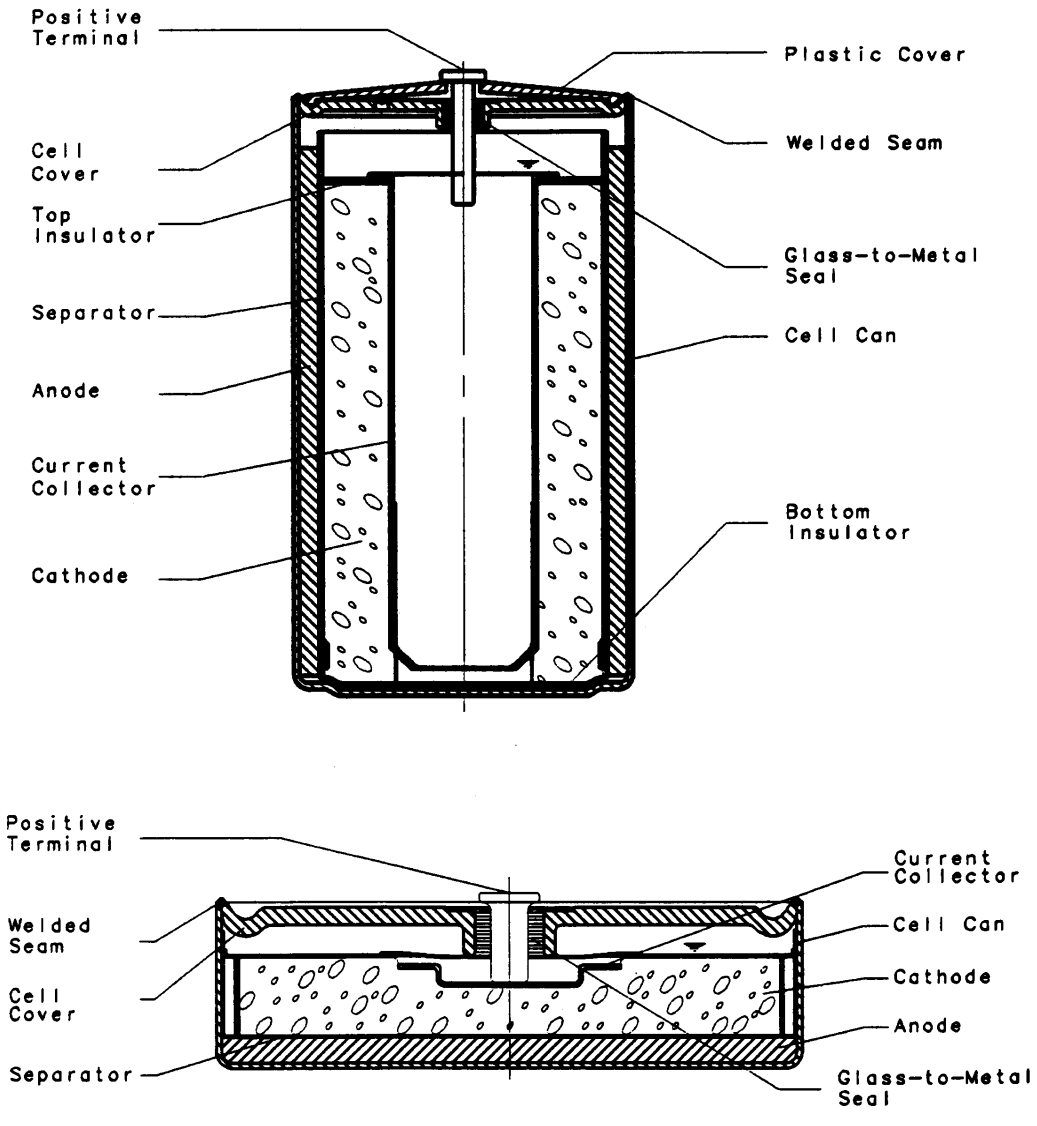
CELL DESIGN:

Mechanical Design

Tadiran Lithium Thionyl Chloride Cells are either of the cylindrical BOBBIN type, or of the flat WAFER type. The typical internal construction of each type is shown below.



Section Through the Tadiran Lithium 3.6V Cell

Cell Components and Materials

¨ Anode:
The anode is made of battery grade lithium foil, which is pressed on to the inner surface of the cell can to provide a mechanically sound and reliable electrical connection.

¨ Separator:
The separator, between the anode and the cathode, prevents internal shorts while enabling ions to move freely between the electrodes. It is made of non-woven glass, carefully selected for compatibility with the chemical system during prolonged storage and subsequent operation.

¨ Cathode:
The cathode is made of highly porous Teflon-bonded carbon powder. Thionyl Chloride cathodic reduction occurs on the cathode surface when a load is connected. The high porosity of the carbon results in a true surface area compatible with the current capability of the cell.

¨ Electrolyte:
The electrolyte is basically a solution of Lithium Aluminum Tetrachloride in Thionyl Chloride which is highly ionic conductive over the entire temperature range. This outstanding feature and the negligible mass transport loss in the electrochemical system, contribute to the outstanding voltage stability of lithium thionyl chloride cells. The low freezing point (-105ºC) and relatively high boiling point (>79ºC) of the electrolyte result in a battery capable of operating over a wide temperature range.

¨ Current Collector:
A metal current collector provides the electrical connection between the porous carbon cathode and the positive terminal of the battery.

¨ Can and Cover:
The cell can and cover are made of nickel-plated cold-rolled steel. The can is designed to withstand the mechanical stresses that would be encountered over the anticipated wide range of environmental service conditions.

¨ Hermetic Seal:
The positive (+) cell termination of the Tadiran lithium cell, is insulated from The cell cover, which is the negative (-) termination, by a glass-to-metal seal that uses compression sealing technology. In addition, the cell cover is welded to the cell can by a LASER seam welding process. The resultant ultra-high hermeticity and mechanical integrity are major contributors to the excellent shelf-life obtained.

Chemical Reaction

All Tadiran lithium cells are based on the same electrochemical system. The reactions during current flow are:

At the Anode:

$4Li \rightarrow 4Li^{+} 4e^{-}$

At the Cathode:

$2SOCL_2 \rightarrow SO_2 + S + 3Cl^{-} - 4e^{-}$

(on the carbon surface)

Overall:

$4Li + 2SOCl_2 \rightarrow 4LiCl + S + SO_2$

Most of the SO_2 formed during cell discharge is dissolved in the electrolyte and cathode. This accounts for the low internal cell pressure before, during and after normal discharge.