



Building Biology Testing Method SBM-2008C

## **BUILDING BIOLOGY EVALUATION GUIDELINES FOR SLEEPING AREAS**

The Building Biology Evaluation Guidelines are based on the precautionary principle, with specific regard for the potential long-term exposure and risks associated with sleeping areas, and the fragile window of opportunity that sleep presents for biological and metabolic regeneration. These guidelines are based on fifty years of accumulated building biology experience and knowledge, as well as on outside scientific research and studies, and they focus on solutions that are practicable and achievable. Approaching the built environment in an holistic manner, considering all possible sources of risk to health and wellness, these guidelines set forth the best possible diagnostic and analytic methodology for creating indoor living environments that are as exposure-free, risk-free, and natural as is reasonably possible.

**No Concern** This category provides the highest degree of precaution. It reflects the unexposed natural conditions or the common and nearly inevitable background level of our modern living environment.

**Slight Concern** As a precaution and especially with regard to sensitive and ill people, remediation should be carried out whenever it is possible.

**Severe Concern** Values in this category are not acceptable from a building biology point of view, they call for action. Remediation should be carried out soon. In addition to numerous case histories, scientific studies indicate biological effects and health problems within this reference range.

**Extreme Concern** These values call for immediate and rigorous action. In this category international guidelines and recommendations for public and occupational exposures may be reached or even exceeded.

If several sources of risk are identified within a single subcategory or for different subcategories, one should be more critical in the final assessment.

The small print at the end of each subcategory of the Building Biology Standard is meant as a comparative guide - e.g. legally binding exposure limits or other guidelines, recommendations and research results or natural background levels.

Building Biology Evaluation Guidelines for  
Sleeping Areas

No Concern	Slight Concern	Severe Concern	Extreme Concern
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### **A FIELDS, WAVES, RADIATION, SBM-2008**

#### **1 AC ELECTRIC FIELDS (Low Frequency, ELF/VLF)**

<b>Field strength</b> with ground potential in volt per meter	<b>V/m</b>	< 1	1-5	5 - 50	> 50
<b>Body voltage</b> with ground potential in millivolt	<b>mV</b>	< 10	10 - 100	100 - 1000	> 1000
<b>Field strength</b> potential-free in volt per meter	<b>V/m</b>	< 0.3	0.3-1.5	1.5 - 10	> 10

Values apply up to and around 50 (60) Hz, higher frequencies and predominant harmonics should be assessed more critically.

ACGIH occupational TLV: 25000 V/m; DIN/VDE: occupational 20000 V/m, general 7000 V/m; ICNIRP: 5000 V/m; TCO: 10 V/m; US-Congress/ EPA: 10 V/m; BUND: 0.5 V/m; studies on oxidative stress, free radicals, melatonin, childhood leukaemia: 10-20 V/m; nature: < 0.0001 V/m



Building Biology Evaluation Guidelines for Sleeping Areas

No Concern	Slight Concern	Severe Concern	Extreme Concern
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## 2 AC MAGNETIC FIELDS (Low Frequency, ELF/VLF)

Flux density in nanotesla in milligauss	nT mG	< 20 < 0.2	20-100 0.2-1	100 - 500 1 - 5	> 500 > 5
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Values apply to frequencies up to and around 50 (60) Hz, higher frequencies and predominant harmonics should be assessed more critically. Line current (50-60 Hz) and traction current (16.7 Hz) are recorded separately.

In the case of intense and frequent temporal fluctuations of the magnetic field, data logging needs to be carried out - especially during nighttime - and for the assessment, the 95<sup>th</sup> percentile is used.

DIN/VDE: occupational 5000000 nT, general 400000 nT; ACGIH occupational TLV: 200000 nT; ICNIRP: 100000 nT; Switzerland 1000 nT; WHO: 300-400 nT "possibly carcinogenic"; TCO: 200 nT; US-Congress/EPA: 200 nT; BioInitiative: 100 nT; BUND: 10 nT; nature: < 0.0002 nT

## 3 RADIOFREQUENCY RADIATION (High Frequency, Electromagnetic Waves)

Power density in microwatt per square meter	$\mu\text{W}/\text{m}^2$	< 0.1	0.1-10	10 - 1000	> 1000
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Values apply to single RF sources, e.g. GSM, UMTS, WiMAX, TETRA, Radio, Television, DECT cordless phone technology, WLAN..., and refer to peak measurements. They do not apply to radar signals. More critical RF sources like pulsed or periodic signals (mobile phone technology, DECT, WLAN, digital broadcasting...) should be assessed more seriously, especially in the higher ranges, and less critical RF sources like non-pulsed and non-periodic signals (FM, short, medium, long wave, analog broadcasting...) should be assessed more generously especially in the lower ranges.

Former Building Biology Evaluation Guidelines for RF radiation / HF electromagnetic waves (SBM-2003): pulsed < 0.1 no, 0.1-5 slight, 5-100 strong, > 100  $\mu\text{W}/\text{m}^2$  extreme anomaly; non-pulsed < 1 no, 1-50 slight, 50-1000 strong, > 1000  $\mu\text{W}/\text{m}^2$  extreme anomaly

DIN/VDE: occupational up to 100000000  $\mu\text{W}/\text{m}^2$ , general up to 10000000  $\mu\text{W}/\text{m}^2$ ; ICNIRP: up to 10000000  $\mu\text{W}/\text{m}^2$ ; Salzburg Resolution / Vi-enna Medical Association: 1000  $\mu\text{W}/\text{m}^2$ ; BioInitiative: 1000  $\mu\text{W}/\text{m}^2$  outdoor; EU-Parliament STOA: 100  $\mu\text{W}/\text{m}^2$ ; Salzburg: 10  $\mu\text{W}/\text{m}^2$  outdoor, 1  $\mu\text{W}/\text{m}^2$  indoor; EEG / immune effects: 1000  $\mu\text{W}/\text{m}^2$ ; sensitivity threshold of mobile phones: < 0.001  $\mu\text{W}/\text{m}^2$ ; nature < 0.000001  $\mu\text{W}/\text{m}^2$

## 4 DC ELECTRIC FIELDS (Electrostatics)

Surface potential in volt	V	< 100	100 - 500	500 - 2000	> 2000
Discharge time in seconds	s	< 10	10 - 30	30 - 60	> 60

Values apply to prominent materials and appliances close to the body and/or to dominating surfaces at ca. 50 % r.h.

TCO: 500 V; damage of electronic parts: from 100 V; painful shocks and actual sparks: from 2000-3000 V; synthetic materials, plastic finishes: up to 10000 V; synthetic flooring, laminate: up to 20000 V; TV screens: up to 30000 V; nature: < 100 V

## 5 DC MAGNETIC FIELDS (Magnetostatics)

Deviation of flux density (steel) in microTesla	$\mu\text{T}$	< 1	1-6	6-20	> 20
Fluctuation of flux density (current) in microtesla	$\mu\text{T}$	< 1	1-2	2-10	> 10
Deviation of compass needle in degree	°	< 2	2-10	10-100	> 100

Values refer to the flux density deviation through metal/steel or flux density fluctuation through direct current.

Germany: DIN/VDE 0848 occupational 67,000  $\mu\text{T}$  and general public 21,200  $\mu\text{T}$ ; USA/Austria 5,000-200,000  $\mu\text{T}$ ; MRI ca. 2T; earth's magnetic field across temperate latitudes 40-50  $\mu\text{T} \pm 1 \mu\text{T}$ ; magnetic field of eye 0.0001 nT; brain 0.001 nT; heart 0.05 nT