

Council Directive 72/245/EEC of 20 June 1972 relating to the radio interference (electromagnetic compatibility) of vehicles (repealed)

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## [<sup>F1</sup>ANNEX IV

### METHOD OF MEASUREMENT OF RADIATED BROADBAND ELECTROMAGNETIC EMISSIONS FROM VEHICLES

#### Textual Amendments

- F1** Substituted by [Commission Directive 95/54/EC](#) of 31 October 1995 adapting to technical progress [Council Directive 72/245/EEC](#) on the approximation of the laws of the Member States relating to the suppression of radio interference produced by spark-ignition engines fitted to motor vehicles and amending [Directive 70/156/EEC](#) on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers.

#### 1. General

1.1. The test method described in this Annex shall only be applied to vehicles.

#### 1.2. Measuring apparatus

The measuring equipment shall comply with the requirements of publication No 16-1 (93) of the International Special Committee on Radio Interference (CISPR).

A quasi-peak detector shall be used for the measurement of broadband electromagnetic emissions in this Annex, or if a peak detector is used an appropriate correction factor shall be used depending on the spark pulse rate.

#### 1.3. Test method

This test is intended to measure the broadband emissions generated by spark ignition systems.

Two alternative reference antenna distances are permissible: 10 or 3 m from the vehicle. In either case the requirements of paragraph 3 of this Annex shall be complied with.

#### 2. Expression of results

The results of measurements shall be expressed in dB microvolt/m (microvol/m) for 120 kHz band width. If the actual band width B (expressed in kHz) of the measuring apparatus differs from 120 kHz, the readings taken in microvolts/m shall be converted to 120 kHz band width through multiplication by a factor 120/B.

#### 3. Measuring location

3.1. The test site shall be a level, clear area free from electromagnetic reflecting surfaces within a circle of minimum radius 30 m measured from a point midway between the vehicle and the antenna (see Figure 1 of Appendix 1 to this Annex).

3.2. The measuring set, test hut, or vehicle in which the measurement set is located may be within the test site, but only in the permitted region shown in Figure 1 in Appendix 1 to this Annex.

Other measuring antennae are allowed within the test area, at a minimum distance of 10 m both from receiving antenna and the vehicle under test, provided that it can be shown that the test results will not be affected.

3.3. Enclosed test facilities may be used if correlation can be shown between the enclosed test facility and an outdoor site. Enclosed test facilities do not need to meet the dimensional requirements of Figure 1 in Appendix 1 of this Annex other than the

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distance from the antenna to the vehicle and the height of the antenna. Neither do they need to have ambient emissions checked before or after the test as indicated in paragraph 3.4 of this Annex.

#### 3.4. Ambient

To ensure that there is no extraneous noise or signal of a magnitude sufficient to affect materially the measurement, measurements shall be taken before and after the main test. If the vehicle is present when ambient measurements are taken, it will be necessary to ensure that any emissions from the vehicle do not affect significantly the ambient measurements, for example by removing the vehicle from the test area, removing the ignition key, or disconnecting the battery. In both of the measurements, the extraneous noise or signal shall be at least 10 dB below the limits of interference given in paragraph 6.2.2.1 or 6.2.2.2 (as appropriate) of Annex I, except for intentional narrowband ambient transmissions.

#### 4. Vehicle state during tests

##### 4.1. Engine

The engine shall be running at its normal operating temperature and the transmission shall be in neutral. If for practical reasons this cannot be achieved, alternative arrangements mutually agreed between the manufacturer and the test authorities may be made. Care shall be taken to ensure that the speed setting mechanism does not influence electromagnetic radiations. During each measurement, the engine shall be operated as follows:

Engine type	Method of measurements	
	Quasi peak	Peak
Spark ignition	Engine speed	Engine speed
One cylinder	2 500 rpm $\pm$ 10 %	2 500 rpm $\pm$ 10 %
More than one cylinder	1 500 rpm $\pm$ 10 %	1 500 rpm $\pm$ 10 %

4.2. Testing shall not be conducted while rain or other precipitation is falling on the vehicle or within 10 minutes after such precipitation has stopped.

#### 5. Antenna type, position and orientation

##### 5.1. Antenna type

Any antenna may be used provided it can be normalized to the reference antenna. The method described in CISPR publication No 12, Edition 3, Appendix A, may be used to calibrate the antenna.

##### 5.2. Height and distance of measurement

###### 5.2.1. Height

###### 5.2.1.1. 10 m test

The phase centre of the antenna shall be  $3,00 \pm 0,05$  m above the plane on which the vehicle rests.

###### 5.2.1.2. 3 m test

The phase centre of the antenna shall be  $1,80 \pm 0,05$  m above the plane on which the vehicle rests.

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5.2.1.3. No part of any antenna's receiving elements shall be closer than 0,25 m to the plane on which the vehicle rests.

5.2.2. Distance of measurement

5.2.2.1. 10 m test

The horizontal distance from the tip or other appropriate point of the antenna defined during the normalization procedure described in paragraph 5.1 to this Annex to the outer body surface of the vehicle shall be  $10,0 \pm 0,2$  m.

5.2.2.2. 3 m test

The horizontal distance from the tip or other appropriate point of the antenna defined during the normalization procedure described in paragraph 5.1 to this Annex to the outer body surface of the vehicle shall be  $3,00 \pm 0,05$  m.

5.2.2.3. If the test is carried out in a facility enclosed for radio frequency electromagnetic screening purposes, the antenna's receiving elements shall be no closer than 1,0 m to any radio absorbent material and no closer than 1,5 m to the wall of the enclosed facility. There must be no absorbent material between the receiving antenna and vehicle under test.

5.3. Antenna location relative to vehicle

The antenna shall be located successively on the left and right-hand sides of the vehicle, with the antenna parallel to the plane of longitudinal symmetry of the vehicle and in line with the engine mid-point (see Figure 1 in Appendix 1 to this Annex).

5.4. Antenna position

At each of the measuring points, readings shall be taken both with the antenna in a horizontal and in a vertical polarization (see Figure 2 in Appendix 1 to this Annex).

5.5. Readings

The maximum of the four readings taken in accordance with paragraphs 5.3 and 5.4 at each spot frequency shall be taken as the characteristic reading at the frequency at which the measurements were made.

6. Frequencies

6.1. Measurements

Measurements shall be made throughout the 30 to 1 000 MHz frequency range. To confirm that the vehicle meets the requirements of this Annex, the Testing Authority shall test at up to 13 frequencies in the range, e.g. 45, 65, 90, 120, 150, 190, 230, 280, 380, 450, 600, 750, 900 MHz. In the event that the limit is exceeded during the test, investigations shall be made to ensure that this is due to the vehicle and not to background radiation.

6.1.1. The limits apply throughout the frequency range 30 to 1 000 MHz.

6.1.2. Measurements can be performed with either quasi-peak or peak detectors. The limits given in Annex I, paragraphs 6.2 and 6.5 are for quasi-peak. If peak is used, add 38 dB for 1 MHz bandwidth or subtract 22 dB for 1 kHz band width.

6.2. Tolerances

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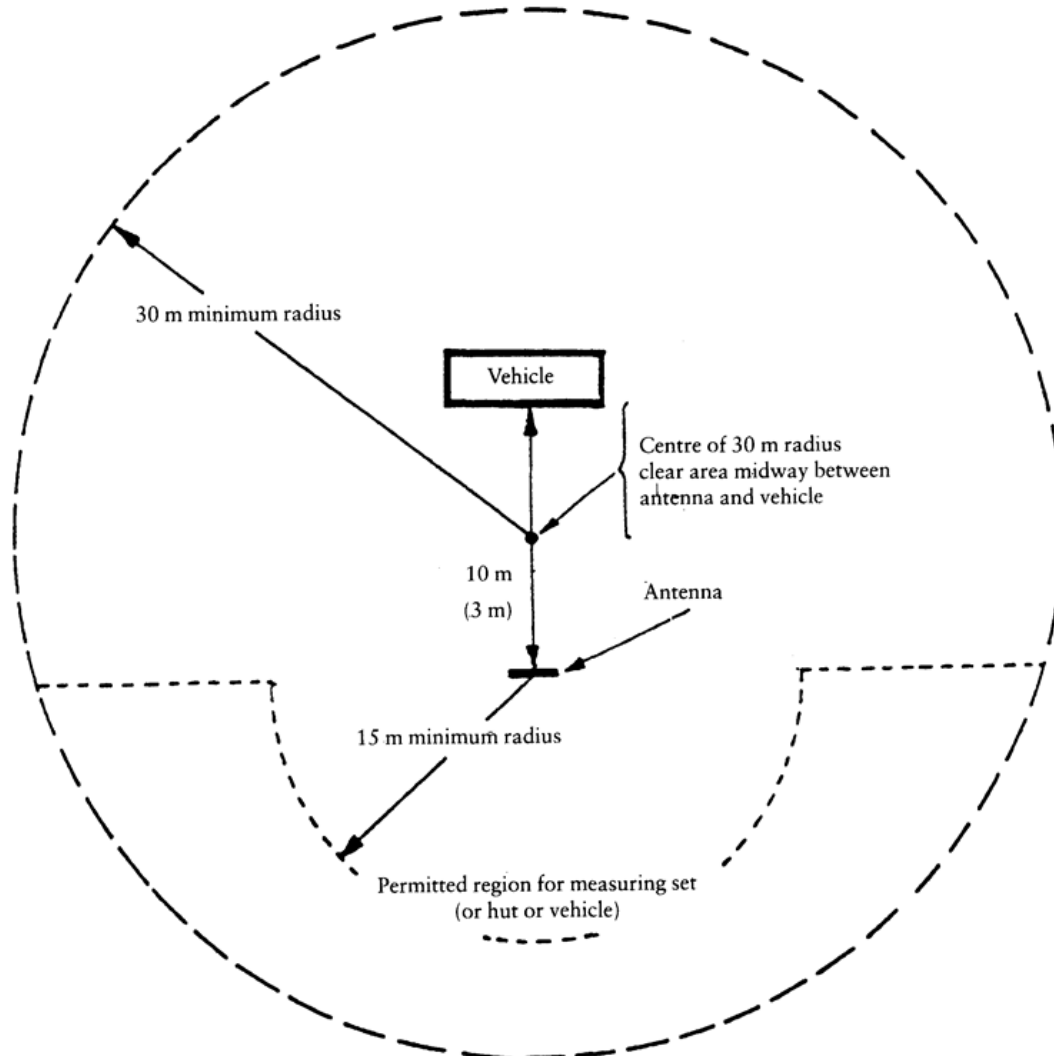
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<b>Spot frequency(MHz)</b>	<b>Tolerance(MHz)</b>
45, 65, 90, 120, 150, 190 and 230	± 5
280, 380, 450, 600, 750 and 900	± 20

The tolerances apply to frequencies quoted and are intended to avoid interference from transmissions operating on or near the nominal spot frequencies during the time of measurement.

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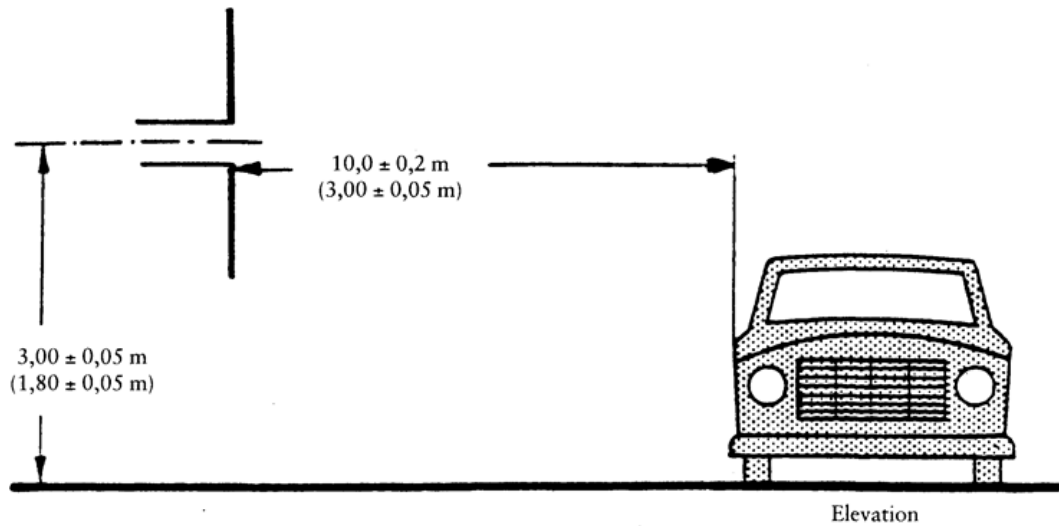
## Appendix 1



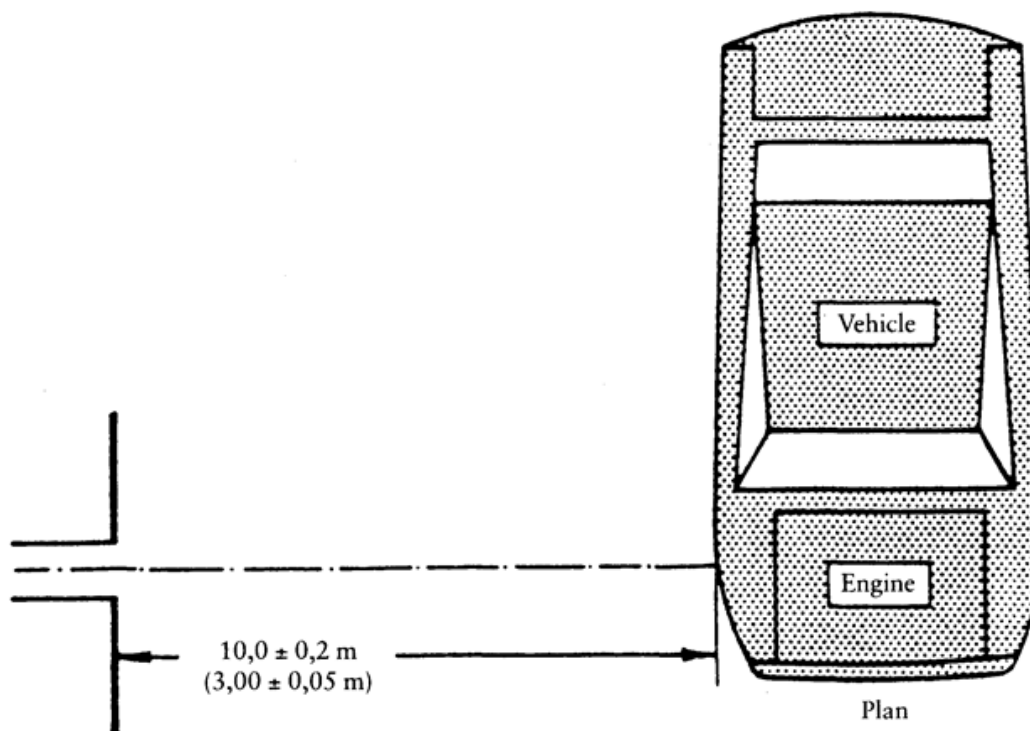
Level clear area free from electromagnetic reflecting surfaces

### Appendix 1

Figure 2 POSITION OF ANTENNA RELATIVE TO VEHICLE



Dipole antenna in position to measure vertical component of radiation



Dipole antenna in position to measure horizontal component of radiation]