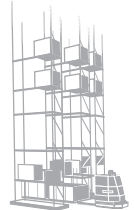
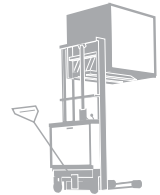


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**Traction batteries**  
**Hawker perfect plus**

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**Superior efficiency and reliability – Increased capacities**



The Hawker perfect plus motive power batteries provide a high level of power and reliability for all industrial truck applications, from simple applications with a low capacity loading up to heavy duty multi-shift applications.

#### Why "plus" ?

Compared to the former perfect range, the Hawker perfect plus cells provide higher efficiency in discharge achieved by advanced components used in the construction of the positive plates. The sizing of the positive and negative plates has been optimised according to the volume available in the cell boxes. The process of filling the positive plates has been improved. All these technical enhancements have enabled an increase in the cell capacities while keeping the same exterior dimensions. The Hawker perfect plus range is at the highest technology level and has a very high efficiency. This improvement integrates the european harmonisation of the DIN and BS ranges. This range meets the dimensions of standards DIN/EN 60254 and IEC 254-2.

#### Cell construction

All Hawker perfect plus cells use the robust tubular vented technology (PzS). The positive electrodes are diecast tubular plates (PzS) and advanced components used in their manufacture provide increased efficiency. The negative plates are flat pasted plates. The separator is of the microporous type. The cell box and lid are made from high impact, temperature resistant polypropylene and are heat-seal welded to prevent electrolyte leakage.

#### Terminals

The special design of the terminals ensures that no electrolyte can leak from the cells.

#### Cell connectors

The cells are joined by fully insulated flexible and halogen free connectors. The bolt-on connectors allow cells to be replaced or moved without excessive work.

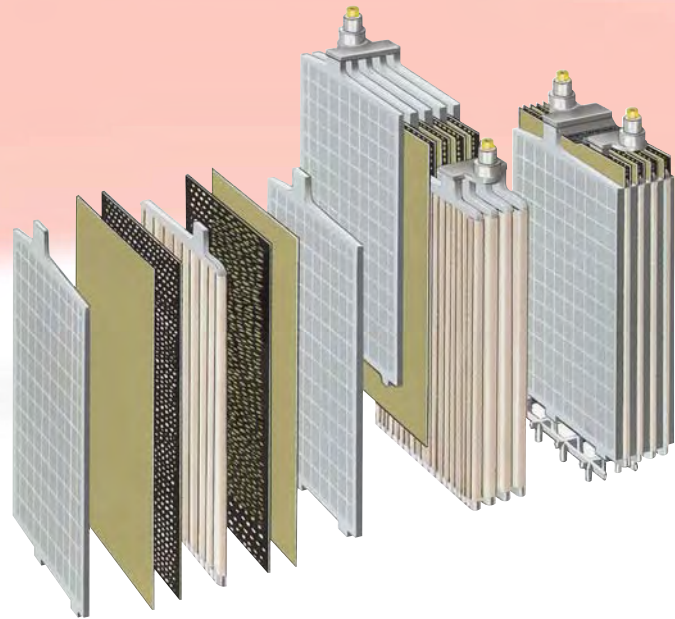


#### Flip top plugs

Flip top plugs with electrolyte level markings are fitted. These allow adequate escape of charging gasses and provide a safe anti-surge baffle for the electrolyte during operation.

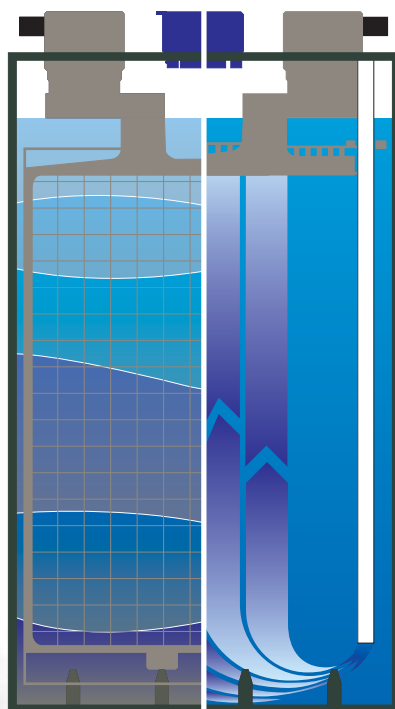
#### Lid

The lid is equipped with holes for installation of electrolyte circulation system, these can also be used for temperature sensor tests.



### Hawker aquamatic

The aquamatic water refill system makes it possible to top up all the cells from one central point through an integrated system. The aquamatic vent plugs automatically ensure the optimum filling level and also allow the measurement of electrolyte specific gravity. The aquamatic kit can be expertly fitted at the factory and on site.



Stratification of the electrolyte at different specific gravity levels

Electrolyte circulation

### Electrolyte circulation

The Hawker electrolyte circulation system, using the AirLift principle, consists of a pipe system which is fitted in the cells. A diaphragm pump sends a low rate airflow into the cell which creates a circulating air stream inside the cell box. This system prevents electrolyte stratification and the battery charging is optimised.

### Benefits

#### Hawker perfect plus

- increased capacities in same dimensions
- higher running time and battery availability
- european harmonisation of capacities and sizes in DIN and BS ranges

#### Hawker perfect plus with electrolyte circulation

- no electrolyte and temperature stratification during partial or complete charging process
- optimal charge acceptance by positive and negative electrodes and therefore uniform plate stressing
- charging time shorter by up to 30% and energy savings of up to 20% compared with conventional charging processes
- minimised gassing phase, reduced sludging and water consumption reduced by up to 70%
- temperature rise during charging is up to 10°C lower, allowing use in warm ambient conditions
- more rapid battery availability for the same nominal charging current due to shorter charging time and therefore higher battery utilisation rate in multiple shift operation
- higher performance and longer battery service life in heavy operation particularly with opportunity charging
- longer maintenance intervals, lower maintenance costs

### Definition of application fields

#### 1. Low duty

single shift with light operation and discharge lower than 60% C<sub>5</sub>.  
electrolyte T°C about 30°C


#### 2. Normal duty

single shift with discharge up to 80% C<sub>5</sub>.  
electrolyte T°C 30°C

#### 3. Heavy duty

- single shift with discharges of 80% C<sub>5</sub> and high discharging currents
- opportunity charging to augment the useable capacity
- multi-shift operation with or without battery changes
- high ambient temperature

	1. Low duty	2. Normal duty	3. Heavy duty
<b>Hawker perfect plus</b>			
<b>Hawker perfect plus with electrolyte circulation</b>			
Hawker Water Less®			
Hawker Water Less® with electrolyte circulation			
Hawker wf200 plus			
Hawker evolution			



Wherever you do business, EnerSys can support you with motive power energy. The Hawker branded battery range, matched chargers and systems provide trouble free performance under the most demanding service conditions. Our strategically located manufacturing plants are efficient and responsive with a culture of continuous improvement and added value for our business partners.

EnerSys has an enviable position in technology leadership and with significant investment in research and development we intend to stay at the leading edge in product innovation. The recently developed energy solutions: Water Less® and XFC batteries, Lifetech and Lifespeed HF chargers, have defined new benefits for our customers: faster recharge, more machine availability, lower operating and investment costs, reduced carbon footprint. Our team of development engineers is driven by the desire to build the best energy solutions and works closely with our customers and suppliers to identify development opportunities. Our bias for rapid innovation means we get new products to market fast.

EnerSys's integrated sales and service network is dedicated to providing our customers with the best solutions and after-sales support for their business. Whether you require 1 battery or a complete fleet of batteries, chargers, a battery handling system and a state of the art fleet management system, you can count on us. EnerSys is the world's largest industrial battery manufacturer and we are dedicated to being the best.



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