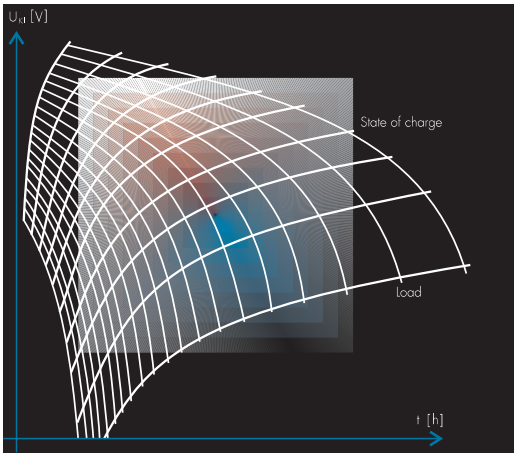
HAGEN Batterie AG

Valve regulated Batteries for Stationary Applications

HAGEN *dc plus*



An EXIDE Company

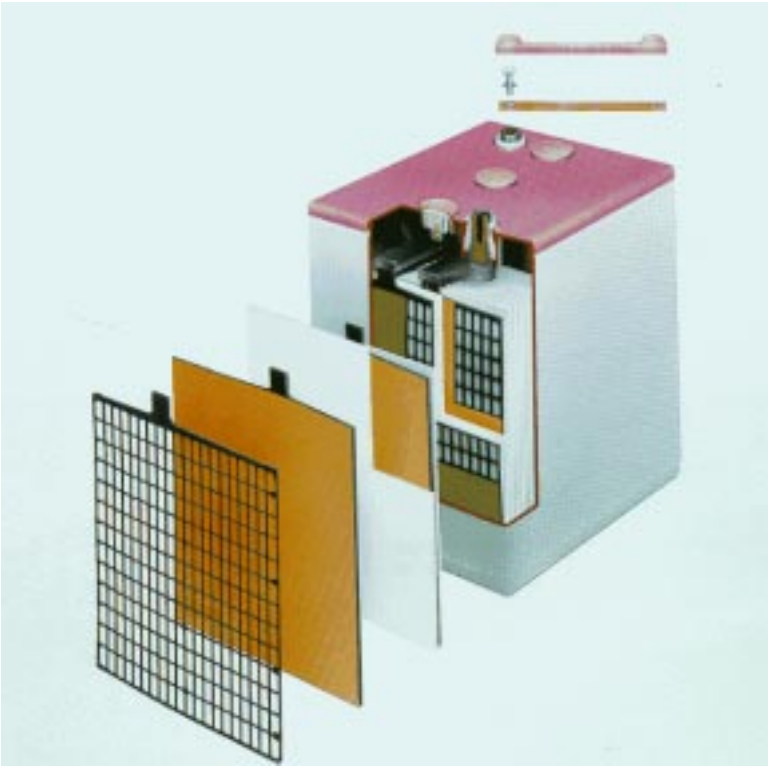
The new!
HAGEN dc plus

The new battery generation dc plus is based on the proven flat plate series HAGEN drysafe compact. Modernized production technique and optimal use of the available volume are resulting in higher energy and power density compared with the common battery technique.

The principle of valve regulation and recombination is maintained. The sealed battery design allows for practically maintenance free use in vertical and horizontal position.

Available capacity ranges:

12 V	25	–	63 Ah
6 V	80	–	252 Ah
4 V	308	–	336 Ah



Advantages

- O High energy density
- O High current proof
- O Valve regulated system
- O Terminals corrosion-free (HAGEN patentpole)*
- O Use independent of position, leakproof
- O Transport without danger of acid leakage
- O Deep discharge protected
- O Reduced ventilation requirements
- O The dimensions are in accordance with DIN 40741, part 1 and DIN 40739. The battery is thus compatible with the *OGi* and OGiV* series.
- O Owing to its compact design higher capacity in standard housing and so far even lower space requirements.
- O The service life is in the floating charge service 10 years.
- O The service life / storage period of these batteries with bonded electrolyte can be around five times longer than that of batteries with liquid electrolytes.
- O Recycling ratio over 95 %

Areas of Application

- O UPS installations
- O Telecommunications systems
- O Signalling equipment
- O Switchgear and controlgear
- O Alarm and fire-alarm systems
- O Building protection systems
- O Protective lighting systems
- O CPS systems and OP ligthing
- O Power supply for buoys and beacons
- O Solar power applications
- O Radio stations

* 6V- and 4 V blocks only

Battery construction

The serie dc plus orientates by the EUROBAT Guide VRB III (high performance use). The grids are made out of a special alloy containing no antimony. The grid structure is designed for low resistance and optimal current distribution. The recipe of the mass and production procedure of the electrodes ensure a good performance in cyclic application and in resistance against deep discharge.

The separators are made out of mats consisting of microscopic glass fibres. The electrolyte is tuned especially to this type of battery.

The program includes seven container sizes. The container and lid are injection moulded out of high-quality reinforced polypropylene. Wall thicknesses between 5 and 6.5 mm ensure that the containers have a high stability, guaranteeing that the plate set will retain its integrity even at an internal pressure of approx. 0.1 bar.

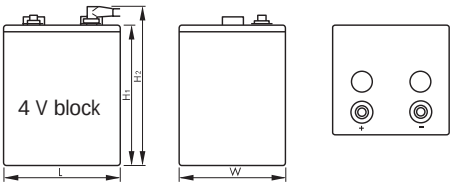
Safety valves built into the lid perform the sole function of protecting the battery in the event of overpressure resulting from faulty charging. The battery is totally sealed, i.e., it is protected against entrance of ambient air.

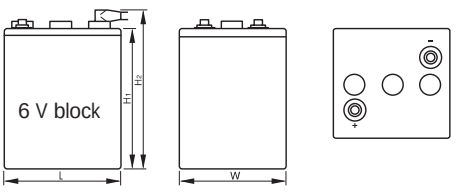
The well proven HAGEN *patentpole** provides for an absolutely tight and corrosion-free pole bushing. Covered flat copper connectors or cableconnectors are used as connection elements.

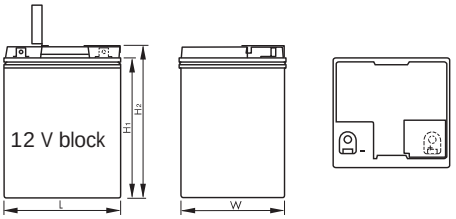
Connectors

80 Ah - 144 Ah, 50 mm² flat-bar copper 25 x 2 mm with covering

196 Ah - 336 Ah, 125 mm² flat-bar copper, 25 x 5 mm with covering







Technical Data – Electrical Characteristic Values

Typ	Capacity (Ah) 10 h	3 h	1 h	1/3 h	1/6 h	Discharge current (A) 10 h	3 h	1 h	1/3 h	1/6 h	Final discharge voltage (V/cell) 10 h	3 h	1 h	1/3 h	1/6 h
dcp 12025	25.0	20.1	17.0	14.3	11.8	2.5	6.7	17.0	42.9	71.1					
dcp 12038	38.0	21.8	25.0	20.6	16.5	3.8	10.6	25.0	62.0	99.0					
dcp 12063	63.0	51.0	43.0	35.3	27.8	6.3	17.0	43.0	106.0	167.0					
dcp 6080	80.0	66.0	53.5	40.0	31.0	8.0	22.0	53.5	120.0	186.0					
dcp 6096	96.0	79.2	64.2	48.0	37.2	9.6	26.4	64.2	144.0	223.2					
dcp 6128	128.0	105.6	85.6	64.0	49.6	12.8	35.2	85.6	192.0	297.6	1.80	1.78	1.74	1.675	1.60
dcp 6144	144.0	118.8	96.3	72.0	55.8	14.4	39.6	96.3	216.0	334.8					
dcp 6196	196.0	165.9	128.8	96.6	76.3	19.6	55.3	128.8	289.8	457.8					
dcp 6252	252.0	213.3	165.6	124.2	98.1	25.2	71.1	165.6	372.6	588.6					
dcp 4308	308.0	260.7	202.4	151.8	119.9	30.8	86.9	202.4	455.4	719.4					
dcp 4336	336.0	284.4	220.8	165.6	130.8	33.6	94.8	220.8	496.8	784.8					

Dimensions and Weights

Type	Volt	Capacity (Ah) C_{10}	Battery dimensions (mm) L	B	H_1	H_2	Battery weight (kg)
dcp 12025	12	25	167	127	242	176	9.7
dcp 12038	12	38	196	166	242	175	14.7
dcp 12063	12	63	272	166	242	190	22.9
dcp 6080	6	80	197	177	242	272	22.5
dcp 6096	6	96	197	177	242	272	25.2
dcp 6128	6	128	282	177	242	272	33.5
dcp 6144	6	144	282	177	242	272	36.2
dcp 6196	6	196	284	230	298	328	51.9
dcp 6252	6	252	284	230	298	328	61.0
dcp 4308	4	308	250	230	298	328	50.5
dcp 4336	4	336	250	230	298	328	53.5

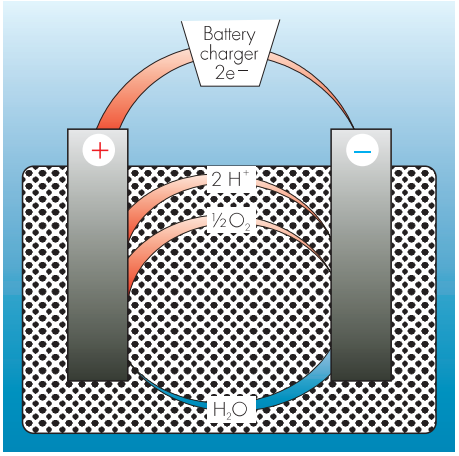
Recombination and how it works!

In lead batteries with a liquid electrolyte, water is decomposed into hydrogen and oxygen gas during charging, especially at its end. These gases escape through the battery cell plugs and have to be replaced by adding water.

In our valve regulated lead acid storage battery, the electrolyte is absorbed in microscopic glass-fibre mats, the pore volume of which is filled up to 90 %.

With a suitable design of the posistive and negative plate capacities, oxygen evolves first at the positive plate during charging. This oxygen can flow through the free pores directly to the negative plate, where it combines with the stream of H^+ ions of the electrolyte and electrons out of the electrode to form water again.

By this procedure the development of hydrogen is almost completely supressed.



The water reaches the positive electrode by means of diffusion. The cycle of decomposition and recombination is closed. Due tho the very low loss of water a refilling of the battery during the life-time is not necessary.

Setting-up of Batteries

Steel stands with Plug-In Elements

The batteries should be set up preferably on floor stands or on multi-tiered stands.

Assembly time has been reduced to a minimum: with the exception of the diagonal braces, the parts do not require any nuts and bolts etc. Owing to the plastic coating and polypropylene insulators, the stands are fully insulated.

The plastic coating (colour grey, RAL 7001*) is an excellent protection against corrosion. At a coating of 0.2 – 0.3 mm dielectric strength up to min. 8 kv is warranted.

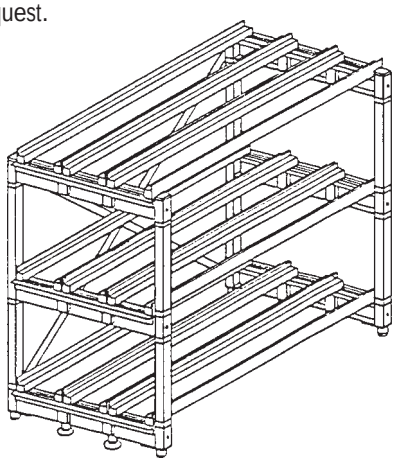
The battery stands are designed in such a way, that a maximal deflection of 2 mm of the beams will not be exceeded.

The width of the battery stands is variable. When installing the battery, a distance of at least 10 mm between the batteries has to be maintained.

It is possible to assemble 6 rows per level at the types *dcp* 6080 – *dcp* 6144 and 5 rows per level at the types *dcp* 6196 – *dcp* 4336 as a maximum. Up to 5 tiers can be assembled. The beams of the battery stands can be delivered in lengths of 600 to 1800 mm (intermediate-grid-length 300 mm). The beams can be assembled together infinitely.

Dimensions, assembling possibilities, weights and prices – arranged according to no. of cells – are all given in our computerized application lists, which are drawn up specifically with your local conditions in mind.

Our drawing program, which is also computer-controlled, is available upon request.



Example: Stand with three tires of three rows each

Steel sheet battery housings

The batteries can be set up inside steel cabinets (IP 20).

Ventilation requirements of battery rooms

Air requirements can be reduced in accordance with VDE 0510, Part 2.7.1., since the plates of the batteries in this series are manufactured without antimony and the cells are sealed.

Example for ventilation requirements:

For IU-charges in standby parallel operation

$Q = 0.05 \cdot n \cdot I \cdot f_1 \cdot f_2 = 0.0125 \cdot n \cdot I$

Q = air flow rate in m^3/h

n = no. of cells

I = charging current

f_1 = 0.5 (for antimony-free cells)

f_2 = 0.5 (for closed cells)

* RAL = Subcommittee for Supply Conditions and Quality Control at the German Standards Committee

Charging Method and Charging Voltage

Only regulated chargers should be used to charge the batteries. The constant charging voltage is 2.27 to 2.30 V/cell at a temperature of 20° C.

A charging voltage which follows the temperature increases the expected life of the battery (see figure 1).

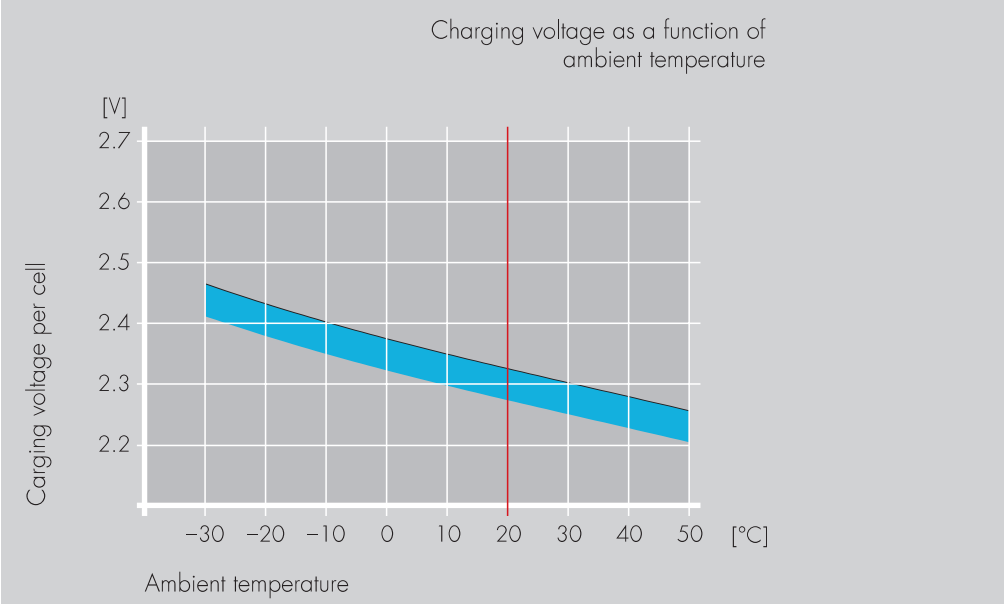


Figure 1

Charging Current

For reasons of economy, the charging current should be 25 Ampere/100 Ah C10 max. up to a cell voltage of 2.4 V/cell at a temperature of 20° C.

Should higher charging currents be required, these are limited at 2.4 V/cell only by the predetermined line cross-section. The charging time is depending on the amount of capacity discharged and the value of the charging current (see figure 2).

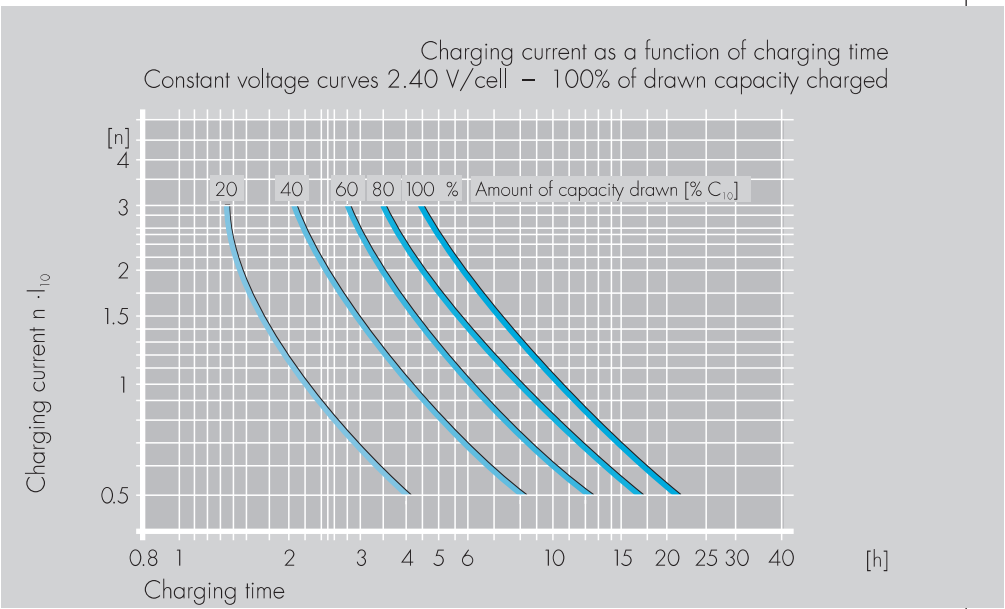


Figure 2

Capacity as a Function of Battery Temperature

Figure 7 shows the capacity which can be discharged related to the battery temperature at several different discharge currents. The capacity ratings given in the type survey are based on a battery temperature of 20 ±2° C (see figure 3).

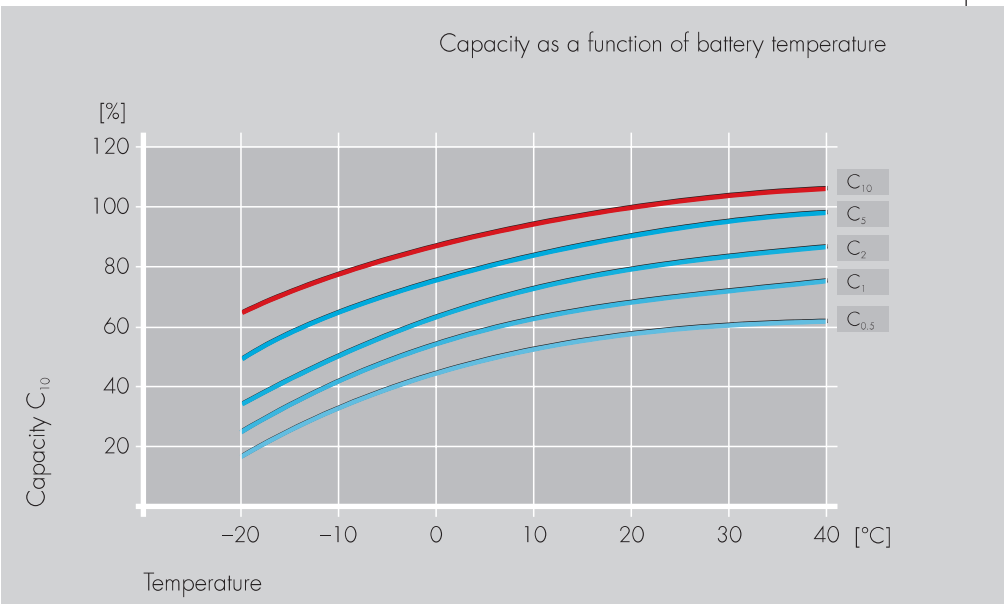


Figure 3

Shelf life

HAGEN dc plus batteries are delivered „filled and charged“. They should be stored in dry rooms at a maximum temperature of 20° C. Figure 4 shows the relationship between shelf life and self-discharge at various ambient temperatures.

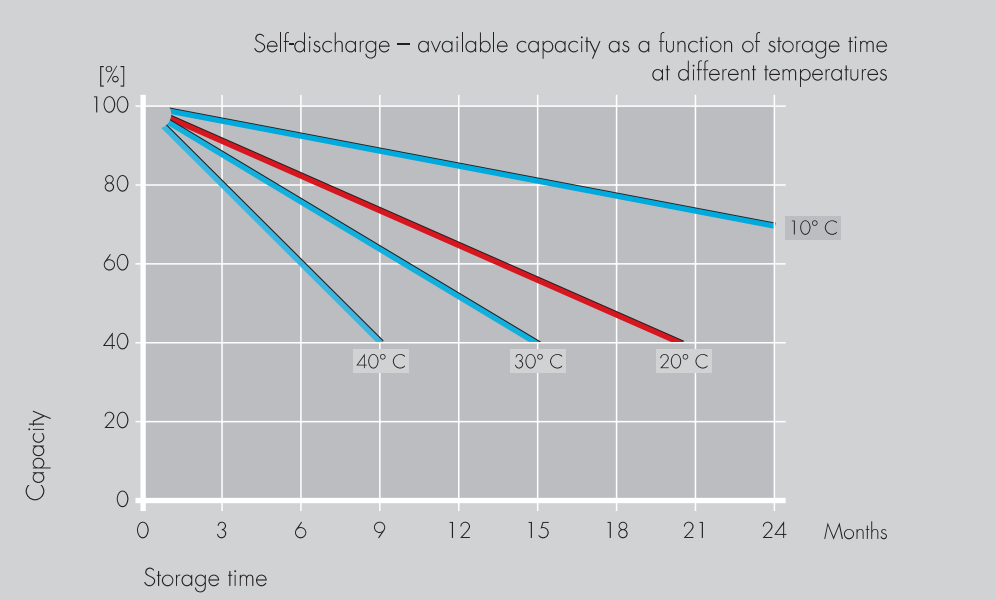


Figure 4

Battery life

The expected life of HAGEN *dc plus* batteries depends mainly on the ambient temperature and the capacity turnover.

In parallel standby operation, particular attention should be paid to the charging voltage as shown in figure 1.

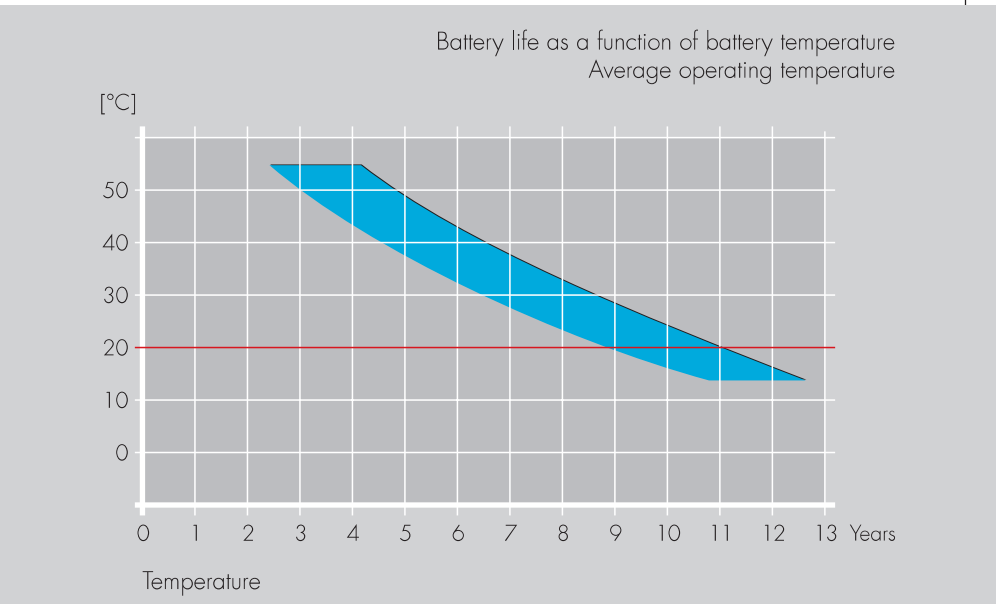


Figure 5

Battery-projecting

The correlation between available capacity and load for constant-current discharge can be seen from picture 6.

The electrical characteristics of the different battery sizes are resulting from this correlation (see page 3).

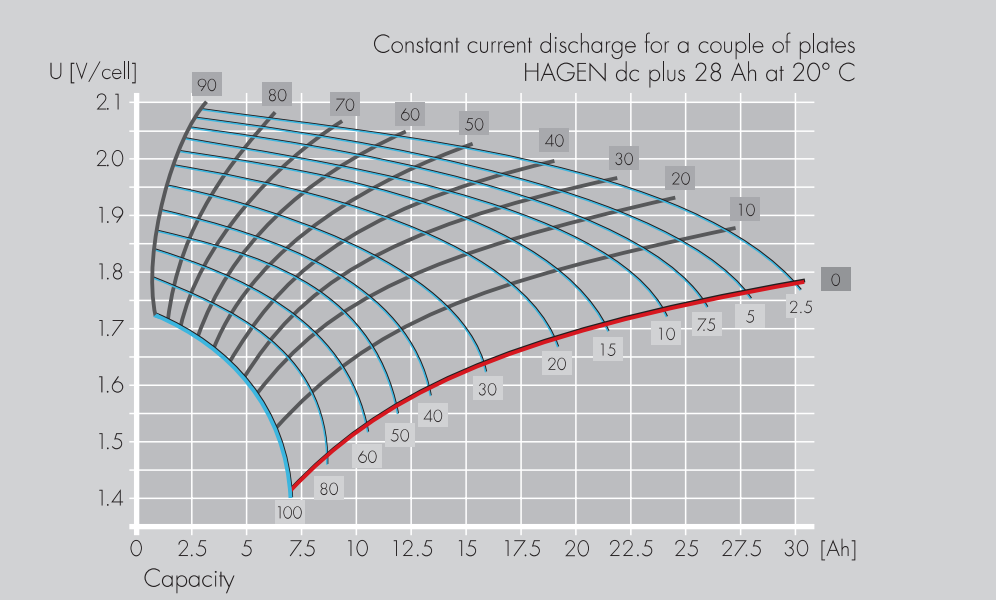


Figure 6