



HAGEN Batterie AG 

Lead storage batteries for stationary installations

HAGEN *GroE*



HAGEN GroE

This battery design is distinguished by the highest levels of reliability and operating safety. High voltage levels during high current discharge and high levels of consistency in the electrical specifications throughout its life are other attributes.

GroE single cells are in accordance to DIN 40738 and cover a capacity range from 75 to 2600 Ah. Practical capacity grading within the types series ensure an optimum match for all area of application.

Low maintenance properties are ensured due to absence of antimony in the positive plate.

Areas of application

The main areas of application for this powerful, reliable and long-lasting design are:

- back-up power supply units in power plants and nuclear power plants.
- computer power supplies

- power supply units for sub-stations
- back-up power supply units for process computers
- starter batteries for diesel generators
- signalling equipment
- emergency lighting systems

Battery design

Plate material and separation

The positive plates are made from pure lead. In order to increase the contact surface between acid and plate the plate surface is enlarged by a lamella structure (Planté plate). The negative plates are made from a hard lead pasted mesh with an active substance. A double separation design is employed consisting of micro-porous separators and corrugated separators.

This separation produces very little resistance which has a positive effect on the voltage level of the cells.

Cell containers and lids

The cell containers are fabricated from transparent, electrolyte-resistant plastic (SAN). Widthways they have a bar-like extension as a support for the suspended positive plates. In the entire cell range 8 different cell container sizes are available. The grey-coloured cell lids are sealed on all sides.

Terminals and connectors

HAGEN-GroE cells (DIN 40738) are fitted with HAGEN *patentpol* terminal which ensure durable seals around the terminals. The advantages of the HAGEN *patentpol* terminal speak for themselves:

- Transition resistance due to creeping acid round screw connectors, or even disturbances to the current conduction are avoided
- Perfect electrical connections
- Increased protection for the copper inlays in connectors and terminals

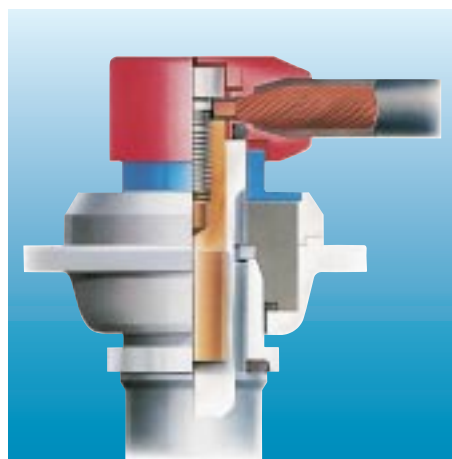
The terminals can be supplied either as screw or welded models.

Talk to the experts at our branches about the advantages of the HAGEN *patentpol* terminal.

Depending on the terminal fittings the individual cells are connected with insulated, flexible copper leads or covered welded connections.



Single cells



HAGEN *patentpol*



Flexible screw-type cable connector



Cell plugs

In the standard models *GroE* cells are supplied with hinge-cap plugs. The cells can, however, also be supplied with flame-retardant ceramic funnel plugs. The major advantages of these plugs are:

- The maintenance opening and the gas chamber of the cells are always kept apart
- Measuring the electrolyte density and refilling with purified water can be performed without removing the plug or opening the lid
- Escape of electrolyte vapour is prevented



Hinge-cap plug



Ceramic plugs/Ceramic funnel plugs

Electrolyte and water

The cells are filled with an electrolyte of diluted sulphuric acid. At the nominal level (upper electrolyte marking) and an electrolyte temperature of 20 °C the charged cells have an electrolyte density of 1.22 kg/l ± 0.01 kg/l (nominal electrolyte density).

Water lost through electrolysis must only be replaced by purified water conforming to DIN 43530 Part. 4.

Charging

All charging processes conforming to DIN 41772 and DIN 41773 can be used. In continuous battery power supply operation *GroE* batteries are operated with a maintenance charge voltage of 2.20 – 2.25

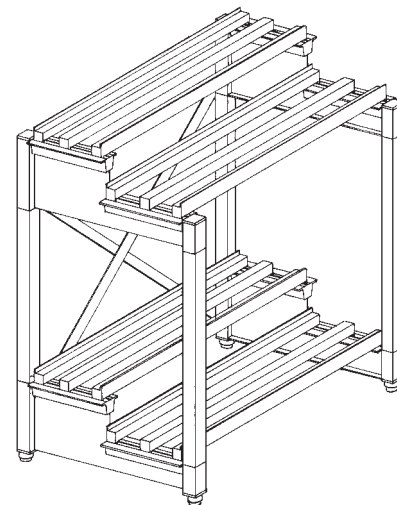
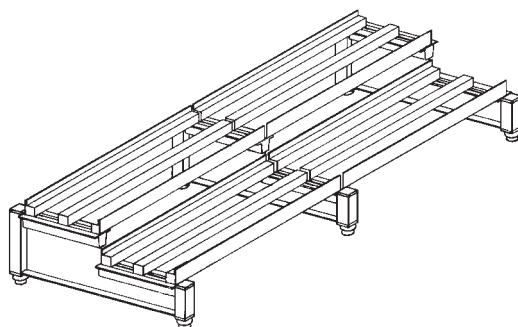
V/cell (optimum value 2.23 V/cell). The fully charged status is maintained at this voltage. Water loss through electrolysis is very low at this voltage.

Battery installation

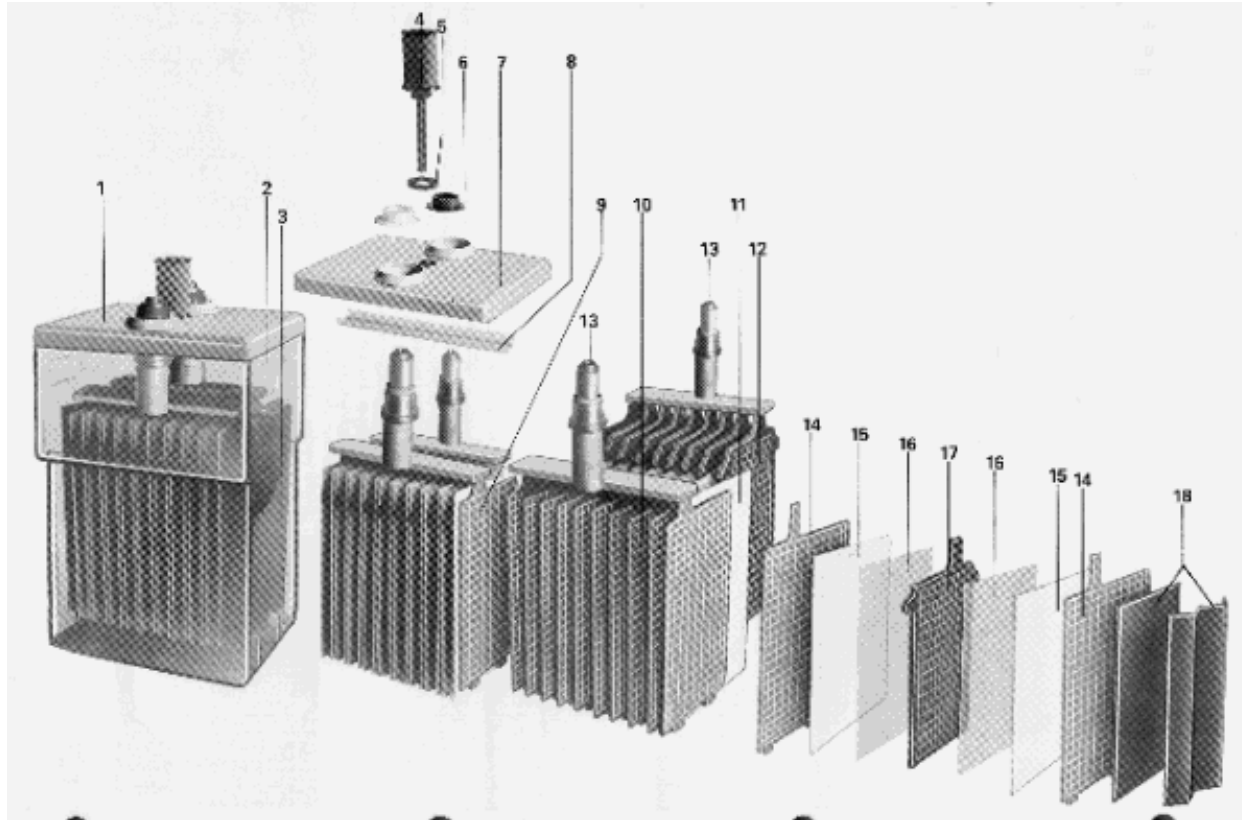
Whilst taking clients' demands and local conditions into consideration, *GroE* cells can only be installed (in accordance with VDE 0510 Part 2) either in battery cabinets or mounted on steel or wooden stands. Both our wooden and steel stands consist basically of plug-in elements making construction easier and reducing assembly time. Ease of installation and overall visibility should be the guiding principles for installing the cells.

Earthquake safety

Special stand design ensures that the efficiency of the batteries is not affected by seismic vibrations or constant mechanical vibration. These are made from steel and the shock absorbing elements guarantee safe storage of the batteries.



GroE single cell conforming to DIN 40 738



- 1 Complete cell 9 GroE 225
- 2 Cell container made from transparent plastic
- 3 Prism
- 4 Ceramic funnel plug
- 5 Gasket
- 6 Identifying discs
- 7 Cell lid
- 8 Baffle
- 9 Block of plates
- 10 Negative plat section
- 11 Separation
- 12 Positive plate section
- 13 HAGEN patentpol terminal
- 14 Negative mesh plate
- 15 Microporous separator
- 16 Corrugated separator
- 17 Positive formed plate
- 18 End plates

Subject to technical alterations · DR 407 DD/DW 03 99 000 5 / 5
Mat.-Nr. 09906430



Technical data

Characteristic electrical values for 25 Ah plate GroE cells

Discharge time in h Discharge voltage in V/cell	Capacity at 20 °C in Ah						Discharge rate in A						Charging current in A from 2,4 V/cell	
	10	5	3	1	1/2	1/6	10	5	3	1	1/2	1/6	start	finish
	1.8	1.79	1.78	1.74	1.70	1.60	1.8	1.79	1.78	1.74	1.70	1.60		
Cell size														
3 GroE 75	75	69	64	50.0	40.0	26.0	7.5	13.8	21.3	50	80	156	10	5
4 GroE 100	100	92	85	66.5	53.5	34.5	10	18.4	28.3	66.5	107	207	14	7
5 GroE 125	125	115	106	83.0	66.5	43.5	12.5	23	35.3	83	133	261	17	8.5
6 GroE 150	150	138	128	99.5	80.0	52.0	15	27.6	42.7	99.5	160	312	20	10
7 GroE 175	175	161	149	116.0	93.5	60.5	17.5	32.2	49.7	116	187	363	24	12
8 GroE 200	200	184	170	133.0	107.0	69.5	20	36.8	56.7	133	214	417	28	14
9 GroE 225	225	207	192	149.0	120.0	78.0	22.5	41.4	64	149	240	468	32	16
10 GroE 250	250	230	213	166.0	133.0	86.5	25	46	71	166	266	519	34	17
11 GroE 275	275	253	234	183.0	147.0	95.5	27.5	50.6	78	183	294	573	37	18.5
12 GroE 300	300	276	256	199.0	160.0	104.0	30	55.2	85.3	199	320	624	42	21
13 GroE 325	325	299	277	216.0	173.0	113.0	32.5	59.8	92.3	216	346	678	44	22
14 GroE 350	350	322	298	232.0	187.0	121.0	35	64.4	99.3	232	374	726	48	24
15 GroE 375	375	345	320	249.0	200.0	130.0	37.5	69	106.6	249	400	780	51	25.5
16 GroE 400	400	368	341	266.0	213.0	139.0	40	73.6	113.6	266	426	834	56	28
17 GroE 425	425	391	362	282.0	227.0	147.0	42.5	78.2	120.7	282	454	882	60	30
18 GroE 450	450	414	383	299.0	240.0	156.0	45	82.8	127.7	299	480	936	63	31.5

Characteristic electrical values for 100 Ah plate GroE cells

Cell size														
5 GroE 500	500	458	415	310	240	138	50	91.6	138.3	310	480	828	70	35
6 GroE 600	600	549	498	372	288	165	60	109.8	166	372	576	990	84	42
7 GroE 700	700	640	581	434	336	192	70	128	193.7	434	672	1152	98	49
8 GroE 800	800	732	664	496	384	220	80	146.4	221.3	496	768	1320	112	56
9 GroE 900	900	824	747	558	432	248	90	164.8	249	558	864	1488	126	63
10 GroE 1000	1000	915	830	620	480	275	100	183	276.6	620	960	1650	140	70
11 GroE 1100	1100	1006	913	682	528	302	110	201.2	304.3	682	1056	1812	154	77
12 GroE 1200	1200	1098	996	744	574	330	120	219.6	332	744	1152	1980	168	84
13 GroE 1300	1300	1190	1079	806	624	358	130	238	359.7	806	1248	2148	182	91
14 GroE 1400	1400	1281	1162	868	672	385	140	256.2	387.3	868	1344	2310	196	98
15 GroE 1500	1500	1372	1245	930	720	412	150	274.4	415	930	1440	2472	210	105
16 GroE 1600	1600	1464	1328	992	768	440	160	292.8	442.7	992	1536	2640	224	112
17 GroE 1700	1700	1556	1411	1054	816	468	170	311.2	470.3	1054	1632	2808	238	119
18 GroE 1800	1800	1647	1494	1116	864	495	180	329.4	498	1116	1728	2970	252	126
19 GroE 1900	1900	1738	1577	1178	912	522	190	347.6	525.7	1178	1824	3132	266	133
20 GroE 2000	2000	1830	1660	1240	960	550	200	366	553.3	1240	1920	3300	280	140
21 GroE 2100	2100	1922	1743	1302	1008	578	210	384.4	581	1302	2016	3468	294	147
22 GroE 2200	2200	2013	1826	1364	1056	605	220	402.6	608.7	1364	2112	3630	308	154
23 GroE 2300	2300	2104	1909	1426	1104	632	230	420.8	636.3	1426	2208	3792	322	161
24 GroE 2400	2400	2196	1992	1488	1152	660	240	439.2	664	1488	2304	3960	336	168
25 GroE 2500	2500	2288	2075	1550	1200	688	250	457.6	691.7	1550	2400	4128	350	175
26 GroE 2600	2600	2379	2158	1612	1248	715	260	475.8	719.3	1612	2496	4290	364	182

Nominal electrolyte density 1.22 kg/l at 20 °C. Greater capacities can be attained by connecting the cells in parallel.



Technical data

Measurements, weights and connections 25 Ah plate *GroE* cells

Type	Length mm	Width mm	Height mm	Height incl. terminals mm	Weight	
					Cell weight with acid kg	acid weight d = 1.22 kg/l kg
3 <i>GroE</i> 75	182	153	364	388	17.5	6.6
4 <i>GroE</i> 100	182	153	364	388	19.7	6.4
5 <i>GroE</i> 125	182	153	364	388	21.9	6.2
6 <i>GroE</i> 150	182	153	364	388	24.1	6.0
7 <i>GroE</i> 175	182	153	364	388	26.3	5.8
8 <i>GroE</i> 200	182	228	364	388	33.2	9.4
9 <i>GroE</i> 225	182	228	364	388	35.4	9.2
10 <i>GroE</i> 250	182	228	364	388	37.6	9.0
11 <i>GroE</i> 275	182	228	364	388	39.8	8.8
12 <i>GroE</i> 300	182	228	364	388	42.0	8.6
13 <i>GroE</i> 325	182	338	364	388	52.5	14.1
14 <i>GroE</i> 350	182	338	364	388	54.7	13.8
15 <i>GroE</i> 375	182	338	364	388	56.9	13.6
16 <i>GroE</i> 400	182	338	364	388	59.1	13.3
17 <i>GroE</i> 425	182	338	364	388	61.3	13.0
18 <i>GroE</i> 450	182	338	364	388	63.5	12.7

Poleterminal for bolted connectors: M8 female, torque 25 Nm ±1 Nm



Technical data

Measurements, weights and connections 100 Ah plate *GroE* cells

Type	Length mm	Width mm	Height mm	Height incl. terminals mm	Weight	
					Cell weight with acid kg	Acid weight d = 1.22 kg/l kg
5 <i>GroE</i> 500	328	268	542	567	95	34
6 <i>GroE</i> 600	328	268	542	567	104	33
7 <i>GroE</i> 700	328	268	542	567	113	32
8 <i>GroE</i> 800	328	268	542	567	122	31
9 <i>GroE</i> 900	328	268	542	567	131	30
10 <i>GroE</i> 1000	328	268	542	567	140	29
11 <i>GroE</i> 1100	328	268	542	567	149	28
12 <i>GroE</i> 1200	328	348	542	567	170	39
13 <i>GroE</i> 1300	328	348	542	567	179	38
14 <i>GroE</i> 1400	328	348	542	567	188	37
15 <i>GroE</i> 1500	328	348	542	567	197	36
16 <i>GroE</i> 1600	328	438	542	567	222	49
17 <i>GroE</i> 1700	328	438	542	567	231	48
18 <i>GroE</i> 1800	328	438	542	567	240	47
19 <i>GroE</i> 1900	328	438	542	567	249	46
20 <i>GroE</i> 2000	328	438	542	567	258	45
21 <i>GroE</i> 2100	328	528	542	567	285	58
22 <i>GroE</i> 2200	328	528	542	567	294	57
23 <i>GroE</i> 2300	328	528	542	567	303	56
24 <i>GroE</i> 2400	328	528	542	567	312	55
25 <i>GroE</i> 2500	328	573	542	567	325	60
26 <i>GroE</i> 2600	328	573	542	567	334	59

Poleterminal for bolted connectors: M8 female, torque 25 Nm ±1 Nm

