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TECHNICAL STATEMENT

LIMITING CHARGING OF LITHIUM BATTERIES OUTSIDE OF "SAFEZONE" TEMPERATURES

TECHNICAL STATEMENT

1.0 BATTERY CHARGING RULES

With the adoption of Lithium batteries namely, Lithium Iron Phosphate ($LiFePO_4$), Lithium Nickel Manganese Colbolt Oxide ($Li(NiCoMn)O_2$) and Lithium Titanate Oxide (LTO) into the latest versions of the emergency luminaire and control gear standards there are now certain requirements with regards to the charging regime. The requirements are summarised below:

- The charger for the battery shall operate (charge) the cells in accordance with the battery manufacturers' declared design and declared safe working conditions;
- Charging of the battery shall only be carried out between *T*cmin (minimum charge temperature) and *T*cmax (maximum charge temperature) as declared by the manufacturer;
- In the absence of manufacturer declerations the values of *T*cmin and *T*cmax shall be taken from BS EN 61347-2-7:2012+A2:2022. For different types of Lithium battery the limits as per BS EN 61347-2-7: 2012+A2:2022 are as follows: 0°C and 55°C for $LiFePO_4$, 5°C and 40°C for $Li(NiCoMn)O_2$ and 0°C and 45°C for LTO;
- The battery charge shall not start (or continue) if the temperature of the battery is below the declared *T*cmin or above *T*cmax;
- Battery temperature sensors shall be installed in a position determined in conjunction with the battery manufacturer. If built into the battery, this would usually require 3 wires between the battery and controlgear;
- The battery temperature sensor's location shall be clearly marked on the label (or within the information sheet);
- The sensor location shall be positioned to reflect the maximum temperature of the battery pack.
- Note 2 of BS EN 60598-2-22:2022 Clause 22.7 allows for the temperature control to limit the charging outside of the 'safe zone' temperatures to be located either within the battery or as part of the controlgear.

Note: Controlgear with this feature would still pass the high temperature operation test in BS EN IEC 60598-2-22:2022 Clause 22.19 as the battery is only discharged for 1 hour at 70°C, having first been charged at ambient temperature for 24 hours. This means that, whilst the battery will not be charged for the 1 hour at 70°C there should be sufficient capacity in the battery to provide the required emergency operation for 30 minutes.

Note 2: Control gear shall be suitable for the specific battery technology used within the ESSS. Control gear suitable for one type of battery technology may not be suitable for other technologies.

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2.0 CHARGE INDICATORS

With the requirements for charging requiring the device to “stop” charging if the temperature is outside of the “safe zone” What should the charge indicator do? In this case BS EN IEC 60598-2-22:2022 Clause 22.7.7 prescribes that the indicator shall show the following conditions:

- The charge to the ESSS is connected and being maintained
- Circuit continuity exists (if using filament lamps)
- If used, electric light source indicators shall comply with the colour requirements in IEC 60073 and be green

As the luminaire is not being charged when operating outside the “safe zone” temperatures the indicator LED should reflect this i.e. be extinguished or in in the case of controlgear featuring an indicator LED/s with different colours indicate a state which shows charging has stopped.

The manufacturers instructions shall clearly state what the indicator LED operating and indication modes are.