

Methodology to be adopted by Wireless Broadband Providers for the Adherence to Radio Communication Obligations Established in General Authorisation (Radiocommunications Apparatus) Regulations

General Procedure for the Compliance Measurement of Electromagnetic Fields from Radio transmitting apparatus operating at frequencies from 110 MHz to 100 GHz.

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Disclaimer

The presentation of the material in this publication includes the basic procedures and standards to be followed by the Licensees in order to adhere to their obligations when installing or modifying their radio base stations.

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Scope

Licensees intending to install or modifying radio transmitting apparatus (also referred to as base stations) need to evaluate the RF field strength levels in the vicinity of the base station and in areas that are accessible to the general public. These levels are an aggregate of the radiating fields emanating from the said radio base station as well as other radiating sources.

Levels for limiting exposure to electromagnetic fields (EMF), as applicable to Malta, are set out in guidelines published by the International Commission for Non-Ionising Radiation Protection (ICNIRP Guidelines). These guidelines are endorsed through S.L 399.40 of the Laws of Malta. The requirement of compliance with ICNIRP also stems from SL399.28 (9th Schedule, Part B, 13.1). The latter applies to all authorised undertakings.

This document details out the basic procedures to be followed by licensees in order to adhere to their obligations when installing or modifying their radio base stations. It also outlines clearly the base station related information and the technical parameters which licensees need to forward to the Authority on installation or after carrying out modifications to existing installations. Lastly, it lists out the methodology to be followed by the licensees, subsequent to an installation or modification, so as to auto-certify such radio transmitting apparatus installations. It is only once compliance with the relevant RF exposure limits and regulations is ensured that the radio base stations may commence to operate.

References

At the time of publication, the references indicated below were valid and, in force. Notwithstanding this, all standards, recommendations and references are subject to revision. Therefore, readers are encouraged to ascertain the reference and application of the latest version of such documentation.

The following documentation is required for the adoption of these guidelines.

- CENELEC: EN 50385 - Product standard to demonstrate the compliance of base station apparatus with radiofrequency electromagnetic field exposure limits (110 MHz - 100 GHz), when placed on the market.
- CENELEC: EN 50401 - Product standard to demonstrate the compliance of base station apparatus with radiofrequency electromagnetic field exposure limits (110 MHz - 100 GHz), when put into service.
- CENELEC: EN 62232 - Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure.
- ITU-T Recommendation K.52 (01/2018) - Guidance on complying with limits for human exposure to electromagnetic fields.
- ITU-T Recommendation K.100 (07/2019) - Measurement of radio frequency electromagnetic fields to determine compliance with human exposure limits when a base station is put into service
- ITU-T Recommendation K.113 (2015) - Generation of radiofrequency electromagnetic field level maps
- ITU-T Recommendation K.61 (01/2018) - Guidance to measurement and numerical prediction of electromagnetic fields for compliance with human exposure limits for telecommunication installations.
- ITU-T Recommendation K.70 (2018) - Mitigation techniques to limit human exposure to EMFs in the vicinity of radiocommunication stations
- C95.7-2014 - IEEE Recommended Practice for Radio Frequency Safety Programs, 3 kHz to 300 GHz
- ICNIRP. Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz). Health Phys 118(00):000–000; 2020.

Resume of Reports and Applicable Timelines as found in the Guidelines

- Timeframes

14-day timeframe to notify the MCA following the installation or modification of radio transmitting apparatus.

- Reports

Reports to be submitted to the MCA following installation or modification of radio transmitting apparatus (within the 14-day period):

- Report 1a – Radio transmitting apparatus installation characteristics
- Report 1b – Site plan of Radio transmitting apparatus installation
- Report 2 - EMF exposure compliance report - (as per obligation of Article (11) Provision 3(f))

- Frequency of Submission

Report 1a is to be submitted to the Authority on a yearly basis following the initial submission (irrespective whether no modifications to the radio transmitting apparatus has been carried out).

Reports 1a, 1b and 2 are only to be resubmitted to the Authority (once submitted for the first-time following installation) should any changes be made to the apparatus installation.

- Adherence to the Guidelines

Licensees have a period of 6 months from the initial publication of the guidelines to report on the status of implementation of the Guidelines. Licensees should do their utmost to implement the processes and procedures as laid out in the Guidelines as soon and as efficiently as possible. In the interim period, the licensees, shall continue to employ the EMF compliance measures currently in effect.

Reports related to existing installation (apparatus installed prior to the publication of these guidelines) are to be submitted to the MCA by not later than 24 months from the publication of the guidelines.

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Section 1

Regulatory frameworks for managing EMF emissions



Regulatory frameworks for managing EMF emissions

1.1 ICNIRP Guidelines

The ICNIRP Guidelines establish thresholds that safeguard from exposure to EMF. These thresholds are founded on known health effects. The ICNIRP Guidelines also facilitate reference levels to help determine whether these basic restrictions are likely to be exceeded. Compliance with the reference levels will ensure compliance with the basic restrictions.

The ICNIRP Guidelines set different limits for the protection of workers (occupational exposure) and the protection of the general public. The limits for workers tend to be higher than those for the general public. Any reference made in this document to ICNIRP thresholds, denotes the compliance with the basic restrictions for general public exposure.

The Control of Electromagnetic Fields at Work Regulations (2016 Regulations) sets minimum health and safety requirements for workers who expose themselves to emissions arising from EMF. The exposure limit values in the 2016 Regulations are based on the occupational exposure limits in the ICNIRP Guidelines. In Malta, the Occupational Health and Safety Authority (OHSA) is responsible to protect employees from risks to their health and safety. Measures are already in place that limit occupational exposure to EMF emissions for workers. Consequently, these guidelines exclude mention to occupational exposure to EMF.

In relation to the general public, European Council Recommendation 1999/519/EC (Council Recommendation) explains that advice on exposure to EMF emissions has been provided by ICNIRP and that this has been endorsed by the European Commission's Scientific Steering Committee. The Council Recommendation explains that EU Member States should "adopt a framework of basic restrictions and reference levels" as set out in the ICNIRP Guidelines. It also explains that "in order to assess compliance with the basic restrictions ... the national and European bodies for standardisation ... should be encouraged to develop standards ... for the purposes of the design and testing of equipment".

In Malta, the Superintendent of Public Health takes the lead on public health matters. This includes matters associated with radiofrequency electromagnetic fields, or radio waves. The Superintendent's position in terms of exposure to radio waves is that they should comply with the European Council Recommendation and the ICNIRP Guidelines. This is reflected in S.L. 399.40 Regulation 5.

The Malta Communications Authority (MCA) manages, and audits for compliance, the use of radio spectrum in Malta. It does this against legally established EMF standards. In its work, the Authority strictly follows the standards found in the legal framework or as may be determined by the superintendent of public health.

1.2 Product Safety Legislation

The Radio Equipment Directive 2014/53/EU (RED) of the European Parliament and Council governs the placing of radio apparatus on the market. It defines requirements associated with health and safety, electromagnetic compatibility, and, efficient use of radio spectrum. Manufacturers, importers and distributors of radio apparatus all have their own responsibilities under this Directive. Amongst other things, they need to ensure that radio apparatus is accompanied by clear, understandable and

intelligible instructions and safety information. Exposure limits need to be set so as to meet the aforementioned essential requirements based on the ICNIRP Guidelines.

The Radio Equipment Directive does not fall within the remit of the Malta Communications Authority.

1.3 The EMF related Standards and Recommendations

There are a number of organisations¹ involved in the development of standards and recommendations on measurement and calculation methods which can be used to determine whether the apparatus that produces electromagnetic radiation complies with the corresponding exposure limits as adopted in the respective countries.

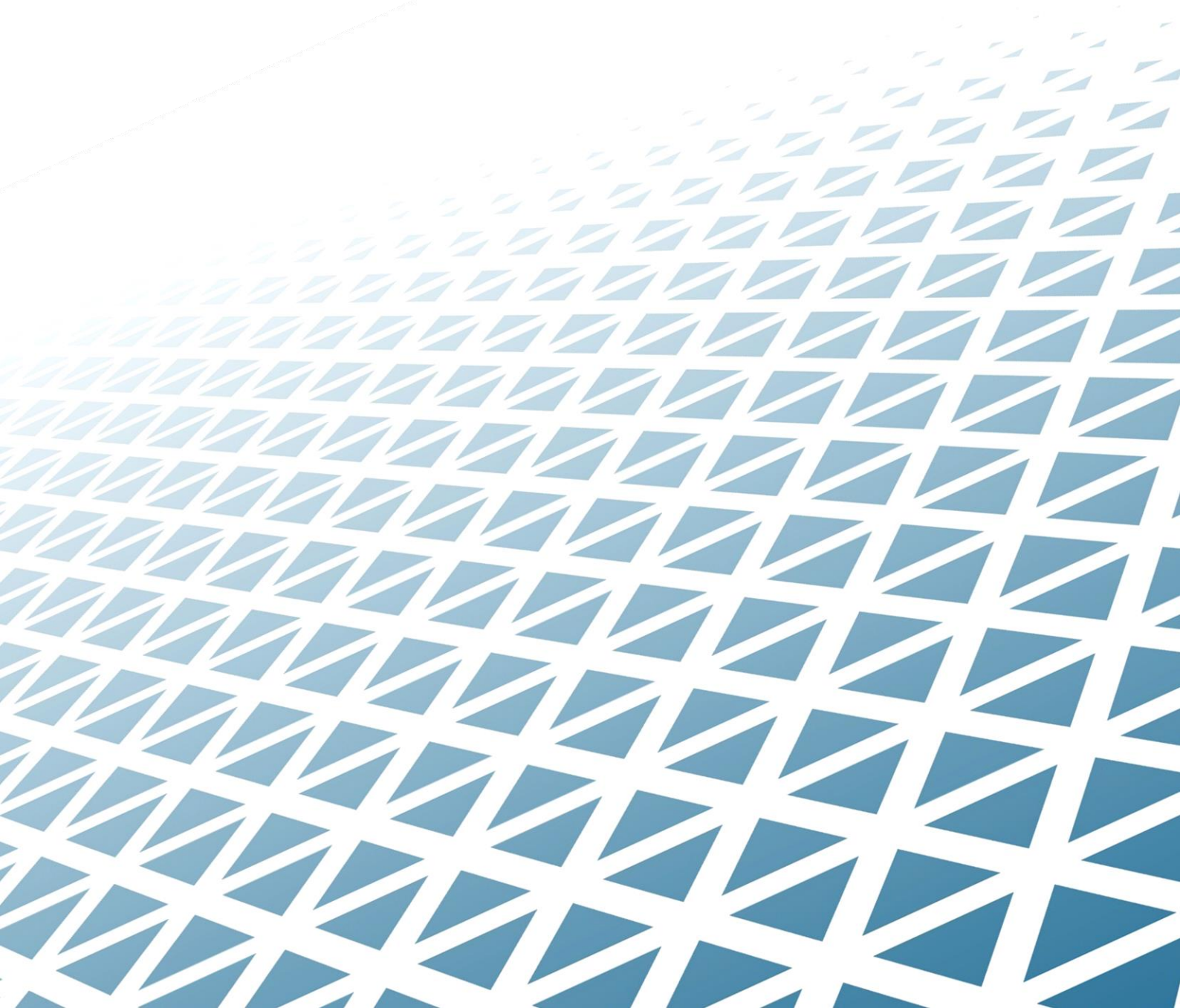
Some of the key standards and recommendations in relation to radio apparatus and EMF are the following:

- CENELEC: EN 50385 - Product standard to demonstrate the compliance of base station apparatus with radiofrequency electromagnetic field exposure limits (110 MHz - 100 GHz), when placed on the market.
- CENELEC: EN 50401 - Product standard to demonstrate the compliance of base station apparatus with radiofrequency electromagnetic field exposure limits (110 MHz - 100 GHz), when put into service.
- CENELEC: EN 62232 - Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure.
- IEC TR 62669 - Case studies supporting IEC 62232.
- ITU-T Recommendation K.52 (01/2018) - Guidance on complying with limits for human exposure to electromagnetic fields.
- ITU-T Recommendation K.61 (01/2008) - Guidance to measurement and numerical prediction of electromagnetic fields for compliance with human exposure limits for telecommunication installations.
- ITU-T Recommendation K.70 (2018) - Mitigation techniques to limit human exposure to EMFs in the vicinity of radiocommunication stations
- ITU-T Recommendation K.100 (07/2019) - Measurement of radio frequency electromagnetic fields to determine compliance with human exposure limits when a base station is put into service

¹ The International Electrotechnical Commission (IEC) has developed standards which set out the methodology to use when installing various types of apparatus to ensure that it complies with the ICNIRP Guidelines, including radiocommunications apparatus. In Europe, CENELEC is responsible for standards relating to EMF and cooperates closely with the IEC. The ITU has further developed a series of recommendations with the aim to help with compliance of telecommunication installations as defined in the respective IEC standards.

Section 2

EMF Exposure Zones and Installation Classification



EMF Exposure Zones and Installation Classification

2.1 The EMF Exposure Zones

Any radiocommunications apparatus exposes its surroundings (including people) to electromagnetic waves. The intensity of the waves depends on the proximity to the radiating object. ITU – T Recommendation K.52 defines three EMF exposure zones. These are the Compliance Zone, the Occupational Zone and the Exceedance Zone. In the Compliance Zone, potential exposure to EMF is below the applicable limits for controlled (occupational) and uncontrolled (public)² exposure. In the Occupational Zone, the potential exposure to EMF is below the applicable limits for controlled exposure but exceeds the limits for uncontrolled (general public) exposure. Conversely, in the Exceedance Zone, the potential exposure to EMF exceeds the applicable limits for both controlled/occupational exposure and uncontrolled/general public exposure.

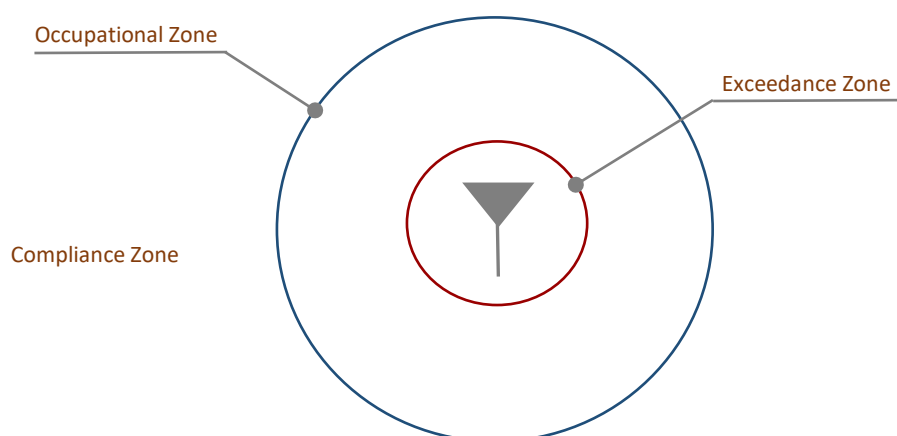


Figure 1. The Exposure Zones

In view of the above, it is vital that the appropriate exposure zones are identified accordingly in order for the necessary safety measures to be taken. Moreover, when auditing EMF within a confined area, it is important that the readings are taken where they are at their highest level (worse emission conditions) within that area. In addition, the aggregate presence of multiple EMF sources (even at different frequencies) needs to be taken into account. In this way, the maximum exposure risk to the individuals is clearly demarcated.

² ITU Recommendation K.52 defines controlled/occupational as the exposure that applies to situations where persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure also applies where the exposure is of transient nature as a result of incidental passage through a location where the exposure limits may be above the general population/uncontrolled limits, as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.






2.2 The MCA EMF Guidelines

These guidelines will assist telecoms operators in verifying compliance with the ICNIRP exposure standards promulgated by the national competent authorities and, in complying with the relevant provisions at law. The assessment is based on the evaluation of the electromagnetic field and on the accessibility considerations.

The Guidelines mainly adopt the tools, methods and procedures described in EN 62232. However, they go further by assessing base-station installation compliance.

The European Standard CENELEC EN 62232;-

- provides methods for determining the radio-frequency field strength near radio-communication base stations with the intention of evaluating human exposure,
- defines the methodology to determine the area for evaluation,
- discusses the mechanisms required to measure and compute the exposure to a radiating source,
- specifies a number of product installation classes which are defined in relation to the maximum radiated power of the apparatus, and
- outlines an evaluation process to be followed during the installation of a base station operating at frequencies from 110 MHz to 100 GHz.

SIMPLIFIED INSTALLATION RULES					
From IEC 62232:2017 Installation shall be done according to instructions from the manufacturer or entity putting into service					
	E0	E2	E10	E100	E+
	N/A	$\leq 2\text{ W}$	$\leq 10\text{ W}$	$\leq 100\text{ W}$	No limit
	None	None	2,2 m	2,5 m	H_m (calculation)
	None, touch compliant	Provided in manufacturer's instructions Small D_m not shown on the picture		Provided in manufacturer's instructions D_m in main lobe direction	
	N/A	N/A	N/A	$5D_m$ in main lobe direction D_m in other directions	

- For apparatus operating at 2 Watts or below (Equipment Installation Class E0 and E2), the standard notes that compliance with the exposure limits is generally obtained at zero distance or within a few centimetres of the apparatus, and installers need to follow the manufacturer's instructions to ensure compliance.
- For apparatus operating above 2 Watts but no higher than 10 Watts (Equipment Installation Class E10), installers need to follow the manufacturer's instructions and also need to ensure that the lowest radiating part of the antenna(s) is at a minimum height of 2.2 m above the general public walkway.
- For apparatus operating above 10 Watts (Equipment Installation Class E100 and E+), the evaluation process is more involved, requiring the installer to perform certain calculations in order to identify minimum separation distances between the installation and areas accessible to the general public, as well as considering other nearby RF sources.

Figure 2. The Installation Rules

2.3 The Installation Classification Scheme

EMF source installation may be classified into three classes, more specifically, the *Inherently Compliant*, the *Normally Compliant* and the *Provisionally Compliant*.

- *Inherently Compliant* sources produce fields that comply with relevant exposure limits at zero distance or within a few centimetres away from the source. Precautions are not necessary. All base stations with EIRP³ ≤ 2W (Equipment Installation Class E0 and E2), are inherently compliant. Furthermore, if the emitter is set up in such a way that the access to the area where the exposure limits may be exceeded is precluded by the construction of the radiating device itself, then, the emitter is also classified as being inherently compliant. All base stations with EIRP ≤ 10W (Equipment Installation Class E10) are also considered as inherently compliant as long as the installation follows the manufacturer's instructions and that the lowest radiating part of the antenna(s) is at a minimum height of 2.2 m above the general public walkway.
- *Normally Compliant* installations contain sources that produce EMF that can exceed relevant exposure limits. However, as a result of normal installation practices and the typical use of these sources for communication purposes, the exceedance zone of these sources is not accessible to people under ordinary conditions. Examples include antennas mounted on sufficiently high towers or narrow-beam earth stations pointing at the satellite. Precaution may need to be exercised by maintenance personnel who come into the close vicinity of emitters in certain normally compliant installations. These types of installations are illustrated further in accessibility category 1, 2 and 3 below.
- *Provisionally Compliant* installations require special measures to achieve compliance. This involves determination of the exposure zones. These types of installations are illustrated further in accessibility category 4 installations below.

Accessibility to, and the positioning of, the source coupled with the frequency range and the directivity of the antenna are key factors that influence the type of installation classification scheme a source falls in⁴. Indeed, they are the criteria being put forward in these guidelines as a means of determining the type of compliance.

³ Effective Isotropically Radiated Power (EIRP) is the hypothetical power that would have to be radiated by an isotropic antenna to give the same ("equivalent") signal strength as the actual source antenna in the direction of the antenna's strongest beam.

⁴Annex B of ITU-T Recommendation K.52 discusses these three factors in detail. Licensees are encouraged to refer to the said Recommendation and Annexes when installing new apparatus. This will ensure coherent categorisation amongst the radio spectrum licensees.

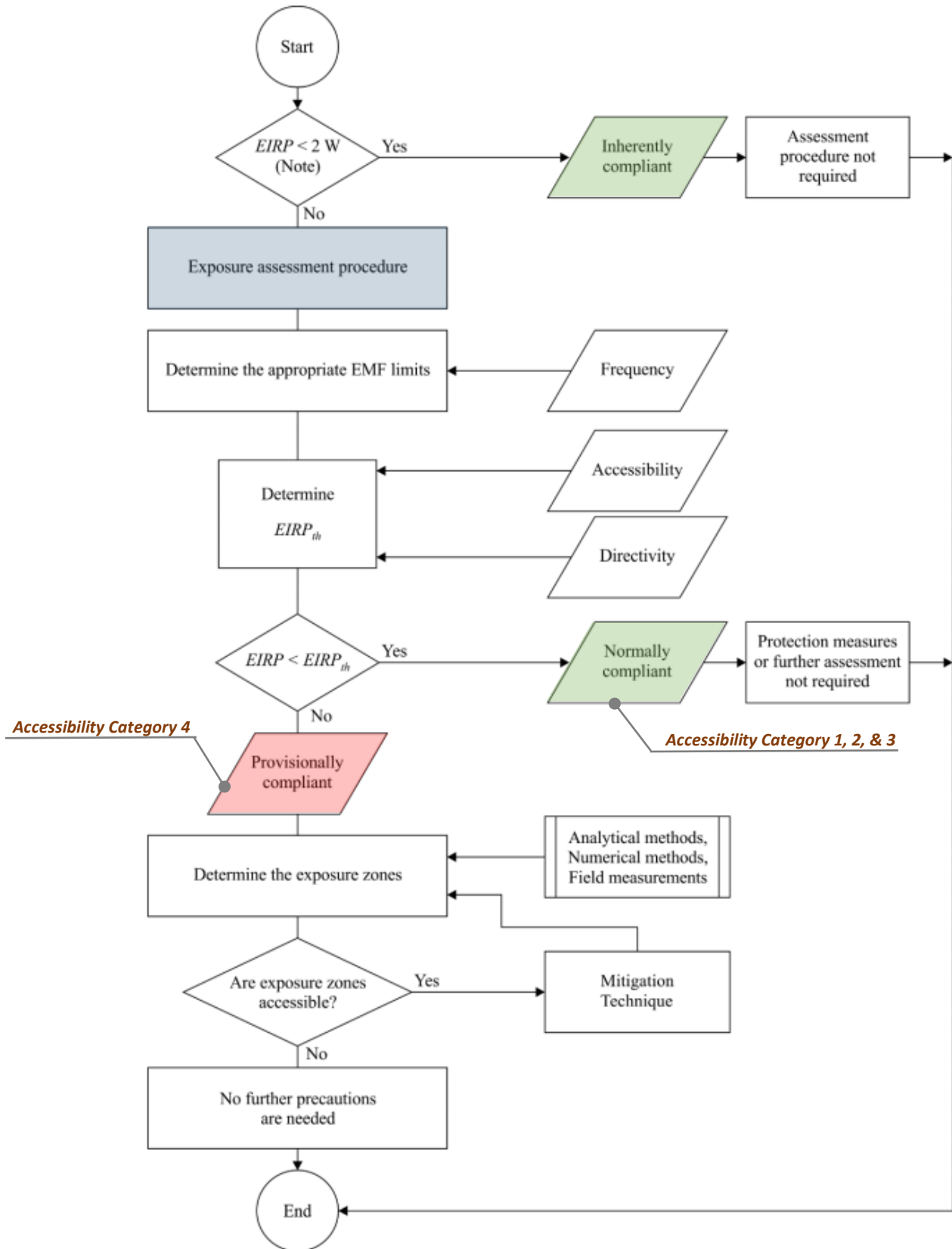


Figure 3. Process to determine the Installation Classification Scheme

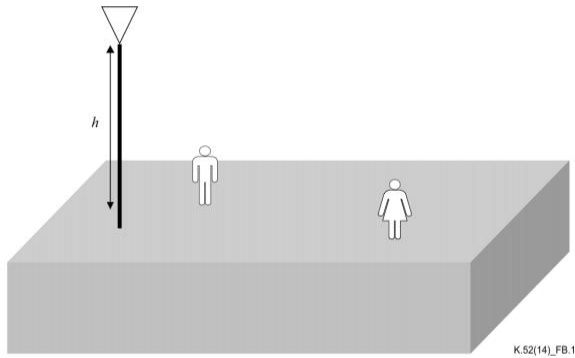


Illustration of the accessibility category 1

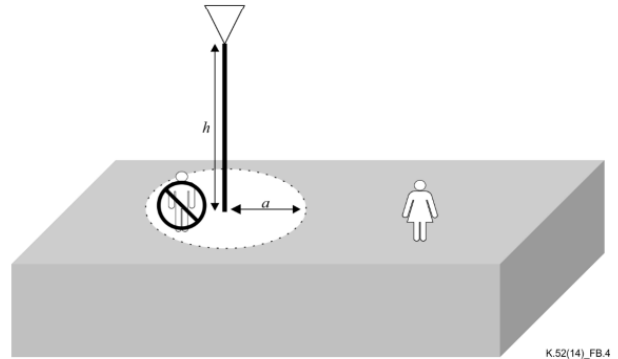


Illustration of the accessibility category 4

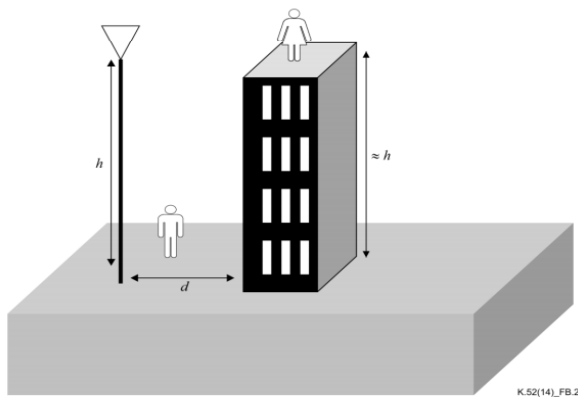


Illustration of the accessibility category 2

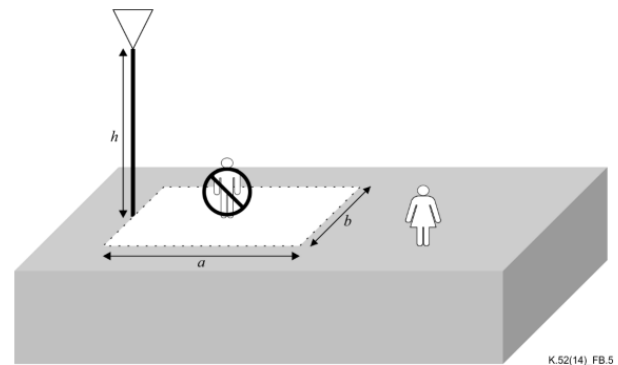


Illustration of the accessibility category 4

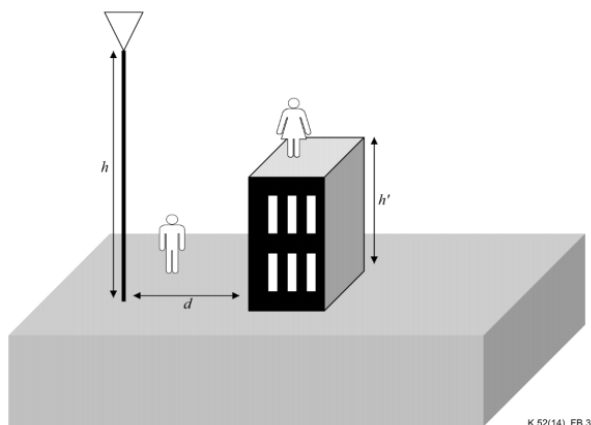
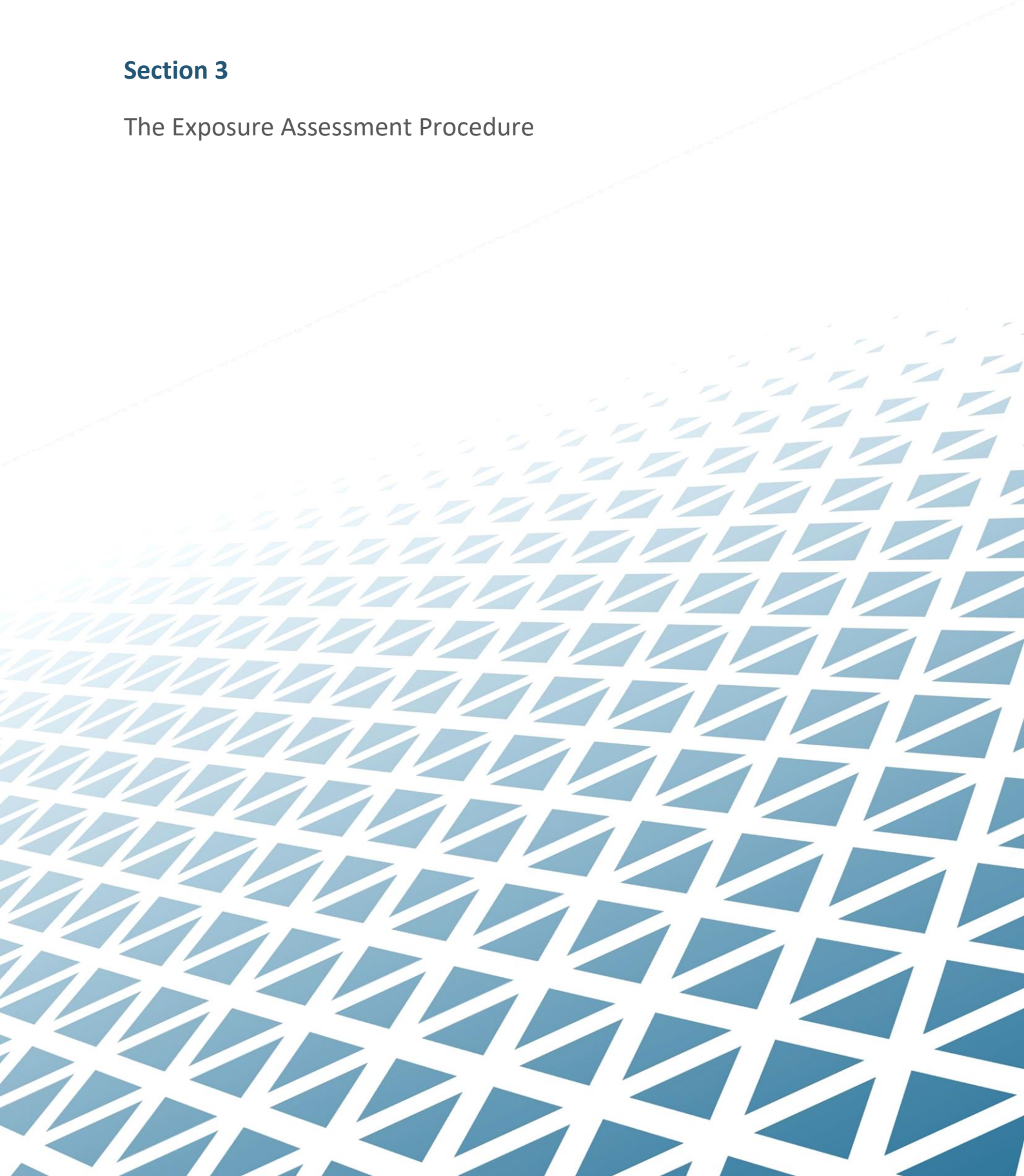


Illustration of the accessibility category 3

Figure 4. Illustration of Accessibility Category

Section 3

The Exposure Assessment Procedure



The Exposure Assessment Procedure

3.1 Assessing compliance with the EMF safety limits

Licensees⁵, shall, when installing, modifying or using the relevant radio apparatus, ensure that their use of radio apparatus complies with the general public exposure limits. This implies that the EMF levels in the vicinity of their radio transmitters shall not be greater than the basic restrictions in any area accessible to the general public.

When carrying out their assessments, licensees shall apply the evaluation process as described in EN 62232 Section 6.2⁶.

Any references made to the RF EMF Exposure compliance boundaries (exclusion zones) for the radio transmitting apparatus as specified by the apparatus manufacturer shall be in line with the applicable EN 50385 standard.

Lastly, the RF exposure levels from the radio transmitting apparatus and any other relevant sources shall be determined at the maximum transmit power of the apparatus (theoretical or actual)⁷ using measurements⁸ or computations⁹.

Figure 5, EN 62232:2017, Figure 8 – Flowchart describing the product installation evaluation process¹⁰, describes the procedure to be adopted in order to evaluate the RF exposure of the installed or modified radio apparatus in use.

⁵ A license holder is the legal entity on which the obligations to assess compliance rests. The licensee shall be responsible that the actions carried out by network operators, installers and other 3rd party users comply with the obligations of these guidelines and provisions at law.

⁶ EN 62232 Standards complements ITU – T K.100 Recommendation

⁷ Section B.5 EN 62232:2017

⁸ B.3.1.2 EN 62232 :2017

⁹ B.4 EN 62232 :2017

¹⁰ Compliments Figure 5.1 of ITU-T K.100 Recommendation

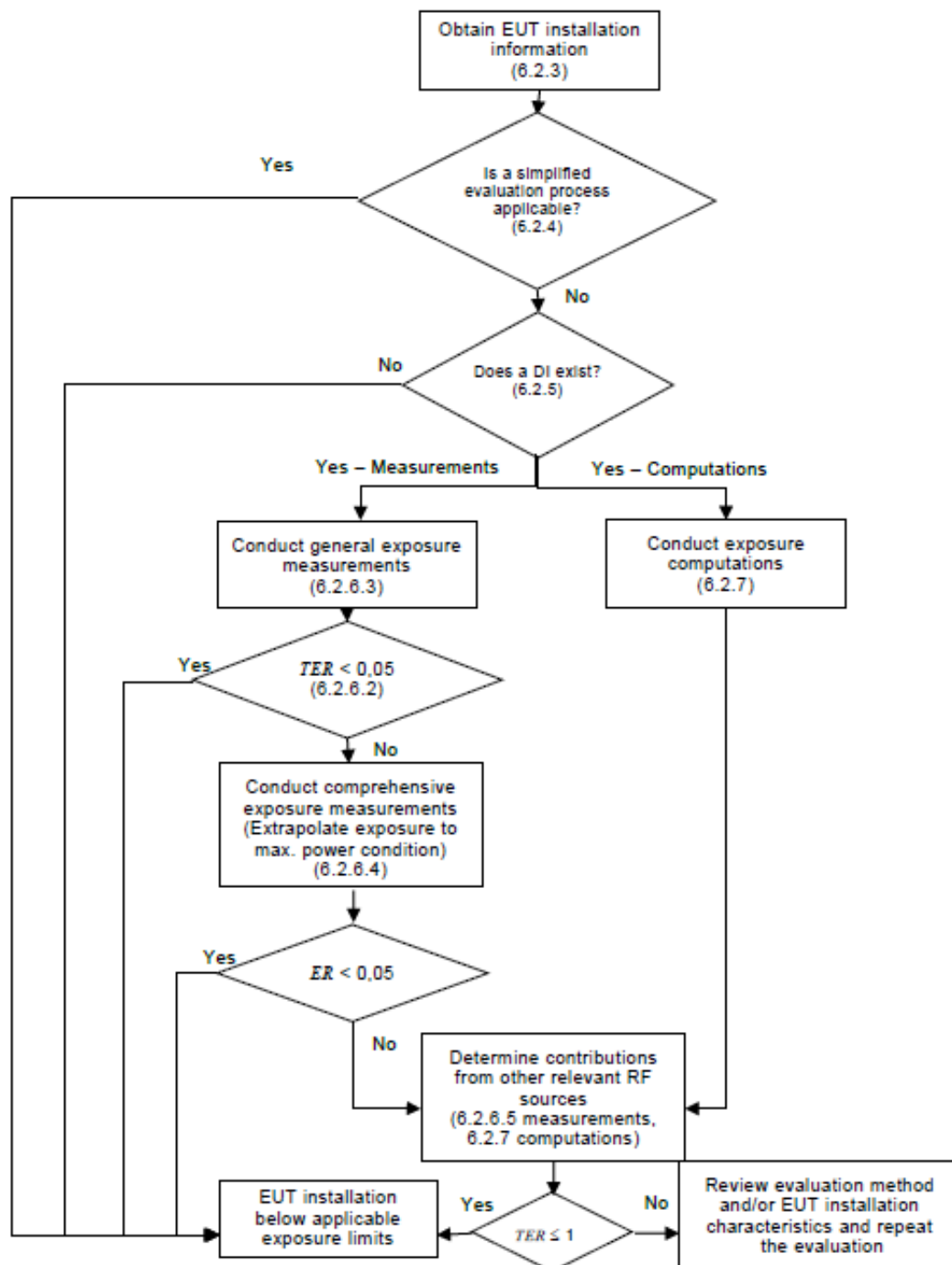


Figure 5 - EN 62232:2017, Figure 8 – Flowchart describing the product installation evaluation process

3.2 Radio transmitting apparatus and installation data collection

The information related to its radio transmitting apparatus and installation, as listed below, is required in order for the licensee to assess and meet its compliance and reporting obligations. This list also incorporates the installation parameters in section 6.2.3 of EN 62232.

- Technology,
- maximum transmitted power for each transmit frequency band of the base station as installed;
- frequency band, total EIRP, and a detailed description of the configuration of the base station in its operational environment, including antenna system (feeders, connectors, combiners, etc);
- all parameters used to define the installation class as defined in EN 62232 Table 2 – product Installation classes;
- the reference name and frequency/bandwidth of any component of the whole signal (to be used as a reference for extrapolation);
- the ratio between the component power level and the maximum power of the configuration (to be used in case of extrapolation);and
- the accessible area.

In the case where extrapolation of the measured signal is utilised to calculate the maximum EMF exposure, the descriptions subsequently underlined for the various technologies will apply.

- **GSM: Central frequency of the broadcast channel (BCCH) and maximum number of carriers (channels) presently installed by the radio transmitting apparatus or P_{max}/P_{BCCH} whichever is the largest¹¹.**
- **WCDMA: Common pilot channel (CPICH) frequency and power level relative to total power.**
- **LTE: Centre frequency of the product channels and bandwidth.**
- **5G NR: The parameters will be in line with the applicable EN measurement standards.**

3.3 Simplified assessment procedure

A first step in ascertaining product installation compliance (*Inherently, Normally or Provisional Compliant*) involves the establishment of the radiation levels emanating from a source. This information determines the classification scheme.

EN 62232 presents a simplified product installation evaluation process whereby the specifications provided by the manufacturer are utilised to resolve the amount of radiation released. A simplified product installation process applies when no detailed measurements or computations are required to establish that the installation of the radio transmitting apparatus is **classified**¹² as *Inherently or Normally Compliant*.

The simplified evaluation process is based on easily accessible characteristics of the installation configuration, such as EIRP, direction of the main lobe, compliance boundary and installation positions

¹¹ **The MCA shall revise its extrapolation calculation methods from N = maximum number of channels supported by the technology to N = to the actual number of channels installed on the radio transmitting apparatus to be in line with EN 62232 Section B.5**

¹² Irrespective of the fact that the installation of the radio transmitting apparatus is classified as normally compliant, the MCA requires that the licensee certifies specific installation as described in section 4.2 of the guidelines.

of the transmitters/antennas with respect to accessible areas for the product and other relevant sources when applicable.

More specifically, EN 62232 tabulates a number of product installation classes, namely E0, E2, E10, E100 and E+; these being developed based on the applicable exposure limits.

Class	EIRP ^a (W)	EIRP (dBm)	Product installation criteria
E0	n/a	n/a	The product complies with IEC 62479 or the product compliance boundary dimensions are zero. No specific requirement for product installation.
E2	≤ 2	≤ 33	The product is installed according to instructions from the manufacturer and/or entity putting into service. Compliance with the exposure limits is generally obtained at zero distance or within a few centimetres.
E10	≤ 10	≤ 40	The product is installed according to instructions from the manufacturer and/or entity putting into service and the lowest radiating part of the antenna(s) is at a minimum height of 2,2 m above the general public walkway.
E100	≤ 100	≤ 50	The product is installed according to instructions from the manufacturer and/or entity putting into service and: <ul style="list-style-type: none"> (a) the lowest radiating part of the antenna(s) is at a minimum height of 2,5 m above the general public walkway, (b) the minimum distance to areas accessible to the general public in the main lobe direction is D_m^b, and (c) there is no pre-existing RF source with EIRP above 10 W installed within a distance of 5 D_m metres in the main lobe direction (as determined by considering the half power beam width) and within D_m metres in other directions. D_m is the compliance distance in the main lobe assessed according to 6.1. If D_m is not available, a value of 2 m can be used or 1 m if all product transmit frequencies are equal to or above 1 500 MHz. ^c
E+	> 100	> 50	The product is installed according to instructions from the manufacturer and/or entity putting into service and: <ul style="list-style-type: none"> (a) the lowest radiating part of the antenna(s) is at a minimum height of H_m metres above the general public walkway, (b) the minimum distance to areas accessible to the general public in the main lobe direction is D_m^b metres, and (c) there is no pre-existing RF source with EIRP above 100 W installed within a distance of 5 D_m metres in the main lobe direction and within D_m metres in other directions. D_m is the compliance distance in the main lobe assessed according to 6.1 and H_m is given by Equations (6.1), (6.2) or (6.3). ^d

^a EIRP transmitted by the installed antenna(s) including all active bands.

^b D_m is also defined as D_r or D_f in 6.1.4. For E10, the installation height is derived from the SAR estimation formula provided in B.4.2.2 and realistic antenna configurations. For E100, the installation height is derived from the SAR estimation formula provided in B.4.2.2 and realistic antenna configurations and D_m values of 1 m and 2 m are derived from the far-field spherical formula (Equation (B.21) in B.4.2.1.1.2) using a ground reflection factor of 0. For E+, H_m and D_m defined in Equations (6.1), (6.2) or (6.3) are derived from the far-field spherical formula (Equation (B.21) in B.4.2.1.1.2) using a ground reflection factor of 1.

^c When such condition is not fulfilled, the installation is still compliant if the sum of the EIRPs of the EUT and nearby sources is less than 100 W. If the total EIRP is above 100 W then the EUT is still compliant if it is installed at a minimum height of H_m metres above the general public walkway and at a minimum distance from areas accessible to the general public in the main lobe direction of D_m metres, where H_m and D_m are obtained using Equations (6.1), (6.2) or (6.3) for the sum of the EIRPs including those of nearby sources.

^d When such condition is not fulfilled, the installation is still exempted from evaluations if the EUT is installed at a minimum height of H_m metres above the general public walkway and at a minimum distance from areas accessible to the general public in the main lobe direction of D_m metres, where H_m and D_m are obtained using Equations (6.1), (6.2) or (6.3) for the sum of the EIRPs including those of nearby sources.

Licencees are to categorise their individual installations based on the EN 62232 Table 2¹³ installation classes. When implementing the simplified evaluation process, the product specifications furnished by the radio transmitting apparatus manufacturer(s) shall be assumed. This is particularly so for the transmitted power, antenna gain and the compliance boundary dimensions (D_m , H_m) evaluated in accordance with the requirements as defined EN 62232 Section 6.1.

The Criteria in EN 62232 Table 2 were developed to be applicable for a wide range of radio transmitting installations. They facilitate a basic means of identifying whether installations are Inherently or Normally Compliant. The rationales used to establish the product installation classes are presented in EN 62232 Annex C.

In general, when the impact of the environment and of other ambient sources on the exposure of the radio transmitting apparatus are known to be negligible or not relevant¹⁴, the radio transmitting apparatus installation is **classified** to be *Inherently* or *Normally Compliant* if the general public does not have access to its compliance boundary.

Exposure Contribution of Ambient Sources

Ambient sources are considered as relevant sources when carrying out the compliance assessments if:-

- **The RF source is considered as a collocated and not remote¹⁵**
- **The distance from the ambient radio source is less than 40 times the distance of the evaluation point to the radio source under investigation¹⁶**
- **The ambient source is not highly directional**
- **The ambient source measured (non-extrapolated) contribution to the ER at the evaluation point is greater or equal to 0.05¹⁷**

¹³ Compliment of Table 7.1 of the ITU-T K,100 Recommendation

¹⁴ EN 62232 Section 6.2.6.5 Exposure Contributions of ambient sources and Section B.3.1.2.6 Guidance on determining ambient field levels

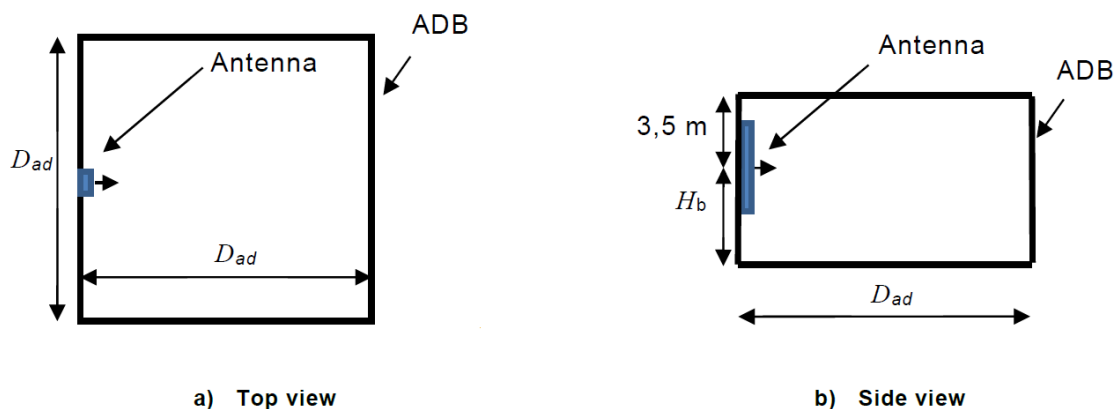
¹⁵ EN 62232 Section B.3.1.2.6.2

¹⁶ EN 62232 Section B.3.1.2.6.3.2

¹⁷ EN 62232 Section 6.2.6.5

3.4 Comprehensive assessment procedure

In the case where the criteria specified in EN 62232 Table 2 are not met, or where members of the general public have access to areas in the vicinity of the radio transmitting apparatus compliance boundary (possibility of Accessibility Criteria 4), then, a Comprehensive Assessment Procedure needs to be applied. The licensee will need to carry out an exposure evaluation and assessment within the Domain of Investigation (DI). The DI is the area of the Assessment Domain Boundary (ADB) where the radio transmitting apparatus is installed and to which the general public may have access.



The ADB is oriented according to the antenna direction.

Figure 6 – Assessment Domain Boundary

The Assessment Area selection adopted in these guidelines is defined in EN 62232 Section 6.2.5

- **Outside the ADB, the exposure ratio (ER) from the installation should be less than 0.05¹⁸ for the radio transmitting device to be considered not a relevant source and the assessment not required beyond the ADB.**
- **If the compliance boundaries are made available by the manufacturer, the length D_{ad} (in meters) of the ADB in the main beam direction shall be 5 times the compliance distance.**
- **Access regions placed 3.5 meters below or above the antenna mounting height (measured from the centre point of the antenna) shall not be considered as part of the ADB. H_b may be evaluated further using equation 6.6 in EN 62232.**
- **In the case of rooftop or wall installations, regions within the building on which the antenna is mounted shall be excluded from the ADB if the antenna main beam is pointing away from the building.**
- **Based on observations of the installation and environment, the physical and geographical constraints, as well as experience gained by RF exposure evaluations of similar sites, the DI can be restricted to the points of maximum exposure.**
- **The DI may need to extend over 3rd party property in case where (i) the electrical and mechanical configuration of the overlying sector in question is different than the other installation sectors. Such a setup may therefore result in a different EMF exposure pattern including the case where the ADB in the main beam direction falls within 3rd party areas which are accessible to the general public.**

¹⁸ Equivalent threshold can be expressed in terms of electric or magnetic field strength as (E, H) / $\sqrt{20}$

In the case where DI extends to third party sites, licensees may consider reverting to computer simulations¹⁹ rather than carrying out site tests. The simulation results will complement the measurements taken on the site where the apparatus is installed. The latter are not to be substituted by simulations. Moreover, should the maximum reading be achieved onsite (on the same roof where the apparatus is installed), no third party site investigation is needed. Such a situation would imply that the readings attained on the third party sites are less than the maximum.

¹⁹ The simulation propagation models and parameters, as employed during the network design and optimisation phases, which approximate the level of mobile signal coverage may be used for the scope to determine the approximate level of EMF emanating from the radio transmitter apparatus in question.

3.5 Measuring the exposure to EMF

A number of techniques exist to measure EMF for radio apparatus transmitting installations. Not all methodologies result in the same detail. Some aggregate the frequencies at a particular point. Others measure the individual frequencies. Depending on the mechanism adopted, readings may either be calculated or measured in the field.

The Measurement process of the EMF exposure adopted in these guidelines is defined in EN 62232 Section 6.2.6. Measurement equipment shall be in line with the requirements as specified in EN 62232 Section B.3.1.2²⁰

Field measurements may be in one of two forms, namely, Broadband or Frequency Selective²¹.

- Broadband measurements help to deduce the overall EMF exposure emanating from the various radiating sources in a given area. It does not, however, designate the individual contributions made by the distinct sources. The result is an aggregate of all the sources at that point in time within a particular space.

Broadband measurements may need to be extrapolated²², as defined in EN 62232 Section B.5.2, in order to estimate the maximum possible RF field strength. The latter is presented in section 3.1, ‘Assessing compliance with EMF safety limits’ of these Guidelines. Extrapolation, however, does not always depict a true picture; it might lead to overly conservative results. In view of this, EN 62232 Section B.5.2 outlines the condition of events where the extrapolation of Broadband measurements is not recommended.

- Frequency Selective measurements deduce the singular contributions²³ of EMF from the signals present within the DI which are being radiated over multiple frequency bands. When carrying out Frequency selective measurements, the field strength has to be integrated over the entire bandwidth or, at least, in the range of frequencies used by the technologies present on site including the respective installation and other applicable ambient sources.

For broadband and frequency selective equipment, the RF Field strength measurement shall consider contributions from all directions and polarizations.

²⁰ Complement to Appendix 1 of ITU-T K.100 Recommendation.

²¹ Note that the Safety Evaluation mode should not be the default RF measurement option when carrying out Frequency Selective Measurements. This option captures a ‘snap shot’ of the instantaneous EMF levels present at a point in time of the measurement. Thus, this measurement mode is more of an extended broadband measurement on the selected frequencies.

²² EN 62232 Section B.3.1.2.3 states that extrapolation of broadband measurements is not recommended.

²³ EN 62232 Section 6.2.6.5 Exposure Contributions of ambient sources and Section B.3.1.2.6 Guidance on determining ambient field levels

3.6 General exposure vs comprehensive assessment approach within the DI

During the **General Exposure Evaluation**, measurements shall be taken according to EN 62232 Section B 3.1.2.5 over the whole DI. The general exposure assessment consists of the measurement of the total field strength over the entire range of frequencies used by the technologies present on site. This includes EUT and ambient sources. Broadband equipment is therefore suitable for this type of measurement. Frequency-selective instruments can also be used by integrating the field strength over the entire bandwidth. No further assessments are required, and the site is **classified** as *Normally Compliant*, if the Maximum Exposure Ratio (ER) in the DI is lower than 0.05²⁴. Otherwise, the location(s) where the maximum level of exposure was found shall be selected for comprehensive measurements.

For the general exposure evaluation, Spatial and Time Averaging of the EMF exposure level shall follow EN 62232 Section 6.4. In the case of ICNIRP, the reference limits need to be averaged over any 6-minute period for frequencies below 10 GHz. Conversely, the averaging needs to be carried out over a period of $68/f^{1.05}$ -minute for frequencies exceeding 10 GHz (where f is the frequency in GHz).

Comprehensive Exposure Evaluation measurements need to be conducted at the location(s) where the maximum Exposure Ratio was determined during the general evaluation. The comprehensive evaluation shall be performed using either broadband*¹ and/or frequency selective*¹ measurements methodology²⁵. For the comprehensive exposure evaluation, the extrapolation procedure, as described in EN 62232 Section B.5 and Annex F respectively, shall be applied and Spatial and Time Averaging shall follow EN 62232 Section 6.4. In the case of ICNIRP, the reference limits are to be averaged over any 6-minute period for frequencies below 10 GHz. Also, similar to the general exposure evaluation, the reference limits will be averaged over a period of $68/f^{1.05}$ -minute for frequencies exceeding 10 GHz (where f is the frequency in GHz).

If the ER is less than one (<1), then the installation is **classified** as *Normally Compliant*. Conversely, if ER is equal or greater than one (≥ 1), then it is necessary to control the EMF exposure in the locations accessible to the general public. Such an installation is **classified** as *Provisionally Compliant*.

Should the EMF exceed the limits for general public exposure but is within the limits for occupational exposure, then access to the general public has to be restricted. Workers may, however, be permitted to enter the area. Physical barriers, lockout procedures or adequate signage²⁶ are required to accomplish this access restriction. Workers entering the occupational zone need to be informed. It is not commendable to locate workers, permanently, within these occupational zone.

In areas where the EMF exceeds the limits for occupational exposure, access to workers and the general public has to be restricted. If workers need to enter the area, then measures to control their exposure are to be taken.

²⁴ Equivalent threshold can be expressed as $\sqrt{20}$ when measurements are carried out in the E or H field domains.

²⁵ EN 62232 Section 6.3.2

²⁶ Section 4.1 of the guidelines specify the signage that needs to be affixed for each of the radio transmitting apparatus installations.

These include:

- temporarily reducing the power of the emitter or complete switch off the transmitting apparatus;
- controlling the duration of the exposure so that time-averaged exposure is within safety limits;
- shielding or use of protective clothing.

*¹ Note that the overall broadband or frequency selective measurements reported shall take into consideration the installation and all relevant ambient source scaled to the maximum power (or to the 95th percentile when available) using either real time artificially loaded traffic for all applicable sources or extrapolated²⁷ using equivalent extrapolation factors²⁸ of the time invariant components present within the measurements.

The Evaluation process for the in-situ RF exposure assessment and the applicable measurement procedure adopted in these guidelines is defined in EN 62232 Section 6.3

All reported measures shall include an estimated level of uncertainty as defined in EN 62232 Section 9. The target expanded uncertainty shall be 4dB or lower. This is considered industry best practice. The expanded uncertainty for the RF exposure evaluation used for radio transmitting apparatus installation compliance assessment should not exceed 6dB.

When the radio transmission apparatus installation lies within a shared site, the comprehensive evaluation process shall be carried out using the Measure Type Case B (frequency selective measurements) as defined in EN 62232 Section 6.3.2.

3.7 Treatment of non-conformities – Exceeding the exposure limits

The level of cumulative exposure, in certain access zones, may exceed the maximum limit (100%), due to two reasons:

- Case 1: Existence of one or several radiating sources whose levels of received energy exceeds the exposure limits corresponding to the operational frequency.
- Case 2: The level of received energy of each of the involved radiating sources is lower than the exposure limit corresponding to its operation frequency. Nevertheless, the combined effect of multiple sources contributes to the level of cumulative exposure being greater than 100%.

²⁷ All field strengths contributions in the frequency range of the measurement probe will be scaled, which can lead to a large overestimation of the maximum field strength.

²⁸ For multi-technology or multiband EUT, the extrapolation factor is chosen as the largest among the active technologies (or bands)

Depending on the outcome of the measurements, different procedures need to be followed to remedy the situation.

For Case 1, a narrow-band meter may detect the radiant sources that exceed the exposure limit corresponding to the operational frequency. Once these sources are identified, then they need to be adjusted using appropriate mitigation techniques.

For Case 2, the level of cumulative exposure is greater than the limit (100%), even though the individual radiation sources emit an electromagnetic field lower than its respective exposure limit. In view of this, it is necessary to select the sources that contribute the greatest energy, depending on the selection approach. Once identified, they need to be adjusted using appropriate mitigation techniques.

Following the employment of the mitigation techniques, the licensee needs to verify that the level of cumulative exposure is below the 100% limit again.

In assessing whether the mitigation measures adopted are appropriate, the licensee must have regard to:

- the kinds of people who may have access to the area;
- the need for physical barriers;
- relevant occupational health and safety requirements;
- the views of the property owner;
- any site changes that have been made; and
- any other matter which may be relevant to ensure site safety with regards to EMF.

The Licensee must also ensure that technical staff (RF workers) who may be involved in activities on or adjacent to the radio transmitting infrastructure are trained in radio frequency exposure safety.

3.8 Shared Sites

A radio transmitting apparatus installation is considered to be sharing the installation site with other radio transmitting apparatus when:-

- **the radio transmitting apparatus are located on the same antenna support, roof-top, or within the same transmitter compound, and**
- **there is a pre-existing RF source installed within a distance of $5 D_m$ metres in the main lobe direction and within D_m metres in other directions. By default, unless specified by the apparatus manufacturer, D_m shall be set to (i) 2 meters for pre-existing RF sources with EIRP above 10 W (E100) and (ii) 20 meters for pre-existing RF sources with EIRP above 100W (E+).**

Licensees need to take into consideration the presence of the neighbouring radiating sources when planning for a new installation or a modification of an existing one. The aggregated radiation needs to, at all times, fall within the ICNRP threshold values for the installation to be compliant. If the

resultant radiation levels exceed the recommended ones, then these should be adjusted using appropriate mitigation techniques. Licensees need to periodically monitor their installations so as to ensure that the radiation levels remain within the norm.

In the case of shared sites, licensees need to inform the Authority of the existence of multiple radiating sources in close proximity to each other. The respective reports need to include a diagram, or a photo image, denoting the presence of the multiple sources.

In the case of shared sites, knowledge of the technical setup of the respective neighbouring radiating sources may be required so as to determine the EMF levels for extrapolation purposes. Often, technical setup details are confidential and cannot be shared. Therefore, to remedy such an issue, the default extrapolation factors²⁹ for the respective technologies will be utilised for the scope of such an exercise.

In sum, when the maximum EMF exposure is required and there is the need to extrapolate measured signals emanating from neighbouring radiating sources, then the extrapolation factors underlined below for the different technologies shall apply.

- **GSM: extrapolation factor of 2 (or 3dBuV/m equivalent)**
- **WCDMA: extrapolation factor of 10 (or 10dBuV/m equivalent)**
- **LTE: the extrapolation factor is determined as per table F.9 of the IEC 62232 based on the measured channel bandwidth**
- **5G NR: The parameters will be in line with the applicable EN measurement standards.**

Table F.9 – Theoretical extrapolation factor, N_{RS} , based on frame structure given in 3GPP TS 36.104 [10]

Channel bandwidth (MHz)	Number of resource blocks	Transmission bandwidth (MHz)	N_{RS} = extrapolation factor for RS (linear/dB)
1,4	6	1,08	72 / 18,57
3	15	2,7	180 / 22,55
5	25	4,5	300 / 24,77
10	50	9,0	600 / 27,78
15	75	13,5	900 / 29,54
20	100	18,0	1 200 / 30,79

Should the extrapolated figures exceed the applicable EMF safe limits, the licensee shall inform the MCA accordingly. In such a circumstance, and in order to avoid the sharing of confidential data among licensees, the MCA will then determine the total extrapolated EMF signal emanating from the neighbouring radiating sources itself and convey the results to all concerned. The MCA will utilise the raw measurements disclosed to it by the individual licensees so as to attain the required results.

²⁹ The default extrapolation factors shall reflect the general setup of the majority of the respective mobile radio base stations installed.

Section 4

The Responsibilities and Obligations



The Responsibilities and Obligations

4.1 Informative, Protective and Preventive measures against exposure to EMF

When installing radio-communications apparatus, the licensee shall introduce the adequate mitigation measures and signage to identify themselves, as well as to inform and warn of RF radiation present at the respective location. Such an obligation emanates from Article 12 of S.L. 399.40.

The IEEE Recommended Practice for Radio Frequency Safety Programs, 3 kHz to 300 GHz, provides guidance on the installation of signs (C95.7-2014).

The signage shall identify the licensee responsible for the radio transmission site, including relevant contact information as well as provide information regarding the identification of the site. Furthermore, undertakings need to place warning signs in clearly visible locations thus informing the general public (and/or RF workers) about the nature and degree of radiation hazards as well as the appropriate safety actions to be followed. RF-EMF safety signs shall, as a minimum, be written in the English language to ensure understanding. A minimum distance to accessible areas needs to also be identified. If possible, and especially for higher radiation sites, the area is enclosed or guarded so as to avoid unnecessary approaches next to the apparatus.

A number of options are available when considering the use of physical barriers to restrict access, namely:

- Rooftop access controls: This may include a locked ladder or rooftop door with permission required and information available for persons requiring access to the rooftop.
- Physical barriers: Non-metallic screens, fences or chains can be used to indicate areas that should not be entered by members of the public.

The building owner shall be provided with information on how to arrange access for persons, such as maintenance personnel, who may need to work in areas close to or in front of the antennas.

In some situations, it may not be practicable to restrict access to areas of strong fields by technical measures, such as guarding. In these circumstances, a range of organisational measures may be used to delimit the areas and place restrictions on access or activities. In general, this is likely to involve additional warning signs and notices to alert workers to the risk, often in combination with floor markings, to identify areas of strong fields.

Should, at any point in time, the field strength levels be affected by the operation of a radiocommunications apparatus, and loom, or exceed, the general public exposure limits referred to in Regulation 5 of Part II (S.L.399.40), the licensee needs to identify and clearly demarcate the said area. The Authority would also need to be informed accordingly.

Low power installations where the compliance zone is within the apparatus will generally not require signage.

Images of the relevant signage need to accompany the report in Annex B.

4.2 Installation Certification

The installation or modification of radio transmitting apparatus needs to be certified once set-up. This guarantees that the apparatus is appropriately installed and operating within the acceptable limits.

Should an installation respect all the prerequisites listed above and, if all the measurements are in line with the predefined EMF exposure limits, then licensees may self-certify their installations. A compliance report, as listed in annex B, needs to be submitted to the MCA together with a copy of the self-certification declaration.

- Licensees shall self-certify the radio transmitting apparatus installations for compliance with the exposure limits as specified in the ICNIRP guidelines (or as may be prescribed from time to time) after the assessment of estimated levels of exposure the EMF.
- The certification of the radio transmitter apparatus installation shall consist of EMF exposure measurements as defined in the Comprehensive Exposure Evaluation Procedure as described in Section 4.8 in the Guidelines.
- Depending on the outcome of such measurements, the installations may be graded based on their compliancy (Normally or Provisional Compliant).
- Licensees are not required to self-certify Inherently or Normally Compliant installation for product installation classes E0, E2 and E10. The licensee is however required to submit a declaration of conformity, as specified in Annex C of the Guidelines, confirming that all such product installations are in full compliance with the requirements of the applicable radio frequency public exposure guidelines. (The licensee shall however still submit to the MCA all relevant details for such installations in the respective reporting mechanism)
- In the case where the site installation or modification is carried out on a number of individual sectors present on the site, the licensee may opt to carry out the comprehensive exposure evaluation and eventual site certification on only one of the sectors. This is valid provided that (i) the electrical configuration of the sectors are identical (ii) the physical setup of the sectors are considered to be identical, (iii) the exclusion zones (compliance boundaries) specified by the manufacturer fall outside the areas of access to the general public.
- In the case of shared sites, only the new tenants to the site need to submit the requisite documentation to the Authority. The same applies to upgrades to existing base-stations on a particular site. In this case, only the licensees carrying out the upgrades need to present their revised reports and self-certification. All submissions need to respect the fourteen-day threshold mentioned further down in this document.
- The certification of such installations is only issued once there is full assurance that the EMF exposure is not perilous to the public.

4.3 The Responsibilities and Obligations

S.L. 399.40 establishes that a licensee, prior to introduction or modification of any radiocommunications apparatus need to estimate, or measure, the background levels of the electromagnetic fields in the area where the apparatus will reside. They also need to predict the

increase in the level of electromagnetic fields, in any areas accessible to the general public and the RF workers respectively.

In addition, following the installation, licensees shall, by not later than fourteen days following the installation of the radio-communications apparatus, notify the Authority of such an installation. Subsequent to this, any modifications made to the characteristics of the apparatus in the course of its operation, need to be notified in writing to the Authority.

The licensees shall therefore submit to the MCA the following information reports: -

- *Report 1a – Radio transmitting apparatus installation characteristics*
- *Report 1b – Site plan of Radio transmitting apparatus installation*
- *Report 2 _ EMF exposure compliance report - (as per obligation of Article (11) Provision 3(f))*

4.4 Frequency of Submissions

The licensee shall submit the complete Report 1a and the respective Report 1b and Report 2 for each site installation and /or modification accordingly. Such reports will be submitted within 14 days following the installation. In order to ensure that the radio apparatus installation information is kept updated, the licensee shall however submit the Report 1a to the MCA on a yearly basis keeping to the date that it was initially submitted. Report 1b and Report 2 shall only be resubmitted should the licensee make any changes to the installation.

Licensees will have up to 24 months, following the publication of these guidelines, to present Report 1b and Report 2 to the Authority for all apparatus installed prior to the release of the said guidelines. Report 1a for this apparatus may, conversely, be submitted to the MCA immediately following the availability of the guidelines.

4.5 Installations which fall under such an obligation.

Report 1a shall include all radio transmitting apparatus classes installed i.e. E0, E2, E10, E100 and E+ installation class equipment. Indoor radio repeaters are to be excluded from such a report.

Report 1b and Report 2 shall only apply for radio transmitting apparatus classes E100 and E+.

4.6 Report 1a – Radio transmitting apparatus installation characteristics

The report shall consist and incorporate of the following information categories:-

- (1) The location of the installation including;
 - a. Site ID
 - b. Cell Id.
 - c. the site address – Address 1 – Seat name or number, Address 2 – Street name, Address 3 – Town, Address 4 – Island,
 - d. the geographical location – Latitude (CRS - WGS 84, Minimum Resolution – 5 Decimal points), Longitude (CRS - WGS 84, Minimum Resolution – 5 Decimal points)
 - e. the height of site above sea level in meters
 - f. the antenna height above ground level in meters

- (2) Information on the type of radiocommunications apparatus and antennas;
 - g. Technology (GSM, UMTS, LTE or LTE_3db , 5G);
 - h. Extrapolation Factor (were for [1] GSM is either equal to the number of GSM channels N installed or P_{max}/P_{BCCH} whichever is the largest; [2] UMTS is equal to $P_{max}/P_{P-CPICH}$; [3] LTE is equal to the number of subcarriers in the signal bandwidth (1.4 MHz – 72, 3MHz – 180, 5MHz – 300, 10 MHz – 600, 15 MHz – 900, 20 MHz – 1200) In case LTE RS is 3dB boosted the respective extrapolation factor is the be halved.)
 - i. Antenna model number (including a common set of manufacturer specifications depicting antenna pattern and antenna emf compliance boundary)³⁰
 - j. Radio Model number
 - k. Installation Class (E0, E2, E10, E100, E+)
 - l. Installation Classification Scheme (Inherent, Normally or Provisionally Compliant)

- (3) The technical properties of the transmission emanating from the said radiocommunications apparatus, namely,
 - m. the operating frequency band
 - n. the maximum conducted transmitting power
 - o. the antenna gain
 - p. the maximum effective radiating power
 - q. the modulation scheme

- (4) Information regarding the antenna setup
 - r. antenna tilt (total combined tilt, electrical tilt and mechanical tilt in degrees)
 - s. antenna orientation / azimuth (in degrees)

Other Notes

The file name of the report shall be recorded as Report1a_Operator Name _MMYYYY.

The report shall be stored in an open standard format (txt, csv or xml).

³⁰ Licensee to submit a digital copy of the antenna radiation pattern for each different antenna installed. The antenna pattern is to be submitted in .msi or .adf format.

The data submitted shall be in the schema as provided in the template report.

Appended with the guidelines is a template report in csv file format.

4.7 Report1b –Layout of Radio transmitting apparatus installations

The report shall consist of the following sections: -

Site Location Plan

The site location plan is a street map of the site and its immediate surroundings. The site location plan must ensure that the site can be located exactly within the respective area. If the plan is not oriented to the north (north = 0 °), a compass rose must be included on the map. The site needs to stand centrally positioned on the map and all nearby roads are visible on it, as well as their designation. Furthermore, the site needs to be oriented in relation to its surrounding, and, within a radius of 100 meters. The map may also be an aerial photograph of the current site together with its immediate surroundings.

The plan has to have a minimum scale of 1/2500. This scale must allow all information to be legible in a resolution of 1,024 × 768 pixels. The scale has to be presented linearly on the plan.

Prior to submitting the site location plan, the licensee needs to confirm whether the antenna is located above the maximum permissible building height of the location in question. Should this not be the case, then the licensee will carry out a visual inspection of the said site when carrying out its routine maintenance so as to ensure that the surrounding building layers have not changed. In the case of the latter, the licensee needs to submit a revised copy of Report 1b and 2.

Roof Plan View

An antenna layout plan view clearly shows where the antennas are located. An antenna layout plan should include:-

- a. Correct positioning of all existing and proposed apparatus including all antennas and radio apparatus housing. Antennas shall be marked with a coloured arrow in the direction of the azimuth antenna;
- b. orientation;
- c. the scale;
- d. information on the different frequencies or technologies on which the antenna transmits, if applicable,
- e. an outline indicating the antenna boxed shaped EMF compliance boundary for General Public and Occupational exposure as per EN 50385.
- f. the boundaries of the site and any means of enclosure
- g. the whole roof of the building if appropriate.

A clear differentiation between existing and proposed apparatus should be made. If this cannot be achieved on a single drawing than separate drawings need to be submitted

The plan has to have a minimum scale of 1/500. This scale must allow all information to be legible in a resolution of 1,024 × 768 pixels. The scale has to be presented linearly on the plan.

Site Installation Photos

The report shall contain all relevant photos of the site including signage, its surroundings and all places of residence that are located within the ADB being investigated. The place and direction from where the photos are taken are to be indicated on the plan view. Photos shall be adequately numbered. Such a numbering scheme needs to be clearly reflected in the plan view. The photos have to be in colour and have a minimum resolution of 1,024 × 768 pixels. Photos submitted to the MCA need to be in compliance with GDPR

Other Notes

The file name of the report shall be recorded as Report1b_Operator Name_SiteID_MMYYYY.
The report shall be stored in pdf format.

4.8 Report2 –EMF Compliance Report

The report shall consist of the following sections: -

Declaration of Compliance

The licensee shall declare and self-certify that the installation which resides in the address in question is in compliance with any non-ionising radiation emission standards as legally adopted and currently as published by International Commission on Non-Ionizing Radiation Protection.

Comprehensive Evaluation Survey Results

The licensee shall, in order to certify that the installation is in compliance with the exposure standards, carry out a comprehensive evaluation survey as indicated in Annex B of these guidelines. The survey results shall either include the broadband measurement only or both the broadband or frequency selective measurements in case were the licensee opts to carry out both Case A and Case B evaluation approaches.³¹ The Survey report shall clearly identify the results of the readings achieved in terms of ICNIRP levels.

Control Points

In view of the fact that the installation in question shall be compliant with the applicable EMF safety levels, the inclusion of EMF measurements for a set of control points is only being presented here as an additional recommendation by the MCA. The licensee may, in addition to certifying that the installation follows the exposure standards, carry out computations in order to evaluate the level of exposure both within the DI and other neighbouring areas of interest. The computations methods adopted shall be in line with any of the various computational methods as described in EN 62232 Section 6.2.7.

The selection of the simulated control points shall cover a copious amount of points, both in terms of locations and heights in the neighbouring spaces which are accessible to the general public. The location of the control points shall be selected in such a way to cover a minimum area of 200m radius from the radio transmitting apparatus installation. The maximum exposure levels are to be clearly displayed on the map. Any colour coding schemes which may be adopted in the display of the control points shall adopt the colour coding as specified in ITU-T K.113 Recommendation. The percentage of EMF exposure values in relation to the ICNIRP guidelines, may be either represented directly on the plot or as field markers with the respective values presented in an adjoining table.

Calibration Certificates

The licensee shall include a copy of a valid calibration certificate for the measurement equipment used when carrying out the Comprehensive Evaluation Procedure.

Other Notes

The file name of the report shall be recorded as
Compliance Report_Operator Name _SiteID _MMYYYY.
The report shall be stored in pdf format.

³¹ EN 62232 Section 6.3 Figure 10

The MCA reserves the right to publish a redacted version of the Compliance report on its website.

Section 5

Sample Reports



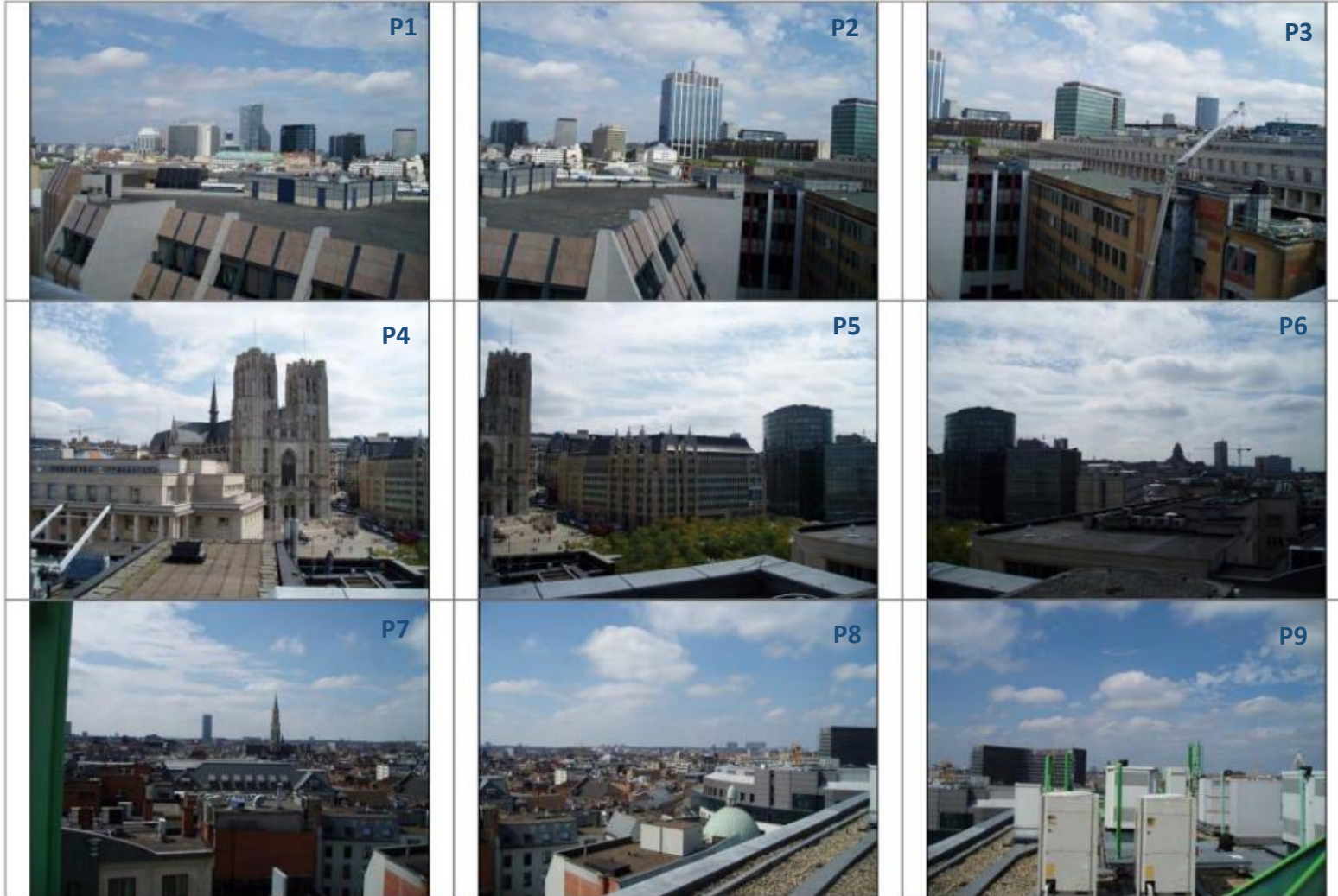
Annex A Sample Technical Report 1b

Operator
Logo

Technical Report 1b

Operator Name_SiteID_Date

Site Photos (for Macro Antenna)



Operator
Logo

Technical Report 1b

Operator Name_SiteID_Date

Site Photos (for Micro Antenna (E100))



Annex B Sample EMF Compliance Report and Site Certification

EMF Compliance Report and Site Certification
Operator Name_SiteID_MMYYYY

Operator Logo

Declaration of Compliance with the provisions of S.L.399.40 as regards to the compliance with any non-ionising radiation emission standards adopted at law and currently as published by International Commission on Non-Ionizing Radiation Protection.

(Operator name)
(Operator address)

Declares and self certifies that the complete apparatus, also comprising the installation, at:

(Address).....
.....
.....
.....
.....

is in full compliance with the requirements of the radio frequency public exposure guidelines of the International Commission on Non-Ionizing Radiation Protection as expressed in General Authorisations (Radiocommunications Apparatus) on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)"

Date:
Signed:
Name:
Position:

EMF Compliance Report and Site Certification

Operator Name_SiteID_MMYYYY

Operator Logo

1. Survey Summary

Address of the Transmitter Site Surveyed:	Click to enter address of Tx station/s
Site Type:	Enter type of technology present at site eg. UMTS, GSM
Survey Date and Time:	Enter date and time of measurements

Measurement Location: (at point of maximum non-ionising radiation near site)	Enter details (eg. on the main road directly across the site)				
Measurement Location Coordinates:			deg.	min.	sec.
	Latitude:	N	deg	min	sec
	Longitude:	E	deg	min	sec

Purpose and Conduct of Survey:

Non-ionising electromagnetic radiation levels were measured at the point of highest emissions which was determined near the site, in order to assess compliance with the international ICNIRP limits for general public exposure to non-ionising radiation.

Compliance with the ICNIRP Limits is a condition of various wireless transmission licences issued by the Malta Communications Authority, as well as a provision in the law.

Overall Conclusions of the Survey:

Broadband Measurements (cumulative emissions measured at specific points)	Enter summary (eg. Below ICNIRP Public limits)
Frequency Selective Measurements: (individual emissions measured at specific points)	Enter summary (eg. Below ICNIRP Public limits)
Total Exposure Quotient: (assessment of cumulative emissions from multiple transmitters)	Enter summary (eg. Below ICNIRP Public limits)

EMF Compliance Report and Site Certification

Operator Name_SiteID_MMYYYY

Operator Logo

2. Survey Methodology

Measurements for the EMF emissions from the designated site were conducted in accordance with the methodology outlined in MCA Guidelines MCA/O/####. The methodology incorporates measurements and procedures as outlined in:

- European Committee for Electrotechnical Standardisation (CENELEC) measurement standard EN 62232: 2017 -Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure,
- International Telecommunications Union ITU-T Recommendation K.52 (01/2018 - Guidance on complying with limits for human exposure to electromagnetic fields, and,
- International Telecommunications Union ITU-T Recommendation K.100 (7/2019) - Measurement of radio frequency electromagnetic fields to determine compliance with human exposure limits when a base station is put into service.

3. Measuring Equipment

The table below shows the equipment used to measure electromagnetic fields in this non-ionising radiation survey.

Description	Manufacture & model	Serial No.	Calibration date	Calibration due date

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4. Survey Location Details

Designated Transmitter Site Photo/s



Remarks

Remarks

Map of Transmission Site and Measurement Location/s



Remarks

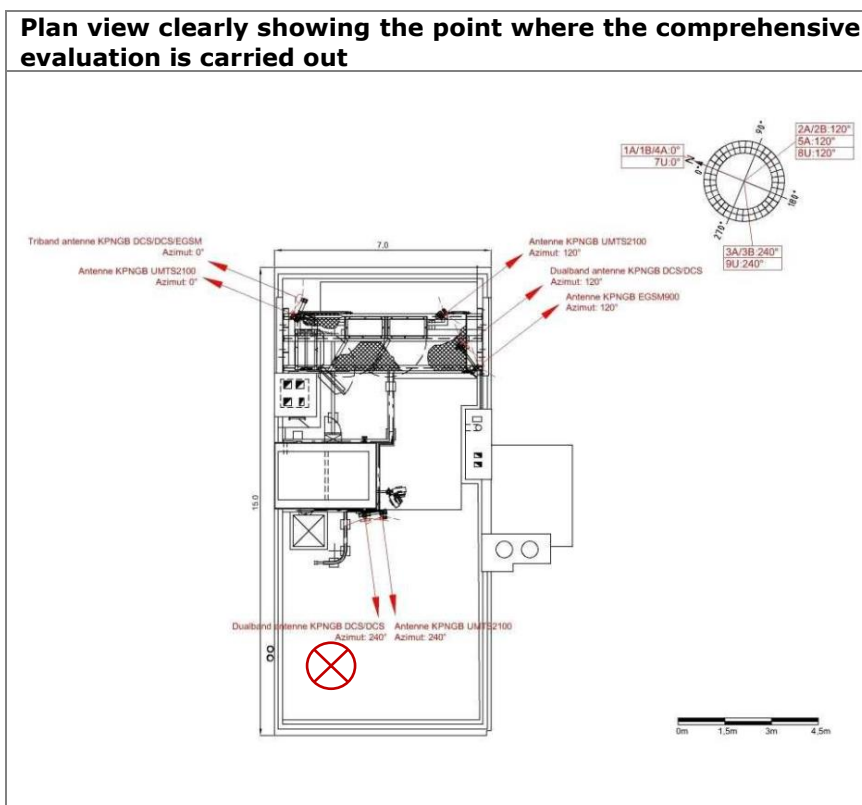
Remarks

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Plan view clearly showing the point where the comprehensive evaluation is carried out



Remarks

Note that this information will be redacted in case the MCA publishes the report for public consumption.

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5. Comprehensive Survey – Broadband Measurements Option

The broadband measurement results presented below show the levels in volts per metre (V/m) recorded during the six-minute period. The average and maximum levels can be compared to the lowest maximum ICNIRP Public Exposure Limits which is set at 28V/m

Electric field strengths recorded over 6-minute period

Mean measurement:	Enter mean value in V/m	Peak measurement:	enter peak value in V/m

Note that the value represented would need to be extrapolated in case were the radio transmitting installation is not transmitting at its maximum capacity.

Conclusion of the Broadband Measurements

The mean and peak measurements were below the lowest ICNIRP guideline limit of 28 V/m

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6. Comprehensive Survey – Frequency Selective Measurements Option

The frequency selective measurement results presented below show the individual transmit frequencies and field strengths of each type of emission and their contribution to the total EMF recorded during the six-minute period. The levels (as adjusted where necessary) are compared to the relevant ICNIRP Public Exposure Limits which applies for the particular frequency of the emission. The levels measured for individual emissions are used to calculate the Total Exposure Quotients. The Total Exposure Quotients must be ≤ 1 in order for the aggregate of multiple measurements to satisfy the criteria of the ICNIRP Public Exposure Limit.

Table of frequency selective measurement results

Point reference	Signal Type	Frequency MHz	Measured Level dB μ V/m	Adjusted Level V/m	ICNIRP Limit V/m	Level in terms of ICNIRP %

Total exposure quotients (calculated from actual measurements)

Measurement point reference	Field Strength (V/m)	ICNIRP's public exposure level

Total exposure quotients (calculated from adjusted measurements)

Measurement point reference	Field Strength (V/m)	ICNIRP's public exposure level

Note:- Ambient source measured (non-extrapolated) contribution to the ER at the evaluation point is greater or equal to 0.05

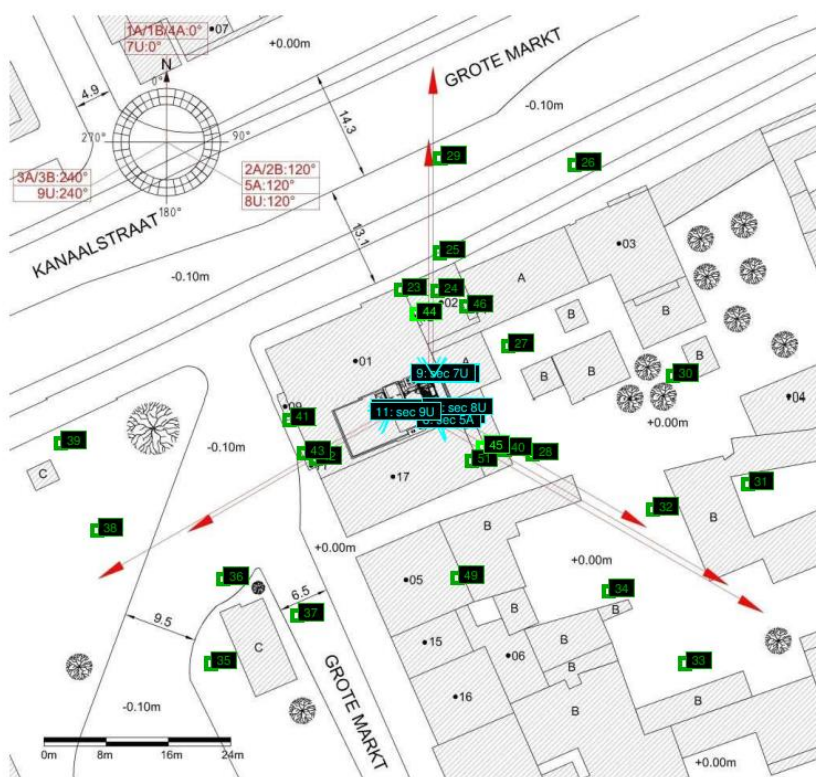
Note that this section is being recommended for inclusion by the MCA

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7. Control Points –

The simulated control points presented below show the expected exposure values contributions from the radio transmitting apparatus installed in public places. The control points are selected both in terms of location and height, so that the maximum simulated exposure is clearly displayed.



No.	Height (m)	Percent compared to the environmental quality standard (%)
23	15.0	0.94%
24	6.5	0.14%
25	0.9	0.11%
26	0.9	0.12%
27	1.0	0.01%
28	1.0	0.12%
29	0.9	0.15%
30	1.0	0.07%
31	1.0	0.07%
32	1.0	0.15%
33	1.0	0.10%
34	1.0	0.12%
35	1.0	0.05%
36	0.9	0.11%
37	1.0	0.07%
38	1.0	0.06%
39	1.0	0.06%
40	3.5	0.14%
41	15.0	1.53%
42	10.3	0.90%

Note that the control points may represent directly the % of the ICNIRP level on the map view.

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To Insert a copy of the Instrument Calibration Certificate (to consider if necessary)

Annex C Equipment Installation E0, E2 and E10 Declaration of Compliance

**Equipment Class E0, E2 and E10
Declaration of Compliance**

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Declaration of Compliance with the provisions of S.L.399.40 as regards to the compliance with any non-ionising radiation emission standards adopted at law and currently as published by International Commission on Non-Ionizing Radiation Protection.

(Operator name)
(Operator address)

Declares and self certifies that **ALL** apparatus installations classified as E0, E2 and E10 are designed and installed to be in full compliance with the requirements of the radio frequency public exposure guidelines of the International Commission on Non-Ionizing Radiation Protection as expressed in General Authorisations (Radiocommunications Apparatus) on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)"

Date:
Signed:
Name:
Position:

