

Final draft **ETSI EN 300 296-2** V1.1.1 (2000-12)

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*Candidate Harmonized European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Land Mobile Service;  
Radio equipment using integral antennas  
intended primarily for analogue speech;  
Part 2: Harmonized EN covering essential requirements  
under article 3.2 of the R&TTE Directive**

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**Reference**

REN/ERM-RP02-042-2

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**Keywords**

analogue, mobile, PMR, radio, regulation, speech

**ETSI**

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## Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document is part 2 of a multi-part deliverable covering the Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech, as identified below:

Part 1: "Technical characteristics and methods of measurements";

**Part 2: "Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive".**

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 1998/34/EC (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive") [1].

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

# Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1].

Each standard is a module in the structure. The modular structure is shown in figure 1.

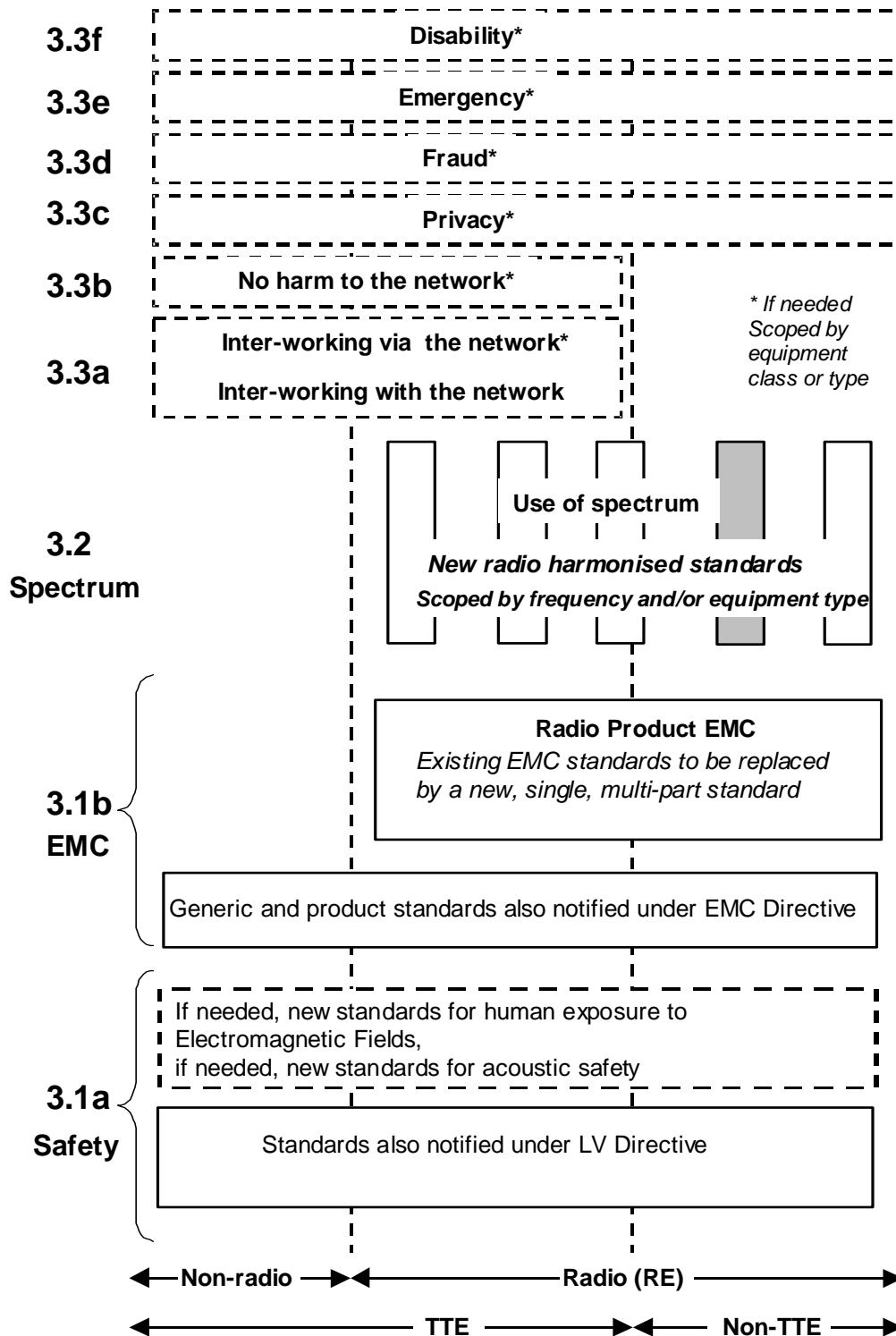


Figure 1: Modular structure for the various standards used under the R&TTE Directive [1]

## Explanation of figure 1

The left hand edge of the figure 1 shows the different clauses of article 3 of the R&TTE Directive [1].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of this standard essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment.

For article 3.1b the diagram shows the new single multi-part product EMC standard for radio, and the existing collection of generic and product standards currently used under the EMC Directive [2]. The parts of this new standard will become available in the second half of 2000, and the existing separate product EMC standards will be used until it is available (at the time of publication of the present document, the part relating to the equipment covered by the present document is part 5).

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive [1] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

The modularity principle has been taken because it is expected that it would:

- minimize the number of standards needed (because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment);
- provide scope for standards to be added under article 3.3 should the Commission take the necessary decisions without requiring alteration of standards that are already published;
- clarify and simplify the usage of Harmonized Standards as the relevant means of conformity assessment.

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# 1 Scope

The present document applies to radio equipment with integral antennas, used in angle modulation systems in the land mobile service, operating on radio frequencies between 30 MHz and 1 000 MHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz, and is intended primarily for analogue speech.

The type of equipment covered by the present document is handportable stations with integral antennas.

The present document covers angle modulation to be used for radio equipment, but individual national administrations are free to choose the type of modulation. Channel separations, maximum transmitter output power/effective radiated power and the inclusion of automatic transmitter shut-off facility may all be conditions attaching to the issue of a licence by the appropriate administration.

The present document is complementary to ETS 300 086 which covers radio equipment with an internal or external RF connector, for use in the land mobile service. It is primarily intended for omnidirectional applications.

The present document is intended to cover the provisions of article 3.2, of Directive 1999/5/EC [1] (R&TTE Directive) 1999/5/EC [1], which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference."

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive 1999/5/EC [1] may apply to equipment within the scope of the present document. Additional standards or specifications may be required for equipment such as that intended for connection to the Public Switched Telephone Network (PSTN).

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (89/336/EEC) (EMC Directive).
- [3] Council Directive of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (73/23/EEC) (LV Directive).
- [4] ETSI EN 300 296-1 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement".
- [5] ETSI ETR 028 (1994): "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".



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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive 1999/5/EC [1] and EN 300 296-1 [4] apply.

### 3.2 Symbols

For the purposes of the present document, the symbols given in EN 300 296-1 [4] apply.

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in EN 300 296-1 [4] apply.

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## 4 Technical specifications

### 4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be determined by the environmental class of the equipment. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the required operational environmental profile.

### 4.2 Transmitter requirements

#### 4.2.1 Frequency error

##### 4.2.1.1 Definition

The frequency error is defined in EN 300 296-1 [4], clause 8.1.1.

##### 4.2.1.2 Limit

The frequency error shall not exceed the limits in EN 300 296-1 [4], table 1.

##### 4.2.1.3 Methods of measurement

The measurement as specified in EN 300 296-1 [4], clause 8.1.2, shall be carried out.

#### 4.2.2 Effective radiated power

##### 4.2.2.1 Definition

The effective radiated power is defined in EN 300 296-1 [4], clause 8.2.1.

##### 4.2.2.2 Limit

The effective radiated power shall not exceed the limits in EN 300 296-1 [4], clause 5.1.2.

#### 4.2.2.3 Methods of measurement

The measurement as specified in EN 300 296-1 [4], clause 8.1.2, shall be carried out.

### 4.2.3 Maximum frequency deviation

#### 4.2.3.1 Definition

The maximum frequency deviation is defined in EN 300 296-1 [4], clause 8.3.

#### 4.2.3.2 Limit

The maximum frequency deviation shall not exceed the limits in EN 300 296-1 [4], table 2.

#### 4.2.3.3 Methods of measurement

The measurement as specified in EN 300 296-1 [4], clause 8.3.1, shall be carried out.

### 4.2.4 Adjacent channel power

#### 4.2.4.1 Definition

The adjacent channel power is defined in EN 300 296-1 [4], clause 8.4.1.

#### 4.2.4.2 Limit

The adjacent channel power shall not exceed the limits in EN 300 296-1 [4], clause 5.1.4.

#### 4.2.4.3 Methods of measurement

The measurement as specified in EN 300 296-1 [4], clause 8.4.2, shall be carried out.

### 4.2.5 Spurious emissions

#### 4.2.5.1 Definition

The spurious emissions are defined in EN 300 296-1 [4], clause 8.5.

#### 4.2.5.2 Limit

The spurious emissions shall not exceed the limits in EN 300 296-1 [4], table 3.

#### 4.2.5.3 Methods of measurement

The measurement as specified in EN 300 296-1 [4], clause 8.5.2, shall be carried out.

### 4.2.6 Transient frequency behaviour of the transmitter

#### 4.2.6.1 Definition

The transient periods are defined in EN 300 296-1 [4], clause 8.6.

#### 4.2.6.2 Limit

The transient periods shall not exceed the limits in EN 300 296-1 [4], table 4.

#### 4.2.6.3 Methods of measurement

The measurement as specified in EN 300 296-1 [4], clause 8.6.2, shall be carried out.

### 4.3 Receiver requirements

#### 4.3.1 Average usable sensitivity (speech, field strength)

##### 4.3.1.1 Definition

The average useable sensitivity (speech, field strength) is defined in EN 300 296-1 [4], clause 9.1.1.

##### 4.3.1.2 Limit

The average useable sensitivity (speech, field strength) shall not exceed the limits in EN 300 296-1 [4], clause 5.2.1.

##### 4.3.1.3 Method of measurement

The measurement as specified in EN 300 296-1 [4], clause 9.1.2, shall be carried out.

#### 4.3.2 Co-channel rejection

##### 4.3.2.1 Definition

The co-channel rejection is defined in EN 300 296-1 [4], clause 9.3.1.

##### 4.3.2.2 Limit

The co-channel rejection shall not exceed the limits in EN 300 296-1 [4], clause 5.2.3.

##### 4.3.2.3 Method of measurement

The measurement as specified in EN 300 296-1 [4], clause 9.3.1, shall be carried out.

#### 4.3.3 Adjacent channel selectivity

##### 4.3.3.1 Definition

The adjacent channel selectivity is defined in EN 300 296-1 [4], clause 9.4.1.

##### 4.3.3.2 Limit

The adjacent channel selectivity shall not exceed the limits in EN 300 296-1 [4], table 6.

##### 4.3.3.3 Method of measurement

The measurement as specified in EN 300 296-1 [4], clause 9.4.2, shall be carried out.

#### 4.3.4 Spurious response rejection

##### 4.3.4.1 Definition

The spurious response rejection is defined in EN 300 296-1 [4], clause 9.5.1.

#### 4.3.4.2 Limit

The spurious response rejection shall not exceed the limits in EN 300 296-1 [4], clause 5.2.5.

#### 4.3.4.3 Method of measurement

The measurement as specified in EN 300 296-1 [4], clause 9.5.2, shall be carried out.

### 4.3.5 Intermodulation response rejection

#### 4.3.5.1 Definition

The intermodulation response rejection is defined in EN 300 296-1 [4], clause 9.6.1.

#### 4.3.5.2 Limit

The intermodulation response rejection shall not exceed the limits in EN 300 296-1 [4], clause 5.2.6.

#### 4.3.5.3 Method of measurement

The measurement as specified in EN 300 296-1 [4], clause 9.6.1, shall be carried out.

### 4.3.6 Blocking or desensitization

#### 4.3.6.1 Definition

The blocking or desensitization is defined in EN 300 296-1 [4], clause 9.7.1.

#### 4.3.6.2 Limit

The blocking or desensitization shall not exceed the limits in EN 300 296-1 [4], clause 5.2.7.

#### 4.3.6.3 Method of measurement

The measurement as specified in EN 300 296-1 [4], clause 9.6.1, shall be carried out.

### 4.3.7 Spurious radiations

#### 4.3.7.1 Definition

The spurious radiations are defined in EN 300 296-1 [4], clause 9.8.1.

#### 4.3.7.2 Limit

The spurious radiations shall not exceed the limits in EN 300 296-1 [4], table 7.

#### 4.3.7.3 Method of measurement

The measurement as specified in EN 300 296-1 [4], clause 9.8.2, shall be carried out.

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## 5 Testing for compliance with technical requirements

### 5.1 Essential radio test suites

#### 5.1.1 Environmental conditions for testing

##### 5.1.1.1 Normal and extreme test-conditions

Measurements shall be made under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in EN 300 296-1 [4], clauses 6.3, 6.4 and 6.5.

##### 5.1.1.2 Test power source

The test power source shall meet the requirements of EN 300 296-1 [4], clause 6.2.

#### 5.1.2 Choice of samples for test suites

Measurement shall be performed, according to the present document, on samples of equipment defined in EN 300 296-1 [4], clause 4.1.

## 5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 1.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with ETR 028 [5] and shall correspond to an expansion factor (coverage factor)  $k = 1,96$  or  $k = 2$  (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 1 is based on such expansion factors.

The particular expansion factor used for the evaluation of the measurement uncertainty shall be stated.

**Table 1: Absolute measurement uncertainties: maximum values**

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power conducted (up to 160 W)	$\pm 0,75$ dB
Conducted RF Power variations using a test fixture	$\pm 0,75$ dB
Radiated RF power	$\pm 6$ dB
Adjacent channel power	$\pm 5$ dB
Average sensitivity (radiated)	$\pm 3$ dB
Two-signal measurement, valid up to 4 GHz (using a test fixture)	$\pm 4$ dB
Two-signal measurement using radiated fields (see note)	$\pm 6$ dB
Three-signal measurement (using a test fixture)	$\pm 3$ dB
Radiated emission of the transmitter, valid up to 4 GHz	$\pm 6$ dB
Radiated emission of receiver, valid up to 4 GHz	$\pm 6$ dB
Transmitter transient frequency (frequency difference)	$\pm 250$ Hz
Transmitter transient time	$\pm 20$ %
Values valid up to 1 GHz for the RF parameters unless otherwise stated.	
NOTE: For blocking and spurious response rejection measurements.	

## 5.3 Essential radio test suites

### 5.3.1 Frequency error

The measurement as specified in EN 300 296-1 [4], clause 8.1.2, shall be carried out.

### 5.3.2 Effective radiated power

The measurement as specified in EN 300 296-1 [4], clause 8.1.2, shall be carried out.

### 5.3.3 Maximum frequency deviation

The measurement as specified in EN 300 296-1 [4], clause 8.3.1, shall be carried out.

### 5.3.4 Adjacent channel power

The measurement as specified in EN 300 296-1 [4], clause 8.4.2, shall be carried out.

### 5.3.5 Spurious emissions

The measurement as specified in EN 300 296-1 [4], clause 8.5.2, shall be carried out.

### 5.3.6 Transient frequency behaviour of the transmitter

The measurement as specified in EN 300 296-1 [4], clause 8.5.2, shall be carried out.

## 5.4 Other test specifications

The following radio test suites shall be used to assess the performance of equipment.

### 5.4.1 Average usable sensitivity (speech, field strength)

The measurement as specified in EN 300 296-1 [4], clause 9.1.2, shall be carried out.

#### **5.4.2 Co-channel rejection**

The measurement as specified in EN 300 296-1 [4], clause 9.3.1, shall be carried out.

#### **5.4.3 Adjacent channel selectivity**

The measurement as specified in EN 300 296-1 [4], clause 9.4.2, shall be carried out.

#### **5.4.4 Spurious response rejection**

The measurement as specified in EN 300 296-1 [4] clause 9.5.2, shall be carried out.

#### **5.4.5 Intermodulation response rejection**

The measurement as specified in EN 300 296-1 [4], clause 9.6.1, shall be carried out.

#### **5.4.6 Blocking or desensitization**

The measurement as specified in EN 300 296-1 [4], clause 9.7.2, shall be carried out.

#### **5.4.7 Spurious radiations**

The measurement as specified in EN 300 296-1 [4], clause 9.8.2, shall be carried out.

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## Annex A (Informative): Bibliography

- ETSI ETS 300 086 (1991): "Radio Equipment and Systems (RES); Land mobile group; Technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech".



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# History

<b>Document history</b>			
V1.1.1	March 2000	Public Enquiry	PE 20000630: 2000-03-01 to 2000-06-30
V1.1.1	December 2000	Vote	V 20010223: 2000-12-25 to 2001-02-23