



**GRANIT**  
QUALITY PARTS

**POWERFUL  
BATTERIES**





In the fast lane whatever the season with batteries from GRANIT.

There is a battery for every application. When choosing the right one, battery technology also plays an important role. With the GRANIT battery range, specialist dealers can choose from OEM-quality batteries of all types.

**Endurance Line SLI batteries:** tried and tested, long-lasting wet cell batteries for all standard start applications. The long service life resulting from their low self-discharge means that these batteries can be stored for long periods. This is particularly advantageous for specialist dealers. The Endurance Line batteries from GRANIT are also maintenance-free over their entire service life, and boast excellent cold start performance.

**EFB batteries:** EFB batteries (enhanced flooded batteries) are an improved and performance-optimised version of wet cell batteries. These batteries are improved as a result of two elements. The mixing element uses the movement of the vehicle to constantly mix the acid and prevent acid stratification. As a result, the current can be absorbed evenly during charging and delivered quickly and reliably when starting. It also reduces sulphation at low charge. The second element is a fleece that protects the lead plates in order to increase vibration resistance.

**AGM batteries:** AGM stands for absorbent glass mat. The electrolyte in these batteries is bound in a glass fibre fleece to prevent acid stratification. AGM batteries have low internal resistance which reduces the risk of self-discharge. This means that they maintain sufficient capacity for the next start, even over a longer service life. The AGM batteries from GRANIT remain reliable even at extreme temperatures that would result in discharge and a loss of capacity in standard starter batteries.

**Supply batteries:** GRANIT supply batteries are ideal for providing a reliable power supply. They make power-intensive day-to-day work with lifting platforms and electric forklifts a breeze, and can be used to store power in solar-powered systems. They also ensure continuous power output. It should be noted, however, that supply batteries should never be discharged to their limits, as deep discharge would reduce their service life.

**Deep cycle batteries:** wet cell batteries specially designed for small 6, 8 or 12 V traction (supply) applications such as golf carts or cleaning machines. Thanks to the reinforced mesh plates for special resistance to deep discharge, they allow optimal use of the capacity as well as long-term use over many charging cycles. The negative plate is made of 99.9% pure lead with special additives for applications requiring deep discharges.

**Quad bike/ATV batteries:** the shape, dimensions and performance of these batteries have been specially designed to meet the requirements of quad bikes and all-terrain vehicles. Thanks to the AGM technology, they meet or exceed all vehicle manufacturer specifications.

CIRCUIT		TERMINAL TYPE				
<div>0</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>9</div>		<div>①</div> <div><math>\varnothing 19,5-0,3</math></div> <div>18<math>\frac{0}{1}</math></div> <div></div>	<div>③</div> <div><math>\varnothing 12,7-0,2</math></div> <div>18<math>\frac{0}{1}</math></div> <div></div>	<div>④</div> <div>7 <math>\varnothing</math> max.</div> <div>8,5<math>\frac{0}{-0,3}</math></div> <div>15 max.</div> <div></div>	<div>⑤</div> <div>12max.</div> <div>6 <math>\varnothing</math> max.</div> <div>11 max.</div> <div>7 max.</div> <div></div>	<div>⑰</div> <div>44<math>\pm 0,5</math></div> <div>10</div> <div>7</div> <div>15</div> <div>06,5</div> <div>016,9<math>\pm 0,2</math></div> <div>18,5</div> <div>22<math>\frac{0}{-0,2}</math></div> <div>15,5</div> <div></div>
<b>BOTTOM BAR</b>		<b>B00: smooth (without base/bottom bar)</b>				
<div>B01:</div> <div></div>	<div>B03:</div> <div></div>		<div>B09:</div> <div></div>		<div>B13:</div> <div></div>	
	<div>B04:</div> <div></div>		<div>B10:</div> <div></div>		<div>B11:</div> <div></div>	



ENDURANCE LINE SLI BATTERIES



Part no.	ETN	Nominal voltage (V)	Capacity (Ah)	Cold cranking current (A)	Bottom bar	Circuit	Terminal type	Dimensions L x W x H (mm)
5796U1L9	-	12	24	250	B00	1	Flat terminal	195 x 130 x 183
5796U1R9	-	12	24	250	B00	0	Flat terminal	195 x 130 x 183
57963030	-	12	30	290	B00	1	Flat terminal	195 x 130 x 183
57963034	-	12	30	290	B00	0	Flat terminal	195 x 130 x 183
58553520G	535020024	12	35	270	B00	0	3	187 x 127 x 226
58553522G	535022027	12	35	270	B00	1	3	187 x 127 x 226
57953032	-	12	38	-	-	1	Round terminal	220 x 135 x 180
5850010100	-	12	40	350	B03	0	1	175 x 175 x 190
58554320G	543020042	12	44	420	B03 / B04	0	1	207 x 175 x 175
58554464G	544064035	12	44	350	B03	1	1	207 x 175 x 190
58554577G	-	12	45	370	B01	0	1	238 x 129 x 225
5850010102	-	12	45	400	B13	0	1	207 x 175 x 190
5850010105	-	12	45	300	B01	0	1	220 x 135 x 225
5850010106	-	12	45	300	B01	1	1	220 x 135 x 225
58554577G	545077037	12	45	370	B01	0	1	238 x 129 x 225
58554551G	545051037	12	45	370	B00	1	3	238 x 129 x 225
58554579G	545079037	12	45	370	B01	1	1	238 x 129 x 225
58554584G	545084037	12	45	370	B00	0	3	238 x 129 x 225
58555041G	550041037	12	50	370	B00	0	1	202 x 173 x 225
58555042G	550042037	12	50	370	B00	1	1	202 x 173 x 225
5850010103	-	12	52	470	B13	0	1	207 x 175 x 190
58555459G	554059051	12	56	510	B03 / B04	0	1	242 x 175 x 175

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.

Part no.	ETN	Nominal voltage (V)	Capacity (Ah)	Cold cranking current (A)	Bottom bar	Circuit	Terminal type	Dimensions L x W x H (mm)
58556068G	560068047	12	60	470	B00	0	1	232 x 173 x 225
58556069G	560069047	12	60	470	B00	1	1	232 x 173 x 225
58556219G	562019048	12	62	480	B03	0	1	242 x 175 x 190
5850010108	-	12	64	610	B13	0	1	242 x 175 x 190
58556318G	570144064	12	68	580	B03 / B04	0	1	278 x 175 x 175
58557024G	570024056	12	70	560	B09	1	1	269 x 174 x 226
58557029G	570029056	12	70	560	B09	0	1	269 x 174 x 226
58557219G	572019058	12	72	580	B03 / B04	1	1	278 x 175 x 190
58557412G	574012065	12	74	650	B03 / B04	0	1	278 x 175 x 175
5850010097	-	12	78	660	B03	1	1	277 x 175 x 190
58557820G	578020066	12	78	660	B03 / B04	0	1	278 x 175 x 190
58558035G	580035073	12	80	730	B03	0	1	315 x 175 x 175
5850010098	-	12	80	660	B03	0	1	315 x 175 x 190
58558838G	588038068	12	90	770	B03 / B04	0	1	353 x 175 x 175
58559226G	585015076	12	95	810	B03 / B04	0	1	353 x 175 x 175
5850010042	600123072	12	95	760	B03	0	1	315 x 175 x 190
58560032G	590032068	12	100	780	B01	0	1	303 x 173 x 225
58560033G	600033068	12	100	780	B01	1	1	303 x 173 x 225
58560525G	600025083	12	100	830	B00	0	1	410 x 175 x 235
58560038G	600038085	12	100	850	B03 / B04	0	1	353 x 175 x 190
5850010107	-	12	100	720	B13	0	1	313 x 175 x 205
5850010038	-	12	100	850	B03	1	1	353 x 175 x 190

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ENDURANCE LINE SLI BATTERIES

EFB BATTERIES



Part no.	ETN	Nominal voltage (V)	Capacity (Ah)	Cold cranking current (A)	Bottom bar	Circuit	Terminal type	Dimensions L x W x H (mm)
585C31102	-	12	100	800	B00	9	1	330 x 173 x 240
58560527G	605027083	12	105	800	B00	1	1	346 x 176 x 233
58560528G	605028083	12	105	800	B00	0	1	346 x 176 x 233
5850010111	-	12	110	850	B03	0	1	347 x 175 x 220
58561040G	610040080	12	110	800	B03	3	1	513 x 175 x 210
5850010101	-	12	115	820	B00	0	1	346 x 176 x 233
585C31102HD	-	12	120	1000	B00	9	1	330 x 173 x 240
5850010110	-	12	120	680	B00	3	1	513 x 189 x 215
5850010112	-	12	120	760	B03	4	1	510 x 175 x 235
5850010043	-	12	120	1000	B00	1	1	330 x 173 x 240
5850010109	-	12	125	720	B00	0	1	345 x 172 x 285
58564035G	640035095	12	140	950	B00	3	1	513 x 189 x 223
5850010077	-	12	143	900	B01	0	1	508 x 174 x 205
58564323G	643023091	12	143	910	B03	3	1	513 x 175 x 210
58564317G	635017095	12	160	950	B00	3	1	513 x 222 x 220
58568032G	680032105	12	180	1050	B00	3	1	513 x 222 x 220
5850010022	680033110	12	180	1100	B03	4	1	513 x 224 x 218
5850010069	-	12	180	1400	B00	3	1	513 x 223 x 223
5850010119	-	12	200	1300	B00	4	1	513 x 223 x 223
58572512G	730012120	12	230	1200	B00	3	1	518 x 273 x 241

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.

EFB batteries (enhanced flooded batteries) are an improved and performance-optimised version of wet cell batteries.

These batteries are improved as a result of two elements:  
The mixing element uses the movement of the vehicle to constantly mix the acid and prevent acid stratification. As a result, the current can be absorbed evenly during charging and delivered quickly and reliably when starting. It also reduces sulphation at low charge. The second element is a fleece that protects the lead plates in order to increase vibration resistance.

- Optimised wet cell battery with improved performance
- Mixing element to prevent acid stratification
  - » Higher cycle stability
  - » Optimised charging
  - » Optimised starting performance when the state of charge is low
- Protective fleece for the lead plates
  - » Higher vibration resistance (V3/V4)
- For tractors with high power requirements and particular reliability requirements

Part no.	Nominal voltage (V)	Capacity (Ah)	Cold cranking current (A)	Bottom bar	Circuit	Terminal type	Dimensions L x W x H (mm)
5850010060	12	60	560	B03	0	1	245 x 175 x 190
5850010061	12	70	650	B03	0	1	277 x 175 x 190
5850010062	12	80	730	B03	0	1	315 x 175 x 190
5850010063	12	95	850	B03	0	1	353 x 175 x 190
5850010064	12	180	1200	B00	3	1	513 x 225 x 218
5850010065	12	230	1350	B00	3	1	518 x 273 x 239

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.

AGM BATTERIES



(AGM = absorbent glass mat)

- VRLA/AGM technology
- Electrolyte bound in micro glass fleece, prevents acid stratification and reduces sulphation
- Optimised cold start performance
- High cycle stability
- Low self-discharge
- Completely sealed
- Completely maintenance-free
- Leak-proof
- Long service life
- For vehicles with particularly high power requirements or long downtimes

WHAT DOES MAINTENANCE-FREE MEAN?

The term maintenance-free simply means that the battery loses so little fluid that refilling is not required. Sufficient charging is essential, meaning that maintenance-free batteries still have to be charged.

Part no.	Nominal voltage (V)	Capacity (Ah)	Cold cranking current (A)	Bottom bar	Circuit	Terminal type	Dimensions L x W x H (mm)
57953048	12	2.8	-	B00	-	Plug	132 x 32 x 98
57953049	12	3	-	B00	-	Blade terminal	134 x 67 x 60
57970050	12	3	-	B00	-	Plug	110 x 55 x 80
57970008	12	4.5	-	B00	1	SAE connector	90 x 69 x 100
57951214	12	4.5	-	B00	1	Blade terminal	90 x 69 x 100
57970005	12	7.2	-	B00	3	Blade terminal	150 x 65 x 95
57970047	12	9	-	B00	3	Blade terminal	151 x 63 x 95
57951213	12	12	-	B00	3	Blade terminal	150 x 95 x 93
57953051	12	14	-	B00	1	Square terminal	150 x 89 x 166
57970034	12	22	-	B00	0	Flat terminal	181 x 76 x 167
57953035	12	22	-	B00	0	Flat terminal	195 x 130 x 175
57953036	12	22	-	B00	1	Flat terminal	195 x 130 x 175

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.

Part no.	Nominal voltage (V)	Capacity (Ah)	Cold cranking current (A)	Bottom bar	Circuit	Terminal type	Dimensions L x W x H (mm)
57962030	12	28	300	B00	0	Flat terminal	187 x 127 x 181
57962035	12	28	300	B00	1	Flat terminal	187 x 127 x 181
57953033	12	30	400	B00	0	Square terminal	165 x 125 x 175
57953034	12	30	-	B00	1	Flat terminal	165 x 125 x 175
5850010091	12	60	660	B13	0	1	242 x 175 x 190
5850010092	12	70	720	B13	0	1	278 x 175 x 190
5850010093	12	80	760	B13	0	1	315 x 175 x 190
5850010094	12	95	810	B13	0	1	353 x 175 x 190
585AGM 100	12	100	800	B01	0	1	353 x 175 x 233
5850010095	12	105	910	B13	0	1	393 x 175 x 190
585AGM 140	12	140	950	B00	3	1	513 x 189 x 223
585AGM 180	12	180	1050	B00	3	1	513 x 223 x 223
585AGM 220	12	220	1400	B00	3	1	518 x 276 x 242

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.



SUPPLY BATTERIES



Supply batteries are wet cell batteries based on SLI technology that have been adapted to supply applications to provide a slow, continuous and reliable power supply.

The following features have been tailored to these requirements:

- Composition
- Mesh alloy
- Lead purity
- Formation and curing process during production

Unlike the starter batteries, no cold cranking current is specified here as this is not relevant for the intended application. In addition, the capacity is not only specified as standard on the basis of 20 hours, but also on the basis of 5 hours.

Part no.	Nominal voltage (V)	Capacity (Ah)	Capacity C5 (Ah)	Bottom bar	Circuit	Terminal type	Dimensions L x W x H (mm)
5850010070	12	50	40	B13	0	1	207 x 175 x 190
5850010071	12	60	48	B13	0	1	242 x 175 x 190
5850010072	12	75	60	B13	0	1	278 x 175 x 190
5850010073	12	95	76	B13	0	1	353 x 175 x 190
5850010074	12	130	104	B00	3	1	513 x 189 x 223
5850010075	12	180	153	B00	3	1	513 x 223 x 223
5850010076	12	230	196	B00	3	1	518 x 276 x 242

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.

DEEP CYCLE BATTERIES



Deep cycle batteries are recommended for applications where particularly deep discharge cannot be avoided.

- Reinforced mesh plates
  - » Special resistance to deep discharge
  - » Use over many charging cycles
- Low self-discharge
- Negative plate with 99.9% pure lead and special additives for deep cycle applications
- High charge efficiency
- Low-maintenance thanks to low water consumption

Part no.	Nominal voltage (V)	Capacity (Ah)	Circuit	Terminal type	Dimensions L x W x H (mm)
57970014	6	210	0	EHPT	259 x 179 x 245
57970015	6	225	0	EHPT	259 x 179 x 245
57970016	6	240	0	EHPT	259 x 179 x 245
57970017	6	260	0	EHPT	260 x 180 x 248
57970018	8	170	1	EHPT	259 x 179 x 245
57970019	8	190	1	EHPT	260 x 180 x 248
57970021	12	150	1	EHPT	329 x 181 x 245

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.

QUAD BIKE/ATV BATTERIES



Batteries for quad bikes and all-terrain vehicles

- VRLA/AGM technology
- Electrolyte bound in micro glass fleece, prevents acid stratification and reduces sulphation
- Optimised cold start performance
- High cycle stability
- Low self-discharge
- Completely sealed
- Completely maintenance-free
- Leak-proof
- Long service life
- For vehicles with particularly high power requirements or long downtimes

Part no.	Nominal voltage (V)	Capacity (Ah)	Cold cranking current EN (A)	Circuit	Dimensions L x W x H (mm)
6620000004	12	3	50	0	114 x 71 x 86
6620000006	12	4	80	0	114 x 71 x 107
6620000003	12	5	50	0	116 x 71 x 88
6620000015	12	5	65	0	120 x 60 x 130
6620000008	12	6	135	1	151 x 88 x 94
6620000009	12	6	100	0	114 x 71 x 130
6620000007	12	8	135	1	151 x 88 x 107
6620000001	12	10	120	1	136 x 75 x 141
6620000019	12	10	120	0	136 x 75 x 141
6620000002	12	11	185	1	151 x 87 x 131
6620000010	12	11	175	1	150 x 87 x 104

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.

CCA: DIN, EN, SAE?

The cold cranking current (CCA) indicates how much current a battery can supply at sub-zero temperatures for a short period of time without the voltage falling below a certain limit. There are four ways of measuring cold cranking current: SAE describes the current that a battery can supply at -18°C for 30s without the voltage dropping below 7.2 V. EN describes the current that a battery can supply at -18°C for 10s, and after a 10s pause at 50% of the current for another 73s, without the voltage dropping below 7.5 V. IEC describes the current that a battery can supply at -18°C for 60s without the voltage dropping below 8.4 V. DIN describes the current that a battery can supply at -18°C for 30s without the voltage dropping below 9 V. Cold cranking current is always given in amperes.

Part no.	Nominal voltage (V)	Capacity (Ah)	Cold cranking current EN (A)	Circuit	Dimensions L x W x H (mm)
6620000011	12	13	200	1	151 x 87 x 147
6620000017	12	13	200	0	151 x 87 x 147
6620000014	12	15	210	1	134 x 90 x 166
6620000018	12	15	210	0	134 x 90 x 166
6620000005	12	19	270	0	175 x 87 x 156
6620000013	12	19	270	1	175 x 87 x 156
6620000016	12	19	270	1	151 x 87 x 161
6620000012	12	32	400	0	166 x 126 x 175

GRANIT batteries are supplied fully charged, but recharging before installation is recommended if they have been stored for any length of time. The minimum voltage for installation is 12.4 V, 12.6 V is recommended.



Is it really a warranty issue?

In recent years, the requirements for batteries have changed considerably. If a battery does not meet these vehicle-specific requirements or is not used for its intended purpose, the service life is drastically reduced.

But even if the correct battery is chosen, appropriate maintenance is essential. If proper maintenance isn't carried out, the battery will quickly fail. However, a manufacturing defect is not to blame for this. These

usually occur in the first 12 weeks and only account for about 1% of battery failures.

How should you deal with a customer complaint and check whether or not it is a warranty issue?

CHECK THE AGE OF THE BATTERY/INVOICE

The age of the battery provides information about whether it has been stored for too long.

Is the battery still covered by the warranty?

If YES  
↓  
If NO = Reject the claim

CHECK THE BATTERY APPLICATION

The size and technology must always match the application. An EFB battery must be used for applications where increased vibrations occur, and an AGM battery must be used where strong vibrations occur. If the battery is not positioned vertically, an AGM battery must be used. Supply and starter batteries should only be used for their intended purposes.

Correct size and technology?

If YES  
↓  
If NO = Reject the claim

VISUAL INSPECTION

Stress whitening? Leaking acid? Fractures? Damaged terminals? Deformed battery box?

External damage visible?

If YES = Reject the claim  
↓  
If NO

CHARGING AND TESTING

- Charge at 10% of the Ah rating for 8 hours. With modern chargers this is done automatically
- Switch on the full beam for one minute without starting the engine or leave the battery for 6 hours (remove surface voltage)
- Test battery using a non-loading tester
- The voltage (V) and cold cranking current (CCA) should be taken into account when interpreting the test results

Does the voltage drop back below 12 V soon after charging?

The battery should have a voltage of at least 12.6 V after a full charge. If the voltage drops back down to 10.5 V after charging and before the battery is used, assume that a cell has short-circuited. In this case the warranty claim must be accepted, unless it must be rejected according to points 1 to 3.

If YES = Accept the claim  
If NO = Reject the claim

Is the cold cranking current below 60%?

A fully charged battery should have a cold cranking current of at least 60% of the value indicated on the battery. If this isn't the case (even if the battery has a voltage of at least 12.6 V), this indicates that the battery is worn out as a result of sulphation caused by deep discharge, insufficient charging for a prolonged period, or the maximum number of charging cycles being reached. The warranty claim must be rejected.

If YES = Reject the claim

Open-circuit voltage	State of charge	Status
> 12.7 V	100%	Fully charged
> 12.4 V	> 60%	Normal
< 12.4 V	< 60%	Not sufficiently charged → Risk of sulphation
< 12.0 V	< 25%	Not charged → Sulphation

What maintenance tips can you give your customers?

- Check the open-circuit voltage regularly. A fully charged battery has a voltage of 12.7 V. Batteries should be recharged before the open-circuit voltage drops below 12.4 V
- The battery surface should always be clean and dry - otherwise there is a risk of creeping currents occurring
- Regularly check the battery and cable connections for a tight fit, tighten where necessary
- Cable connections should always be clean and well greased - clean and apply grease as required
- External charging at least twice a year prevents insufficient charging



» BOSCH  
Battery tester BAT 115  
Part no.: 2500687000115

- Dimensions L x W x H (mm): 250 x 130 x 60
- Standard: EN, EN2, DIN, SAE, IEC, JIS, MCA
- Cold cranking current EN (A): 40 - 2000
- Operating temperature (°C): 0 - 40
- Language: menu in 25 languages
- With internal memory and integrated printer



» GRANIT  
Battery tester BT400  
Part no.: 5070011165

- Dimensions L x W x H (mm): 140 x 100 x 30
- Voltage range (V): 8 - 31.5
- For 12 V start-stop batteries, as well as 12 V and 24 V starter batteries
- Cold cranking current EN (A): 40 - 2000
- Without internal memory, without integrated printer



» GRANIT  
Battery tester T5  
Part no.: 5070010178

- Without internal memory, without integrated printer
- Cold cranking current (CCA A EN): 100 - 2000
- Operating voltage (V): 9 - 15



» GRANIT  
Battery tester T10  
Part no.: 5070010177

- With internal memory and integrated printer
- Cold cranking current (CCA A EN): 100 - 2000
- Operating voltage (V): 9 - 15
- For testing max. 24 V on-board electrical systems







Rule of thumb for setting charger charging current: the battery capacity in ampere hours (Ah) divided by 10 gives the maximum charging current in amperes (A). Example calculation: a 180 Ah battery should be charged with a maximum of 18 A. The charger should be set to the next level below this (15 A).



The cold and dark conditions during the winter months result in much higher power requirements than in summer. At this time of year it is immediately apparent which battery still has enough charge when electrical consumers such as lights, blowers, windscreen wipers and heaters are used at the same time. The first frosty night may be the last for a worn out battery.

Contrary to popular belief, the **cause** is not the low temperatures, but the **high summer temperatures occurring beforehand**. The **chemical processes in the battery are highly temperature-dependent**. The higher temperatures in summer result in faster chemical reactions within the battery. This applies to temperatures above 20°C. Battery self-discharge is accelerated, and insufficiently charged batteries experience a loss of capacity caused by sulphation.

The GRANIT Black Edition chargers have a desulphation function which dissolves surface sulphation on the lead plates. However, once the sulphate has been removed from the lead plate and has fallen to the bottom of the battery, the original capacity cannot be recovered. **The charger must therefore be used in good time.**

At temperatures below 20°C, the chemical processes inside the battery slow down. Assuming that 20°C is the optimum temperature for 100% performance, the chemical reaction speed and starting performance drop to 50% at 10°C. At freezing point, battery performance drops further to just 25%.

The engine oil is also thicker in cold conditions, meaning that the starting process is more difficult and requires more power. This means that the battery power may still be sufficient at 20°C during the summer months, but the battery will fail when the temperature drops to 0°C in winter and must be replaced.

**Don't wait until next winter**  
Maintain your battery throughout the year to avoid costly downtimes. Even if a battery is advertised as maintenance-free, this doesn't mean that charging isn't required. It simply means that the acid doesn't need to be refilled.

To ensure that your vehicles are always ready for use and to avoid additional costs and unexpected failures, we've put together the following tips:

- Check the open-circuit voltage regularly. A fully charged battery has a voltage of 12.6 V. Batteries should be recharged before the open-circuit voltage drops below 12.4 V.
- The battery surface should always be clean and dry - otherwise there is a risk of creeping currents occurring.
- Regularly check the battery and cable connections for a tight fit, tighten where necessary.
- External charging at least twice a year prevents insufficient charging.

Damage caused by sulphation does not occur as a result of a manufacturing defect, but as a result of use or insufficient charging. It is therefore not covered by the warranty. **Batteries should be charged in good time - in other words while the capacity can still be restored by the desulphation function.**

» GRANIT  
Battery charger

Part no.: 5850010113

- Charging current (A): 1
- Battery capacity (Ah): 3 - 30
- Dimensions L x W x H (mm): 149 x 71 x 32
- Voltage (V): 6 / 12
- Multi-stage charging process (5 stages)
- Including analysis, desulphation, reconditioning and charge maintenance



» GRANIT  
Battery charger

Part no.: 5850010114

- Charging current (A): 2 / 4 / 8
- Battery capacity (Ah): 6 - 160
- Dimensions L x W x H (mm): 205 x 90 x 52
- Voltage (V): 12
- Multi-stage charging process (7 stages)
- Including analysis, desulphation, reconditioning and charge maintenance



» GRANIT  
Battery charger

Part no.: 5850010116

- Charging current (A): 3 / 15 / 30
- Battery capacity (Ah): 6 - 500
- Dimensions L x W x H (mm): 220 x 115 x 63
- Voltage (V): 12
- Multi-stage charging process (7 stages)
- Including analysis, desulphation, reconditioning and charge maintenance



» GRANIT  
Battery charger

Part no.: 5850010121

- Charging current (A): 2 / 5
- Battery capacity (Ah): 6 - 120
- Dimensions L x W x H (mm): 205 x 90 x 52
- Voltage (V): 12
- Multi-stage charging process (7 stages)
- Including analysis, desulphation, reconditioning and charge maintenance



» GRANIT  
Battery charger

Part no.: 5850010115

- Charging current (A): 2 / 5 / 10
- Battery capacity (Ah): 6 - 200
- Dimensions L x W x H (mm): 205 x 90 x 52
- Voltage (V): 12
- Multi-stage charging process (7 stages)
- Including analysis, desulphation, reconditioning and charge maintenance



» GRANIT  
Battery charger

Part no.: 5850010117

- Charging current (A): 2 / 5 / 10
- Battery capacity (Ah): 6 - 200
- Dimensions L x W x H (mm): 220 x 115 x 63
- Voltage (V): 24
- Multi-stage charging process (7 stages)
- Including analysis, desulphation, reconditioning and charge maintenance



BATTERY OR ACCUMULATOR - WHAT'S THE DIFFERENCE?

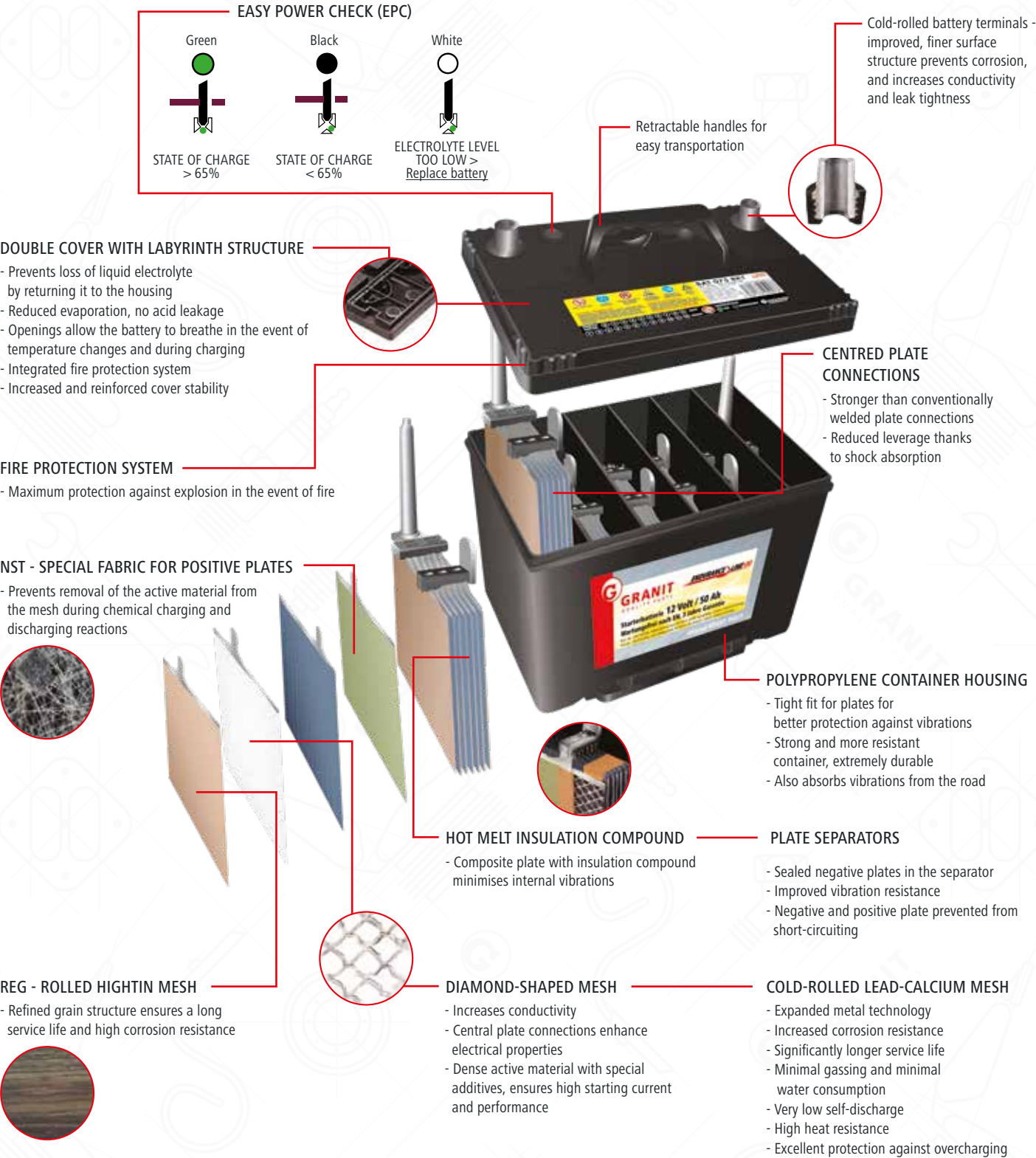
Batteries and accumulators differ as follows: when the electrode is empty, either a new battery is used or the accumulator is recharged. Despite reference often being made to batteries, the products in question are usually accumulators or what are known as secondary batteries as these (unlike primary batteries) can be recharged.



ENDURANCE LINE: POWERFUL STARTER BATTERIES

The GRANIT Endurance Line battery range has been specially developed for heavy-duty, continuous use in agricultural and construction machinery. These starter batteries provide full power over a long period. Significantly lower self-discharge compared with conventional hybrid/antimony batteries and excellent cold start capability thanks to the Ca/Ca expanded metal technology.

The batteries are designed as an enclosed system and are therefore completely maintenance-free in accordance with the EN standard.



If the battery is ever so deeply discharged that it can no longer start the vehicle, jump leads or a booster can be used. However, the battery should be charged, tested and (if necessary) replaced as soon as possible thereafter. Jump starting is not a replacement for charging. Even the vehicle alternator will not be able to recharge a battery discharged below 12.4 V as reconditioning is required. An external charger with the appropriate function is required for this.

» GRANIT Jump leads

Part no.: 50799200

- Voltage range (V): 12
- Cable length (m): 3.0
- Cross section (mm<sup>2</sup>): 16
- Petrol engines max. 2500 ccm
- Clamps: plastic, fully insulated
- Power rating (A): 220
- Flexible cables (16 mm<sup>2</sup> / 3 m)



» GRANIT Jump leads

Part no.: 50799201

- Voltage range (V): 12
- Cable length (m): 3.5
- Cross section (mm<sup>2</sup>): 25
- Petrol engines max. 5500 ccm
- Diesel engines max. 3000 ccm
- Clamps: plastic, fully insulated
- Power rating (A): 350
- Flexible cables (25 mm<sup>2</sup> / 3.5 m)



» GRANIT Jump leads

Part no.: 50799202

- Voltage range (V): 12
- Cable length (m): 4.5
- Cross section (mm<sup>2</sup>): 35
- Petrol engines max. 7000 ccm
- Diesel engines max. 4000 ccm
- Clamps: plastic, fully insulated
- Power rating (A): 480
- Flexible cables (35 mm<sup>2</sup> / 4.5 m)



» GRANIT Jump lead set

Part no.: 50799128

- Voltage range (V): 12
- Power rating (A): 220, 350, 480
- Cable length (m): 3.0, 3.5, 4.5
- Cross section (mm<sup>2</sup>): 16, 25, 35
- Petrol engines max. 7000 ccm
- Diesel engines max. 4000 ccm
- Easy-to-use terminal clamps
- Fully insulated
- Flexible cables

Contents:  
10x jump leads 50799200  
5x jump leads 50799201  
5x jump leads 50799202



» GRANIT 12V hybrid start booster

Part no.: 5850010122

- For vehicles with up to 2 l diesel and 4 l gas engines
- Charging voltage (V): 12
- Start peak power (A): 1600



» GRANIT 12V hybrid start booster

Part no.: 5850010123

- For vehicles with up to 2.5 l diesel and 5 l gas engines
- Charging voltage (V): 12
- Start peak power (A): 2000





# DEFINITIONS -

## SO YOU KNOW WHAT WE'RE TALKING ABOUT

### AGM (ABSORBENT GLASS MAT)

Mat made of micro glass fibres that fixes the sulphuric acid contained in lead-acid batteries.

### ACTIVE MATERIAL

The active material in the positive plates consists of lead dioxide, and the active material in the negative plates consists of sponge lead. When a circuit is made, these materials react with sulphuric acid during charging and discharging according to the following chemical formula:  $\text{PbO}_2 + \text{Pb} + 2\text{H}_2\text{SO}_4 = 2\text{PbSO}_4 + 2\text{H}_2\text{O}$ .

### AMPERE (A)

Unit of current in a circuit.

### AMPERE HOUR (AH)

Unit of electric charge capacity of a battery. Calculated by multiplying the current (in amperes/A) by the time (in hours/h) during which a battery supplies current until it is discharged. Example: a battery that supplies 5 amps of current for 20 hours has a charge capacity of 100 ampere hours ( $20 \text{ h} \times 5 \text{ A} = 100 \text{ Ah}$ ).

### TERMINAL

Electrical connection between the battery and the external circuit. One terminal (positive terminal) is connected to the first battery cell connecting lug and one terminal (negative terminal) is connected to the last battery cell connecting lug (cells connected in series).

### CURRENT

The movement of electrons along a conductor or the flow speed (current intensity). The unit of current is amperes (A).

### ELECTROLYTE

In a lead-acid battery, sulphuric acid diluted with water serves as the electrolyte. This acts as a conductor, supplying water and sulphate for the electrochemical reaction according to the following formula:  $\text{PbO}_2 + \text{Pb} + 2\text{H}_2\text{SO}_4 = 2\text{PbSO}_4 + 2\text{H}_2\text{O}$ .

### DISCHARGE

When a battery is supplying current, it is said to be discharging.

### MESH

The lead alloy frame that supports the active material in a battery plate and conducts electricity.

### INTERNAL RESISTANCE

The battery's internal electrical resistance (dependent on type and age). The lower the battery's internal resistance, the higher the potential starting power and the higher the charge acceptance and recharge capability.

### COLD CRANKING CURRENT

The amount of current that a battery can supply for 30 seconds at  $-17.8^\circ\text{C}$  until each cell still has a voltage of at least 1.2 V.

### CAPACITY

The ability of a fully charged battery to supply a certain amount of current (measured in ampere hours/Ah) with a certain intensity (in amperes/A) over a certain time (in hours/h).

### CORROSION

The destructive chemical reaction of a liquid electrolyte with a reactive substance, for example dilute sulphuric acid with lead plates. Rust is also a result of corrosion.

### SHORT CIRCUIT

An unintentional, usually low-resistance connection within an electrical device or wiring (past a consumer) that creates a strong current flow. A short circuit in a cell can last so long that the cell discharges, making the battery useless (cell short circuit).

### STATE OF CHARGE/INTEGRITY

The amount of electrical energy stored in a battery at any given time, expressed as a proportion (percentage) of the energy that would be present if the battery were fully charged.

### EARTH

The reference potential of a circuit. In vehicle construction, the bodywork used to be used as earth by connecting the battery to it via cable to complete the circuit when there was no direct connection from a component. Nowadays the negative battery terminal is used as earth in over 99 percent of all vehicle construction applications.

### OHM

Unit of electrical resistance or impedance in a circuit.

### PLATE (NEGATIVE)

Cast metal frame containing the active material (sponge lead).

### PLATE (POSITIVE)

Cast metal frame containing the active material (lead dioxide).

### ACID STRATIFICATION

When a lead-acid cell is discharged, low-density acid is produced. As a result of gravity, this light acid rises to the top of the cell, while high-density acid sinks to the bottom of the cell. This acid stratification can lead to a loss of capacity and/or battery failure as the less charged acid layer results in a higher rate of sulphation.

### SELF-DISCHARGE

A cell's loss of capacity during storage. The level of self-discharge is influenced by the ambient temperature.

### SEPARATOR

A divider between the positive and negative plates in a cell, made of a material that allows current to flow through it.

### DEEP DISCHARGE

State in which a cell is completely discharged due to the removal of current, and only has a voltage below the end-of-discharge voltage.

### VOLT (V)

Unit of electrical voltage.

### VRLA BATTERY

The abbreviation stands for valve regulated lead-acid battery, a maintenance-free sealed battery.

### MAINTENANCE-FREE

The term maintenance-free simply means that the battery loses so little fluid that refilling is not required. Sufficient charging is essential, meaning that maintenance-free batteries still have to be charged.

### CELL

The basic electrochemical unit in a battery that produces current and consists of a set of positive plates, negative plates, electrolyte, separators and housing. There are six cells in a 12 V lead-acid battery.

### CYCLE

In a battery, a discharge of 50% and the subsequent charge correspond to one cycle. With a 12 V battery, a discharge of 50% is reached when the voltage drops below 12.4 V. 100% charge is reached at 12.7 V.