

STATIC MAGNETIC FIELDS¹

These TLVs refer to static magnetic flux densities to which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. These values should be used as guides in the control of exposure to static magnetic fields and should not be regarded as fine lines between safe and dangerous levels.

Routine occupational exposures should not exceed 60 millitesla (mT), equivalent to 600 gauss (G), whole body or 600mT (6000 G) to the limbs on a daily, time-weighted average basis [1 Tesla (T) = 10⁴ G]. Recommended ceiling values are 2 T for the whole body and 5 T for the limbs. Safety hazards may exist from the mechanical forces exerted by the magnetic field upon ferromagnetic tools and medical implants. Cardiac pacemaker and similar medical electronic device wearers should not be exposed to field levels exceeding 0.5 mT (5G). Adverse effects may also be produced at higher flux densities resulting from forces upon other implanted devices such as suture staples, aneurism clips, prostheses, etc.

These TLVs are summarized in Table 1.

TABLE 1. TLVs for Static Magnetic Fields

	8-hour TWA	Ceiling
Whole Body	60 mT	2T
Limbs	600 mT	5T
Medical electronic device wearers	----	0.5 mT

SUB-RADIOFREQUENCY (30 kHz and below) MAGNETIC FIELDS¹

These TLVs refer to the amplitude of the magnetic flux density (B) of sub-radiofrequency magnetic fields in the frequency range of 30 kHz and below to which it is believed that nearly all worker may be exposed repeatedly without adverse health effects. The magnetic field strengths in these TLVs are root-mean-square (rms) values. These values should be used as guides in the control of exposure of sub-radiofrequency magnetic fields and should not be regarded as fine lines between safe and dangerous levels.

Occupational exposures in the extremely-low-frequency (ELF) range from 1 Hz to 300Hz should not exceed the ceiling value given by the equation:

$$B_{TLV} = \frac{60}{f}$$

Where f is the frequency in Hz, and B_{TLV} is the magnetic flux density in millitesla (mT).

For frequencies in the range of 300 Hz to 30 kHz (which includes the voice frequency [VF] band from 300 Hz to 3 kHz and the very-low-frequency [VLF] band from 3 kHz to 30 kHz), occupational exposures should not exceed the ceiling value of 0.2mT.

These ceiling values for frequencies of 300 Hz to 30 kHz are intended for both partial-body and whole-body exposures. For frequencies below 300 Hz, the TLV for exposure of the extremities can be increased by a factor of 10 for the hands and feet and by a factor of 5 for the arms and legs.

The magnetic flux density of 60 mT/f at 60 Hz corresponds to a TLV of 1 mT. At 30kHz, the TLV is 0.2 mT which corresponds to a magnetic field intensity of 160 A/m.

¹For workers wearing cardiac pacemakers, the TLV may not protect against electromagnetic interference with pacemaker function. Some models of cardiac pacemakers have been shown to be susceptible to interference by power-frequency (50/60 Hz) magnetic flux densities as low as 0.1 mT. It is recommended that, lacking specific information on electromagnetic interference from the manufacturer, the exposure of persons wearing cardiac pacemakers or similar medical electronic devices be maintained at or below 0.1 mT at power frequencies.

References

1. “2003 TLVs and BELs, Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices”, American Conference of Government Industrial Hygienists (ACGIH).
2. [SBMS Subject Area, “STATIC Magnetic Fields”](#).