



# Waterbeds

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Unlike conventional beds, which have mattresses made of foam, latex or natural products, waterbeds feature a mattress with a water-filled core. To prevent the loss of body heat, most waterbeds incorporate an electric heating system to warm the water in the core. The heating generates low-frequency magnetic fields that exceed those normally present in dwellings. However, the magnetic fields are below the official threshold by a factor of at least 100. The magnetic fields only occur while the heating system is in operation. Some waterbed heating systems incorporate a nighttime deactivation function, thus preventing any exposure to magnetic fields during the hours of sleep. There are also special low-radiation waterbed heating systems that generate practically no magnetic fields even during operation. Further information on the various heating models can be provided by waterbed manufacturers and specialist retailers.



It is not known whether the long-term impact of low-frequency magnetic fields presents a health risk. No effects are expected from short-term exposure to low-frequency emissions from water beds.

Exposure to the magnetic fields generated by waterbeds can be reduced by the following precautions:

- Prior to purchasing a waterbed, enquire about the available low-radiation heating systems.
- With normal waterbed heating systems without low-radiation properties, use the nighttime deactivation function or a time switch.
- Use a shielded three-pole cable for the heating power supply in order to avoid electric fields.

**NB:**

- Observe the safety measures listed in the instruction manual
- Due to the risk of suffocation, waterbeds are not at all suitable for babies. Babies should only sleep on a solid mattress. Please note the relevant recommendations.



# 1 Technical data

Output: 400 W or 310 W per lying surface

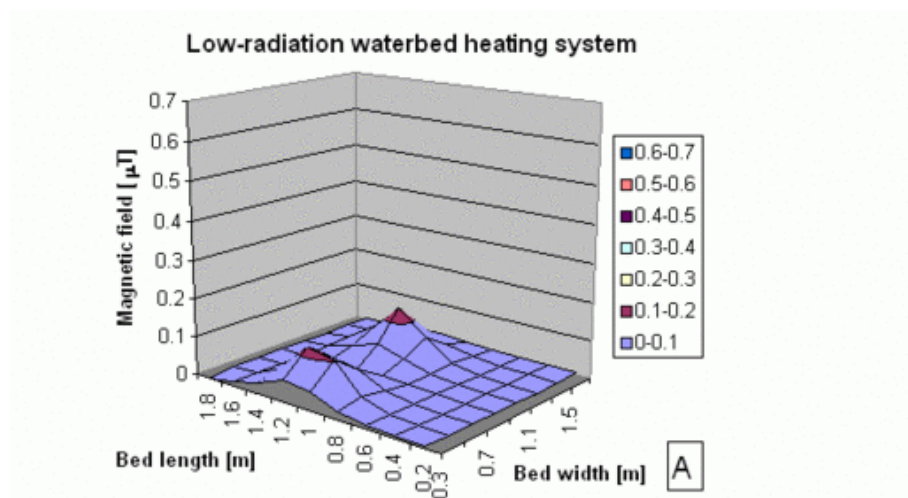
Frequency: 50 Hz

Waterbeds comprise a water-filled core enclosed inside a protective cover. The water-filled core is normally heated from the underside by means of an electric heating system. As current flows through the electrically conductive heating conductor (metal component, wire), the electrical resistance of this conductor causes electrical energy to be converted into thermal energy. The current flowing through the heating element generates a magnetic field. The power can be shut off and the magnetic field eliminated by the use of a nighttime deactivation function or a time switch. There are also special low-radiation waterbed heating systems that generate practically no magnetic fields even during operation.

## 2 Exposure to low-frequency magnetic fields

Unlike other, sporadically operated electrical household appliances, waterbeds are used every day for an extended period. Depending on the waterbed heating system, this may result in a prolonged exposure to magnetic fields [1]. A survey commissioned by the FOPH (Federal Office of Public Health) set out to measure the magnetic fields on the lying surface of three waterbeds.

- In the case of the two waterbeds with low-radiation heating systems, no measurable magnetic field exposure was detected on the lying surface (Figure 1A).
- For the waterbed incorporating a conventional heating system, magnetic field values in the region of 0.3-0.7  $\mu\text{T}$  (microtesla) were measured (Figure 1B). Though at least 160 times below the threshold of 100  $\mu\text{T}$  (for 50 Hz) recommended by the European Union [2], the values far exceeded the levels normally encountered in dwellings [3]. Similar high magnetic field values for waterbed heating systems were also recorded in other studies [4, 5].
- This unshielded waterbed heating system was also observed to generate relatively strong electric fields (35 V/m).



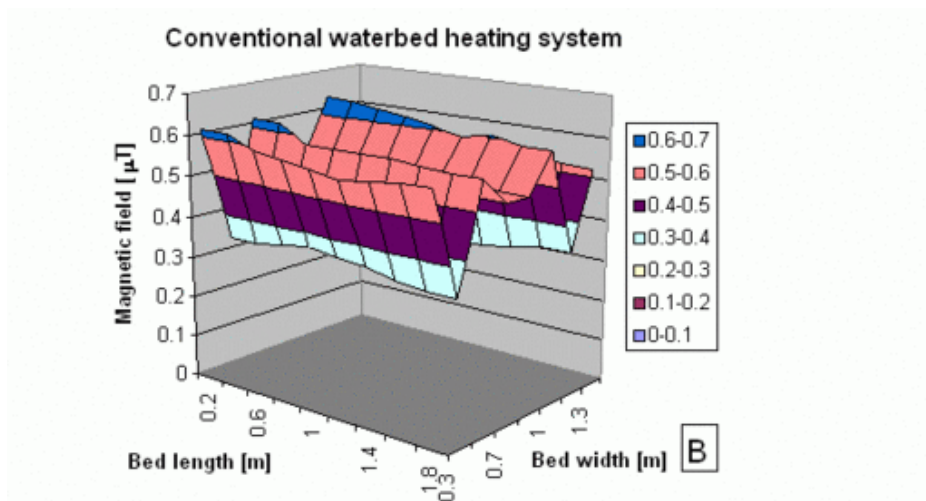


Figure 1: Low-frequency magnetic fields on the lying surface of two waterbeds: A) low-radiation waterbed heating system, B) conventional waterbed heating system

## 3 Impact on health

### 3.1 Low-frequency magnetic fields

Low-frequency magnetic fields can penetrate and induce electric current within the human body. Excessive amounts of current may in some cases excite the nerves of the central nervous system. Accordingly, the European threshold values for magnetic fields have been set such that the current is at least 50-fold below this excitation threshold [6]. The magnetic fields from waterbeds are much lower than the threshold value of 100  $\mu\text{T}$ . Short-term effects on health are not expected as the current thresholds avoid acute damage.

In 2002 the International Agency for Research on Cancer (IARC) classified static and low-frequency magnetic fields as possibly carcinogenic (Group 2B) [6]. This was based on epidemiological studies that suggest that long-term and durable exposure to magnetic fields in the low-dosage area of 1  $\mu\text{T}$  or even lower ( $< 0.4 \mu\text{T}$ ) could increase the risk of Alzheimer's disease [7, 8] or of childhood leukaemia [9, 10]. Personal exposure to magnetic fields generated by waterbed heating systems can be reduced by following the recommendations listed above.

### 3.2 Specific studies on waterbeds

Several studies conducted in the 1980s and 1990s investigated the risks of magnetic field exposure caused by electrically heated beds and waterbeds. Precise information on the level of magnetic field exposure is absent in most of these studies. Yet it can be assumed, given the date of these studies, that they were based on conventional waterbed heating systems causing strong magnetic fields. The investigations focused on the occurrence of childhood leukaemia, miscarriages, abnormal foetal development and abnormalities among children, as well as the risk of breast cancer, brain tumours and prostate cancer. The majority of studies were unable to establish a correlation between the use of a



waterbed and these illnesses. A small number of studies, some of which did not distinguish between waterbeds and electric blankets, found evidence of links with miscarriages, abnormalities and cancer incidence.

### 3.3 Babies in adult waterbeds

Soft mattresses such as water beds can be dangerous for babies due to the risk of suffocation [11]. Babies should only sleep on solid mattresses. Please note the relevant recommendations [11-13].

## 4 Regulation in law

Water beds are low-voltage appliances which are regulated in Switzerland by the Ordinance on electrical low-voltage equipment ([SR 734.26 - Ordinance of 25 November 2015 on electrical low-voltage equipment | Fedlex](#)). It stipulates that low-voltage appliances may only be marketed if they comply with the safety objectives of Annex I of the European (EC) Low Voltage Directive ([Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits \(recast\) Text with EEA relevance](#)). The European directive states that low-voltage appliances must be designed and created in such a manner that protection against hazards is guaranteed when they are used as intended and adequately maintained. To this end, technical measures, among other things, must be defined to ensure that no hazardous radiation is emitted. Manufacturers of low-voltage appliances must obtain a Declaration of Conformity for a product from the time at which it is brought onto the market; this declaration states that the product complies with these requirements. The requirements for individual products are specified in the technical standards. For the electromagnetic fields created by domestic appliances, the standard "SN EN 62233:2008 Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure", which refers to the standard "IEC 62233:2005" of the same name, applies. According to the standard SN EN 62233:2008, the conformity criteria for compliance with the requirements correspond to the limit recommended by the EU ([1999/519/EC: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields \(0 Hz to 300 GHz\) - Publications Office of the EU](#)). In addition to other specifications for intended use, the standard IEC 62233:2005 defines a distance of 10 cm between the surface of the waterbed heating and the magnetic field measuring device. Manufacturers are responsible for ensuring that their appliances comply with the conformity criteria. In Switzerland, no authority checks whether water beds meet these standards ([23.4244 | Mobile phones emit more radiation than permitted. The time has come to check the NIR limits in Switzerland too! | Item of business | The Swiss Parliament](#) – available in German, French and Italian).

## 5 Literature

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