Crush Test Abuse Stand

This technology can be used in most applications for the performance of battery testing.

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The purpose of this system is to simulate an internal short on battery cells by causing deformation (a crushing force) in a cell without penetration. This is performed by activating a hydraulic cylinder on one side of a blast wall with a hydraulic pump located on the other. The operator can control the rate of the crush by monitoring a local pressure gauge connected to the hydraulic cylinder or a load cell digital display located at the hydraulic pump control area. The internal short simulated would be considered a worst-case scenario of a manufacturer’s defect. This is a catastrophic failure of a cell and could be a very destructive event.

Fully charged cells are to have an internal short simulated at the center of the length of the cell (away from terminals). The crush can be performed with a ½ to 1-in. (≈0.6 to 2.5-cm) rod placed crossways to the cell axis, causing deformation of the cell without penetration. The OCV (open-circuit voltage) and temperature of the cells, as well as the pressure and crushing force, are recorded during the operation. Occurrence of an internal short accompanied by any visible physical changes such as venting, fires, or explosions is reported. Typical analytical data examined after the test would be plots of voltage, temperature, and pressure or force versus time.

The rate of crushing force can be increased or decreased based on how fast the operator pumps the hydraulic pump. The size of cylinder used to compress the battery cell can be easily changed by adding larger or smaller fittings onto the end of the hydraulic cylinder based on the battery/cell size being tested. The cell is crushed remotely and videotaped, allowing the operator to closely monitor the situation from a safe distance.

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