

Schedule 1

Conditions about electromagnetic energy

1 Interpretation

ARPANSA standard is the “Radiation Protection Standard for Limiting Exposure to Radiofrequency Fields – 100 kHz to 300 GHz” (2021) published by the Australian Radiation Protection and Nuclear Safety Agency or a later document.

Note: The ARPANSA standard is available, free of charge, from the Australian Radiation Protection and Nuclear Safety Agency's website at www.arpansa.gov.au. Goto <https://www.arpansa.gov.au/regulation-and-licensing/regulatory-publications/radiation-protection-series/codes-and-standards/rpss-1>

A **Controlled Area** is an area or place in which exposure to RF fields may reasonably be expected to exceed general public exposure limits, and with the following characteristics:

- (a) The area is under the management of a Responsible Person (see 5.1.3) who must ensure that exposures do not exceed occupational exposure limits.
- (b) The area is only to be entered by persons who have been provided with information, training and instruction on RF safety appropriate to the nature of their proposed activity within the Controlled Area.
- (c) There is documentation or signage to clearly indicate:
 - (i) areas above occupational exposure limits
 - (ii) areas above general public exposure limits
 - (iii) the Responsible Person and contact details.

ARPANSA standard 5.1.2

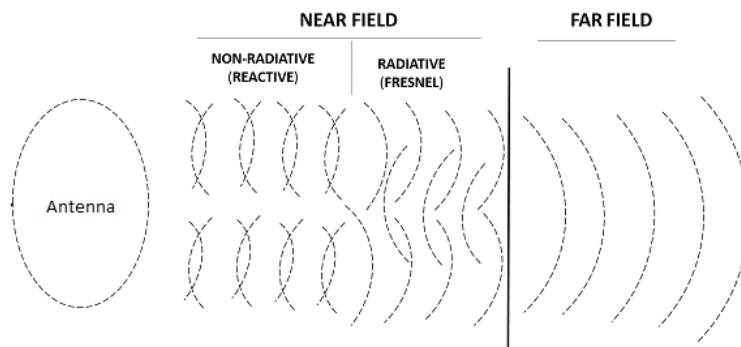
Controlled Area Worker: A person, other than an RF Worker, who may be required to work in a Controlled Area. [ARPANSA standard 5.1.1](#)

Antenna Fields.

The signal from an antenna varies as a function of distance from the antenna. These distances are broadly divided into two regions, the near-field region, and the far field region.

The near field is unpredictable, and no measurements are usually made in this region.

In the Far Field the EM fields are dominated by radiating E and H-fields are at right angles to each other and in line with the direction of propagation.



Far Field. The regulation defines the far field of an antenna as the region from the antenna that is beyond the larger of the following.

- $2 D^2 \div \lambda$
- 0.5λ

λ = wavelength

D = maximum lineal dimension of the antenna.

A far field calculator can be found [HERE](#).

Example: Frequency = 14.3 MHz and the antenna length is 10 metres.

$$\lambda = 20.964 \text{ m}$$

$$\begin{aligned} \text{Far field} &= \frac{2 \times D^2}{\lambda} \\ &= \frac{2 \times 10^2}{20.964} \\ &= \frac{200}{20.964} \\ &= 9.53993312 \text{ metres} \end{aligned}$$

Effective isotropic radiated power (EIRP) is the hypothetical power that would have to be radiated by an isotropic antenna to give the same ("equivalent") signal strength as the actual source antenna in the direction of the antenna's strongest beam.

Member of the general public most other people.

Reference levels are complex and dependant on exposure, frequency and area of exposure. [ARPANSA standard Section 2 and 3](#).

RF worker is a person who may be occupationally exposed to RF fields in the course of and intrinsic to the nature of their work. [ARPANSA standard 5.1.1](#)

Supervised visitor to RF sites who are under the direct supervision of a Responsible Person/RF Worker/Controlled Area Worker and may be exposed above general public limits but below occupational limits while transiting Controlled Areas. [ARPANSA standard 5.1.1 \(d\)](#)

Member of the general public means a person other than a person who may be exposed to radiofrequency fields under controlled conditions, in the course of and intrinsic to the nature of their work.

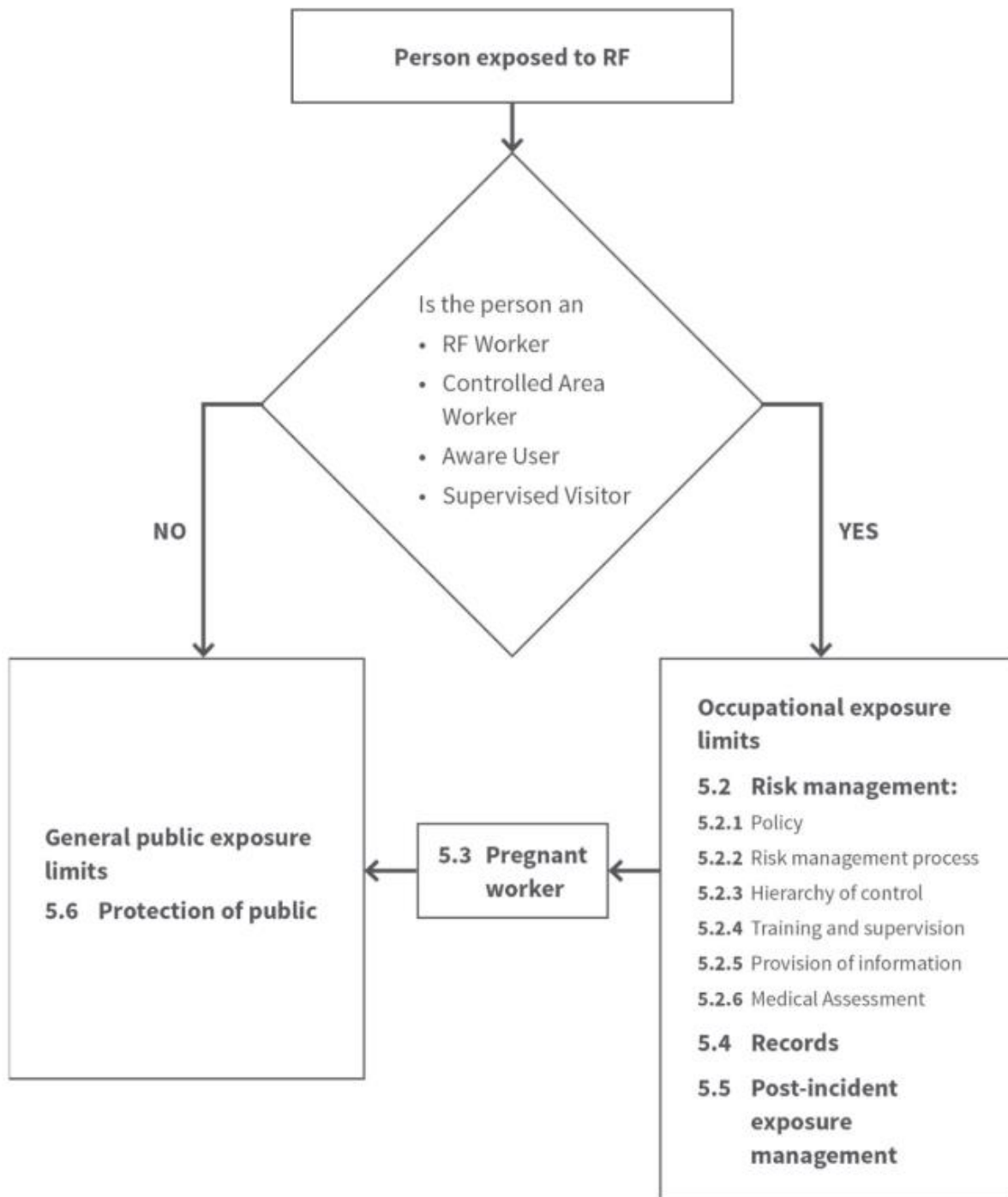
2 Condition – compliance with electromagnetic standard

General

1. A person must not operate an amateur station if the radiofrequency field produced by the station exceeds the reference levels for general public exposure at a place accessible to a member of the general public.

The flow chart, reproduced below, is extracted from the [ARPANSA standard page 20](#). The numbers refer to the paragraphs in the [ARPANSA standard](#).

Management of radio frequency (RF) exposure



To show compliance to the exposure levels the following properties needs to be measured or calculated in the **far field** of the antenna.

Frequency band 10 – 30 MHz

- The incident electric field strength.
- The incident magnetic field strength.

Frequency band 30 MHz – 2 GHz

- The incident electric field strength.
- The incident magnetic field strength.
- Incident power density

Frequency band over 2 GHz

- Incident power density

Meaning

Incident electric field strength (E_{inc}) is the electric field incident on the body surface, expressed in volt per metre (V/m).

Incident magnetic field strength (H_{inc}) is the magnetic field incident on the body surface, expressed in ampere per metre (A/m).

Incident power density (S_{inc}) is the rate of RF energy through a unit area incident on the body surface, expressed in watt per square metre (W/m²).

Simultaneous exposure to multiple frequency fields

An operator must not transmit simultaneously on multiple frequencies unless the station meets the requirements of [ARPANSA standard Section 3](#).

3 Presumptions about compliance with the condition in sub clause 2 (1) – low risk station.

Application

Subclause 2 (1) states:

A person must not operate an amateur station if the radiofrequency field produced by the station exceeds the reference levels for general public exposure at a place accessible to a member of the general public.

This applies to an amateur station (not a mobile station) where:

- The power to the antenna is not more than 100 Watts and the antennas are not accessible to the general public.
- or
- The lowest feed point is 10 metres above the ground and the average EIRP is not more than 3200 watts in any direction.

Victorian Building Regulations 2018

Section 97 Masts, poles etc.

(1) A mast, pole, aerial, antenna, chimney, flue or service pipe—

(a) when attached to a building, must not exceed a height of 3 m above the highest point of the roof of the building; or

(b) when not attached to a building, must not exceed 8 m above the ground level.

(2) The report and consent of the relevant council must be obtained to an application for a building permit in relation to a design that does not comply with this regulation.

Check your local council or State authority for the regulations in your area.

- A mobile station where the average total power to the antenna is not more than 100 W and the antenna is not accessible to the public.

Presumption

3. The operator needs documentation to prove the station complies with sub clause 2 (1) above.
4. The station also complies with sub clause 2 (1) if:
 - There is more than one station on site and
 - Calculations made for all sites: and
 - Documentation proves compliance with sub clause 2 (1): and
 - The operator is in possession of documentation showing the calculations and measurement prove the site complies with sub clause 2 (1).

4 Condition – Measurements or calculations of electromagnetic energy - high risk stations.

Application

1. This applies to all other amateur stations excluding the low-risk stations in Clause 3.
2. An operator must not operate a high-risk station unless the person has calculated or measured the radio frequency fields in accordance with one of the following.

(a) if **AS/NZS 2772.2** applies in relation to the station – AS/NZS 2772.2

(Cost \$ to buy and 144 pages)

[AS/NZS 2772.2 Radiofrequency fields Part 2: Principles and methods of measurement and computation—3 kHz to 300 GHz](#)

SCOPE

This Standard specifies requirements for, and provides guidance on, assessing compliance with the exposure limits of radiofrequency (RF) safety standards such as ARPANSA Standard RPS3 or New Zealand Standard NZS 2772.1. This includes methodologies for making an assessment (by measurement or computation) of human exposure to ambient RF fields and induced body currents in the frequency range of 3 kHz to 300 GHz. This Standard also sets out processes for calculating the basic restrictions' quantities (such as specific absorption rate (SAR) and induced current density) in the relevant standards and addresses SAR measurement.

This Standard provides appropriate methodologies for measurement techniques and instrumentation selection, computational techniques and the determination of the uncertainty of exposure assessments and its use in assessing compliance with applicable exposure limits.

The assessment methodologies provided in this Standard may be applied for all types of RF exposure situations including exposure to—

- (a) leakage fields.
- (b) radiated fields; and
- (c) reactive fields.

NOTE: Leakage fields generally imply unintentional leakage of energy, whereas radiated fields are considered primarily to be intentionally radiated RF fields. Reactive fields are present in the immediate vicinity of all sources or re-radiating objects.

This Standard is applicable to the compliance assessment of RF exposures from most kinds of RF sources including—

- (i) broadcast installations.
- (ii) radiocommunication base stations and facilities.
- (iii) radar installations.
- (iv) medical applications such as diathermy machines.
- (v) industrial applications, including RF welders, heaters and induction heaters.
- (vi) wireless charging devices; and
- (vii) scientific applications.

(b) if **C95.3** applies in relation to the station – C95.3.

(Free)

[IEEE C95.3 Recommended Practice for Measurements and Computations of Electric, Magnetic, and Electromagnetic Fields with Respect to Human Exposure to Such Fields, 0 Hz to 300 GHz](#)

Best practices are described for the development, validation, and application of methods for the computation and measurement of relevant metrics characterizing human exposure to electric and/or magnetic fields (collectively, electromagnetic fields) over the frequency range of 0 Hz to 300 GHz. This recommended practice is a replacement for IEEE Std C95.3-2002 and IEEE Std C95.3.1-2010, extensively revising the contents from those and harmonizing with IEEE Std C95.1-2019. Detailed methodology is not described; rather, requirements for best practice are expressed through guidance and references to other documents and standards. Examples are included to clarify the guidance. This recommended practice is intended for professional users who are familiar with basic electromagnetic field theory and practice and for persons involved in specifying or implementing critical hazard assessments or surveys such as those described in IEEE Std C95.7-2014. (The PDF of this standard is available in the IEEE GET program at no cost to you compliments of the United States Navy, United States Air Force, and United States Army.

(c) if **IEC 62232** applies in relation to the station – IEC 62232.

(Cost \$ to buy& 736 pages)

[IEC 62232:2022 Determination of RF field strength, power density and SAR in the vicinity of base stations for the purpose of evaluating human exposure. Abstract](#)

IEC 62232:2022 addresses the evaluation of RF field strength, power density and specific absorption rate (SAR) levels in the vicinity of base stations (BS), also called products or equipment under test (EUT), intentionally radiating in the radio frequency (RF) range 110 MHz to 300 GHz in accordance with the scope, see Clause 1. It does not address the evaluation of current density.

RF exposure evaluation methods to be used for product compliance, product installation compliance and in-situ RF exposure assessments are specified in this document. Exposure limits are not specified in this document. The entity conducting RF exposure assessments refers to the set of exposure limits applicable where exposure takes place. Examples of applicable exposure limits

considered in this document are provided in the Bibliography, for example ICNIRP-2020 [1], ICNIRP-1998 [2], IEEE Std C95.1™-2019 [3] and Safety Code 6 [4].

Presumptions

3. The station also complies with the standards above if:
 - There is more than one station on site and
 - Calculations made for all sites: and
 - Documentation proves compliance and
 - The operator is in possession of documentation showing the calculations and measurement prove the site complies.

Measurements and calculations before 1 March 2003.

4. If the station was licenced before 1 March 2003, and the measurements were taken in accordance AS/NZS 2772.1, and the operator still has the records in their possession then the station meets this requirement.

Measurements and calculations after 1 March 2003 and before class licencing.

6. If the station was licenced between 1 March 2003 and class licencing, the measurements were taken in accordance with Radiocommunications Licence Conditions (Apparatus Licence) Determination 2015 clause 10(2) and the operator still has the records in their possession then the station meets this requirement.

Measurements and calculations before the relevant document amended.

7. If measurements are taken or calculations made, recorded and retained under the class regulations and then the standard is amended. The operator is taken as having made the measurements or calculations.

Measurements and calculations after the relevant document amended.

8. If measurements are taken or calculations made, recorded and retained under the class regulations and then the standard is amended. The operator has a year to redo the tests under the amend standard.

5 Compliance with the condition in subclause 2 (1) – change of station.

1. If a station changes from a low risk to a high-risk station, then the measurements or calculations for a high-risk station in subclause 4 must be taken, recorded and retained. This must be undertaken when the change occurs.
2. Changes that would warrant remeasuring include the following.
 - Change location.
 - Power to the antenna is altered.
 - The antenna gain is altered.
 - The antenna size is altered.
 - The antenna's height above ground or any other surface is altered.
 - The antenna tilt is altered.
 - The station's emission mode is changed.

6 Condition – record keeping.

1. This clause applies to any other type of amateur radio station,
2. The operator must have in their possession.
 - A declaration made by a person that includes the testing information required in subclause 3.
 - If an agency conducted the tests, a copy of the agreement with the agency.

- Name and qualifications of any person who assessed the station for compliance.
- The date of the assessment.
- The measurements and calculations made for the purpose.
- The details of the station, including its power level, gain, size, tilt, manufacturer, model number and emission mode.

Note: Giving false or misleading information is a serious offence under section 137.1 of the Criminal Code.

3. The declaration required above must include the details below.

(a) the person's name, address, ABN (if any), and, if the person is a body corporate, one of the following:

(i) ACN (if any).

(ii) ARBN (if any).

(iii) incorporation or registration number under the law by which the body was incorporated.

(b) details of the station, including its location, antenna type and height above the ground or other accessible surface.

(c) a statement that the operation of the station complies with subclause 2(1); and

subclause 2(1) states, *“A person must not operate an amateur station if the radiofrequency field produced by the station exceeds the reference levels for general public exposure at a place accessible to a member of the general public.”*

(d) if the person is a body corporate – the name and position of the person making the declaration on behalf of the body corporate.

Note: Giving false or misleading information is a serious offence under section 137.1 of the Criminal Code.

3. All records required must meet the following requirements.

- Be in English.
- Readily accessible to the person.
- May be a copy of the original.
- May be kept in electronic form.

7. Use of agent

A person may, by written agreement, use an agent:

(a) to ensure that the operation of an amateur station complies with the conditions in this Schedule; and

(b) to possess any document mentioned in this Schedule, other than the agency agreement.

