

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Short Range Devices (SRD);  
Radio equipment to be used in the 25 MHz to 1 000 MHz  
frequency range with power levels ranging up to 500 mW;  
Part 2: Harmonized EN covering essential requirements  
under article 3.2 of the R&TTE Directive**

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**Reference**

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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 Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 2 of a multi-part deliverable, covering the Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW, as identified below:

Part 1: "Technical characteristics and test methods";

**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 98/34/EC [3] 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 [1] 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").

Proposed national transposition dates	
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.

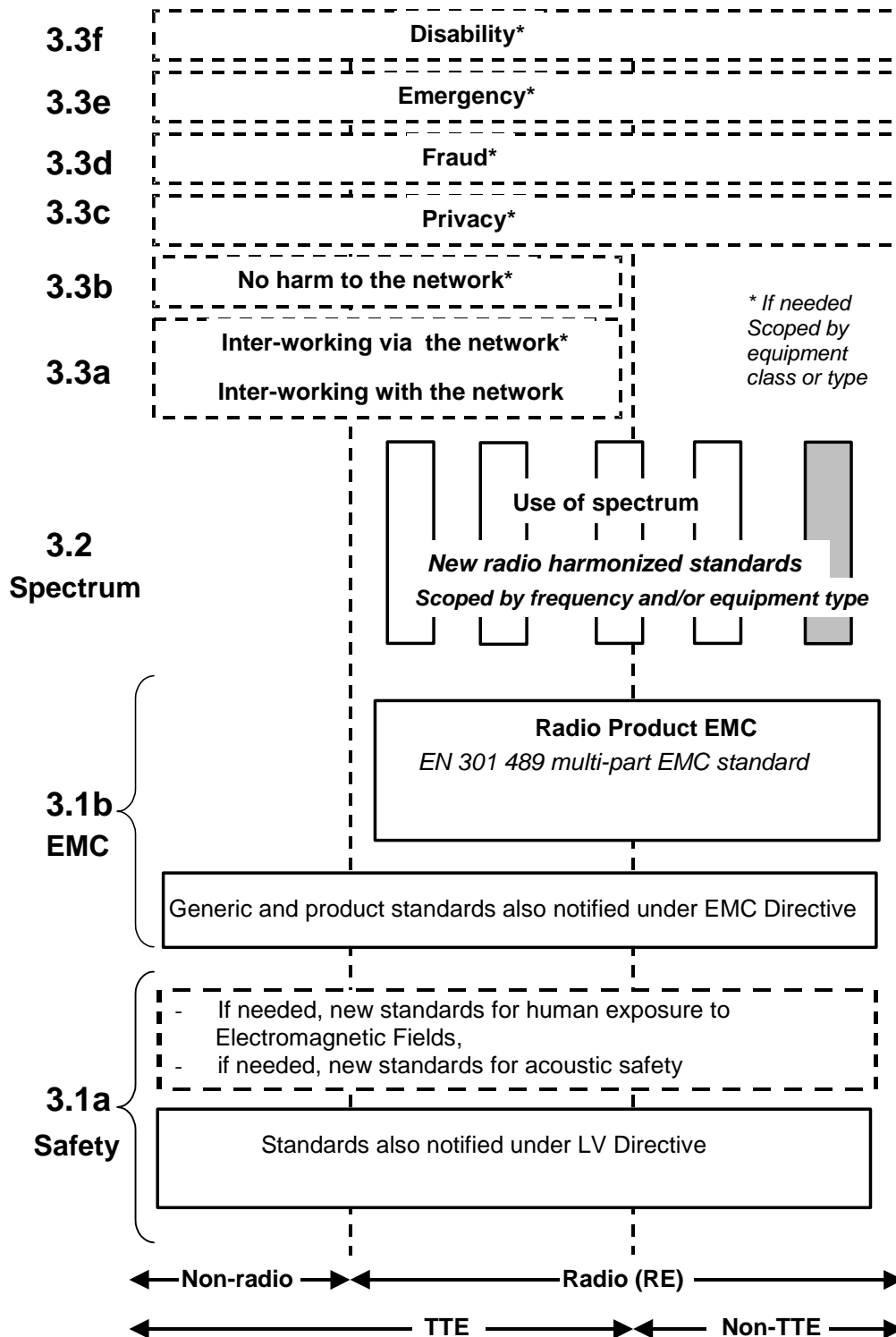


Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 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 the present document essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far 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. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b the diagram shows EN 301 489, the multi-part product EMC standard for radio used under the EMC Directive [5].

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive 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 minimizes 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;
- it provides scope for standards to be added:
  - under articles 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions;without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

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# 1 Scope

The present document applies to short range device radio transmitters and receivers as described in the scope of EN 300 220-1 [2].

The present document is intended to cover the provisions of Article 3.2 of Directive 1999/5/EC [1] (R&TTE Directive), 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".

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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.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- |     |  |
|-----|--|
| [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] | ETSI EN 300 220-1 (V2.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods". |
| [3] | Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.   |
| [4] | ETSI TR 100 028 (Parts 1 and 2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".   |
| [5] | Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC directive).  |



---

## 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 [1] and EN 300 220-1 [2] apply.

### 3.2 Symbols

For the purposes of the present document, the symbols given in EN 300 220-1 [2] apply.

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in EN 300 220-1 [2] apply.

---

## 4 Technical requirements specifications

### 4.1 Transmitter requirements

#### 4.1.1 Frequency error or frequency drift

One of the following shall be met:

- The frequency error or frequency drift, as defined in EN 300 220-1 [2], clause 8.1.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.1.4, table 6a for narrow band or table 6b for wide band; or
- For narrow band equipment not capable of producing an unmodulated carrier, the adjacent and alternate channel power, as defined in EN 300 220-1 [2], clause 8.5.2, shall not exceed the limits in EN 300 220-1 [2], clause 8.6.3 under extreme conditions.

This requirement applies to all transmitters.

#### 4.1.2 Carrier power (conducted)

The carrier power (conducted), as defined in EN 300 220-1 [2], clause 8.2.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.2.3.

This requirement applies to transmitters which may be used without an integral or dedicated antenna.

#### 4.1.3 Effective radiated power

The effective radiated power, as defined in EN 300 220-1 [2], clause 8.3.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.3.3.

This requirement applies to transmitters with an integral or dedicated antenna.

#### 4.1.4 Transient power

The transient power, as defined in EN 300 220-1 [2], clause 8.5.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.5.4.

This requirement applies to all transmitters.

### 4.1.5 Adjacent channel power

The adjacent channel power, as defined in EN 300 220-1 [2], clause 8.6.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.6.3.

This requirement applies to transmitters with a channel spacing of 200 kHz or less.

### 4.1.6 Modulation bandwidth for wide band equipment (> 200 kHz)

The range of modulation bandwidth, as defined in EN 300 220-1 [2], clause 8.7.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.7.3.

This requirement applies to transmitters using wide band as defined in EN 300 220-1 [2], clause 3.1.

### 4.1.7 Spurious emissions

The spurious emissions, as defined in EN 300 220-1 [2], clause 8.8.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.8.5.

This requirement applies to all transmitters.

### 4.1.8 Frequency stability under low-voltage conditions

The frequency stability under low-voltage conditions, as defined in EN 300 220-1 [2], clause 8.9.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.9.3.

This requirement applies to all battery-operated transmitters.

### 4.1.9 Duty cycle

The duty cycle, as defined in EN 300 220-1 [2], clause 8.10.1, shall not exceed the limits in EN 300 220-1 [2], clause 8.10.3.

This requirement applies to all transmitters excluding those with a listen before talk facility, see clause 4.1.10.

### 4.1.10 Listen Before Talk (LBT)

#### 4.1.10.1 Minimum transmitter off-time

The minimum transmitter off-time, as defined in EN 300 220-1 [2], clause 8.11.1.2, shall not exceed the limits in EN 300 220-1 [2], clause 8.11.1.3.

This requirement applies to all transmitters using LBT.

#### 4.1.10.2 Minimum listening time

The minimum listening time, as defined in EN 300 220-1 [2], clause 8.11.2.1 shall not exceed the limits in EN 300 220-1 [2], clause 8.11.2.2.

This requirement applies to all transmitters using LBT.

#### 4.1.10.3 Maximum transmitter on-time

The maximum transmitter on-time, as defined in EN 300 220-1 [2], clause 8.11.3.1 shall not exceed the limits in EN 300 220-1 [2], clause 8.11.3.2.

This requirement applies to all transmitters using LBT.

## 4.1.11 Types of modulation

### 4.1.11.1 Frequency hopping spread spectrum devices

The FHSS parameters, as declared in EN 300 220-1 [2], clause 8.4.1.1 shall not exceed the limits in EN 300 220-1 [2], clause 8.4.1.2 table 9 and indent a) to g).

This applies to all transmitters which employ FHSS.

### 4.1.11.2 Direct sequence or other spread spectrum than FHSS

The power density, as defined in EN 300 220-1 [2], clause 8.4.1.3 shall not exceed the limits in EN 300 220-1 [2], clause 8.4.1.3, table 10.

This applies to all transmitters which employ DSSS and other spread spectrum than FHSS.

## 4.2 Receiver requirements

### 4.2.1 Receiver sensitivity

The receiver sensitivity as defined in EN 300 220-1 [2], clauses 9.1.1 and F.2.1, shall be equal to or less than the limits in EN 300 220-1 [2], clauses 9.1.4 or F.2.2, as appropriate.

This requirement applies to all receivers with Listen Before Talk (LBT) facility.

### 4.2.2 LBT threshold and transmitter max on-time

- a) The LBT threshold, as defined in EN 300 220-1 [2], clause 9.2.1, shall be equal to or less than the limits in EN 300 220-1 [2], clause 9.2.3, table 14.
- b) The transmitter max on-time, as defined in EN 300 220-1 [2], clause 8.11.3, shall be equal to or less than the limits in EN 300 220-1 [2], clause 9.2.3, table 14.

This requirement applies to all receivers with listen before talk (LBT) facility.

### 4.2.3 Adjacent channel selectivity

The adjacent channel selectivity as defined in EN 300 220-1 [2], clause 9.3.1, shall be equal to or greater than the limits in EN 300 220-1 [2], clauses 9.3.3.1, table 15 and clause 9.3.3.2, table 16.

This requirement applies to all class 1 receivers, as defined in EN 300 220-1 [2], clause 4.1.1.

### 4.2.4 Blocking or desensitization

The blocking or desensitization, as defined in EN 300 220-1 [2], clause 9.4.1, shall be equal to or greater than the limits in EN 300 220-1 [2], clause 9.4.3.1, table 17 and clause 9.5.3.3, table 18.

This requirement applies to class 1 receivers, as defined in EN 300 220-1 [2], clause 4.1.1.

The blocking or desensitization for receivers with listen before talk (LBT) facility, as defined in EN 300 220-1 [2], clause 9.4.1, shall be equal to or greater than the limits in EN 300 220-1 [2], clause 9.4.3.2.

### 4.2.5 Intermodulation response rejection

The intermodulation response rejection, as defined in EN 300 220-1 [2], clause 9.5.1, shall be equal to or greater than the limits in EN 300 220-1 [2], clause 9.5.3.

This requirement applies to class 1 receivers, as defined in EN 300 220-1 [2], clause 4.1.1.

## 4.2.6 Spurious response rejection

The spurious response rejection, as defined in EN 300 220-1 [2], clause 9.6.1, shall be equal to or greater than the limits in EN 300 220-1 [2], clause 9.6.3.

This requirement applies to class 1 receivers, as defined in EN 300 220-1 [2], clause 4.1.1.

## 4.2.7 Spurious radiations

The spurious radiations, as defined in EN 300 220-1 [2], clause 9.7.1, shall not exceed the limits in EN 300 220-1 [2], clause 9.7.5.

This requirement applies to all receivers.

---

# 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

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

The test procedures shall be as specified in EN 300 220-1 [2], clauses 5.3 to 5.4.

#### 5.1.1.2 Test power source

The test power source shall meet the requirements of EN 300 220-1 [2], clause 5.2.

### 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 300 220-1 [2], clauses 4.2.1 to 4.2.13.2.

### 5.1.3 Transmitter test suites

#### 5.1.3.1 Frequency error or drift

For narrow band equipment, either:

- the test specified in EN 300 220-1 [2], clause 8.1.2.1 shall be carried out; or
- the test specified in EN 300 220-1 [2], clause 8.6.2 shall be carried out under extreme test conditions.

The test specified in EN 300 220-1 [2], clause 8.1.3.1 shall be carried out on wide band equipment.

This test suite applies to all transmitters.

#### 5.1.3.2 Carrier power (conducted)

The test specified in EN 300 220-1 [2], clause 8.2.2 shall be carried out.

This test suite applies to transmitters which may be used without an integral or dedicated antenna.

### 5.1.3.3 Effective radiated power

The test specified in EN 300 220-1 [2], clause 8.3.2 shall be carried out.

This test suite applies to transmitters with an integral or dedicated antenna.

### 5.1.3.4 Types of spread spectrum modulation

The declarations specified in EN 300 220-1 [2], clause 8.4.1.1 shall be carried out.

This applies to all transmitters employing FHSS modulation.

### 5.1.3.5 Transient power

The tests specified in EN 300 220-1 [2], clause 8.5.2 shall be carried out.

This test suite applies to all transmitters used for data transmission.

### 5.1.3.6 Adjacent channel power

The test specified in EN 300 220-1 [2], clause 8.6.2 shall be carried out.

This test suite applies to transmitters where a channel plan is used with a channel spacing of 200 kHz or less.

### 5.1.3.7 Range of modulation bandwidth for wide band equipment (> 200 kHz)

The test specified in EN 300 220-1 [2], clause 8.7.2 shall be carried out.

This test suite applies to transmitters using wide band as defined in EN 300 220-1 [2], clause 3.1.

### 5.1.3.8 Spurious emissions

Either:

- the tests specified in EN 300 220-1 [2], clause 8.8.2 and EN 300 220-1 [2], clause 8.8.3 shall be carried out; or
- the test specified in EN 300 220-1 [2], clause 8.8.4 shall be carried out.

This test suite applies to all transmitters.

### 5.1.3.9 Frequency stability under low-voltage conditions

The test specified in EN 300 220-1 [2], clause 8.9.2 shall be carried out.

This test suite applies to all battery-operated transmitters.

## 5.1.4 Receiver test suites

### 5.1.4.1 Receiver sensitivity

The test specified in EN 300 220-1 [2], clause 9.1.2 or 9.1.3 shall be carried out.

This test suite applies to all receivers with a listen Before Talk Facility (LBT).

### 5.1.4.2 Receiver LBT threshold and max on-time

The test specified in EN 300 220-1 [2], clause 9.2.2 shall be carried out.

This test suite applies to all receivers with a listen Before Talk Facility (LBT).

#### 5.1.4.3 Adjacent channel selectivity

The test specified in EN 300 220-1 [2], clause 9.3.2 shall be carried out.

This test suite applies to all Class 1 receivers.

#### 5.1.4.4 Blocking or desensitization

The test specified in EN 300 220-1 [2], clause 9.4.2 shall be carried out.

This test suite applies to all Class 1 and Class 2 receivers.

This test suite applies to all receivers with a listen Before Talk Facility (LBT).

#### 5.1.4.5 Intermodulation response rejection

The test specified in EN 300 220-1 [2], clause 9.5.2 shall be carried out.

This test suite applies to all Class 1 receivers.

#### 5.1.4.6 Receiver spurious response rejection

The test specified in EN 300 220-1 [2], clause 9.6.2 shall be carried out.

This test suite applies to all Class 1 receivers.

#### 5.1.4.7 Receiver spurious radiations

Either:

- the tests specified in EN 300 220-1 [2], clause 9.7.2 and EN 300 220-1 [2], clause 9.7.3 shall be carried out; or
- the test specified in EN 300 220-1 [2], clause 9.7.4 shall be carried out.

This test suite applies to all receivers.

## 6 Interpretation of measurement results

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

- the measured value related to the corresponding limit shall 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 separately 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.

**Table 1: Measurement uncertainty**

RF frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	$\pm 0,75$ dB
Maximum frequency deviation:	
- within 300 Hz and 6 kHz of audio frequency	$\pm 5$ %
- within 6 kHz and 25 kHz of audio frequency	$\pm 3$ dB
Adjacent channel power	$\pm 3$ dB
Conducted emission of transmitter, valid up to 12,75 GHz	$\pm 4$ dB
Conducted emission of receivers	$\pm 3$ dB
Radiated emission of transmitter, valid up to 12,75 GHz	$\pm 6$ dB
Radiated emission of receiver, valid up to 12,75 GHz	$\pm 6$ dB
Bit Error Ratio (BER)	$\pm 0,5$ dB
Temperature	$\pm 1$ K
Humidity	$\pm 10$ %

For the test methods, according to the present document the uncertainty figures shall be calculated according to the methods described in the TR 100 028 [4] 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 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.

## Annex A (normative): The EN Requirements Table (EN-RT)

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the EN-RT proforma in this annex so that it can be used for its intended purposes and may further publish the completed EN-RT.

The EN Requirements Table (EN-RT) serves a number of purposes, as follows:

- it provides a tabular summary of all the requirements;
- it shows the status of each EN-R, whether it is essential to implement in all circumstances (Mandatory), or whether the requirement is dependent on the supplier having chosen to support a particular optional service or functionality (Optional). In particular it enables the EN-Rs associated with a particular optional service or functionality to be grouped and identified;
- when completed in respect of a particular equipment it provides a means to undertake the static assessment of conformity with the EN.

**Table A.1: EN Requirements Table (EN-RT)**

EN Reference		EN 300 220-2				Comment
No.	Reference	EN-R (see note 1)	Status			
1	4.1.1	Frequency error or frequency drift	M			
2	4.1.3	Effective radiated power	M			
3	4.1.4	Transmitter transient power	M			
4	4.1.5	Transmission adjacent channel power (for bandwidth < 200 kHz)	M			
5	4.1.6	Range for modulation bandwidth for wide band equipment (for bandwidth ≥ 200 kHz)	M			
6	4.1.7	Transmitter spurious emissions	M			
7	4.1.11	Spread spectrum modulation, FHSS	M			
8	4.1.12	Spread spectrum modulation, other than FHSS	M			
9	4.2.1	Receiver sensitivity (see notes 3 and 4)	M			
10	4.2.2	LBT threshold (see note 3)	O.1			
11	4.1.9	Duty cycle	O.1			
12	4.2.3	Adjacent channel selectivity (see note 4)	M			
13	4.2.4	Blocking or desensitization (see notes 3 and 4)	M			
14	4.2.5	Intermodulation response rejection (see note 4)	M			
15	4.2.6	Receiver spurious rejection (see note 4)	M			
16	4.2.7	Receiver spurious emissions (see note 2)	M			
NOTE 1: These EN-Rs are justified under article 3.2 of the R&TTE Directive.						
NOTE 2: Not required for transceivers or co-located receivers and transmitters using continuous transmissions.						
NOTE 3: Required for all transceivers using a LBT facility.						
NOTE 4: Required for Class 1 receivers.						



**Key to columns:**

<b>No</b>	Table entry number.
<b>Reference</b>	Clause reference number of conformance requirement within the present document.
<b>EN-R</b>	Title of conformance requirement within the present document.
<b>Status</b>	Status of the entry as follows.
<b>M</b>	Mandatory, shall be implemented under all circumstances.
<b>O.1</b>	Mutually exclusive options of which it is mandatory to implement one.
<b>Comments</b>	To be completed as required.

## Annex B (informative):

### The EN title in the official languages

Language	EN title
Czech	
Danish	
Dutch	
English	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive
Estonian	
Finnish	
French	
German	Elektromagnetische Verträglichkeit und Funkspektrumsangelegenheiten (ERM); Funkanlagen geringer Reichweite; Technische Kennwerte und Prüfverfahren für Funkgeräte zur Verwendung im Frequenzbereich von 25 MHz bis 1000 MHz mit Ausgangsleistungen bis zu 500 mW; Teil 2: Wesentliche Anforderungen gemäß Art. 3.2 der R&TTE-Richtlinie
Greek	
Hungarian	
Italian	
Latvian	
Lithuanian	
Maltese	
Portuguese	
Slovak	
Slovenian	
Spanish	
Swedish	

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## Annex C (informative): Bibliography

CEPT/ERC Recommendation 70-03: "Relating to the use of Short Range Devices (SRD)".

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## History

Document history		
Edition 1	October 1993	Publication as I-ETS 300 220
V1.2.1	November 1997	Publication
V1.3.1	September 2000	Publication
V2.1.1	April 2005	Public Enquiry PE 20050805: 2005-04-06 to 2005-08-05