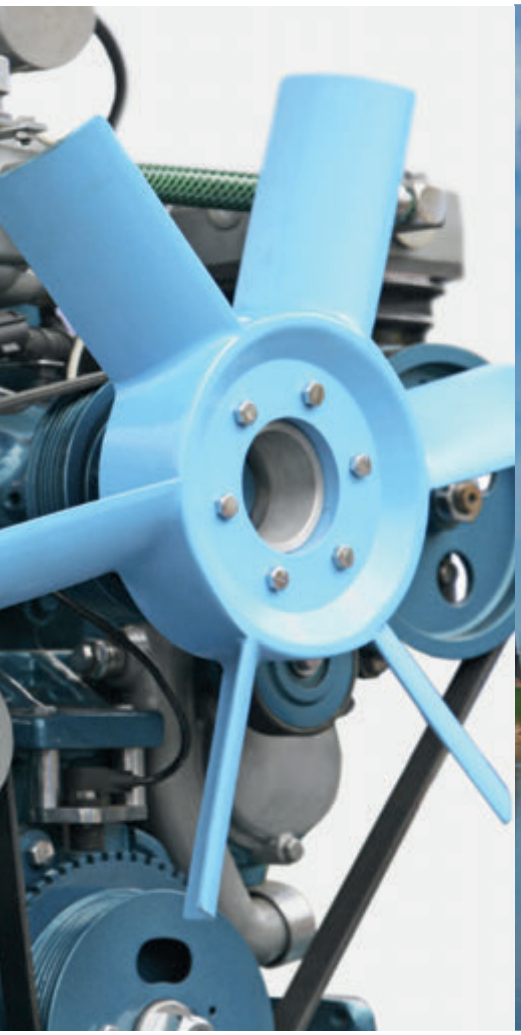
Nickel Cadmium Batteries

BLOCK TYPE



NICA

POWER BACK-UP WITH NICA

NICA your long term partner
for power back-up challenges

Nica has been a trusted battery for the world's leading industrial players for over 100 years, with a range of well proven solutions that deliver secure energy for stationary applications.

Nica's products are designed to meet the reliability, safety and security challenges of today's industrial landscape where they provide power back-up, starting power and bulk energy storage. Nica's commitment to Research and Development and innovative engineering ensures that our nickel-cadmium (Ni-Cd) batteries offer the very latest in design, quality and industrial process technology. They also come with comprehensive through-life global service support, from initial consultancy to volume delivery, including training, maintenance and expert technical back-up.

Reliable and robust batteries for a wide range of industrial applications

Stationary batteries are used in

- refineries,
- power plants,
- onshore & offshore oil and gas industries,
- substations,
- airports & building infrastructure

Locations where it is absolutely critical to have batteries that will work when they should, even under extreme operating conditions.

Power is absolutely vital to Uninterruptible Power Supply (UPS) systems, switching and transmission functions, emergency and security systems, industrial fire monitors and alarms, process control installations, substation switchgear, signaling systems and more.

If the primary power source for these applications is suddenly unavailable, a back-up system provides a temporary source of power until primary power re-engages or while systems operators perform a controlled shutdown. However, back-up power is only as good as the stationary battery that enables it!

NICA LE/M/H Block battery range

Built with the highest quality, safety and environmental standards

Electrical characteristics:

- Certified IEC 60623 - Secondary cells and batteries containing alkaline or other non-acid electrolytes - vented nickel-cadmium prismatic rechargeable single cells.

Safety:

- Complies with EN 50272-2/ IEC 62485-2 - Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries - The protective covers for terminals and connectors, the insulated cables are compliant with IP2 level protection against electrical shocks according to safety standard.
- Complies with UL 1989 - Section 7 : Flame arrester vent cap tests - UL standard for safety for standby batteries.

Quality:

- ISO 9001 and ISO 14001
- Nica world class continuous programme

Environment & recycling

- Fully recyclable
- RoHS - Although batteries and accumulators are not within the scope of the RoHS directive, Nica has taken voluntary measures to make sure that the substances forbidden by RoHS are not present in the battery, with the exception of the electro- chemical core.
- REACH - Nica has adopted internal procedures to ensure conformity with the European REACH (Registration, Evaluation, Authorization and Restriction of Chemical Substances) Regulations.

Instant starting power

Cranking up an emergency generator or switching on heaters, pumps or other equipment requires batteries that are very reliable, offer high discharge capabilities and function properly in extreme temperatures. Nica batteries recover their voltage instantaneously, making them the ideal choice for starting applications.

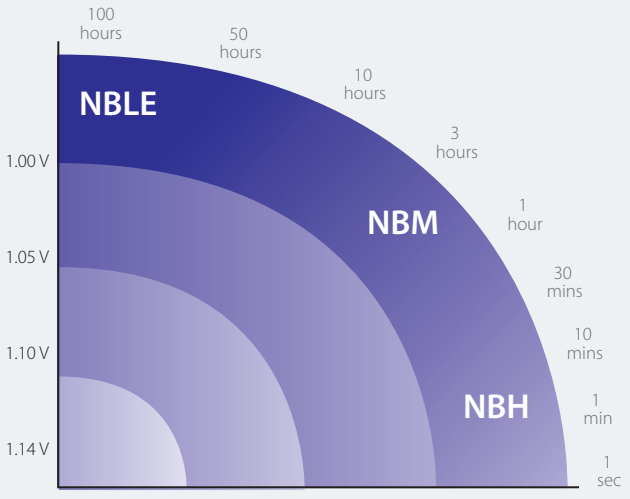
A wide choice of capacity and performance

Nica has developed the NBLE, NBM and MBH ranges of block batteries to offer the optimum, flexible solution for all stationary applications. The choice of low, medium and high capacity types makes it easy to select the ideal battery, based on required discharge time and end of discharge voltage. Thanks to the robust and reliable Nica pocket plate technology they resist electrical abuse, shock and vibrations.

Furthermore, a generous reserves for electrolyte means that the block batteries need only basic maintenance, while operating across a wide range of fluctuating temperatures. This ensures an optimized Total Cost of Ownership (TCO) over a life cycle that can last 20 years or more.

From seconds to hours - every discharge need is covered

Nica has a Block battery range to suit every discharge profile from 1 second to 100 hours



	LE Type	M Type	H Type
Capacity steps	58	68	51
Capacity	7.5 - 1690 Ah	11 - 1445 Ah	8.3 - 920 Ah
Performance	For low rate discharge over long periods between 1 and 100 hours	For varied loads with low and high discharge rates between 30 minutes and 3 hours	For high rate discharge over short periods less than 30 minutes
Applications	Power back-up applications		Power back-up and starting applications

NICA Ni-Cd Technology

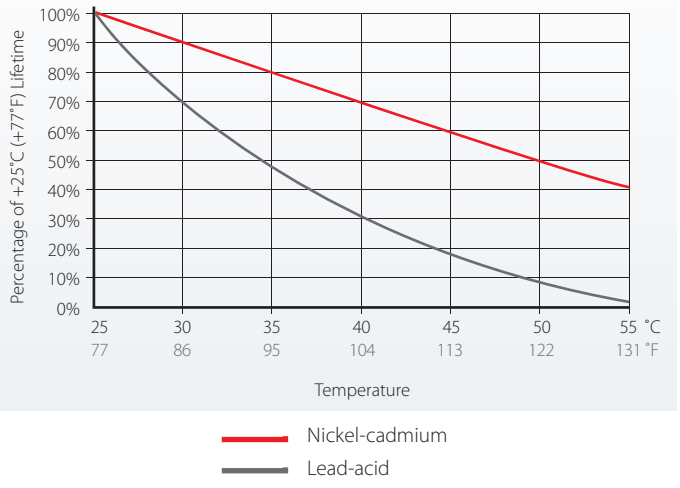
the proven advantages of a safe and robust design

Ni-Cd means proven reliability

Nica's robust Ni-Cd technology sets the benchmark for industrial batteries operating in difficult and demanding conditions.

- Delivers performance, reliability, and a long, totally predictable, service life - with no risk of sudden death failure.
- Ensures a 20-year plus service life at +25˚C (+77˚F).
- Even at +35˚C (+95˚F), lifetime falls by just 20% compared with a 50% reduction for a lead-acid battery.

Effect of temperature on lifetime



NICA Block battery construction

The ideal battery for every application

- Performance optimized for each application according to plate thickness.

  : **LE type**
  - Thicker plates
  - High energy
  - Low cost per Amp at low rates.

  : **M type**
  - Thinner plates
  - Medium power
  - Optimized between H and L design for mixed loads

  : **H type**
  - Thinnest plate
  - High power
  - Low cost per Amp at high rates

- Optimized design boost electrical performance by up to 10% depending on discharge time.

- Twice the number of capacity steps compared with previous designs enables accurate matching with calculated amp-hour requirements.

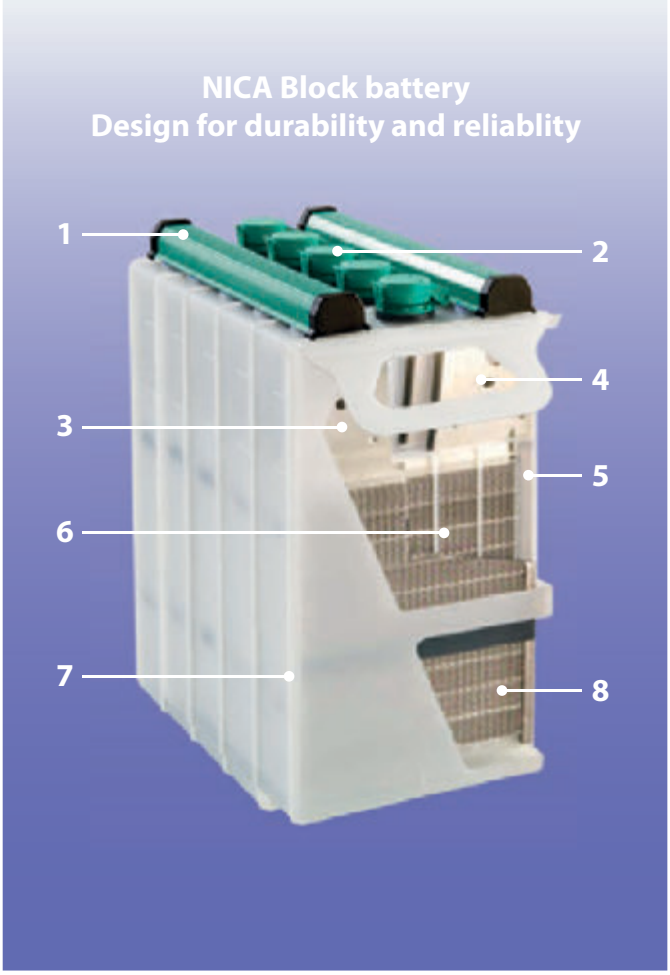
Improved performance and more capacity steps allow you to select the best, cost-effective battery for your application.

1. **Protective cover**
   In line with IEC 60485-2 / EN 50272-2 (safety) with IP2 level.
2. **Flame-arresting vents**
   Compliant with UL 1989 - Section 7 - Flame arrester vent cap tests.
3. **Plate group bus**
4. **Plate tab**
5. **Plate frame**
6. **Separating grids**
7. **Cell container**
8. **Nica pocket plate technology**

Note : The cells are welded together to form rugged blocks of 1-6 cells depending on the cell size and type. Nica cells fully comply with the requirements of the IEC 60623 standard.

The essential features

- The steel pocket plate structure does not suffer from "sudden death" or internal corrosion since there is no interaction between the active material and electrolyte.
- Tough polypropylene casing ensures structural integrity throughout a long life.
- An engineered electrolyte solution delivers optimum performance without causing degradation of plate materials.
- Plenty of space is allowed for a good reserve of electrolyte.
- A special electrolyte is available for extremely low temperature applications.
- A specially designed flame arresting flip top vent ensures the battery does not produce corrosive emissions.
- The Black battery offers a long shelf life when stored under Nica's recommended conditions and it is easy to install.

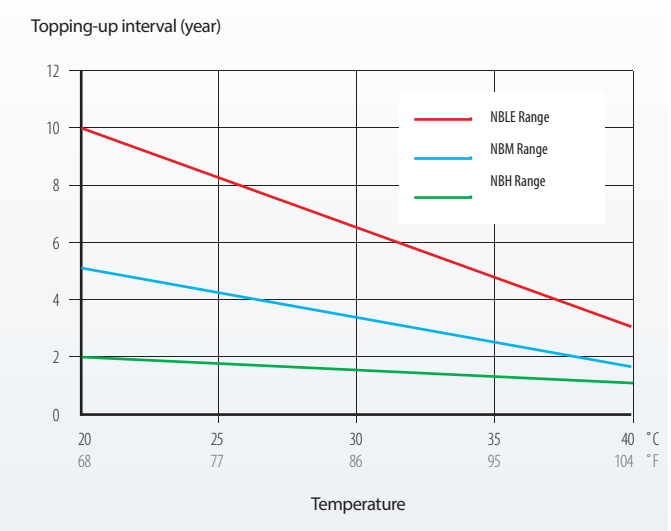


NICA the benchmark
for industrial batteries

Low maintenance means lower lifetime costs

- Topping-up intervals are now up to two times longer under standard conditions at +20˚C (+68˚F) and at float voltage.
- A simple annual maintenance exercise is recommended to check correct functioning of the charging system, battery and the auxilliary electronics.
- Easy maintenance thanks to :
  - Visible electrolyte level
  - Simple bolted connector for fast installation and allowing the battery to be quickly commissioned

Typical topping up intervals at recommended charge voltage



Higher chargeability
minimizes down time

Faster recharge time enables at least 80% recovery of capacity from fully discharged conditions in 15 hours at float voltage level.

Constant voltage charging (+20˚C to +25˚C or +68˚F to +77˚F)

Continuous parallel operation, with occasional battery discharge. Recommended charging voltages:

a) **For two levels charge**:

- Float level :
  1.42 ± 0.01 V/cell for NBLE
  1.40 ± 0.01 V/cell for NBM and NBH

- High level :
  1.47 - 1.70 V/cell for NBLE
  1.45 - 1.70 V/cell for NBM and NBH
  A high voltage will increase the speed and efficiency of the recharging.

b) **For single level charge** :

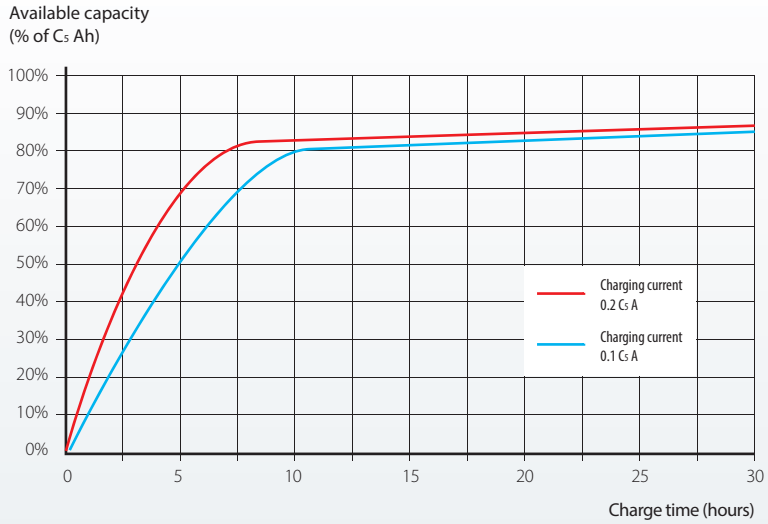
- 1.43 - 1.50 V/cell

Buffer operation, where the load exceeds the charger rating. Recommended charging voltage: 1.50 - 1.60 V/cell.

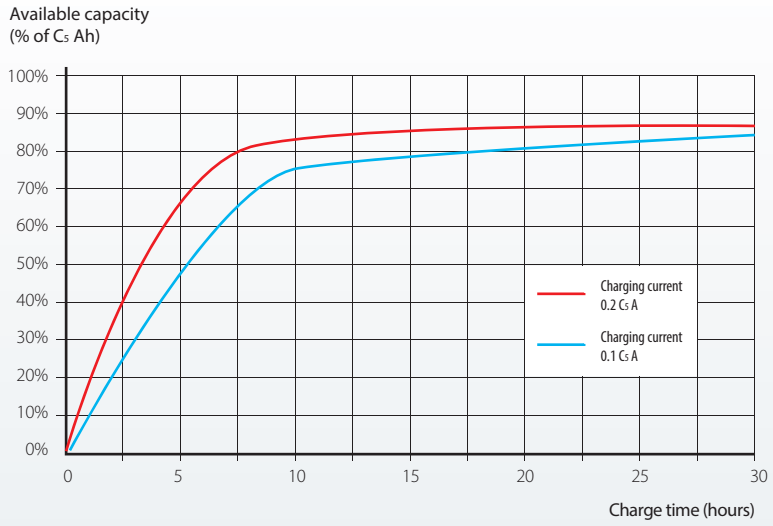
Constant current charging

- Normal charging: 0.2 C_5A for 10 hrs.

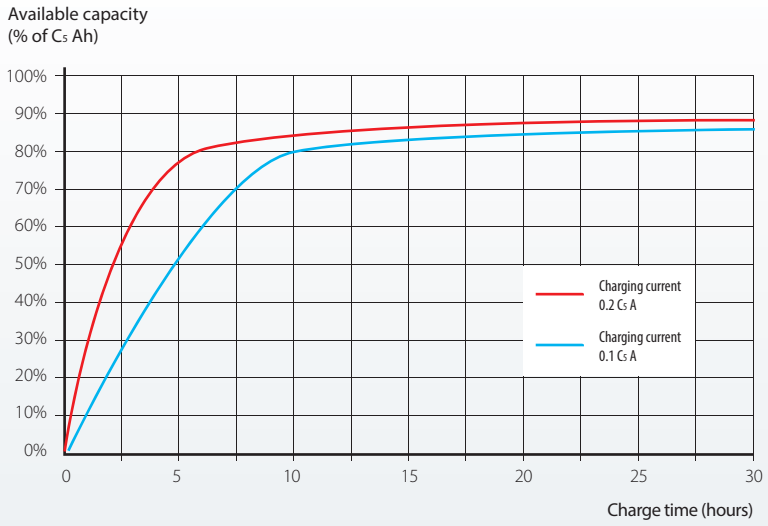
NBLE Range - Available capacity after constant voltage charge at 1,42 V at +20˚C (+ 68˚F)



NBM Range - Available capacity after constant voltage charge at 1,40 V at +20˚C (+ 68˚F)



NBH Range - Available capacity after constant voltage charge at 1,40 V at +20˚C (+ 68˚F)



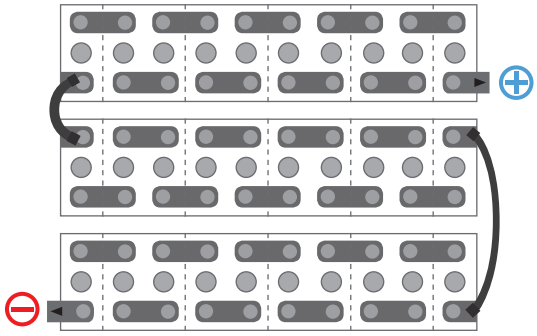
NICA Battery Layout
for optimum efficiency

Standard layouts

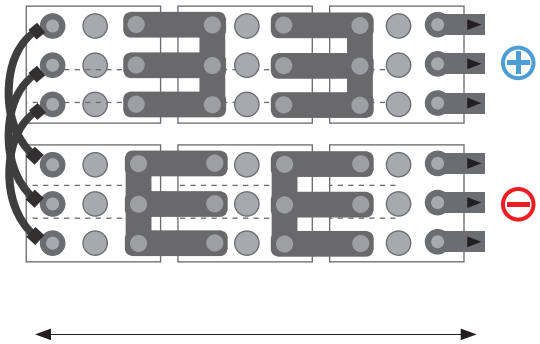
Nica has developed a series of standard layouts for ordering a battery. Whether the battery is being installed on a rack, in a cabinet or is simply freestanding, the same configuration principals can be applied.

Two ways to configure the battery

	Normal connection	Crosswise connection
NBLE	7.5 → 510	550 → 1690
NBM	11 → 392	415 → 1445
NBH	8.3 → 157	177 → 920



Length-to-Length connection



Width-to-Width connection

The cell is turned through 90° and then connected width-to-width. This is referrred to as "crosswise" mounted and its purpose is to minimize the installation's over-all length. The cell's width is used to calculate the row length.

Dimensions

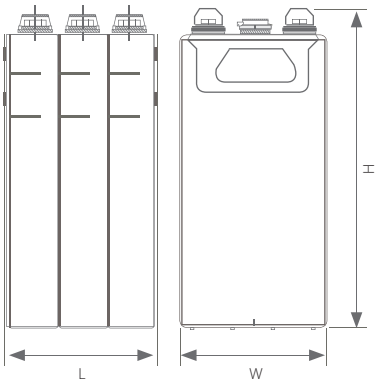
The dimensions of all available cell types are listed in the tables. The block length is determined by the cell length and the number of cells in the block.

Notes :

- All the tabulated dimensions are maximum values.
- All block types with a cell weight exceeding 8.4 kg (18.5 lbs) have handles.
  The tabulated block length includes 6mm for handles for these types.
- All the cell heights given in the tables include the height of the IP2X terminal cover.

Dimensions

The dimensions of all available cell types are listed in the tables. The block length is determined by the cell length and the number of cells in the block.



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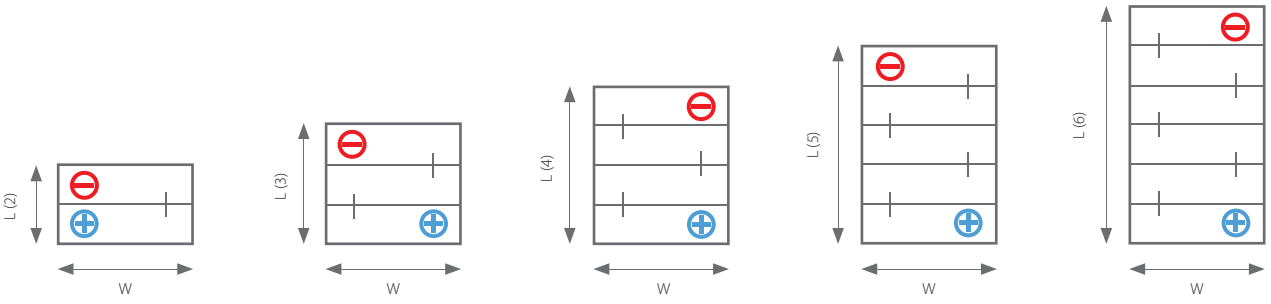
Position of terminals

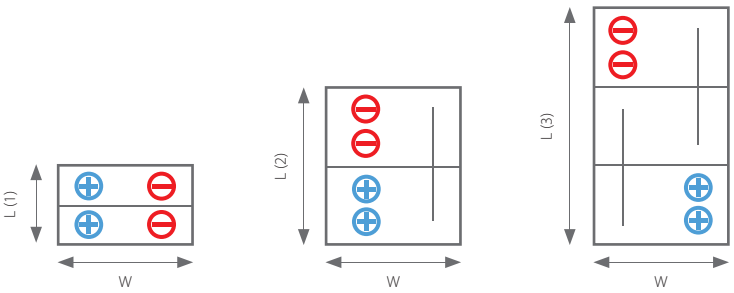
Block of cells with single pole bolt



NBLE 7.5 → 62

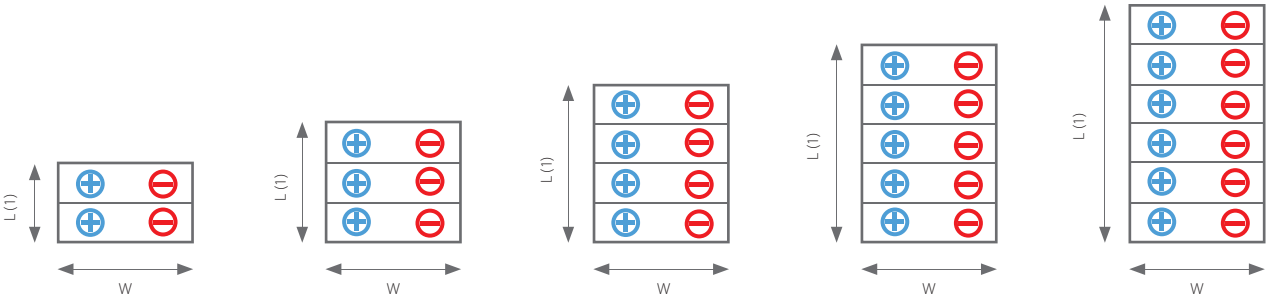
NBLE 75 → 275
NBM 11 → 241
NBH 8.3 → 118

Block of cells with 2 pole bolt per poles



NBLE 300 → 510
NBM 250 → 392
NBH 137 → 157

Block of cells with 2 - 6 poles bolt per poles



NBLE 550
NBM 415 → 482
NBH 177 → 256
NBH 270 → 281
NBH 307

NBLE 600 → 830
NBM 505 → 723
NBH 265 / 294
NBH 323 → 383
NBH 400 → 460

NBLE 890 → 1100
NBM 740 → 940
NBH 393 / 471
NBH 510 → 560
NBH 600 → 615

NBLE 1150 → 1400
NBM 1009 → 1181
NBH 471 / 590NBH
640 → 765

NBLE 1450 → 1690
NBM 965
NBH 1220 →1445
NBH 800 → 920

NBH Capacities and dimensions - **International System of units**

Connection	Cell type	Capacity (C_5 Ah)	Height* (mm)	Width (mm)	Length per bock (mm)			Approx. weight per cell (kg)	Approx. electrolyte volume between level marks (cm^3)	Electrolyte per cell		Internal resistance (mOhm)	Cell connection bolt per pole
					1 cell	2 cells	3 cells			Solid (kg)	Liquid (L)		
NORMAL CONNECTION	NBH 8,3	8,3	260	123	-	53,0	77,0	1,10	80	0,12	0,36	3,61	M 6
	NBH 12	12	260	123	-	64,0	93,5	1,50	110	0,14	0,44	2,50	M 6
	NBH 16	16	260	123	-	74,0	109	1,80	120	0,16	0,48	1,88	M 6
	NBH 19	19	344	123	-	57,0	82,0	2,80	190	0,29	0,90	2,05	M 6
	NBH 29	29	344	195	-	69,0	100	3,70	230	0,36	1,10	1,34	M 6
	NBH 39	39	350	195	-	79,0	115	4,50	270	0,39	1,20	1,00	M 8
	NBH 49	49	350	195	-	94,0	138	5,40	340	0,49	1,50	0,80	M 8
	NBH 59	59	350	195	-	103	151	6,20	370	0,52	1,60	0,66	M 10
	NBH 69	69	350	195	-	127	187	7,30	470	0,68	2,10	0,57	M 10
	NBH 79	79	350	195	-	127	187	7,70	470	0,65	2,00	0,49	M 10
	NBH 88	88	350	195	-	159	232	9,10	580	0,81	2,50	0,44	M 10
	NBH 98	98	350	195	-	159	232	9,40	570	0,78	2,40	0,40	M 10
	NBH 110	110	350	195	-	183	268	10,6	680	0,94	2,90	0,35	M 10
	NBH 118	118	350	195	-	183	268	11,0	670	0,87	2,70	0,33	M 10
	NBH 137	137	350	195	-	253	373	14,5	950	1,33	4,10	0,28	2 × M 10
	NBH 157	157	350	195	-	253	373	15,3	940	1,26	3,90	0,25	2 × M 10
CROSSWISE CONNECTION	NBH 177	177	354	195	159	-	-	17,6	1170	1,59	4,90	0,22	2 × M 10
	NBH 196	196	354	195	159	-	-	18,3	1150	1,52	4,70	0,20	2 × M 10
	NBH 204	204	410	195	133	-	-	18,0	940	1,49	4,60	0,21	2 × M 10
	NBH 236	236	354	195	183	-	-	21,4	1350	1,75	5,40	0,17	2 × M 10
	NBH 256	256	410	195	159	-	-	21,7	1150	1,78	5,50	0,17	2 × M 10
	NBH 265	265	354	195	232	-	-	26,1	1750	2,40	7,40	0,15	3 × M 10
	NBH 270	270	410	195	171	-	-	23,4	1260	1,98	6,10	0,16	2 × M 10
	NBH 281	281	410	195	183	-	-	24,8	1360	2,17	6,70	0,15	2 × M 10
	NBH 294	294	354	195	232	-	-	27,2	1730	2,27	7,00	0,13	3 × M 10
	NBH 307	307	410	195	183	-	-	25,6	1350	2,07	6,40	0,14	2 × M 10
	NBH 323	323	410	195	206	-	-	28,1	1530	2,43	7,50	0,13	3 × M 10
	NBH 345	345	410	195	232	-	-	30,9	1750	2,85	8,80	0,12	3 × M 10
	NBH 353	353	354	195	268	-	-	31,8	2020	2,62	8,10	0,11	3 × M 10
	NBH 363	363	410	195	232	-	-	31,3	1740	2,79	8,60	0,12	3 × M 10
	NBH 383	383	410	195	232	-	-	32,2	1730	2,69	8,30	0,11	3 × M 10
	NBH 393	393	354	195	305	-	-	36,1	2310	3,01	9,30	0,10	4 × M 10
	NBH 400	400	410	195	244	-	-	33,9	1830	2,88	8,90	0,11	3 × M 10
	NBH 422	422	410	195	268	-	-	37,0	2040	3,27	10,1	0,10	3 × M 10
	NBH 440	440	410	195	268	-	-	37,4	2040	3,21	9,90	0,10	3 × M 10
	NBH 460	460	410	195	268	-	-	38,3	2020	3,11	9,60	0,09	3 × M 10
	NBH 471	471	354	195	353	-	-	42,2	2700	3,50	10,8	0,08	4 × M 10
	NBH 491	491	354	195	378	-	-	45,1	2890	3,79	11,7	0,08	5 × M 10
	NBH 510	510	410	195	305	-	-	42,7	2310	3,56	11,0	0,08	4 × M 10
	NBH 560	560	410	195	353	-	-	49,2	2720	4,34	13,4	0,08	4 × M 10
	NBH 590	590	354	195	438	-	-	52,6	3370	4,37	13,5	0,07	5 × M 10
	NBH 600	600	410	195	353	-	-	50,6	2700	4,18	12,9	0,07	4 × M 10
	NBH 615	615	410	195	353	-	-	51,0	2700	4,15	12,8	0,07	4 × M 10
	NBH 640	640	410	195	378	-	-	53,2	2890	4,47	13,8	0,07	5 × M 10
	NBH 655	655	410	195	390	-	-	55,0	2990	4,67	14,4	0,07	5 × M 10
	NBH 670	670	410	195	402	-	-	56,7	3100	4,86	15,0	0,06	5 × M 10
	NBH 705	705	410	195	438	-	-	61,5	3410	5,41	16,7	0,06	5 × M 10
	NBH 765	765	410	195	438	-	-	63,7	3370	5,18	16,0	0,06	5 × M 10
	NBH 800	800	410	195	463	-	-	65,9	3560	5,51	17,0	0,05	6 × M 10
	NBH 865	865	410	195	498	-	-	72,6	3850	5,90	18,2	0,05	6 × M 10
	NBH 920	920	410	195	523	-	-	76,4	4050	6,19	19,1	0,05	6 × M 10

** Height including the IP2X terminal cover - The dark line distinguishes the normal mounted cells from the crosswise cells.*

NBH Capacities and dimensions - **Imperial units**

Connection	Cell type	Capacity (C_5 Ah)	Height* (in)	Width (in)	Length per bock (in)			Approx. weight per cell (lbs)	Approx. electrolyte volume between level marks (in^3)	Electrolyte per cell		Internal resistance (mOhm)	Cell connection bolt per pole
					1 cell	2 cells	3 cells			Solid (lbs)	Liquid (US Gal)		
NORMAL CONNECTION	NBH 8,3	8,3	10,2	4,84	-	2,09	3,03	2,43	4,88	0,26	0,10	3,61	M 6
	NBH 12	12	10,2	4,84	-	2,52	3,68	3,31	6,71	0,31	0,12	2,50	M 6
	NBH 16	16	10,2	4,84	-	2,91	4,27	3,97	7,32	0,35	0,13	1,88	M 6
	NBH 19	19	13,5	4,84	-	2,24	3,23	6,17	11,6	0,64	0,24	2,05	M 6
	NBH 29	29	13,5	7,68	-	2,72	3,94	8,16	14,0	0,79	0,29	1,34	M 6
	NBH 39	39	13,8	7,68	-	3,11	4,53	9,92	16,5	0,86	0,32	1,00	M 8
	NBH 49	49	13,8	7,68	-	3,70	5,41	11,9	20,7	1,07	0,40	0,80	M 8
	NBH 59	59	13,8	7,68	-	4,06	5,94	13,7	22,6	1,14	0,42	0,66	M 10
	NBH 69	69	13,8	7,68	-	5,00	7,36	16,1	28,7	1,50	0,55	0,57	M 10
	NBH 79	79	13,8	7,68	-	5,00	7,36	17,0	28,7	1,43	0,53	0,49	M 10
	NBH 88	88	13,8	7,68	-	6,26	9,13	20,1	35,4	1,79	0,66	0,44	M 10
	NBH 98	98	13,8	7,68	-	6,26	9,13	20,7	34,8	1,71	0,63	0,40	M 10
	NBH 110	110	13,8	7,68	-	7,20	10,6	23,4	41,5	2,07	0,77	0,35	M 10
	NBH 118	118	13,8	7,68	-	7,20	10,6	24,3	40,9	1,93	0,71	0,33	M 10
	NBH 137	137	13,8	7,68	-	9,96	14,7	32,0	58,0	2,93	1,08	0,28	2 × M 10
	NBH 157	157	13,8	7,68	-	9,96	14,7	33,7	57,4	2,79	1,03	0,25	2 × M 10
CROSSWISE CONNECTION	NBH 177	177	13,9	7,68	6,26	-	-	38,8	71,4	3,50	1,29	0,22	2 × M 10
	NBH 196	196	13,9	7,68	6,26	-	-	40,3	70,2	3,36	1,24	0,20	2 × M 10
	NBH 204	204	16,1	7,68	5,24	-	-	39,7	57,4	3,29	1,22	0,21	2 × M 10
	NBH 236	236	13,9	7,68	7,20	-	-	47,2	82,4	3,86	1,43	0,17	2 × M 10
	NBH 256	256	16,1	7,68	6,26	-	-	47,8	70,2	3,93	1,45	0,17	2 × M 10
	NBH 265	265	13,9	7,68	9,13	-	-	57,5	107	5,29	1,95	0,15	3 × M 10
	NBH 270	270	16,1	7,68	6,73	-	-	51,6	76,9	4,36	1,61	0,16	2 × M 10
	NBH 281	281	16,1	7,68	7,20	-	-	54,7	83,0	4,79	1,77	0,15	2 × M 10
	NBH 294	294	13,9	7,68	9,13	-	-	60,0	106	5,00	1,85	0,13	3 × M 10
	NBH 307	307	16,1	7,68	7,20	-	-	56,4	82,4	4,57	1,69	0,14	2 × M 10
	NBH 323	323	16,1	7,68	8,11	-	-	61,9	93,4	5,36	1,98	0,13	3 × M 10
	NBH 345	345	16,1	7,68	9,13	-	-	68,1	107	6,29	2,32	0,12	3 × M 10
	NBH 353	353	13,9	7,68	10,6	-	-	70,1	123	5,79	2,14	0,11	3 × M 10
	NBH 363	363	16,1	7,68	9,13	-	-	69,0	106	6,14	2,27	0,12	3 × M 10
	NBH 383	383	16,1	7,68	9,13	-	-	71,0	106	5,93	2,19	0,11	3 × M 10
	NBH 393	393	13,9	7,68	12,0	-	-	79,6	141	6,64	2,46	0,10	4 × M 10
	NBH 400	400	16,1	7,68	9,61	-	-	74,7	112	6,36	2,35	0,11	3 × M 10
	NBH 422	422	16,1	7,68	10,6	-	-	81,6	124	7,21	2,67	0,10	3 × M 10
	NBH 440	440	16,1	7,68	10,6	-	-	82,5	124	7,07	2,62	0,10	3 × M 10
	NBH 460	460	16,1	7,68	10,6	-	-	84,4	123	6,86	2,54	0,09	3 × M 10
	NBH 471	471	13,9	7,68	13,9	-	-	93,0	165	7,71	2,85	0,08	4 × M 10
	NBH 491	491	13,9	7,68	14,9	-	-	99,4	176	8,36	3,09	0,08	5 × M 10
	NBH 510	510	16,1	7,68	12,0	-	-	94,1	141	7,86	2,91	0,08	4 × M 10
	NBH 560	560	16,1	7,68	13,9	-	-	108	166	9,57	3,54	0,08	4 × M 10
	NBH 590	590	13,9	7,68	17,2	-	-	116	206	9,64	3,57	0,07	5 × M 10
	NBH 600	600	16,1	7,68	13,9	-	-	112	165	9,21	3,41	0,07	4 × M 10
	NBH 615	615	16,1	7,68	13,9	-	-	112	165	9,14	3,38	0,07	4 × M 10
	NBH 640	640	16,1	7,68	14,9	-	-	117	176	9,86	3,65	0,07	5 × M 10
	NBH 655	655	16,1	7,68	15,4	-	-	121	182	10,3	3,80	0,07	5 × M 10
	NBH 670	670	16,1	7,68	15,8	-	-	125	189	10,7	3,96	0,06	5 × M 10
	NBH 705	705	16,1	7,68	17,2	-	-	136	208	11,9	4,41	0,06	5 × M 10
	NBH 765	765	16,1	7,68	17,2	-	-	140	206	11,4	4,23	0,06	5 × M 10
	NBH 800	800	16,1	7,68	18,2	-	-	145	217	12,1	4,49	0,05	6 × M 10
	NBH 865	865	16,1	7,68	19,6	-	-	160	235	13,0	4,81	0,05	6 × M 10
	NBH 920	920	16,1	7,68	20,6	-	-	168	247	13,6	5,05	0,05	6 × M 10

** Height including the IP2X terminal cover - The dark line distinguishes the normal mounted cells from the crosswise cells.*

NBH Performance after prolonged float charge of fully charged cells

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

Final voltage: 1.00 V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBH 8,3	8,3	1,04	1,66	2,73	4,05	5,34	7,78	14,1	18,8	21,7	25,8	32,0	43,0	48,6	61,7	65,4
NBH 12	12	1,50	2,40	3,95	5,86	7,73	11,3	20,4	27,2	31,3	37,3	46,3	62,2	70,2	89,3	94,5
NBH 16	16	2,00	3,20	5,26	7,81	10,3	15,0	27,2	36,3	41,8	49,8	61,8	82,9	93,6	119	126
NBH 19	19	2,38	3,80	6,24	9,27	12,2	17,9	32,8	44,0	51,2	61,0	75,6	97,9	112	141	155
NBH 29	29	3,64	5,80	9,53	14,1	18,6	27,3	50,0	67,2	78,2	93,1	115	149	170	215	236
NBH 39	39	4,89	7,80	12,8	19,0	25,1	36,7	67,3	90,3	105	125	155	201	229	289	317
NBH 49	49	6,15	9,8	16,1	23,9	31,5	46,1	84,5	114	132	157	195	253	288	363	399
NBH 59	59	7,41	11,8	19,4	28,8	37,9	55,4	102	137	159	189	235	304	347	437	480
NBH 69	69	8,66	13,8	22,7	33,7	44,4	64,8	119	160	186	221	275	356	406	511	561
NBH 79	79	9,92	15,8	26,0	38,5	50,8	74,2	136	183	213	253	314	407	464	585	642
NBH 88	88	11,0	17,6	28,9	42,9	56,6	82,7	152	204	237	282	350	453	517	652	716
NBH 98	98	12,3	19,6	32,2	47,8	63,0	92,1	169	227	264	314	390	505	576	726	797
NBH 110	110	13,8	22,0	36,1	53,7	70,7	103	190	255	297	353	438	567	647	815	895
NBH 118	118	14,8	23,6	38,8	57,6	75,9	111	203	273	318	379	470	608	694	874	960
NBH 137	137	17,2	27,4	45,0	66,8	88,1	129	236	317	369	440	545	706	805	1015	1114
NBH 157	157	19,7	31,4	51,6	76,6	101	148	271	364	423	504	625	809	923	1163	1277
NBH 177	177	22,2	35,4	58,2	86,3	114	166	305	410	477	568	704	912	1040	1311	1439
NBH 196	196	24,6	39,2	64,4	95,6	126	184	338	454	529	629	780	1010	1152	1452	1594
NBH 204	204	25,6	40,8	67,3	100	131	192	349	469	537	635	770	967	1091	1327	1411
NBH 236	236	29,6	47,2	77,5	115	152	222	407	547	636	757	939	1216	1387	1748	1919
NBH 256	256	32,1	51,2	84,5	125	165	241	438	588	674	797	966	1213	1369	1665	1771
NBH 265	265	33,3	53,0	87,1	129	170	249	457	614	715	850	1055	1366	1558	1963	2155
NBH 270	270	33,8	54,0	89,1	132	174	254	462	621	711	840	1019	1279	1444	1756	1868
NBH 281	281	35,2	56,2	92,7	137	181	265	481	646	740	874	1061	1332	1503	1827	1944
NBH 294	294	36,9	58,8	96,6	143	189	276	507	681	793	943	1170	1515	1728	2178	2391
NBH 307	307	38,5	61,4	101	150	198	289	525	706	809	955	1159	1455	1642	1997	2124
NBH 323	323	40,5	64,6	107	158	208	304	552	742	851	1005	1219	1531	1728	2101	2234
NBH 345	345	43,2	69,0	114	169	222	325	590	793	909	1074	1302	1635	1845	2244	2386
NBH 353	353	44,3	70,6	116	172	227	332	609	818	952	1133	1405	1819	2075	2615	2871
NBH 363	363	45,5	72,6	120	178	234	342	621	834	956	1130	1370	1720	1942	2361	2511
NBH 383	383	48,0	76,6	126	187	247	361	655	880	1009	1192	1446	1815	2049	2491	2649
NBH 393	393	49,3	78,6	129	192	253	369	678	910	1060	1261	1564	2025	2310	2911	3196
NBH 400	400	50,1	80,0	132	196	258	377	684	919	1054	1245	1510	1895	2139	2601	2767
NBH 422	422	52,9	84,4	139	206	272	398	722	970	1112	1313	1593	2000	2257	2744	2919
NBH 440	440	55,1	88,0	145	215	283	415	753	1011	1159	1369	1661	2085	2353	2861	3044
NBH 460	460	57,6	92,0	152	225	296	433	787	1057	1212	1432	1736	2180	2460	2992	3182
NBH 471	471	59,1	94,2	155	230	303	443	812	1091	1270	1511	1875	2427	2768	3489	3830
NBH 491	491	61,6	98,2	161	239	316	461	847	1137	1324	1575	1954	2530	2886	3637	3993
NBH 510	510	63,9	102	168	249	328	481	872	1172	1343	1587	1925	2417	2728	3317	3528
NBH 560	560	70,2	112	185	274	361	528	958	1287	1475	1743	2114	2654	2995	3642	3874
NBH 590	590	74,1	118	194	288	379	554	1017	1367	1591	1893	2348	3040	3468	4371	4798
NBH 600	600	75,2	120	198	293	386	565	1026	1379	1581	1867	2265	2843	3209	3902	4150
NBH 615	615	77,0	123	203	301	396	579	1052	1414	1620	1914	2321	2914	3289	4000	4254
NBH 640	640	80,2	128	211	313	412	603	1095	1471	1686	1992	2416	3033	3423	4162	4427
NBH 655	655	82,1	131	216	320	422	617	1120	1506	1725	2038	2472	3104	3503	4260	4531
NBH 670	670	83,9	134	221	328	431	631	1146	1540	1765	2085	2529	3175	3584	4357	4635
NBH 705	705	88,3	141	233	345	454	664	1206	1620	1857	2194	2661	3341	3771	4585	4877
NBH 765	765	95,8	153	253	374	493	721	1308	1758	2015	2381	2888	3625	4092	4975	5292
NBH 800	800	100	160	264	391	515	754	1368	1839	2107	2490	3020	3791	4279	5203	5534
NBH 865	865	108	173	286	423	557	815	1479	1988	2279	2692	3265	4099	4627	5625	5983
NBH 920	920	115	184	304	450	592	867	1573	2115	2424	2863	3473	4359	4921	5983	6364

** Height including the IP2X terminal cover*

NBH Performance after prolonged float charge of fully charged cells

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

Final voltage: 1.05 V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBH 8,3	8,3	1,03	1,63	2,69	3,97	5,2	7,57	13,4	16,1	18,6	22,0	26,2	35,5	41,7	50,9	55,0
NBH 12	12	1,49	2,36	3,89	5,74	7,6	11,0	19,4	23,3	26,9	31,8	37,9	51,3	60,3	73,7	79,5
NBH 16	16	1,98	3,15	5,18	7,65	10,1	14,6	25,8	31,0	35,8	42,4	50,6	68,4	80,4	98,2	106
NBH 19	19	2,37	3,74	6,17	9,09	11,9	17,3	31,0	38,0	43,8	52,0	61,6	83,4	95,0	117	126
NBH 29	29	3,61	5,71	9,41	13,9	18,2	26,3	47,3	58,0	66,9	79,3	94,0	127	145	179	192
NBH 39	39	4,86	7,68	12,7	18,7	24,5	35,4	63,7	78,0	90,0	107	126	171	195	241	258
NBH 49	49	6,10	9,7	15,9	23,5	30,8	44,5	80,0	98,0	113	134	159	215	245	303	325
NBH 59	59	7,34	11,6	19,1	28,2	37,1	53,6	96,3	118	136	161	191	259	295	364	391
NBH 69	69	8,59	13,6	22,4	33,0	43	62,7	113	138	159	189	224	303	345	426	457
NBH 79	79	9,83	15,6	25,6	37,8	50	71,7	129	158	182	216	256	347	395	488	523
NBH 88	88	11,0	17,3	28,6	42,1	55	79,9	144	176	203	241	285	386	440	543	583
NBH 98	98	12,2	19,3	31,8	46,9	62	89,0	160	196	226	268	318	430	490	605	649
NBH 110	110	13,7	21,7	35,7	52,6	69	100	180	220	254	301	357	483	550	679	728
NBH 118	118	14,7	23,2	38,3	56,5	74	107	193	236	272	323	383	518	590	728	781
NBH 137	137	17,1	27,0	44,5	65,6	86	124	224	274	316	375	444	601	685	846	907
NBH 157	157	19,5	30,9	50,9	75,1	99	143	256	314	362	430	509	689	785	969	1040
NBH 177	177	22,0	34,9	57,4	84,7	111	161	289	354	408	484	574	777	885	1093	1172
NBH 196	196	24,4	38,6	63,6	93,8	123	178	320	392	452	536	636	860	980	1210	1298
NBH 204	204	25,3	40,2	66,2	98,0	128	186	331	402	457	538	626	811	916	1104	1151
NBH 236	236	29,4	46	77	113	148	214	385	472	544	646	765	1036	1180	1457	1563
NBH 256	256	31,8	50	83	123	161	233	416	505	574	675	785	1018	1149	1386	1445
NBH 265	265	33,0	52	86	127	167	241	433	530	611	725	859	1163	1325	1636	1755
NBH 270	270	33,5	53	88	130	170	246	438	532	605	712	828	1074	1212	1462	1524
NBH 281	281	34,9	55	91	135	177	256	456	554	630	741	862	1117	1261	1521	1586
NBH 294	294	36,6	58	95	141	185	267	480	588	678	804	953	1290	1470	1815	1947
NBH 307	307	38,1	61	100	147	193	280	498	605	688	809	942	1221	1378	1662	1732
NBH 323	323	40,1	64	105	155	203	295	524	637	724	851	991	1284	1450	1749	1823
NBH 345	345	42,8	68	112	166	217	315	560	680	773	909	1058	1372	1548	1868	1947
NBH 353	353	43,9	70	115	169	222	321	576	706	814	966	1145	1549	1765	2179	2338
NBH 363	363	45,1	72	118	174	229	331	589	716	814	957	1114	1443	1629	1965	2048
NBH 383	383	47,6	76	124	184	241	349	622	755	859	1010	1175	1523	1719	2074	2161
NBH 393	393	48,8	77	128	189	247	358	638	775	881	1036	1206	1563	1764	2128	2218
NBH 400	400	49,7	79	130	192	252	365	649	789	897	1054	1227	1590	1795	2166	2257
NBH 422	422	52,4	83	137	203	266	385	685	832	946	1112	1295	1678	1894	2285	2381
NBH 440	440	54,6	87	143	211	277	401	714	868	986	1160	1350	1749	1975	2382	2483
NBH 460	460	57,1	91	149	221	290	419	747	907	1031	1213	1411	1829	2064	2490	2596
NBH 471	471	58,5	93	153	226	297	429	764	929	1056	1242	1445	1873	2114	2550	2658
NBH 491	491	61,0	97	159	236	309	448	797	968	1101	1294	1506	1952	2204	2658	2771
NBH 510	510	63,3	101	166	245	321	465	828	1006	1143	1344	1564	2028	2289	2761	2878
NBH 560	560	69,5	110	182	269	353	511	909	1104	1255	1476	1718	2227	2513	3032	3160
NBH 590	590	73,4	116	191	282	371	536	963	1180	1361	1614	1913	2589	2950	3642	3907
NBH 600	600	74,5	118	195	288	378	547	974	1183	1345	1582	1841	2386	2693	3248	3386
NBH 615	615	76,4	121	200	295	387	561	998	1213	1379	1621	1887	2445	2760	3330	3470
NBH 640	640	79,5	126	208	307	403	584	1039	1262	1435	1687	1963	2545	2872	3465	3611
NBH 655	655	81,3	129	213	315	412	597	1063	1291	1468	1727	2009	2604	2940	3546	3696
NBH 670	670	83,2	132	217	322	422	611	1087	1321	1502	1766	2055	2664	3007	3627	3781
NBH 705	705	87,5	139	229	339	444	643	1144	1390	1580	1858	2163	2803	3164	3817	3978
NBH 765	765	95,0	151	248	368	482	698	1242	1508	1715	2017	2347	3042	3433	4142	4317
NBH 800	800	99,3	158	260	384	504	729	1298	1577	1793	2109	2454	3181	3590	4331	4514
NBH 865	865	107	171	281	416	545	789	1404	1706	1939	2280	2653	3439	3882	4683	4881
NBH 920	920	114	181	299	442	579	839	1493	1814	2062	2425	2822	3658	4129	4981	5191

** Height including the IP2X terminal cover*

NBH Performance after prolonged float charge of fully charged cells

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

Final voltage: 1.10 V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBH 8,3	8,3	1,01	1,59	2,61	3,84	5,02	7,09	10,8	12,9	14,5	16,5	20,5	28,2	32,8	41,5	43,7
NBH 12	12	1,46	2,30	3,78	5,56	7,26	10,2	15,6	18,6	21,0	23,9	29,6	40,8	47,4	60,0	63,2
NBH 16	16	1,94	3,07	5,04	7,41	9,68	13,7	20,8	24,8	28,0	31,9	39,5	54,4	63,2	80,0	84,2
NBH 19	19	2,31	3,64	5,99	8,80	11,5	16,4	25,3	30,4	34,3	38,8	47,8	65,7	76,0	93,1	104
NBH 29	29	3,52	5,56	9,14	13,4	17,6	25,0	38,7	46,4	52,3	59,2	72,9	100	116	142	159
NBH 39	39	4,74	7,48	12,3	18,1	23,6	33,6	52,0	62,4	70,3	79,7	98,1	135	156	191	214
NBH 49	49	5,95	9,4	15,5	22,7	29,7	42,2	65,3	78,4	88,4	100	123	170	196	240	269
NBH 59	59	7,16	11,3	18,6	27,3	35,8	50,8	78,7	94,4	106	121	148	204	236	289	324
NBH 69	69	8,38	13,2	21,8	32,0	41,8	59,5	92,0	110	124	141	174	239	276	338	379
NBH 79	79	9,59	15,2	24,9	36,6	47,9	68,1	105	126	142	161	199	273	316	387	434
NBH 88	88	10,7	16,9	27,7	40,8	53,3	75,8	117	141	159	180	221	304	352	431	483
NBH 98	98	11,9	18,8	30,9	45,4	59,4	84,4	131	157	177	200	247	339	392	480	538
NBH 110	110	13,4	21,1	34,7	51,0	66,7	94,8	147	176	198	225	277	381	440	539	604
NBH 118	118	14,3	22,6	37,2	54,7	71,5	102	157	189	213	241	297	408	472	578	648
NBH 137	137	16,6	26,3	43,2	63,5	83,0	118	183	219	247	280	345	474	548	671	752
NBH 157	157	19,1	30,1	49,5	72,7	95,2	135	209	251	283	321	395	543	628	769	862
NBH 177	177	21,5	34,0	55,8	82,0	107	153	236	283	319	362	445	612	708	867	972
NBH 196	196	23,8	37,6	61,8	90,8	119	169	261	314	353	400	493	678	784	960	1076
NBH 204	204	24,7	39,3	64,4	94,7	124	176	269	315	355	399	482	647	736	876	920
NBH 236	236	28,7	45,3	74,4	109	143	203	315	378	426	482	594	816	944	1156	1296
NBH 256	256	31,0	49,4	80,9	119	155	221	337	396	445	501	604	812	923	1099	1155
NBH 265	265	32,2	50,8	83,6	123	161	228	353	424	478	541	667	917	1060	1298	1455
NBH 270	270	32,6	52,1	85,3	125	164	233	356	417	469	529	637	856	974	1159	1218
NBH 281	281	34,0	54,2	88,8	130	170	242	370	434	489	550	663	891	1013	1206	1267
NBH 294	294	35,7	56,4	92,7	136	178	253	392	470	530	601	740	1017	1176	1440	1614
NBH 307	307	37,1	59,2	97,0	142	186	265	405	475	534	601	725	973	1107	1318	1385
NBH 323	323	39,1	62,3	102	150	196	279	426	499	562	632	762	1024	1165	1386	1457
NBH 345	345	41,7	66,5	109	160	209	298	455	533	600	676	814	1094	1244	1481	1556
NBH 353	353	42,9	67,7	111	164	214	304	471	565	637	721	888	1221	1412	1729	1938
NBH 363	363	43,9	70,0	115	168	220	313	478	561	631	711	857	1151	1309	1558	1637
NBH 383	383	46,3	73,8	121	178	232	330	505	592	666	750	904	1214	1381	1644	1727
NBH 393	393	47,7	75,4	124	182	238	339	524	629	709	803	989	1359	1572	1925	2157
NBH 400	400	48,4	77,1	126	186	243	345	527	618	695	783	944	1268	1442	1717	1804
NBH 422	422	51,0	81,4	133	196	256	364	556	652	734	826	996	1338	1522	1811	1903
NBH 440	440	53,2	84,8	139	204	267	380	580	680	765	862	1039	1395	1586	1888	1984
NBH 460	460	55,6	88,7	145	213	279	397	606	711	800	901	1086	1458	1659	1974	2075
NBH 471	471	57,2	90,4	149	218	285	406	628	753	849	962	1185	1629	1884	2307	2586
NBH 491	491	59,4	94,7	155	228	298	424	647	759	854	961	1159	1556	1770	2107	2214
NBH 510	510	61,7	98,3	161	237	309	440	672	788	887	999	1204	1617	1839	2189	2300
NBH 560	560	67,7	108	177	260	340	483	738	866	974	1097	1322	1775	2019	2403	2525
NBH 590	590	71,3	114	186	274	358	509	778	912	1026	1155	1393	1870	2127	2532	2661
NBH 600	600	72,5	116	190	278	364	518	791	927	1043	1175	1416	1902	2163	2575	2706
NBH 615	615	74,4	119	194	285	373	531	811	951	1069	1204	1452	1950	2217	2640	2774
NBH 640	640	77,4	123	202	297	388	552	844	989	1113	1253	1511	2029	2308	2747	2886
NBH 655	655	79,2	126	207	304	397	565	863	1012	1139	1283	1546	2076	2362	2811	2954
NBH 670	670	81,0	129	212	311	407	578	883	1036	1165	1312	1582	2124	2416	2876	3022
NBH 705	705	85,2	136	223	327	428	608	929	1090	1226	1381	1664	2235	2542	3026	3179
NBH 765	765	92,5	148	242	355	464	660	1008	1182	1330	1498	1806	2425	2758	3283	3450
NBH 800	800	96,7	154	253	371	485	690	1054	1237	1391	1567	1888	2536	2885	3434	3608
NBH 865	865	105	167	273	401	525	746	1140	1337	1504	1694	2042	2742	3119	3713	3901
NBH 920	920	111	177	291	427	558	794	1213	1422	1599	1802	2172	2916	3317	3949	4149

** Height including the IP2X terminal cover*

NBH Performance after prolonged float charge of fully charged cells

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

Final voltage: 1.14 V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBH 8,3	8,3	0,97	1,54	2,51	3,51	4,47	5,87	8,6	10,3	11,7	13,4	16,6	22,7	26,5	32,2	38,6
NBH 12	12	1,40	2,22	3,62	5,08	6,47	8,49	12,4	14,9	16,9	19,4	23,9	32,8	38,3	46,5	55,8
NBH 16	16	1,87	2,96	4,83	6,77	8,62	11,3	16,6	19,8	22,5	25,9	31,9	43,7	51,0	62,0	74,4
NBH 19	19	2,23	3,51	5,76	8,41	10,9	14,5	19,8	23,5	26,4	29,9	36,6	52,5	60,9	76,0	79,9
NBH 29	29	3,40	5,36	8,79	12,8	16,6	22,1	30,2	35,9	40,3	45,7	55,9	80,2	92,9	116	122
NBH 39	39	4,58	7,20	11,8	17,3	22,4	29,7	40,6	48,3	54,2	61,4	75,1	108	125	156	164
NBH 49	49	5,75	9,05	14,9	21,7	28,1	37,3	51,0	60,7	68.1	77,2	94,4	136	157	196	206
NBH 59	59	6,92	10,9	17,9	26,1	33,8	44,9	61,4	73,1	82,0	92,9	114	163	189	236	248
NBH 69	69	8,10	12,7	20,9	30,6	39,6	52,6	71,8	85,5	95,9	109	133	191	221	276	290
NBH 79	79	9,27	14,6	23,9	35,0	45,3	60,2	82,2	97,9	110	124	152	218	253	316	332
NBH 88	88	10,3	16,3	26,7	39,0	50,5	67,0	91,6	109	122	139	170	243	282	352	370
NBH 98	98	11,5	18,1	29,7	43,4	56,2	74,7	102	121	136	154	189	271	314	392	412
NBH 110	110	12,9	20,3	33,3	48,7	63,1	83,8	115	136	153	173	212	304	352	440	462
NBH 118	118	13,8	21,8	35,8	52,3	67,7	89,9	123	146	164	186	227	326	378	472	496
NBH 137	137	16,1	25,3	41,5	60,7	78,6	104	143	170	190	216	264	379	439	548	576
NBH 157	157	18,4	29,0	47,6	69,5	90,0	120	163	195	218	247	302	434	503	628	660
NBH 177	177	20,8	32,7	53,6	78,4	101,5	135	184	219	246	279	341	489	567	708	744
NBH 196	196	23,0	36,2	59,4	86,8	112	149	204	243	273	309	378	542	628	784	824
NBH 204	204	24,0	37,8	61,8	86,9	110	145	212	253	284	321	393	516	591	696	720
NBH 236	236	27,7	43,6	71,5	105	135	180	246	292	328	372	455	653	756	944	992
NBH 256	256	30,1	47,4	77,5	109	138	181	266	317	356	403	493	647	742	873	904
NBH 265	265	31,1	48,9	80,3	117	152	202	276	328	368	417	511	733	849	1060	1114
NBH 270	270	31,8	50,0	81,8	115	146	191	281	335	375	425	520	682	782	921	953
NBH 281	281	33,1	52,0	85,1	120	152	199	293	348	391	442	541	710	814	958	992
NBH 294	294	34,5	54,3	89,1	130	169	224	306	364	409	463	566	813	942	1176	1236
NBH 307	307	36,1	56,9	93,0	131	166	218	320	380	427	483	591	776	890	1047	1084
NBH 323	323	38,0	59,8	97,8	138	175	229	336	400	449	509	622	816	936	1101	1140
NBH 345	345	40,6	63,9	104	147	187	245	359	428	480	543	665	872	1000	1176	1218
NBH 353	353	41,4	65,2	107	156	202	269	367	437	491	556	680	976	1131	1412	1484
NBH 363	363	42,7	67,2	110	155	196	257	378	450	505	572	699	917	1052	1238	1281
NBH 383	383	45,1	70,9	116	163	207	272	399	475	533	603	738	968	1110	1306	1352
NBH 393	393	46,1	72,6	119	174	225	299	409	487	546	619	757	1087	1259	1572	1652
NBH 400	400	47,1	74,1	121	170	216	284	416	496	556	630	771	1011	1159	1364	1412
NBH 422	422	49,6	78,1	128	180	228	299	439	523	587	665	813	1066	1223	1439	1489
NBH 440	440	51,8	81,5	133	187	238	312	458	545	612	693	848	1112	1275	1500	1553
NBH 460	460	54,1	85,2	139	196	249	326	479	570	640	724	886	1163	1333	1568	1624
NBH 471	471	55,3	87,0	143	209	270	359	490	584	655	742	907	1302	1509	1884	1980
NBH 491	491	57,6	90,7	149	217	282	374	511	608	683	773	946	1358	1573	1964	2064
NBH 510	510	60,0	94,4	154	217	276	362	531	632	709	803	982	1289	1478	1739	1800
NBH 560	560	65,9	104	170	239	303	397	583	694	779	882	1079	1415	1623	1909	1976
NBH 590	590	69,2	109	179	261	338	449	614	731	820	929	1137	1632	1890	2360	2480
NBH 600	600	70,6	111	182	256	324	425	625	744	834	945	1156	1516	1739	2046	2118
NBH 615	615	72,4	114	186	262	333	436	640	762	855	968	1185	1554	1782	2097	2171
NBH 640	640	75,3	119	194	273	346	454	666	793	890	1008	1233	1617	1854	2182	2259
NBH 655	655	77,1	121	198	279	354	464	682	812	911	1031	1262	1655	1898	2233	2312
NBH 670	670	78,8	124	203	285	362	475	697	830	932	1055	1291	1693	1941	2284	2365
NBH 705	705	82,9	131	213	300	381	500	734	874	980	1110	1358	1782	2043	2404	2488
NBH 765	765	90,0	142	232	326	414	542	796	948	1064	1205	1474	1933	2217	2608	2700
NBH 800	800	94,1	148	242	341	433	567	833	991	1112	1260	1541	2022	2318	2728	2824
NBH 865	865	102	160	262	368	468	613	900	1072	1203	1362	1666	2186	2506	2949	3053
NBH 920	920	108	170	279	392	497	652	958	1140	1279	1449	1772	2325	2666	3137	3247

** Height including the IP2X terminal cover*

NBH - Engine starting applications

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

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

Cell type	Capacity (C_5 Ah)	Final voltage: 0.65 V/cell						Final voltage: 0.85 V/cell					
		Minutes		Seconds				Minutes		Seconds			
		1,5	1	30	15	5	1	1,5	1	30	15	5	1
NBH 8,3	8,3	90,8	98,1	109	119	132	149	64,1	70,1	77,9	91,5	102	112
NBH 12	12	131	142	158	171	190	216	92,6	101	113	132	148	162
NBH 16	16	175	189	210	229	254	287	123	135	150	176	198	216
NBH 19	19	215	230	253	275	306	341	151	163	182	209	235	256
NBH 29	29	328	351	386	420	468	521	231	249	277	320	358	391
NBH 39	39	441	472	519	565	629	700	311	335	373	430	482	525
NBH 49	49	554	593	652	710	790	880	390	421	469	540	605	660
NBH 59	59	667	714	785	855	951	1060	470	507	564	650	728	795
NBH 69	69	780	835	918	1000	1112	1239	550	592	660	760	852	929
NBH 79	79	893	956	1051	1145	1274	1419	629	678	755	871	975	1064
NBH 88	88	942	993	1084	1158	1275	1382	654	696	768	848	936	1020
NBH 98	98	1108	1186	1304	1420	1580	1760	781	841	937	1080	1210	1320
NBH 110	110	1244	1331	1463	1594	1773	1976	876	944	1052	1212	1358	1482
NBH 118	118	1334	1428	1570	1710	1902	2119	940	1013	1128	1300	1457	1589
NBH 137	137	1549	1658	1822	1985	2209	2460	1091	1176	1310	1510	1692	1845
NBH 157	157	1775	1900	2088	2275	2531	2820	1250	1348	1501	1730	1938	2115
NBH 177	177	2001	2142	2355	2565	2854	3179	1410	1520	1693	1951	2185	2384
NBH 196	196	2216	2372	2607	2840	3160	3520	1561	1683	1874	2160	2420	2640
NBH 204	204	2183	2302	2513	2684	2955	3203	1516	1613	1780	1966	2170	2365
NBH 236	236	2668	2857	3139	3420	3805	4238	1880	2026	2257	2601	2914	3179
NBH 256	256	2739	2889	3154	3368	3709	4020	1903	2024	2234	2468	2724	2968
NBH 265	265	2996	3208	3525	3840	4272	4759	2111	2275	2534	2920	3272	3569
NBH 270	270	2889	3047	3326	3552	3912	4240	2007	2135	2357	2603	2873	3131
NBH 281	281	3007	3171	3462	3697	4071	4413	2088	2222	2453	2709	2990	3258
NBH 294	294	3324	3559	3911	4260	4740	5280	2342	2524	2811	3240	3630	3960
NBH 307	307	3285	3464	3782	4039	4448	4821	2282	2427	2679	2959	3266	3560
NBH 323	323	3478	3667	4004	4276	4708	5103	2415	2570	2837	3133	3458	3768
NBH 345	345	3900	4176	4589	4999	5562	6196	2748	2962	3299	3802	4260	4647
NBH 353	353	3991	4273	4696	5115	5691	6340	2811	3031	3376	3890	4358	4755
NBH 363	363	3906	4119	4497	4802	5288	5732	2713	2886	3186	3518	3883	4232
NBH 383	383	4098	4322	4718	5039	5549	6014	2846	3028	3343	3692	4075	4441
NBH 393	393	4443	4757	5228	5694	6336	7058	3130	3374	3758	4331	4852	5293
NBH 400	400	4280	4514	4928	5262	5795	6281	2973	3162	3491	3856	4256	4638
NBH 422	422	4515	4762	5199	5552	6114	6627	3136	3336	3683	4068	4490	4893
NBH 440	440	4708	4965	5420	5788	6374	6909	3270	3479	3840	4241	4681	5102
NBH 460	460	4922	5191	5667	6052	6664	7223	3419	3637	4015	4434	4894	5334
NBH 471	471	5325	5701	6265	6825	7594	8459	3751	4044	4504	5191	5815	6344
NBH 491	491	5551	5943	6532	7114	7916	8818	3911	4215	4695	5411	6062	6613
NBH 510	510	5457	5755	6283	6709	7389	8009	3790	4032	4451	4916	5426	5914
NBH 560	560	5992	6319	6899	7367	8113	8794	4162	4427	4888	5398	5958	6493
NBH 590	590	6670	7141	7848	8549	9512	10596	4699	5065	5642	6502	7285	7947
NBH 600	600	6420	6771	7392	7893	8692	9422	4459	4744	5237	5784	6384	6957
NBH 615	615	6581	6940	7576	8091	8910	9657	4571	4862	5368	5928	6543	7131
NBH 640	640	6848	7222	7884	8419	9272	10050	4756	5060	5586	6169	6809	7421
NBH 655	655	7009	7391	8069	8617	9489	10286	4868	5179	5717	6314	6969	7595
NBH 670	670	7169	7561	8254	8814	9707	10521	4979	5297	5848	6458	7128	7769
NBH 705	705	7544	7956	8685	9275	10214	11071	5239	5574	6153	6796	7501	8175
NBH 765	765	8186	8633	9424	10064	11083	12013	5685	6048	6677	7374	8139	8870
NBH 800	800	8560	9028	9855	10524	11590	12562	5945	6325	6982	7712	8511	9276
NBH 865	865	9256	9761	10656	11379	12532	13583	6428	6839	7550	8338	9203	10030
NBH 920	920	9844	10382	11334	12103	13328	14447	6837	7274	8030	8868	9788	10668

** Height including the IP2X terminal cover*

Maintenance of Batteries

Cleanliness / Mechanical
Cells must be kept clean and dry at all times, as dust and damp cause current leakage. Terminal and connectors should be kept clean, and any spillage during maintenance should be wiped off with a clean cloth. The battery can be cleaned, using water. Do not use wire brush or a solvent of any kind. Vent caps can be rinsed in clean water, if necessary.

Check that the flame arresting vents are tightly sealed and that there are no deposits on the vent caps.

Terminals should be checked for tightness, and the terminals and connectors should be corrosion protected by coating with a thin layer of neutral grease or anti-corrosion oil.

Changing electrolyte
In most stationary operations, the electrolyte will retain its effectiveness for the life of the battery. Thus, normally it is not necessary to change the electrolyte.

However, under certain battery operating conditions involving high temperature and cycling, the electrolyte can become excessively carbonated. Under these circumstances, the battery performance can be improved by replacing the electrolyte. Please consult your representative under these conditions.

Topping up
Check the electrolyte level. Never let the level fall below the lower MIN mark. Use only approved distilled or deionized water to top up. Do not overfill the cells.

Excessive consumption of water indicates operation at too high a voltage or too high temperature. Negligible consumption of water, with batteries on continuous low current or float charge, could indicate undercharging. A reasonable consumption of water is the best indication that a battery is being operated under the correct conditions. Any marked change in the rate of water consumption should be investigated immediately.

Capacity check
Electrical battery testing is not part of normal routine maintenance, as the battery is required to have the back-up function and cannot be easily taken out-of-service.

However, if a capacity test of the battery is needed, the following procedure should be followed:

a) Discharge the battery at the rate of $0.1C_5$ to $0.2C_5$ amperes (10 to 20 amperes for a 100 Ah battery) to a final average voltage of 1.0 volts per cell. (i.e. 92 volts for a 92 cells battery)

b) Charge 200% (i.e. 200 Ah for 100 Ah battery at the same rate used as the above paragraph (a)

c) Discharge at the same rate used in (a), measuring and recording current, voltage and time every hour, and more frequently towards the end of the discharged. This should be continued until a final average voltage of 1.0 volts per cell is reached. The overall state of battery can then be seen, and if individually cell measurements are taken, the state of each cell can be observed.

Recommended maintenance procedure

In order to obtain the best from your battery, the following maintenance procedures are recommended.

Yearly
- Check charge voltage settings
- Check cell voltages
  (50 mV deviation from average is acceptable)
- Check floats current of the battery
- Check electrolyte level
- High voltage charge if agreed for application

Every 2 years
- Clean cell lids and battery area
- Check torque values
- Grease terminals and connectors

Every 5 years or as required
- Capacity check

As required
Top-up with water according to defined period (depend on float voltage, cycles and temperature)

It is also recommended that a maintenance record be kept which should include a record of the temperature of the battery room.

Installation and storage

Batteries on arrival
On receiving the battery, open the cases and check for any indication of damage in transit.

Remove the cells and any accessories from the packaging, and check that the contents are in order and inspect for any damage in transit.

Damage must be reported immediately to the carrier, and the company or its agent.

If batteries are not put into service immediately they should be stored in a clean, dry, cool and well ventilated storage space on open shelves. Plastic cells should not be exposed to direct sunlight.

Before storage, ensure that:
a) Cells are kept clean with adequate protective finish, such as neutral grease on post and connectors.

b) Electrolyte in cells are filled to the correct level.

c) Vents are correctly seated and vent plugs firmly in position. Keep the transit sealing tape in position.

Note that if excessive loss of electrolyte in transit is found in cells supplied filled, ensure that the cells are correctly filled before storage.

Cells after storage
All cells after storage must be prepared for service and fully commissioned.

Cell oil
On top of the electrolyte of filled cells which floats a layer of cell oil to reduce self- discharge and water loss due to evaporation. This layer is approximately 5mm thick, when the cells are delivered empty and must be added to the cells after they have been filled with electrolyte.

Filled Cells
Filled cells can be stored for up to a maximum of one year. The cells should be sealed with plastic transport seals, supplied with the cells. Check the transport seals upon receipt.

If for unavoidable reasons, filled cells have been stored for more than one year, they must be given maintenance cycles as follows:

a) Remove transport seals form the cells.

b) Discharged at the charging current in the Cell Data Tables to 1.0 Volts per cell.

c) Charge to 10 hours at the charging current in the Cell Data Tables, or equivalent.

d) Wait for 24 hours for all gassing to stop.

e) Replace plastic transport seals and return to store.

For batteries stored more than 12months, at least one discharged/charged cycle as above should be carried out before the commissioning change begins.

Discharge and empty
Cells discharge and empty can be stored for many years if kept under the correct conditions. They should be stored in a clean, dry, cool (+10˚C to 30˚C) and well ventilated storage space on open shelves. It is important that they are sealed with the transport seals firmly in place. These should be checked at least yearly, and if necessary replaced or refitted. Failure or the seal will result in ingress of carbon dioxide from the atmosphere, which will result in carbonation of plates. This can affect the capacity of the battery.

Storage of the battery at temperatures above +30˚C can result in loss of capacity. This can be as much as 5% per 10˚C above +30˚C per year. Discharged and empty cells should be filled with electrolyte, and then the procedure for filled cells stored more than 1 year must followed.

Emplacement
The battery should be installed in a dry and clean location, away from direct sunlight, strong daylight and heat.

Block batteries can be fitted on to stands, floor-mounted or fitted into cabinets. The battery will give the best performance and maximum service life when the ambient temperature is between +10°C and + 35°C.

Local standards or codes normally define the mounting arrangements of batteries, and these must be followed, if applicable. However, if this is not the case, the following comments should be used as a guide. When mounting the battery, it is desirable to maintain an easy access to all blocks; they should be situated in a readily available position.

Distance between stands, and between stands and walls, should be sufficient to give good access to the battery.

Example

A battery of 98 cells, type NBH 79 on a two step, two tier stand, is placed in a room of dimension 2m x 2m x 3m

The charging system is capable of charging at 0.1C_5 and so the charging current is 7.9 amperes.

The volume of hydrogen evolved per hour in this, the worst, case is:
= 98 x 7.9 x 0.00045 m^3
= 0.35 m^3

The total volume of room is 2 x 2 x 3 = 12 m^3

Approximate volume of battery and stand does not exceed 1 m^3, and so, the volume of free air in the room is 11 m^3.

Therefore, the concentration of hydrogen gas after charging for 1 hour at full gassing potential at 0.1 C_5 will be: = 0.35/11 = 3.2%

The overall weight of the battery must be considered and the load bearing on the floor taken into account in the selection of the battery accommodation. In case of doubt, please contact your representative for advice.

When mounting the battery, ensure that the cells are correctly interconnected with the appropriate polarity. The battery connection to load should be with nickel-plated cable lugs.

Recommended torque for connecting screws is:

* M6 11 ± 1.0 N.m
* M8 20 ± 2 N.m
* M10 30 ± 3 N.m

To avoid accelerated aging of the plastic due to UV-light, batteries with plastic cell containers should not be exposed to direct sunlight or strong daylight for a prolonged period.

If the battery is enclosed in a cabinet or other such enclosed space, it is important to provide sufficient space to disperse the gasses given off during charging, and also to minimize condensation. It is recommended that at least 200mm be allowed above cell tops, to ensure easy access during inspection and topping up, and that enough space is allowed between cabinet walls and the battery to avoid any risk of short circuits. Flip-top vents may be turned through 180' to achieve the most convenient position for topping-up.

Ventilation

When the battery is housed in a cubicle or enclosed compartment, it is necessary to provide adequate ventilation.

During the last part of high-rate charging, the battery is emitting gases (oxygen-hydrogen mixture).

It is required to establish that the ventilation of the battery room is adequate, and it is necessary to calculate the rate of evolution of hydrogen to ensure that the concentration of hydrogen gas in the room is kept within safe limits.

The normally accepted safe limit for hydrogen is 4%. However, some standards call for more severe levels than this, and levels as low as 1% are sometimes required.

To calculate the ventilation requirements of a battery room, the following method can be used:

1 Ah of overcharge breaks down 0.366 cm^3 of water, and 1 cm^3 of water produces 1.865 liters of gas in the proportion 2/3 hydrogen and 1/3 oxygen. Thus 1 Ah of overcharge produces 0.45 liters of hydrogen.

Therefore, the volume of hydrogen evolved from a battery per hour

= number of cells x charge current x 0.45 liters or

= number of cells x charge current x 0.00045 m^3

The volume of hydrogen found by this calculation can be expressed as a percentage of the total volume of the battery room, and from this, the number of air changes required to keep the concentration of hydrogen below a certain level can be calculated.

Thus, to maintain a maximum concentration of 2%, the air in the room will need changing 3.2 = 1.6 times per hour.

A typical figure for natural room ventilation is about 2.5 air changes per hour, and so, in this case, it would not be necessary to introduce any forced ventilation. In a floating situation, the current flowing is very much lower than when the cell is being charged, and the gas evolution is minimal; it may be calculated in the same way using typical floating currents.

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