

EMF Guidelines for Radio Frequency and Low Frequency Electromagnetic Radiation

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EM Watch	Electromagnetic Radiation Exposure Guidelines	Copyright: www.emwatch.com
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Radio-Frequency Radiation Guidelines - for continuous and prolonged exposure

Risk Level	Millivolts per Metre	Microwatts per square meter	Description
1	0.00 – 10.0	0.00 – 0.27	Negligible risk of health effects, except for electro-hypersensitive people.
2	10.0 – 100	0.27 – 26.5	Low risk of serious health effects
3	100 – 650	26.5 – 1120	Moderate risk of serious health effects
4	Over 650	Over 1120	High risk of serious health effects

Low Frequency Electromagnetic Radiation Guidelines - for continuous and prolonged exposure

Risk Level	Milligauss	MicroTesla	Description
1	0.0 – 1.0	0.00 – 0.1	Negligible risk of health effects, except for electro-hypersensitive people.
2	1.0 – 2.0	0.1 – 0.2	Low risk of serious health effects
3	2.0 – 5.0	0.2 – 0.5	Moderate risk of serious health effects
4	Over 5.0	Over 0.5	High risk of serious health effects

Continuous and prolonged exposure means exposure for several hours a day, for several months - or years.

Notes

1. Electro-Hypersensitive people may experience symptoms and discomfort at very low EMF levels (even at Risk Level 1).
2. Pregnant women should spend most of their time in Risk Level 1, but brief visits to higher levels will probably do no harm. Level 4 is best avoided, where possible.
3. Children should also be protected from the higher exposure levels, especially avoiding spending long periods of time at level 4.
4. In our view, everyone should try to avoid continuous, prolonged exposure at level 4.
5. Bedrooms, schools, hospitals, libraries and workplaces should ideally be at level 1.

Use with discretion, and at your own risk. Bear in mind that none of these levels has been proved absolutely to be damaging to your health, but there are highly suggestive indications. On the other hand, no level of EMF has been proved absolutely safe (except zero). Until EMF is proven safe, it makes sense to minimise your risk by managing your exposure.

Two Kinds of Electromagnetic Radiation

There are two kinds of man-made EMF (ElectroMagnetic Field) common in our homes and workplaces, believed to be damaging to our health.

One kind is called low-frequency EMF, a.k.a. ELF (extremely low frequency) EMF, which is emitted from all mains electrical devices, power lines and house wiring, electric motors and some electronic devices.

The other kind is radio-frequency EMF which is emitted from all radio transmitters, cordless phones, cell phones, cell towers, wi-fi systems, and wireless communications devices.

The two kinds have different qualities. They are measured differently, and the measurements are expressed in different units. That is why the EMF Guidelines on Page 1 above contain two separate sections. They are both important, because each type of EMF can affect your health.

What About Short-Term Radiation Exposure?

The above guidelines are for **long-term** EMF exposure - that generally means several hours a day for years, but at the very least, months.

What about occasional short-term exposure? If your exposure is limited to a few hours, or days at most, you are unlikely to suffer long-term health consequences, even if exposed to very high levels of radiation (but rather avoid it if you can!)

For pregnant women and very young children, we recommend that they should avoid high EMF levels, even for short periods, until there is more clarity on the risks.

How Much Electromagnetic Radiation is Safe?

No one can answer this question with certainty. You may be inclined to accept the government's pronouncements or the legal limits in your country, as giving the best indication of what is safe.

We believe that it would be better to err on the side of caution, and follow the recommendations given here.

How Reliable is the Information Available?

There is no consensus among scientists as to what level of radiation creates a health risk in the population. Literally thousands of studies have been performed, with differing results. This means that you can probably find studies to support your viewpoint, no matter what your viewpoint is.

Companies that make profits from devices which generate electromagnetic radiation can contend that there is insufficient evidence of any health risk from EMF exposure. They can find studies to support their viewpoint, some of them funded by organisations who may benefit from this finding.

However, many independent studies have found a relationship between high EMF levels and increased health risks. Using the results of these studies, it is possible, in some cases, to deduce the EMF exposure level which was associated with an increase in the incidence of a particular disease. No such study by itself proves that EMF caused the disease, but each one adds to the weight of evidence.

It is becoming harder for reputable organisations to deny at least a possible connection. Even the World Health Organization has recently acknowledged that electromagnetic radiation might cause serious diseases, such as cancer.

But legal limits in the UK and USA (and some other countries) have not been reduced from the very high levels which were set decades ago by the International Commission on Non-Ionising Radiation Protection (ICNIRP) and it is possible that the reasons for this have more to do with politics and economics than with concern for your health.

How Much Radiation is Too Much for You?

It appears from scientific research that **no level of electromagnetic radiation (low-frequency or radio-frequency) is completely safe**. Even low levels may cause biological changes or damage.

But the body has some ability to repair EMF damage. So if the amount of EMF you are receiving is within your repair capacity, no long-term damage is done. (Of course, the energy used to effect the repair could have been used by your body for some other useful purpose.)

Generally speaking, the level of radiation which will affect **your** health depends on **how much time** you are exposed to it.

But another factor is **who** you are and **your** state of health. A young, healthy adult can handle more EMF than a child or an older person, or a chronically sick person.

That is why any EMF guideline can only give an indication of the risks for an average person. Bear in mind, you may not be average!

Pregnancy

Pregnant women have to be particularly careful because the foetus is very vulnerable.

There is evidence that high levels of electromagnetic radiation can cause miscarriage. Also, it appears that EMF exposure in the womb can cause the unborn child to be more susceptible to various illnesses later in life.

So a pregnant women would want to take special precautions to avoid high EMF levels. For example

- Keep a good distance between your tummy and any electric oven (2 feet for an electric oven and at least 5 feet from a microwave oven) while it is cooking.
- Do not allow any cell phone to come into contact with your tummy. Try to keep them at least 18 inches away at all times. And if possible, avoid having a wireless phone in your house.

We recommend that, if you are pregnant, you take the trouble to learn as much as you can about EMF, from [our website](#) and elsewhere. This may be a very important time to minimize your exposure to electromagnetic radiation.

Electro-HyperSensitivity

Some people have somehow become sensitized to certain kinds of EMF, rather like hay-fever sufferers who have become sensitized to pollen.

People who are sensitive to EMF are called Electro-HyperSensitive (EHS) or just Electro-Sensitive.

EHS people react to much lower levels of EMF than the rest of us, and they may be more likely than others to suffer serious diseases such as cancer when exposed to high EMF levels. (This is by no means certain – they may be less likely to suffer serious diseases because they know when they are being exposed and try hard to avoid such exposure.)

Although you may not be EHS right now, you could become EHS if exposed frequently to high levels of EMF. The condition is acquired and appears to be caused by previous EMF exposure.

Using Our EMF Guidelines

Until we know for sure what is, and is not safe, we believe the only sensible way to deal with electromagnetic radiation is to act on the **precautionary principle**. (Treat it as harmful until it proves to be safe.)

Actually, there is already plenty of evidence that EMF is harmful, at least to the health of some people. See <http://emwatch.com/emf-research-quality-and-quantity/>. So it is unlikely that it will ever be proven to be safe.

The EMF Guidelines are intended to be useful and practical, but to make the best use of them you will need to have access to appropriate EMF measurements (low-frequency, radio-frequency, or both) either from a professional EMF survey or by obtaining your own EMF measuring equipment.

Reducing Your EMF Exposure - - - -

Radiation exposure has two components: intensity of radiation, and duration of exposure.

It usually takes many years of EMF exposure to cause serious disease, and in the case of cancer this can be a decade or more. (It can even be two or three decades.)

So it is a good idea to reduce your exposure now - before you get sick - to prevent your body from accumulating more radiation damage.

EM Watch has plenty of information about how to reduce EMF exposure from many different sources. But without an EMF meter it is hard to know how much radiation you are getting, and where it might be coming from. So you may find it hard to take meaningful action.

That is why we have reviewed what we consider to be the best [low-frequency EMF meters](#) as well as the best [radio-frequency EMF meters](#) and recommend that you get one of each, and use them in your home and workplace.

I hope you will be able to make use of these EMF Guidelines to reduce your EMF exposure and safeguard your health. I don't need to remind you how precious that is!

Robert Sinclair
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Notes on Appendix 1 & 2

Appendix 1 shows various international limits and recommendations for exposure to **Radio-Frequency** electromagnetic radiation (or EMF) in descending order (highest limits on top).

EM Watch's own EMF Guidelines are also shown in this table, and the colours reflect the same risk levels we used in the Guidelines on page 1. (High risk is red.)

Notice the huge disparity between different countries' limits. Leading the pack is the USA (with Canada and Japan) whose legal limit is 1000 times higher than Austria (already in our High Risk band) and 10,000 times higher than the BioInitiative Report recommends.

Appendix 2 is similar to Appendix 1, but shows various limits and recommendations for exposure to **Low-Frequency** magnetic radiation, again in descending order (highest limits on top), together with EM Watch's Guidelines.

The table is color-coded to reflect the same risk levels used in the Guidelines on page 1. (High risk is red.)

Again, you will notice the enormous range.

Many countries do not even set statutory limits for this kind of radiation, despite known health implications.

Appendix 1 – Radio-Frequency Electromagnetic Limits and Recommendations

EM Watch Electromagnetic Radiation Exposure Guidelines			Copyright: www.emwatch.com
Radio / Microwave Radiation – International Safety Limits (Highest levels at top)			
Electric Field Strength	Power Density		Country or Organization
mV/m	W/m ²	μW/m ²	
61400	10.00	10000000	USA Statutory Limit (also Canada and Japan) ICNIRP Public Exposure Limit (2-300GHz) 1998
6140	0.100	100000	China, Italy (sum of multiple frequencies), Russia statutory limit
5984	0.095	95000	Switzerland, Lichtenstein, Luxembourg statutory limit
3008	0.024	24000	Belgium statutory limit
1942	0.010	10000	Austria statutory limit
650	0.001	1120	EM Watch Guidelines – Maximum for Level 3 - Moderate Risk
614	0.001	1000	BioInitiative Report - Limit for Long-Term Exposure to Pulsed Signal
614	0.001	1000	Salzburg, Austria (1998) Sum GSM
614	0.001	1000	Italy statutory limit for a single frequency
600	0.001	954.9	Council of Europe (2011) - proposed indoor limit (also see 200 mV/m)
200	0.0001	106.1	Council of Europe Report (2011) - proposed indoor limit for "medium term"
194	0.0001	100.0	Building Biology Standard (2003) - Pulsed RF - "Extreme Anomaly" level
135	0.0000	48.1	Median Level of 15 US cities in 1977 (Mainly VHF TV)
100	0.0000	26.5	EM Watch Guidelines – Maximum for Level 2 - Slight Risk
61	0.0000	10.0	Salzburg, Austria (2002) GSM / 3G Limit for Residences (Outdoors)
43	0.0000	5.0	Building Biology Standard (2003)- Pulsed RF - "Strong Anomaly" level
10	0.0000	0.2656	EM Watch Guidelines – Maximum for Level 1 - Low Risk
6	0.0000	0.1	Building Biology Standard (2003)- Pulsed RF - "Weak Anomaly" level

Appendix 2 – Low-Frequency Magnetic Radiation Limits and Recommendations

EM Watch Electromagnetic Radiation Exposure Guidelines		Copyright: www.emwatch.com
Low-Frequency Magnetic Radiation – International Safety Limits (Highest levels at top)		
MilliGauss	MicroTesla	Country or Organization
4166	416.6	ICNIRP Occupational Exposure Limit (60Hz) 1998
1000	100	European Union Recommendation 1999
833	83.3	ICNIRP Public Exposure Limit (60Hz) 1998
750	75	Poland statutory limit
100	10	Russia statutory limit
100	10	Belgium (Flanders)
5.0	0.5	EM Watch Guidelines – Maximum for Level 3 - Moderate Risk
5.0	0.5	Building Biology Standard (2003) - ELF magnetic -"Extreme Anomaly"
2.5	0.25	American National Standards Institute (ANSI) limit
2.5	0.25	National Council for Radiation Protection and Measurement (NCRP)(USA)
2.5	0.25	Confederation of Professional Employees (Sweden)
2.0	0.2	EM Watch Guidelines – Maximum for Level 2 - Slight Risk
2.0	0.2	BioInitiative Report - Planning Limit for all new construction projects
1.0	0.1	EM Watch Guidelines – Maximum for Level 1 - Low Risk
1.0	0.1	BioInitiative Report - Limit for pregnant women and children
1.0	0.1	BioInitiative Report - Limit for all new space adjacent to power lines
1.0	0.1	Building Biology Standard (2003) - ELF magnetic -"Strong Anomaly" level
1.0	0.1	Switzerland – New Installations (Sensitive Use) Limit
0.2	0.02	Building Biology Standard (2003) - ELF magnetic -"Weak Anomaly" level