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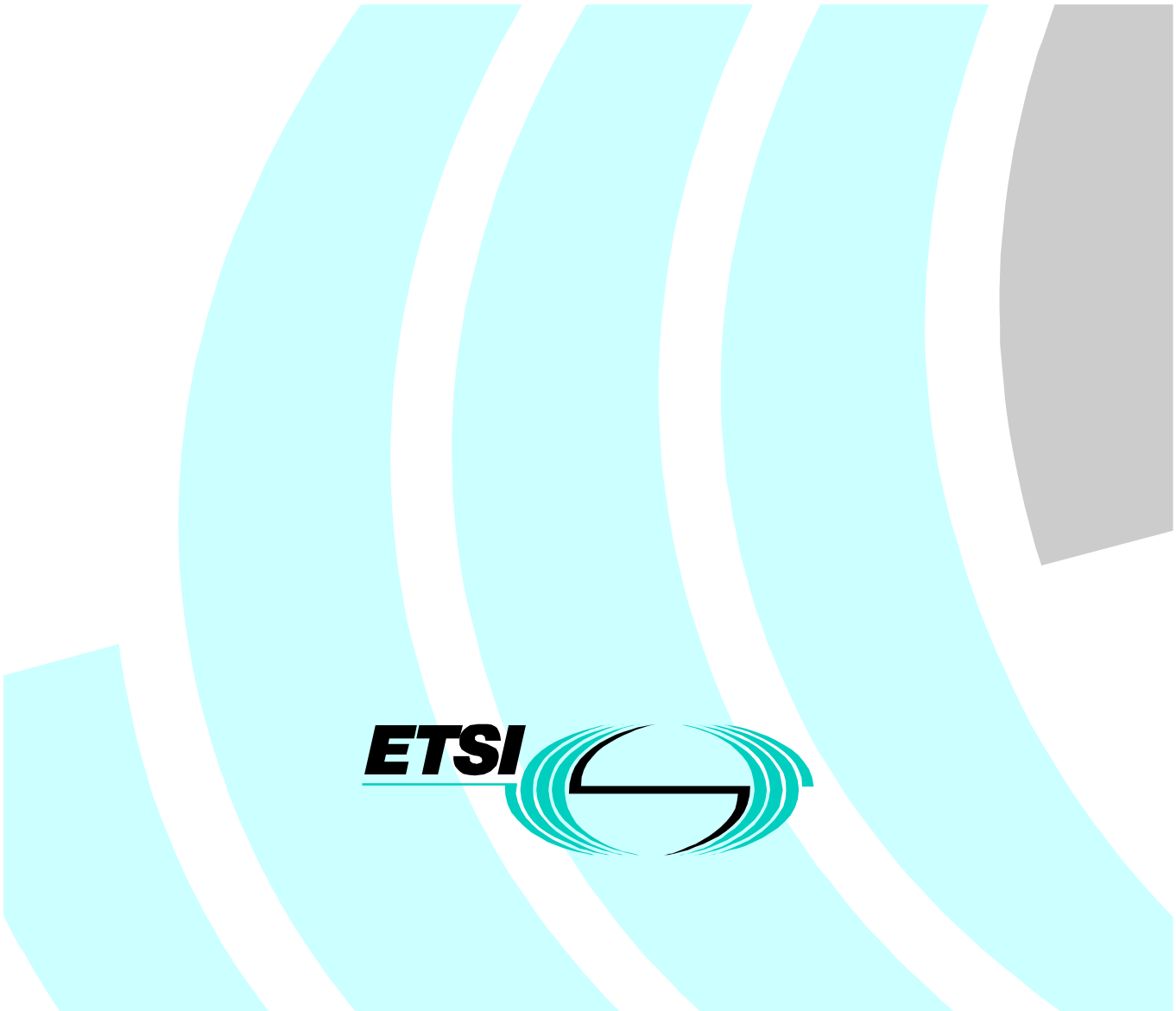
Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 3: Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive



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Contents

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 3 of a multi-part deliverable covering the Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

Part 1: "Harmonized standard for IMT-2000, Introduction and common requirements, covering essential requirements of article 3.2 of the R&TTE Directive";

Part 2: "Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 3: "Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 4: "Harmonized standard for IMT-2000, CDMA Multi-Carrier (cdma2000) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 5: "Harmonized standard for IMT-2000, CDMA Multi-Carrier (cdma2000) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 6: "Harmonized standard for IMT-2000, CDMA TDD (UTRA TDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 7: "Harmonized standard for IMT-2000, CDMA TDD (UTRA TDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 8: "Harmonized standard for IMT-2000, TDMA Single-Carrier (UWC 136) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 9: "Harmonized standard for IMT-2000, TDMA Single-Carrier (UWC 136) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 10: "Harmonized standard for IMT-2000 FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive".

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive. Each standard is a module in the structure. The modular structure is shown in figure 1.

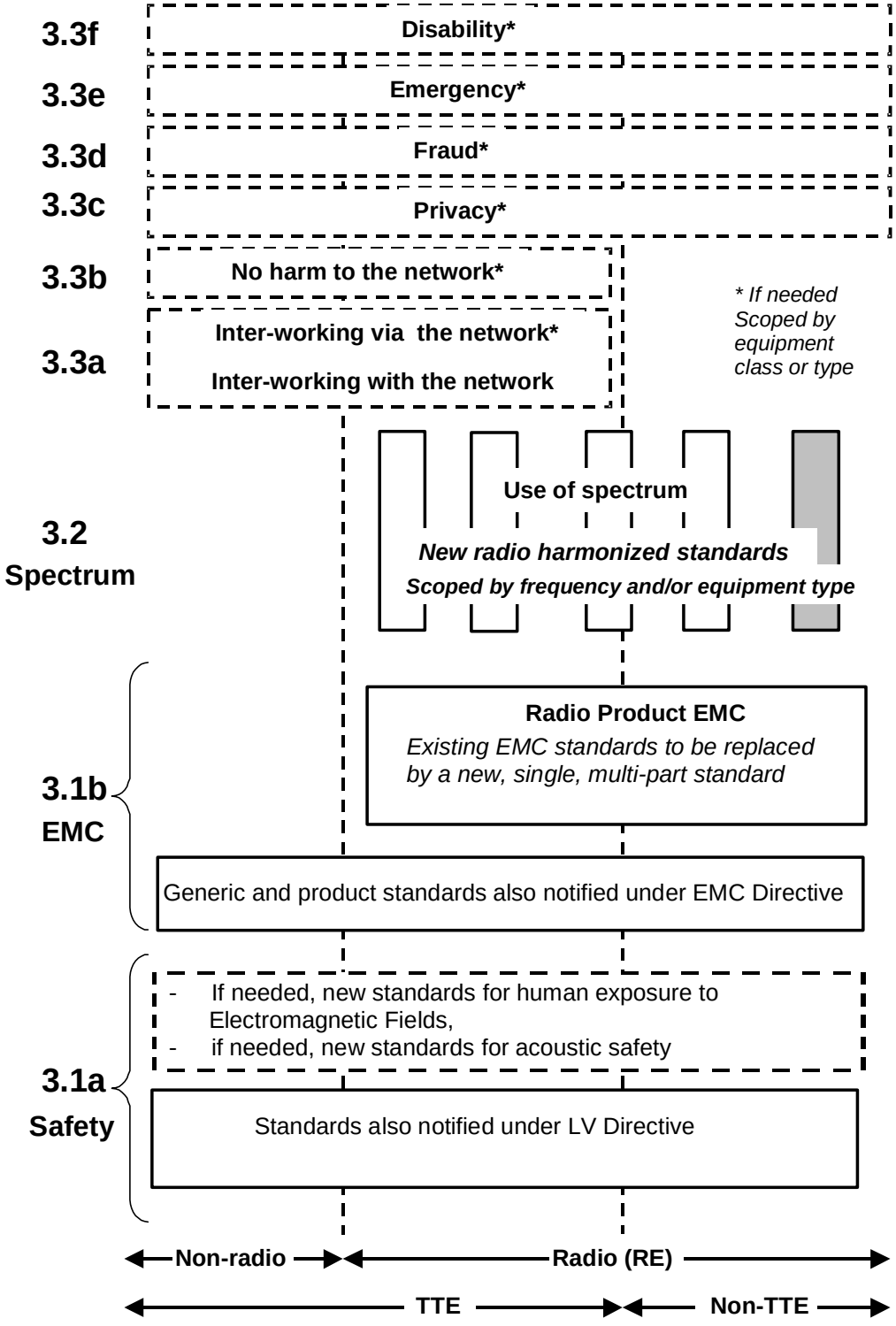

Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 1 shows the different clauses of article 3 of the R&TTE Directive.

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b the diagram shows EN 301 489 [7], the multi-part product EMC standard for radio, and the existing collection of generic and product standards currently used under the EMC Directive [2].

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive may be covered in a set of standards.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions

  without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

The product specifications upon which this multi-part deliverable is based, differ in presentation; and this is reflected in the present document

1 Scope

The present document applies to the following radio equipment type:

1) Base Stations for IMT-2000 CDMA Direct Spread (UTRA FDD).

This radio equipment type is capable of operating in all or any part of the frequency bands given in table 1.

Table 1: CDMA Direct Spread base station frequency bands

Direction of transmission	CDMA Direct Spread base station frequency bands
Transmit	2 110 MHz to 2 170 MHz
Receive	1 920 MHz to 1 980 MHz

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (R&TTE Directive) article 3.2, which states that "….. radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive will apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site http://www.newapproach.org/.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[2] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

[3] Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).

[4] ETSI ETR 028 (1994): "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

[5] ETSI TS 125 141 V3.4.1 (2000-12): "3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station conformance testing (FDD) (Release 1999)".

[6] ITU-R Recommendation SM.329-8: "Spurious emissions".

[7] ETSI EN 301 489: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

[8] ETSI TR 100 028-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive, and the following apply.

chip rate: rate of "chips" (modulated symbols after spreading) per second
The UTRA FDD chip rate is 3,84 Mcps.

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

output power: mean power of one carrier of the base station, delivered to a load with resistance equal to the nominal load impedance of the transmitter

rated output power: rated output power of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector

maximum output power: mean power level per carrier of the base station measured at the antenna connector in a specified reference condition

3.2 Symbols

There are no special symbols used in the present document.

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
B	Appropriate frequency in the Bottom of the operating frequency band of the BS
BER	Bit Error Ratio
BS	Base Station
CW	Continuous Wave (unmodulated signal)
DL	Down Link (forward link)
EMC	Electro-Magnetic Compatibility
FDD	Frequency Division Duplexing
F_{uw}	Frequency of unwanted signal
LV	Low Voltage
M	Appropriate frequency in the Middle of the operating frequency band of the BS
R&TTE	Radio and Telecommunications Terminal Equipment
RE	Radio Equipment
RX	Receiver
TDD	Time Division DuplexingT Appropriate frequency in the Top of the operating frequency band of the BS
TX	Transmitter
TTE	Telecommunications Terminal Equipment
UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UL	Up Link (reverse link)
UTRA	UMTS Terrestrial Radio Access
WCDMA	Wideband Code Division Multiple Access

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the supplier. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

For guidance on how a supplier can declare the environmental profile see annex B.

4.2 Conformance requirements

4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive [1] for IMT-2000 base station equipment (BS) seven essential parameters have been identified. Table 2 provides a cross reference between these essential parameters and the corresponding technical requirements for equipment within the scope of the present document.

Table 2: Cross references

Essential parameter	Corresponding technical requirements
Spectrum emissions mask	4.2.2 Spectrum emissions mask
	4.2.3 adjacent channel leakage power ratio (ACLR)
Conducted spurious emissions from the transmitter antenna connector	4.2.4 Transmitter spurious emissions
Accuracy of maximum output power	4.2.5 Base station maximum output power
Intermodulation attenuation of the transmitter	4.2.6 Transmit intermodulation
Conducted spurious emissions from the receiver antenna connector	4.2.7 Receiver spurious emissions
Impact of interference on receiver performance	4.2.8 Blocking characteristics
	4.2.9 Receiver intermodulation characteristics
Receiver adjacent channel selectivity	4.2.10 Receiver adjacent channel selectivity (ACS)

4.2.2 Spectrum emissions mask

4.2.2.1 Definition

Out of band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and adjacent channel leakage power ratio for the transmitter.

4.2.2.2 Limit

The requirement shall be met by a base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 3 to 6 for the appropriate BS maximum output power, in the frequency range from Δf =2,5 MHz to f_offset_{max} from the carrier frequency, where:

- Δf is the separation between the carrier frequency and the nominal –3 dB point of the measuring filter closest to the carrier frequency;
- f_offset is the separation between the carrier frequency and the centre of the measurement filter;
- f_offset_{max} is either 12,5 MHz or the offset to the UMTS TX band edge as defined in clause 1, whichever is the greater.

Table 3: Spectrum emission mask values, BS maximum output power P ≥ 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 ≤ Δf < 2,7 MHz	2,515 MHz ≤ f_offset < 2,715 MHz	-12,5 dBm	30 kHz
2,7 ≤ Δf < 3,5 MHz	2,715 MHz ≤ f_offset < 3,515 MHz	-12,5 – 15 × (f_offset - 2,715) dBm	30 kHz
	3,515 MHz ≤ f_offset < 4,0 MHz	-24,5 dBm	30 kHz
3,5 ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0 MHz	-11,5 dBm	1 MHz
7,5 ≤ Δf MHz	8,0 MHz ≤ f_offset < f_offset_{max}	-11,5 dBm	1 MHz

Table 4: Spectrum emission mask values, BS maximum output power 39 ≤ P < 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 ≤ Δf < 2,7 MHz	2,515 MHz ≤ f_offset < 2,715 MHz	-12,5 dBm	30 kHz
2,7 ≤ Δf < 3,5 MHz	2,715 MHz ≤ f_offset < 3,515 MHz	-12,5 – 15 × (f_offset – 2,715) dBm	30 kHz
	3,515 MHz ≤ f_offset < 4,0 MHz	-24,5 dBm	30 kHz
3,5 ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0 MHz	-11,5 dBm	1 MHz
7,5 ≤ Δf MHz	8,0 MHz ≤ f_offset < f_offset_{max}	P – 54,5 dBm	1 MHz

Table 5: Spectrum emission mask values, BS maximum output power 31 ≤ P < 39 dBm

Frequency offset of measurement filter – 3dB point,Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 ≤ Δf < 2,7 MHz	2,515 MHz ≤ f_offset < 2,715 MHz	P – 51,5 dBm	30 kHz
2,7 ≤ Δf < 3,5 MHz	2,715 MHz ≤ f_offset < 3,515 MHz	P – 51,5 – 15 × (f_offset – 2,715) dBm	30 kHz
	3,515 MHz ≤ f_offset < 4,0 MHz	P – 63,5 dBm	30 kHz
3,5 ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0 MHz	P – 50,5 dBm	1 MHz
7,5 ≤ Δf MHz	8.0 MHz ≤ f_offset < f_offset_{max}	P – 54,5 dBm	1 MHz

Table 6: Spectrum emission mask values, BS maximum output power P < 31 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 ≤ Δf < 2,7 MHz	2,515 MHz ≤ f_offset < 2,715 MHz	-20,5 dBm	30 kHz
2,7 ≤ Δf < 3,5 MHz	2,715 MHz ≤ f_offset < 3,515 MHz	-20,5 – 15 × (f_offset – 2,715) dBm	30 kHz
	3,515 MHz ≤ f_offset < 4,0 MHz	-32,5 dBm	30 kHz
3,5 ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0 MHz	-19,5 dBm	1 MHz
7,5 ≤ Δf MHz	8,0 MHz ≤ f_offset < f_offset_{max}	-23,5 dBm	1 MHz

4.2.2.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

4.2.3 Adjacent channel leakage ratio (ACLR)

4.2.3.1 Definition

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured after a receiver filter in the adjacent channel(s). Both the transmitted power and the received power are measured through a matched filter (Root Raised Cosine and roll-off 0.22) with a noise power bandwidth equal to the chip rate. The requirements shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

4.2.3.2 Limits

The limit for ACLR shall be as specified in table 7.

Table 7: BS ACLR limits

BS channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	44,2 dB
10 MHz	49,2 dB

4.2.3.3 Conformance

Conformance tests described in clause 5.3.2 shall be carried out.

4.2.4 Transmitter spurious emissions

4.2.4.1 Definition

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the base station RF output port.

The requirement applies at frequencies within the specified frequency ranges, which are more than 12,5 MHz under the first carrier frequency used or more than 12,5 MHz above the last carrier frequency used.

The requirements of clause 4.2.4.2 shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

Unless otherwise stated, all requirements are measured as mean power (RMS).

4.2.4.2 Limit

4.2.4.2.1 Spurious emissions (Category B)

The power of any spurious emission shall not exceed the limit specified in table 8.

Table 8: BS Mandatory spurious emissions limits, Category B

Band	Maximum level	Measurement bandwidth	Note
9 kHz ↔ 150 kHz	-36 dBm	1 kHz	Note 1.
150 kHz ↔ 30 MHz	-36 dBm	10 kHz	Note 1.
30 MHz ↔ 1 GHz	-36 dBm	100 kHz	Note 1.
1 GHz ↔ Fc1 – 60 MHz or 2 100 MHz whichever is the higher	-30 dBm	1 MHz	Note 1.
Fc1 – 60 MHz or 2 100 MHz whichever is the higher ↔ Fc1 – 50 MHz or 2 100 MHz whichever is the higher	-25 dBm	1 MHz	Note 2.
Fc1 – 50 MHz or 2 100 MHz whichever is the higher ↔ Fc2 + 50 MHz or 2 180 MHz whichever is the lower	-15 dBm	1 MHz	Note 2.
Fc2 + 50 MHz or 2 180 MHz whichever is the lower ↔ Fc2 + 60 MHz or 2 180 MHz whichever is the lower	-25 dBm	1 MHz	Note 2.
Fc2 + 60 MHz or 2 180 MHz whichever is the lower ↔ 12,75 GHz	-30 dBm	1 MHz	Note 3.
NOTE 1: Bandwidth as in ITU-R Recommendation SM.329-8 [6], clause 4.1. NOTE 2: Specification in accordance with ITU-R Recommendation SM.329-8 [6], clause 4.1. NOTE 3: Bandwidth as in ITU-R Recommendation SM.329-8 [6], clause 4.1. Upper frequency as in ITU-R SM.329-8 [6], clause 2.6.			
Key: Fc1: Center frequency of first carrier frequency used by the BS. Fc2: Center frequency of last carrier frequency used by the BS.			

4.2.4.2.2 Co-existence with GSM 900

This requirement shall be applied for the protection of GSM 900 MS.

The power of any spurious emission shall not exceed the limit specified in table 9.

Table 9: Spurious emissions limits for protection of GSM 900 MS receiver

Band	Maximum level	Measurement bandwidth	Note
921 MHz to 960 MHz	-57 dBm	100 kHz	

4.2.4.2.3 Co-existence with DCS 1800

This requirement shall be applied for the protection of DCS 1800 MS.

The power of any spurious emission shall not exceed the limit specified in table 10.

Table 10: Spurious emissions limits for protection of DCS 1800 MS receiver

Band	Maximum level	Measurment bandwidth	Note
1 805 MHz to 1 880 MHz	-47 dBm	100 kHz	

4.2.4.2.4 Co-existence with services in adjacent frequency bands

This requirement shall be applied for the protection in bands adjacent to the frequency band 2 110 MHz to 2 170 MHz, as defined in clause 1 in geographic areas in which both an adjacent band service and UTRA are deployed.

The power of any spurious emission shall not exceed the limits specified in table 11.

Table 11: Spurious emissions limits for protection of adjacent band services

Band (f)	Maximum level	Measurement bandwidth	Note
2 100 MHz to 2 105 MHz	-30 + 3,4 (f - 2 100 MHz) dBm	1 MHz	
2 175 MHz to 2 180 MHz	-30 + 3,4 (2 180 MHz - f) dBm	1 MHz	

4.2.4.2.5 Co-existence with UTRA-TDD

This requirement shall be applied for the protection of UTRA-TDD.

The power of any spurious emission shall not exceed the limit specified in table 12.

Table 12: Spurious emissions limits for protection of UTRA-TDD receiver

Band	Maximum level	Measurement bandwidth	Note
1 900 MHz to 1 920 MHz	-52 dBm	1 MHz	
2 010 MHz to 2 025 MHz	-52 dBm	1 MHz	

4.2.4.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

4.2.5 Base station maximum output power

4.2.5.1 Definition

Maximum output power, Pmax, of the base station is the mean power level per carrier measured at the antenna connector in specified reference condition.

4.2.5.2 Limit

In normal conditions, the Base station maximum output power shall remain within +2,7 dB and –2,7 dB of the manufacturer's rated output power.

In extreme conditions, the Base station maximum output power shall remain within +3,2 dB and -3,2 dB of the manufacturer's rated output power.

4.2.5.3 Conformance

Conformance tests described in clause 5.3.4 shall be carried out.

4.2.6 Transmit intermodulation

4.2.6.1 Definition

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

The transmit intermodulation level is the power of the intermodulation products when a WCDMA modulated interference signal is injected into an antenna connector at a level of 30 dB lower than that of the wanted signal. The frequency of the interference signal shall be 5 MHz, 10 MHz and 15 MHz offset below the first or above the last carrier frequency used.

The requirements are applicable for single carrier BS.

4.2.6.2 Limit

The transmit intermodulation level shall not exceed the out of band emission or the spurious emission requirements of clauses 4.2.2.2, 4.2.3.2 and 4.2.4.2.

4.2.6.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

4.2.7 Receiver spurious emissions

4.2.7.1 Definition

The spurious emission power is the power of the emissions generated or amplified in a receiver that appears at the BS antenna connector. The requirements apply to all BS with separate RX and TX antenna port. The test shall be performed when both TX and RX are on with the TX port terminated.

For all BS with common RX and TX antenna port the transmitter spurious emission as specified in clause 4.2.2 is valid.

4.2.7.2 Limit

The power of any spurious emission shall not exceed the limit specified in table 13.

Table 13: Spurious emission minimum requirement

Band	Maximum level	Measurement bandwidth	Note
1 900 – 1 980 MHz and 2 010 – 2 025 MHz	-78 dBm	3,84 MHz	
30 MHz – 1 GHz	-57 dBm	100 kHz	
1 GHz – 12,75 GHz	-47 dBm	1 MHz	With the exception of frequencies between 12,5 MHz below the first carrier frequency and 12,5 MHz above the last carrier frequency used by the BS transmitter.

4.2.7.3 Conformance

Conformance tests described in clause 5.3.6 shall be carried out.

4.2.8 Blocking characteristics

4.2.8.1 Definition

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the adjacent channels. The blocking performance shall apply at all frequencies as specified in table 14.

The requirements in this clause shall apply to base stations intended for general-purpose applications.

4.2.8.2 Limit

The BER shall not exceed 0.001 for the parameters specified in table 14.

Table 14: Blocking characteristics

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1 920 MHz to 1 980 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal with one code
1 900 MHz to 1 920 MHz 1 980 MHz to 2 000 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal with one code
1 MHz to 1 900 MHz and 2 000 MHz to 12 750 MHz	-15 dBm	-115 dBm	-	CW carrier

4.2.8.3 Conformance

Conformance tests described in clause 5.3.7 shall be carried out.

4.2.9 Receiver intermodulation characteristics

4.2.9.1 Definition

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

4.2.9.2 Limit

The intermodulation performance should be met when the following signals are applied to the receiver.

Table 15: Interferer signals for intermodulation performance requirement

Type of signal	Offset	Signal level
Wanted signal	-	-115 dBm
CW signal	10 MHz	-48 dBm
WCDMA signal with one code	20 MHz	-48 dBm

The BER for the wanted signal shall not exceed 0,001 for the parameters specified in table 15.

4.2.9.3 Conformance

Conformance tests described in clause 5.3.8 shall be carried out.

4.2.10 Receiver adjacent channel selectivity

4.2.10.1 Definition

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at is assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the center frequency of the assigned channel. ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The interference signal be detuned by F_{uw} MHz and modulated by a pseudo random binary sequence uncorrelated to the wanted signal.

4.2.10.2 Limit

The BER shall not exceed 0,001 for the parameters specified in table 16.

Table 16: Adjacent channel selectivity

Parameter	Level	Unit
Data rate	12,2	kpbs
Wanted signal	-115	dBm
Interfering signal	-52	dBm
F_{uw} modulated	±5	MHz

The interference signal shall be a wide band CDMA signal of single code.

4.2.10.3 Conformance

Conformance tests described in clause 5.3.9 shall be carried out.

5 Testing for compliance with technical requirements

5.1 Conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements.

Normally it should be sufficient for all tests to be conducted using normal test conditions except where otherwise stated. For guidance on the use of other test conditions to be used in order to show compliance reference can be made to TS 25.141 [5], clause 4.4.

Many tests in the present document are performed with appropriate frequencies in the bottom, middle and top of the operating frequency band of the BS. These are denoted as RF channels B (bottom), M (middle) and T (top).

5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 17.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with ETR 028 [4] and shall correspond to an expansion factor (coverage factor) k = 1,96 (which provide confidence levels of 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 17 is based on such expansion factors.

Table 17: Maximum uncertainty of the test system

Parameter	Conditions	Uncertainty
Spectrum emissions mask		±1,5 dB
Adjacent channel leakage power ratio (ACLR)	5 MHz offset 10 MHz offset	± 0,8 dB ± 0,8 dB
Transmitter spurious emissions	For "Spurious emissions (Category B)": f ≤ 2,2 GHz 2,2 GHz < f ≤ 4 GHz f > 4 GHz For the co-existence requirements:	 ±1,5 dB ±2,0 dB ±4,0 dB ±2,0 dB
Base station maximum output power		±0,7 dB
Transmit intermodulation	For spectrum emissions mask: For ACLR For "Spurious emissions (Category B)": f ≤ 2,2 GHz 2,2 GHz < f ≤ 4 GHz f > 4 GHz For co-existence requirements:	±2,5 dB ±2.2 dB ±2.5 dB ±2,8 dB ±4,5 dB ±2,8 dB
Receiver spurious emissions	For BS receive bands (-78 dBm) Outside the BS receive bands: f ≤ 2,2 GHz 2,2 GHz < f ≤ 4 GHz f > 4 GHz	±3,0 dB ±2,0 dB ±2,0 dB ±4,0 dB
Blocking characteristics	For offset <15 MHz: For offset > = 15 MHz and f ≤ 2,2 GHz 2,2 GHz < f ≤ 4 GHz f > 4 GHz	±1.4 dB ±1.0 dB ±1.7 dB ±3.1 dB
Receiver intermodulation characteristics		±0,6 dB
Receiver adjacent channel selectivity (ACS)		±1,1 dB

NOTE 1: For RF tests it should be noted that the uncertainties in table 17 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the EUT and the Test System.

NOTE 2: Annex G of TR 100 028-2 [8] provides guidance for the calculation of the uncertainty components relating to mismatch.

NOTE 3: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 17, this equipment can still be used, provided that an adjustment is made follows:

Any additional uncertainty in the Test System over and above that specified in table 17 is used to tighten the Test Requirements - making the test harder to pass (for some tests, e. g. receiver tests, this may require modification of stimulus signals). This procedure will ensure that a Test System not compliant with table 17 does not increase the probability of passing an EUT that would otherwise have failed a test if a Test System compliant with table 17 had been used.

5.3 Essential radio test suites

5.3.1 Spectrum emission mask

5.3.1.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

1) Set-up the equipment as shown in TS 25.141 [5], annex A.

2) Measurements with an offset from the carrier centre frequency between 2,515 MHz and 4,0 MHz shall use a 30 kHz measurement bandwidth.

3) Measurements with an offset from the carrier centre frequency between 4,0 MHz and (f_offset_{max} -500 kHz) shall use a 1 MHz measurement bandwidth. The 1 MHz measurement bandwidth may be calculated by integrating multiple 50 kHz or narrower filter measurements.

4) Detection mode: True RMS.

5.3.1.2 Procedures

1) Set the BS to transmit a signal in accordance to test model 1 in TS 25.141 [5] at the manufacturer's specified maximum output power.

2) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

The results obtained shall be compared to the limits in clause 4.2.2.2 in order to prove compliance.

5.3.2 Adjacent Channel Leakage power Ratio (ACLR)

5.3.2.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

1) Connect measurement device to the base station RF output port as shown in TS 25.141 [5], annex B.

2) The measurement device characteristics shall be:

   - measurement filter bandwidth: defined in clause 4.2.3.1;

   - detection mode: true RMS voltage or true average power.

3) Set the base station to transmit a signal modulated in accordance with TS 25.141 [5] Test model 1. Total power at the RF output port shall be the maximum output power as specified by the manufacturer.

4) Set carrier frequency within the frequency band supported by BS. Minimum carrier spacing shall be 5 MHz and maximum carrier spacing shall be specified by manufacturer.

5.3.2.2 Procedure

1) Measure Adjacent channel leakage power ratio for 5 MHz and 10 MHz offsets both side of channel frequency. In multiple carrier case only offset frequencies below the lowest and above the highest carrier frequency used shall be measured.

2) All RF channel configurations supported by BS shall be verified.

The results obtained shall be compared to the limits in clause 4.2.3.2 in order to prove compliance.

5.3.3 Transmitter spurious emissions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

The BS shall be configured with transmitters active at their maximum output power for all transmission modes foreseen by the manufacturer's specification.

Set the base station to transmit a signal as stated in TS 25.141 [5], clause 6.1.1.1. Total power at the RF output port shall be the nominal power as specified by the manufacturer.

The transmitter antenna connector shall be connected to a measurement receiver with the same characteristic impedance, using an attenuator or directional coupler if necessary.

The detecting device shall be configured with a measurement bandwidth as stated in the tables.

The results obtained shall be compared to the limits in clause 4.2.4.2 in order to prove compliance.

5.3.4 Base station maximum output power

5.3.4.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

In addition, on one UARFCN only, the test shall be performed under extreme power supply as defined in TS 25.141 [5], clause 4.4.2.

NOTE: Tests under extreme power supply also test extreme temperature.

1) Connect the power measuring equipment to the base station RF output port.

5.3.4.2 Procedure

1) Set the base station to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 in TS 25.141 [5], clause 6.1.1.1.

2) Measure the mean power at the RF output port over a certain slots.

The results obtained shall be compared to the limits in clause 4.2.5.2 in order to prove compliance.

5.3.5 Transmit intermodulation

5.3.5.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

1) Test set-up in accordance to TS 25.141 [5], annex B.

5.3.5.2 Procedures

1) Generate the wanted signal in accordance to test model 1 in TS 25.141 [5], clause 6.1.1.1 at specified maximum BS output power.

2) Generate the interference signal (WCDMA signal as specified in TS 25.141 [5] tables 6.1 and 6.2 (Test model 1)) with frequency offset of 5 MHz relative to the wanted signal in accordance to test model 2 in TS 25.141 [5], clause 6.1.1.2.

3) Adjust ATT1 so the level of the WCDMA modulated interference signal at BS is 30 dB below the wanted signal.

4) Perform the out of band emission test as specified in clause 5.3.1.

5) Perform the spurious emission test as specified in clause 5.3.2.

6) Verify that the emission level does not exceed the required level with the exception of interference signal frequencies.

7) Repeat the test for interference frequency off set of -5 MHz.

8) Repeat the test for interference frequency off set of ±10 MHz and ±15 MHz.

The results obtained shall be compared to the limits in clause 4.2.6.2 in order to prove compliance.

5.3.6 Receiver spurious emissions

5.3.6.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: M; see clause 5.1.

1) Connect a measurement receiver to the BS antenna connector as shown in TS 25.141 [5], annex B.

2) Enable the BS receiver.

3) Start BS transmission with channel configuration as specified in TS 25.141 [5], tables 6.1 and 6.2 (Test model 1).

5.3.6.2 Procedure

1) Set measurement equipment parameters as specified in table 18.

2) Measure the spurious emissions over each frequency range described in clause 4.2.7.2.

3) Repeat test using diversity antenna connector if available.

Table 18: Measurement equipment parameters

Measurement Band width	As in table 13.
Sweep frequency range	30 MHz to 12,75 GHz
Detection	True RMS

The results obtained shall be compared to the limits in clause 4.2.7.2 in order to prove compliance.

5.3.7 Blocking characteristics

5.3.7.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: M; see clause 5.1. The BS shall be configured to operate as close to the centre of the operating band as possible.

1) Connect WCDMA signal generator at the assigned channel frequency of the wanted signal and a signal generator to the antenna connector of one RX port.

2) Terminate any other RX port not under test.

3) Transmit a signal from the WCDMA signal generator to the BS. The characteristics of the signal shall be set according to the UL reference measurement channel (12,2 kbit/s) specified in TS 25.141 [5], clause A.2.1. The level of the WCDMA signal measured at the BS antenna connector shall be set to the level specified in clause 4.2.8.2.

5.3.7.2 Procedure

1) Set the signal generator to produce an interfering signal at a frequency offset F_{uw} from the assigned channel frequency of the wanted signal which is given by:

$$F_{uw} = \pm(n \times 1\ MHz),$$

where n shall be increased in integer steps from n = 1 up to such a value that the center frequency of the interfering signal covers the range from 1 MHz to 12,75 GHz. The interfering signal level measured at the antenna connector shall be set in dependency of its center frequency, as specified in table 14. The type of the interfering signal is either equivalent to a continuous WCDMA signal with one code of chip frequency 3,84 Mchip/s, filtered by an RRC transmit pulse-shaping filter with roll-off $\alpha = 0,22$, or a CW signal; see table 14.

2) Measure the BER of the wanted signal at the BS receiver.

NOTE: The test procedure as defined in steps (1) and (2) requests to carry out more than 10 000 BER measurements. To reduce the time needed for these measurements, it may be appropriate to conduct the test in two phases: During phase 1, BER measurements are made on all center frequencies of the interfering signal as requested but with a reduced confidence level, with the aim to identify those frequencies which require more detailed investigation. In phase 2, detailed measurements are made only at those critical frequencies identified before, applying the required confidence level.

3) Interchange the connections of the BS RX ports and repeat the measurements according to steps (1) to (2).

The results obtained shall be compared to the limits in clause 4.2.8.2 in order to prove compliance.

5.3.8 Receiver intermodulation characteristics

5.3.8.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

1) Set-up the equipment as shown in TS 25.141 [5], annex B.

5.3.8.2 Procedures

1) Generate the wanted signal (reference signal) and adjust ATT1 to set the signal level to the BS under test to the specified -115 dBm.

2) Adjust the signal generators to the frequency offset of +10 MHz (CW tone) and +20 MHz (WCDMA modulated) from the frequency of the wanted signal if possible.

3) Adjust the ATT2 and ATT3 to obtain the specified level of interference signal at the BS input.

4) Measure the BER and control that the measured value does not exceed the specified value.

5) Repeat the test for interference signal frequency offset of –10 MHz and -20 MHz for CW and WCDMA modulated respectively.

6) Repeat the whole test for the port which was terminated.

The results obtained shall be compared to the limits in clause 4.2.9.2 in order to prove compliance.

5.3.9 Adjacent Channel Selectivity (ACS)

5.3.9.1 Initial conditions

Test environment: Normal; see TS 25.141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

1) Set-up the equipment as shown in TS 25.141 [5], annex B.

5.3.9.2 Procedure

1) Generate the reference channel and adjust the ATT1 to set the input level to the base station under test to the specified -115 dBm.

2) Set-up the interference signal at the adjacent channel frequency and adjust the ATT2 to obtain the specified level of interference signal at the base station input. Note that the interference signal shall have an ACLR of at least 63 dB in order to eliminate the impact of interference signal adjacent channel leakage power on the ACS measurement.

3) Measure the BER and control that the measured value does not exceed the specified value (BER < 0,001).

4) Repeat the test for the port, which was terminated.

The results obtained shall be compared to the limits in clause 4.2.10.2 in order to prove compliance.

Annex A (normative): The EN Requirements Table (EN-RT)

The EN Requirements Table (EN-RT) serves a number of purposes, as follows:

- it provides a tabular summary of all the requirements;
- it shows the status of each EN-R, whether it is essential to implement in all circumstances (Mandatory), or whether the requirement is dependent on the supplier having chosen to support a particular optional service or functionality (Optional). In particular it enables the EN-Rs associated with a particular optional service or functionality to be grouped and identified;
- when completed in respect of a particular equipment it provides a means to undertake the static assessment of conformity with the EN.

Table A.1: EN Requirements Table (EN-RT)

EN Reference		**EN <xxx xxx-3>**				**Comment**
No.	**Reference**	**EN-R** (note)	**Status**			
1	4.2.2	Spectrum emissions mask	M			
2	4.2.3	Adjacent channel leakage power ratio (ACLR)	M			
3	4.2.4	Transmitter spurious emissions	M			
4	4.2.5	Base station maximum output power	M			
5	4.2.6	Transmit intermodulation	M			
6	4.2.7	Receiver spurious emissions	M			
7	4.2.8	Blocking characteristics	M			
8	4.2.9	Receiver intermodulation characteristics	M			
9	4.2.10	Receiver adjacent channel selectivity (ACS)	M			
NOTE: These EN-Rs are justified under article 3.2 of the R&TTE Directive.						

Key to columns:

No Table entry number;

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

EN-R Title of conformance requirement within the present document;

Status Status of the entry as follows:

M	Mandatory, shall be implemented under all circumstances;
O	Optional, may be provided, but if provided shall be implemented in accordance with the requirements;
O.n	this status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".

Comments To be completed as required.

Annex B (informative): Environmental profile specification

The following environmental conditions may be declared by the supplier:

- barometric pressure: minimum and maximum;
- temperature: minimum and maximum;
- relative humidity: minimum and maximum;
- power supply: lower and upper voltage limit.

When operating outside the boundary limits of the declared operational environmental profile the equipment should not make ineffective use of the radio frequency spectrum so as to cause harmful interference.

Annex C (informative): Bibliography

ETSI TS 125 104: "3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UTRA (BS) FDD; Radio transmission and Reception (Release 1999)".

Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

Annex D (informative): The EN title in the official languages

Language	EN title
Danish	
Dutch	
English	Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 3: Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive
Finnish	
French	
German	
Greek	
Icelandic	
Italian	
Portuguese	
Spanish	
Swedish	

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