What are AC electric fields?

AC or alternating current electric fields are the result of an alternating voltage applied across a wire such as in home wiring, wired walls, extension cords, appliances, outlets, and power strips...as long as they are energized-even when no current is flowing. This means-even if no power is consumed and nothing is turned on-we are surrounded by AC electric fields. The field strength of AC electric fields is measured in volts per meter (V/m). The electric field strength decreases or increases, e.g. depending on the voltage level, the electric conductivity of building materials and air, the technical quality of installations and devices, the presence or the quality of the grounding, and the distance to the field source.

AC ELECTRIC FIELDS

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Stress Caused by Electricity

Authors: Dipl. Med. Frank Mehlis, Bonn / Wolfgang Maes, Neuss, Germany
Translated into English by Katharina Gustavs, Canada

What does building biology have to offer?

The building biology environmental consultants from the BUILDING BIOLOGY ASSOCIATION (VB) are experts in identifying and reducing environmental risks in indoor environments. They measure, analyze, and assess Wi-Fi networks in addition to many other factors, including mold, indoor toxins, and other physical exposures from e.g. mobile phones, DECT cordless phones, and radioactivity, air quality and indoor climate. They also make recommendations for remediations. Building biology environmental consultants help find and reduce disease-causing factors that often hide within our own four walls.

We are less interested in discussing or arguing about unreasonable exposure limits than in taking positive action.

Life is more satisfying when there are less stressors-as a precaution and to be on the safe side.

Your Building Biology Consultant
Member of the Building Biology Association e.V. (VB)

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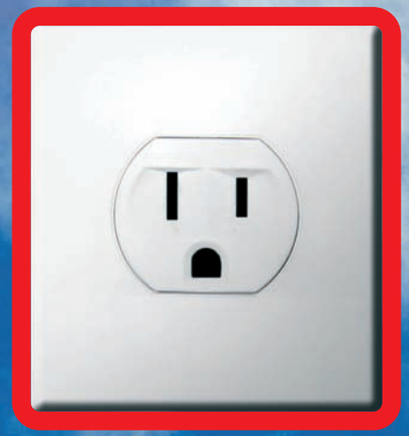
The Building Biology Association (VB) follows the Standard of Building Biology Testing Methods SBM and works in cooperation with the Institute of Building Biology and Ecology IBN/Neubeuern (http://www.baubiologie.de/site/english.php). Comprehensive information on building biology can be found in Wolfgang Maes' book "Stress durch Strom und Strahlung" (German ISBN 3-923531-25-7).

VERBAND BAUBIOLOGIE (VB)
Building Biology Association

AC ELECTRIC FIELDS

Stress Caused by Electricity



The human body an antenna?

Our body picks up electric fields from its environment just like an antenna and becomes, so to speak, hot, especially if isolated from earth such as in bed. The extreme case being when a person e.g. lies on a heating pad or touches an ordinary ungrounded lamp cord that is plugged in. During building biology surveys, therefore, body voltage testing is performed in addition to field strength measurements in order to determine the electric coupling (in millivolts or mV) of a person lying in bed. We want to know how "charged" a person becomes.

Do AC electric fields make you sick?

First and foremost they cause stress. Our precious immune resilience is worn out. The body's own defense mechanisms are maxed out. According to scientific evidence, the ubiquitous mains supply frequency of our power grids (e.g. 50 Hz in Europe, Australia or 60 Hz in North & Central America) interferes with delicate biological functions, depending on the voltage level.
In electrically disturbed beds, you will sleep yourself tired. After eight hours of sleep, you will wake up and not feel well rested. And you think, just another half an hour of sleep and another one and so on. AC electric fields may also cause you to feel highly charged, hyper, and frantic. For short periods of time, this is perceived as a pleasant buzz by some-just like a strong cup of coffee. Others report that they loose their concentration and feel unpleasantly stressed. Others become tense or moody, some even feel aggressive.

What does science say?

The currently accepted doctrine assumes that a biological effect increases with increasing field strength and frequency. Yet, especially, the extremely low frequencies of the power supplies are quite similar to our body's own bioelectric functions and, therefore, can be particularly disruptive. The few available research results are based on questionable theoretical calculations and short-term studies with healthy subjects during their active waking phase. Long-term studies with seniors, pregnant women, unborn children, sick or sensitive persons do not yet exist, certainly not for the vulnerable sleep phase. In an RWE study (from 1984), we can read that nerves show the greatest sensitivity at about 50 Hz, cell membrane potentials change at a stimulus of 15-20 millivolts; eddy currents are induced.
Each person is an individual and responds in his or her own individual way. And everything is subject to the laws of resonance, induction, and charge separation. The capacity to resonate is different in different systems, be they technical antennas or biological systems such as humans, animals, and plants.

What happens in humans?

In our organism, billions of electric functions are processed each second. All cells communicate with each other non-stop, using electric signals. All of them posses a measurable electric potential. Tiny currents run along nerve signal pathways, which also can be quantified. Each single thought, emotion, or sensation is triggered by minute bioelectric stimuli. Alternating electric fields-as far as known to science (and there is very little known!)-induce artificial eddy currents, currents, potential depolarizations, cell and nerve stimuli.
Alternating electric fields have a major impact on the human body. The biological risk associated with human-made electric fields is much greater than has been conceived possible until recently. The worst-case scenario is when electric and magnetic fields are combined. Scientists report that fields as they frequently occur in bedrooms not only increase the leukemia and cancer risk but are also a contributing factor to headaches, loss of vitality, depressions, suppression of the hormone melatonin, impairment of cell signaling, impact on lymphocytes, heart rhythm disturbances, and sudden infant death syndrome. And we are talking here about field strengths of only 10-20 V/m.

What does it look like in our beds?

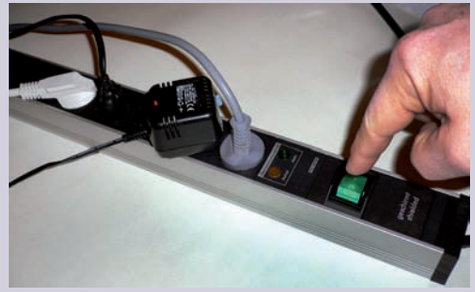
In each third bed of children and adults, building biology environmental consultants find (mostly unnecessary and avoidable) electric fields with a strength up to 50 V/m (North America) or 100 V/m (Europe), sometimes even up to 500 V/m. These exposure levels exceed by many times current VDT workplace regulations. By way of comparison: The Swedish TCO exposure limit for VDTs is set at 10 V/m (30 cm away from screen)-the "secret" exposure limit; an absolutely ordinary, anywhere purchasable, ungrounded bedside lamp (which is not even turned on!), makes 50 or 100 V/m or even more. If these fields are reduced or even shut off (e.g. through automatic demand switches), chronically ill people consistently experience spontaneous improvements in health.

What role is played by the frequency?

A high exposure level with a biologically compatible frequency will have a less critical impact than a relatively low one with a biologically detrimental frequency. Beside the common frequency of the electricity supply (50 or 60 Hz), we can also count on lower and higher frequencies or on concurrent mixtures of diverse frequencies (e.g. electric railway with 16.7 Hz, fluorescent or energy saving lamps 30,000 to 60,000 Hz, TV with about 15,000 Hz).

Are AC electric fields always present?

Normally, the exposure levels from a well grounded home wiring system are quite moderate. Because of technical errors or sloppy installation, poor or nonexistent grounding, unnecessary amounts of cords and electric appliances in close proximity to the human body, it is possible that a great level of coupling occurs. In contrast, shielded cables and installations emit virtually no fields.



Can I recognize field sources by myself?

Field sources are often hidden. Electrically conductive building components, metals, and aluminum foils without grounding or even electrically insulating building materials (wood, gypsum, wood-frame construction) may increase exposure levels through charge separation-just as unfavorably and unpredictably as the metal parts in beds (e.g. metal frame, innersprings). Masonry and concrete constructions as well as conductive building components with grounding favorably conduct away the voltages, thereby reducing electric field exposures. Two-prong cords with flat plugs (without ground) generate much higher electric field emissions than any three-prong cords with a ground (e.g. Schuko plug in Germany). Clamp-on, swivel, and floor lamps-just because they are not grounded-cause field emissions that are a hundred times higher and reach much farther. And this, even if they are not turned on. Plug in outlet is all it takes. Be persistent and always ask for grounded cords and appliances.

Are official exposure limits adequate?

Official recommendations by the International Commission for Non-Ionizing Radiation Protection (ICNIRP) allow 4,200 V/m (60 Hz) or 5,000 V/m (50 Hz), respectively, in our homes. The German Radiation Protection Commission and DIN/VDE norms also allow 5,000 or up to 7,000 V/m for the general public, and for occupational exposures even up to 20,000 V/m. All of the exposure recommendations above consider acute, short-term effects only. There is always a poscript that goes like this: "So far as we know today..." What we do know today is rather sparse, based on mostly theoretical and mathematical calculations, lacking in practical relevance. These limits, therefore, are inadequate in protecting humans or nature from the risks of electromagnetic pollution. In the process of setting standards, biological effects and risks are simply ignored.

What are reasonable guideline values?

Since May 1997, the German Association for Environmental Protection and Nature Conservation (BUND) has demanded for areas of frequent human use and sleeping areas that the in Germany permissible exposure limits for electric fields (26. BImSchV) must be lowered by a factor of 10,000 in order to accomplish a certain level of protection and precaution. The US Congress responded with a draft report, recommending as a precaution to keep levels below 10 V/m ever since. With their recommendations, the BUND and the US Congress confirm the Building Biology Guideline Values that have been published already years ago.