Choosing your traction battery and charger

- The battery is the heart of your truck
- Without food and drink, even a genius can’t think
- Brains and brawn - the right combination of charger and battery makes your life easier
Traction batteries - general

Construction
Cells connected in series, each of 2 volts

Size
Number of cells
Cell length
Cell width
Cell height
A little battery chemistry

Discharge
The truck consumes current and the battery is discharged
- the voltage and density decrease

Charge
Main "bulk" charge: The battery gets the current consumed back plus...
Gas phase: 5-20% extra to get the acid agitated and in equilibrium
Pause charging

Important
The battery must not emit gas during pause charging

80% is the correct depth of discharge
Self-discharge

Important
A battery that is not used for a while must be fully charged when it is stored.

5-7% self-discharge per month, depending on the battery’s age.

If a battery is stored for an extended period of time, it must be charged every now and again, every three months, for example.
Cold stores

The effect of the temperature on capacity:

<table>
<thead>
<tr>
<th>Acid temperature</th>
<th>Battery capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>+30°C</td>
<td>100%</td>
</tr>
<tr>
<td>+20°C</td>
<td>95%</td>
</tr>
<tr>
<td>+10°C</td>
<td>90%</td>
</tr>
<tr>
<td>0°C</td>
<td>80%</td>
</tr>
<tr>
<td>-10°C</td>
<td>70%</td>
</tr>
<tr>
<td>-20°C</td>
<td>50%</td>
</tr>
<tr>
<td>-30°C</td>
<td>35%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temp.</th>
<th>Density</th>
<th>Volt</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°C</td>
<td>1.31</td>
<td>2.15</td>
</tr>
<tr>
<td>15°C</td>
<td>1.30</td>
<td>2.14</td>
</tr>
<tr>
<td>30°C</td>
<td>1.29</td>
<td>2.13</td>
</tr>
<tr>
<td>45°C</td>
<td>1.28</td>
<td>2.12</td>
</tr>
</tbody>
</table>

When the battery is cold, the voltage and density are different to what you are used to.

But the voltage value must always be 0.84 higher than the density value.
Choosing your battery

Standard battery
Normal operation
Normal operating time
Normal charging time
Most used battery
Discharge depth… max. 80%
Choosing your battery

Acid circulation battery
Normal operation
Short charging time
Pause charging
Minimal heat generation during charging
Discharge depth… max. 80%
Choosing your battery

CSM (Copper Stretch Metal) battery
Hard operation
Stiff voltage
High energy gain
Two or three-shift operation
Discharge depth… max. 80%
Choosing your battery

Dryfit battery, VRLA maintenance-free
Light operation
Less capacity
No topping up with water
No acid overflow
Discharge depth… 70-75%
Life factors

Battery life
5-6 years or around 1500 (1200) cycles in normal operation with one outlet and a discharge depth of max. 80% (70-75%) per day.

Definition of a cycle
A cycle is a discharge followed by a charge. The more cycles a battery undergoes in a 24-hour period, the shorter its life in terms of time.

Important
Over 80% (70-75%) discharge depth constitutes a deep discharge and invalidates the battery warranty.
Life factors

What affects the lifetime of a battery?
Deep discharges: Max. 80% depth
Over consumption: Max. 80% of capacity
High temperatures: Max. 50°C in the acid
Overcharging: Burns the battery out
Undercharging: Sulphates the battery
Maintenance: Incorrect acid level, dirt, faults, etc.

Why is too much current used?
Battery too small
Driving and lifting at the same time
The truckdriver likes to think he’s a racing driver
Truck faults (wear and tear, brakes sticking, dirt in wheels)
Too much additional equipment
Incorrect tyre type, ramp driving, driving surface

When does a battery sulphate?
If it is left uncharged
If it is not discharged to 80% every now and again, it gets "sluggish"
If it is not fully charged
If it works at a high temperature
If it is topped up with acid
Chargers - general

Important
Incorrect and careless charging shortens the life of a battery
Examples of constant current charge profiles

2100 HFP high-frequency for open tubular plate batteries
- IWA charging profile

2100 HFP high-frequency for closed dryfit tubular plate batteries
- IUIU charging profile
Charging process - general

Main ”Bulk” charge
The battery is filled up

Gas phase
The acid is agitated

Maintenance charge
Self-discharge is counteracted

Equalising charge
The cells are adjusted

Important
Always remember to switch the charger off or press the pause button each time the battery is disconnected from or connected to the charger. This avoids sparking.
Oxyhydrogen gas - oxygen and hydrogen

A battery emits gases during charging
Hydrogen, in particular, is very explosive. So be careful with cigarettes, sparks and open flames near the battery

Important
Your eyes are most at risk, so you should always use protective goggles. There must be an eyewash bottle near the charger.
Topping up with water

Manually

Without a filling gun

With a filling gun

Automatically

BFS system

Aqua-jet system

Autofill system
Water quality

Important
Only top up with demineralised water

Normal tap water is usually around 250 microSiemens (mS). Battery water should not exceed 10 mS and never exceed 20 mS. Only use equipment in which the battery water cannot come into contact with metal, otherwise it will immediately be ionised.
Maintenance

Daily
Morning - When you start work

- Check that the charging process has finished
- Switch off the charger or press the pause button
- Disconnect the battery connector and the charger connector. Do not pull the cables
- Connect the battery to the truck and drive off.

Evening - When you stop work

- Drive the truck close enough to the charger that the battery connector and the charger connector can easily reach each other
- Turn the ignition key and switch off the current
- Open the battery cover so that the gases can escape during charging
- Connect the charger connector to the battery connector
- Switch the charger on if it has a switch
- Check that the charger starts before leaving it. The red light must be on. Some chargers have a yellow light
**Maintenance**

**Weekly**

**Friday**
Check that the acid level covers the plates. If necessary, top it up until the plates are covered ... No more than this

**NB!**
If the acid level is too high when the battery is charged, the cells will boil over.

**Every 14 days**
Check the acid level after charging has finished and top up, if necessary, up to 1-2 cm above the plates.

Check cell connections, cable terminals and connectors. Any defects must be remedied immediately.

Ensure that the cell plugs are closed. Then wash the battery with a brush and water and wipe it dry. Use protective goggles.
Maintenance

Monthly

Take the temperature of the battery.
It must not exceed 50°c.

If the temperature in the battery is not 30°c,
the density and the voltage have changed,
as shown in the table to the right.

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Measure the density or the voltage. If the
variation between cells is too great, the battery
must undergo an equalising charge.

Note:
The voltage value must always be
0,84 higher than the density value