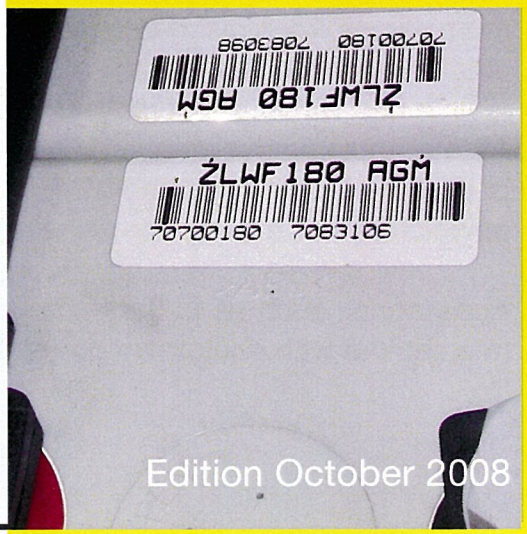
Explosionproof Battery Systems
Ex e II T6



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Explosionproof battery systems with Ex e protection

Modern battery systems with sealed, low-maintenance VRLA (valve-regulated lead-acid) batteries for uninterruptible power supplies in the oil and gas industries, on offshore platforms or in process engineering are nowadays manufactured using the increased safety Ex e equipment protection technique. thuba has developed an ATEX-certified modular system using 2 V batteries with 200 or 400 Ah capacity ratings to meet a wide variety of requirements.

The flameproof enclosure for batteries is obsolescent!

The 2006 edition of IEC/EN 60079-1: Equipment protection by flameproof enclosures 'd' introduced restrictions on the use of batteries inside flameproof enclosures. The objective is to prevent the release of a combustible mixture of gases generated by electrolysis (normally hydrogen and oxygen) within the flameproof enclosure. For this reason the use of cells and batteries where a release of this electrolytic gas (either by normal ventilation or through pressure relief valves) is to be expected in normal operation is ***not permissible*** inside flameproof enclosures.

Only gastight nickel-cadmium cells may be installed and charged in flameproof enclosures. When charging batteries in flameproof enclosures the entire circuitry and safety systems must be included in the documentation and conformity assessment procedure. Backup batteries having a ***maximum capacity of 1.5 Ah and a maximum volume of 1% of the free volume of the enclosure*** are exempted from these restrictions. These small batteries must not be charged in flameproof enclosures without additional safety measures being taken.

The modern modular system

Certified battery systems can be designed and constructed to meet customer requirements. Control cabinets in various dimensions can be fitted with a rack with an acid-resistant coating to hold the batteries. The cabinets can be fabricated in coated mild steel or stainless steel sheet, with the great advantage that the batteries are accessible from the front of the cabinet and the sealed battery connections (IP 65) can be inspected at any time. All the cabling is led to a separate junction box using the increased safety Ex e type of protection. Test terminals enable the voltage and/or the system symmetry to be monitored.

The battery cabinet must be adequately ventilated so that a maximum hydrogen content of only 2% can accumulate in the enclosure during the charging process. In this case a reduced degree of protection (IP) is permitted by IEC/EN 60079-7. With IP23 excellent ventilation can be achieved by natural convection through the cabinet. The certification permits the use of a certified fan if it is necessary to use forced ventilation in the battery cabinet. In addition to ventilation it is also important to maintain surface temperatures below their permitted maximum values when discharging and charging the batteries. A routine thermal test by the manufacturer guarantees that the surface temperature specified for temperature class T6 can be maintained within the permitted ambient temperature range of –20 °C to 50 °C.
All relevant industrial standards and the additional requirements for explosion protection must of course also be complied with. The industrial standards specify certain requirements, one of which is that the interior of the enclosure must be finished with an acid-resistant coating.

Accessories such as battery chargers, instrumentation and controls are housed in a separate cabinet with equipment protection by flameproof enclosure 'd' or pressurized enclosure 'px'.

Explosionproof Batteries and Systems

Technical Data	
Marking to 94/9/EC	II 2G II 2D
Type of protection (Gas)	Ex e II T6
Type of protection (Dust)	Ex tD A21 IP65 80°C
EC Type Examination Certificate	SEV 08 ATEX 0106
IECEx Scheme	pending
Protection degree to EN 60529	min. IP 23 enclosure / IP 65 cells in accordande to IEC/EN 60079-7
Enclosure material	mild steel / stainless steel
Admissible ambient temperature	–20 ... 50°C
Manufacture	made in Switzerland

Type	Nominal voltage	Rated capacity C_{10} to 1.80 Vpc at 20°C	Rated capacity C_{100} to 1.80 Vpc at 20°C	Current/Power for 0.5 h back-up time 1.65 Vpc 20°C	Current/Power for 1.0 h back-up time 1.67 Vpc 20°C	Current/Power for 2.0 h back-up time 1.80 Vpc 20°C	Weight	Dimension H x W x D cm
2BG200	2V	206 Ah	255 Ah	246 A, 450 W	142 A, 266 W	77.6 A, 150 W	15 kg	257 x 157 x 125
2BG400	2V	406 Ah	500 Ah	502 A, 904 W	286 A, 539 W	155 A, 292 W	23.5 kg	357 x 198 x 136

Float voltage setting according to DIN 41773	2.27 Vpc ± 1% at 20 to 25°C (68 to 77°F)
Float voltage with daily discharge cycles	2.29 Vpc – 2.30 Vpc (no correction factor needed)
Float voltage compensation in function of temperature	–2 to –4 mV/°C or with profile as displayed figure 1
Preferred operating temperature range	between 15°C (68°F) and 25°C (77°F)
Maximum long term operating temperature	+40°C (104°F) with ventilation assured (reduced service life)
Maximum short term operating temperature (for hours)	+50°C (122°F) with ventilation assured (reduced service life)
Service life expected at 20°C	15 years

Figure 1