ON-LINE DOCUMENTATION

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Chapter: 4

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# 4 Battery Construction

DURACELL standard-sized nickel-metal hydride batteries are constructed with cylindrical and prismatic nickel-metal hydride cells. DURACELL nickel-metal hydride batteries are a sealed construction designed for optimal performance and maximum safety. The batteries are manufactured to strict quality control standards to ensure reliability and consumer satisfaction and offer such features as:

- **High energy density** — Minimizes battery volume and weight
- **Wide voltage range** — Meets operating voltage requirements of 3C devices
- **Thin profiles** — Innovative wall-less design
- **Advanced interconnect** — Self securing, voltage-keyed interconnect provides a highly reliable battery-to-device contact
- **Durability** — Manufactured with LEXAN® and LUSTRAN® polycarbonate high impact and flame retardant polymers
- **UL listing** — Independent approval of battery use in devices

LEXAN® is a registered trademark of the General Electric Company.
LUSTRAN® is a registered trademark of the Monsanto Company.

## 4.1 Basic Cell Construction

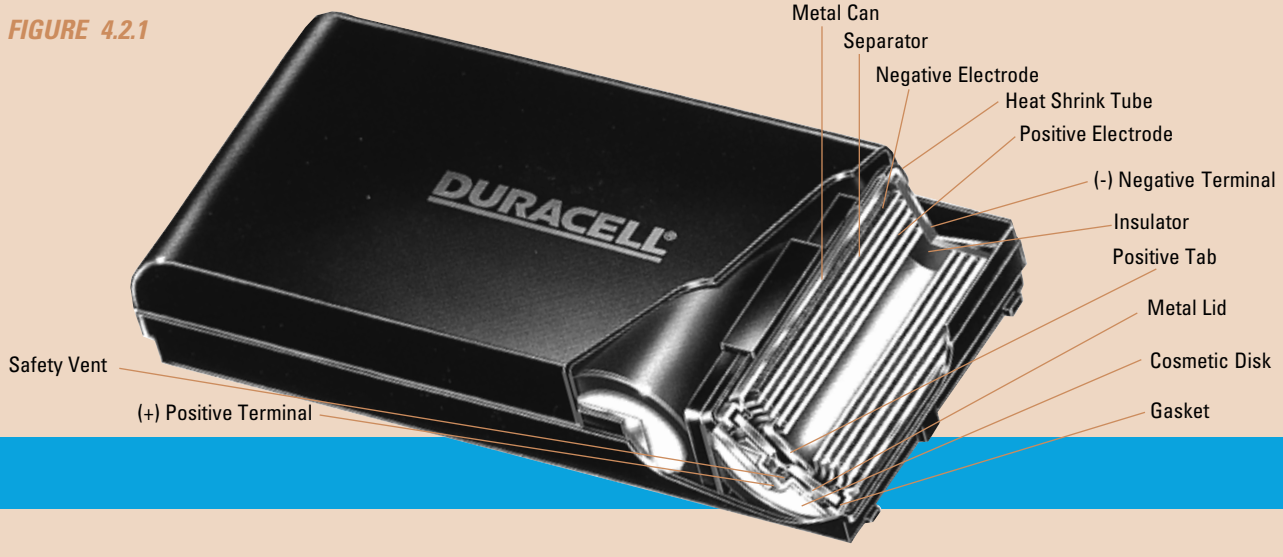
The electrodes in both cylindrical and prismatic cell configurations are designed with highly porous structures which have large surface areas to provide low internal resistance which results in superior high rate performance. The positive electrode in the cylindrical nickel-metal hydride cell is a highly porous nickel-felt substrate into which the nickel compounds are pasted. Similarly, the negative electrode is a perforated nickel-plated steel foil onto which the plastic-bonded, active hydrogen storage alloy is coated.

## 4.2 Cylindrical Cell Construction

The assembly of a cylindrical cell is shown in **Figure 4.2.1.** The electrodes are separated by the separator which is a synthetic, non-woven material that serves as an insulator between the two electrodes and as a medium for absorbing the electrolyte. The electrodes are spirally-wound and inserted into a cylindrical nickel-plated steel can. The electrolyte is added and contained within the pores of the electrodes and separator.

The positive electrode is connected to the metal lid with a tab. The cell is then sealed by crimping the top assembly to the can. The top assembly incorporates a resealable safety vent, a metal lid and a plastic gasket. A heat-shrink tube is placed over the metal can. The bottom of the metal can serves as the negative terminal and the metal lid as the positive terminal. The insulator and gasket insulate the terminals from each other. The vent provides additional safety by releasing any excess pressure that may build up if the battery is subjected to abusive conditions.

*FIGURE 4.2.1*



## Battery Construction (cont.)

### 4.3 Prismatic Cell Construction

The basic differences between the prismatic cell and the cylindrical cell are the construction of the electrodes and the shape of the can. Prismatic cells are designed to meet the needs of compact equipment where space for the battery is limited. The rectangular shape of the prismatic cell permits more efficient battery assembly by eliminating the voids that occur in a battery constructed with cylindrical cells. Thus, the volumetric energy density of a battery can be increased by constructing it with prismatic instead of cylindrical cells.

**Figure 4.3.1** shows the structure of the prismatic nickel-metal hydride cell. The electrodes are manufactured in a manner similar to those of the cylindrical cell, except that the finished electrodes are flat and rectangular in shape. The positive and negative electrodes are interspaced by separator sheets. The assembly is then placed in a nickel-plated steel can and the electrolyte is added. The positive electrodes are connected to the metal lid with a tab. The cell is then sealed by crimping the top assembly to the can. The top assembly incorporates a resealable safety vent, a metal lid and a plastic gasket that is similar to the one used in the cylindrical cell. A heat-shrink tube is placed over the metal can. The bottom of the metal can serves as the negative terminal and the top metal lid as the positive terminal. The insulator and gasket insulate the terminals from each other. The vent provides additional safety by releasing any excess pressure that may build up if the battery is subjected to abusive conditions.

*FIGURE 4.3.1*