HAGEN Batterie AG

Maintenance-Free Batteries for Stationary Applications

HAGEN *drysafe® compact* (*OGiV*)

HAGEN *drysafe® compact*

acc. to DIN 40741 Part 1 (Draft)

The new stage of development drysafe® compact signifys a maintenance free battery technology in flat grid plate construction.

Water refilling is omitted, the container and lids are heat-sealed and acid proof.

Battery Design

The series HAGEN *drysafe® compact* has been designed by reference to DIN* 40739. As in the HAGEN *compact* series, the design of this battery is based on a grid plate. The grids are made out of a special alloy containing no antimony. The structure of these grids has been optimised with respect to electrical resistance.

The material recipe and process sequences have been designed to attain cycle stability and deep discharge protection.

The electrolyte is immobilised in a gel. The Valve Regulated Lead Acid (VRLA) series *drysafe® compact* has been conceived for application in vertical position.

Scope of capacities:

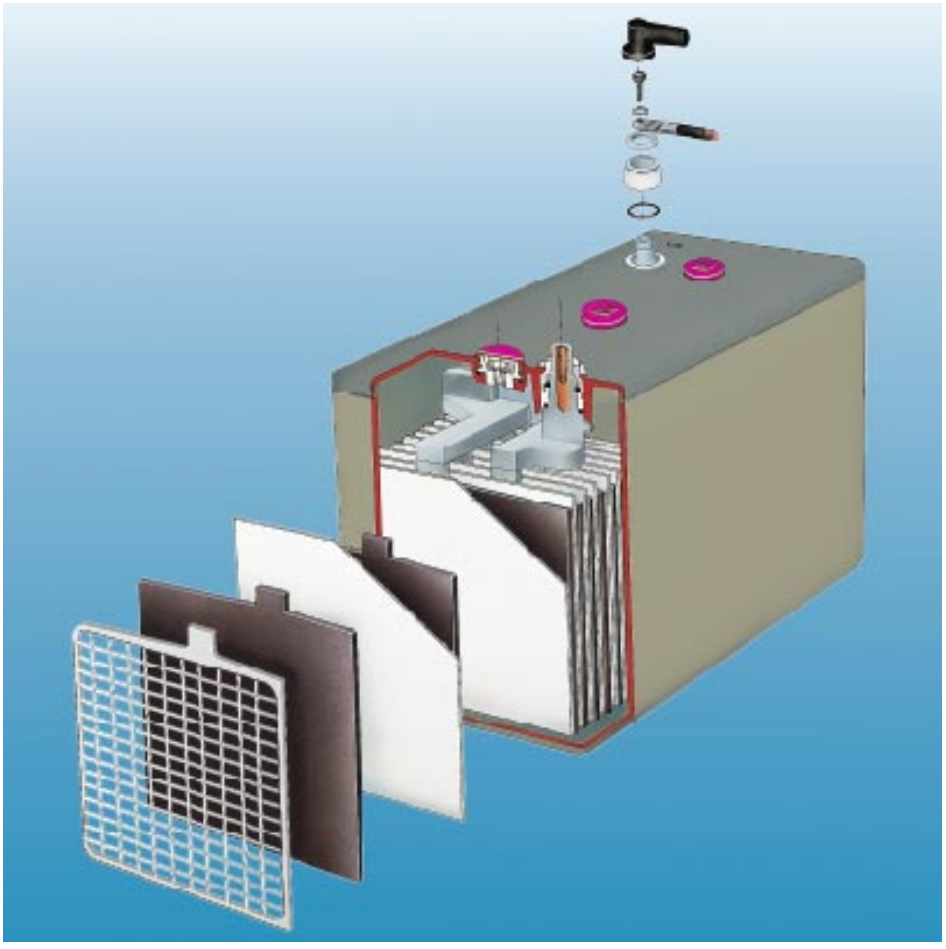
6 V blocks 18 Ahh – 192 Ah C_{10}
4 V blocks 224 Ah + 256 Ah C_{10}

The program includes five case sizes. The case and lid are injection moulded out of high-quality reinforced polypropylene. Wall thicknesses between 5 and 6,5 mm ensure that the cases 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 pressure regulation and protects the battery in case of overpressure, e. g. resulting from faulty charging. Otherwise, the entire battery is totally sealed.

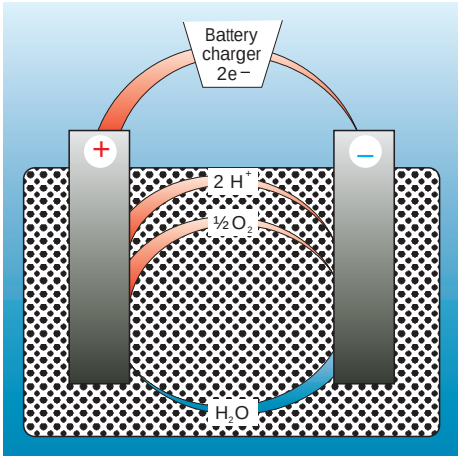
Flexible copper cables serve as the connecting elements for 18Ah and 36 Ah blocks. For 54 Ah blocks up to 256 Ah flexible cable connector or in addition, covered flat-bar copper connectors are employed.

*DIN = German Industrial Standards (Deutsche Industrie Normen)



Subject to technical alterations · DR 257 DD/DW 08.99-002/2/.5/1/1/1
Mat.-Nr. 09906940

Recombination and how it works!



Principle of recombination

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

In our maintenance-free lead-acid storage battery, the electrolyte is fixed in form of gel in connection with additives.

During charging, oxygen first evolves at the positive plate. This oxygen can flow through capillaries directly to the negative plate, where it combines with the stream of H^+ ions and electrons to form water again.

During this process the negative electrode is depolarized; as a result, there is practically no production of hydrogen.

The water reaches the positive electrode by means of diffusion. The cycle of decomposition and recombination is closed. As a result, there is no loss of water within the cell.

Technical advantages

In addition to the important feature of „maintenance-free“, the HAGEN *drysafe®* *compact* has additional advantages to offer:

- transport without danger of acid leakage
- deep discharge protected
- The dimensions are in accordance with DIN / VDE 40739**. The battery is thus compatible with the *OGi* series.
- Owing to its compact design, the battery has even lower space requirements.
- The service life is in float-charge service at 20 °C approx. 12 years.
- The service life / storage period of these batteries with bonded electrolyte can be around five times longer compared with that of batteries with liquid electrolytes.

Areas of Application

- UPS installations
- telecommunications systems
- signalling equipment
- switchgear and controlgear
- alarm and fire-alarm systems
- building protection systems
- emergency lighting systems
- OP lighting and Additional Power Supply systems for Hospitals (acc. to DIN VDE 0107)
- power supply for buoys an beacon light
- solar power applications
- radio stations

** VDE = Society of German Electrical Engineers (Verband Deutscher Elektrotechniker)

Charging Method and Charging Voltage

Only regulated chargers should be used to load the batteries. The constant charging voltage is 2.25 V/cell at a temperature of 20 °C.

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

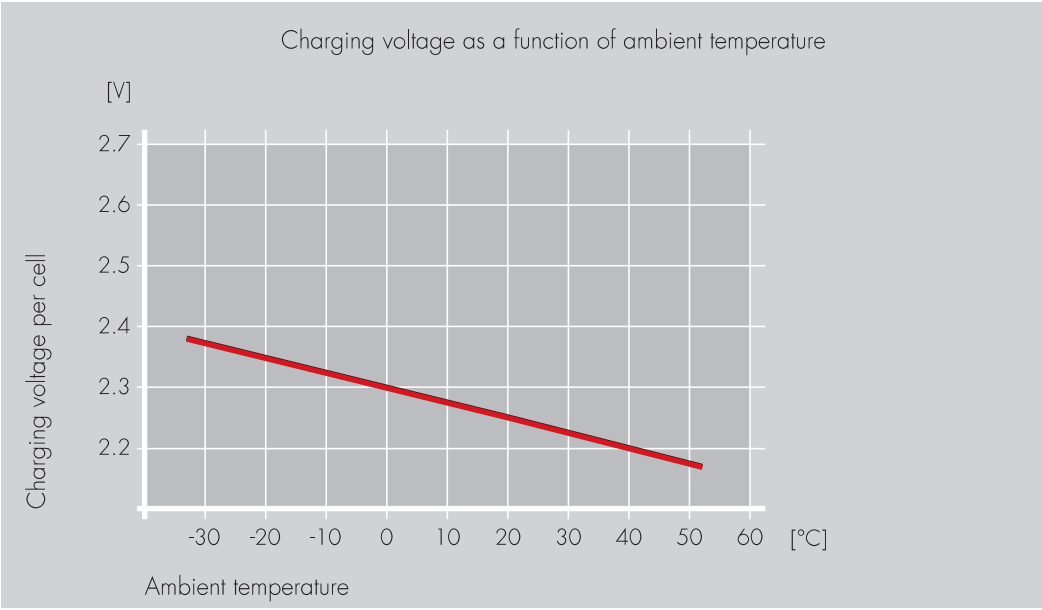


Figure 1

Charging Current

For reasons of economy, the charging current should be max. 25 Ampere / 100 Ah C_{10} up to a cell voltage of 2,4 V/cell at a temperature of 20 °C.

If higher charging currents are required, these are limited up to 2,4 V/cell only by the predetermined connector cross-section. The charging time is dependent on the amount of capacity drawn and the strength of the charging current (see Figure 2).

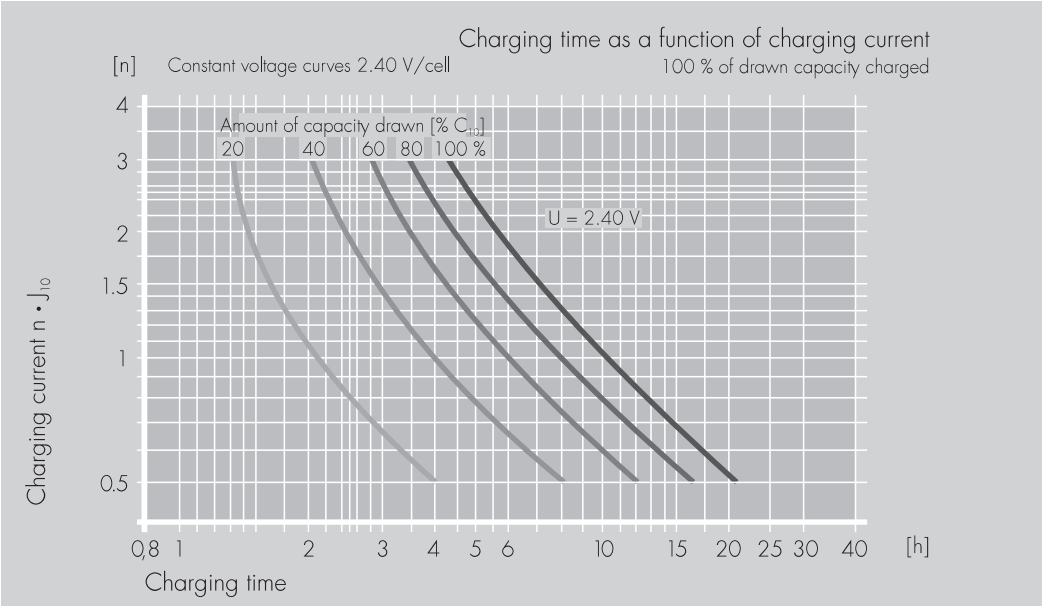


Figure 2

Capacity as a Function of Battery Temperature

Figure 3 shows the capacity which can be drawn as a function of battery temperature for several different discharge currents. The capacity ratings given in the type survey are based on a battery temperature of 20 ±2 °C.

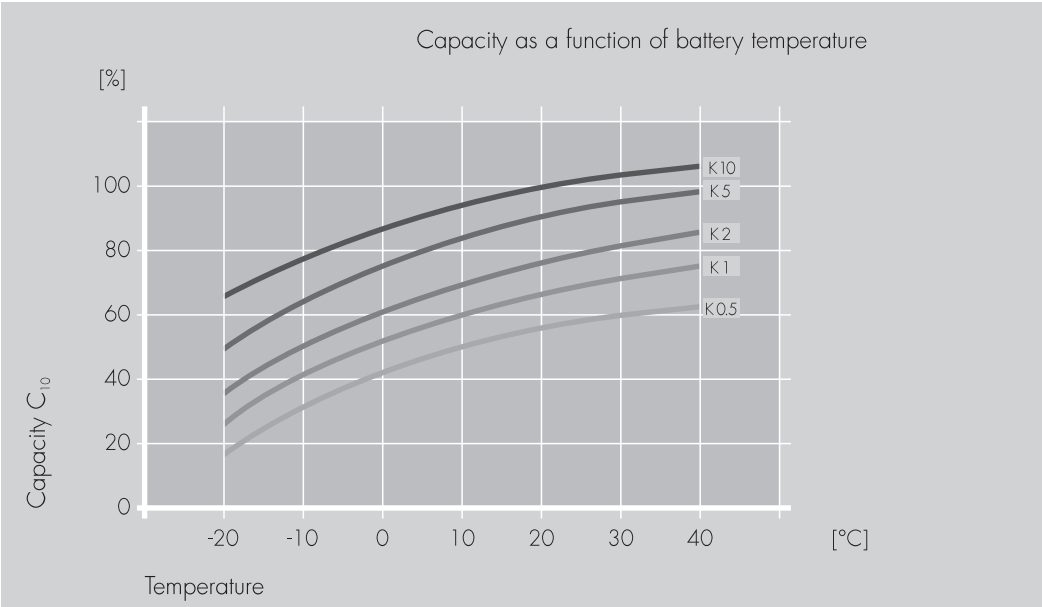


Figure 3

Storage

HAGEN *drysafe® compact* batteries are delivered „filled an charged“. They should be stored in dry rooms at a maximum temperature of 20 °C. Figure 4 shows the relationship between storage time and self discharge at certain ambient temperatures.

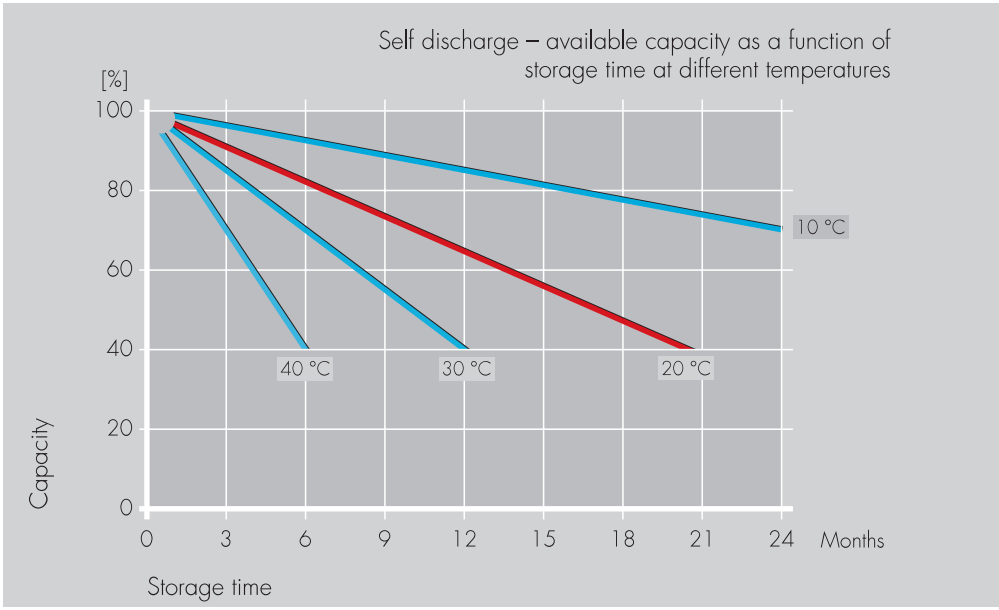


Figure 4

Life Expectancy

The life expectancy of HAGEN *drysafe® compact* depends mainly on the ambient temperature and the capacity throughput.

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

During cyclical operation, the charging voltage should be adjusted to meet the requirements of the specific application (Figure 5 and Figure 6).

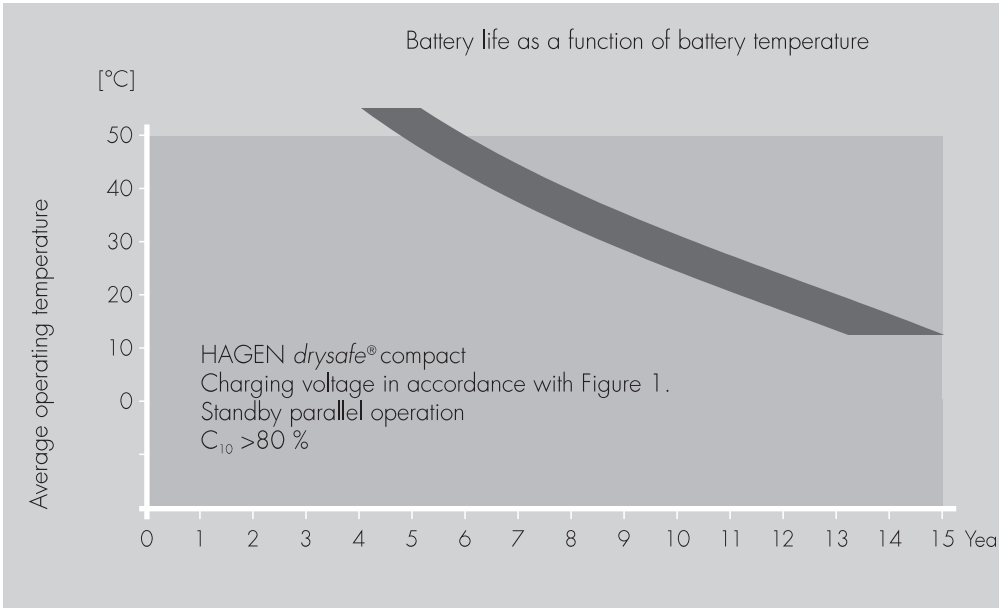


Figure 5

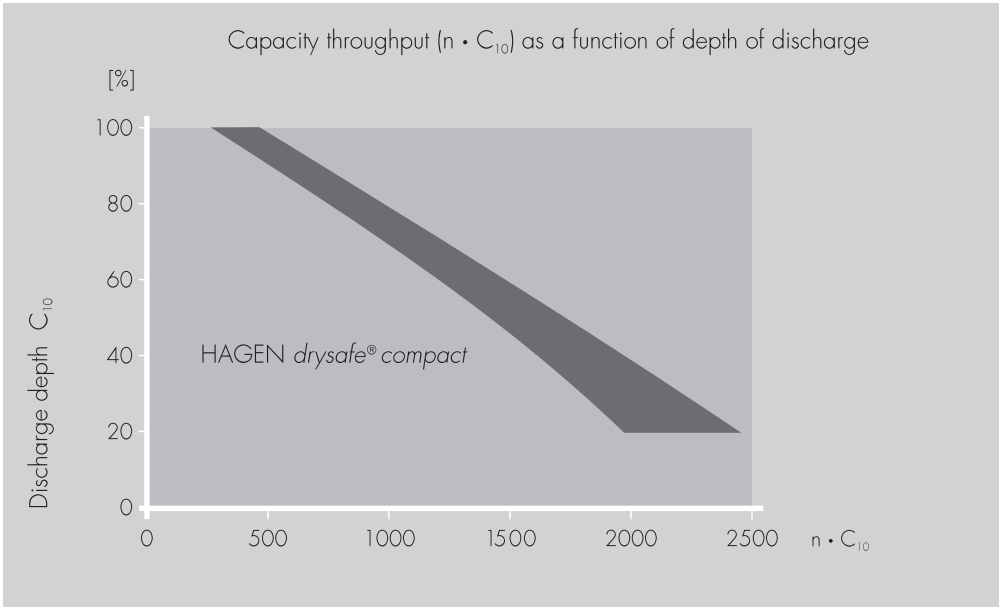


Figure 6

Technical Data

Electrical Characteristics Values

Type	Capacity (Ah)					Discharge current (A)					Final discharge voltage (V / cell)				
	10h	3h	1h	1/3h	1/6h	10h	3h	1h	1/3h	1/6h	10h	3h	1h	1/3h	1/6h
6 V 1 *OGiV* 18	18.0	15.0	12.0	9.0	7.0	1.8	5.0	12.0	27.0	42.0					
6 V 2 *OGiV* 36	36.0	30.0	24.0	18.0	14.0	3.6	10.0	24.0	54.0	84.0					
6 V 3 *OGiV* 54	54.0	45.0	36.0	27.0	21.0	5.4	15.0	36.0	81.0	126.0					
6 V 4 *OGiV* 72	72.0	60.0	48.0	36.0	28.0	7.2	20.0	48.0	108.0	168.0					
6 V 5 *OGiV* 90	90.0	75.0	60.0	45.0	35.0	9.0	25.0	60.0	135.0	210.0					
6 V 6 *OGiV* 108	108.0	90.0	72.0	54.0	42.0	10.8	30.0	72.0	162.0	252.0	1.80	1.78	1.74	1.675	1.60
6 V 4 *OGiV* 128	128.0	108.0	84.0	64.0	50.0	12.8	36.0	84.0	192.0	300.0					
6 V 5 *OGiV* 160	160.0	135.0	105.0	80.0	62.5	16.0	45.0	105.0	240.0	375.0					
6 V 6 *OGiV* 192	192.0	162.0	126.0	96.0	75.0	19.2	54.0	126.0	288.0	450.0					
4 V 7 *OGiV* 224	224.0	189.0	147.0	112.0	87.5	22.4	63.0	147.0	336.0	525.0					
4 V 8 *OGiV* 256	256.0	216.0	168.0	128.0	100.0	25.6	72.0	168.0	384.0	600.0					

Technical Data

Dimensions and Weights

Type	Battery dimensions (mm)				Battery weight
	L	W	H_1	H_2	kg ±5 %
6 V 1 *OGiV* 18	112	177	242	272	8.50
6 V 2 *OGiV* 36	112	177	242	272	11.80
6 V 3 *OGiV* 54	197	177	242	272	17.90
6 V 4 *OGiV* 72	197	177	242	272	21.20
6 V 5 *OGiV* 90	282	177	242	272	27.30
6 V 6 *OGiV* 108	282	177	242	272	30.70
6 V 4 *OGiV* 128	284	230	298	328	41.20
6 V 5 *OGiV* 160	284	230	298	328	46.90
6 V 6 *OGiV* 192	284	230	298	328	52.70
4 V 7 *OGiV* 224	250	230	298	328	42.20
4 V 8 *OGiV* 256	250	230	298	328	46.10

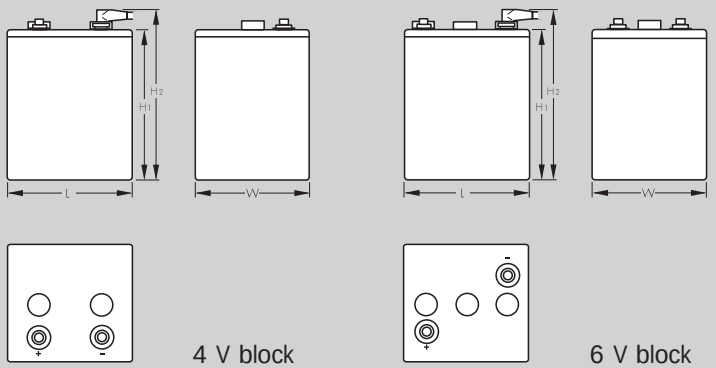
The dimensions are in accordance with DIN 40739.

Connectors

18 Ah und 36 Ah
25 mm² flexible cable connectors

54 Ah bis 108 Ah
50 mm² flat-bar copper
25 x 2 mm with covering

128 Ah bis 256 Ah
125 mm² flat-bar copper
25 x 5 mm with covering



4 V block

6 V block

Internal terminal connection M8 female

Terminal connection:
18 and 36 Ah internal M 5 female
54 to 192 Ah internal M 8 female

Setting-up of Batteries

The batteries should be set up preferably on floor stands or on multi-tiered stands: these racks should consist mainly of plug-in elements. The installation is easy to perform and thus shortens the setting-up time considerably.

If desired, the batteries can also be set up inside closed steel cabinets (IP 20).

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

Example:

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)

Steel stands with Plug-In Elements

– plastic-laminated –

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 of 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.

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.

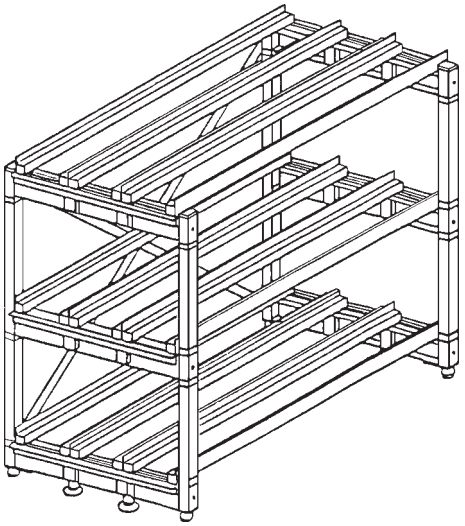
Our drawing program, which is also computer-controlled, is available upon request.

*RAL = Subcommittee for Supply Conditions and Quality Control at the German Standards Committee (Ausschuß für Lieferbedingungen und Gütesicherung beim Deutschen Normenausschuß).

Approved/Licensed:

German PTT, Central Office for Telecommunications in Darmstadt. (West Germany)
E14 · 5B 7686-25 of 14. August 1985.

German Federal Railway Experimental Facility in Munich.
E2/C212 Stwna 62.264 of 31 March 1987



Example: Stand with three tiers of three rows each