

The Building Biology Survey according to the

STANDARD OF BUILDING BIOLOGY TESTING METHODS

SBM-2008

The Standard gives an overview of the physical, chemical and biological risks encountered in sleeping areas, living spaces, workplaces and properties. It offers guidelines on how to perform specific measurements and assess possible health risks. All testing results, testing instruments and procedures are documented in a final written report. In case potential problems are identified, an effective remediation strategy is developed.

The individual subcategories of the Standard describe critical indoor environmental influences. With its professional approach, it helps identify, minimize and avoid such factors within an individual's framework of achievability. It is the Standard's goal to create indoor living environments that are as exposure-free and natural as practicable, this holistic approach is accomplished by taking all subcategories into account and implementing all available diagnostic possibilities. Testing, assessment and remediation strategies focus mainly on the building biology experience, precaution and achievability. Any risk reduction is worth striving for.

Between 1987 and 1992, BAUBIOLOGIE MAES developed the *Standard of Building Biology Testing Methods*, the accompanying *Building Biology Evaluation Guidelines for Sleeping Areas* and additional testing details on behalf and with the support of the *Institut für Baubiologie und Ökologie Neubeuern IBN*. Scientists, medical doctors and colleagues also offered their support. The *Standard* was issued for the first time in May 1992. The most current *Standard* SBM-2008 is the seventh edition and was published at the beginning of 2008. Since 1999 a 10-member expert commission assists in maintaining and updating the *Standard*, including the *Guidelines* and specific testing protocols. The current members of the commission are as follows: Dr. Dipl.Chem. Thomas Haumann, Dipl.Ing. Norbert Honisch, Wolfgang Maes, Dipl.Ing. Helmut Merkel, Dr. Dipl.Biol. Manfred Mierau, Uwe Münzenberg, Rupert Schneider, Peter Sierck, Dipl.Chem. Jörg Thumulla, Dr.Ing. Martin H. Vírnic.

A FIELDS, WAVES, RADIATION

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

Sources: AC voltage in electrical installations, cables, appliances, outlets, walls, floors, beds, high-tension and other power lines...

Measurement of low frequency electric **field strength** (V/m) and human **body voltage** (mV) as well as identification of dominant **frequency** (Hz) and prominent **harmonics**

2 AC MAGNETIC FIELDS (Low Frequency, ELF/VLF)

Sources: AC current in electrical installations, cables, appliances, transformers, motors, overhead and ground cables, power lines, railways...

Measurement and data logging of low frequency magnetic **flux density** (nT) from power grid or railway system as well as identification of dominant **frequency** (Hz) and prominent **harmonics**

3 RADIOFREQUENCY RADIATION (High Frequency, Electromagnetic Waves)

Sources: cell phone technology, RF transmitters, broadcast, trunked radio systems, line-of-sight systems, radar, military, cordless phones...

Measurement of high frequency electromagnetic **power density** ($\mu\text{W}/\text{m}^2$) as well as identification of dominant RF **sources** and low frequency **signals** (pulse, periodicity, modulation...)

4 DC ELECTRIC FIELDS (Electrostatics)

Sources: synthetic carpeting, drapes and textiles, vinyl wallpaper, varnishes, laminates, stuffed toy animals, TV or computer screens...

Measurement of electrostatic **surface potential** (V) as well as **discharge time** (s)

5 DC MAGNETIC FIELDS (Magnetostatics)

Sources: steel components in beds, mattresses, furniture, appliances, building materials; DC current in street cars, photovoltaic systems...

Measurement of **geomagnetic field distortion** as **spatial deviation** of magnetic flux density (μT , metal/steel) or **temporal fluctuation** of magnetic flux density (μT , current) as well as **compass deviation** ($^\circ$)

6 RADIOACTIVITY (Gamma Radiation, Radon)

Sources: building materials, stones, tiles, slags, waste products, devices, antiques, ventilation, terrestrial radiation, location, environment...

Measurement of **equivalent dose rate** (nSv/h, %) as well as **radon concentration** (Bq/m^3)

7 GEOLOGICAL DISTURBANCES (Geomagnetic Field, Terrestrial Radiation)

Sources: currents and radioactivity in the earth; local disturbances caused by faults, fractures, underground water courses...

Measurement of earth's **magnetism** (nT) and earth's **radiation** (ips) and its prominent **disturbances** (%)

8 SOUND and VIBRATION (Airborne and Solid Sound)

Sources: traffic noise, air traffic, train traffic, industry, buildings, devices, machines, motors, transformers, sound bridges...

Measurement of **noise level**, **sound**, **infrasound**, **ultrasound**, **oscillations** and **vibrations** (dB, m/s^2)

B INDOOR TOXINS, POLLUTANTS, INDOOR CLIMATE

1 FORMALDEHYDE and other Toxic Gases

Sources: varnishes, glues, particle board, wood products, furnishings, devices, heating, gas leaks, combustion, exhaust fumes, environment...

Measurement of **toxic gases** ($\mu\text{g}/\text{m}^3$, ppm) such as formaldehyde, ozone and chlorine, urban and industrial gases, natural gas, carbon monoxide, nitrogen dioxide and other combustion gases

2 SOLVENTS and other Volatile Organic Compounds (VOC)

Sources: paints, varnishes, adhesives, synthetics, building materials, particle board, furniture, coatings, cleaners...

Measurement of **volatile organic compounds** ($\mu\text{g}/\text{m}^3$, ppm) as acrylates, aldehydes, aliphates, alkanes, alkenes, alcohols, amines, cycloalkanes, esters, ethers, glycols, halogens, hydrocarbons, isocyanates, ketones, cresols, phenols, siloxanes, terpenes and other aromatic or organic compounds (VOC)

3 PESTICIDES and other Semi-Volatile Organic Compounds (SVOV)

Sources: wood, leather and carpet protections, adhesives, plastics, sealers, coatings, moth-proofing agents, pest-control agents...

Measurement of **semi-volatile organic compounds** (mg/kg, ng/m^3) as biocides, insecticides, fungicides, wood preservatives, pyrethroids, fire retardants, plasticizers, PCBs, PAHs, dioxins

4 HEAVY METALS and other Similar Toxins

Sources: wood preservatives, building materials, building moisture, PVC, paints, glazes, plumbing pipes, industry, toxic waste, environment...

Measurement of **inorganic substances** (mg/kg) such as heavy metals and metal compounds, salts

5 PARTICLES and FIBERS (Fine Particulate Matter, Nanoparticles, Asbestos, Mineral Fibers...)

Sources: aerosols, airborne particles, dust, smoke, soot, building and insulating material, ventilation and air-conditioning, toner, environment...

Measurement of **dust**, number and size of **particles**, **asbestos** and other **fibers** (/l, $\mu\text{g}/\text{m}^3$, /g, %)

6 INDOOR CLIMATE (Temperature, Humidity, Carbon Dioxide, Air Ions, Air Changes, Odors...)

Source: moisture damage, building materials, ventilation, heating, furnishings, breathing, static electricity, radiation, dust, environment...

Measurement of **air and surface temperature** ($^{\circ}\text{C}$), air humidity and **material moisture** (r.h., a.h., %), **oxygen** (vol.%), **carbon dioxide** (ppm), **air pressure** (mbar), **air movement** (m/s) and **air ions** ($/\text{cm}^3$) as well as **air electricity** (V/m), identification of **odors** and **air exchange rate**

C FUNGI, BACTERIA, ALLERGENS

1 MOLDS and their Spores and Metabolites

Sources: moisture damage, thermal bridges, construction defects, building materials, remediation mistakes, air-conditioning, environment...

Measurement and identification of **molds** that can or cannot be cultured, their spores and fragments ($/\text{m}^3$, $/\text{dm}^2$, /g) as well as their metabolites (MVOC, mycotoxins...)

2 YEASTS and their Metabolites

Sources: moist areas, hygiene problems, food storage, garbage, appliances, water purification systems, sanitary plumbing systems...

Measurement and identification of **yeasts** ($/\text{m}^3$, $/\text{dm}^2$, /g) and their metabolites

3 BACTERIA and their Metabolites

Sources: moisture damage, waste water damage, hygiene problems, food storage, garbage, water purification, sanitary plumbing systems...

Measurement and identification of **bacteria** ($/\text{m}^3$, $/\text{dm}^2$, /g, /l) and their metabolites

4 DUST MITES and other Allergens

Sources: dust mites, their feces and metabolites, mold growth, hygiene, house dust, pets, building moisture, ventilation, environment...

Measurement and identification of **mite number** and **feces**, **pollen**, **grasses**, **animal hair** ($/\text{m}^3$, /g, %)

Additional measurements, inspections and surveys are also part of the Standard e.g. light quality, illuminance level and UV exposure, potable water quality testing for toxic and microbial contamination, testing of building materials, furniture and other furnishings as well as for home and wood pests, also consulting and planning services for respective projects as well as consulting and support during construction.

The Standard also includes the Building Biology Evaluation Guidelines for Sleeping Areas, which have been developed specifically for long-term risks and the sensitive time of regeneration or sleep, as well as additional testing conditions and explanations, which specify and describe the methods and analyses in more detail.

The Standard of Building Biology Testing Methods SBM-2008 was translated from German into English by Katharina Gustavs in June 2008.