

Australian Standard[®]

**Recommended practices for
protection of low-voltage electrical
installations and equipment in
MEN systems from transient
overvoltages**

This Australian Standard was prepared by Committee EL/7, Power Switchgear. It was approved on behalf of the Council of Standards Australia on 17 August 1992 and published on 12 October 1992.

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Australian-British Chamber of Commerce
Australian Electrical and Electronic Manufacturers Association
Confederation of Australian Industry
Electrical Supply Association of Australia
Institution of Engineers, Australia
Railways of Australia Committee
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PREFACE

This Standard was prepared by the Standards Australia Committee on Power Switchgear for the guidance of electricians, electrical contractors, designers and switchboard manufacturers in the protection of electrical installations and equipment from transient overvoltages.

It covers the installation of surge arresters for the protection of equipment and wiring from transient voltages exceeding 2.5 kV due to lightning discharges and switching.

Manufacturers of electrical equipment designed for IEC 664* Installation Category II should recommend the protection of electrical installations in accordance with this Standard before connecting the equipment.

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* IEC 664, *Insulation co-ordination within low-voltage systems including clearances and creepage distances for equipment*

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FOREWORD

Electrical equipment designed to meet the requirements of Australian and International Standards is being produced in increasing quantities for connection to overvoltage protected installations complying with Installation Category II in accordance with IEC 664.

For electrical installations in which the maximum phase-to-earth r.m.s. voltage exceeds 150 V but does not exceed 300 V, IEC 664 gives the following four installation categories with maximum impulse voltage levels:

- Installation Category I: 1500 V.
- Installation Category II: 2500 V.
- Installation Category III: 4000 V.
- Installation Category IV: 6000 V.

IEC 664 states that the installation category of overvoltage protected installations may vary from Category IV at the entry point, decreasing through the lower categories to Category I for connection of equipment most sensitive to transient overvoltages.

Insulation co-ordination is achieved by ensuring that equipment is not subjected to transient overvoltages higher than those permitted for the insulation category concerned and that equipment connected to that part of the installation does not produce switching overvoltages greater than the impulse voltages permitted for that installation category.

Overvoltages due to lightning may be attenuated by the distributed series inductances and shunt capacitances of circuit wiring, the breakdown of switch contact gaps, the introduction of load impedances, and connected loads. However, these effects should not be relied upon to afford any protection to equipment, as voltage sensitive equipment could be connected only a short distance from the main switchboard.

The intent of this Standard is to provide a system of protection against transient overvoltages due to lightning discharges arriving at the switchboard and switching under certain circumstances. A system of protection is recommended in this Standard for Installation Category II only, and manufacturers of equipment which is not able to withstand transient overvoltages of 2500 V are advised to provide additional protection.

Equipment at a distance from a transient overvoltage limiting (TOVL) device may be subject to locally produced overvoltages which are not limited fully by a remote TOVL. The voltage locally depends on the magnitude and rate of the switching overvoltage, the distance to the TOVL, the voltage distribution along this distance, the operating time of the TOVL, etc. A local TOVL should be installed in this case.

The protection recommended in this Standard will reduce the incidence of unwanted tripping of residual current devices, due to lightning overvoltages, when they are connected on the load side of the recommended surge arresters.