

ETSI EN 301 489-5 V2.2.1 (2019-04)



**ElectroMagnetic Compatibility (EMC)
standard for radio equipment and services;
Part 5: Specific conditions for
Private land Mobile Radio (PMR) and
ancillary equipment (speech and non-speech) and
Terrestrial Trunked Radio (TETRA);
Harmonised Standard covering the essential requirements
of article 3.1(b) of Directive 2014/53/EU**

ReferenceREN/ERM-EMC-378

KeywordsEMC, harmonised standard, PMR, radio,
regulation, TETRA**ETSI**

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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.3] 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.

The present document is part 5 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

National transposition dates	
Date of adoption of this EN:	6 June 2017
Date of latest announcement of this EN (doa):	31 July 2019
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2020
Date of withdrawal of any conflicting National Standard (dow):	31 January 2021

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, together with ETSI EN 301 489-1 [1], covers the assessment of Private land Mobile Radio (PMR) and associated ancillary equipment, in respect of ElectroMagnetic Compatibility (EMC).

The present document covers both analogue and digital Private land Mobile Radio (PMR) equipment.

Technical specifications related to the antenna port and emissions from the enclosure port of Private land Mobile Radio (PMR) equipment are not included in the present document. Such technical specifications are found in the relevant product standards for the effective use of the radio spectrum.

The present document specifies the applicable test conditions, performance assessment and performance criteria for Private land Mobile Radio (PMR) equipment and associated ancillary equipment.

Examples of Private Mobile Radio equipment are given in annex B.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and ETSI EN 301 489-1 [1], the provisions of the present document take precedence.

The environmental classification and the emission and immunity requirements used in the present document are as stated in ETSI EN 301 489-1 [1], except for any special conditions included in 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/>.

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 necessary for the application of the present document.

- [1] ETSI EN 301 489-1 (V2.4.1) ~~(11-2016)~~ (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU".
- [2] ETSI EN 300 394-1 (V3.3.1) (04-2015): "Terrestrial Trunked Radio (TETRA); Conformance testing specification; Part 1: Radio".
- [3] ETSI EN 300 395-2 (V1.3.1) (01-2005): "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 2: TETRA codec".

[4] _____ Void.

~~ETSI EN 300 392-2 (V3.4.1) (08-2010): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".~~

[5] _____ Void.

~~ETSI EN 300 396-2 (V1.4.1) (11-2011): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 2: Radio aspects".~~

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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] ETSI EN 302 561: "Land Mobile Service; Radio equipment using constant or non-constant envelope modulation operating in a channel bandwidth of 25 kHz, 50 kHz, 100 kHz or 150 kHz; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.3] 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.4] ETSI ~~ETSEN~~ 300 086: ~~"Radio Equipment and Systems (RES); Land mobile group; Technical characteristics and test conditions for radio~~ Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.5] ETSI I-ETS 300 219: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment transmitting signals to initiate a specific response in the receiver".
- [i.6] ETSI EN 300 113: "Land Mobile Service; Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.7] ETSI EN 300 296: "Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.8] ETSI EN 300 341: "Land Mobile Service; Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.9] ETSI EN 300 390: "Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.10] ETSI EN 301 166: "Land Mobile Service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrow band channels and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 301 489-1 [1] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 301 489-1 [1] and the following apply:

BER	Bit Error Ratio
CR	Continuous phenomena applied to Receivers
CT	Continuous phenomena applied to Transmitters
EUT	Equipment Under Test
PMR	Private land Mobile Radio
TR	Transient phenomena applied to Receivers
TT	Transient phenomena applied to Transmitters

4 Test conditions

4.1 General

For the purposes of the present document, the test conditions of ETSI EN 301 489-1 [1], clause 4 shall apply as appropriate. Further product related test conditions for PMR equipment are specified in the present document.

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5 of the present document shall apply.

4.2 Arrangements for test signals

4.2.0 ~~General~~

~~The provisions of ETSI EN 301 489-1 [1], clause 4.2 shall apply.~~

4.2.1 Arrangements for test signals at the input of transmitters

The provisions of ETSI EN 301 489-1 [1], clause 4.2.1 shall apply.

4.2.2 Arrangements for test signals at the output of transmitters

The provisions of ETSI EN 301 489-1 [1], clause 4.2.2 shall apply with the following modification.

The transmitter shall be operated at its maximum rated RF output power, modulated with normal test modulation (see clause 4.5).

4.2.3 Arrangements for test signals at the input of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.3 shall apply with the following modification.

A communication link shall be established at the start of the test and maintained during the test.

4.2.4 Arrangements for test signals at the output of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.4 shall apply.

4.2.5 Arrangements for testing transmitter and receiver together (as a system)

The provisions of ETSI EN 301 489-1 [1], clause 4.2.5 shall apply with the following modification.

For the immunity tests of duplex transceivers, the EUT may be configured in the repeater mode, consistent with the conditions given above.

4.3 Exclusion bands

4.3.0 ~~General~~

~~The provisions of ETSI EN 301 489-1 [1], clause 4.3 shall apply.~~

4.3.1 Receiver and receivers of transceivers exclusion band

The exclusion band for receivers and receivers of transceivers is the frequency range determined by the switching range, as declared by the manufacturer, extended as follows:

- –the lower frequency of the exclusion band is the lower frequency of the switching range, minus 5 % of the centre frequency of the switching range, or minus 10 MHz, whichever will result in the lowest frequency;
- –the upper frequency of the exclusion band is the upper frequency of the switching range, plus 5 % of the centre frequency of the switching range, or plus 10 MHz, which ever will result in the highest frequency.

The switching range is the maximum frequency range over which the receiver can be operated without reprogramming or realignment.

NOTE: The receiver exclusion band range aligns with the blocking test range.

4.3.2 Transmitter exclusion band

The exclusion band for transmitters extends ± 25 kHz from the nominal operating frequency of the transmitter.

However for TETRA equipment, the exclusion band for transmitters extends ± 50 kHz from the nominal operating frequency of the transmitter.

4.4 Narrow band responses of receivers

The provision of ETSI EN 301 489-1 [1], clause 4.4 shall apply.

4.5 Normal test modulation

4.5.1 General

The manufacturer may have to supply the test modulation/demodulation equipment.

The test signal generator (modulation) shall be able to produce a continuous stream of data or a repetitive message.

The test signal receiver (de-modulator) shall be, where appropriate, able to produce a readout of Bit Error Ratio (BER) of a continuous data stream or a repetitive readout of message acceptance.

4.5.2 Analogue speech equipment

4.5.2.1 Angle modulated equipment

- The receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a sinusoidal audio frequency of 1 000 Hz to a deviation of 60 % peak system.
- The transmitter of the EUT shall be modulated with a sinusoidal audio frequency of 1 000 Hz at a deviation of 60 % peak system deviation.

4.5.2.2 Non-angle modulated equipment

- The receiver wanted input signal shall be set to the nominal frequency of the receiver suitably modulated with a sinusoidal audio frequency of 1 000 Hz, which represents normal operation.

- The transmitter of the EUT shall be suitably modulated with a sinusoidal audio frequency of 1 000 Hz, which represents normal operation.
- Details concerning the modulation used shall be recorded in the test report.

4.5.3 Digital speech equipment

- ~~— the receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a test signal specified by the manufacturer which represents normal operation which is in accordance with the appropriate radio product standard;~~
- ~~— the transmitter shall be modulated with a test signal which represents normal operation as specified by the manufacturer which is in accordance with the appropriate radio product standard;~~
- ~~— the manufacturer may have to supply the test modulation/de-modulation equipment;~~
- ~~• details concerning the modulation used shall be recorded in the test report.~~

~~4.5.4 Non-speech equipment (data, specific response, etc.)~~

- The receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a test signal specified by the manufacturer which represents normal operation which is in accordance with the appropriate radio product standard.
- The transmitter shall be modulated with a test signal which represents normal operation as specified by the manufacturer which is in accordance with the appropriate radio product standard.
- The manufacturer may have to supply the test modulation/de-modulation equipment.
- Details concerning the modulation used shall be recorded in the test report.

4.5.4 Non-speech equipment (data, specific response, etc.)

- The receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a test signal specified by the manufacturer which represents normal operation which is in accordance with the appropriate radio product standard.
- The transmitter shall be modulated with a test signal which represents normal operation as specified by the manufacturer which is in accordance with the appropriate radio product standard.
- The manufacturer may have to supply the test modulation/de-modulation equipment.
- Details concerning the modulation used shall be recorded in the test report.

4.5.5 TETRA equipment

The receiver wanted input signal shall be set to a frequency near to the middle of the operating band of the receiver modulated with one of the test signals listed below, the transmitter shall be set to a frequency near to the middle of the operating band of the transmitter modulated with one of the test signals listed below:

- for equipment capable of speech operation, a speech traffic channel (TETRA TCH/S) in accordance with all clauses of ETSI EN 300 395-2 [3] representing a 1 020 Hz tone at a level of 17 dB below peak level;
- for non-speech V+D or DMO equipment, a T1 TCH/7.2 test signal in accordance with clause 5.3 of ETSI-EN 300 392-2 [4] ~~or ETSI EN 300 396-2 [5]~~ ~~or ETSI EN 300 394-1 [2]~~;
- for non-speech V+D or DMO equipment, a T1 SCH/F test signal in accordance with ~~ETSI EN 300 392-2 [4]~~ ~~or ETSI EN 300 396-2 [5]~~ ~~or ETSI EN clause 5.3 of ETSI EN 300 394-1 [2]~~;
- for equipment capable of speech operation speech traffic channel (TETRA TCH/S) in accordance with all clauses of ETSI EN 300 395-2 [3] representing silence;

- for speech and/or data equipment connected to ancillary equipment intended for data operation, or connected to ancillary equipment which can be directly connected to a data application, the method of BER or MER measurement shall be agreed between the test house and the manufacturer.

5 Performance assessment

5.1 General

The provision of ETSI EN 301 489-1 [1], clause 5.1 shall apply.

5.2 Equipment which can provide a continuous communications link

The provision of ETSI EN 301 489-1 [1], clause 5.2 shall apply.

5.3 Equipment which does not provide a continuous communications link

The provision of ETSI EN 301 489-1 [1], clause 5.3 shall apply.

5.4 Ancillary equipment

The provision of ETSI EN 301 489-1 [1], clause 5.4 shall apply.

5.5 Equipment classification

The provision of ETSI EN 301 489-1 [1], clause 5.5 shall apply.

5.6 Performance assessment of equipment providing an audio path

5.6.1 Introduction

The audio performance shall be evaluated using either the audio breakthrough method described in clause 5.6.2 or the audio distortion method described in clause 5.6.3.

5.6.2 Assessment of audio path using the audio breakthrough method

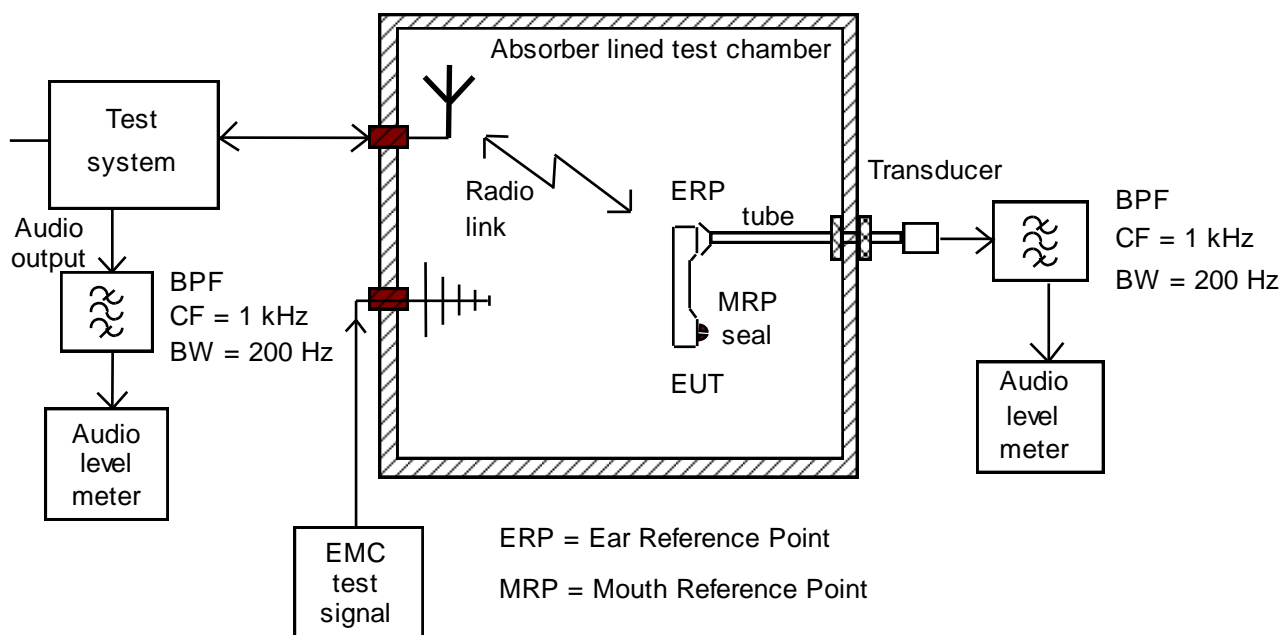
This test only applies to equipment, which contains audio capability. The audio paths shall be enabled.

A communication link shall be set up with a suitable TETRA transceiver system simulator, or test set (hereafter called "the test system"). The wanted RF signals to be applied should be agreed between the test house and the manufacturer.

When the EUT is required to be in the transmit/receive mode, the following conditions shall be met:

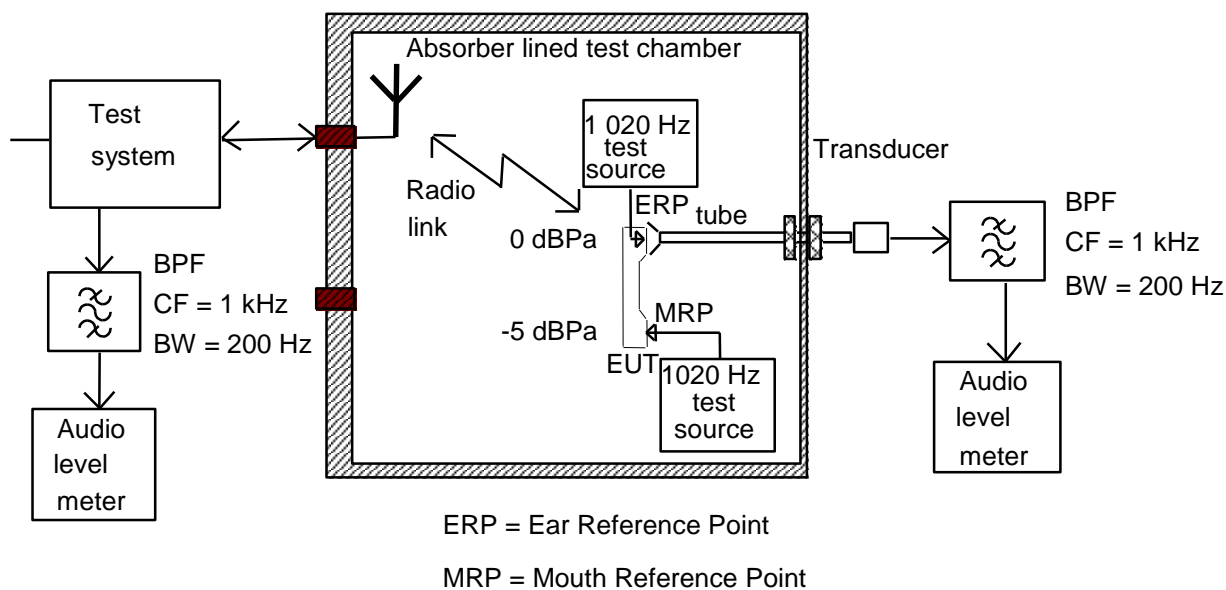
- the EUT shall be set to operate at maximum transmit power;
- prior to the test sequence, the reference level of the speech output signal on both the downlink and uplink shall be recorded on the test instrumentation, as shown in figure 2. The reference level shall be equivalent to 0 dBPa at 1 020 Hz at the Ear Reference Point (ERP), or +5,0 dBPa at the loudspeaker for the downlink and -5 dBPa at 1 020 Hz at the Mouth Reference Point (MRP), or the microphone for the uplink. The nominal acoustic test levels may need to be adapted for different types of TETRA equipment and for different acoustic test arrangements;
- the level of the output signal from the EUT's downlink speech channel at the mobile or portable's ear piece shall be assessed by measuring the Sound Pressure Level (SPL) as shown in figure 1;

- the level of the recovered audio output signal of the test system from the EUT's uplink speech channel shall be measured. Pick up of extraneous background noise by the EUT's microphone shall be minimized.



NOTE: In the case of a mobile equipment the ERP may be the loudspeaker, and the MRP the microphone.

Figure 1: Audio breakthrough measurement, test set-up



NOTE 1: The EUT is in position during calibration of the uplink, but not during calibration of the downlink.

NOTE 2: Where the EUT has a loudspeaker the reference level shall be equivalent to +5,0 dBPa at 1 020 Hz.

Figure 2: Audio breakthrough measurement, calibration set-up

5.6.3 Assessment of audio path using the audio distortion method

This test only applies to equipment, which contains audio capability. The audio paths shall be enabled.

A communication link loop-back shall be set up through a suitable TETRA test system. The wanted RF signals to be applied should be agreed between the test house and the manufacturer:

- the EUT shall be set to operate at maximum transmit power;

- a link between the EUT and the test system is established. In the test system the received uplink signal from the EUT is looped back and returned to the EUT as a downlink signal. The loopback in the test system should be done keeping the looped signal in a digital format or in a way that the signal to be looped is left unchanged;
- a 1 020 Hz signal, at a level within the dynamic range of the microphone audio circuit, is applied at the Mouth Reference Point (MRP).
The audio signal is, after loopback in the test system, picked up at the Ear Reference Point (ERP) by an audio transducer provided with a non-metallic acoustic tube. The transducer signal is feed to an audio distortion analyser located outside the test environment.
Pick up of extraneous background noise by the EUT's microphone or by the transducer at the ERP shall be minimized.

6 Performance criteria

6.0 General

The equipment shall meet the minimum performance criteria as specified in clauses 6.1, 6.2, 6.3 and 6.4.

The establishment of the communication link at the start of the test, its maintenance and the assessment of the recovered signal are used as the performance criteria for the evaluation of the essential functions of the equipment during and after the test.

If an equipment is of a specialized nature and the performance criteria specified in the table are not appropriate the manufacturer shall declare a substituted specification for an acceptable performance level or performance degradation as required by the present document. The performance specification shall be included in the test report and the product description and documentation.

The equipment shall meet the minimum performance criteria as specified in clauses 6.1, 6.2, 6.3 and 6.4.

A portable equipment powered by the battery in the vehicle shall fulfil the applicable requirements in ETSI EN 301 489-1 [1] for vehicular mobile equipment.

A portable or mobile equipment powered by AC mains shall fulfil the applicable requirements in ETSI EN 301 489-1 [1] for base station equipment, although the tests performed are only those applicable to the input/output arrangements of the equipment, the performance criteria will remain as the origin class for the equipment.

6.1 Performance criteria for Continuous phenomena applied to Transmitters (CT)

For speech equipment, the distortion of the audio signal shall be measured during each individual exposure in the test sequence and shall not exceed 25 % measured in a post detection bandwidth determined by a first order band pass filter with a 3 dB bandwidth of 300 Hz to 3 kHz, without the use of psophometric weighting filter.

For equipment which can be measured using continuous bit streams, a bit error shall not exceed 1×10^{-2} .

For other non-speech equipment four messages out of five or 90 % of the transmitted symbols shall be received correctly.

At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained during the test.

Where the EUT is a transmitter only and can be operated in standby mode, tests shall be repeated with the EUT in this mode to ensure that unintentional transmission does not occur.

6.2 Performance criteria for Transient phenomena applied to Transmitters (TT)

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication 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 communication link shall have been maintained during the test.

Where the EUT is a transmitter only and can be operated in standby mode, tests shall be repeated with the EUT in this mode to ensure that unintentional transmission does not occur.

6.3 Performance criteria for Continuous phenomena applied to Receivers (CR)

For speech equipment, the distortion of the audio signal shall be measured during each individual exposure in the test sequence and shall not exceed 25 % measured in a post detection bandwidth determined by a first order band pass filter with a 3 dB bandwidth of 300 Hz to 3 kHz, without the use of psophometric weighting filter.

For equipment which can be measured using continuous bit streams, the bit error rate shall not exceed 10^{-2} .

For other non-speech equipment four messages out of five or 90 % of the transmitted symbols shall be received correctly.

At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained during the test.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

6.4 Performance criteria for Transient phenomena applied to Receivers (TR)

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication 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 communication link shall have been maintained during the test.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

6.5 Performance criteria for ancillary equipment tested on a stand alone basis

The provision of ETSI EN 301 489-1 [1], clause 6.4 shall apply.

7 Applicability overview

7.1 Emission

7.1.1 General

Table 1 in ETSI EN 301 489-1 [1], contains the applicability of EMC emission measurements to the relevant ports of radio and/or associated ancillary equipment.

7.1.2 Special conditions

No special conditions shall apply to Private Land Mobile Radio (PMR) equipment in the scope of the present document.

7.2 Immunity

7.2.1 General

Table 2 of ETSI EN 301 489-1 [1], contains the applicability of EMC immunity measurements to the relevant ports of radio and/or associated ancillary equipment.

7.2.2 Special conditions

The following special conditions set out in table 1, relate to the immunity test methods and performance criteria used in ETSI EN 301 489-1 [1], clause 9 apply to TETRA equipment only.

For all other types of Private land Mobile Radio (PMR) equipment in the scope of the present document no special conditions apply.

Table 1: Special conditions for EMC immunity tests for TETRA equipment

Reference to clauses in ETSI EN 301 489-1 [1]	Special product-related conditions, additional to or modifying the test conditions in ETSI EN 301 489-1 [1], clause 9
9.2.2: Test method; Radio frequency electromagnetic field	<ul style="list-style-type: none"> - the test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 020 Hz; - for transmitters in transceivers with a non-continuous duty cycle the stepped frequency increments may be 10 % of the momentary frequency; - the test shall be carried out on one surface. The surface selected to face the source of the interference signal shall be the one anticipated by the test house to be the most susceptible. The selected surface shall be recorded in the test report.
9.5.2: Test method; Radio frequency, common mode	<ul style="list-style-type: none"> - the test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 020 Hz; - for transmitters in transceivers with a non-continuous duty cycle the stepped frequency increments may be 500 kHz in the frequency range 150 kHz to 5 MHz and 10 % frequency increment of the momentary frequency in the frequency range 5 MHz to 80 MHz.

Annex A (normative/informative): Relationship between the present document and the essential requirements of Directive 2014/53/EU

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3] 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.

Table A.1: Relationship between the present document and the essential requirements of Directive 2014/53/EU

Harmonized Standard EN 301 489-5				
The following requirements are relevant to the presumption of conformity under the article 3.1b of Directive 2014/53/EU [i.1]				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
1	<u>Emissions</u> : Enclosure of ancillary equipment measured on a stand alone basis	8.2 of ETSI EN 301 489-1 [1]	U	
2	<u>Emissions</u> : DC power input/output ports	8.3 of ETSI EN 301 489-1 [1]	C	Only where equipment has DC power input and/or output ports with a cable length greater than 3m or from a vehicle power supply
3	<u>Emissions</u> : AC mains power input/output ports	8.4 of ETSI EN 301 489-1 [1]	C	Only where equipment has AC mains power input and/or output ports
4	<u>Emissions</u> : Harmonic current emission (AC mains input port)	8.5 of ETSI EN 301 489-1 [1]	C	Only where equipment has AC mains power input ports
5	<u>Emissions</u> : Voltage fluctuations and flicker (AC mains input ports)	8.6 of ETSI EN 301 489-1 [1]	C	Only where equipment has AC mains power input ports
6	<u>Emissions</u> : Wired network ports	8.7 of ETSI EN 301 489-1 [1]	C	Only where equipment has wired network ports
7	<u>Immunity</u> : Radio frequency electromagnetic field (80 MHz to 6 000 MHz)	7.2.2	UC	For TETRA equipment refer to clause 7.2.2 of the present document. For all other types of PMR equipment refer to clause 9.2 of ETSI EN 301 489-1 [1]
8	<u>Immunity</u> : Electrostatic discharge	9.3 of ETSI EN 301 489-1 [1]	U	
9	<u>Immunity</u> : Fast transients common mode	9.4 of ETSI EN 301 489-1 [1]	U	
10	<u>Immunity</u> : Radio frequency common mode	7.2.2	UC	For TETRA equipment refer to clause 7.2.2 of the present document. For all other types of PMR equipment refer to clause 9.2 of ETSI EN 301 489-1 [1]
11	<u>Immunity</u> : Transients and surges in the vehicular environment	9.6 of ETSI EN 301 489-1 [1]	C	Only where equipment is fitted to a vehicle power supply
12	<u>Immunity</u> : Voltage dips and interruptions	9.7 of ETSI EN 301 489-1 [1]	C	Only where equipment has AC mains power input ports
13	<u>Immunity</u> : Surges, line to line and line to ground	9.8 of ETSI EN 301 489-1 [1]	C	Only where equipment has AC mains power input ports and/or wired network ports

Key to columns:**Requirement:**

- No** A unique identifier for one row of the table which may be used to identify a requirement.
- Description** A textual reference to the requirement.
- Clause Number** Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

- U/C** Indicates whether the requirement ~~shall be~~ is unconditionally applicable (U) or is conditional upon the ~~manufacturer's~~ manufacturer's claimed functionality of the equipment (C).
- Condition** Explains the conditions when the requirement ~~shall~~ is or ~~shall~~ is not be applicable for a requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

Annex B (informative): Examples of PMR equipment in the scope of the present document

B.1 Introduction

The provisions of the present document apply to radio and associated ancillary equipment intended for use in the land mobile service, that means to Private/Professional land Mobile Radio (PMR) equipment as set out in the following clauses.

B.2 Non-integral antenna PMR equipment

The present document applies in particular to angle modulated (constant envelope) radio equipment, operating on radio frequencies between 30 MHz and 1 000 MHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz, and associated ancillary equipment. It applies to:

- PMR equipment primarily intended for transmission of analogue speech, as defined in ETSI EN 300 086 [i.4];
- PMR equipment and the non-speech part of combined speech/non-speech radio equipment, intended for transmission of non-speech information to initiate a specific response in the receiver, as defined in ETSI I-ETS 300 219 [i.5];
- digital and combined analogue and digital PMR equipment and parts thereof, intended for transmission of data and/or speech as defined in ETSI EN 300 113 [i.6].

B.3 Integral antenna PMR equipment

The present document applies also to angle modulated (constant envelope) radio equipment, operating on radio frequencies between 30 MHz and 1 000 MHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz, and associated ancillary equipment. It applies to:

- PMR equipment intended for transmission of analogue speech, as defined in ETSI EN 300 296 [i.7];
- PMR equipment and the non-speech part of combined speech/non-speech radio equipment, intended for transmission of non-speech information to initiate a specific response in the receiver, as defined in ETSI EN 300 341 [i.8];
- digital and combined analogue and digital PMR equipment and parts thereof, intended for transmission of data and/or speech as defined in ETSI EN 300 390 [i.9].

B.4 Narrowband channel non-integral PMR equipment

The present document applies also to radio equipment, operating on radio frequencies between 30 MHz and 3 GHz, with narrow channel separations (less than 10 kHz, and associated ancillary equipment). It applies to:

- PMR equipment intended for transmission of digitized speech and/or data, with narrow channel separation (less than 10 kHz and permitted by CEPT), and using constant or non-constant envelope type of modulation as defined in ETSI EN 301 166 [i.10].

B.5 Mobile, base station, and portable equipment of TERrestrial Trunked Radio (TETRA) equipment

The present document applies to all TERrestrial Trunked Radio (TETRA) radio equipment covered by ETSI EN 302 561 [i.2]. This includes the following categories of equipment:

- Mobile Station (MS);
- Base Station (BS);
- Direct Mode Mobile Station (DM-MS);
- Dual Watch Mobile Station (DW-MS);
- Direct Mode GATEway (DM-GATE);
- Direct Mode REPeater (DM-REP);
- Direct Mode REPeater/GATEway (DM-REP/GATE);
- Trunked MOde REPeater (TMO-REP);
- portable equipment of TERrestrial Trunked RAdio (TETRA) radiocommunications systems.

Annex C (informative): Bibliography

~~ETSI EN 300 086 1: "ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Land Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement".~~

~~ETSI EN 300 086 2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ETSI EN 300 086: "Land Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Part 2: Harmonized ENHarmonised Standard covering the essential requirements underof article 3.2 of the R&TTE Directive 2014/53/EU".~~

ETSI EN 300 113-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Radio equipment intended for the transmission of data (and speech) and having an antenna connector; Part 1: Technical characteristics and methods of measurement".

ETSI EN 300 113-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Radio equipment intended for the transmission of data (and speech) and having an antenna connector; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive".

ETSI EN 300 219: "ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Land Mobile Service; Radio equipment transmitting signals to initiate a specific response in the receiver".

ETSI EN 300 296-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement".

ETSI EN 300 296-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive".

ETSI EN 300 341-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service (RP 02); Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver; Part 1: Technical characteristics and methods of measurement".

ETSI EN 300 341-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service (RP 02); Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive".

ETSI EN 300 390-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Part 1: Technical characteristics and test conditions".

ETSI EN 300 390-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive".

ETSI EN 301 166-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrowband channels and having an antenna connector; Part 1: Technical characteristics and methods of measurement".

ETSI EN 301 166-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrowband channels and having an antenna connector; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive".

ETSI EN 300 392-2 (V3.4.1) (08-2010): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

ETSI EN 300 396-2 (V1.4.1) (11-2011): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 2: Radio aspects".

Annex D (informative): Change history

Version	Information about changes
<u>2.2.1</u>	<u>Addition of TETRA requirements to the DMR EMC standard</u> <u>Extension of radiated immunity test range from 80 MHz - 2 700 MHz to 80 MHz - 6 000 MHz</u> <u>Alignment of text with requirements of the standardisation request for article 3.1(b) of the RED.</u>

History

Document history		
V1.2.1	August 2000	Publication
V1.3.1	August 2002	Publication
V2.1.1	November 2016	Publication
V2.2.0	March 2017	EN Approval Procedure AP 20170606: 2017-03-08 to 2017-06-06
V2.2.1	April 2019	Publication