

## Lead storage batteries for stationary installations

HAGEN *OCSM*



Source: Siemens AG

# HAGEN OCSM



Cell 6 OCSM 690

The HAGEN OCSM product range is an enhanced development of the HAGEN OPzS series which uses the CSM patent, developed by HAGEN Batterie AG in 1978. This patent, originally created and implemented for propulsion technology, has been successfully adapted for all kinds of traction application and as a further innovational highlight in stand-by operation where remarkable energy transformations or short-term discharges are required.

Main efforts of application are power-plants (approved for use in nuclear power plants) load leveling devices and for back-

up of regenerative energy systems (wind and solar parks).

The major difference, compared to the OPzS, is the use of a copper stretch mesh as the core of the negative electrode. The higher conductivity of copper leads to a lower internal resistance and provides a much better performance at discharge and charge of the battery.

The HAGEN OCSM batteries are complying to DIN 40736, Part 1 for series OPzS but with enhanced capacities resp. energy performances.

## Areas of application

HAGEN OCSM batteries are mainly used when a bridging period of more than an hour is necessary. Apart from the long duration in continuous battery power supply the OCSM-series also provides high cyclical stability.

Main areas of application:

- OP lighting and Additional Power Supply systems for Hospitals (acc. to DIN VDE 0107)
- Telecommunications equipment
- Substations
- UPS systems
- Security lighting systems
- Storage of solar and wind energy
- Back-up power supply units in power plants and nuclear power plants (TÜV Testcertificate TSW-95-01, approval for use in nuclear power plants)

## Battery design

### Plate material and separation

The battery design is based on the use of a copper mesh in the negative electrode. Tried and tested iron-clad (tubular) plate is used for the positive electrode.

The special lead alloy of the positive HAGEN OCSM grid has a level of antimony which is below 3 %. That is why HAGEN OCSM cells are labelled „LA“ (low antimony). Therefore, according to DIN VDE 0510 part 2.71 reduction in ventilation is possible.

The double separation consists of microporous and corrugated separators.

### Cell containers and lids

OCSM cell containers are made from transparent plastic and the cell lids from grey-coloured SAN copolymer. The containers conform – as do the OPzS-cells – to DIN 40736, Part 1.

## Terminals and connectors

HAGEN OCSM cells in plastic containers, from 60 – 3480 Ah, are fitted as standard with the proven HAGEN *patent pole* terminals for reliable sealing of the terminals. The terminals can be supplied either as screw or welded models. The individual cells are connected with insulated flexible copper leads, covered pure lead connectors or lead connectors with a copper core depending on the terminals. The main factor in the choice of connectors is the load of the battery and the application conditions.

## Cell plugs

In the standard models, OCSM cells are supplied with hinge-cap plugs. Extra flame-retardant ceramic funnel plugs according to DIN 40740 are available.

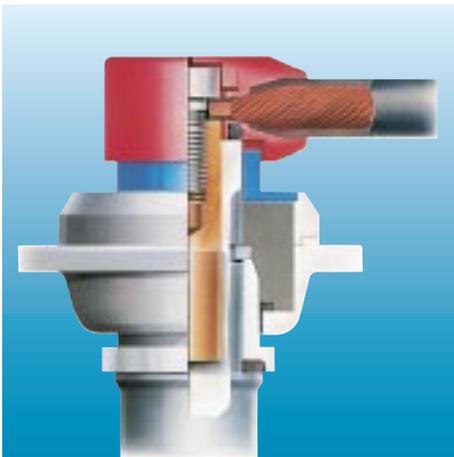
## Advantages

- Optimal voltage level during discharging due to the copper mesh of the negative electrode.
- High efficiency with low losses due to the low internal resistance of the cell.
- Higher cell capacity
- More energy at higher voltage levels during discharge. Higher energy density compared to OPzS-batteries with the same container dimensions.

## Electrolyte and water

According to DIN 43530, part 2 sulphuric acid with a density of 1.24 kg/l at 20° C is to be used for initial filling.

The correct level can be seen from the electrolyte level markings. When charged the acid density is 1.26 ± 0.01 kg/l at 20° C. This is the „nominal electrolyte density“. For replacement of water lost during electrolysis, only water conforming to DIN 43530 part 4 may be used.



HAGEN *patent pole*



Hinge-cap plug



Ceramic plugs/Ceramic funnel plugs

## Service life

The life expectancy for the *OCSM* batteries is equal to the *OPzS* series, i. e. in stand-by parallel operation at 20 °C the service life will be >15 years. The load volume related to the application will of course determine the definite service life.

## Charging

Any charging procedures which comply with DIN 41722 may be used for charging; *OCSM* batteries are operated in stand-by parallel mode and require a float charge voltage of 2.21 to 2.26 V/cell (recommended value 2.25 V/cell).

At this voltage the fully charged condition is maintained. The water consumption caused by electrolyses at this voltage is very low.

## Battery installation

Installation of *OCSM* batteries should be carried out according to DIN VDE 0510, Section 2.

The cells can be installed according to VDE 0510, part 2. in cabinet or on wood/steel racks depending on particular customer requirements or on local conditions.

Our steel racks are essentially composed of plug-in elements which ensures their easy construction and shortens installation time. The mode of installation should guarantee good visual checking. All elements are protected by an electrolyte-proof plastic coating.

The terminals of the batteries are provided with protective caps for transport.

The type of installation should be carefully chosen that the batteries are simple to install and good visual monitoring is possible.

The connection leads should be laid short circuit proof up to the first fuse protection. (VDE 0100, Section 520).

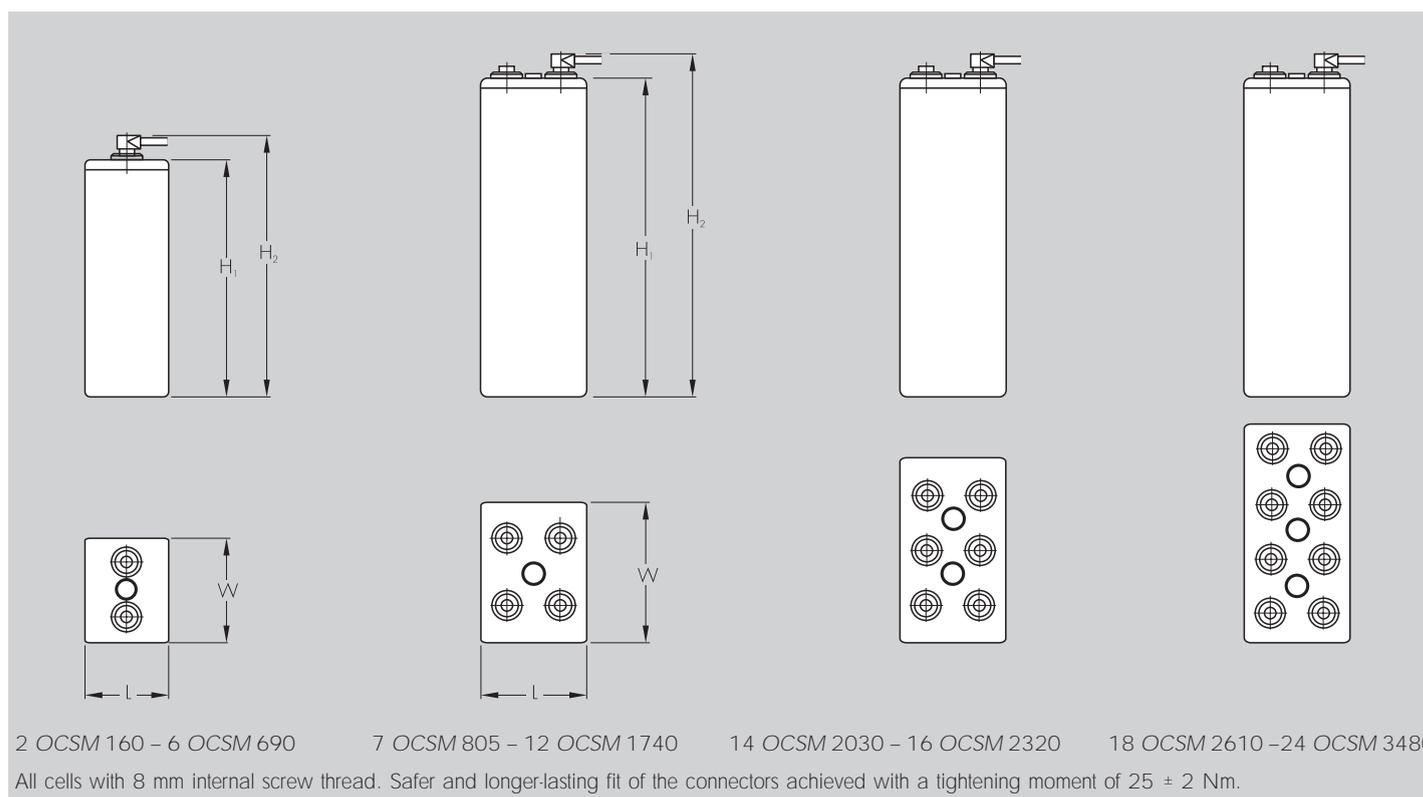
Service access points must have a passage width of at least 50 cm. Conductive battery parts, with a potential of more than 120 V in between, must have a minimum distance of 1,50 m, if no other contact protection is made.

## Characteristic electrical values for *OCSM* cells

Discharge time in h	Capacity at 20 °C in Ah				Discharge rate in A			
	10	5	3	1	10	5	3	1
Discharge voltage in V/cell	1.80	1.77	1.75	1.67	1.80	1.77	1.75	1.67
Cell size								
2 <i>OCSM</i> 160	160.0	140.0	120.0	84.0	16.0	28.0	40.0	84.0
3 <i>OCSM</i> 240	240.0	210.0	180.0	126.0	24.0	42.0	60.0	126.0
4 <i>OCSM</i> 320	320.0	280.0	240.0	168.0	32.0	56.0	80.0	168.0
5 <i>OCSM</i> 400	400.0	350.0	300.0	210.0	40.0	70.0	100.0	210.0
6 <i>OCSM</i> 480	480.0	420.0	360.0	252.0	48.0	84.0	120.0	252.0
7 <i>OCSM</i> 560	560.0	490.0	420.0	294.0	56.0	98.0	140.0	294.0
5 <i>OCSM</i> 575	575.0	500.0	427.5	300.0	57.5	100.0	142.5	300.0
6 <i>OCSM</i> 690	690.0	600.0	513.0	360.0	69.0	120.0	171.0	360.0
7 <i>OCSM</i> 805	805.0	700.0	598.5	420.0	80.5	140.0	199.5	420.0
8 <i>OCSM</i> 920	920.0	800.0	684.0	480.0	92.0	160.0	228.0	480.0
9 <i>OCSM</i> 1035	1035.0	900.0	769.5	540.0	103.5	180.0	256.5	540.0
10 <i>OCSM</i> 1150	1150.0	1000.0	855.0	600.0	115.0	200.0	285.0	600.0
11 <i>OCSM</i> 1265	1265.0	1100.0	940.5	660.0	126.5	220.0	313.5	660.0
12 <i>OCSM</i> 1380	1380.0	1200.0	1026.0	720.0	138.0	240.0	342.0	720.0
11 <i>OCSM</i> 1595	1595.0	1342.0	1188.0	792.0	159.5	268.4	396.0	792.0
12 <i>OCSM</i> 1740	1740.0	1464.0	1296.0	864.0	174.0	292.8	432.0	864.0
14 <i>OCSM</i> 2030	2030.0	1708.0	1512.0	1008.0	203.0	341.6	504.0	1008.0
16 <i>OCSM</i> 2320	2320.0	1952.0	1728.0	1152.0	232.0	390.4	576.0	1152.0
18 <i>OCSM</i> 2610	2610.0	2196.0	1944.0	1296.0	261.0	439.2	648.0	1296.0
20 <i>OCSM</i> 2900	2900.0	2440.0	2160.0	1440.0	290.0	488.0	720.0	1440.0
22 <i>OCSM</i> 3190	3190.0	2684.0	2376.0	1584.0	319.0	536.8	792.0	1584.0
24 <i>OCSM</i> 3480	3480.0	2928.0	2592.0	1728.0	348.0	585.6	864.0	1728.0

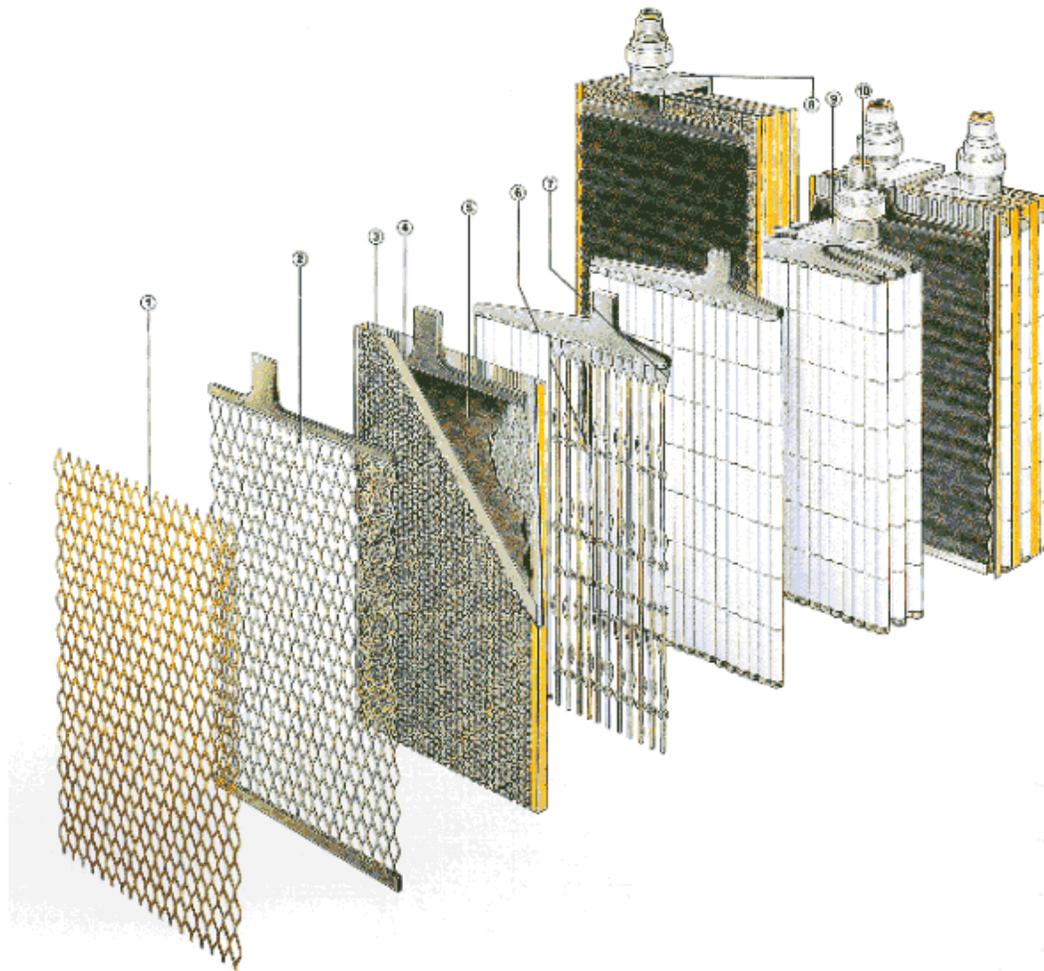
## Measurements and weights of OCSM cells

Type	Length L mm	Width W mm	Height H <sub>1</sub> mm	Height incl. Terminals H <sub>2</sub> mm	Weight		
					dry cell kg	filled cell kg	electro- lyte 1.24 kg/l
2 OCSM 160	124	206	471	522	9.6	17.9	8.3
3 OCSM 240					12.8	20.9	8.1
4 OCSM 320					16.0	23.9	7.9
5 OCSM 400					19.4	26.9	7.5
6 OCSM 480	145	206	471	522	23.4	31.5	8.1
7 OCSM 560	166	206	471	522	27.4	36.1	8.7
5 OCSM 575	145	206	647	698	30.1	41.6	11.5
6 OCSM 690					33.9	44.8	10.9
7 OCSM 805	210	191	647	698	41.5	58.1	16.6
8 OCSM 920					45.3	61.3	16.0
9 OCSM 1035	210	233	647	698	51.7	71.4	19.7
10 OCSM 1150					55.5	74.6	19.1
11 OCSM 1265	210	275	647	698	62.0	84.8	22.8
12 OCSM 1380					65.8	88.0	22.2
11 OCSM 1595	210	275	797	848	80.0	108.7	28.7
12 OCSM 1740					87.0	114.3	27.3
14 OCSM 2030	214	399	773	824	99.7	140.5	40.8
16 OCSM 2320					113.6	151.5	37.9
18 OCSM 2610	214	489	773	824	130.8	182.0	51.2
20 OCSM 2900					144.7	193.0	48.3
22 OCSM 3190	214	579	773	824	161.9	223.5	61.6
24 OCSM 3480					175.8	234.5	58.7



## HAGEN OCSM

### The battery with the copper-electrode



- ① Copper stretched grid *OCSM*
- ② Negative, lead-coated *OCSM* grid
- ③ Perforated, corrugated envelope separator
- ④ Microporous separator
- ⑤ Negative plate
- ⑥ Positive iron-clad (tubular) grid
- ⑦ Positive iron-clad plate
- ⑧ Negative plate set *OCSM*
- ⑨ Positive plate set
- ⑩ *Patentpol*