



## EMF Regulation in France

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### Abstract

This document summarizes recent developments in the regulation in France of public exposure to electromagnetic waves. We can mention in particular a new version of the protocol of in situ measurement of the exposure, a publication of the list of atypical points identified in 2017 with a technical definition of this new notion, and finally a new monitoring process for the radio equipment market due to the new Radio Equipment (RE) Directive particularly for the SAR of telephones.

### 1. Introduction

The Agence nationale des fréquences (ANFR) is a public body in charge of enforcing the limit values of public exposure and of radio equipment market surveillance and has no health competence.

In order to have reliable measurements a protocol of in situ measurement is established by the ANFR. It evolves regularly according to technological developments and is published in the French Official journal. It is in line with the standard NF EN 50492.

A new version of our measurement protocol (V4) has been published last year. This version takes into account the Internet of Things (IOT) in particular the smart counters which have been deployed in France.

Concerning the base stations a law has defined the notion of atypical point as the places in which the level of exposure to electromagnetic fields substantially exceeds that generally observed nationally, in accordance with the criteria, including technical ones, determined by ANFR and reviewed regularly.

For radio equipment RE Directive is in force in the French regulation and a new procedure has been set to control SAR values.

### 2. In situ measurement protocol

The objective of the measurement is to determine if the RF exposure levels are in compliance with ICNIRP exposure reference levels and to obtain data for communication purpose.

A new version of the measurement protocol (V4) [1] has been published.

A preliminary study conducted by ANFR on the exposure created by the smart counters [2] has been used to develop the protocol.

For the frequency range 100 kHz-300 GHz, the protocol complies with the requirements of the standard NF EN 50492 of January 2009 and its annex L NF EN 50492/A1 of July 2014, basic standard for the measurement of the electromagnetic field on site, in relation to the exposure of the human body near the base stations. The requirements of this standard are applicable unless otherwise noted in this document. For topics not covered by this standard (radar signals), recommendation ECC (02) 04 can be used (available on the Internet site of the ECO, European Communications Office). In this frequency band 100 kHz – 300 GHz, this protocol is particularly suitable for the broadcast of mobile telephony, broadcasting (audio or visual), wireless local area networks and independent radio networks.

The spatial average will be on a minimum of three points (110 cm, 150 cm and 170 cm, see figure 1) in accordance with the recommendations of the NF EN 50492 standard (paragraph 9.2.2-Assessment of human body exposure in a complex environment)

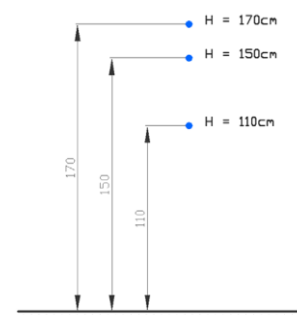


Figure 1: Position of measurement points for the calculation of a three-point average spatial value

The equipment must be in a mode that allows access to the average effective value over a period of time of:

- six minutes for frequencies between 100 kHz and 10 GHz,
- $68/f^{1.05}$  minutes ( $f$  is expressed in GHz) for frequencies greater than 10 GHz.

If the result of the broadband measurement (case A) is greater than or equal to 6 V/m, there is no possible conclusion at this stage and the process must continue with a detailed evaluation (case B) with extrapolation to the maximum power of the transmitters where appropriate.

For the frequency range 9 kHz – 100 kHz, the protocol is based on the standard IEC 61786-2 of December 2014: Measurement of continuous magnetic fields and of alternating magnetic and electric fields in the frequency range from 1 Hz to 100 kHz in their report to the human Exposure -Part 2: Basic standard for measurements.

This protocol introduces informative measurements of maximum average and instantaneous values at 20 cm below 100 kHz and 50 cm above 100 kHz by default.

### 3. Atypical points

Decree No. 2002-775 of 3 May 2002 sets the limit values for exposure of the public to electromagnetic fields. It takes up the European Council recommendation 1999/519/EC of 12 July 1999. These limit values are between 28 V/m and 87 V/m depending on the frequencies in the radio band. The National Frequency Agency shall ensure that these limit values are respected.

Act No. 2015-136 of 9 February 2015 on sobriety, transparency, information and consultation on exposure to electromagnetic waves has defined the atypical points. They are defined as the places in which the level of exposure to electromagnetic fields substantially exceeds that generally observed nationally, in accordance with the criteria, including technical ones, determined by the ANFR and reviewed regularly. The act has entrusted the ANFR with the annual census of atypical points [3].

The atypical points are detected in the first census of atypical points on the basis of the results of in situ measurements. Since 2014, a national surveillance process has been created: everyone can ask for free for a measurement at home or at any public places. Between 2000 and 3000 in situ measurements are performed per year by accredited laboratories following the ANFR protocol.

In this initial approach, the ANFR selected as a criterion a global exposure level of 6 V/m based on the following elements:

- This is the level selected from the ANFR protocol to trigger a case B, i.e. a detailed measure of exposure, by frequency band, with a spectrum analyser. This value of 6 V/m, corresponding in far field at about 100 mW/m<sup>2</sup>, is also mentioned in standard NF EN 50492;
- The World Health Organization (WHO) also indicates on its website that the typical maximum exposure induced by mobile phone antennas or broadcasting is 100 mW/m<sup>2</sup> (about 6 V/m in far field).

A total of 15 atypical points were identified among the 3836 measures carried out in 2017.

For several years, the ANFR has been communicating a 6 V/m attention value leading operators to adopt preventive actions, which explains the low number of atypical points identified in 2017.

The levels are between 6 and 11.3 V/m with an average of 7.8 V/m. These atypical points are observed both outdoors and indoors in dense urban areas. In thirteen cases, the main contributor is mobile telephony and in the other two cases they are broadcasting transmitters.

It is planned to develop strategies to better detect atypical points. In particular, to study methods which do not only base the search for atypical points on the analysis of measurement reports and, in particular, techniques for detecting atypical points by modelling.

### 4. New monitoring process for the SAR measurements

The Radio Equipment (RE) Directive has been transposed into French Law.

In July 2014, France lodged an objection in respect of EN 50566:2013 (requirements to demonstrate compliance of radio frequency fields from handheld and body-mounted wireless communication devices used by the general public). European Commission decision 2016/537/UE [4] of 5 April 2016 and endorsed by TCAM, in response to a request from France for a stricter framework of the SAR measurement method. Since 25 April 2016, measurements of exposure of the human body to electromagnetic fields emitted by radio equipment known as specific absorption rate (SAR) will be carried out by the ANFR at a maximum distance of 5 millimeters on all the faces of the phones or tablets, against in the past a current distance of up to 25 millimeters.

Where ANFR finds that the radio equipment does not comply with the requirements, ANFR requires the relevant economic operator to take all appropriate corrective actions to:

- bring the radio equipment into compliance
- withdraw the radio equipment from the market or recall it

Measurements take into account the potential reduction mechanisms of exposure.

In the interests of transparency, ANFR regularly publishes SAR measurement results in open data [5].

### 5. Conclusion

Regulation is based on a scientific knowledge which obliges the public body to have an expertise on EMF exposure both in measurements and simulations due on the one end to the new technologies and on the second hand to the evolution of the regulation, for instance the

Act No. 2015-136 of 9 February 2015 on sobriety, transparency, information and consultation on exposure to electromagnetic waves.

## 6. References

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