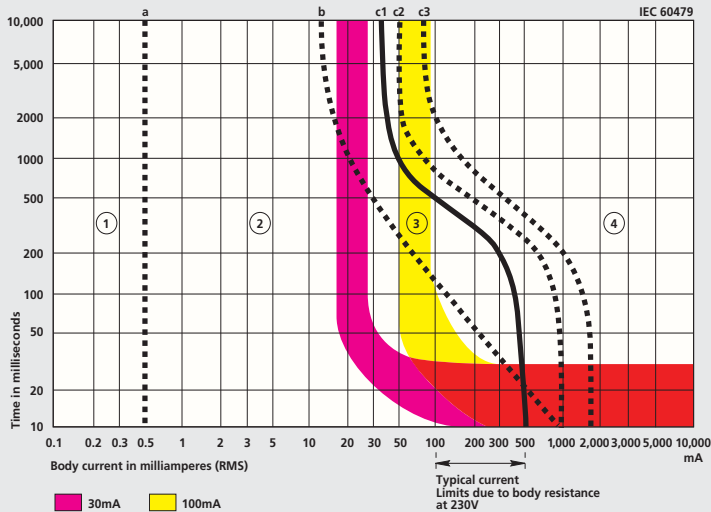


IEC PUBLICATION (60479) CURVES WITH WYLEX RCD CHARACTERISTICS SUPERIMPOSED

TIME/CURRENT ZONES OF EFFECT OF AC CURRENT (15–100Hz) ON PERSONS



Zone Physiological effects

- 1 Usually no reaction effects (no danger).
- 2 Usually no harmful physiological effects (usually no effects).
- 3 Usually no organic damage to be expected. Likelihood of muscular contraction and difficulty of breathing, reversible disturbances of formation and conduction of impulses in the heart, and transient cardiac arrest without ventricular fibrillation increases with current magnitude and time.
- 4 In addition to the effects of zone 3, probability of ventricular fibrillation increased up to 5% (Curve C2), up to 50% (Curve C3) and above 50% beyond Curve C3. Increasing with magnitude and time, pathophysiological effects such as cardiac arrest, breathing arrest and heavy burns may occur.

18TH EDITION SELECTION OF RCDs (RCCBS)

A number of different RCDs are available due to their behaviour when the presence of Direct Current components and frequencies that may exist on the electrical installation. The appropriate RCD may be selected from the following:

Type AC

RCDs for which tripping is ensured for residual sinusoidal alternating currents, whether suddenly applied or smoothly increasing.

Type A

RCDs for which tripping is ensured for residual sinusoidal alternating currents and pulsating direct residual currents, whether suddenly applied or smoothly increasing. Tripping is achieved for residual pulsating DC superimposed on a smooth DC current up to 6mA.

Type F

RCDs having all the protective elements of a Type A RCD but additionally suitable for detecting residual currents from mixed frequencies of up to 1kHz. Tripping is achieved for residual pulsating DC superimposed on a smooth DC current up to 10mA.

Type B

RCDs that will detect both the residual current waveforms of a Type F and residual smooth DC currents.

In addition, within the BS7671 wiring regulations, Part 7 - Section 722 includes specific requirements for Electric Vehicles – Type A or B maybe required and Section 712 Solar Photovoltaic (PV) power systems Type B may be required.

OPERATION

The RCD employs the current balance principle which involves the supply conductors to the load (phase and neutral) being wound onto a common transformer core to form the primary windings. Under healthy circuit conditions, the current in the phase conductor is equal to the current in the neutral, and the vector sum of the current is zero.

In the event of an earth fault, an amount of current will flow to earth, creating an out of balance situation in the transformer assembly.

This out of balance is detected by the secondary winding of the transformer and at a pre-determined level of out of balance will activate the trip mechanism.

Single phase and neutral or three phase and neutral units (suitable for 3 or 4 wire systems) are available, the latter being suitable for balanced or unbalanced 3 phase loads.

The RCD trip mechanism will operate at a residual current of between 50–100% of its rating tripping current (sensitivity).

TRANSIENT EARTH LEAKAGE (PE) CURRENTS

All Wylex residual current devices incorporate a high level of immunity to tripping when subjected to transient earth leakage currents.

Such transients can occur when there is a significant level of capacitance to earth as can result from cable capacitance (particularly MICC) or RF filter networks. Wylex RCDs are therefore less susceptible to nuisance tripping due to transient earth leakage currents.

To help to avoid unwanted tripping of RCDs from PE currents leaking through the protective conductor during normal (non-fault) operating conditions, BS7671 wiring regulation 531.3.2 (ii) states the accumulated leakage current should be less than 30% of the RCD rating e.g. for a 30mA device this should be no more than 9mA. Designers should also take into consideration (i) Subdivision of circuits with individual associated RCDs and shall be selected in such a way that any earth leakage (PE) current likely to occur will not cause unwanted tripping of the RCD. See also Section 314.

RESIDUAL TRIPPING CURRENTS

10mA - Used in special applications where additional protection against contact is essential due to the nature of the installation.

30mA - Tripping current designated by the IEE Wiring Regulations to provide additional protection.

100mA - Suitable for use where protection is provided to guard against firehazard, etc, rather than to provide additional protection to personnel, and where the earthing requirements need supplementing by RCD protection.

100mA time delay - Suitable for use when total RCD protection is required to supplement the system earthing and where local 30mA RCDs are used to give additional protection. The time delay RCD will discriminate with the 30mA RCD.

300mA - For use in large installations where plant and equipment protection are the main considerations and high levels of earth leakage are experienced.

If using RCDs in series, discrimination can only be achieved by using Type S devices in series with Types A or AC.