

Touch Current Measurement on workplace electrical equipment

Test & Measurement
Sector

Position Paper

Contents

Background	2
Touch current limits	2

Background

Historically, in the absence of a relevant standard, persons performing routine tests on electrical equipment used in the workplace have followed the guidance given in the IET Code of Practice for In-service Inspection and Testing of Electrical Equipment. Recently, BSI published two new standards: BS EN 50678 *General procedure for verifying the effectiveness of protective measures of electrical equipment after repair* and BS EN 50699 *Recurrent Test of Electrical Equipment*.

In many respects, the newly published standards endorse the guidance given in the IET Code Practice, however there is a significant difference with respect to the limits given for the maximum allowable touch current.

Touch current limits

The standard IEC 60479-1 *Effects of current on human beings and livestock Part 1: General aspects* is a basic safety publication. It is intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 104 *The preparation of safety publications and the use of basic safety publications and group safety publications* and ISO/IEC Guide 51 *Safety aspects – Guidelines for their inclusion in standards*.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications.

IEC 60479-1:2018 Table 11 shows the physiological effects for different current levels of AC 15 Hz to 100 Hz for hand to feet pathway. The physiological effects for currents not exceeding 0.5 mA are possible perception but usually no 'startled' reaction. This limit of 0.5 mA is generally applied as the limit for touch current in product standards to ensure conformity with basic safety publications.

Both BS EN 50678 and BS EN 50699 specify a maximum touch current value of 0.5mA. These standards also state that if the limit is exceeded, the limits given in the relevant product standard or limits from the manufacturer of the equipment under test should be applied.

Much of the equipment used in the workplace falls within the scope of BS EN 62368-1 *Audio/video, information and communication technology equipment* or BS EN 61010-1 *Safety requirements for electrical equipment for measurement, control and laboratory use*. BS EN 62368-1 states that bare parts at ES2 shall not be accessible to ordinary persons. Accessible conductive parts must therefore be ES1, which limits the potential touch current to 0.5 mA for AC waveforms up to 1 kHz. The current limit in BS EN 61010-1 for accessible parts in normal condition is 0.5 mA for sinusoidal waveforms.

This is summarised in the table below:

Standard	Application	Touch current limit (mA)
BS EN 61010-1	Measurement, control and laboratory equipment	0.5
BS EN 62368-1	Audio/video, information and communication technology equipment	0.5
BS EN 50678	General procedure for verifying the effectiveness of protective measures of electrical equipment after repair	0.5
BS EN 50699	Recurrent Test of Electrical Equipment	0.5

In the revised IET Code of Practice, the limit value for touch current has been increased from 0.25 mA to 5 mA. This is an order of magnitude greater than the limit value in BS EN 50678, BS EN 50699, the applicable product standards and basic safety publication IEC 60479-1. Whilst this level of current may be unlikely to present a risk of injury due to electric shock, it is sufficient to cause a startle reaction, where involuntary action can lead to indirect injuries, for example whilst operating power tools.

Test instrument manufacturers commonly configure test equipment with threshold values or pass/fail limits. Applying the touch current limit of 5 mA from the IET CoP could result in users of electrical equipment reporting that they have received an electric shock, even though the equipment under test meets the requirements of the IET Code of Practice.

Gambica members configure their test equipment to conform to the touch current limit specified by BS EN 50678 / BS EN 50699 i.e. 0.5 mA.



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