

# IEC 61010: 6.1.2

- If any of the parts receive a charge from an internal capacitor, they shall not be hazardous live 10s after interruption of the supply.
  - 6.3.1a The voltage levels are 33V rms 46.7V peak or 70V dc (in normal conditions)

# IEC 60065: 9.1.6

- Apparatus intended to be connected to the mains by a mains plug shall be so designed that there is no risk of an electric shock from stored charge on the capacitors when touching the pins or contacts on the plug after its withdrawal from the socket outlet...
  - 2 seconds after the withdrawal of the mains plug, the pins or contacts of the plug shall not be hazardous live
  - 9.1.1 A part is not hazardous live if the open circuit voltage does not exceed 35V (peak) ac or 60V dc
  - The test MAY repeated up to 10 times to determine the most unfavorable situation.

# IEC 60950: 1 2.1.1.7

- Equipment shall be so designed that, at an external point of disconnection of an ac mains supply...the risk of electric shock from stored charge on capacitors connected in the equipment is reduced.
  - (The circuit has a means of discharge) resulting in a time constant not exceeding 1s for pluggable type equipment...  
Note: during an interval for one time constant, the voltage will have decayed to 37% of its original value.
  - The relative time constant is the product of the effective capacitance.... And the effective discharge resistance.... If it is difficult to determine (these) values, a measurement of voltage decay at the point of external disconnection can be used.

# IEC 60335-1 :22.5

- Appliances intended to be connected to supply mains by means of a plug shall be constructed so that in normal use there is no risk of electric shock from charged capacitors when the pins of the plug are touched. ...
  - One second after disconnection, the voltage between the pins of the plug is measured with an instrument that does not appreciably affect the value to be measured. The voltage shall not exceed 34V.
    - The test is performed 10 times.

# Whole Group Activity:

- Using the summarised information provided (plus experience...) to populate the table.

standard	voltage limit	time elapsed to measure	special instructions/notes
61010			
60065			
60950			
60335			



# Discussion questions for group

- What voltage comprises “hazardous live”
  
- Under what circumstances would “discharge” after disconnection of the circuit not be dc volts?