

AS 2772.2—1988

Australian Standard[®]

Radiofrequency radiation

**Part 2: Principles and methods of
measurement—300 kHz to 100 GHz**

This Australian Standard was prepared by Committee TE/7, Hazards of Non-ionizing Radiation. It was approved on behalf of the Council of the Standards Association of Australia on 25 November 1987 and published on 7 March 1988.

The following interests are represented on Committee TE/7:

Australian Electronic Industry Association
Australian Radiation Protection Association
Confederation of Australian Industry
Consumer Electronics Suppliers Association
CSIRO Division of Applied Physics
Department of Community Services and Health
Department of Transport and Communications
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This Standard was issued in draft form for comment as DR 86160.

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First published as AS 2772.2—1988.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 4838 X

PREFACE

This draft Standard was prepared by the Association's Committee on Hazards of Non-ionizing Radiation. The techniques discussed apply to radiofrequency (RF) electromagnetic radiation in the frequency range 300 kHz to 100 GHz. In preparing this draft attention was paid to ANSI C95.3 and ANSI C95.5,* for which acknowledgement is due for the assistance received therefrom.

Except for light, electromagnetic radiation is not visible and its presence must be measured by instruments or approximated by theoretical calculations. This draft specifies techniques and instrumentation for the measurement of potentially hazardous electromagnetic fields as defined in Part 1 of this Standard. The techniques apply to both the near-field and the far-field of the source of the electromagnetic radiation. No single measurement technique or instrumentation configuration is suitable for such a wide frequency range. Furthermore, most older instruments are not designed specifically for hazardous purposes and are incapable of performing the accurate near-field measurements required to evaluate hazardous situations, e.g. below 300 MHz field-strength measurements are often required within one wavelength of the source.

* ANSI C95.3 Techniques and instrumentation for the measurement of potentially hazardous electromagnetic radiation.

ANSI C95.5 Recommended practice for the measurement of hazardous RF electromagnetic fields.

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FOREWORD

The evaluation of potentially hazardous fields is not a subject for persons who are unaware of the dangers of the situation in which they may find themselves. It is also a task which should be performed only by the technically competent, if the correct assessment is to be made. This may seem strange given the ready availability of instrumentation claimed to be simple to use, robust and accurate, but is nevertheless true. The measuring or survey instruments may well be all these things but they are, however, deceptively simple and the situations that are required to be surveyed may be anything but simple when actually attempted.

This is not to say that simple instruments cannot be used to give warning of a hazardous situation. It means however, that reliance must not be placed on such instruments to evaluate situations for which they are not intended. Survey instruments must be selected to match the operating conditions of the equipment to be measured. Measurement techniques as explained in this Standard must be carefully followed. Survey instruments must be regularly calibrated, and checked against known signals to ensure that their calibration is still accurate before undertaking a survey.

The surveyor should take care to observe the occupational limits set in AS 2772, being especially careful not to disregard the time limits for limited period exposure in fields with levels of the recommended maximum exposure limits.

The surveyor should estimate the expected field strength and, selecting the appropriate instrument, proceed with the survey using a high-power probe to avoid inadvertent probe burnout. The instrument should be set on the most sensitive setting to avoid possible over-exposure of the surveyor.

For accurate measurements in the near field, where many surveys must be performed, an electrically small sensor is required since large gradients in field components exist and spatial resolution is critical. Unless the polarization of the field is known, or can be deduced, then the use of an isotropic probe is recommended. A probe with a single axis requires measurement in all three directions to ensure that all components have been measured. If this latter approach is used the field must also be time-invariant.

Accessible positions as well as those normally occupied by any personnel must be surveyed. All objects likely to reflect energy, including the operator, should be in their normal positions. Only if all these factors are carefully observed is the survey likely to be meaningful.

A flowchart to explain the measurement system of this Standard is given in Figure 1.

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