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Electromagnetic compatibility and Radio spectrum Matters (ERM); Transmitting equipment for the Amplitude Modulated (AM) sound broadcasting service; Part 1: Technical characteristics and test methods

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European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Transmitting equipment for the Amplitude Modulated (AM)
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Part 1: Technical characteristics and
test methods**

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Contents

Intellectual Property Rights	5
Foreword.....	5
Introduction	5
1 Scope	6
2 References	6
3 Definitions, symbols and abbreviations	6
3.1 Definitions	6
3.2 Symbols.....	7
3.3 Abbreviations	8
4 Technical requirements specifications	8
4.1 Environmental profile.....	8
4.2 Antenna port measurements	8
4.2.1 Rated output power.....	8
4.2.1.1 Definition	8
4.2.1.2 Method of measurement.....	8
4.2.1.2.1 Initial conditions.....	8
4.2.1.2.2 Procedure.....	9
4.2.1.2.3 Test requirements	9
4.2.1.3 Limit.....	9
4.2.2 Frequency drift.....	9
4.2.2.1 Definition	9
4.2.2.2 Method of measurement.....	9
4.2.2.2.1 Initial conditions.....	9
4.2.2.2.2 Procedure.....	9
4.2.2.2.3 Test requirements	9
4.2.2.3 Limit.....	9
4.2.3 Spurious emissions	10
4.2.3.1 Definition	10
4.2.3.2 Method of measurement.....	10
4.2.3.2.1 Initial conditions.....	10
4.2.3.2.2 Procedure.....	10
4.2.3.2.3 Test requirements	10
4.2.3.3 Limit.....	10
4.2.4 Transmitter muting during frequency shift.....	11
4.2.4.1 Definition	11
4.2.4.2 Method of measurement.....	11
4.2.4.2.1 Initial conditions.....	11
4.2.4.2.2 Procedure.....	12
4.2.4.2.3 Test requirements	12
4.2.4.3 Limit.....	12
4.2.5 Out-of-band emissions.....	12
4.2.5.1 Definition	12
4.2.5.2 Method of measurement.....	12
4.2.5.2.1 Initial conditions.....	12
4.2.5.2.2 Procedure.....	12
4.2.5.2.3 Test requirements	13
4.2.5.3 Limit.....	13
4.3 Enclosure port measurements (radiated emissions).....	15
4.3.1 Cabinet radiation.....	15
4.3.1.1 Definition	15
4.3.1.2 Method of measurement.....	15
4.3.1.2.1 Initial conditions.....	15
4.3.1.2.2 Procedure.....	15

4.3.1.3	Limits	16
4.4	Measurement uncertainties	17
Annex A (informative):	General measuring arrangements	18
A.1	Testing arrangements for antenna port measurements	18
A.2	Test frequency range	18
A.3	Test modulating signal	19
A.4	Testing arrangements for radiated measurements	20
A.5	Test load characteristics	20
Annex B (informative):	Bibliography	21
History		22

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SIST EN 302 017-1 V1.1.1:2006

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 1 of a multi-part deliverable covering the transmitting equipment for the Amplitude Modulated (AM) sound broadcasting service, as identified below:

Part 1: "Technical characteristics and test methods";

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

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Date of adoption of this EN:	26 August 2005
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Introduction

The present document covers a set of non mandatory technical parameters that are considered to be the minimum requirement for the design and operation of an AM sound broadcasting service.

Other documents directly associated with the present document:

- EN 302 017-2 [1];
- EN 301 489-11 [2].

1 Scope

The present document applies to Double Side Band Transmitting equipment for the Amplitude-modulated radio broadcast service.

The types of equipment covered by the present document are as follows:

- Transmitting equipment for Amplitude Modulated sound broadcasting service operating in the LF MF and HF bands.

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] ETSI EN 302 017-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Transmitting equipment for the Amplitude Modulated (AM) sound broadcasting service; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive".
- [2] ETSI EN 301 489-11: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 11: Specific conditions for terrestrial sound broadcasting service transmitters".
- [3] CENELEC EN 55011: "Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement".
- [4] ETSI TR 100 028 (V1.4.1) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [5] ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain".
- [6] IEC 60489-1: "Methods of measurement for radio equipment used in the mobile services. Part 1: General definitions and standard conditions of measurement".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

antenna port: port of an apparatus which is designed, in normal operation, to be connected to an antenna using coaxial cable

broadcasting service: radiocommunication service in which the transmissions are intended for direct reception by the general public

NOTE: This service may include sound transmissions, television transmissions or other types of transmission.

cabinet radiation: radiation from an enclosure containing, equipment, excluding radiation from connected antennas or cables

carrier power: average power supplied to the antenna transmission line by a transmitter during one cycle taken under the condition of no modulation

channel bandwidth: frequency band of defined width (as a multiple of the carrier grid) including safety margin for operation on adjacent channels, located symmetrically around a carrier frequency in the carrier grid

class of emission: set of characteristics of an emission, designated by standard symbols, e.g. type of modulation of the main carrier, modulating signal, type of information to be transmitted, and also, if appropriate, any additional signal characteristics

dBc: decibels relative to the unmodulated carrier power of the emission

NOTE: In the cases which do not have a carrier, for example in some digital modulation schemes where the carrier is not accessible for measurement, the reference level equivalent to dBc is decibels relative to the mean power P.

enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

environmental profile: range of environmental conditions under which equipment within the scope of EN 302 017-1 document is required to comply with the provisions of EN 302 017-1

harmonic: component of order greater than 1 of the Fourier series of a periodic quantity

harmonic number: integral number given by the ratio of the frequency of a harmonic to the fundamental frequency (2nd harmonic = 2 × fundamental frequency)

intermodulation products: unwanted frequencies resulting from intermodulation between carriers or harmonics of emission, or between any oscillations generated to produce the carrier

mean power: average power supplied to the antenna transmission line by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation envelope taken under normal operating conditions

necessary bandwidth: for a given class of emission, width of the frequency band which is sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

out-of-band emissions: emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions

reference bandwidth: bandwidth in which the spurious emission level is specified

spurious emissions: emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out of band emissions.

unwanted emissions: spurious emissions and out of band emissions

3.2 Symbols

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

Ω	ohms (unit of resistance)
μ	micro, 10 ⁻⁶

3.3 Abbreviations

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

AF	Audio Frequency
AM	Amplitude Modulation
dB	decibel, logarithmic ratio (tenths of a "Bel")
dBm	dB relative to one milliwatt
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
HF	High Frequency
LF	Low Frequency
LV	Low Voltage
MF	Medium Frequency
R&TTE	Radio equipment and Telecommunications Terminal Equipment
V	Volt
W	Watt

4 Technical requirements specifications

4.1 Environmental profile

The environmental profile for operation of the equipment shall be declared by the supplier. 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 Antenna port measurements

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4.2.1 Rated output power

4.2.1.1 Definition

The rated output power is the carrier power that the transmitter or transposer shall deliver at its antenna port under manufacturers specified conditions of operation.

4.2.1.2 Method of measurement

4.2.1.2.1 Initial conditions

Test environment:

- the normal operating environment, as declared by the equipment manufacturer.

Test frequencies:

- the lowest operating frequency of the EUT;
- the highest operating frequency of the EUT;
- a frequency mid-way between a) and b) above.

Test arrangement (see figure A.1):

- connect the EUT to the Test Load, via the Coupling Device;
- connect the Spectrum Analyser or power meter to the Coupling Device.

NOTE: AF Signal Generator and Voltage measuring equipment are not required for this test.

4.2.1.2.2 Procedure

- 1) operate the EUT at each of the test frequencies as defined in clause 4.2.1.2.1;
- 2) measure the results on the Spectrum Analyser or power meter.

4.2.1.2.3 Test requirements

The results obtained shall be compared to the limits in clause 4.2.1.3 in order to demonstrate compliance.

4.2.1.3 Limit

The carrier output power shall be within $\pm 1,0$ dB of the rated output power under normal operating conditions as defined by the manufacturer.

4.2.2 Frequency drift

4.2.2.1 Definition

The uncontrolled continuous and irreversible variation of frequency against a predetermined time scale.

4.2.2.2 Method of measurement

4.2.2.2.1 Initial conditions

Test environment:

- the normal operating environment, as declared by the equipment manufacturer.

Test frequency:

- any one frequency within the tuning range of the EUT.

Test arrangement (see figure A.1):

- 1) connect the EUT to the Test Load, via the Coupling Device;
- 2) connect a frequency recorder to the Coupling Device.

NOTE: AF Signal Generator and Voltage measuring equipment are not required for this test.

4.2.2.2.2 Procedure

- 1) operate the exciter of the EUT at the test frequency as defined in clause 4.2.2.2.1;
- 2) measure the results on the frequency recorder.

Measurements should be made at intervals, which are short enough to reveal the presence of superimposed periodical variations.

4.2.2.2.3 Test requirements

The results obtained shall be compared to the limits in clause 4.2.2.3 in order to demonstrate compliance.

4.2.2.3 Limit

For a period of not less than ninety days, the frequency of the transmitter shall stay within the tolerance of ± 10 Hz.