Important or Pertinent Material Lexicon

RTI or Relative Thermal Index

A measure of the long term durability of a resin (plastic) as it ages as defined by UL or Underwriters Laboratories in standard UL 746B. Materials can deteriorate with age, time or use. In this case the material is aged for 5000 hours at the rated temperature. The allowed deterioration is 50%. This would apply independently to mechanical properties without impact, mechanical properties with impact and electrical properties. This testing is a trial and error process where if it fails we would have to do the test at a lower rating and so forth.. The results of tests done by UL can be seen on UL websites certification files for plastics for RTI mechanical with and without impact and electrical and files for terminal blocks at the chosen RTI.

UL94

An often-used measure of inflammability as defined by UL94, the most popular being the Section 8: 20 mm Vertical Burning Test; 94V-0, 94V-1 or 94V-2. It involves exposing the plastic resin or terminal block to a small blowtorch flame for a certain time. The molten plastic then drips onto cotton. The flame is removed. Two things are important. Does the cotton ignite and how long does it take the flame on the plastic itself to extinguish when the blowtorch flame is removed.

Table 8.1 MATERIALS CLASSIFICATIONS

The Criteria Conditions	94V-0	94V-1	94V-2
Afterflame time for each individual specimen	<=10s	<=30s	<=30s
Total afterflame time for any condition	<=50s	<=250s	<=250s
Afterflame plus afterglow time for each individual specimen after a second flame application	<=30s	<=60s	<=60s
Afterflame or afterglow of any specimen up to holding clamp	No	No	No]
Cotton indicator ignited by flaming particles or drops	No	No	No

The above are done on specifically sized resin samples. If the resin is used in thinner sections than allowed then further tests must be done for those thinner specimens according to section 11: Thin Material Vertical Burning Test; 94VTM-0, 94VTM-1 or 94VTM-2. The Section 7: Horizontal Burning Test; 94HB is not often used in the terminal block field.

Oxygen Index

A measure of inflammability defined by ASTM D2863-91; Oxygen Index for Candle-like Combustion. It is the proportion of oxygen required in an oxygen-nitrogen mixture to support a candle-like flame. Air has about 21 % oxygen. So a resin that has an oxygen index of 32% requires air that is enriched with oxygen in order to sustain a candle-like flame. Less and it would extinguish and more and the flame would be more powerful. A high oxygen index number is better than a low one.

Comparative Tracking Index (CTI)

Comparative Tracking Index of electrical insulation materials is the voltage, that causes a permanent electrically conductive carbon path with the application of 50 drops of electrolyte that is applied in the rate of one drop every 30 seconds. CTI is a result of test used as a measure of susceptibility of the material to tracking. UL 746A is giving the level categories related to this test:

Table 22.1

COMPARATIVE TRACKING PERFORMANCE LEVEL CATEGORIES

Range-tracking index (V)	Assigned PLC
600 <= TI	0
400 <= TI < 600	1
250 <= TI < 400	2
175 <= TI < 250	3
100 <= TI < 175	4
0 <= TI < 100	5

Metal Plating

A coating applied to metal substrates to enhance its surface properties. It can be electrolytically, electroless plated or hot dipped or other process.

- On steel a galvanic corrosion protections has the advantage of protecting even when scratched or porous. This protection can often be zinc plating then covered by a yellow or clear chromate passivation passivated layer. A long life corrosion free life for normal applications.
- On steel a noble layer or passive layer such a nickel, gold or tin may prevent corrosion if it is thick and impermeable enough and not damaged by abrasions.
- A solderable layer is usually required to aid in wave or reflow soldering of solderable components such as solder leads and PCB pins. Tin, silver and gold are all very solderable.
- A barrier layer is a layer that prevents the substrate metal from being in contact with the surface layer of metal plating. This is to prevent or slow down the formation of intermetallic compounds that may not be solderable and for other reasons. Nickel over brass and under tin is such a barrier.

Metal Spring Materials and Fasteners

A property called stress relaxation is important here. Materials that have good stress relaxation properties with regards to springs and fasteners are materials that do not stress relax quickly. Stress relaxation is a creep type phenomenon whereby a material microstructure changes under stress (being stretched, bent or compressed) over a period of time. Time and temperature are a factor here. Certain metals are very good and others not. Certain steels and bronzes have good properties.

Dielectric Withstand Voltage

This is a UL or CSA safety factor test. They apply a voltage that is twice the rated voltage plus 1000 V for one minute at 60 periods per second (Hz). This is for low voltage applications at rating of 50 to 1000 V.

Impulse Withstand Voltage

An IEC 664-1 defined test that tries to emulate the effects of voltages surges. High voltages for short periods of time characterize these tests. They try to emulate the voltages caused by lightning strikes near buildings that would affect electrical components and equipment located at different locations inside buildings. Different waveforms and pulses are defined such as the 100 kHz Ring Wave, the Combination Wave Open Circuit Voltage and the Combination Short Circuit Current. Times involved can be1 to 50 microseconds and voltages up to 12,000 V.