

**Ordinance
relating to Protection from Non-Ionising Radiation
(ONIR)**

of 23 December 1999 (as of 1 February 2000)

The Swiss Federal Council,

pursuant to Article 12 para. 2, 13 para. 1, 16 para. 2, 38 para. 3 and 39 para. 1 of the Federal Law relating to the Protection of the Environment of 7 October 1983¹ (Law) and to Article 3 of the Federal Law on Spatial Planning of 22 June 1979²,

hereby ordains:

Chapter 1: General provisions

Art. 1 Purpose

The purpose of this Ordinance is to protect people against harmful effects or nuisances caused by non-ionising radiation.

Art. 2 Scope

¹ This Ordinance regulates:

- a. the limitation of electric and magnetic field emissions with frequencies in the range 0 Hz to 300 GHz (radiation) that are generated by stationary installations;
- b. the determination and assessment of the radiation exposure;
- c. requirements concerning the designation of building zones.

² It does not regulate the limitation of emissions that are generated:

- a. by sources in firms, insofar as the radiation affects staff employed by them;
- b. in connection with the application of medical devices in accordance with the Ordinance relating to Medical Products of 24 January 1996³;
- c. by military installations, insofar as the radiation affects members of the army;
- d. by electrical appliances such as microwave ovens, cookers, electric tools or mobile telephones.

AS 2000 213

¹ SR 814.01

² SR 700

³ SR 819.124

³ It also does not regulate the limitation of radiation that affects electrical or electronic medical life-support systems such as cardiac pacemakers.

Art. 3 Terminology

¹ Installations shall be deemed to be old if the decision authorising construction or commencement of operations had legal validity when this Ordinance entered into force.

² Installations shall be deemed to be new if:

- a. the decision authorising construction or commencement of operations was not yet legally valid when this Ordinance entered into force;
- b. they are moved to another site; or
- c. they are replaced at the present site; excepted are railways and trams (Annex 1 Number 5).

³ Places of sensitive use are deemed to be:

- a. rooms in buildings that are regularly occupied by persons for prolonged periods;
- b. public or private children's playgrounds designated in spatial planning legislation;
- c. those areas of undeveloped sites on which uses according to letters a and b are permitted.

⁴ Measures to limit emissions are deemed technically and operationally possible if:

- a. they have been successfully applied in comparable installations in Switzerland or abroad; or
- b. they have been successfully applied in tests, and may be applied to other installations using current technology.

⁵ To assess the economic acceptability of emission limitations, a medium-sized, financially sound, firm shall be taken as representative of the particular branch. If a branch contains widely differing classes of firms, a medium-sized firm in the relevant class shall be used.

⁶ The installation limit value applies to the radiation emitted by a single installation.

⁷ The contact current is the electric current that flows when a person touches a conducting object that is charged by an electric or magnetic field but not connected to a voltage supply.

⁸ The induced limb current is the electric current discharged to earth from a person subjected to an electric field, but not touching a conducting object.

⁹ The equivalent radiated power (ERP) is the power supplied to a transmission antenna multiplied by the antenna gain for the principal transmission direction and referred to a half-wave dipole.

Chapter 2: Emissions

Section 1: General provisions for new and old installations

Art. 4 Precautionary limitation of emissions

¹ Installations shall be built and operated in such a way that they meet the precautionary emission limitations laid down in Annex 1.

² For installations for which no provisions are laid down in Annex 1, the authorities shall stipulate emission limitations as far as this is technically and operationally possible and economically acceptable.

Art. 5 Supplementary and stricter emission limitations

¹ Where it is established or anticipated that one or more of the exposure limit values laid down in Annex 2 are exceeded by a single installation or by several installations taken together, the authorities shall stipulate supplementary or stricter emission limitations.

² The authorities shall stipulate supplementary or stricter emission limitations to ensure that the exposure limit values are complied with.

³ Where it is established or anticipated that the exposure limit value laid down in Annex 2 Numbers 13 or 225 for the contact current arising on contact with conducting objects is exceeded, the authorities shall first stipulate measures for these objects.

Section 2: Special provisions for new installations

Art. 6

If after being taken into operation a new installation is modified in accordance with Annex 1, the provisions relating to emission limitations for new installations shall apply.

Section 3: Special provisions for old installations

Art. 7 Obligation to retrofit

¹ The authorities shall ensure that old installations that do not comply with the requirements of Articles 4 and 5 are retrofitted.

² They shall issue the necessary orders and lay down the time period for retrofitting in accordance with Article 8. If necessary, they shall order operational restrictions or shut-down of the installation for the duration of retrofitting work.

³ Retrofitting can be waived if the owner undertakes to shut down the installation within the time period set for retrofitting.

Art. 8 Time period for retrofitting

¹ The time period for the implementation of precautionary emission limitations shall be as laid down in Annex 1. If Annex 1 contains no relevant provisions, a maximum period of five years shall apply. The authorities may on request extend the time period for retrofitting by half if implementation of the emission limitations within the normal time period is economically unacceptable.

² Concerning supplementary or stricter emission limitations, the time period for retrofitting shall be a maximum of three years. The authorities shall stipulate shorter time periods if the implementation of the measures does not require significant investments to be made.

Art. 9 Modification of old installations

¹ If an old installation is modified in accordance with Annex 1, it shall comply with the following requirements when operated in the reference operating mode:

- a. the magnetic flux density or the electric field strength shall not increase at places of sensitive use where the installation limit value was exceeded prior to the modification;
- b. the installation limit value laid down in Annex 1 shall not be exceeded at other places of sensitive use.

² The authorities shall grant exemptions in accordance with Annex 1.

Section 4: Cooperation and control

Art. 10 Obligation to cooperate

The owner of an installation is obliged to provide the authorities with a minimum of information necessary for enforcement as specified in Article 11 Paragraph 2. If necessary, he/she shall carry out or tolerate measurements or inspections.

Art. 11 Obligation to report

¹ The owner of an installation for which emission limitations are laid down in Annex 1 shall submit a site data sheet to the authorities in conformity with the authorisation or licensing procedure when the installation is built, moved to another site, replaced at the old site or modified in accordance with Annex 1. Domestic electrical installations (Annex 1 Number 4) are excepted.

² The site data sheet shall contain:

- a. the current and planned technical and operational data of the installation, insofar as these are relevant to the generation of radiation;

- b. the reference operating mode according to Annex 1;
- c. data on the radiation generated by the installation:
 1. at the points accessible to persons where the radiation is most intense,
 2. at the three places of sensitive use where the radiation is most intense, and
 3. at all places of sensitive use where the installation limit value according to Annex 1 is exceeded;
- d. a site map showing the data according to Letter c.

Art. 12 Control

¹ The authorities shall ensure compliance with the emission limitations.

² In order to ensure compliance with the installation limit value laid down in Annex 1, the authorities shall carry out or commission measurements or calculations, or make use of the results of third parties. The Swiss Agency for the Environment, Forests and Landscape (SAEFL) shall recommend suitable measurement and calculation methods.

³ If as a result of exemptions being granted the installation limit value according to Annex 1 is exceeded for new or modified installations, the authorities shall carry out or commission periodic measurements of the radiation generated by these installations. They shall establish within six months after the installation has begun operation whether:

- a. the technical and operating data upon which the order was based are correct; and
- b. the orders issued have been complied with.

Chapter 3: Exposure

Art. 13 Applicability of the exposure limit values

¹ The exposure limit values as laid down in Annex 2 shall be complied with at all places accessible to persons.

² They apply only to radiation that uniformly impinges on the entire human body.

Art. 14 Determination of exposure

¹ The authorities shall determine the exposure if they have reason to believe that the exposure limit values laid down in Annex 2 are exceeded.

² The authorities shall carry out or commission measurements or calculations, or make use of the results of third parties. SAEFL shall recommend suitable measurement and calculation methods.

³ In determining radiation on a firm's premises, exposure resulting from sources within the firm shall not be considered.

⁴ Exposure shall be expressed in terms of electric field strength, magnetic field strength, magnetic flux density, induced limb current or contact current, and shall be determined for the operating mode of the installation at the point where it is most intense.

⁵ If an averaging period is laid down in Annex 2, the exposure shall be expressed as the root mean square value over this period. If not, the maximum rms value shall apply.

Art. 15 Assessment of exposure

The authorities shall assess whether the exposure exceeds one or more of the exposure limit values laid down in Annex 2.

Chapter 4: Requirements for the designation of building zones

Art. 16

For old installations, and for installations planned and authorised in spatial planning legislation, building zones shall only be designated where the installation limit values laid down in Annex 1 are complied with, or can be complied with, by suitable planning or construction measures.

Chapter 5: Final provisions

Section 1: Enforcement

Art. 17 Enforcement by the cantons

Subject to Article 18, the cantons shall be responsible for enforcing this Ordinance.

Art. 18 Enforcement by the Confederation

Where the federal authorities apply other federal laws, international agreements or resolutions relating to the provisions of this Ordinance, they shall also have the responsibility for enforcing this Ordinance. Cooperation by SAEFL and the cantons is laid down in Article 41 Paragraphs 2 and 4 of the Law and is subject to the legal obligation to maintain secrecy.

Art. 19 Coordinating authority

¹ Where several installations contribute to exceeding the exposure limit values laid down in Annex 2, and where several authorities are responsible for the enforcement

of this Ordinance for these installations, the authorities concerned shall designate the authority responsible for coordination.

² The coordinating authority shall act according to the coordination principles of the Federal Law on Spatial Planning of 22 June 1979⁴.

Section 2: Transitional provision and entry into force

Art. 20 Transitional provision

The authorities shall issue the retrofitting order as laid down in Article 7 within two years after this Ordinance enters into force. In doing so, they shall consider the urgency of the retrofitting. In non-urgent and exceptional cases, the two-year period may be extended.

Art. 21 Entry into force

This Ordinance enters into force on 1 February 2000.

⁴ SR 700

Precautionary emission limitations

1 Overhead and cable lines for the transmission of electrical energy

11 Scope

¹ The provisions of this Number apply to the following installations with a nominal voltage of at least 1000 V:

- a. Alternating current overhead lines;
- b. Alternating current cable lines with single conductor cables in separate conduits.

² For railway catenary systems, Number 5 shall apply.

12 Terminology

¹ A phase conductor is a single conductor under tension.

² A line circuit comprises all phase conductors belonging to the same electrical circuit. For three-phase systems, these are the three phase conductors R, S and T, and for single-phase systems the two phase conductors U and V.

³ A line consists of the collectivity of all phase and earth wires on a support structure or in a cable system laid underground. It can comprise one or several line conductors.

⁴ The installation contains all the lines located in close proximity within the line section to be considered.

⁵ The right of way is the space under an overhead line or above an underground cable line. It is bounded at the sides by the outermost phase conductors.

⁶ Modification of an installation is defined as the modification of the conductor arrangement, the order of the phases or the reference operating mode.

13 Reference operating mode

¹ The installation's reference operating mode is defined as the simultaneous operation of all line circuits, where each line circuit is in operation:

- a. at its thermal limiting current at 40 °C; and
- b. with the power flow in the most frequently occurring direction.

² Where a maximum current deviating from the thermal limiting current is laid down in the construction permit, this current may be used in defining the reference operating mode.

14 Installation limit value

The installation limit value for the rms magnetic flux density is 1 μ T.

15 New installations

¹ At places of sensitive use, new installations shall comply in the reference operating mode with the installation limit value.

² The authorities shall grant exemptions if the owner of the installation can provide evidence that:

- a. the order of the phases is optimised such that the magnetic flux density outside the right of way is minimised in the reference operating mode; and
- b. all other measures to limit radiation that are technically and operationally possible and economically acceptable have been taken, such as choice of another site, modification of the conductor arrangement, cabling or shielding.

16 Old installations

¹ Should the radiation generated by an old installation in the reference operating mode exceed the installation limit value at places of sensitive use, the order of the phases shall be optimised such that the magnetic flux density is minimised at these locations.

² The period for retrofitting laid down in Article 8 Paragraph 1 shall be a maximum of three years.

17 Modification of old installations

If an old installation is modified, the authorities shall grant exemptions from the requirements laid down in Article 9 Paragraph 1, if the owner of the installation can provide evidence that the conditions specified in Number 15 Paragraph 2 are fulfilled.

2 Transformer stations

21 Scope

The provisions of this Number apply to installations for high to low-voltage transformation.

22 Terminology

¹ An installation is defined as the current-carrying parts of a transformer station including the low-voltage connections and the low-voltage distribution board.

² Modification of an installation is defined as an increase in the nominal power.

23 Reference operating mode

The reference operating mode is defined as operation at nominal power.

24 Installation limit value

The installation limit value for the rms magnetic flux density is 1 μ T.

25 New and old installations

¹ At places of sensitive use, new and old installations shall comply in the reference operating mode with the installation limit value.

² The authorities shall grant exemptions if the owner of the installation can show that that all measures have been taken to limit radiation that are technically and operationally possible and economically acceptable, such as choice of another site or shielding.

3 Sub-stations and switchyards

31 Scope

The provisions of this Number apply to installations for the transformation between two different high-voltage levels and for high-voltage switchyards.

32 Terminology

¹ An installation is defined as those parts of a sub-station or switchyard that are under high voltage.

² A modification is defined as an increase in the nominal power or the displacement or extension of parts that are under high voltage.

33 Reference operating mode

The reference operating mode is defined as operation at nominal power.

34 Installation limit value

The installation limit value for the rms magnetic flux density is $1 \mu\text{T}$.

35 New and old installations

¹ At places of sensitive use, new and old installations shall comply in the reference operating mode with the installation limit value.

² The authorities shall grant exemptions if the owner of the installation can show that all measures have been taken to limit radiation that are technically and operationally possible and economically acceptable, such as choice of another site or shielding.

36 Modification of old installations

If an old installation is modified, the authorities shall grant exemptions from the requirements laid down in Article 9 Paragraph 1 if the condition specified in Number 35 Paragraph 2 is fulfilled.

4 Domestic electrical installations

41 Scope

The provisions of this Number apply to domestic installations in accordance with Article 16 of the Electricity Law of 24 June 1902⁵ excluding electrical products with fixed connection and stationary electrical products with plugged connection.

42 New installations

New domestic installations shall be built in accordance with current technology. In particular, the following measures shall be taken:

⁵ SR 734.0

- a. Low-voltage wiring from distribution boards shall if possible be arranged in star formation.
- b. Loops in low-voltage wiring shall be avoided.
- c. Main distribution systems shall not be located in the vicinity of sleeping areas.

5 Railways and trams

51 Scope

The provisions of this Number apply to railways and trams operating with alternating current.

52 Terminology

¹ An installation is defined as the catenary system in accordance with Article 3 of the Ordinance relating to Railway Electrical Installations of 5 December 1994⁶, together with the traction current return wire.

² A modification is defined as an increase in the number of tracks.

53 Reference operating mode

The reference operating mode is defined as operation of passenger and goods trains according to the timetable.

54 Installation limit value

The installation limit value for the rms magnetic flux density is 1 μ T, expressed as the average over 24 hours.

55 New installations

¹ At places of sensitive use, new installations shall comply in the reference operating mode with the installation limit value.

² The authorities shall grant exemptions if the owner of the installation can show that:

- a. the installation is equipped with a return wire placed as near as possible to the contact line; and

⁶ SR 734.42

- b. all other measures to limit radiation that are technically and operationally possible and economically acceptable have been taken, such as choice of another site or shielding.

56 Old installations

Should the radiation generated by the installation in the reference operating mode exceed the installation limit value at places of sensitive use, the installation shall be fitted with a return wire placed as near as possible to the contact line.

57 Modification of old installations

If an old installation is modified, the authorities shall grant exemptions from the requirements laid down in Article 9 Paragraph 1 if the conditions specified in Number 55 Paragraph 2 are fulfilled.

6 Transmission installations for mobile telecommunication systems and wireless local loops

61 Scope

¹ The provisions of this Number apply to transmission installations for cellular mobile telecommunication networks and to transmission installations for wireless local loops with a total equivalent radiated power (ERP) of at least 6 W.

² They do not apply to point-to-point microwave links.

62 Terminology

¹ An installation comprises all transmission antennae for wireless services in accordance with Number 61 that are either attached to the same mast or located in close proximity, e.g. on the roof of the same building.

² A modification is defined as an increase in the maximum equivalent radiated power (ERP) or change in the transmission directions.

63 Reference operating mode

The reference operating mode is defined as operation at maximum speech and data traffic at maximum transmission power.

64 Installation limit value

The installation limit value for the rms electric field strength is:

- a. 4.0 V/m for installations transmitting exclusively in the range of 900 MHz;
- b. 6.0 V/m for installations transmitting exclusively in the range of 1800 MHz or higher;
- c. 5.0 V/m for installations transmitting simultaneously in both the frequency ranges specified in letters a and b.

65 New and old installations

At places of sensitive use, new and old installations shall comply in the reference operating mode with the installation limit value.

7 Transmission installations for broadcasting and other wireless applications

71 Scope

¹ The provisions of this Number apply to transmission installations for broadcasting and other wireless applications with a total equivalent radiated power (ERP) of at least 6 W that transmit at the same location for at least 800 hours per year.

² They apply neither to wireless services in accordance with Number 6 nor to point-to-point microwave links.

72 Terminology

¹ An installation comprises all transmission antennae for wireless services in accordance with Number 71 that are either attached to the same mast or located in close proximity.

² A modification is defined as an increase in the maximum equivalent radiated power (ERP) or a change in the transmission directions.

73 Reference operating mode

The reference operating mode is defined as operation at maximum transmission power.

74 Installation limit value

The installation limit value for the rms electric field strength is :

- a. 8.5 V/m for long-wave and medium-wave broadcasting transmitters;
- b. 3.0 V/m for all other transmission installations.

75 New and old installations

¹ At places of sensitive use, new and old installations shall comply in the reference operating mode with the installation limit value.

² The authorities shall grant exemptions if the owner of the installation can show that:

- a. the installation is operated at the lowest transmission power necessary to fulfil its intended purpose; and
- b. all other measures to limit radiation that are technically and operationally possible and economically acceptable have been taken, such as choice of another site or shielding.

76 Modification of old installations

If an old installation is modified, the authorities shall grant exemptions from the provisions laid down in Article 9 Paragraph 1 if the conditions specified in Number 75 Paragraph 2 are fulfilled.

8 Radar installations**81 Scope**

The provisions of this Number apply to radar transmission installations with an average equivalent radiated power (ERP) of at least 6 W that transmit at the same location for at least 800 hours per year.

82 Terminology

¹ An installation is defined as all radar transmission antennae located in close proximity.

² A modification is defined as an increase in the maximum equivalent radiated power (ERP), a change in transmission direction or of scan cycles.

83 Reference operating mode

The reference operating mode is defined as surveillance of the intended air space at maximum transmission power.

84 Installation limit value

The installation limit value for the rms electric field strength is 5.5 V/m expressed as the average over an entire scan cycle.

85 New and old installations

¹ At places of sensitive use, new installations shall comply in the reference operating mode with the installation limit value.

² The authorities shall grant exemptions if the owner of the installation can show that:

- a. the installation is operated at the lowest transmission power necessary to fulfil its intended purpose; and
- b. all other measures to limit radiation that are technically and operationally possible and economically acceptable have been taken, such as choice of another site or shielding.

86 Modification of old installations

If an old installation is modified, the authorities shall grant exemptions from the provisions laid down in Article 9 Paragraph 1 if the conditions specified in Number 85 Paragraph 2 are fulfilled.

Annex 2
(Art. 5, 13, 14, 15, 19)

Exposure limit values

1 Exposure containing a single frequency

11 Exposure limit values for field quantities

¹ The exposure limit values for the rms electric field strength, the rms magnetic field strength and the rms magnetic flux density are:

Frequency	Exposure limit values for the			Averaging period (minutes)
	rms electric field strength $E_{G,f}$ (V/m)	rms magnetic field strength $H_{G,f}$ (A/m)	rms magnetic flux density $B_{G,f}$ (μT)	
< 1 Hz	–	32 000	40 000	– ⁷
1–8 Hz	10 000	$32\,000 / f^2$	$40\,000 / f^2$	– ⁷
8–25 Hz	10 000	$4000 / f$	$5000 / f$	– ⁷
0.025–0.8 kHz	$250 / f$	$4 / f$	$5 / f$	– ⁷
0.8–3 kHz	$250 / f$	5	6.25	– ⁷
3–100 kHz	87	5	6.25	– ⁷
100–150 kHz	87	5	6.25	6
0.15–1 MHz	87	$0.73 / f$	$0.92 / f$	6
1–10 MHz	$87 / \sqrt{f}$	$0.73 / f$	$0.92 / f$	6
10–400 MHz	28	0.073	0.092	6
400–2000 MHz	$1.375 \cdot \sqrt{f}$	$0.0037 \cdot \sqrt{f}$	$0.0046 \cdot \sqrt{f}$	6
2–10 GHz	61	0.16	0.20	6
10–300 GHz	61	0.16	0.20	$68 / f^{1.05}$

Where f is the frequency in the units specified in the first column.

⁷ Based on the highest rms value (Art. 14 Para. 5)

² For pulsed exposure, in addition to the exposure limit values given in Paragraph 1, the following exposure limit values for the rms electric field strength, the rms magnetic field strength and the rms magnetic flux density apply. The pulsed exposure is averaged over the duration of the pulse:

Frequency	Exposure limit value for the			Averaging period
	rms electric field strength $E_{P,f}$ (V/m)	rms magnetic field strength $H_{P,f}$ (A/m)	rms magnetic flux density $B_{P,f}$ (μT)	
10–400 MHz	900	2.3	2.9	pulse duration
400–2000 MHz	$44 \cdot \sqrt{f}$	$0.12 \cdot \sqrt{f}$	$0.15 \cdot \sqrt{f}$	pulse duration
2–300 GHz	1950	5.1	6.4	pulse duration

Where f is the frequency in MHz.

12 Exposure limit value for the induced limb current

For frequencies between 10 and 110 MHz, the exposure limit value for the rms electric current discharged via any limb is 45 mA. The averaging period is 6 minutes.

13 Exposure limit value for the contact current

The exposure limit value for the rms contact current is:

Frequency	Exposure limit value for the rms contact current $I_{B,G,f}$ (mA):
< 2.5 kHz	0.5
2.5–100 kHz	$0.2 \cdot f$
0.1–110 MHz	20

Where f is the frequency in kHz

2 Exposure containing several frequencies

21 Principles

¹ If several frequencies are present concurrently, the exposure shall be determined at each frequency.

² The exposure values so determined shall be weighted with a frequency-dependent factor and summed as shown in Number 22.

³ The exposure limit value for each of the sums calculated according to Number 22 shall be 1.

22 Summation procedure

Number	Frequency range	Physical quantity	Summation formula	Averaging period
221	1 Hz–10 MHz	electric field strength	$\sum_{1\text{Hz}}^{1\text{MHz}} \frac{E_f}{E_{G,f}} + \sum_{>1\text{MHz}}^{10\text{MHz}} \frac{E_f}{87}$	–8
		magnetic field strength	$\sum_{1\text{Hz}}^{65\text{kHz}} \frac{H_f}{H_{G,f}} + \sum_{>65\text{kHz}}^{10\text{MHz}} \frac{H_f}{5}$	–8
		magnetic flux density	$\sum_{1\text{Hz}}^{65\text{kHz}} \frac{B_f}{B_{G,f}} + \sum_{>65\text{kHz}}^{10\text{MHz}} \frac{B_f}{6,25}$	–8
222	100 kHz–300 GHz	electric field strength	$\sqrt{\sum_{100\text{kHz}}^{1\text{MHz}} \left(\frac{E_f}{87}\right)^2 \cdot f + \sum_{>1\text{MHz}}^{300\text{GHz}} \left(\frac{E_f}{E_{G,f}}\right)^2}$	6 minutes
		magnetic field strength	$\sqrt{\sum_{100\text{kHz}}^{1\text{MHz}} \left(\frac{H_f}{0,73}\right)^2 \cdot f^2 + \sum_{>1\text{MHz}}^{300\text{GHz}} \left(\frac{H_f}{H_{G,f}}\right)^2}$	6 minutes
		magnetic flux density	$\sqrt{\sum_{100\text{kHz}}^{1\text{MHz}} \left(\frac{B_f}{0,92}\right)^2 \cdot f^2 + \sum_{>1\text{MHz}}^{300\text{GHz}} \left(\frac{B_f}{B_{G,f}}\right)^2}$	6 minutes
223	additional limit value for pulsed exposure	electric field strength	$\sqrt{\sum_{10\text{MHz}}^{300\text{GHz}} \left(\frac{E_f}{E_{p,f}}\right)^2}$	pulse duration
	10 MHz–300 GHz	magnetic field strength	$\sqrt{\sum_{10\text{MHz}}^{300\text{GHz}} \left(\frac{H_f}{H_{p,f}}\right)^2}$	pulse duration
		magnetic flux density	$\sqrt{\sum_{10\text{MHz}}^{300\text{GHz}} \left(\frac{B_f}{B_{p,f}}\right)^2}$	pulse duration
224	10 MHz–110 MHz	induced limb current	$\sqrt{\sum_{10\text{MHz}}^{110\text{MHz}} \left(\frac{I_{K,f}}{45}\right)^2}$	6 minutes

⁸ Based on the highest rms values (Article 14 Paragraph 5)

Number	Frequency range	Physical quantity	Summation formula	Averaging period
225	1 Hz–110 MHz	contact current	$\sum_{1\text{Hz}}^{110\text{MHz}} \frac{I_{B,f}}{I_{B,G,f}}$	–9

The summation shall be carried out for all frequencies f at which exposures are simultaneously present and which fall into the frequency range specified at the summation symbol (Σ).

Definition of symbols:

f	frequency in MHz
E_f	rms electric field strength in V/m at frequency f
$E_{G,f}$	exposure limit value for the rms electric field strength in V/m at frequency f as laid down in Number 11 Paragraph 1
$E_{P,f}$	exposure limit value for the rms electric field strength in V/m at frequency f as laid down in Number 11 Paragraph 2
H_f	rms magnetic field strength in A/m at frequency f
$H_{G,f}$	exposure limit value for the rms magnetic field strength in A/m at frequency f as laid down in Number 11 Paragraph 1
$H_{P,f}$	exposure limit value for the rms magnetic field strength in A/m at frequency f as laid down in Number 11 Paragraph 2
B_f	rms magnetic flux density in μT at frequency f
$B_{G,f}$	exposure limit value for the rms magnetic flux density in μT at frequency f as laid down in Number 11 Paragraph 1
$B_{P,f}$	exposure limit value for the rms magnetic flux density in μT at frequency f as laid down in Number 11 Paragraph 2
$I_{K,f}$	rms electric limb current in mA at frequency f
$I_{B,f}$	rms contact current in mA at frequency f
$I_{B,G,f}$	exposure limit value for the rms contact current in mA at frequency f as laid down in Number 13

⁹ Based on the highest rms values (Article 14 Paragraph 5)