



## UL 1977

There are several standards which deal with plug and receptacle. Each of them is only for a small area of applications. It could be telecommunication, Etc. The UL 1977 covers single and multipole connectors intended for factory assembly.

Requirements apply to devices in taking into account intensity and voltage. There are categories as follows:

	0	30 V (42 V peak)	600 V
0	Type 0	Type 1A	
8.3 A			
31 A	Type 1B	Type 2	
200 A		Type 3	
1000 A	Type 4		

According to above table, the level of performance that has to be reached could be different. Most of them are explained in the following page.

### Insulating materials:

Material used for electrical insulation, as a minimum, have to comply with the characteristics shown below:

• Minimum ratings for polymeric materials

Type	Flame rating	Relative thermal index (RTI) Electrical/mechanical w/o impact **/**
0	-	50/50
1A	HB	50/50
1B	HB	50/50
2	HB	50/50
3	HB	50/50
4	HB	50/50

\* The RTI of the material shall not be lower than the temperature measured during the Temperature Test.

\*\* For a thickness less than that for which a value has been established, the RTI of the minimum thickness with an established value shall be used.

### Assembly:

Connector has to be keyed to prevent any mismatching that can damage the machine or hurt the user. In the same way, plugs and sockets have to be equipped to protect persons against contact with live parts.

Finally the identified grounding contact shall be located so that the corresponding electrical continuity has to be completed before any other contact.



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### Spacing:

For a 250V max connector, distance through air or over material shall be 1.2mm whereas from 250V to 600V connector the spacing is 3.2 minimum. These distances have to be taken between uninsulated live parts as shown in the matrix below:

• **Applicability of spacing requirements**

Type	Uninsulated live part - uninsulated live part of opposite polarity	Uninsulated live part - uninsulated grounded metal part	Uninsulated live part - exposed dead metal part
0	No	No	No
1A	Yes	Yes	Yes
1B	Yes	Yes	No
2	Yes	Yes	Yes
3	Yes	Yes	Yes
4	Yes	Yes	Yes

An alternative way to determine voltage rating is with the Dielectric-Withstand test. If during one minute there is no arc-over or breakdown the rated voltage is given as given below:

- a) 500 volts for a type 1B device
- b) 1000 volts plus twice rated voltage for types 1A, 2, 3 and 4 devices.

### Marking:

A device shall be legibly marked with the manufacturer's trade name, trade mark, or other descriptive marking by which the organisation responsible for the product may be identified. (Exception: If the device is too small, or where the legibility would be difficult to attain, the manufacturer's name, trademark, or other descriptive marking may appear on the smallest unit container or carton)

The following shall be marked on the device or on the smallest unit container or carton or on a stuffer sheet in the smallest unit container or carton:

- a) The catalogue number or an equivalent designation
- b) The electrical rating in both volts and amperes, if assigned
- c) Whether ac or dc, if restricted
- d) Flammability class, if identified

Example - Marking for the arrangement 10-3: 