

MPT 1570

**Radiation Limits and Measurement
Specification**

**Electromagnetic radiation in the range 9 kHz to 1.6 MHz from material substances forming part
of a telecommunication system**

JANUARY 2003

**RADIOCOMMUNICATIONS AGENCY
Wyndham House
189 Marsh Wall
London
E14 9SX**

Tel: 020 7211 0211

THIS PAGE LEFT INTENTIONALLY BLANK

Contents

1 Introduction.....	5
2 Scope	5
3 Application.....	5
4 Aims	5
5 Electromagnetic radiation in the frequency range 9 kHz to 150 kHz.....	6
5.1 Principle.....	6
5.2 Equipment	6
5.3 Measurement frequencies	6
5.4 Magnetic field limit.....	6
5.5 Measurement procedure.....	7
6 Electromagnetic radiation in the frequency range 150 kHz to 1.6 MHz	8
6.1 Principles.....	8
6.2 Equipment	8
6.3 Measurement frequencies	8
6.4 Magnetic field limit.....	8
6.5 Measurement procedure.....	9

THIS PAGE LEFT INTENTIONALLY BLANK

1 Introduction

- 1.1 Material substances, when used to carry radio frequency signals as an essential part of a telecommunication system, can be a source of interference to a wide range of radio services that use the radio frequency spectrum. These include not only the emergency, safety of life, broadcasting, aeronautical, military and radio navigation services but also cordless telephones, land mobile and hobby radio services.
- 1.2 A formal definition of “material substances” for the purpose of this specification is given in the Wireless Telegraphy (Control of Interference from Material Substances forming part of Telecommunication Systems) Regulations 2003 (“the 2003 Regulations”).
- 1.3 The range of radio services considered at risk from interference falls into two broad types:
- (i) those operating in a high wanted signal environment and located very close to material substances used to carry radio frequency signals as an essential part of a telecommunication system. These are mainly broadcast receivers, radio controlled clocks and cordless telephones; and
 - (ii) those operating with low-level wanted signals requiring the use of efficient external antennas. These are most other types of radio apparatus.
- 1.4 To protect current and projected radio services identified in paragraph 1.3, limits of electromagnetic radiation from material substances forming part of a telecommunication system have been determined. These limits, and procedures for measuring such radiation, are contained in this specification. Radiocommunications Agency staff tasked with investigating complaints of radio interference will use the measurement procedures described in sections 5 and 6 below.

2 Scope

- 2.1 This MPT specification must be read in conjunction with the Wireless Telegraphy (Control of Interference from Material Substances forming part of Telecommunication Systems) Regulations 2003, and is applicable to the systems defined in the Schedule to the Regulations as specified in the Regulations. For the purposes of this specification, the material substances forming part of the Telecommunications Systems defined in the Regulations will hereinafter be referred to as the material substances.

3 Application

- 3.1 The maximum permissible levels of electromagnetic radiation from material substances, and the procedure to be adopted for the measurement of that radiation, are set out in this specification. Further information on the application of this specification can be obtained from:

Enforcement Policy Unit
Customer Services Executive
Radiocommunications Agency
Wyndham House
189 Marsh Wall
London E14 9SX

Tel: 020 7211 0470/0485
Email: MPT1570@ra.gsi.gov.uk

4 Aims

- 4.1 The emission limits contained in this document are intended to afford protection to licensed and licence-exempt radiocommunication services in addition to the specific examples set out in paragraphs 5.1 and 6.1 below.

5 Electromagnetic radiation in the frequency range 9 kHz to 150 kHz

5.1 Principle

5.1.1 The limits set for this part of the spectrum are specifically, but not exclusively, intended to afford protection against undue interference to radio receivers incorporated into devices such as, but not limited to, radio clocks and standard frequency generators which are intended for use within buildings.

5.2 Equipment

5.2.1 A calibrated Measuring Receiver meeting the requirements of CISPR 16-1 (CISPR: International Special Committee on Radio Interference) for measurements between 9 kHz and 150 kHz (peak detector and 200 Hz measuring bandwidth).

5.2.2 A calibrated Loop Antenna meeting the requirements of CISPR 16-1 for measurements between 9 kHz and 150 kHz.

5.2.3 A tripod, or some other appropriate support for mounting the Loop Antenna a minimum of 1 metres above ground level in the vertical plane and having a facility for orientating the loop in the horizontal plane.

5.3 Measurement frequencies

5.3.1 Measurements using this method will normally be made at or around the emission frequency giving rise to a complaint, but shall be limited to frequencies between 9 kHz and 150 kHz.

5.4 Magnetic field limit

5.4.1 The magnetic field strength, measured in the frequency range 9 kHz to 150 kHz, shall not exceed **(49 – 20 log f (kHz) dBμA/m)** when measurements are made at accessible points which are not less than 3 metres from the material substance. For the purpose of this requirement, the distance is measured as the shortest distance between any part of the material substance and any point on the periphery of the measurement antenna. A chart depicting the limit is shown in figure 1 below.

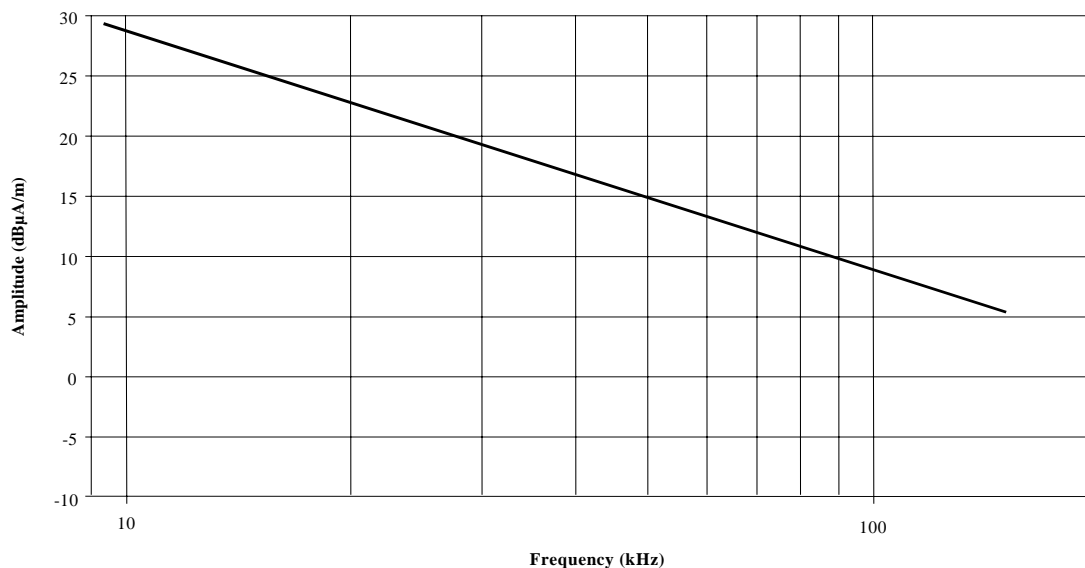


Figure 1: Electromagnetic radiation limit between 9 kHz and 150 kHz

5.5 Measurement procedure

5.5.1 Having identified that the source of interference is a material substance forming part of a telecommunication system, calibrated measurements shall be made to determine compliance with the limit in paragraph 5.4 above. The following method should be used for determining compliance.

- (i) Mount the Measurement Antenna on a tripod or some other suitable supporting device so that the shortest distance between any point of the material substance and any point on the periphery of the measurement antenna is not less than 3 metres.
- (ii) Tune the measuring receiver to the frequency of complaint and rotate the measurement antenna to obtain the maximum signal indication on the measuring receiver, taking care to maintain the minimum separation of 3 metres. Move the tripod either side of the measuring position to ensure that the maximum level is obtained. Repeat as necessary on adjacent frequencies to establish any variations.
- (iii) Taking into account the antenna calibration factor, record the highest field strength measured in (ii) above and compare it with the requirement stated in paragraph 5.4.
- (iv) Compliance will be determined on a shared-risk basis provided that the measurement uncertainty does not exceed ± 6 dB. Having regard to the typical measuring environment, it is expected that the overall measurement uncertainty may exceed this value and that this factor must be taken into account when considering the particular circumstances of the case.

NOTE: The level of emissions recorded may vary according to the density of traffic present on the telecommunication system at the time of measurement. Most telecommunication systems will operate bi-directionally and particular care should therefore be taken to ensure that any measurements of emissions are made with, as far as practicable, both forward and return paths fully activated such that the highest levels of emissions are observed. Signals that are highly impulsive with a low or indeterminate duty cycle when fully activated present little risk of undue interference to radio services. Indeed, such a signal may prove impractical to capture and measure over a sweep of the measuring instrument. Under these circumstances the measurement should be made by setting the measurement instrument to record the average received level over multiple sweeps.

6 Electromagnetic radiation in the frequency range 150 kHz to 1.6 MHz.

6.1 Principle

6.1.1 The limits set for this part of the spectrum are specifically, but not exclusively, intended to provide reasonable protection to broadcast radio receivers having integral ferrite rod antennas which are intended for use within domestic premises.

6.2 Equipment

6.2.1 A calibrated Measuring Receiver meeting the requirements of CISPR 16-1 (CISPR: International Special Committee on Radio Interference) for measurements between 150 kHz and 1.6 MHz (peak detector and 9 kHz measuring bandwidth).

6.2.2 A calibrated Loop Antenna meeting the requirements of CISPR 16-1 for measurements between 150 kHz and 1.6 MHz.

6.2.3 A tripod, or some other appropriate support for mounting the Loop Antenna a minimum of 1 metre above ground level in the vertical plane and having a facility for orientating the loop in the horizontal plane.

6.3 Measurement frequencies

6.3.1 Measurements using this method will normally be made at or around the emission frequency giving rise to a complaint, but shall be limited to frequencies between 150 kHz and 1.6 MHz.

6.4 Magnetic field limit

6.4.1 The magnetic field strength, measured in the frequency range 150 kHz to 1.6 MHz, shall not exceed $(-1.5 - 20 \log f \text{ (MHz)}) \text{ dB}\mu\text{A/m}$ when measurements are made at accessible points which are not less than 1 metre from the material substance. For the purpose of this requirement, the distance is measured as the shortest distance between any part of the material substance and any point on the periphery of the measurement antenna. A chart depicting the limit is shown in figure 2 below.

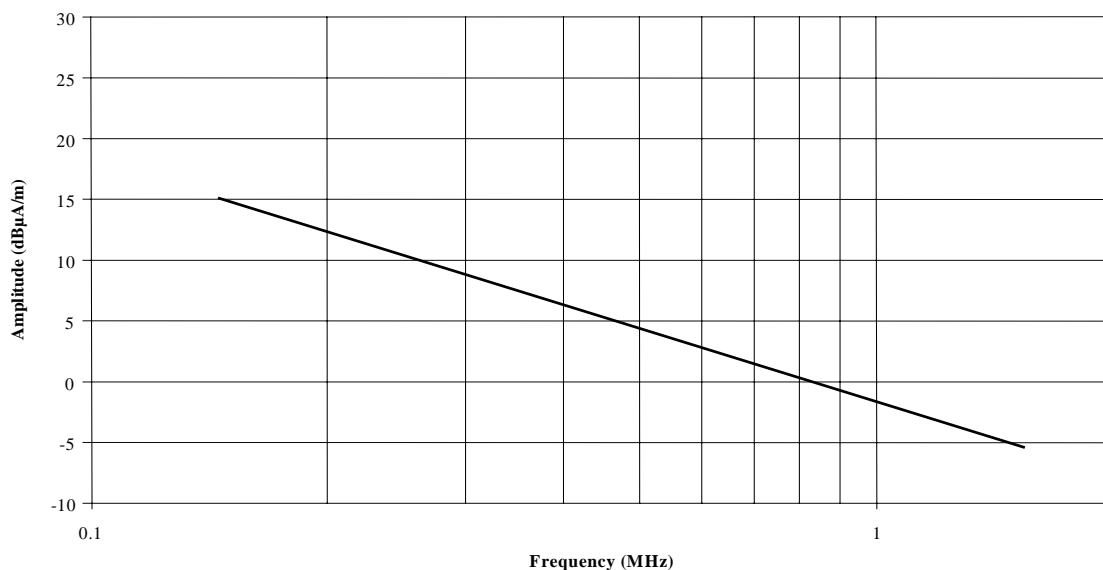


Figure 2: Electromagnetic radiation limit between 150 kHz and 1.6 MHz

6.5 Measurement procedure

6.5.1 Having identified that the source of interference is a material substance forming part of a telecommunication system, calibrated measurements shall be made to determine compliance with the limits in paragraph 6.4 above. The following method should be used for determining compliance.

- (i) Mount the Measurement Antenna on a tripod or some other suitable supporting device so that the shortest distance between any point of the material substance and any point on the periphery of the measurement antenna is not less than 1 metre.
- (ii) Tune the measuring receiver to the frequency of complaint and rotate the measurement antenna to obtain the maximum signal indication on the measuring receiver, taking care to maintain the minimum separation of 1 metre. Move the tripod either side of the measuring position to ensure that the maximum level is obtained. Repeat as necessary on adjacent frequencies to establish any variations.
- (iii) Taking into account the antenna calibration factor, record the highest field strength measured in (ii) above and compare it with the requirement stated in paragraph 6.4.
- (iv) Compliance will be determined on a shared-risk basis provided that the measurement uncertainty does not exceed ± 6 dB. Having regard to the typical measuring environment, it is expected that the overall measurement uncertainty may exceed this value and that this factor must be taken into account when considering the particular circumstances of the case.

NOTE: The level of emissions recorded may vary according to the density of traffic present on the telecommunication system at the time of measurement. Most telecommunication systems will operate bi-directionally and particular care should therefore be taken to ensure that any measurements of emissions are made with, as far as practicable, both forward and return paths fully activated such that the highest levels of emissions are observed.