

**Electromagnetic compatibility and
Radio Spectrum Matters (ERM);
Ultra-High Frequency (UHF) on-board
communications systems and equipment;
Part 2: Harmonized EN under article 3.2 of the R&TTE Directive**



Reference

REN/ERM-RP01-038-2

Keywords

maritime, radio, regulation**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 ETSI standards One-step Approval Procedure.

The present document is part 2 of a multi-part European Standard, the titles of which are:

Part 1: "Technical characteristics and methods of measurement".

Part 2: "Harmonized EN 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 (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].

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):	6 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.

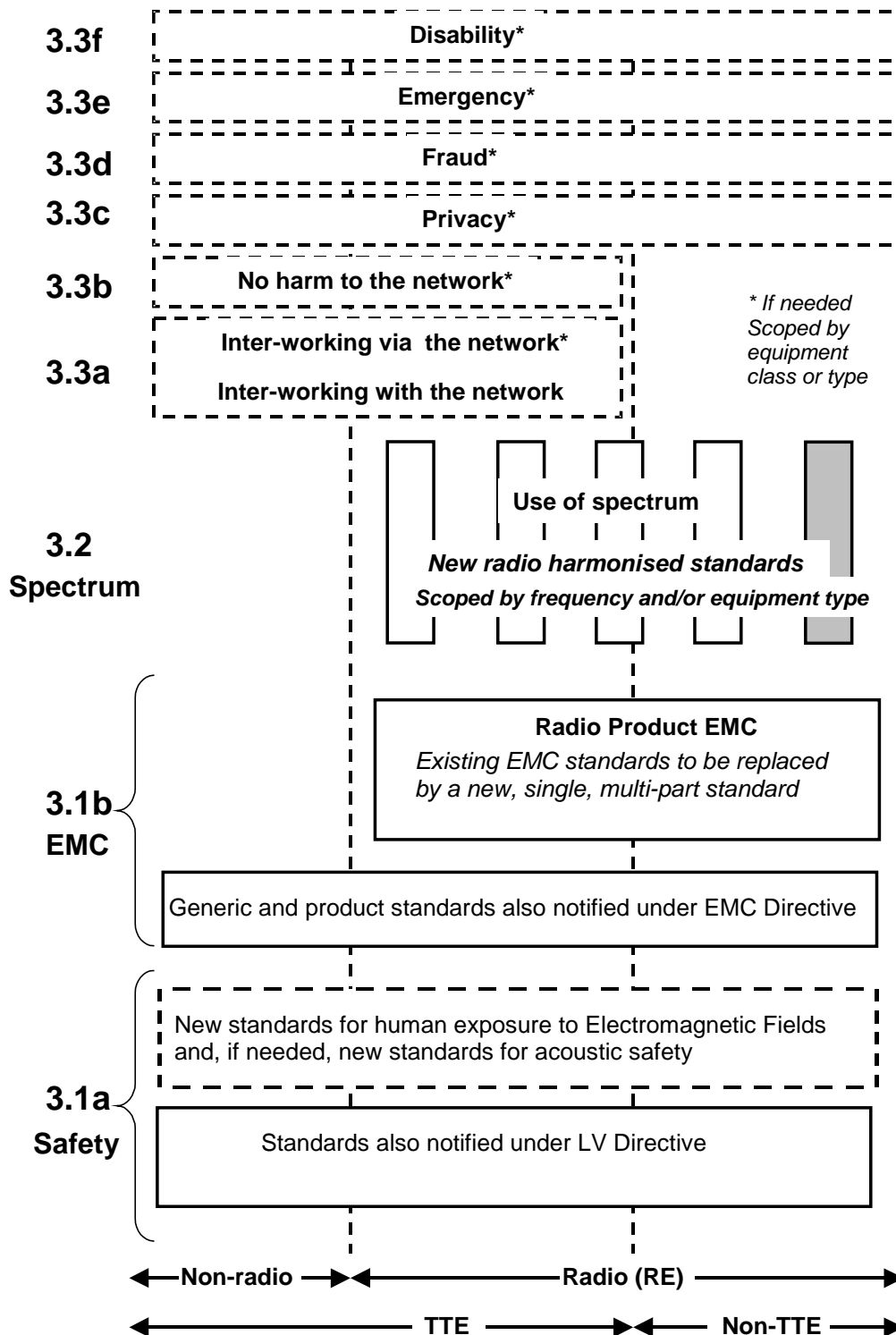


Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 1 shows the different subclauses 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 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. 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 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.

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 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 article 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.

1 Scope

The present document applies to UHF on-board communications systems and equipment.

This equipment is intended for operation, utilizing class of emission G3E, either on single-frequency or two-frequency simplex channels on those frequencies specified in tables 1 and 2.

Table 1: Single frequency simplex channels

Channel designator	Frequency
Channel A	467,525 MHz
Channel B	467,550 MHz
Channel C	467,575 MHz
Channel D	457,525 MHz
Channel E	457,550 MHz
Channel F	457,575 MHz

Table 2: Two-frequency simplex channels for use with repeater only

Channel designator	Transmit frequency	Receive frequency
Channel G	467,525 MHz	457,525 MHz
Channel H	467,550 MHz	457,550 MHz
Channel J	467,575 MHz	457,575 MHz

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

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] 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 (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 300 720-1 (V1.2): "Electromagnetic compatibility and Radio Spectrum Matters (ERM); Ultra-High Frequency (UHF) on-board communications systems and equipment; Part 1: Technical characteristics and methods of measurement".
- [5] ETSI ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions in the R&TTE Directive [1], and the following terms and definitions apply:

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

supplier: entity referred to in the R&TTE Directive [1] responsible for the placing on the market of an equipment within the scope of the Directive

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

EMC	Electro-Magnetic Compatibility
LV	Low Voltage
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
UHF	Ultra High Frequency

4 Technical requirements 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 Conformance requirements

4.2.1 Transmitter frequency error

4.2.1.1 Definition

The transmitter frequency error shall be as defined in EN 300 720-1 [4], subclause 8.1.1.

4.2.1.2 Limit

The transmitter frequency error limit shall be as stated in EN 300 720-1 [4], subclause 8.1.3.

4.2.1.3 Conformance

Conformance tests as defined in subclause 5.3.1 shall be carried out.

4.2.2 Transmitter carrier power

4.2.2.1 Definition

The transmitter carrier power shall be as defined in EN 300 720-1 [4], subclause 8.2.1.

4.2.2.2 Limit

The transmitter carrier power limit shall be as stated in EN 300 720-1 [4], subclause 8.2.3.

4.2.2.3 Conformance

Conformance tests as defined in subclause 5.3.2 shall be carried out.

4.2.3 Transmitter frequency deviation

4.2.3.1 Definition

The transmitter frequency deviation shall be as defined in EN 300 720-1 [4], subclause 8.3.1.

4.2.3.2 Limit

The transmitter frequency deviation limit shall be as stated in EN 300 720-1 [4], subclause 8.3.3.

4.2.3.3 Conformance

Conformance tests as defined in subclause 5.3.3 shall be carried out.

4.2.4 Transmitter adjacent channel power

4.2.4.1 Definition

The transmitter adjacent channel power shall be as defined in EN 300 720-1 [4], subclause 8.8.1.

4.2.4.2 Limit

The transmitter adjacent channel power limit shall be as stated in EN 300 720-1 [4], subclause 8.8.3.

4.2.4.3 Conformance

Conformance tests as defined in subclause 5.3.4 shall be carried out.

4.2.5 Transient frequency behaviour of the transmitter

4.2.5.1 Definition

The transient frequency behaviour of the transmitter shall be as defined in EN 300 720-1 [4], subclause 8.10.1.

4.2.5.2 Limit

The transient frequency behaviour of the transmitter limit shall be as stated in EN 300 720-1 [4], subclause 8.10.3.

4.2.5.3 Conformance

Conformance tests as defined in subclause 5.3.5 shall be carried out.

4.2.6 Transmitter conducted spurious emissions conveyed to the antenna

4.2.6.1 Definition

The transmitter conducted spurious emissions conveyed to the antenna shall be as defined in EN 300 720-1 [4], subclause 8.11.1.

4.2.6.2 Limit

The transmitter conducted spurious emissions conveyed to the antenna limit shall be as stated in EN 300 720-1 [4], subclause 8.11.3.

4.2.6.3 Conformance

Conformance tests as defined in subclause 5.3.6 shall be carried out.

4.2.7 Transmitter cabinet radiation and conducted spurious emissions other than those conveyed to the antenna

4.2.7.1 Definition

The transmitter cabinet radiation and conducted spurious emissions other than those conveyed to the antenna shall be as defined in EN 300 720-1 [4], subclause 8.12.1.

4.2.7.2 Limit

The transmitter cabinet radiation and conducted spurious emissions other than those conveyed to the antenna limit shall be as stated in EN 300 720-1 [4], subclause 8.12.3.

4.2.7.3 Conformance

Conformance tests as defined in subclause 5.3.7 shall be carried out.

4.2.8 Receiver maximum usable sensitivity

4.2.8.1 Definition

The receiver maximum usable sensitivity shall be as defined in EN 300 720-1 [4], subclause 9.3.1.

4.2.8.2 Limit

The receiver maximum usable sensitivity limit shall be as stated in EN 300 720-1 [4], subclause 9.3.3.

4.2.8.3 Conformance

Conformance tests as defined in subclause 5.4.2 may be carried out.

4.2.9 Receiver co-channel rejection

4.2.9.1 Definition

The receiver co-channel rejection shall be as defined in EN 300 720-1 [4], subclause 9.4.1.

4.2.9.2 Limit

The receiver co-channel rejection limit shall be as stated in EN 300 720-1 [4], subclause 9.4.3.

4.2.9.3 Conformance

Conformance tests as defined in subclause 5.4.3 may be carried out.

4.2.10 Receiver adjacent channel selectivity

4.2.10.1 Definition

The receiver adjacent channel selectivity shall be as defined in EN 300 720-1 [4], subclause 9.5.1.

4.2.10.2 Limit

The receiver adjacent channel selectivity limit shall be as stated in EN 300 720-1 [4], subclause 9.5.3.

4.2.10.3 Conformance

Conformance tests as defined in subclause 5.4.4 may be carried out.

4.2.11 Receiver spurious response rejection

4.2.11.1 Definition

The receiver spurious response rejection shall be as defined in EN 300 720-1 [4], subclause 9.6.1.

4.2.11.2 Limit

The receiver spurious response rejection limit shall be as stated in EN 300 720-1 [4], subclause 9.6.3.

4.2.11.3 Conformance

Conformance tests as defined in subclause 5.4.5 may be carried out.

4.2.12 Receiver intermodulation response

4.2.12.1 Definition

The receiver intermodulation response shall be as defined in EN 300 720-1 [4], subclause 9.7.1.

4.2.12.2 Limit

The receiver intermodulation response limit shall be as stated in EN 300 720-1 [4], subclause 9.7.3.

4.2.12.3 Conformance

Conformance tests as defined in subclause 5.4.6 may be carried out.

4.2.13 Receiver blocking or desensitization

4.2.13.1 Definition

The receiver blocking or desensitization shall be as defined in EN 300 720-1 [4], subclause 9.8.1.

4.2.13.2 Limit

The receiver blocking or desensitization limit shall be as stated in EN 300 720-1 [4], subclause 9.8.3.

4.2.13.3 Conformance

Conformance tests as defined in subclause 5.4.7 may be carried out.

4.2.14 Receiver conducted spurious emissions conveyed to the antenna

4.2.14.1 Definition

The receiver conducted spurious emissions 300 720 conveyed to the antenna shall be as defined in EN 300 720-1 [4], subclause 9.9.1.

4.2.14.2 Limit

The receiver conducted spurious emissions conveyed to the antenna limit shall be as stated in EN 300 720-1 [4], subclause 9.9.3.

4.2.14.3 Conformance

Conformance tests as defined in subclause 5.4.8 may be carried out.

4.2.15 Receiver radiated spurious emissions

4.2.15.1 Definition

The receiver radiated spurious emissions shall be as defined in EN 300 720-1 [4], subclause 9.10.1.

4.2.15.2 Limit

The receiver radiated spurious emissions limit shall be as stated in EN 300 720-1 [4], subclause 9.10.3.

4.2.15.3 Conformance

Conformance tests as defined in subclause 5.4.9 may be carried out.

5 Testing for compliance with technical requirements

5.1 Test conditions, power supply and ambient temperatures

These shall be as described in EN 300 720-1 [4], clause 5 and subclauses 6.1 to 6.6.

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 recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 3.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with ETR 028 [3] 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 3 is based on such expansion factors.

Table 3: Absolute measurement uncertainties: maximum values

Parameter	Maximum uncertainty
RF frequency	$\pm 1 \times 10^{-7}$
RF power	$\pm 0,75$ dB
Maximum frequency deviation:	
- within 300 Hz to 6 kHz of modulation frequency:	± 5 %
- within 6 kHz to 25 kHz of modulation frequency:	± 3 dB
Deviation limitation	± 5 %
Adjacent channel power	± 5 dB
Radiated emission of transmitter	± 6 dB
Radiated emission of receiver	± 6 dB
Two-signal measurement	± 4 dB
Three-signal measurement	± 3 dB
Conducted spurious emission of transmitter	± 4 dB
Conducted emission of receiver	± 3 dB
Transmitter transient time	± 20 %
Transmitter transient frequency	± 250 Hz

5.3 Essential radio test suites

5.3.1 Transmitter frequency error

The test specified in EN 300 720-1 [4], subclause 8.1.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.1.2 in order to prove compliance with the requirement.

5.3.2 Transmitter carrier power

The test specified in EN 300 720-1 [4], subclause 8.2.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.2.2 in order to prove compliance with the requirement.

5.3.3 Transmitter frequency deviation

The test specified in EN 300 720-1 [4], subclause 8.3.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.3.2 in order to prove compliance with the requirement.

5.3.4 Transmitter adjacent channel power

The test specified in EN 300 720-1 [4], subclause 8.8.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.4.2 in order to prove compliance with the requirement.

5.3.5 Transient behaviour of the transmitter

The test specified in EN 300 720-1 [4], subclause 8.10.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.5.2 in order to prove compliance with the requirement.

5.3.6 Transmitter conducted spurious emissions conveyed to the antenna

The test specified in EN 300 720-1 [4], subclause 8.11.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.6.2 in order to prove compliance with the requirement.

5.3.7 Transmitter cabinet radiation and conducted spurious emissions other than those conveyed to the antenna

The test specified in EN 300 720-1 [4], subclause 8.12.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.6.2 in order to prove compliance with the requirement.

5.4 Other test specifications

5.4.1 General

The requirements in subclauses 4.2.8 to 4.2.15 inclusive have been set on the assumption that the test specifications in subclauses 5.4.2 to 5.4.9 will be used to verify the performance of the equipment.

5.4.2 Receiver maximum usable sensitivity

The test specified in EN 300 720-1 [4], subclause 9.3.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.8.2 in order to prove compliance with the requirement.

5.4.3 Receiver co-channel rejection

The test specified in EN 300 720-1 [4], subclause 9.4.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.9.2 in order to prove compliance with the requirement.

5.4.4 Receiver adjacent channel selectivity

The test specified in EN 300 720-1 [4], subclause 9.5.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.10.2 in order to prove compliance with the requirement.

5.4.5 Receiver spurious response rejection

The test specified in EN 300 720-1 [4], subclause 9.6.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.11.2 in order to prove compliance with the requirement.

5.4.6 Receiver intermodulation response

The test specified in EN 300 720-1 [4], subclause 9.7.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.12.2 in order to prove compliance with the requirement.

5.4.7 Receiver blocking or desensitization

The test specified in EN 300 720-1 [4], subclause 9.8.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.13.2 in order to prove compliance with the requirement.

5.4.8 Receiver conducted spurious emissions conveyed to the antenna

The test specified in EN 300 720-1 [4], subclause 9.9.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.14.2 in order to prove compliance with the requirement.

5.4.9 Receiver radiated spurious emissions

The test specified in EN 300 720-1 [4], subclause 9.10.2 shall be performed. The results obtained shall be compared to the limits in subclause 4.2.15.2 in order to prove compliance with the requirement.

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 300 720-2				Comment
No.	Reference	EN-R (Note 1)	Status			
1	4.2.1	Transmitter frequency error	M			
2	4.2.2	Transmitter carrier power	M			
3	4.2.3	Transmitter frequency deviation	M			
4	4.2.4	Transmitter adjacent channel power	M			
5	4.2.5	Transient frequency behaviour of the transmitter	M			
6	4.2.6	Transmitter conducted spurious emissions conveyed to the antenna	M			
7	4.2.7	Transmitter cabinet radiation and conducted spurious emissions other than those conveyed to the antenna	M			
8	4.2.8	Receiver maximum usable sensitivity	M			
9	4.2.9	Receiver co-channel rejection	M			
10	4.2.10	Receiver adjacent channel selectivity	M			
11	4.2.11	Receiver spurious response rejection	M			
12	4.2.12	Receiver intermodulation response	M			
13	4.2.13	Receiver blocking or desensitization	M			
14	4.2.14	Receiver conducted spurious emissions conveyed to the antenna	M			
15	4.2.15	Receiver radiated spurious emissions	M			
NOTE: These EN-Rs are justified under Article 3.2 of the R&TTE Directive.						

Key to columns:

No Table entry number;

Reference Subclause reference number of conformance requirement within the present document;

EN-R	Title of conformance requirement within the present document;
Status	Status of the entry as follows: <ul style="list-style-type: none">M Mandatory, shall be implemented under all circumstances;O Optional, may be provided, but if provided shall be implemented in accordance with the requirements;O.n This status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".
Comments	To be completed as required.>

History

Document history			
V1.1.1	March 2000	One-step Approval Procedure	OAP 20000714: 2000-03-15 to 2000-07-14