External pressure measurement of cell decomposition in the esARC™ using the 18650 battery tank

Obtaining pressure data from battery decomposition tests in the standard esARC requires the use of a pressure-tight holder or tank to contain the gaseous products of the battery decomposition.

Smaller closed battery holders can be used, but due to the lack of void volume along with the energy of the battery decomposition, these holders will often rupture and not retain the gas released from the cell during a heat-wait-seek test.

The solution to this is to use a larger-volume pressure vessel to contain the gaseous products. For 18650, AA or smaller size batteries, THT offer the 18650 battery tank to fulfil this requirement:

The tank can hold a single 18650 battery. Internal volume is 400cm³. Maximum pressure is 20 bar. It is custom made and can be supplied with 4 or 6 ports. 2 ports are required for the introduction of the thermocouple into the tank, and to connect the pressure measurement line. Additional ports may be used for voltage monitoring wires, gas flushing, nitrogen inerting or for additional thermocouples.

The data shown below is from a commercial 18650 cell tested inside the battery tank in a standard calorimeter. Cell voltage was monitored during the test. The maximum pressure was 3.3 bar at 160°C. The exotherm onset temperature is 105°C.

Using the ideal gas equation this works out as 0.037 moles of gas, or 0.9 litres at STP. Here the gas is released after the test, but it may be retained for analysis if this is desired. Tanks with larger orifices to fit 26650 cells are also available. Contact THT for more info.

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