



EUROPEAN
TELECOMMUNICATION
STANDARD

DRAFT
pr **ETS 300 446**

November 1996

Second Edition

Source: ETSI TC-RES

Reference: RE/RES-09037

ICS: 33.100, 33.060.20, 33.060.50

Key words: CT2, EMC, radio, testing

**Radio Equipment and Systems (RES);
ElectroMagnetic Compatibility (EMC) standard
for second generation Cordless Telephone (CT2) apparatus
operating in the frequency band 864,1 MHz to 868,1 MHz,
including public access services**

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 4 92 94 42 00 - Fax: +33 4 93 65 47 16

Copyright Notification: No part may be reproduced except as authorized by written permission. The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1996. All rights reserved.

Contents

Foreword		7
1	Scope	9
2	Normative references	9
3	Definitions and abbreviations	10
	3.1 Definitions	10
	3.2 Abbreviations	11
4	General test conditions	11
	4.1 Test conditions	11
	4.2 Arrangements for test signals at the input of the transceiver	11
	4.2.1 Speech equipment	11
	4.3 Normal test modulation	12
	4.4 Connection of test signals for transceivers	12
	4.4.1 RF connection	12
	4.5 Connection of test signals for receiver-only equipment	12
	4.5.1 RF connection	12
	4.6 Receiver test signal level	12
	4.7 Narrow band responses on receivers or receivers which are part of transceivers	12
	4.8 Exclusion bands	13
	4.8.1 Exclusion band for CT2 receivers and CT2 receiver parts of transceivers ...	13
	4.8.2 Exclusion band for CT2 transmitter parts of transceivers	13
5	Performance assessment	13
	5.1 General	13
	5.2 Equipment classification	14
	5.3 Ancillary equipment	14
	5.4 Assessment of host connected equipment and plug-in cards	14
	5.4.1 Alternative A: composite equipment	14
	5.4.2 Alternative B: use of a test jig and three hosts	14
	5.5 Performance assessment test procedure to verify no loss of user control functions or stored data for CT2 transceivers	15
	5.6 Performance assessment of audio breakthrough	15
6	Performance criteria	16
	6.1 Performance criteria for Continuous phenomena applied to CT2 Transceivers (CT)	17
	6.2 Performance criteria for Transient phenomena applied to CT2 Transceivers (TT)	17
	6.3 Performance criteria for Continuous phenomena applied to CT2 Receive-only equipment (CR)	17
	6.4 Performance criteria for Transient phenomena applied to CT2 Receive-only equipment (TR)	17
7	Applicability overview tables	17
	7.1 Emission	18
	7.2 Immunity	18
8	Test methods and limits for emission tests of transceivers and/or receivers and/or ancillary equipment	19
	8.1 Test configuration	19
	8.2 Enclosure	19
	8.2.1 Definition	19
	8.2.2 Test method	19
	8.2.3 Test limit	19
	8.3 DC power input/output port	20

	8.3.1	Definition.....	20
	8.3.2	Test method.....	20
	8.3.3	Test limit	20
8.4		AC mains power input/output port.....	20
	8.4.1	Definition.....	20
	8.4.2	Test method.....	21
	8.4.3	Test limit	21
9		Test methods and levels for immunity tests of transceivers and/or receivers and/or ancillary equipment.....	21
9.1		Test configuration.....	21
9.2		Radio frequency electromagnetic field (80 to 1 000 MHz)	21
	9.2.1	Enclosure.....	22
		9.2.1.1 Definition	22
		9.2.1.2 Test method and level.....	22
		9.2.1.3 Performance criteria.....	22
9.3		Electrostatic discharge	22
	9.3.1	Definition.....	22
	9.3.2	Test method and levels.....	22
	9.3.3	Performance criteria	23
9.4		Fast transients common mode.....	23
	9.4.1	Definition.....	23
	9.4.2	Test method and levels.....	23
	9.4.3	Performance criteria	24
9.5		RF common mode, 0,15 MHz to 80 MHz (current clamp injection)	24
	9.5.1	Definition.....	24
	9.5.2	Test method and level	24
	9.5.3	Performance criteria	25
9.6		Transients and surges, vehicular environment	25
	9.6.1	Definition.....	25
	9.6.2	Test method and level	25
	9.6.3	Performance criteria	26
9.7		Voltage dips and interruptions.....	26
	9.7.1	Definition.....	26
	9.7.2	Test method and levels.....	26
	9.7.3	Performance criteria	27
9.8		Surges, common and differential mode	27
	9.8.1	Definition.....	27
	9.8.2	Test method and levels.....	28
	9.8.3	Performance criteria	28
Annex A (normative):		ETS 300 446, EMC Standard for Cordless Telephone (CT2) apparatus operating in the frequency band 864,1 MHz to 868,1 MHz including public access services	29
Annex B (normative):		Clauses and/or subclauses from I-ETS 300 131 [3] which are relevant for compliance with essential requirements of the EC Council Directives.	30
B.1		CTAs without integral or supplied antenna.....	30
B.2		Unmodulated interfering carrier signal.....	30
B.3		Blocking due to spurious responses.....	31
B.4		Spurious emissions of the combined transmitter/receiver.....	31
Annex C (normative):		Clauses and/or subclauses from I-ETS 300 131 Second Edition [4] which are relevant for compliance with essential requirements of the EC Council Directives.	32
C.1		CTAs without integral or supplied antenna.....	32
C.2		Unmodulated interfering carrier signal.....	32

C.3 Blocking due to spurious responses 33

C.4 Spurious emissions of the combined transmitter/receiver 33

History..... 41

Blank page

Foreword

This European Telecommunication Standard (ETS) has been prepared by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Unified Approval Phase of the ETSI standards approval procedure.

This ETS is intended to become a Harmonised EMC Standard for equipment within the scope of I-ETS 300 131, the reference of which is intended to be published in the Official Journal of the European Communities referencing the Council Directive 89/336/EEC (EMC Directive).

Harmonised standards can be used to confer presumption of compliance with the essential requirements of the EMC Directive.

The technical specifications which are relevant to the EMC Directive are listed in annexes A, B and C.

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

Blank page

1 Scope

This European Telecommunication Standard (ETS) covers the assessment of radio communication and ancillary equipment in respect of Electromagnetic Compatibility (EMC).

This ETS specifies the minimum performance and the methods of measurements of EMC on second generation Cordless Telephone (CT2) apparatus and ancillary equipment.

This ETS specifies the applicable EMC tests, the limits, and the performance criteria for digital radio equipment, operating in the frequency range 864,1 to 868,1 MHz, and for the associated ancillary equipment.

The environment classification used in this ETS refers to the environment classification used in the Generic Standards EN 50081-1 [1], EN 50082-1 [2], except the vehicular environment class which refers to ISO 7637 [6].

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus at residential, commercial, light industrial and vehicular environments. The levels however, do not cover extreme cases which may occur in any location but with a low probability of occurrence.

This ETS may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena, or a continuous phenomena, is permanently present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference, or the interfered part, or both.

Compliance of radio equipment to the requirements of this ETS does not signify compliance to any requirement related to the use of the equipment (i.e. licensing requirements).

Compliance to this ETS does not signify compliance to any safety requirements. However, it is the responsibility of the assessor of the equipment that any observation regarding the equipment becoming dangerous or unsafe as a result of the application of the tests of this ETS, should be recorded in the test report.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- [1] EN 50081-1 (1992): "Electromagnetic compatibility - Generic emission standard. Part 1 Residential, commercial and light industry".
- [2] EN 50082-1 (1992): "Electromagnetic compatibility - Generic immunity standard. Part 1: Residential, commercial and light industry".
- [3] I-ETS 300 131 (1992): "Radio Equipment and Systems (RES); Common air interface specification to be used for the interworking between cordless telephone apparatus in the frequency band 864,1 MHz to 868,1 MHz, including public access services".
- [4] I-ETS 300 131 (1994): 2nd Edition "Radio Equipment and Systems (RES); Common air interface specification to be used for the interworking between cordless telephone apparatus in the frequency band 864,1 MHz to 868,1 MHz, including public access services".
- [5] I-ETS 300 176: "Radio Equipment and Systems (RES); Digital European Cordless Telephone (DECT); Approval test specification".

- [6] ISO 7637 (1990): "Road vehicles - Electrical disturbance by conducting and coupling - Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage".
- ISO 7637 (1990): "Road vehicles - Electrical disturbance by conducting and coupling - Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only".
- [7] EN 55022: "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".
- [8] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus".
- [9] ENV 50140: "Electromagnetic Compatibility - Basic immunity standard - Radiated, radio-frequency electromagnetic field. Immunity test".
- [10] EN 61000-4-2: "Electromagnetic Compatibility (EMC) - Part 4: Testing and measurements techniques - Section 2: Electrostatic discharge immunity test".
- [11] EN 61000-4-4: "Electromagnetic Compatibility (EMC) - Part 4: Testing and measurements techniques - Section 4: Electrical fast transients/burst requirements".
- [12] EN 61000-4-6: "Electromagnetic Compatibility (EMC) - Part 4: Testing and measurements techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields".
- [13] EN 61000-4-11: "Electromagnetic Compatibility (EMC) - Part 4: Testing and measurements techniques - Section 11: Voltage dips, short interruptions and voltage variations immunity tests".
- [14] EN 61000-4-5: "Electromagnetic Compatibility (EMC) - Part 4: Testing and measurements techniques - Section 5: Surge immunity test".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS the following definitions apply:

ancillary equipment: Equipment (apparatus), used in connection with a receiver or transceiver is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a receiver, or transceiver to provide additional operational and/or control features to the radio equipment (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a receiver or transceiver; and
- the receiver or transceiver to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

base station equipment: Used to describe CT2 equipment including CFPs (Cordless Fixed Parts) and/or CPPs (Cordless Portable Parts) which are powered via an ac power input port or a dc power input port.

CT2 equipment: Apparatus which includes one or more transceivers and/or receivers and/or parts thereof which operate in the frequency band 864,1 MHz to 868,1 MHz.

host equipment: Any equipment which has a complete user functionality when not connected to the CT2 radio equipment, and to which the CT2 radio equipment provides additional functionality, and to which connection is necessary for the CT2 radio equipment to offer functionality.

integral antenna: An antenna designed to be connected to the equipment without the use of an external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

manufacturer: The legal entity responsible for placing the product on the market.

mobile equipment: Used to describe all CT2 equipment powered by a vehicular power supply.

port: A particular interface of the specified equipment (apparatus) with the electromagnetic environment.

portable equipment: Used to describe all CT2 equipment powered by an internal battery.

NOTE: More than one of the equipment classifications may apply to certain equipment, as described in subclause 5.2, dependent upon the manufacturer's declaration of normal intended use.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

CT2	second generation Cordless Telephone
CTA	Cordless Telephone Apparatus
CFP	Cordless Fixed Part
CPP	Cordless Portable Part
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
SPL	Sound Pressure Level

4 General test conditions

4.1 Test conditions

The equipment shall be tested under normal test conditions contained in the relevant product and basic standards or in the information accompanying the equipment, which are within the manufacturers declared range of humidity, temperature, and supply voltage.

The test conditions shall be recorded in the test report.

The test configuration shall be as close to normal intended use as possible and shall be recorded in the test report.

Whenever the EUT is provided with a detachable antenna, the EUT shall be tested with the antenna fitted in a manner typical of normal intended use.

For CT2 equipment parts for which connection to a host equipment is necessary to offer functionality the test configuration shall be as defined in subclause 5.4.

4.2 Arrangements for test signals at the input of the transceiver

4.2.1 Speech equipment

Audio input signals may be connected to the EUT either by a non-metallic acoustic tube or, if provided, electrical connections. The CT2 equipment shall not be modified to provide any electrical connection ports for the purposes of this test. Suitable test arrangements for the acoustic tube are described in I-ETS 300 176 [5].

4.3 Normal test modulation

The wanted input signal shall have the maximum peak frequency deviation which shall lie between 14,4 kHz and 25,2 kHz.

4.4 Connection of test signals for transceivers

4.4.1 RF connection

Where the equipment incorporates an external antenna connector, the wanted signal to establish communications shall be delivered to that connector by a coaxial cable.

The source of the wanted input signal shall be located outside of the test environment.

Where the equipment does not incorporate an external RF connector (integral antenna equipment), the wanted signal to establish communications shall be delivered from the equipment to an antenna located within the test environment.

4.5 Connection of test signals for receiver-only equipment

4.5.1 RF connection

Where the equipment incorporates an external antenna connector, the wanted signal, to establish communications shall be presented to that connector by a coaxial cable.

The source of the wanted input signal shall be located outside of the test environment.

Where the equipment does not incorporate an external RF connector (integral antenna equipment), the wanted signal, to establish communications, shall be presented to the equipment from an antenna located within the test environment. Adequate measures shall be taken to protect the measuring equipment from the effect of all the radiated fields within the test environment.

4.6 Receiver test signal level

For tests on receivers and the receiver parts of transceivers, the level of the wanted input signal shall be adjusted to approximately 40 dB above the radio receiver sensitivity limit as defined in I-ETS 300 131 [3] and [4].

The source of the wanted input signal shall be located outside of the test environment.

4.7 Narrow band responses on receivers or receivers which are part of transceivers

No immunity tests shall be carried out on frequencies of identified narrow band responses (i.e. spurious responses) of the receiver parts of the CT2 equipment.

A spurious response is defined as a failure of the communications state between a CFP or CPP and its corresponding CPP or CFP due to the introduction of interfering radio signals, at any frequency within a continuous frequency band of width 1 MHz or less at a lower field strength than given as the limiting value in annex B, taken from I-ETS 300 131 [3] and [4], subclause 4.6.3.1, at that frequency equal to the centre frequency of this band.

The procedure by which a narrow band response is distinguished from a wide band response is as follows:

- if during testing the communications link is dropped, or there is an increase above the permitted level in the measured value of speech output signal level, the frequency of the unwanted signal shall be recorded and then increased by 1 MHz and the test repeated. Similarly, the frequency of the unwanted signal shall be set to the frequency recorded in the previous test, and then decreased by 1 MHz and the test repeated;

- if the communications link is maintained and the speech output signal of the EUT as measured is within the permitted limit at the two test frequencies described in the previous paragraph, then the response observed at the recorded frequency of the unwanted signal shall be considered a narrow band response and shall not be used in determining the EMC compliance of the EUT;
- if the communications link is dropped or the speech output signal level of the EUT as measured is outside the permitted limits at the two test frequencies, then the test shall be repeated using frequency offsets of plus and minus 1,5 MHz. If at one or both of this second set of test frequencies the communications link is dropped or the speech output signal level as measured is still outside the permitted limits, then the response is considered to be a wide band phenomena and the EUT fails the test.

4.8 Exclusion bands

Frequencies on which the EUT is intended to operate are excluded from immunity tests with either conducted or radiated unwanted RF signals. For the purposes of this ETS these frequencies are referred to as "exclusion bands".

4.8.1 Exclusion band for CT2 receivers and CT2 receiver parts of transceivers

The exclusion band for a receiver or a receiver part of a transceiver shall extend from 820,9 MHz to 911,5 MHz.

4.8.2 Exclusion band for CT2 transmitter parts of transceivers

The exclusion band for the transmitter part of a transceiver shall extend from 820,9 MHz to 911,5 MHz.

NOTE: The product operates on a single frequency in a time-division multiplex mode. For this reason, it is not practical to configure test equipment to use an exclusion band for the transmitter that is narrower than that used for the receiver. As a result, the specified exclusion band for transmitters has been set equal to the exclusion band for receivers.

5 Performance assessment

5.1 General

The manufacturer shall at the time of submission of the equipment for test, declare the following information which shall be recorded in the test report:

- in the case of receive-only equipment, the primary functions of the radio equipment to be tested during and after the EMC testing;
- the intended functions of the EUT which shall be in accordance with the documentation accompanying the equipment;
- the ancillary equipment and/or host equipment to be used with the radio equipment for testing;
- the user-control functions and stored data that are required for normal operation and the method to be used to assess whether these have been lost after EMC stress;
- an exhaustive list of ports, classified as either power or signal/control. Power ports shall further be classified as ac or dc power;
- the volume setting required to provide nominal operation of the product as defined in I-ETS 300 131 [3] or [4].

5.2 Equipment classification

Portable equipment or combinations of equipment declared as capable of being powered for intended use by the battery in the vehicle shall additionally be considered as vehicular mobile equipment.

Portable or mobile equipment or combinations of equipment declared as capable of being powered for intended use by ac mains shall additionally be considered as base station equipment.

5.3 Ancillary equipment

At the manufacturer's discretion an ancillary equipment may be:

- declared compliant separately from a receiver or transceiver to all the applicable immunity and emission clauses of this ETS;
- declared compliant to another appropriate harmonized EMC standard;
- tested with it connected to a receiver or transceiver, in which case compliance shall be demonstrated to the appropriate clauses of this ETS.

In each case, compliance enables the ancillary equipment to be used with different receivers, transmitters, or transceivers.

5.4 Assessment of host connected equipment and plug-in cards

For CT2 equipment parts for which connection to or integration with a host equipment is necessary in order to offer functionality, two alternative approaches are permitted. The manufacturer shall declare which alternative shall be used.

5.4.1 Alternative A: composite equipment

A combination of CT2 radio equipment part and a specific type of host equipment may be used for assessment according to this ETS.

Where more than one such combination is intended, each combination shall be tested separately.

Where a specific combination of host equipment and a CT2 radio equipment part is tested as a composite system for compliance, repeat testing shall not be required for:

- those other combinations of hosts and CT2 radio equipment parts which are based on substantially similar host models in the circumstance that the variations in mechanical and electrical properties between such host models are unlikely to significantly influence the intrinsic immunity and unwanted emissions of the CT2 radio equipment part;
- the CT2 radio equipment part which cannot be used without mechanical, electrical, or software modification in variations of host equipment different from those represented by the units for which compliance to this ETS has been demonstrated.

5.4.2 Alternative B: use of a test jig and three hosts

Where the CT2 radio equipment part is intended for use with a variety of host equipment, the manufacturer shall supply a suitable test jig to enable compliance with this ETS to be assessed.

The test jig shall be designed such that alteration of the CT2 radio equipment part's intrinsic immunity and unwanted emissions is minimized.

Where connection between the CT2 radio equipment part and the host equipment control and/or power ports is by cables, optical fibres, or other similar means, this connection to the host shall be considered as a suitable test jig.

The test jig shall allow the CT2 radio equipment part to be powered and stimulated in a way representative of the way in which it would be powered and stimulated when connected to or inserted into the host equipment.

In addition to tests using the test jig the CT2 radio equipment part shall be tested when connected to or inserted into three different host equipment. These hosts shall be provided by the manufacturer and shall be selected from the list of compatible hosts published by the manufacturer as part of the user documentation supplied with the CT2 radio equipment part.

The selection of hosts shall be by agreement with the Notified Body.

Notified bodies shall have the discretion to require the manufacturer to inform them of each deletion from, or addition to, the list of compatible hosts published in the user documentation.

5.5 Performance assessment test procedure to verify no loss of user control functions or stored data for CT2 transceivers

The test system shall set up a link in the same manner as the Equipment Under Test's (EUT) normal intended use.

Any user defined data fields shall be filled in a way representative of normal intended use.

The test procedure shall verify that the CT2 link is maintained and that there is no loss of user control functions declared by the manufacturer or loss of the stored user defined data.

5.6 Performance assessment of audio breakthrough

This test is used to measure the effect of continuous EMC phenomena on the analogue speech circuits of CT2 equipment so fitted.

The test system shall be arranged as shown in figure 1 such that the level of the output signals from the EUT's speech channels can be recorded on suitable test instruments, though not necessarily in each channel simultaneously. For a Cordless Portable Part (CPP) with an acoustic transducer this will require the measurement of Sound Pressure Level (SPL). Pick-up of extraneous back-ground noise by the EUT's speech transducer (microphone) shall be minimized.

Prior to the test sequence, the reference level of the speech output signal shall be recorded on the test instrumentation as shown in figure 2. For a CPP with an acoustic speech transducer this shall be equivalent to 0 dBPa at 1 kHz, applied to the ear reference point in the receive path, and - 5 dBPa at 1 kHz applied to the mouth reference point. For an Cordless Fixed Part (CFP) with analogue speech circuits and other implementations of CT2 equipment with analogue speech circuits, the reference level shall be equivalent to these acoustic signals.

At each test frequency, the level of the acoustic output signal relative to the reference level shall be measured.

Where it is necessary to interface to the acoustic transducers of the EUT care shall be taken to ensure that the disturbance to the EM field is minimized. The use of a non metallic acoustic coupler as described in I-ETS 300 176 [5] is recommended.

The precise arrangements shall be recorded in the test report.

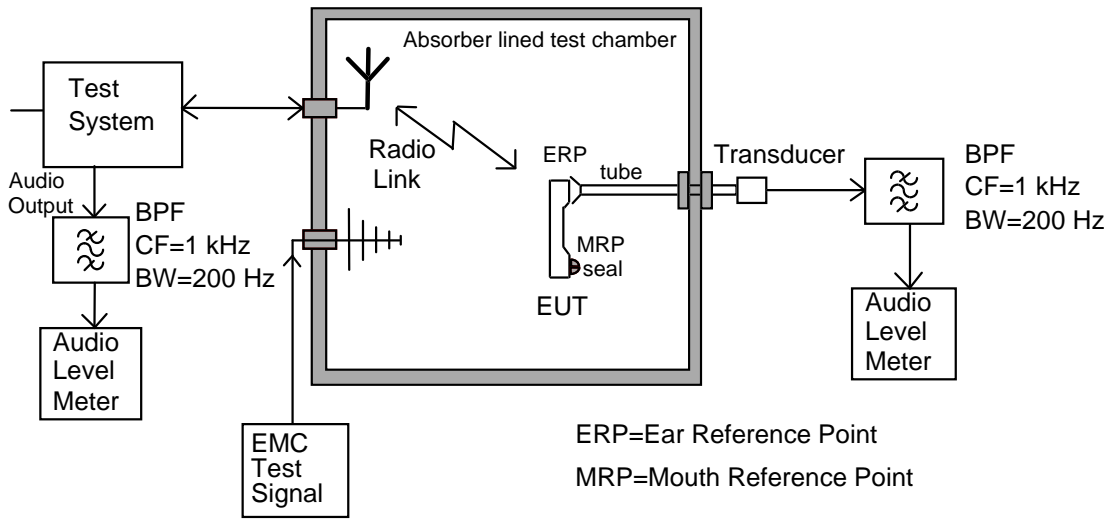
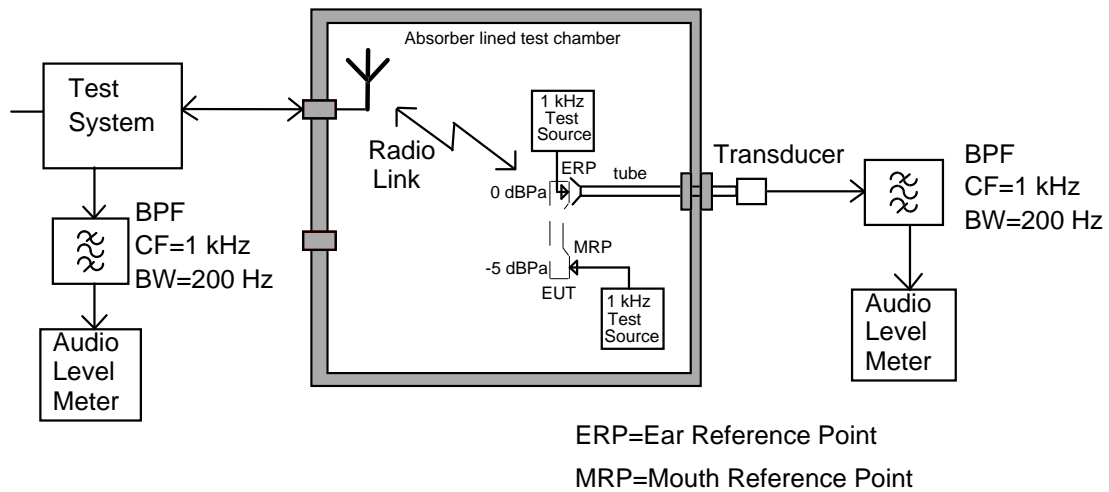


Figure 1: Audio breakthrough measurement, test set-up



NOTE: The EUT is in position during calibration of the uplink, but not during calibration of the downlink.

Figure 2: Audio breakthrough measurement, calibration set-up

6 Performance criteria

The definition of the primary functions to be checked during and after the EMC testing shall be declared by the manufacturer and recorded in the test report.

The equipment shall meet the minimum performance criteria as specified in subclauses 6.1, 6.2, 6.3 and 6.4 and additionally the primary functions as declared by the manufacturer.

Equipment powered by the battery in the vehicle shall also fulfil the applicable requirements set out in this ETS for vehicular mobile equipment.

Equipment powered by ac mains shall also fulfil the applicable requirements set out by this standard for base station equipment, although the input/output arrangements of the equipment and the performance criteria may remain as for the original class, as appropriate.

6.1 Performance criteria for Continuous phenomena applied to CT2 Transceivers (CT)

The communications link shall be maintained during the test sequence.

Additionally for equipment containing analogue speech circuits the speech output signal level shall be at least 35 dB less than the previously recorded reference level, when measured through an audio bandpass filter of width 200 Hz, centred on 1 kHz. This shall be verified by the procedure in subclause 5.6.

At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data and the communications link shall have been maintained during and after the tests. This shall be verified by the procedure in subclause 5.5.

Where the EUT is capable of transmission, tests shall be performed to ensure that unintentional transmission does not occur.

6.2 Performance criteria for Transient phenomena applied to CT2 Transceivers (TT)

At the conclusion of each exposure, the EUT shall operate with no user noticeable loss of the communications link.

At the conclusion of the total test comprising the series of individual exposures the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communications link shall have been maintained. This shall be verified by the procedure in subclause 5.5.

Where the EUT is capable of transmission, tests shall be performed to ensure that unintentional transmission does not occur.

6.3 Performance criteria for Continuous phenomena applied to CT2 Receive-only equipment (CR)

The primary functions shall be verified during each individual exposure in the test sequence.

Additionally for equipment containing analogue speech circuits the speech output signal level shall be at least 35 dB less than the previously recorded reference level, when measured through an audio bandpass filter of width 200 Hz, centred on 1 kHz. This shall be verified by the procedure in subclause 5.6.

At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communications link shall have been maintained. This shall be verified by checking the primary functions.

6.4 Performance criteria for Transient phenomena applied to CT2 Receive-only equipment (TR)

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communications link.

At the conclusion of the total test comprising the series of individual exposures the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communications link shall have been maintained. This shall be verified by checking the primary functions.

7 Applicability overview tables

Definitions in clause 3 define the terms "base station equipment", "mobile equipment", and "portable equipment" as they apply to this ETS.

7.1 Emission

Table 1: Emission applicability

Application	Equipment test requirement			Reference subclause in this ETS	Reference document
	Base station and ancillary equipment for fixed use	Mobile and ancillary equipment for vehicular use	Portable and ancillary equipment for portable use		
Enclosure	applicable for ancillary equipment not integrated into receivers, or transceivers	applicable for ancillary equipment not integrated into receivers, or transceivers	applicable for ancillary equipment not integrated into receivers, or transceivers	8.2	EN 55022 [7]
DC power in/out	applicable	applicable	not applicable	8.3	EN 55022 [7], CISPR 16-1 [8]
AC mains	applicable	not applicable	not applicable	8.4	EN 55022 [7]

7.2 Immunity

Table 2: Immunity applicability

Phenomena	Application	Equipment test requirement			Reference subclause in this ETS	Reference document
		Base station and ancillary equipment for fixed use	Mobile and ancillary equipment for vehicular use	Portable and ancillary equipment for portable use		
RF electromagnetic field (80 MHz to 1 000 MHz)	Enclosure	applicable	applicable	applicable	9.2	ENV 50140 [9]
Electrostatic discharge	Enclosure	applicable	applicable	applicable	9.3	EN 61000-4-2 [10]
Fast transients common mode	Signal and control ports, dc and ac power input ports	applicable	not applicable	not applicable	9.4	EN 61000-4-4 [11]
RF common mode 0,15 to 80 MHz (current clamp injection)	Signal and control ports, dc and ac power ports	applicable	applicable	not applicable	9.5	EN 61000-4-6 [12]
Transients and surges, vehicular environment	DC power input ports	not applicable	applicable	not applicable	9.6	ISO 7637 parts 1 and 2 [6]
Voltage dips and interruptions	AC mains power input ports	applicable	not applicable	not applicable	9.7	EN 61000-4-11 [13]
Surges, common and differential mode	AC mains power input ports	applicable	not applicable	not applicable	9.8	EN 61000-4-5 [14]

8 Test methods and limits for emission tests of transceivers and/or receivers and/or ancillary equipment

8.1 Test configuration

This subclause defines the requirements for test configurations described in the following subclauses. The requirements are as follows:

- the measurement shall be made in the operational mode producing the largest emission in the frequency band being investigated consistent with normal applications;
- the equipment shall be configured in a manner which is representative of normal/typical operation, where practical;
- an attempt shall be made to maximize the detected radiated emission, for example by moving the cables of the equipment;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- for CT2 equipment parts for which connection to a host equipment is necessary to offer functionality, the manufacturer shall select which of the alternative performance assessment configurations described in subclause 5.4 shall be used;
- the configuration and mode of operation during measurements shall be precisely noted in the test report;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- ports which in normal operation are connected, shall be connected to an ancillary equipment or to a representative piece of cable terminated to simulate the impedance of the ancillary equipment. RF input/output ports shall be correctly terminated;
- the tests shall be carried out at a point within the specified operating environmental range and at the rated supply voltage for the equipment.

8.2 Enclosure

This test is applicable for ancillary equipment not integrated into the receiver or transceiver.

This test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment.

8.2.1 Definition

This test assesses the ability of ancillary equipment to limit any spurious radiation from the enclosure.

8.2.2 Test method

The test method shall be in accordance with EN 55022 [7].

8.2.3 Test limit

The EUT shall meet the Class B limits of EN 55022 [7] shown in table 3 (10 m measuring distance).

Table 3: Limits

Frequency range	Limit (quasi-peak)
30 - 230 MHz	30 dB μ V/m
> 230 - 1 000 MHz	37 dB μ V/m

8.3 DC power input/output port

This test is applicable for base station, mobile, and ancillary equipment which may have dc cables longer than 3 metres.

This test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment.

8.3.1 Definition

This test assesses the ability of receivers, transceivers and ancillary equipment to limit its internal noise from being present on the dc power input/output ports.

8.3.2 Test method

The test method shall be in accordance with EN 55022 [7]. The artificial network (LISN) specified in EN 55022 [7] shall be used connected to a dc power source.

The equipment shall be installed with a ground plane as defined in EN 55022 [7] subclause 9.3. The reference earth point of the Line Impedance Stabilization Networks (LISN) shall be connected to the reference ground plane with a conductor as short as possible.

The measurement receiver shall be in accordance with the requirements of section one of CISPR 16-1 [8].

8.3.3 Test limit

The equipment shall meet the limits below (including the average limit and the quasi-peak limit) when using, respectively, an average detector receiver and a quasi-peak detector receiver and measured in accordance with the method described in subclause 8.3.2. If the average limit is met when using a quasi-peak detector, the equipment shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

The EUT shall meet the Class B limits of EN 55022 [7] shown in table 4.

Table 4: Limits

Frequency range	Quasi-peak	Average
0,15 - 0,5 MHz	66 - 56 dB μ V	56 - 46 dB μ V
> 0,5 - 5 MHz	56 dB μ V	46 dB μ V
> 5 - 30 MHz	60 dB μ V	50 dB μ V
NOTE: The limit decreases linearly with the logarithm of frequency in the range 0,15 MHz to 0,50 MHz.		

8.4 AC mains power input/output port

This test is applicable for base station and fixed ancillary equipment.

This test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment.

8.4.1 Definition

This test assesses the ability of receivers, transceivers and ancillary equipment to limit its internal noise from being present on the ac mains power input/output ports.

8.4.2 Test method

The test method shall be in accordance with EN 55022 [7].

8.4.3 Test limit

The EUT shall meet the Class B limits of EN 55022 [7] shown in table 5.

Table 5: Limits

Frequency range	Quasi-peak	Average
0,15 - 0,5 MHz	66 - 56 dB μ V	56 - 46 dB μ V
> 0,5 - 5 MHz	56 dB μ V	46 dB μ V
> 5 - 30 MHz	60 dB μ V	50 dB μ V
NOTE: The limit decreases linearly with the logarithm of frequency in the range 0,15 MHz to 0,50 MHz.		

9 Test methods and levels for immunity tests of transceivers and/or receivers and/or ancillary equipment

9.1 Test configuration

This subclause defines the requirements for test configurations described in the following subclauses. The requirements are as follows:

- for the immunity tests of receivers, the wanted input signal coupled to the receiver shall be modulated with normal test modulation (see subclauses 4.2 and 4.5). Communications shall be established (see subclause 4.4);
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- for the immunity tests of transceivers, the EUT shall have a radio link set-up with the testing system;
- for the immunity tests of ancillary equipment, without a separate pass/fail criteria, the receiver or transceiver coupled to the ancillary equipment shall be used to judge whether the ancillary equipment passes or fails;
- for CT2 equipment parts for which connection to a host equipment is necessary to offer functionality the manufacturer shall select which of the alternative performance assessment configurations described in subclause 5.4 shall be used;
- the configuration and mode of operation during measurements shall be precisely noted in the test report;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are covered;
- ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable terminated to simulate the impedance of the ancillary equipment. RF input/output ports shall be correctly terminated;
- the tests shall be carried out at a point within the specified normal operating environmental range and at the rated supply voltage for the equipment.

9.2 Radio frequency electromagnetic field (80 to 1 000 MHz)

9.2.1 Enclosure

This test is applicable for base station, mobile, portable, and ancillary equipment.

This test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment.

9.2.1.1 Definition

This test assesses the ability of receivers, transceivers, and ancillary equipment to operate as intended in the presence of a radio frequency electromagnetic field disturbance.

9.2.1.2 Test method and level

The test method shall be in accordance with ENV 50140 [9], except that the following requirements shall apply:

- the test level shall be 3V/m RMS amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 kHz;
- the stepped frequency increments shall be 1 % of the previous frequency;
- the test shall be performed over the frequency range 80 to 1 000 MHz with the exception of an exclusion band for transmitters and receivers, see subclause 4.8;
- responses on receivers and receiver parts of transceivers occurring at discrete frequencies which are narrow band responses, shall be disregarded, see subclause 4.7;
- the frequencies selected during the test shall be recorded in the test report.

9.2.1.3 Performance criteria

For transceivers, the general performance criteria CT (see subclause 6.1) shall apply.

For stand alone receivers, the general performance criteria CR (see subclause 6.3) shall apply.

For ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transceivers in which case the corresponding performance criteria above shall apply.

9.3 Electrostatic discharge

This test is applicable for base station, mobile, portable, and ancillary equipment.

This test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment.

9.3.1 Definition

This test assesses the ability of receivers, transceivers and ancillary equipment to operate as intended in the event of an electrostatic discharge.

9.3.2 Test method and levels

The test method shall be in accordance with EN 61000-4-2 [10].

The following requirements shall apply:

- the test severity level for ESD contact discharge shall be 4 kV; and for air discharge shall be 8 kV. Refer to the basic standard for all other details, including intermediate test severity levels.

- electrostatic discharges shall be applied to all exposed surfaces of the EUT except where the user documentation specifically indicates a requirement for appropriate protective measures (see EN 61000-4-2 [10]).

9.3.3 Performance criteria

For transceivers, the general performance criteria TT (see subclause 6.2) shall apply.

For stand alone receivers, the general performance criteria TR (see subclause 6.4) shall apply.

For ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transceivers in which case the corresponding performance criteria above shall apply.

9.4 Fast transients common mode

This test is applicable for base station and fixed ancillary equipment.

This test shall be performed on ac mains power input ports.

This test shall be performed on signal ports, control ports and dc power input/output ports if the cables may be longer than 3 metres.

Where this test is not carried out on any ports because the manufacturer declares that it is not intended to be used with cables longer than 3 metres, a list of ports which were not tested for this reason shall be included in the test report.

This test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment or host equipment.

9.4.1 Definition

This test assesses the ability of receivers, transceivers, and ancillary equipment to operate as intended in the event of fast transients present on one of the input/output ports.

9.4.2 Test method and levels

The test method shall be in accordance with EN 61000-4-4 [11], except that the following requirements shall apply:

For receivers, transceivers and ancillary equipment, which have cables longer than 3 metres, or are connected to the ac mains:

- the test level for signal and control ports shall be severity level 2 corresponding to 0,5 kV open circuit voltage as given in EN 61000-4-4 [11];
- the test level for dc power input/output ports shall be severity level 2 corresponding to 1 kV open circuit voltage as given in EN 61000-4-4 [11];
- the test level for ac mains power input ports shall be severity level 3 corresponding to 2 kV open circuit voltage as given in EN 61000-4-4 [11];
- for ac power input and dc power input/output ports the transients shall be applied (in parallel) to all the wires in the cable with reference to the cabinet reference ground, i.e. line-to-ground, (true common mode), with a source impedance of 50 Ω .

9.4.3 Performance criteria

For transceivers, the general performance criteria TT (see subclause 6.2) shall apply.

For stand alone receivers, the general performance criteria TR (see subclause 6.4) shall apply.

For ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transceivers in which case the corresponding performance criteria shall apply.

9.5 RF common mode, 0,15 MHz to 80 MHz (current clamp injection)

This test is applicable for base station, mobile and ancillary equipment.

This test shall be performed on signal ports including antenna ports, control ports and dc power input/output ports of mobile and ancillary equipment, which may have cables longer than 2 metres.

This test shall be performed on signal ports including antenna ports, control ports and dc power and ac mains power input/output ports of base station and fixed ancillary equipment which may have cables longer than 1 metre.

Where this test is not carried out on any ports because the manufacturer declares that it is not intended to be used with cables longer than 2 metres (mobile and ancillary equipment) or 1 metre (base station and fixed ancillary), a list of ports which were not tested shall be included in the test report.

This test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment or host equipment.

9.5.1 Definition

This test assesses the ability of receivers, transceivers, and ancillary equipment to operate as intended in the presence of a radio frequency electromagnetic disturbance on the input/output ports.

9.5.2 Test method and level

The test method shall be the current clamp injection method in accordance with EN 61000-4-6 [12] except that the following requirements shall apply:

- the test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 kHz;
- the stepped frequency increments shall be 50 kHz in the frequency range 150 kHz to 5 MHz and 1 % stepped frequency increments of the momentary frequency in the frequency range 5 MHz to 80 MHz;
- the test level shall be severity level 2 as given in EN 61000-4-6 [12] corresponding to 3 V RMS, at a transfer impedance of 150 Ω ;
- no intrusive or direct connection shall be made to any of the lines of any input/output port, therefore the current clamp injection method shall be used;
- the test shall be performed over the frequency range 150 kHz to 80 MHz;
- responses on receivers and receiver parts of transceivers occurring at discrete frequencies which are narrow band responses, shall be disregarded, see subclause 4.6;
- the frequencies selected during the test shall be recorded in the test report.

9.5.3 Performance criteria

For transceivers the general performance criteria CT (see subclause 6.1) shall apply.

For stand alone receivers the general performance criteria CR (see subclause 6.3) shall apply.

For ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transceivers in which case the corresponding performance criteria above shall apply.

9.6 Transients and surges, vehicular environment

These tests are applicable to mobile and ancillary equipment intended for use in a vehicular environment.

These tests shall be performed on 12 V and 24 V dc power input ports of mobile and ancillary equipment, intended for vehicular use.

These tests shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment.

9.6.1 Definition

These tests assess the ability of transmitters, receivers, transceivers and ancillary equipment to operate as intended in the event of transients and surges present on the dc power input ports in a vehicular environment.

9.6.2 Test method and level

The test method shall be in accordance with ISO 7637 part 1 [6] for 12 V dc powered equipment and ISO 7637 part 2 [6] for 24 V dc powered equipment.

- 1) The following requirements shall apply for 12 V dc powered equipment:
 - a) where the manufacturer in his installation documentation requires the EUT to have a direct connection to the 12 V main vehicle battery the following requirements in accordance with ISO 7637 [6] part 1 shall apply:
 - pulse 3a and 3b, level II, with the test time reduced to 5 min for each;
 - pulse 4, level II, 5 pulses, with the characteristics as follows:

V_s - 5 V,	V_a - 2.5 V,	t_6 - 25 ms,	t_8 - 5 s, t_f - 5 ms.
--------------	----------------	----------------	----------------------------
 - b) where the manufacturer does not require the EUT to have a direct connection to the 12 V main vehicle battery, the following pulses apply, in addition to the pulses in 1) a):

- pulse 1, level II	t_1 - 2.5 s,	10 pulses,
- pulse 2, level II	t_1 - 2.5 s,	10 pulses,
- pulse 7, level II		5 pulses.

Where the manufacturer declares that the EUT requires a direct connection to the vehicle battery, and therefore the tests in accordance with 1) b) are not carried out, this shall be stated in the test report.

- 2) The following requirements shall apply for 24 V dc powered equipment:
 - a) where the manufacturer in his installation documentation requires the EUT to have a direct connection to the 24 V main vehicle battery, the following requirements in accordance with ISO 7637 [6] part 2 shall apply:
 - pulse 3a and 3b, level II, with the test time reduced to 5 min for each;

- pulse 4, level II, 5 pulses, with the characteristics as follows:

$$V_s - 10 \text{ V}, \quad V_a - 5,0 \text{ V}, \quad t_6 - 25 \text{ ms}, \quad t_8 - 5 \text{ s}, \quad t_f - 5 \text{ ms}.$$

The test for this pulse 4 shall be carried out as specified in ISO 7637 [6] part 1.

- b) where the manufacturer does not require the EUT to have a direct connection to the 24 V main vehicle battery, the following pulses apply, in addition to the pulses in 2) a):

- | | | | |
|----------------------|-------------|---------------------|------------|
| - pulse 1a, level II | t1 - 2,5 s, | Ri - 25 Ω , | 10 pulses, |
| - pulse 1b, level II | t1 - 2,5 s, | Ri - 100 Ω , | 10 pulses, |
| - pulse 2, level II | t1 - 2,5 s, | | 10 pulses. |

Where the manufacturer declares that the EUT requires a direct connection to the vehicle battery, and therefore the tests in accordance with 2) b) are not carried out, this shall be stated in the test report.

For radio and ancillary equipment designed to operate at both dc power voltages both requirement 1) and 2) shall apply.

For radio equipment designed to operate at 12 V dc power supply, but operating from a 24 V dc power adapter ancillary, then the radio equipment shall comply with the requirements in 1) and the configuration of the radio equipment and the power adapter shall comply with the requirements of 2).

9.6.3 Performance criteria

For transmitters, pulses 3a and 3b, the performance criteria CT (see subclause 6.1) shall apply. For pulses 1, 1a, 1b, 2, 4 and 7 the performance criteria TT (see subclause 6.2) shall apply, with the exception that the link need not have been maintained during exposure and may have to be re-established.

For stand alone receivers or receivers which are part of transceivers, pulses 3a and 3b the performance criteria CR (see subclause 6.3) shall apply. For pulses 1, 1a, 1b, 2, 4 and 7 the performance criteria TR (see subclause 6.4) shall apply, with the exception that the link need not have been maintained during exposure and may have to be re-established.

For ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers, transmitters or transceivers in which case the corresponding performance criteria above shall apply.

9.7 Voltage dips and interruptions

These tests are applicable for base station and fixed ancillary equipment powered by ac mains.

These tests shall be performed on ac mains power input ports.

These test shall be performed on a representative configuration of the equipment or a representative configuration of the combination of radio and ancillary equipment or host equipment.

9.7.1 Definition

These tests assess the ability of receivers, transceivers and ancillary equipment to operate as intended in the event of voltage dips and interruptions present on the ac mains power input ports.

9.7.2 Test method and levels

The following requirements shall apply.

The test method shall be in accordance with EN 61000-4-11 [13].

The test levels shall be:

- a voltage dip corresponding to a reduction of the supply voltage of 30 % for 10 ms;

- a voltage dip corresponding to a reduction of the supply voltage of 60 % for 100 ms;
- a voltage interruption corresponding to a reduction of the supply voltage of > 95 % for 5 000 ms.

9.7.3 Performance criteria

For a voltage dip corresponding to a reduction of the supply voltage of 30 % for 10 ms, the following performance criteria shall apply:

- for transceivers the performance criteria CT (see subclause 6.1);
- for stand alone receivers the performance criteria CR (see subclause 6.3);
- for ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transceivers in which case the corresponding performance criteria above shall apply.

For a voltage dip corresponding to a reduction of the supply voltage of 60 % for 100 ms, the following performance criteria shall apply:

- for transceivers the performance criteria TT (see subclause 6.2);
- for receivers the performance criteria TR (see subclause 6.4);
- for ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transceivers in which case the corresponding performance criteria above shall apply.

In addition, when equipment is powered solely from the ac mains supply (without the use of a parallel battery back-up) communications need not have been maintained and may have to be re-established, and volatile user data may have been lost.

In the event of loss of communications and/or user data, this fact shall be recorded in the test report, the product description and the user documentation.

For a voltage interruption corresponding to a reduction of the supply voltage of more than 95 % for 5 000 ms, the following performance criteria shall apply:

- for equipment fitted with or connected to a battery back-up the performance criteria TT (see subclause 6.2) or TR (see subclause 6.4) as appropriate;
- for equipment powered solely from the ac mains supply (without the use of a parallel battery back-up) communications need not have been maintained and may have to be re-established, and volatile user data may have been lost.

In the event of loss of communications and/or user data, this fact shall be recorded in the test report, the product description and the user documentation.

9.8 Surges, common and differential mode

These tests are applicable for base station and fixed ancillary equipment.

These tests shall be performed on ac mains power input ports.

These tests shall be performed on a representative configuration of the radio equipment or a representative configuration of the combination of radio and ancillary equipment or host equipment.

9.8.1 Definition

These tests assess the ability of receivers, transceivers and ancillary equipment to operate as intended in the event of surges present on the ac mains power input ports.

9.8.2 Test method and levels

The following requirements shall apply.

The test method shall be in accordance with EN 61000-4-5 [14].

- The test level shall be severity level 2 corresponding to 1 kV open circuit voltage for line-to-ground, and severity level 2 corresponding to 0,5 kV open circuit voltage for line-to-line.
- The transients shall be applied (in parallel) to all the wires in the cable with reference to the cabinet reference ground, for line-to-ground tests, i.e. true common mode, with a series resistance of 10 Ω .

9.8.3 Performance criteria

For transceivers, the general performance criteria TT (see subclause 6.2) shall apply.

For receivers, the general performance criteria TR (see subclause 6.4) shall apply.

For ancillary equipment the pass/fail criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transceivers in which case the corresponding performance criteria above shall apply.

Annex A (normative): ETS 300 446, EMC Standard for Cordless Telephone (CT2) apparatus operating in the frequency band 864,1 MHz to 868,1 MHz including public access services

Table A.1: Subclauses of this ETS relevant for compliance with the essential requirements of the EC Council Directives

Clause/subclause number and title		Corresponding article of Council Directive 89/336/EEC	Qualifying remarks
8	Test methods and limits for emission tests of transceivers and/or receivers and/or ancillary equipment		
8.2	Enclosure	4(a)	
8.3	DC power input/output port	4(a)	
8.4	AC mains power input/output port	4(a)	
9	Test methods and levels for immunity tests of transceivers and/or receivers and/or ancillary equipment		
9.2	Radio frequency electromagnetic field (80 to 1 000 MHz)	4(b)	
9.3	Electrostatic discharge	4(b)	
9.4	Fast transient common mode	4(b)	
9.5	RF common mode, 0,15 - 80 MHz (current clamp injection)	4(b)	
9.6	Transient and surges, vehicular environment	4(b)	
9.7	Voltage dips and interruptions	4(b)	
9.8	Surges, common and differential mode	4(b)	

Annex B (normative): **Clauses and/or subclauses from I-ETS 300 131 [3] which are relevant for compliance with essential requirements of the EC Council Directives**

The provisions in this annex only apply to equipment constructed in accordance with I-ETS 300 131 [3].

Table B.1: Additional subclauses of this ETS taken from I-ETS 300 131 [3] relevant for compliance with the essential requirements of the EC Council Directives

Clause/subclause number and title		Corresponding article of Council Directive 89/336/EEC	Qualifying remarks
B.2	Unmodulated interfering carrier signal	4 (b)	
B.3	Blocking due to spurious responses	4 (b)	
B.4	Spurious emissions of the combined transmitter/receiver	4 (a)	

B.1 CTAs without integral or supplied antenna

In the case of equipments without integral or supplied antennas, such declaration may be based upon measurements made by application of signals to the termination point provided for non-integral antennas. The termination point shall have an impedance of nominally 50 Ω. In this case, the conversion factor of 0 dB relative to 1 μV/m (0 dBμV/m) being equivalent to -134 dBm (referring to a λ/2 dipole with 2,2 dB of gain over the isotropic radiator) shall be used to convert the stated field strengths to absolute signal levels.

B.2 Unmodulated interfering carrier signal

The communications state, once established between the CFP and CPP shall be maintained when the receiver of the CFP or CPP is receiving a signal from its associated CPP or CFP at a signal strength equal to that specified in subclause 4.6.2 of I-ETS 300 131 [4] for the receiver sensitivity plus 5 dB and when an unmodulated interfering carrier signal is introduced at any frequency within the ranges and at the corresponding field strengths (dBμV/m) or carrier to interference ratios (dBc) listed below in table B.2.

Table B.2: Unmodulated Interfering Signals

Frequency Range(s)	Extreme conditions	Nominal conditions
25 MHz to 800 MHz	120 dBμV/m	123 dBμV/m
800 MHz to 850 MHz 890 MHz to 4 GHz	110 dBμV/m	113 dBμV/m
850 MHz to 860 MHz 872 MHz to 890 MHz	100 dBμV/m	103 dBμV/m
860 MHz to $f_c - 300$ kHz $f_c + 300$ kHz to 872 MHz	35 dBc	38 dBc
$f_c - 300$ kHz to $f_c - 200$ kHz $f_c + 200$ kHz to $f_c + 300$ kHz	30 dBc	33 dBc
$f_c - 200$ kHz to $f_c - 100$ kHz $f_c + 100$ kHz to $f_c + 200$ kHz	20 dBc	20 dBc
$f_c - 100$ kHz to $f_c + 100$ kHz	-20 dBc	-20 dBc

where f_c is the nominal frequency of operation.

The signal from the associated CPP or CFP and the interfering carrier wave are assumed to have the same polarization.

B.3 Blocking due to spurious responses

If any part of the CTA fails to meet the requirements of subclause B.2 only due to a maximum, in each case, of ten spurious responses to unmodulated carrier wave signals at discrete frequencies in the range 25 MHz to 4 GHz, of which two shall be at a field strength of not less than 80 dB relative to 1 $\mu\text{V}/\text{m}$ and a remainder at a field strength of not less than 100 dB relative to 1 $\mu\text{V}/\text{m}$, then the CTA shall be deemed to meet the requirements of this ETS.

For the purposes of this subclause, a spurious response is the failure of the communications state between a CFP or CPP and its corresponding CPP or CFP due to the introduction of interfering radio signals, at any frequency within a continuous band of width 1 MHz or less and of which the centre frequency varies with the channel of operation selected by the CTA, and at a lower field strength than that given as the limiting value in subclause B.2 for that frequency equal to the centre frequency of this band.

B.4 Spurious emissions of the combined transmitter/receiver

The power of any spurious emission in the specified range of frequencies when the equipment is in the active mode, shall not exceed the value of 20 nW in the frequency bands:

- 41,0 MHz to 68,0 MHz;
- 87,5 MHz to 118,0 MHz;
- 162,0 MHz to 230,0 MHz;
- 470,0 MHz to 862,0 MHz;
- 10,7 GHz to 12,75 GHz;

and shall not exceed a value of 250 nW on other frequencies below 1 000 MHz.

On frequencies above 1000 MHz, the power of any spurious emission shall not exceed a value of 1 μW .

The power of any spurious emission in the specified range of frequencies, when the equipment is in the idle mode shall not exceed 0,2 nW in the range 864 MHz to 868 MHz (when measured in a 1 kHz bandwidth), 2 nW in the range 100 kHz to 1 000 MHz, 4 nW in the range 10,7 GHz to 12,75 GHz, and shall not exceed 20 nW at other frequencies in the range 1 000 MHz to 12,75 GHz.

Annex C (normative): **Clauses and/or subclauses from I-ETS 300 131 Second Edition [4] which are relevant for compliance with essential requirements of the EC Council Directives**

The provisions in this annex only apply to equipment constructed in accordance with I-ETS 300 131 second edition [4].

Table C.1: Additional subclauses of this ETS taken from I-ETS 300 131 Second Edition [4] relevant for compliance with the essential requirements of the EC Council Directives

Clause/subclause number and title		Corresponding article of Council Directive 89/336/EEC	Qualifying remarks
C.2	Unmodulated interfering carrier signal	4 (b)	
C.3	Blocking due to spurious responses	4 (b)	
C.4	Spurious emissions of the combined transmitter/receiver	4 (a)	

C.1 CTAs without integral or supplied antenna

In the case of equipments without integral or supplied antennas, assessment of compliance to subclause C.2 may be based upon measurements made by application of signals to the termination point provided for non-integral antennas. The termination point shall have an impedance of nominally 50 Ω. In this case, the conversion factor of 0 dB relative to 1 μV/m (0 dBμV/m) being equivalent to -134 dBm (referring to a λ/2 dipole with 2,2 dB of gain over the isotropic radiator) shall be used to convert the stated field strengths to absolute signal levels.

The conversion factor is derived by substituting F = 866 MHz in the following equation:

$$E(\text{dB}\mu\text{V}/\text{m}) = P(\text{dBm}) + 20 \log F(\text{MHz}) + 75.$$

C.2 Unmodulated interfering carrier signal

The communications state, once established between the CFP and CPP shall be maintained when the receiver of the CFP or CPP is receiving a wanted signal from its associated CPP or CFP at a signal strength equal to that specified in subclause 4.6.2 of I-ETS 300 131 [4] for the receiver sensitivity plus 5 dB, and when an unmodulated interfering carrier signal is introduced at any frequency within the ranges and at the corresponding field strengths (dBμV/m), power levels (dBm - see subclause C.1) or the interferer to wanted signal ratios (dBc) listed below in table C.2.

Table C.2: Unmodulated interfering signals

Frequency Range(s)	Extreme conditions	Nominal conditions
25 MHz to 800 MHz	120 dB μ V/m	123 dB μ V/m
800 MHz to 850 MHz 890 MHz to 4 GHz	117 dB μ V/m	120 dB μ V/m
850 MHz to 860 MHz 872 MHz to 890 MHz	110 dB μ V/m	113 dB μ V/m
860 MHz to 863 MHz 869 MHz to 872 MHz	45 dBc	48 dBc
863 MHz to $f_c - 300$ kHz $f_c + 300$ kHz to 869 MHz	35 dBc	38 dBc
$f_c - 300$ kHz to $f_c - 200$ kHz $f_c + 200$ kHz to $f_c + 300$ kHz	30 dBc	33 dBc
$f_c - 200$ kHz to $f_c - 100$ kHz $f_c + 100$ kHz to $f_c + 200$ kHz	20 dBc	20 dBc
$f_c - 100$ kHz to $f_c + 100$ kHz	-20 dBc	-20 dBc

where f_c is the nominal frequency of operation.

The signal from the associated CPP or CFP and the interfering carrier wave are assumed to have the same polarization.

C.3 Blocking due to spurious responses

If any part of the CTA fails to meet the requirements of subclause C.2 only due to a maximum, in each case, of ten spurious responses to unmodulated carrier wave signals at discrete frequencies in the range 25 MHz to 4 GHz, of which three shall be at a field strength of not less than 80 dB relative to 1 μ V/m and the remaining such responses at a field strength of not less than 100 dB relative to 1 μ V/m, then the CTA shall be deemed to meet the requirements of subclause C.2.

For the purposes of this subclause, a spurious response is the failure of the communications state between a CFP or CPP and its corresponding CPP or CFP due to the introduction of interfering radio signals, at any frequency within a continuous band of width 1 MHz or less and of which the centre frequency varies with the channel of operation selected by the CTA, and at a lower field strength than that given as the limiting value in subclause C.2 for that frequency equal to the centre frequency of this band.

C.4 Spurious emissions of the combined transmitter/receiver

The power of any spurious emission in the frequency ranges specified in table C.3, when the equipment is in the active mode, shall not exceed the values listed in table C.3.

Table C.3: Spurious emissions

Frequency range	Maximum level (active mode)	Maximum level (idle mode)
100 kHz to 862 MHz	4 nW	2 nW
862 MHz to 864,1 MHz	250 nW	2 nW
864,1 MHz to 868,1 MHz	250 nW	0,2 nW
868,1 MHz to 890 MHz	250 nW	2 nW
890 MHz to 1 000 MHz	4 nW	2 nW
1 000 MHz to 10,7 GHz	1 μ W	20 nW
10,7 GHz to 12,75 GHz	20 nW	4 nW

Annex D (normative): **ERC Decision on the adoption of approval regulations for radio equipment to be used for cordless telephone apparatus operating in the mobile service in the frequency range 864.1 MHz to 868.1 MHz, based on the Interim European Telecommunications Standard (I-ETS) 300 131 [3], [4]**

This annex contains the ERC Decision which references the technical specifications in I-ETS 300 131 [3], [4] for inclusion in national type approval regulations.

EUROPEAN RADIOCOMMUNICATIONS COMMITTEE

ERC Decision
of1996

on the adoption of approval regulations for radio equipment to be used for cordless telephone apparatus operating in the mobile service in the frequency range 864.1 MHz to 868.1 MHz, based on the Interim European Telecommunications Standard (I-ETS) 300 131

EXPLANATORY MEMORANDUM

1. INTRODUCTION.

The free movement of radiocommunications goods and the provision of Europe-wide services for radiocommunications are only achievable if there exist common regulations throughout Europe regarding availability of frequency bands, type approval requirements and border crossing procedures. A basic requirement to fulfil these objectives is the Europe-wide implementation of national regulations based on the European Telecommunications Standards (ETSS) developed by the European Telecommunications Standards Institute (ETSI).

This Decision (ERC/***/(96)XX) provides the necessary mechanism for CEPT administrations to commit themselves to implement, within their national regimes, Interim European Telecommunications Standard 300 131¹ and withdraw any conflicting national standard.

2. BACKGROUND.

Both the ERC and ETSI are involved in the development of common regulations, as described in (1) above. The Memorandum of Understanding between ERC and ETSI explains the respective responsibilities of the two organisations and its annex describes the principles of co-operation. The ERC, for its part, should, *inter alia*, adopt Decisions on the introduction of ETSI standards into approval regimes.

I-ETS 300 131 has been prepared by the Radio Equipment and Systems (RES) Technical Committee of ETSI. The standard has undergone the ETSI standards approval procedure and is now published as an I-ETS.

The use of the frequency range (864.1 to 868.1 MHz) covered by I-ETS 300 131 is not harmonised within CEPT. Further, the equipment used in this frequency range is subject to national licensing and frequency planning which requires specification of, *inter alia*, frequency of operation and effective radiated power (e.r.p.).

Nevertheless, there are a number of parameters, in particular those considered by the ERC as essential for spectrum management purposes², which can be harmonised by adopting within approval regulations the limit values and measurement methods provided in I-ETS 300 131.

3. REQUIREMENT FOR AN ERC DECISION.

The allocation and assignment of radio frequencies and the complementary equipment type approval regimes in CEPT member countries are laid down by law, regulation or administrative action. The ERC recognises that for harmonised fixed and mobile radio services to be introduced successfully throughout Europe, manufacturers and operators must be given the confidence to make the necessary investment in the development and procurement of new systems. Commitment by CEPT administrations to implement this ERC Decision will provide a clear indication that equipment conforming to approval

¹ I-ETS 300 131: "Common air interface specification to be used for the interworking between cordless telephone apparatus in the frequency band 864.1 MHz to 868.1 MHz, including public access service."

² See Annex 1 of the Decision

regulations based on I-ETS 300 131 will have the benefit of markets in those countries which permit use of this equipment.

Draft

**ERC Decision
of(1996)**

on the adoption of approval regulations for radio equipment to be used for cordless telephone apparatus operating in the mobile service in the frequency range 864.1 MHz to 868.1 MHz, based on the Interim European Telecommunications Standard (I-ETS) 300 131

The European Conference of Postal and Telecommunications Administrations,

considering:

- a) that CEPT has a long term objective to harmonise the use of frequencies and the related regulatory regimes;
- b) that such harmonisation will benefit administrations, manufacturers, operators and users;
- c) that ETSI has published I-ETS 300 131 for equipment to be used for cordless telephones in the frequency range 864.1 MHz to 868.1 MHz.
- d) that, for the foreseeable future, there will continue to be use of cordless telephone apparatus having the technical characteristics described in (c) above;
- e) that, in accordance with the Memorandum of Understanding between ERC and ETSI, the ERC shall adopt ERC Decisions on the introduction of ETSI standards into approval regimes;
- f) that the use of cordless telephone apparatus is subject to national licensing and frequency planning requirements, in particular for frequency of operation and e.r.p.;
- g) that suitable transitional arrangements are given in CEPT Recommendation T/R 01-05.

DECIDES

- 1. to adopt, by 1 January 1997, approval regulations for cordless telephone apparatus operating in the frequency range 864.1 to 868.1 MHz with power levels of up to 10mW, based on the limit values and measurement methods for spectrum management parameters contained in I-ETS 300 131, with the exclusion by national choice of those parameters which are subject to national licensing requirements. A list of the spectrum management parameters to be included in approval regulations is given in Annex 1;
- 2. to withdraw any conflicting national approval regulation(s);
- 3. that the equipment shall be marked ERC CT2 Y, where Y is the country symbol of the national type approval authority which issued the type approval certificate;
- 4. that CEPT Member administrations shall communicate the national measures implementing this Decision to the ERC Chairman and the ERO when the Decision is nationally implemented.

European Radiocommunications Committee Decision ERC/***(96)XX

on the adoption of approval regulations for radio equipment to be used for cordless telephone apparatus operating in the mobile service in the frequency range 864.1 MHz to 868.1 MHz, based on the Interim European Telecommunications Standard (I-ETS) 300 131.

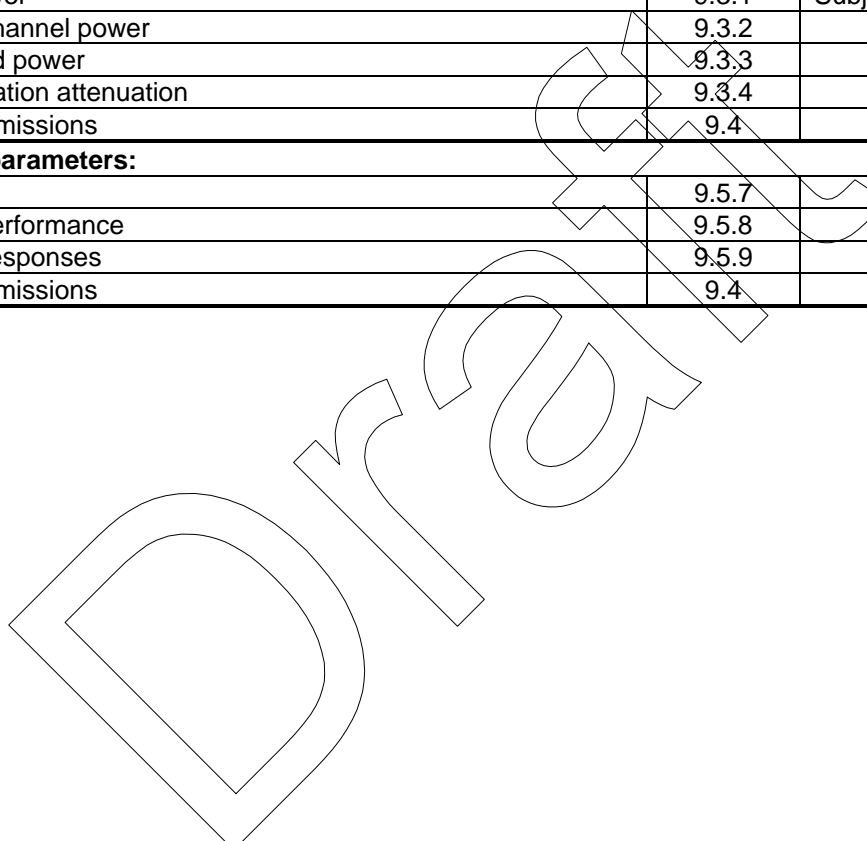
The following CEPT administrations have committed themselves to apply the terms of this Decision:

DRAFT

Annex 1

Parameters from I-ETS 300 131 to be included in approval requirements:

I-ETS 300 131	Section	Comments
Transmitter parameters:		
Carrier power	9.3.1	Subject to national licensing conditions
Adjacent channel power	9.3.2	
Out of band power	9.3.3	
Intermodulation attenuation	9.3.4	
Spurious emissions	9.4	
Receiver parameters:		
Sensitivity	9.5.7	
Blocking performance	9.5.8	
Spurious responses	9.5.9	
Spurious emissions	9.4	



History

Document history	
June 1996	First edition
November 1996	Unified Approval Procedure UAP 57: 1996-11-04 to 1997-02-28