Republic of Latvia

Cabinet

Regulation No. 637

Adopted 16 October 2018

**Regulations Regarding the Assessment and Limitation of the Exposure of Inhabitants to Electromagnetic Fields**

*Issued pursuant to*

*Section 18.2, Paragraph two of the law On Pollution*

1. The Regulation prescribes:

1.1. the limit values and target values of the electromagnetic field radiation, the procedures for the application and methods for the assessment thereof;

1.2. the requirements for the prevention or reduction of the risk caused by electromagnetic field;

1.3. the competent authority for the control of the electromagnetic field radiation caused by the devices.

2. The following terms are used in this Regulation:

2.1. limit values of the electromagnetic field radiation – the maximum permissible values of exposure to the electromagnetic field which have been determined on the basis of the impact caused thereby on human health and which ensure protection against adverse impact on health for people exposed to electromagnetic field, provided that such values are complied with;

2.2. target values of the electromagnetic field radiation – permissible values of exposure to the electromagnetic field by which the compliance with the limit value is controlled and which are determined in order to simplify the process of proving reliably that the determined limit values for human health protection are not exceeded;

2.3. magnetic flux density or magnetic induction (B) – a vector quantity of the field affecting moving charges, expressed in teslas (T). In a free space and biological materials, the relationship between magnetic flux density and magnetic field intensity is as follows: B A/m = 4 π 10-7T;

2.4. current density (J) – a flow of current induced by the electromagnetic field through a unit of area of the human body perpendicular to the flow, expressed in amperes per square meter (A/m²);

2.5. power density (S) – a parameter which is used to characterise very high frequencies where the penetration depth of radiation in the body is small. The power density shall be determined by dividing the energy flow perpendicular to the body surface by the surface area. It is expressed in watts per square metre (W/m²);

2.6. specific energy absorption (SA) – energy absorbed by a unit of mass of biological tissue, expressed in joules per kilogramme (J/kg). It shall be used to limit non-thermal effects of pulsed microwave radiation;

2.7. specific energy absorption rate (SAR) – a rate at which energy is absorbed by a unit of mass of the body, expressed in watts per kilogramme (W/kg). SAR of the whole body shall characterise the radio frequency field exposure that manifests itself into unwanted thermal effects;

2.8. electric field intensity (E) – a vector quantity of the field which corresponds to the force acting on a charged particle regardless of its movement in space. It is expressed in volts per metre (V/m);

2.9. magnetic field intensity (H) – a vector quantity of the field, together with magnetic flux density or magnetic induction, characterises the magnetic field at any point in space. It is expressed in amperes per metre (A/m);

2.10. contact current (Ik) – a flow of current in the human body when it comes into contact with a conductor in the electromagnetic field, expressed in amperes (A).

3. Limit values and target values of the electromagnetic field radiation which are applicable to the protection of humans against the impact of electromagnetic field on human health are specified in Annex to this Regulation.

4. For the purpose of assessing exposure to the electromagnetic field radiation, an assessment method shall be used where the electromagnetic field intensity is determined by making calculations, modelling or conducting measurements, or using data obtained from the assessment of analogous objects, and the obtained results shall be compared with the relevant target values of the electromagnetic field radiation specified in Annex to this Regulation.

5. Sources of the electromagnetic field radiation (hereinafter – the radiation source) shall be installed and used in a way that ensures that values of the electromagnetic field radiation do not exceed the target values specified in Paragraphs 2 and 3 of Annex to this Regulation in places where humans are exposed to the electromagnetic field radiation.

6. Persons who own, use, or possess radiation sources shall, prior to the installation of the radiation source, forecast the possible values of the created electromagnetic field radiation by making calculations or modelling within a territory that can be potentially affected by the electromagnetic radiation caused by the radiation source, or on the basis of information on the values of the electromagnetic field radiation caused by the operation of analogous objects. Unless it has been laid down otherwise in other laws and regulations, measurements of the electromagnetic field radiation shall be conducted upon request of the competent authority when commencing operation of the radiation source as well as during the operation of the object.

7. If the electromagnetic field radiation in the external environment exceeds the target values specified in Paragraphs 2 and 3 of Annex to this Regulation and may affect human health, the persons referred to in Paragraph 6 of this Regulation shall, upon request of the competent authority, conduct measurements to verify compliance with the limit values specified in Paragraph 1 of Annex to this Regulation.

8. The Ministry of Health shall recommend to the national standardisation body a list of the standards that can be applied to comply with the requirements referred to in Paragraph 9 of this Regulation (hereinafter – the applicable standards). The national standardisation body shall publish on its official website a list of the applicable standards that have been adapted in the status of the Latvian national standards and that may be applied to comply with the requirements referred to in Paragraph 9 of this Regulation.

9. For the purpose of measuring and calculating the impact of the electromagnetic field radiation on human health, such procedures shall be used which ensure that the obtained data are reliable, representative, and comparable. If the procedures used conform to the requirements of the applicable standards, they shall be considered as appropriate for the compliance with the requirements referred to in this Regulation.

10. Measurements of the electromagnetic field radiation shall be conducted as follows:

10.1. by laboratories which are accredited in the national accreditation body in accordance with the laws and regulations regarding the evaluation, accreditation, and supervision of conformity assessment bodies or in another accreditation body of a European Union Member State;

10.2. using measuring instruments verified in accordance with the requirements stipulated by the manufacturer and conforming to the procedures referred to in Paragraph 9 of this Regulation. Information on the measuring instruments used for measurements of the electromagnetic field radiation, and also on the verification documents thereof shall be available to the contracting authority ordering the measurements and the competent authority.

11. Measurements of the electromagnetic field radiation shall be conducted within a territory where people may be exposed to the electromagnetic field radiation caused by the specific radiation source.

12. Measurements of the electromagnetic field radiation shall be conducted under normal operating conditions of the radiation source.

13. For the purpose of calculating the conformity of the electromagnetic field radiation from multiple radiation sources with the limit values and target values, the methods (algorithms) specified in Paragraph 4 of Annex to this Regulation shall be used.

14. The persons referred to in Paragraph 6 of this Regulation shall ensure access to the information on the results of the measurements conducted for radiation sources in accordance with Paragraph 6 of this Regulation by publishing them on their website or upon request of the competent authority.

15. The Health Inspectorate shall be the competent authority responsible for the control of the electromagnetic field radiation created by devices.

16. The requirements referred to in Paragraph 6 of this Regulation for forecasting the possible values of the created electromagnetic field radiation when installing the radiation source shall be mandatory for the construction of such new radiation sources and reconstruction, renovation, or installation of existing radiation sources the design of which has been commenced after the day of coming into force of this Regulation.

17. This Regulation shall come into force on 1 November 2018.

Prime Minister Māris Kučinskis

Minister for Health Anda Čakša

**Annex**

Cabinet Regulation No. 637

16 October 2018

**Limit Values, Target Values of the Electromagnetic Field Radiation and the Assessment Methods Thereof**

1. Limit values of the electromagnetic field radiation (from 0 Hz to 300 GHz):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frequency band | Magnetic flux density (mT) | Current density (mA/m2) (r.m.s.) | SAR average for whole body (W/kg) | SAR for head and torso (W/kg) | SAR for arms and legs (W/kg) | Power density (W/m²) |
| 0 Hz | 40 | – | – | – | – | – |
| >0–1 Hz | – | 8 | – | – | – | – |
| 1–4 Hz | – | 8/f | – | – | – | – |
| 4–1000 Hz | – | 2 | – | – | – | – |
| 1 kHz–100 kHz | – | f/500 | – | – | – | – |
| 100 kHz–10 MHz | – | f/500 | 0.08 | 2 | 4 | – |
| 10 MHz–10 GHz | – | – | 0.08 | 2 | 4 | – |
| 10–300 GHz | – | – | – | – | – | 10 |

Notes.

1. f – frequency, expressed in Hz.

2. r.m.s. – root mean square or effective value.

3. For frequencies up to 100 kHz, the peak value of current density shall be obtained by multiplying the root mean square by √2 (~1.414). For pulses with a duration tp, the equivalent frequency shall be calculated as f = 1/(2tp).

4. For frequencies up to 100 kHz and pulsating magnetic fields, the peak of current density associated with pulses may be calculated according to the rise/fall times and the maximum rate of change of magnetic flux density.

5. All specific energy absorption rate (SAR) values are averaged over a 6-minute period.

6. Localised exposure SAR shall be determined for an average mass of tissue of 10 g (compact mass of tissue) with relatively uniform conductivity, and the maximum SAR value determined in this manner shall be used as the final exposure value.

7. For pulsed exposure in the frequency band from 0.3 GHz to 10 GHz and localised exposure to the head (to limit and avoid auditory effects caused by thermal expansion of tissue), an additional limit value shall be determined – the specific energy absorption (SA) must not exceed 2 mJ/kg, averaged over 10 g of tissue.

2. Target values for the electromagnetic field radiation (from 0 Hz to 300 GHz, uniform field r.m.s. values):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency band | Electric field intensity (V/m) | Magnetic field intensity (A/m) | Magnetic flux density (μT) | Equivalent plane wave power density (W/m²) |
| 0–1 Hz | – | 3.2 × 104 | 4 × 104 | – |
| 1–8 Hz | 10 000 | 3.2 × 104/f2 | 4 × 104/f2 | – |
| 8–25 Hz | 10 000 | 4 000/f | 5 000/f | – |
| 0.025–0.8 kHz | 250/f | 4/f | 5/f | – |
| 0.8–3 kHz | 250/f | 5 | 6.25 | – |
| 3–150 kHz | 87 | 5 | 6.25 | – |
| 0.15–1 MHz | 87 | 0.73/f | 0.92/f | – |
| 1–10 MHz | 87/f1/2 | 0.73/f | 0.92/f | – |
| 10–400 MHz | 28 | 0.073 | 0.092 | 2 |
| 400–2000 MHz | 1.375 f1/2 | 0.0037 f1/2 | 0.0046 f1/2 | f/200 |
| 2–300 GHz | 61 | 0.16 | 0.20 | 10 |

Notes.

1. f – frequency (unit of measurement specified in the column “Frequency band”).

2. In the frequency band from 100 kHz to 10 GHz, the electric and magnetic field intensities and the magnetic flux density, and also power density shall be averaged over a 6-minute period. For frequencies exceeding 10 GHz, averaging shall be performed over a period of 68/f1,05minutes (f expressed in GHz).

3. The peak values of pulsed electric and magnetic field intensities and the magnetic flux density shall be obtained by using the following formulas:

3.1. for frequencies up to 100 kHz – multiplying the corresponding r.m.s. values by (~1.414). For pulses with a duration tp, the equivalent frequency shall be calculated as f = 1/(2tp);

3.2. in the frequency band from 100 kHz to 10 MHz – multiplying the corresponding r.m.s. values by 10α, where α = (0.665 log(f/105) + 0.176) and f is expressed in Hz;

3.3. in the frequency band from 10 MHz to 300 GHz – multiplying the corresponding r.m.s. values by 32.

4. For frequencies up to 110 MHz, additional values shall be determined to avoid risks posed by contact currents.

3. Target values for contact currents from electrically conductive objects:

|  |  |
| --- | --- |
| Frequency band | Peak of contact current (mA) |
| 0 Hz–2.5 kHz | 0.5 |
| 2.5 kHz–100 kHz | 0.2 f |
| 100 kHz–110 MHz | 20 |

Notes.

1. f – frequency, expressed in kHz.

2. In the frequency band from 10 MHz to 110 MHz, a value of 45 mA shall be determined (for current flowing through any limb).

4. For the purpose of calculating and assessing the exposure to electromagnetic field related to the exposure to multiple radiation sources, the following methods (algorithms) shall be applied (simultaneous exposure to fields of different frequencies, the effect of their exposure can be additive):

4.1. assess the conformity of the electromagnetic field radiation with the limit values:

4.1.1. when assessing the conformity with the limit values in the frequency band from 1 Hz to 10 MHz, the measurement value is considered acceptable if the total current density meets the condition expressed by the following equation:

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4.1.2. to prevent thermal effect, starting from the frequency of 100 kHz, the measurement value is considered acceptable if the condition expressed by the following equation is met:

|  |  |
| --- | --- |
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Ji – current density at frequency i;

JL,i – limit value for current density at frequency i, as determined in Paragraph 1 of this Annex;

SAR – SAR value at frequency i;

SARL – SAR limit value, as determined in Paragraph 1 of this Annex;

Si – power density at frequency i;

SL – limit value for power density, as determined in Paragraph 1 of this Annex;

4.2. assess the conformity of the electromagnetic field radiation with the target values:

4.2.1. when assessing the conformity with the target values in the frequency band up to 10 MHz, the measurement value is considered acceptable if the total electric and magnetic field intensities meet the conditions expressed by the following equations:



|  |  |
| --- | --- |
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Ei – electric field intensity at frequency i;

EL,i – target values for electric field intensity, as determined in Paragraph 2 of this Annex;

Hj – magnetic field intensity at frequency j;

HL,j – target values for magnetic field intensity, as determined in Paragraph 2 of this Annex;

a – 87 V/m;

b – 5 A/m (6.25 µ T);

4.2.2. to prevent thermal effect, starting from the frequency of 100 kHz, the conditions expressed by the following equations shall be met:

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|  |  |
| --- | --- |
|  | where |

Ei – electric field intensity at frequency i;

EL,i – target values for electric field intensity, as determined in Paragraph 2 of this Annex;

Hj – magnetic field intensity at frequency j;

HL,i – target values for magnetic field intensity, as determined in Paragraph 2 of this Annex;

c – 87/f 0.5 V/m;

d – 0.73/f A/m;

4.2.3. in respect of currents through limbs and contact currents, the conditions expressed by the following equation shall be met:

|  |  |
| --- | --- |
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Ik – current component through limbs at frequency k;

IL,k – target value for current through limbs, 45 mA;

In – contact current component at frequency n;

IC,n – target value for contact current, as determined in Paragraph 3 of this Annex.

Minister for Health Anda Čakša