600	160	196	301	417	517	577	691	765	813	876	960	1066	1106	1466	1598	1948	2134
LBE1660P	1660	166	203	312	433	536	599	717	794	844	908	996	1106	1147	1521	1658	2021	2214

Cell performance **LE Range**

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.14 V/cell

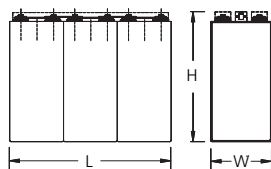
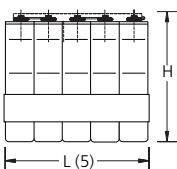
Cell type	C ₅ Ah	HOURS					MINUTES									SECONDS			
		10 h	8 h	5 h	3 h	2 h	90 min	60 min	45 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s	
LCE10P	10	0.98	1.15	1.66	2.35	2.80	3.09	3.75	4.09	4.7	5.2	5.6	5.9	6.7	9.5	11.0	14.4	16.5	
LCE15P	15	1.47	1.73	2.48	3.52	4.20	4.64	5.63	6.14	7.0	7.8	8.4	8.8	10.1	14.3	16.5	21.6	24.8	
LCE22P	22	2.16	2.53	3.64	5.17	6.16	6.80	8.25	9.01	10.3	11.4	12.3	12.9	14.8	20.9	24.2	31.7	36.3	
LCE30P	30	2.94	3.46	4.97	7.05	8.40	9.27	11.3	12.3	14.0	15.6	16.7	17.6	20.2	28.5	33.0	43.3	49.6	
LCE40P	40	3.92	4.61	6.62	9.40	11.2	12.4	15.0	16.4	18.7	20.7	22.3	23.5	26.9	38.0	44.0	57.7	66.1	
LCE47P	47	4.61	5.41	7.78	11.0	13.2	14.5	17.6	19.2	22.0	24.4	26.2	27.6	31.6	44.7	51.8	67.8	77.6	
LCE62P	62	6.08	7.14	10.3	14.6	17.4	19.2	23.3	25.4	29.0	32.1	34.5	36.5	41.7	58.9	68.3	89.4	102	
LCE75P	75	7.20	8.46	12.3	17.2	20.4	22.4	25.9	28.1	31.8	35.6	35.7	41.0	44.1	60.0	66.4	85.1	95.9	
LCE90P	90	8.64	10.2	14.7	20.6	24.5	26.9	31.1	33.7	38.1	42.8	42.8	49.1	52.9	72.0	79.6	102	115	
LCE110P	110	10.6	12.4	18.0	25.2	29.9	32.9	38.0	41.2	46.6	52.3	52.4	60.1	64.7	88.0	97.3	125	141	
LCE145P	145	13.9	16.4	23.7	33.2	39.4	43.3	50.0	54.4	61.4	68.9	69.0	79.2	85.3	116	128	164	185	
LCE185P	185	17.8	20.9	30.3	42.4	50.3	55.3	63.8	69.4	78.3	87.9	88.1	101	109	148	164	210	236	
LCE220P	220	21.1	24.8	36.0	50.4	59.8	65.8	75.9	82.5	93.1	105	105	120	129	176	195	249	281	
LCE235P	235	23.0	27.1	38.9	53.2	61.1	66.7	77.6	83.5	96.1	102	105	118	138	176	193	239	265	
LCE280P	280	27.4	32.3	46.4	63.3	72.8	79.4	92.4	99.5	114	121	125	141	165	209	229	284	316	
LCE330P	330	32.3	38.0	54.6	74.6	85.8	93.6	109	117	135	143	148	166	194	247	270	335	372	
LCE375P	375	36.8	43.2	62.1	84.8	97.5	106.4	124	133	153	162	168	189	221	280	307	381	423	
LBE415P	415	40.7	47.8	68.7	93.9	108	118	137	147	170	179	186	209	244	310	340	422	468	
LBE460P	460	45.1	53.0	76.2	104	120	131	152	163	188	199	206	232	270	344	377	467	519	
LBE510P	510	50.0	58.8	84.5	115	133	145	168	181	208	220	228	257	300	381	418	518	575	
LBE550P	550	53.9	63.4	91.1	124	143	156	182	195	225	238	246	277	323	411	451	559	620	
LBE600P	600	58.8	69.1	99.4	136	156	170	198	213	245	259	269	302	353	448	492	610	676	
LBE650P	650	63.7	74.9	108	147	169	184	215	231	266	281	291	328	382	486	533	660	733	
LBE700P	700	68.6	80.6	116	158	182	199	231	249	286	302	314	353	412	523	574	711	789	
LBE750P	750	73.5	86.4	124	170	195	213	248	266	307	324	336	378	441	560	615	762	846	
LBE830P	830	81.3	95.6	137	188	216	235	274	295	339	359	372	418	488	620	680	843	936	
LBE925P	925	90.7	107	153	209	241	262	305	329	378	400	414	466	544	691	758	940	1043	
LBE1020P	1020	100	118	169	231	265	289	337	362	417	441	457	514	600	762	836	1036	1150	
LBE1100P	1100	108	127	182	249	286	312	363	391	450	475	493	554	647	822	901	1118	1240	
LBE1200P	1200	118	138	199	271	312	340	396	426	491	518	538	605	706	897	983	1219	1353	
LBE1300P	1300	127	150	215	294	338	369	429	462	531	562	582	655	764	971	1065	1321	1466	
LBE1400P	1400	137	161	232	317	364	397	462	497	572	605	627	706	823	1046	1147	1422	1578	
LBE1500P	1500	147	173	248	339	390	426	495	533	613	648	672	756	882	1121	1229	1524	1691	
LBE1600P	1600	157	184	265	362	416	454	528	568	654	691	717	806	941	1196	1311	1626	1804	
LBE1660P	1660	163	191	275	375	432	471	548	590	679	717	744	837	976	1240	1360	1687	1872	

M Range

Cell dimensions and internal resistance

M cells are normally supplied as single cells, taped together into blocks or assembled in steel crates.

Cell type	Capacity at the 5hr rate (Ah)	Volume of liquid electrolyte above plates (cc)	Approx. weight per cell		Overall height		Width per cell		Length per cell		Internal resistance (mOhm)	Electrolyte height between Min - Max (mm)
			(kg)	(lbs)	(mm)	H (ins)	(mm)	W (ins)	(mm)	L (ins)		
MC9P	9	146	1.6	3.6	275	10.83	121	4.76	42	1.65	6.89	35
MC14P	14	146	1.7	3.7	275	10.83	121	4.76	42	1.65	4.43	35
MC22P	22	143	1.9	4.2	275	10.83	121	4.76	42	1.65	2.82	35
MC31P	31	140	2.1	4.6	275	10.83	121	4.76	42	1.65	2.00	35
MC39P	39	235	3.1	6.8	275	10.83	121	4.76	66	2.60	1.59	35
MC47P	47	232	3.3	7.2	275	10.83	121	4.76	66	2.60	1.32	35
MC55P	55	230	3.5	7.6	275	10.83	121	4.76	66	2.60	1.13	35
MC70P	70	552	6.3	13.8	358	14.09	192	7.56	68	2.68	1.11	35
MC90P	90	546	6.6	14.4	358	14.09	192	7.56	68	2.68	0.87	50
MC110P	110	539	7.2	15.9	358	14.09	192	7.56	68	2.68	0.71	50
MC130P	130	532	7.7	16.9	358	14.09	192	7.56	68	2.68	0.60	50
MC145P	145	758	9.9	21.7	358	14.09	192	7.56	93	3.66	0.54	50
MC165P	165	751	10.3	22.7	358	14.09	192	7.56	93	3.66	0.47	50
MC185P	185	744	10.7	23.5	358	14.09	192	7.56	93	3.66	0.42	50
MC215P	215	751	13.1	28.8	414	16.30	192	7.56	93	3.66	0.40	50
MC240P	240	744	13.5	29.7	414	16.30	192	7.56	93	3.66	0.36	50
MC285P	285	1005	17.2	38.0	414	16.30	192	7.56	122	4.80	0.30	50
MC310P	310	996	17.7	38.9	414	16.30	192	7.56	122	4.80	0.28	50
MC335P	335	989	18.2	40.1	414	16.30	192	7.56	122	4.80	0.26	50
MB370P	369	1200	19.5	42.9	405	15.94	195	7.68	159	6.26	0.23	50
MB390P	392	1300	21.0	46.2	405	15.94	195	7.68	171	6.73	0.22	50
MB415P	415	1400	23.0	50.6	405	15.94	195	7.68	183	7.20	0.21	50
MB440P	438	1400	23.5	51.7	405	15.94	195	7.68	183	7.20	0.20	50
MB460P	461	1400	24.0	52.8	405	15.94	195	7.68	183	7.20	0.19	50
MB505P	505	1600	27.5	60.5	405	15.94	195	7.68	213	8.39	0.17	50
MB555P	555	1800	30.0	66.0	405	15.94	195	7.68	232	9.13	0.15	50
MB625P	625	2100	34.5	75.9	405	15.94	195	7.68	268	10.55	0.14	50
MB690P	690	2100	36.0	79.2	405	15.94	195	7.68	268	10.55	0.12	50
MB740P	740	2400	40.0	88.0	405	15.94	195	7.68	304	11.97	0.12	50
MB830P	830	2800	46.0	101.2	405	15.94	195	7.68	352	13.86	0.10	50
MB920P	920	2800	48.0	105.6	405	15.94	195	7.68	352	13.86	0.09	50
MB965P	965	3000	50.5	111.1	405	15.94	195	7.68	372	14.65	0.09	50
MB1040P	1040	3500	57.5	126.5	405	15.94	195	7.68	437	17.20	0.08	50
MB1150P	1150	3500	60.0	132.0	405	15.94	195	7.68	437	17.20	0.07	50
MB1220P	1220	4100	67.5	148.5	405	15.94	195	7.68	510	20.08	0.07	50
MB1390P	1390	4200	72.0	158.4	405	15.94	195	7.68	522	20.55	0.06	50



MC9P - MC335P
Taped block length =
cell length x no of cells + 2mm/0.1 in.

MB370P - MB1390P

Cell connection bolt per pole:	MB370P to MB460P: 2 x M10
	MB505P to MB690P: 3 x M10
MC9P to MC55P: M6	MB740P to MB920P: 4 x M10
MC70P & MC90P: M8	MB965P: 6 x M10
MC110P to MC240P: M10	MB1040P & MB1150P: 5 x M10
MC285P to MC335P: 2 x M10	MB1120P to MB1390P: 6 x M10

Cell performance

M Range

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.00 V/cell

Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
MC9P	9	1.13	1.80	2.94	4.29	5.15	6.66	9.00	10.6	11.5	13.0	15.9	22.7	25.6	30.8	32.6
MC14P	14	1.76	2.80	4.58	6.68	8.02	10.4	14.0	16.4	17.9	20.3	24.7	35.3	39.8	47.9	50.7
MC22P	22	2.77	4.40	7.19	10.5	12.6	16.3	22.0	25.8	28.2	31.8	38.9	55.4	62.5	75.3	79.7
MC31P	31	3.91	6.20	10.1	14.8	17.8	22.9	31.0	36.3	39.7	44.9	54.8	78.1	88.1	106	112
MC39P	39	4.91	7.80	12.8	18.6	22.3	28.8	39.0	45.7	49.9	56.4	68.9	98.2	111	134	141
MC47P	47	5.92	9.40	15.4	22.4	26.9	34.8	47.0	55.1	60.2	68.0	83.0	118	134	161	170
MC55P	55	6.93	11.0	18.0	26.2	31.5	40.7	55.0	64.5	70.4	79.6	97.2	139	156	188	199
MC70P	70	8.82	14.0	22.9	33.5	40.4	52.4	74.6	87.3	95.8	109	133	188	213	258	276
MC90P	90	11.3	18.0	29.4	43.0	51.9	67.3	95.9	112	123	140	171	241	274	332	354
MC110P	110	13.9	22.0	36.0	52.6	63.4	82.3	117	137	150	171	209	295	334	406	433
MC130P	130	16.4	26.0	42.5	62.1	75.0	97.2	139	162	178	202	247	349	395	480	512
MC145P	145	18.3	29.0	47.4	69.3	83.6	108	155	181	198	225	275	389	441	535	571
MC165P	165	20.8	33.0	54.0	78.9	95.2	123	176	206	226	256	313	442	502	609	650
MC185P	185	23.3	37.0	60.5	88.4	107	138	197	231	253	287	351	496	562	683	728
MC215P	215	27.1	43.0	70.3	103	124	161	228	266	291	329	397	554	620	739	782
MC240P	240	30.2	48.0	78.5	115	138	180	254	297	325	367	444	619	692	825	873
MC285P	285	35.9	57.0	93.2	136	164	213	302	353	386	436	527	735	821	979	1036
MC310P	310	39.1	62.0	101	148	179	232	328	384	419	474	573	799	893	1065	1127
MC335P	335	42.2	67.0	110	160	193	251	354	415	453	512	619	863	965	1151	1218
MB370P	369	46.5	73.8	121	176	213	276	390	457	499	564	682	951	1063	1268	1342
MB390P	392	49.4	78.4	128	187	226	293	415	485	530	599	725	1010	1130	1347	1425
MB415P	415	52.3	83.0	136	198	239	310	439	514	562	635	767	1070	1196	1426	1509
MB440P	438	55.2	87.6	143	209	253	328	463	542	593	670	810	1129	1262	1505	1593
MB460P	461	58.1	92.2	151	220	266	345	488	571	624	705	852	1188	1329	1584	1676
MB505P	505	63.6	101	165	241	291	378	534	625	683	772	933	1302	1455	1735	1836
MB555P	555	69.9	111	181	265	320	415	587	687	751	849	1026	1430	1599	1907	2018
MB625P	625	78.7	125	204	299	360	467	661	774	846	956	1155	1611	1801	2148	2273
MB690P	690	86.9	138	226	330	398	516	730	854	934	1055	1275	1778	1988	2371	2509
MB740P	740	93.2	148	242	354	427	553	783	916	1001	1131	1368	1907	2133	2543	2691
MB830P	830	105	166	271	397	479	621	878	1027	1123	1269	1534	2139	2392	2852	3018
MB920P	920	116	184	301	440	531	688	974	1139	1245	1407	1701	2371	2651	3162	3345
MB965P	965	122	193	316	461	557	722	1021	1194	1306	1476	1784	2487	2781	3316	3509
MB1040P	1040	131	208	340	497	600	778	1101	1287	1407	1590	1922	2680	2997	3574	3782
MB1150P	1150	145	230	376	550	663	860	1217	1423	1556	1758	2126	2964	3314	3952	4182
MB1220P	1220	154	244	399	583	704	912	1291	1510	1651	1865	2255	3144	3516	4192	4436
MB1390P	1390	175	278	455	664	802	1040	1471	1720	1881	2125	2569	3582	4006	4777	5055

M Range Cell performance

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.05 V/cell

Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
MC9P	9	1.13	1.78	2.90	3.78	4.53	5.83	7.65	8.69	9.65	11.0	13.2	18.6	21.1	25.0	26.9
MC14P	14	1.75	2.77	4.51	5.87	7.05	9.07	11.9	13.5	15.0	17.1	20.5	28.9	32.8	38.9	41.9
MC22P	22	2.75	4.36	7.08	9.23	11.1	14.2	18.7	21.2	23.6	26.9	32.2	45.4	51.5	61.1	65.9
MC31P	31	3.88	6.14	9.98	13.0	15.6	20.1	26.4	29.9	33.2	37.9	45.3	63.9	72.6	86.1	92.8
MC39P	39	4.88	7.72	12.6	16.4	19.6	25.3	33.2	37.6	41.8	47.7	57.0	80.4	91.3	108	117
MC47P	47	5.88	9.31	15.1	19.7	23.7	30.4	40.0	45.4	50.4	57.5	68.7	96.9	110	131	141
MC55P	55	6.88	10.9	17.7	23.1	27.7	35.6	46.8	53.1	58.9	67.3	80.4	113	129	153	165
MC70P	70	8.75	13.9	22.6	29.5	35.7	47.1	63.3	71.8	79.3	91.5	110	155	175	211	227
MC90P	90	11.3	17.8	29.1	37.9	45.9	60.5	81.4	92.3	102	118	141	199	226	272	291
MC110P	110	13.8	21.8	35.5	46.3	56.1	74.0	99.5	113	125	144	172	243	276	332	356
MC130P	130	16.3	25.7	42.0	54.8	66.3	87.4	118	133	147	170	204	288	326	393	421
MC145P	145	18.1	28.7	46.8	61.1	73.9	97.5	131	149	164	190	227	321	363	438	469
MC165P	165	20.6	32.7	53.3	69.5	84.1	111	149	169	187	216	259	365	414	498	534
MC185P	185	23.1	36.6	59.8	77.9	94.3	124	167	190	210	242	290	409	464	559	599
MC215P	215	26.9	42.6	69.4	90.6	110	145	193	219	242	275	326	452	508	599	646
MC240P	240	30.0	47.5	77.5	101	122	161	215	244	270	307	364	504	567	669	721
MC285P	285	35.6	56.4	92.1	120	145	192	256	290	321	364	432	599	674	794	856
MC310P	310	38.8	61.4	100	131	158	208	278	316	349	396	470	651	733	864	931
MC335P	335	41.9	66.3	108	141	171	225	300	341	377	428	508	704	792	933	1006
MB370P	369	46.1	73.1	119	155	188	248	331	376	415	471	559	775	872	1028	1108
MB390P	392	49.0	77.6	127	165	200	264	352	399	441	501	594	824	927	1092	1177
MB415P	415	51.9	82.2	134	175	212	279	372	423	467	530	629	872	981	1156	1246
MB440P	438	54.8	86.7	141	184	223	295	393	446	493	559	664	920	1035	1220	1315
MB460P	461	57.6	91.3	149	194	235	310	413	469	519	589	698	968	1090	1284	1384
MB505P	505	63.1	100.0	163	213	258	340	453	514	568	645	765	1061	1194	1407	1517
MB555P	555	69.4	110	179	234	283	373	498	565	624	709	841	1166	1312	1546	1667
MB625P	625	78.1	124	202	263	319	420	561	636	703	798	947	1313	1478	1741	1877
MB690P	690	86.3	137	223	291	352	464	619	703	776	881	1045	1450	1631	1922	2072
MB740P	740	92.5	147	239	312	377	498	664	754	832	945	1121	1555	1749	2061	2222
MB830P	830	104	164	268	350	423	558	744	845	934	1060	1258	1744	1962	2312	2492
MB920P	920	115	182	297	388	469	619	825	937	1035	1175	1394	1933	2175	2563	2763
MB965P	965	121	191	312	406	492	649	865	983	1085	1232	1462	2027	2281	2688	2898
MB1040P	1040	130	206	336	438	530	699	933	1059	1170	1328	1576	2185	2459	2897	3123
MB1150P	1150	144	228	371	484	586	773	1031	1171	1294	1469	1742	2416	2719	3203	3453
MB1220P	1220	153	242	394	514	622	820	1094	1242	1372	1558	1848	2563	2884	3398	3664
MB1390P	1390	174	275	449	586	709	935	1247	1415	1564	1775	2106	2920	3286	3872	4174

Cell performance

M Range

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.10 V/cell

Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
MC9P	9	1.11	1.76	2.61	3.35	3.98	4.85	6.26	7.23	7.84	8.81	10.7	15.2	16.9	20.1	21.4
MC14P	14	1.72	2.73	4.06	5.21	6.18	7.55	9.74	11.2	12.2	13.7	16.6	23.6	26.4	31.3	33.3
MC22P	22	2.71	4.29	6.38	8.19	9.72	11.9	15.3	17.7	19.2	21.5	26.1	37.0	41.4	49.2	52.4
MC31P	31	3.81	6.05	9.00	11.5	13.7	16.7	21.6	24.9	27.0	30.4	36.8	52.2	58.4	69.4	73.8
MC39P	39	4.80	7.61	11.3	14.5	17.2	21.0	27.1	31.3	34.0	38.2	46.3	65.7	73.4	87.2	92.9
MC47P	47	5.78	9.17	13.6	17.5	20.8	25.3	32.7	37.8	40.9	46.0	55.8	79.1	88.5	105	112
MC55P	55	6.77	10.7	16.0	20.5	24.3	29.6	38.2	44.2	47.9	53.9	65.2	92.6	104	123	131
MC70P	70	8.61	13.7	20.4	26.3	31.6	39.3	51.3	59.8	65.0	73.1	88.5	125	142	168	194
MC90P	90	11.1	17.6	26.2	33.8	40.6	50.6	65.9	76.9	83.6	93.9	114	161	182	216	249
MC110P	110	13.5	21.5	32.0	41.3	49.6	61.8	80.6	93.9	102	115	139	197	223	264	305
MC130P	130	16.0	25.4	37.8	48.8	58.7	73.1	95.2	111	121	136	164	233	263	312	360
MC145P	145	17.8	28.3	42.2	54.4	65.4	81.5	106	124	135	151	183	259	294	348	402
MC165P	165	20.3	32.2	48.0	62.0	74.5	92.7	121	141	153	172	209	295	334	396	457
MC185P	185	22.8	36.1	53.9	69.5	83.5	104	136	158	172	193	234	331	374	444	512
MC215P	215	26.4	41.9	62.6	80.7	97.0	121	156	181	195	220	263	366	409	482	512
MC240P	240	29.5	46.8	69.9	90.1	108	135	174	202	218	245	293	409	456	538	571
MC285P	285	35.1	55.6	83.0	107	129	160	207	239	259	291	348	486	542	639	679
MC310P	310	38.1	60.5	90.2	116	140	174	225	260	281	317	379	528	589	695	738
MC335P	335	41.2	65.3	97.5	126	151	188	243	281	304	343	409	571	637	751	798
MB370P	369	45.4	72.0	107	139	167	207	268	310	335	377	451	629	702	827	879
MB390P	392	48.2	76.4	114	147	177	220	284	329	356	401	479	668	745	879	933
MB415P	415	51.0	80.9	121	156	187	233	301	348	377	424	507	707	789	930	988
MB440P	438	53.9	85.4	128	164	198	246	318	368	397	448	535	746	833	982	1043
MB460P	461	56.7	89.9	134	173	208	259	334	387	418	471	563	785	876	1034	1098
MB505P	505	62.1	98.5	147	190	228	284	366	424	458	516	617	860	960	1132	1202
MB555P	555	68.3	108	162	208	250	312	402	466	504	567	678	945	1055	1244	1321
MB625P	625	76.9	122	182	235	282	351	453	525	567	639	763	1065	1188	1401	1488
MB690P	690	84.9	135	201	259	311	388	500	579	626	706	842	1175	1312	1547	1643
MB740P	740	91.0	144	215	278	334	416	537	621	672	757	904	1261	1407	1659	1762
MB830P	830	102	162	242	312	375	467	602	697	753	849	1013	1414	1578	1861	1976
MB920P	920	113	179	268	345	415	517	667	772	835	941	1123	1567	1749	2063	2190
MB965P	965	119	188	281	362	435	542	700	810	876	987	1178	1644	1835	2164	2298
MB1040P	1040	128	203	303	391	469	585	754	873	944	1063	1270	1772	1977	2332	2476
MB1150P	1150	141	224	335	432	519	646	834	966	1044	1176	1404	1959	2186	2578	2738
MB1220P	1220	150	238	355	458	551	686	885	1024	1107	1247	1490	2078	2319	2735	2905
MB1390P	1390	171	271	405	522	627	781	1008	1167	1261	1421	1697	2368	2643	3117	3310

M Range Cell performance

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.14 V/cell

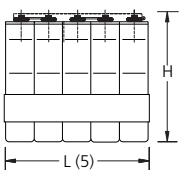
Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
MC9P	9	1.08	1.69	2.29	2.87	3.37	3.89	5.03	5.75	6.27	7.18	8.62	12.2	13.7	15.9	16.5
MC14P	14	1.68	2.63	3.56	4.46	5.25	6.05	7.83	8.95	9.76	11.2	13.4	18.9	21.3	24.8	25.6
MC22P	22	2.64	4.14	5.59	7.01	8.25	9.50	12.3	14.1	15.3	17.5	21.1	29.8	33.4	38.9	40.2
MC31P	31	3.72	5.83	7.88	9.88	11.6	13.4	17.3	19.8	21.6	24.7	29.7	41.9	47.1	54.9	56.7
MC39P	39	4.68	7.33	9.91	12.4	14.6	16.8	21.8	24.9	27.2	31.1	37.4	52.8	59.3	69.0	71.3
MC47P	47	5.64	8.84	11.9	15.0	17.6	20.3	26.3	30.1	32.8	37.5	45.0	63.6	71.4	83.2	85.9
MC55P	55	6.60	10.3	14.0	17.5	20.6	23.8	30.7	35.2	38.3	43.9	52.7	74.4	83.6	97.3	101
MC70P	70	8.40	13.2	17.8	22.7	27.0	31.7	41.1	47.1	52.0	59.1	71.3	102	114	134	139
MC90P	90	10.8	16.9	22.9	29.2	34.8	40.8	52.8	60.6	66.9	75.9	91.6	131	147	172	179
MC110P	110	13.2	20.7	28.0	35.7	42.5	49.9	64.5	74.1	81.8	92.8	112	161	180	210	219
MC130P	130	15.6	24.4	33.1	42.1	50.2	59.0	76.2	87.5	96.7	110	132	190	212	248	258
MC145P	145	17.4	27.3	37.0	47.0	56.0	65.8	85.0	97.6	108	122	148	212	237	277	288
MC165P	165	19.8	31.0	42.1	53.5	63.7	74.8	96.8	111	123	139	168	241	270	315	328
MC185P	185	22.2	34.8	47.2	60.0	71.5	83.9	109	125	138	156	188	270	302	353	368
MC215P	215	25.8	40.4	54.8	69.5	82.9	97.5	125	143	156	177	212	297	330	381	392
MC240P	240	28.8	45.1	61.2	77.6	92.5	109	139	160	174	198	236	331	368	425	438
MC285P	285	34.2	53.6	72.7	92.2	110	129	165	190	206	235	281	393	437	504	520
MC310P	310	37.2	58.3	79.0	100	120	141	180	207	224	256	305	428	475	549	566
MC335P	335	40.2	63.0	85.4	108	129	152	194	223	242	276	330	462	514	593	611
MB370P	369	44.3	69.4	94.1	119	142	167	214	246	267	304	364	509	566	653	673
MB390P	392	47.0	73.7	100	127	151	178	227	261	284	323	386	541	601	694	715
MB415P	415	49.8	78.0	106	134	160	188	241	276	300	342	409	572	637	735	757
MB440P	438	52.6	82.3	112	142	169	199	254	292	317	361	432	604	672	775	799
MB460P	461	55.3	86.7	118	149	178	209	267	307	334	380	454	636	707	816	841
MB505P	505	60.6	94.9	129	163	195	229	293	336	365	416	498	697	775	894	922
MB555P	555	66.6	104	142	179	214	252	322	370	402	458	547	766	851	982	1013
MB625P	625	75.0	118	159	202	241	283	362	416	452	515	616	862	959	1106	1141
MB690P	690	82.8	130	176	223	266	313	400	460	499	569	680	952	1058	1221	1259
MB740P	740	88.8	139	189	239	285	336	429	493	535	610	729	1021	1135	1310	1350
MB830P	830	99.6	156	212	268	320	376	481	553	601	684	818	1145	1273	1469	1515
MB920P	920	110	173	235	298	355	417	533	613	666	758	906	1269	1411	1628	1679
MB965P	965	116	181	246	312	372	438	559	643	698	796	951	1331	1480	1708	1761
MB1040P	1040	125	196	265	336	401	472	603	693	753	857	1025	1434	1595	1841	1898
MB1150P	1150	138	216	293	372	443	522	667	766	832	948	1133	1586	1764	2035	2099
MB1220P	1220	146	229	311	395	470	553	707	813	883	1006	1202	1683	1871	2159	2226
MB1390P	1390	167	261	354	450	536	630	806	926	1006	1146	1369	1917	2132	2460	2536

Cell dimensions and internal resistance

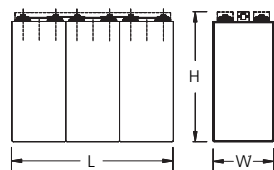
H Range

H cells are normally supplied as single cells, taped together into blocks or assembled in steel crates.

Cell type	Capacity at the 5hr rate (Ah)	Volume of liquid electrolyte above plates (cc)	Approx. weight per cell		Overall height		Width per cell		Length per cell		Internal resistance (mOhm)	Electrolyte height between Min - Max (mm)
			(kg)	(lb)	(mm)	H (ins)	(mm)	W (ins)	(mm)	L (ins)		
HC9P	9	143	1.8	3.9	275	10.83	121	4.76	42	1.65	3.33	35
HC12P	12	140	1.9	4.2	275	10.83	121	4.76	42	1.65	2.50	35
HC17P	17	138	2.1	4.5	275	10.83	121	4.76	42	1.65	1.76	35
HC21P	21	232	3.0	6.6	275	10.83	121	4.76	66	2.60	1.43	35
HC25P	25	230	3.2	6.9	275	10.83	121	4.76	66	2.60	1.20	35
HC29P	29	227	3.3	7.3	275	10.83	121	4.76	66	2.60	1.03	35
HC34P	34	224	3.5	7.6	275	10.83	121	4.76	66	2.60	0.88	35
HC40P	40	546	6.2	13.7	358	14.09	192	7.56	68	2.68	0.98	50
HC50P	50	539	6.6	14.5	358	14.09	192	7.56	68	2.68	0.78	50
HC60P	60	532	7.0	15.4	358	14.09	192	7.56	68	2.68	0.65	50
HC70P	70	525	7.4	16.2	358	14.09	192	7.56	68	2.68	0.56	50
HC80P	80	518	7.7	17.0	358	14.09	192	7.56	68	2.68	0.49	50
HC90P	90	744	9.8	21.6	358	14.09	192	7.56	93	3.66	0.43	50
HC100P	100	737	10.1	22.2	358	14.09	192	7.56	93	3.66	0.39	50
HC110P	110	731	10.5	23.1	358	14.09	192	7.56	93	3.66	0.35	50
HC120P	120	724	10.8	23.8	358	14.09	192	7.56	93	3.66	0.33	50
HC130P	130	737	12.8	28.3	414	16.30	192	7.56	93	3.66	0.33	50
HC145P	145	731	13.2	29.0	414	16.30	192	7.56	93	3.66	0.30	50
HC155P	155	724	13.5	29.8	414	16.30	192	7.56	93	3.66	0.28	50
HC185P	185	976	17.5	38.5	414	16.30	192	7.56	122	4.80	0.23	50
HC210P	210	962	18.2	40.0	414	16.30	192	7.56	122	4.80	0.20	50
HB230P	230	1200	20.0	44.0	405	15.94	195	7.68	159	6.26	0.19	50
HB255P	256	1200	21.0	46.2	405	15.94	195	7.68	159	6.26	0.17	50
HB280P	281	1400	23.5	51.7	405	15.94	195	7.68	183	7.20	0.15	50
HB305P	307	1400	24.5	53.9	405	15.94	195	7.68	183	7.20	0.14	50
HB345P	345	1800	29.5	64.9	405	15.94	195	7.68	232	9.13	0.12	50
HB385P	383	1700	31.0	68.2	405	15.94	195	7.68	232	9.13	0.11	50
HB420P	422	2100	34.5	75.9	405	15.94	195	7.68	268	10.55	0.10	50
HB460P	460	2100	36.0	79.2	405	15.94	195	7.68	268	10.55	0.09	50
HB510P	510	2300	42.0	92.4	405	15.94	195	7.68	304	11.97	0.08	50
HB560P	560	2800	46.0	101.2	405	15.94	195	7.68	352	13.86	0.08	50
HB615P	615	2800	48.0	105.6	405	15.94	195	7.68	352	13.86	0.07	50
HB640P	640	2900	52.5	115.5	405	15.94	195	7.68	377	14.84	0.07	50
HB705P	705	3500	57.5	126.5	405	15.94	195	7.68	437	17.20	0.06	50
HB765P	765	3500	60.0	132.0	405	15.94	195	7.68	437	17.20	0.06	50
HB865P	865	4000	68.5	150.7	405	15.94	195	7.68	497	19.57	0.05	50
HB920P	920	4200	72.0	158.4	405	15.94	195	7.68	522	20.55	0.05	50



HC9P - HC210P
Taped block length =
cell length x no of cells + 2mm/0.1 in.



HB230P - HB920P

Cell connection bolt per pole:	HB230P to HB305P:	2 x M10	
HC9P to HC34P:	M6	HB345P to HB460P:	3 x M10
HC40P & HC50P:	M8	HB510P to HB615P:	4 x M10
HC60P to HC155P:	M10	HB640P to HB765P:	5 x M10
HC185P & HC210P:	2 x M10	HB865P & HB920P:	6 x M10

H Range

Cell performance

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.00 V/cell

Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
HC9P	9	1.13	1.80	2.96	4.39	5.78	8.46	15.3	20.4	23.0	26.2	31.6	46.6	52.6	66.7	70.9
HC12P	12	1.50	2.40	3.95	5.86	7.70	11.3	20.4	27.2	30.7	34.9	42.1	62.2	70.2	88.9	94.5
HC17P	17	2.13	3.40	5.59	8.30	10.9	16.0	28.9	38.5	43.5	49.4	59.6	88.1	99.4	126	134
HC21P	21	2.63	4.20	6.91	10.2	13.5	19.7	35.7	47.6	53.7	61.0	73.7	109	123	156	165
HC25P	25	3.13	5.00	8.22	12.2	16.0	23.5	42.5	56.7	63.9	72.7	87.7	130	146	185	197
HC29P	29	3.63	5.80	9.54	14.2	18.6	27.3	49.3	65.8	74.2	84.3	102	150	170	215	228
HC34P	34	4.25	6.80	11.2	16.6	21.8	32.0	57.8	77.1	87.0	98.8	119	176	199	252	268
HC40P	40	5.00	8.00	13.2	19.5	25.7	37.6	68.8	92.8	106	120	145	206	235	296	325
HC50P	50	6.25	10.0	16.5	24.4	32.2	47.0	86.1	116	132	150	181	258	294	370	407
HC60P	60	7.50	12.0	19.7	29.3	38.6	56.4	103	139	158	180	217	309	353	444	488
HC70P	70	8.75	14.0	23.0	34.2	45.0	65.8	120	162	185	210	254	361	412	519	569
HC80P	80	10.0	16.0	26.3	39.0	51.4	75.2	138	186	211	240	290	412	471	593	650
HC90P	90	11.3	18.0	29.6	43.9	57.9	84.6	155	209	237	270	326	464	529	667	732
HC100P	100	12.5	20.0	32.9	48.8	64.3	94.0	172	232	264	300	362	515	588	741	813
HC110P	110	13.8	22.0	36.2	53.7	70.7	103	189	255	290	330	399	567	647	815	894
HC120P	120	15.0	24.0	39.5	58.6	77.2	113	207	278	317	360	435	619	706	889	976
HC130P	130	16.3	26.0	42.8	63.4	83.5	122	222	298	335	377	445	615	694	844	897
HC145P	145	18.1	29.0	47.7	70.8	93.1	136	247	333	374	421	496	686	774	941	1001
HC155P	155	19.4	31.0	51.0	75.6	99.5	146	265	355	399	450	531	733	827	1006	1070
HC185P	185	23.1	37.0	60.9	90.3	119	174	316	424	477	537	633	875	987	1200	1277
HC210P	210	26.3	42.0	69.1	102	135	197	358	482	541	609	719	993	1121	1363	1449
HB230P	230	28.8	46.0	75.7	112	148	216	393	528	593	668	788	1088	1228	1493	1588
HB255P	255	31.9	51.0	83.9	124	164	240	435	585	657	740	873	1206	1361	1655	1760
HB280P	280	35.0	56.0	92.1	137	180	263	478	642	721	813	959	1324	1494	1817	1933
HB305P	305	38.1	61.0	100	149	196	287	520	700	786	885	1044	1442	1628	1979	2105
HB345P	345	43.1	69.0	114	168	221	324	589	791	889	1001	1181	1631	1841	2239	2381
HB385P	385	48.1	77.0	127	188	247	362	657	883	992	1117	1318	1820	2055	2498	2657
HB420P	420	52.5	84.0	138	205	270	395	717	963	1082	1219	1438	1986	2242	2725	2899
HB460P	460	57.5	92.0	151	224	295	432	785	1055	1185	1335	1575	2175	2455	2985	3175
HB510P	510	63.8	102	168	249	327	479	870	1170	1314	1480	1746	2411	2722	3309	3520
HB560P	560	70.0	112	184	273	360	526	956	1284	1443	1625	1917	2648	2989	3634	3865
HB615P	615	76.9	123	202	300	395	578	1050	1410	1584	1785	2106	2908	3282	3991	4245
HB640P	640	80.0	128	211	312	411	602	1092	1468	1649	1857	2191	3026	3416	4153	4417
HB705P	705	88.1	141	232	344	453	663	1203	1617	1816	2046	2414	3333	3763	4575	4866
HB765P	765	95.6	153	252	373	491	719	1305	1755	1971	2220	2619	3617	4083	4964	5280
HB865P	865	108	173	285	422	555	813	1476	1984	2228	2510	2962	4090	4616	5613	5970
HB920P	920	115	184	303	449	591	865	1570	2110	2370	2670	3150	4350	4910	5970	6350

Cell performance

H Range

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.05 V/cell

Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
HC9P	9	1.12	1.77	2.92	4.30	5.65	8.19	14.5	17.4	19.2	21.7	25.9	38.5	45.2	55.2	59.6
HC12P	12	1.49	2.36	3.89	5.74	7.54	10.9	19.3	23.3	25.6	28.9	34.5	51.3	60.3	73.6	79.5
HC17P	17	2.11	3.35	5.51	8.13	10.7	15.5	27.4	32.9	36.2	41.0	48.9	72.6	85.4	104	113
HC21P	21	2.60	4.14	6.80	10.0	13.2	19.1	33.8	40.7	44.8	50.6	60.3	89.7	106	129	139
HC25P	25	3.10	4.93	8.10	12.0	15.7	22.7	40.3	48.4	53.3	60.2	71.8	107	126	153	166
HC29P	29	3.60	5.71	9.40	13.9	18.2	26.4	46.7	56.2	61.8	69.9	83.3	124	146	178	192
HC34P	34	4.22	6.70	11.0	16.3	21.4	30.9	54.8	65.9	72.5	81.9	97.7	145	171	209	225
HC40P	40	4.96	7.88	13.0	19.2	25.2	36.4	65.3	80.2	87.9	99.5	118	175	200	247	265
HC50P	50	6.20	9.85	16.2	24.0	31.4	45.5	81.6	100	110	124	147	219	250	309	331
HC60P	60	7.44	11.8	19.4	28.7	37.7	54.6	97.9	120	132	149	177	263	300	370	397
HC70P	70	8.68	13.8	22.7	33.5	44.0	63.7	114	140	154	174	206	307	350	432	464
HC80P	80	9.92	15.8	25.9	38.3	50.3	72.8	131	160	176	199	236	351	400	494	530
HC90P	90	11.2	17.7	29.2	43.1	56.6	81.9	147	180	198	224	265	395	450	556	596
HC100P	100	12.4	19.7	32.4	47.9	62.9	91.0	163	200	220	249	295	439	500	617	662
HC110P	110	13.6	21.7	35.6	52.7	69.2	100	179	220	242	274	324	482	550	679	728
HC120P	120	14.9	23.6	38.9	57.5	75.5	109	196	240	264	299	354	526	600	741	795
HC130P	130	16.1	25.6	42.1	62.3	81.6	118	211	256	277	311	362	516	582	702	732
HC145P	145	18.0	28.6	47.0	69.5	91.1	132	235	285	309	347	403	575	649	783	816
HC155P	155	19.2	30.5	50.2	74.2	97.3	141	251	305	330	371	431	615	694	837	873
HC185P	185	22.9	36.4	59.9	88.6	116	168	300	364	394	442	515	734	828	999	1042
HC210P	210	26.0	41.4	68.0	101	132	191	340	413	447	502	584	833	940	1134	1182
HB230P	230	28.5	45.3	74.5	110	144	209	373	453	490	550	640	913	1030	1243	1295
HB255P	255	31.6	50.2	82.6	122	160	232	413	502	543	610	710	1012	1142	1378	1436
HB280P	280	34.7	55.2	90.7	134	176	255	453	551	597	670	779	1111	1254	1513	1577
HB305P	305	37.8	60.1	98.8	146	192	278	494	600	650	729	849	1210	1366	1648	1717
HB345P	345	42.8	68.0	112	165	217	314	559	679	735	825	960	1369	1545	1864	1943
HB385P	385	47.7	75.8	125	184	242	350	624	757	820	921	1071	1527	1724	2080	2168
HB420P	420	52.1	82.7	136	201	264	382	680	826	895	1004	1169	1666	1881	2269	2365
HB460P	460	57.0	90.6	149	220	289	419	745	905	980	1100	1280	1825	2060	2485	2590
HB510P	510	63.2	100	165	244	320	464	826	1003	1087	1220	1419	2023	2284	2755	2872
HB560P	560	69.4	110	181	268	352	510	907	1102	1193	1339	1558	2222	2508	3025	3153
HB615P	615	76.3	121	199	295	386	560	996	1210	1310	1471	1711	2440	2754	3322	3463
HB640P	640	79.4	126	207	307	402	582	1037	1259	1363	1530	1781	2539	2866	3457	3603
HB705P	705	87.4	139	228	338	443	642	1142	1387	1502	1686	1962	2797	3157	3809	3969
HB765P	765	94.9	151	248	366	480	696	1239	1505	1630	1829	2129	3035	3426	4133	4307
HB865P	865	107	170	280	414	543	787	1401	1702	1843	2068	2407	3432	3874	4673	4870
HB920P	920	114	181	298	441	578	837	1490	1810	1960	2200	2560	3650	4120	4970	5180

H Range

Cell performance

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.10 V/cell

Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
HC9P	9	1.09	1.73	2.83	4.17	5.44	7.66	11.7	13.5	15.0	16.8	20.2	30.6	35.6	45.0	47.4
HC12P	12	1.45	2.30	3.78	5.56	7.26	10.2	15.6	18.0	20.0	22.3	26.9	40.8	47.4	60.0	63.2
HC17P	17	2.06	3.26	5.35	7.87	10.3	14.5	22.0	25.4	28.3	31.7	38.1	57.8	67.2	85.0	89.5
HC21P	21	2.54	4.03	6.61	9.72	12.7	17.9	27.2	31.4	35.0	39.1	47.1	71.4	83.0	105	111
HC25P	25	3.03	4.80	7.87	11.6	15.1	21.3	32.4	37.4	41.7	46.6	56.1	85.0	98.8	125	132
HC29P	29	3.51	5.57	9.13	13.4	17.5	24.7	37.6	43.4	48.3	54.0	65.0	98.6	115	145	153
HC34P	34	4.11	6.53	10.7	15.7	20.6	28.9	44.1	50.9	56.7	63.3	76.2	116	134	170	179
HC40P	40	4.84	7.68	12.6	18.5	24.2	34.5	53.3	61.6	68.7	76.5	91.5	138	160	196	220
HC50P	50	6.05	9.60	15.8	23.2	30.3	43.1	66.7	77.0	85.9	95.6	114	173	200	245	275
HC60P	60	7.26	11.5	18.9	27.8	36.4	51.7	80.0	92.4	103	115	137	208	240	294	330
HC70P	70	8.47	13.4	22.1	32.4	42.4	60.3	93.3	108	120	134	160	242	280	343	385
HC80P	80	9.68	15.4	25.2	37.0	48.5	68.9	107	123	137	153	183	277	320	392	440
HC90P	90	10.9	17.3	28.4	41.7	54.5	77.5	120	139	155	172	206	311	360	441	495
HC100P	100	12.1	19.2	31.5	46.3	60.6	86.1	133	154	172	191	229	346	400	490	549
HC110P	110	13.3	21.1	34.7	50.9	66.7	94.7	147	169	189	210	252	381	440	539	604
HC120P	120	14.5	23.0	37.8	55.6	72.7	103	160	185	206	229	275	415	480	588	659
HC130P	130	15.7	25.0	41.0	60.2	78.7	112	171	194	215	237	278	411	468	557	585
HC145P	145	17.5	27.8	45.7	67.1	87.7	125	191	216	240	265	310	459	522	621	653
HC155P	155	18.8	29.8	48.8	71.8	93.8	134	204	231	256	283	332	490	558	664	698
HC185P	185	22.4	35.5	58.3	85.7	112	159	243	275	306	338	396	585	666	792	833
HC210P	210	25.4	40.3	66.2	97.2	127	181	276	313	347	383	450	664	756	899	945
HB230P	230	27.8	44.2	72.5	106	139	198	303	343	380	420	493	728	828	985	1035
HB255P	255	30.9	49.0	80.3	118	154	220	335	380	421	466	546	807	917	1092	1148
HB280P	280	33.9	53.8	88.2	130	169	241	368	417	463	511	600	886	1007	1199	1260
HB305P	305	36.9	58.6	96.1	141	185	263	401	454	504	557	653	965	1097	1306	1373
HB345P	345	41.7	66.2	109	160	209	297	454	514	570	630	739	1091	1241	1478	1553
HB385P	385	46.6	73.9	121	178	233	332	506	573	636	703	824	1218	1385	1649	1733
HB420P	420	50.8	80.6	132	194	254	362	552	625	694	767	899	1328	1511	1799	1890
HB460P	460	55.7	88.3	145	213	278	396	605	685	760	840	985	1455	1655	1970	2070
HB510P	510	61.7	97.9	161	236	309	439	671	759	843	931	1092	1613	1835	2184	2295
HB560P	560	67.8	108	176	259	339	482	737	834	925	1023	1199	1771	2015	2398	2520
HB615P	615	74.4	118	194	285	372	530	809	916	1016	1123	1317	1945	2213	2634	2768
HB640P	640	77.4	123	202	296	387	551	842	953	1057	1169	1370	2024	2303	2741	2880
HB705P	705	85.3	135	222	326	427	607	927	1050	1165	1287	1510	2230	2536	3019	3173
HB765P	765	92.6	147	241	354	463	659	1006	1139	1264	1397	1638	2420	2752	3276	3443
HB865P	865	105	166	272	400	523	745	1138	1288	1429	1580	1852	2736	3112	3704	3893
HB920P	920	111	177	290	426	557	792	1210	1370	1520	1680	1970	2910	3310	3940	4140

Cell performance

H Range

Available amperes at +20°C ± 5°C (+68°F ± 9°F)
Performance after prolonged float charge of fully charged cells

Final voltage: 1.14 V/cell

Cell type	C ₅ Ah	HOURS				MINUTES								SECONDS		
		8 h	5 h	3 h	2 h	90 min	60 min	30 min	20 min	15 min	10 min	5 min	1 min	30 s	5 s	1 s
HC9P	9	1.05	1.67	2.72	3.97	5.14	6.77	9.03	10.5	11.6	12.9	15.8	24.6	28.7	34.9	41.9
HC12P	12	1.40	2.22	3.62	5.29	6.86	9.02	12.0	14.0	15.4	17.2	21.1	32.8	38.2	46.5	55.8
HC17P	17	1.99	3.15	5.13	7.50	9.71	12.8	17.1	19.8	21.9	24.4	29.9	46.4	54.1	65.9	79.1
HC21P	21	2.46	3.89	6.34	9.26	12.0	15.8	21.1	24.5	27.0	30.1	36.9	57.4	66.9	81.4	97.7
HC25P	25	2.93	4.63	7.55	11.0	14.3	18.8	25.1	29.2	32.2	35.8	43.9	68.3	79.6	96.9	116
HC29P	29	3.39	5.37	8.76	12.8	16.6	21.8	29.1	33.8	37.3	41.5	51.0	79.2	92.4	112	135
HC34P	34	3.98	6.29	10.3	15.0	19.4	25.6	34.1	39.7	43.8	48.7	59.8	92.9	108	132	158
HC40P	40	4.68	7.40	12.1	17.7	22.9	30.5	41.2	48.0	52.8	58.5	71.4	111	128	160	168
HC50P	50	5.85	9.25	15.2	22.2	28.7	38.1	51.4	60.0	66.0	73.1	89.3	139	160	200	210
HC60P	60	7.02	11.1	18.2	26.6	34.4	45.7	61.7	71.9	79.2	87.7	107	166	192	240	252
HC70P	70	8.19	13.0	21.2	31.0	40.1	53.3	72.0	83.9	92.3	102	125	194	224	280	294
HC80P	80	9.36	14.8	24.2	35.4	45.8	60.9	82.3	95.9	106	117	143	222	256	320	336
HC90P	90	10.5	16.7	27.3	39.9	51.6	68.5	92.6	108	119	132	161	249	288	360	378
HC100P	100	11.7	18.5	30.3	44.3	57.3	76.2	103	120	132	146	179	277	321	400	420
HC110P	110	12.9	20.4	33.3	48.7	63.0	83.8	113	132	145	161	196	305	353	440	462
HC120P	120	14.0	22.2	36.4	53.2	68.8	91.4	123	144	158	175	214	332	385	480	504
HC130P	130	15.2	24.1	39.3	57.5	74.4	97.8	131	151	165	181	220	328	376	442	458
HC145P	145	17.0	26.8	43.8	64.1	82.9	109	146	169	184	202	246	366	419	493	511
HC155P	155	18.1	28.7	46.8	68.5	88.7	117	156	180	197	216	263	391	448	527	546
HC185P	185	21.6	34.2	55.9	81.8	106	139	186	215	235	257	314	467	535	629	652
HC210P	210	24.6	38.9	63.4	92.8	120	158	211	244	267	292	356	530	607	714	740
HB230P	230	26.9	42.6	69.5	102	132	173	232	268	293	320	390	580	665	783	810
HB255P	255	29.8	47.2	77.0	113	146	192	257	297	324	355	432	643	737	868	898
HB280P	280	32.8	51.8	84.6	124	160	211	282	326	356	390	475	706	810	953	986
HB305P	305	35.7	56.4	92.1	135	174	229	307	355	388	424	517	769	882	1038	1074
HB345P	345	40.4	63.8	104	152	197	259	347	401	439	480	585	870	998	1174	1215
HB385P	385	45.0	71.2	116	170	220	290	388	448	490	536	653	971	1113	1310	1356
HB420P	420	49.1	77.7	127	186	240	316	423	488	534	584	712	1059	1214	1429	1479
HB460P	460	53.8	85.1	139	203	263	346	463	535	585	640	780	1160	1330	1565	1620
HB510P	510	59.7	94.4	154	225	292	384	514	593	649	710	865	1286	1475	1735	1796
HB560P	560	65.5	104	169	248	320	421	564	651	712	779	950	1412	1619	1905	1972
HB615P	615	72.0	114	186	272	352	462	619	715	782	856	1043	1551	1778	2092	2166
HB640P	640	74.9	118	193	283	366	481	645	744	814	890	1085	1614	1850	2177	2254
HB705P	705	82.5	130	213	312	403	530	710	820	897	981	1195	1778	2038	2399	2483
HB765P	765	89.5	142	231	338	438	575	770	890	973	1064	1297	1929	2212	2603	2694
HB865P	865	101	160	261	382	495	650	871	1006	1100	1203	1467	2181	2501	2943	3046
HB920P	920	108	170	278	407	526	692	927	1070	1170	1280	1560	2320	2660	3130	3240

H Range

Cell performance for engine starting applications

Available amperes at +20°C ± 5°C (+68°F ± 9°F)

Performance for fully charged cells by a constant current charge according to IEC 60623 standard.

Final voltage: 0.65 V/cell

Cell type	C ₅ Ah	SECONDS					
		90 s	60 s	30 s	15 s	5 s	1 s
HC9P	9	85.7	96.1	111	129	144	162
HC12P	12	114	128	147	172	191	216
HC17P	17	162	181	209	244	271	306
HC21P	21	200	224	258	301	335	378
HC25P	25	238	267	307	359	399	450
HC29P	29	276	309	356	416	463	522
HC34P	34	324	363	418	488	542	612
HC40P	40	393	439	502	580	646	719
HC50P	50	491	548	627	725	808	899
HC60P	60	589	658	753	870	969	1080
HC70P	70	687	768	878	1010	1130	1260
HC80P	80	785	877	1000	1160	1290	1440
HC90P	90	883	987	1130	1300	1450	1620
HC100P	100	981	1100	1260	1450	1620	1800
HC110P	110	1080	1210	1380	1590	1780	1980
HC120P	120	1180	1320	1510	1740	1940	2160
HC130P	130	1210	1340	1500	1720	1880	2040
HC145P	145	1350	1490	1680	1920	2100	2280
HC155P	155	1440	1600	1790	2050	2250	2430
HC185P	185	1720	1910	2140	2440	2680	2900
HC210P	210	1950	2160	2430	2770	3040	3300
HB230P	230	2140	2370	2660	3040	3330	3610
HB255P	255	2370	2630	2950	3370	3700	4000
HB280P	280	2600	2880	3240	3700	4060	4400
HB305P	305	2840	3140	3530	4030	4420	4790
HB345P	345	3210	3550	3990	4560	5000	5420
HB385P	385	3580	3970	4450	5090	5580	6040
HB420P	420	3910	4330	4860	5550	6090	6590
HB460P	460	4280	4740	5320	6080	6670	7220
HB510P	510	4740	5250	5900	6740	7390	8010
HB560P	560	5210	5770	6470	7400	8120	8790
HB615P	615	5720	6330	7110	8120	8910	9660
HB640P	640	5950	6590	7400	8450	9280	10050
HB705P	705	6560	7260	8150	9310	10220	11070
HB765P	765	7120	7880	8840	10110	11090	12010
HB865P	865	8050	8910	10000	11430	12540	13580
HB920P	920	8560	9480	10640	12150	13330	14440

Final voltage: 0.85 V/cell

Cell type	C ₅ Ah	SECONDS					
		90 s	60 s	30 s	15 s	5 s	1 s
HC9P	9	66.5	74.0	84.1	98.7	110	121
HC12P	12	88.7	98.6	112	132	146	161
HC17P	17	126	140	159	186	207	228
HC21P	21	155	173	196	230	256	282
HC25P	25	185	205	234	274	305	335
HC29P	29	214	238	271	318	354	389
HC34P	34	251	279	318	373	415	456
HC40P	40	303	336	382	443	492	537
HC50P	50	379	419	477	554	615	671
HC60P	60	455	503	573	665	738	805
HC70P	70	531	587	668	776	861	940
HC80P	80	607	671	763	887	984	1070
HC90P	90	682	755	859	998	1110	1210
HC100P	100	758	839	954	1110	1230	1340
HC110P	110	834	923	1050	1220	1350	1480
HC120P	120	910	1010	1150	1330	1480	1610
HC130P	130	922	1010	1130	1280	1390	1510
HC145P	145	1030	1130	1260	1430	1550	1690
HC155P	155	1100	1200	1340	1530	1660	1800
HC185P	185	1310	1440	1610	1820	1980	2150
HC210P	210	1490	1630	1820	2070	2250	2440
HB230P	230	1630	1790	2000	2260	2460	2670
HB255P	255	1810	1980	2210	2510	2730	2970
HB280P	280	1990	2170	2430	2760	3000	3260
HB305P	305	2160	2370	2650	3000	3260	3550
HB345P	345	2450	2680	2990	3400	3690	4010
HB385P	385	2730	2990	3340	3790	4120	4480
HB420P	420	2980	3260	3640	4130	4490	4880
HB460P	460	3260	3570	3990	4530	4920	5350
HB510P	510	3620	3960	4420	5020	5460	5930
HB560P	560	3970	4350	4860	5510	5990	6510
HB615P	615	4360	4780	5330	6050	6580	7150
HB640P	640	4540	4970	5550	6300	6850	7440
HB705P	705	5000	5470	6110	6940	7540	8200
HB765P	765	5430	5940	6640	7530	8180	8900
HB865P	865	6140	6720	7500	8510	9250	10060
HB920P	920	6530	7140	7980	9060	9840	10700

Standard layouts

Alcad has developed a series of standard layouts by which a battery may be ordered. Whether the battery is being installed on a rack, in a cabinet or is simply free-standing, the same configuration principles can be applied. There are two ways to configure the battery. The first is the normal method and is used on all LCE..P, MC..P and HC..P cell types. The cell's length is used to calculate the row length, shown in figure 1. The second method is shown in figure 2. It is used on the majority of Alcad's LBE..P, MB..P and HB..P cells, where the cell is turned through 90° and then connected width-to-width. This is referred to as 'crosswise' mounted and its purpose is to minimise the installation's overall length.

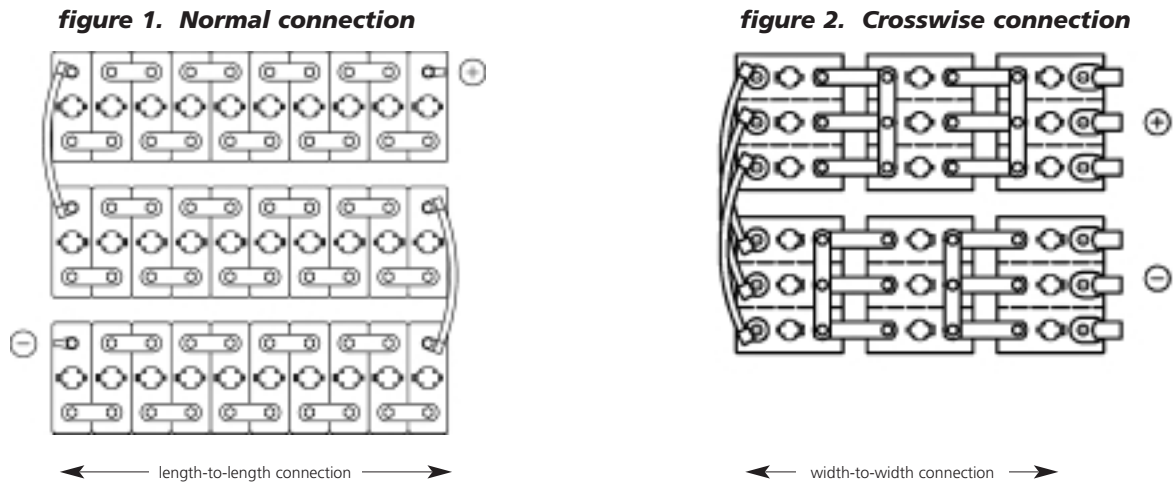


Table 1 demonstrates the connection method for Alcad's extended range of cells. All other designations utilise the normal method of connection (length-to-length).

Table 1

Connection type	LBE..P	MB..P	HB..P
Normal	LBE415P to LBE510P	MB370P to MB390P	-
Crosswise	LBE550P to LBE1660P	MB415P to MB1390P	HB230P to HB920P

Battery layout

Assembly method

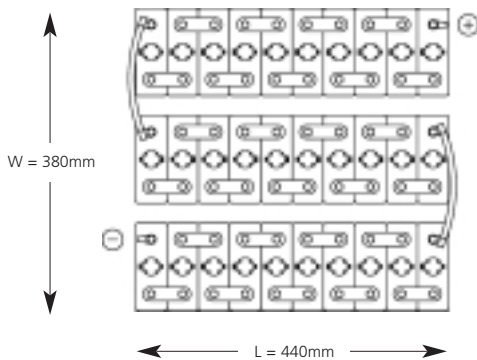
Whatever your installation, use these simple guidelines when calculating your preferred configuration.

1. From the data in this publication, define the total number of cells in the battery.
2. Divide the length of the available installation area by the cell length (normal mount) or width (crosswise mount). This gives the maximum number of cells per row.
3. Divide the width (depth) of the available area by the cell width (normal mount) or length (crosswise mount). This will give the maximum number of rows.

For example

If we consider a cabinet with three shelves : each shelf has a length of 440 mm and a width 380 mm. The battery comprises of ninety cells type LCE30P, (figure 3).

figure 3.



The LCE30P has length of 42 mm and width 121 mm.

$$\frac{440}{42} = 10 \text{ cells per row}$$

$$\frac{380}{121} = 3 \text{ rows per shelf}$$

A total of 30 cells can therefore be fitted on each shelf.

Whilst this is an ideal example, the calculation formula can be applied to all rack, cabinet and free-standing installations. For engineering assistance on complex layouts, please contact the company or its agent.

When ordering a battery rack, please specify the battery type and the preferred rack configuration (see pages 23-25). If your battery is being assembled in a cabinet, or is free-standing, please specify the number of rows, cells per row and total number of cells. This will ensure that all necessary inter-row and inter-tier flexible connectors are provided.

Battery racks

Alcad's product portfolio includes standard and anti-seismic battery racks (conforming to Uniform Building Code, Seismic Zone 4). These have been designed for all cell types in the Alcad range and are supplied unassembled to allow for easy installation. The purpose-built racks are strong, adaptable and provide good alkali protection.

Dimensions are given below for the range of rack layouts. Rack lengths are available in increments of 150 mm from 600 mm to a maximum of 6,000 mm. Calculate the required length using the cell length on page 5, 10, or 15 for normal connection, and by using the cell width 195 mm for crosswise connection.

1. Dimensions (mm) for single tier, standard floor mounted racks : single cell range

Cell type			1 tier rack					
LCE..P	MC..P	HC..P	Depth (D) No. of steps			Height (H) No. of steps		
			2	3	4	2	3	4
10 to 62	9 to 55	9 to 34	430	645	860	560	660	760
75 to 220	70 to 185	40 to 120	430	645	860	643	743	843
235 to 375	215 to 335	130 to 210	430	645	860	699	799	899

2. Dimensions (mm) for double tier, standard floor mounted racks : single cell range

Cell type			2 tier rack					
LCE..P	MC..P	HC..P	Depth (D) No. of steps			Height (H) No. of steps		
			2	3	4	2	3	4
10 to 62	9 to 55	9 to 34	500	715	930	1565	1665	1765
75 to 220	70 to 185	40 to 120	500	715	930	1648	1748	1848
235 to 375	215 to 335	130 to 210	500	715	930	1704	1804	1904

3. Dimensions (mm) for single tier, standard floor mounted racks : extended cell range

Cell type			1 tier rack							
LBE..P	MB..P	HB..P	1	Depth (D) No. of steps			Height (H) No. of steps			
				2	3	4	1	2	3	4
415 to 510*	370 to 390*	-	-	430	645	860	-	690	790	890
550	415 to 460	230 to 305	-	430	645	860	-	690	790	890
600 to 830	505 to 690	345 to 460	-	580	870	-	-	690	790	-
925 to 1300	740 to 965	510 to 640	-	860	-	-	-	690	-	-
1400 to 1660	1040 to 1390	705 to 920	580	1160	-	-	590	690	-	-

* normal connection

4. Dimensions (mm) for double tier, standard floor mounted racks : extended cell range

Cell type			2 tier rack							
LBE..P	MB..P	HB..P	1	Depth (D) No. of steps			Height (H) No. of steps			
				2	3	4	1	2	3	4
415 to 510*	370 to 390*	-	-	500	715	930	-	1695	1795	1895
550	415 to 460	230 to 305	-	500	715	930	-	1695	1795	1895
600 to 830	505 to 690	345 to 460	-	650	940	-	-	1695	1795	-
925 to 1300	740 to 965	510 to 640	-	930	-	-	-	1695	-	-
1400 to 1660	1040 to 1390	705 to 920	650	1230	-	-	1595	1695	-	-

* normal connection

Battery racks

5. Designations for single and double tier, standard floor mounted racks : single cell range (diagrams 1 to 6)

Cell type			1 tier No. of steps			2 tier No. of steps		
LCE..P	MC..P	HC..P	2	3	4	2	3	4
10 to 62	9 to 55	9 to 34	SGL2	SGL3	SGL4	ESGL2	ESGL3	ESGL4
75 to 220	70 to 185	40 to 120	SGL2	SGL3	SGL4	ESGL2	ESGL3	ESGL4
235 to 375	215 to 335	130 to 210	SGL2	SGL3	SGL4	ESGL2	ESGL3	ESGL4

6. Designations for single and double tier, standard floor mounted racks : extended cell range (diagrams 7 - 10)

Cell type			1 tier No. of steps				2 tier No. of steps			
LBE..P	MB..P	HB..P	1	2	3	4	1	2	3	4
415 to 510*	370 to 390*	-	-	SGL2	SGL3	SGL4	-	ESGL2	ESGL3	ESGL4
550	415 to 460	230 to 305	-	SGL2	SGL3	SGL4	-	ESGL2	ESGL3	ESGL4
600 to 830	505 to 690	345 to 460	-	SGS2	SGS3	-	-	ESGS2	ESGS3	-
925 to 1300	740 to 965	510 to 640	-	SGT2	-	-	-	ESGT2	-	-
1400 to 1660	1040 to 1390	705 to 920	PGS2	SGU2	-	-	EPGS2	ESGU2	-	-

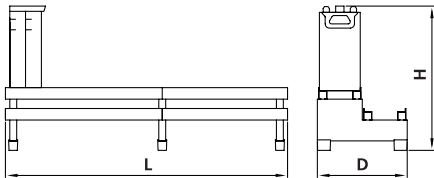


Diagram 1.
1 tier, 2 steps, normal connection

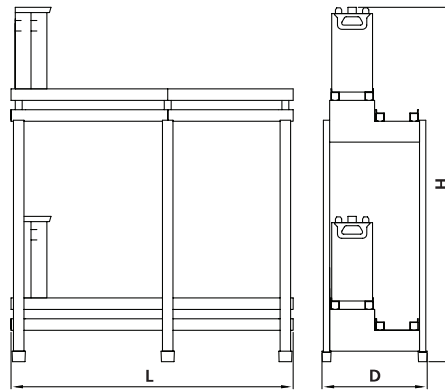


Diagram 2.
2 tier, 2 steps, normal connection

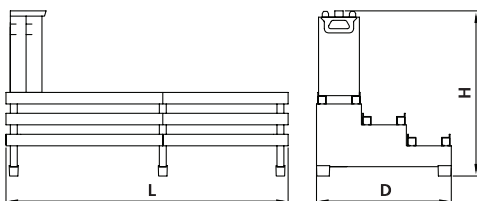


Diagram 3.
1 tier, 3 steps, normal connection

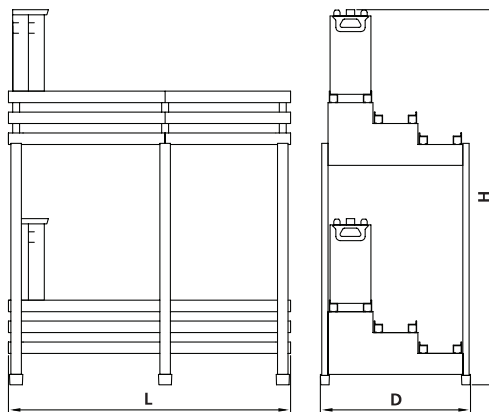


Diagram 4.
2 tier, 3 steps, normal connection

Battery racks

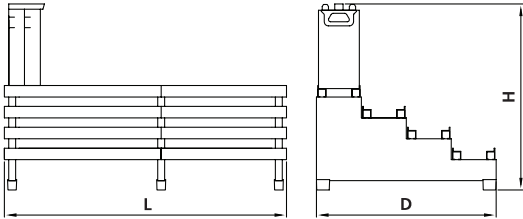


Diagram 5.
1 tier, 4 steps, normal connection

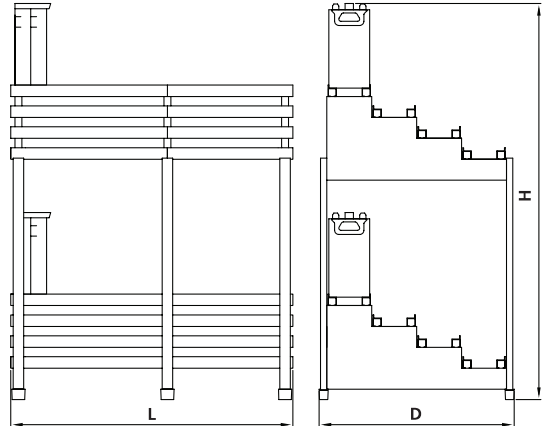


Diagram 6.
2 tier, 4 steps, normal connection

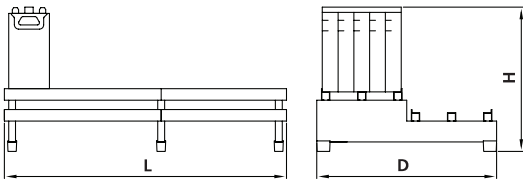


Diagram 7.
1 tier, 2 steps, crosswise connection

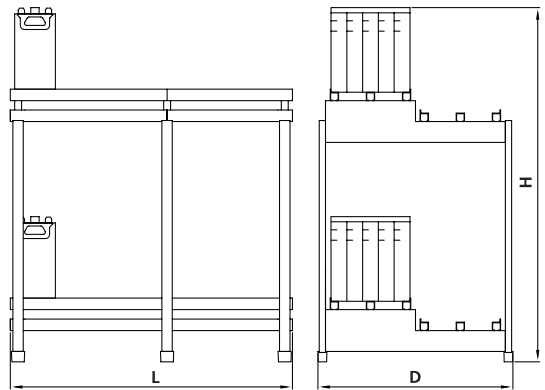


Diagram 8.
2 tier, 2 steps, crosswise connection

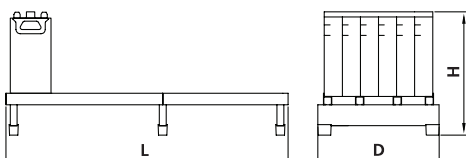


Diagram 9.
1 tier, 1 step, crosswise connection

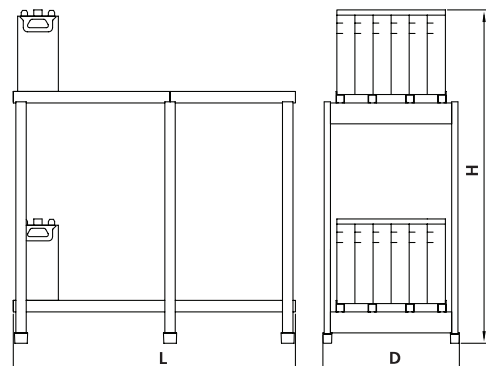


Diagram 10.
2 tier, 1 step, crosswise connection

Disposal and recycling

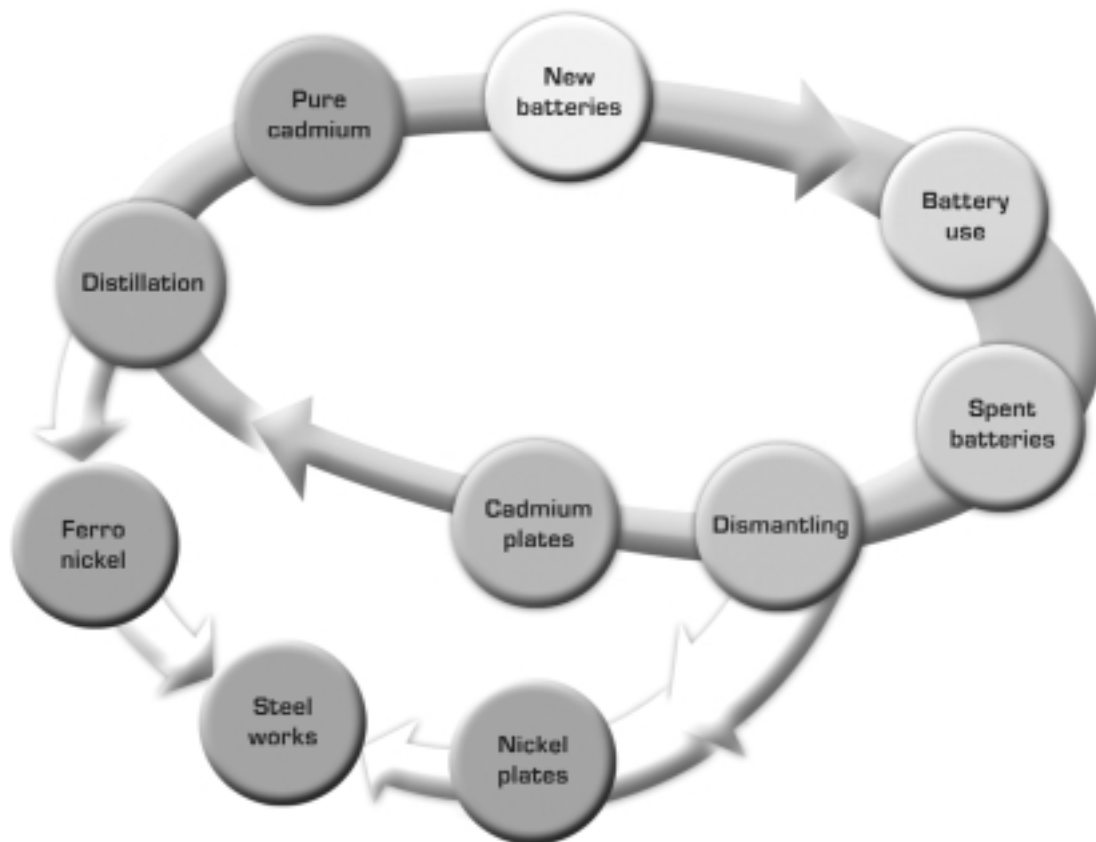
In a world where autonomous sources of electric power are ever more in demand, Alcad batteries provide an environmentally responsible answer to these needs. Environmental management lies at the core of Alcad's business and we take care to control every stage of a battery's life-cycle in terms of potential impact. Environmental protection is our top priority, from design and production through end-of-life collection, disposal and recycling.

Our respect for the environment is complemented by an equal respect for our customers. We aim to generate confidence in our products, not only from a functional standpoint, but also in terms of the environmental safeguards that are built into their life-cycle. The simple and unique nature of the battery components make them readily recyclable and this process safeguards valuable natural resources for future generations.

In partnership with collection agencies worldwide, Alcad organises retrieval from pre-collection points and the recycling of spent Alcad batteries. Information about Alcad's collection network can be found on our web site :

www.alcad.com

Ni-Cd batteries must not be discarded as harmless waste and should be treated carefully in accordance with local and national regulations. Your Alcad representative can assist with further information on these regulations and with the overall recycling procedure.



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