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**Land Mobile Service;
Radio Equipment for use in a Paging Service
operating within the frequency range 25 MHz - 470 MHz;
Harmonised Standard covering the essential requirements
of article 3.2 of Directive 2014/53/EU**

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Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

National transposition dates	
Date of adoption of this EN:	26 June 2017
Date of latest announcement of this EN (doa):	30 September 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2018
Date of withdrawal of any conflicting National Standard (dow):	31 March 2019

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document applies to on-site and wide area paging equipment, operating in the frequency range of 25 MHz to 470 MHz.

An on-site paging system is a privately owned and operated wireless communication system, used in a restricted and predefined area, with the primary function to alert and/or inform ambulant people. The air interface of the system, using a single radio channel, comprises at least one transmitter. The system may be extended to include a return, or talk-back frequency. Mainly used for call acknowledgement, this frequency may also be used to supply some of the features of a mobile radio service, or other two-way radio services, without the need to use a separate system.

Covering a larger geographical area, a wide-area system is typically associated with large organizations such as emergency services and may include additional radio facilities and utilize different a frequency for return messaging, which is outside the scope of the present document. These features should be tested against the relevant standard.

The present document specifies technical characteristics and methods of measurements for the following equipment types:

- 1) base station transmitters and transcoders, with or without an external 50 Ω antenna connector;
- 2) base station receivers, with a permanent 50 Ω connector;
- 3) paging receiver, with or without an external 50 Ω antenna connector.

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1.

Table 1: Radiocommunications service frequency bands

Radiocommunications service frequency bands	
Transmit	25 MHz to 470 MHz
Receive	25 MHz to 470 MHz
NOTE:	Frequencies and frequency bands, used for on-site paging equipment, are not harmonised throughout the community. The frequency band 47 MHz to 47,25 MHz and operating frequencies or operating bands within 440 MHz to 470 MHz, are recommended by CEPT/ECC in Report 25 [i.5].

The existence of a Harmonised Standard does not imply the availability of the above frequency spectrum for the particular types of equipment covered by the present document.

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU under the conditions identified in annex A and contains requirements to demonstrate that "... *Radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference*" [i.1].

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 Radio Equipment Directive [i.1] may apply to equipment within the scope of the present document.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

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

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The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

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NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.2] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.3] ETSI EN 300 793 (V1.1.1): "Electromagnetic compatibility and Radio Spectrum Matters (ERM); Land mobile service; Presentation of equipment for type testing".
- [i.4] ETSI TS 103 052 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".
- [i.5] CEPT/ERC Report 25 (June 2016): "The European Table of Frequency Allocations and Applications in the Frequency Range 8.3 kHz to 3000 GHz".
- [i.6] Recommendation ITU-T O.41 (1994): "Psophometer for use on telephone-type circuits".
- [i.7] ETSI TR 100 028 (V1.4.1) (12-2001) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.8] IEC 60489-3: "Radio equipment used in mobile services. Methods of measurement for receivers for A3E or F3E emissions".
- [i.9] ANSI C63.5 (2006): "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electro Magnetic Interference".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Radio Equipment Directive [i.1] and the following apply:

50 Ω : 50 Ohm non-reactive impedance

angle/constant envelope modulation: either phase or frequency modulation, with or without pre-emphasis

angle modulation: phase modulation (G3) or frequency modulation (F3)

base station: transmitter and/or receiver intended for use in a fixed location

coded messages: messages transmitted to a paging receiver via coded signals

conducted measurements: measurements which are made using a direct connection to the equipment under test

integral antenna: antenna designed as an indispensable part of the equipment, with or without the use of an antenna connector

NOTE: An integral antenna may be fitted internally or externally to the equipment.

Low Frequency (LF): frequency range from 30 kHz to 300 kHz

paging receiver: equipment for the reception and decoding of paging transmissions; either fixed or portable

pocket unit: pocket size equipment fitted with an integral antenna, carried on a person or held in the hand

preamble facility: signal needed in a system in which a battery saving system is used, in order to activate and prepare the receivers for the calls to come

psophometric weighting network: As described in Recommendation ITU-T O.41 [i.6].

radiated measurements: measurements which involve the absolute measurement of a radiated field

SINAD: SND/ND ratio

SINAD Meter: measurement instrument used to measure SND/ND using a band-stop filter

transcoder: transmitter and encoder combined in a single housing and normally operated in a fixed location indoors

3.2 Symbols

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

Hz	Hertz
kHz	kilohertz
MHz	Megahertz
V	Volt
W	Watt

3.3 Abbreviations

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

AM	Amplitude Modulation
emf	electromotive force
EUT	Equipment Under Test
IF	Intermediate Frequency
MPFD	Maximum Permissible Frequency Deviation
OATS	Open Area Test Site
PTT	Push To Talk
RF	Radio Frequency
rms	root-mean-squared
SND/ND	(Signal + Noise And Distortion)/(Noise + Distortion) ratio
Tx	Transmitter
VOX	Voice Operated Switch
VSWR	Voltage Standing Wave Ratio

4 Testing for compliance with technical requirements

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer but as a minimum, shall be that specified in the test conditions contained in the present document. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times, when operating within the boundary limits of the declared operational environmental profile.

4.2 Choice of model for testing

4.2.0 General

Stand-alone equipment should be complete with any ancillary equipment needed for testing.

If an equipment has several optional features considered not to affect the RF parameters, then the tests need only to be performed on the equipment configured with the combination of features considered to be the most complex.

Where practicable, equipment to be tested should provide a 50 Ω connector for conducted RF power level measurements.

In the case of integral antenna equipment, if the equipment does not have an internal permanent connector, then it is permissible to use a second sample of the equipment with a temporary antenna connector fitted to facilitate testing. Any such modified samples shall not be used for any radiated measurements.

The performance of the equipment to be tested shall be representative of the performance of the corresponding production model.

NOTE: Guidance may be found in ETSI EN 300 793 [1,3].

4.2.1 Auxiliary test equipment

All necessary auxiliary test equipment, setting up instructions and other product information should be available.

4.3 Mechanical and electrical design

4.3.1 General

The equipment should be designed, constructed and manufactured in accordance with good engineering practice, and with the aim of minimizing harmful interference to other equipment and services.

4.3.2 Controls

Those controls, which if maladjusted might increase the interfering potentialities of the equipment, should not be accessible for adjustment by the user.

4.3.3 Transmitter shut-off facility

When a timer for an automatic shut-off facility is operative, at the moment of the time-out, the transmitter should automatically be switched off (the re-activation of the transmitter shall reset the timer).

A shut-off facility should be inoperative for the duration of the measurements, unless it has to remain operative to protect the equipment. If the shut-off facility is left operative, the status of the equipment should be indicated.

5 Test conditions, power sources and ambient temperatures

5.1 Normal and extreme test conditions

Type tests shall be made under normal operational conditions and, where stated, under extreme conditions. The test conditions and procedures shall be as specified in clauses 5.2 and 5.3.

5.2 Normal operational test conditions

5.2.1 Normal temperature and humidity

The normal temperature and humidity conditions for tests shall be any convenient combination of temperature and humidity within the following ranges:

- temperature: +15 °C to +35 °C;
- relative humidity: 20 % to 75 %.

When it is impracticable to carry out the tests under these conditions, a note to this effect, stating the ambient temperature and relative humidity during the tests, shall be added to the test report.

5.2.2 Normal test power source

a) Mains supply:

- the normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of type testing to the present document, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment was designed;
- the frequency of the test power source corresponding to the ac mains shall be between 49 Hz and 51 Hz.

b) Other power sources:

- for operation from other power sources or types of battery (primary or secondary), the normal test voltage shall be that declared by the equipment manufacturer and approved by the test authority;
- such values shall be stated in the test report;
- in pocket equipment with an integral antenna, the battery shall not be replaced with an external power source when making radiating measurements, because this external power source could influence the test results.

5.3 Extreme test conditions

5.3.1 Procedure for tests at extreme temperatures

Before measurements are made the equipment shall have reached thermal balance in the test chamber. The equipment shall be switched to stand-by during the temperature stabilizing period.

In the case of equipment containing stabilization circuits designed to operate continuously, the temperature stabilization arrangements shall be switched on for 15 minutes after thermal balance has been obtained and the equipment shall then meet the specified requirements. For such equipments, the manufacturer shall provide for the power source circuit feeding the crystal oven, to be independent of the power source to the rest of the equipment:

- a) Procedure for equipment designed for continuous operation:
 - if the manufacturer states that the equipment is designed for continuous operation, the procedure shall be as follows:
 - before tests at the upper temperature, the equipment shall be placed in the test chamber and left until thermal balance is attained. The equipment shall then be switched on in the transmit condition for a period of half an hour, after which the equipment shall meet the specified requirements. For tests at the lower temperatures, the equipment shall be left in the test chamber until thermal balance is attained, after which the equipment shall meet the specified requirements.
- b) Procedure for equipment designed for intermittent operation:
 - if the applicant states that the equipment is designed for intermittent operation, the test procedure shall be as follows:
 - before tests at the upper extreme temperature are made, the equipment shall be placed in the test chamber and left until thermal balance is attained in the test chamber;
 - the equipment shall then either:
 - transmit "on" and "off", according to the duty cycle as declared by the applicant, for a period of 5 minutes; or,
 - if the "on" period as declared by the applicant exceeds one minute, transmit in the "on" condition for a period not exceeding one minute, followed by a period in the "off" or "standby" mode for four minutes, after which the equipment shall meet the specified requirements.

For tests at the lower extreme temperature the equipment shall be left in the test chamber until thermal balance is attained, then the equipment shall be switched to the "standby" or "receive" condition for one minute, after which the equipment shall meet the specified requirements.

5.3.2 Extreme temperature limits

For tests at extreme temperatures, measurements shall be made in accordance with procedures specified in clause 5.3.1 over an ambient temperature range of:

- Base station equipment: -20 °C to +55 °C;
- Transcoder used in temperature-controlled environments: -10 °C to +55 °C;
- Pocket and fixed paging receiver unit equipment: -10 °C to +55 °C.

5.3.3 Extreme test power source

- a) Mains voltage:
 - the extreme source voltages for equipment to be connected to an ac mains source, shall be the nominal mains voltage $\pm 10\%$.
- b) Battery power source:
 - when the equipment is intended for operation from battery power sources, the extreme voltages shall be as follows:
 - the end point voltages indicated by the battery status indicator of the unit under test;