Electric and Magnetic Fields – Quick Tips

Electric and magnetic fields (EMF) are invisible lines of force that surround any electrical device. Electrical wiring, electrical equipment and power lines all produce electric and magnetic fields. Electrical fields and magnetic fields can be characterized by their wavelength, frequency and amplitude (strength). The wavelength describes the distance between the peak of one wave to the peak of the next wave. Frequency is the number of wave cycles per second measured in Hertz (Hz). Electricity in the United States alternates or changes direction at 60 cycles per second or 60 Hz. In many other parts of the world the frequency of electric power is 50 Hz. If equipment uses batteries, the current flows in only one direction and is referred to as direct current. Direct current produces a static or stationary magnetic field which would be 0 Hz.

The term EMF can describe electromagnetic fields with high or low frequencies. In general, when you see EMF, it usually refers to electric and magnetic fields at extremely low frequencies (ELF) such as those associated with the use of electrical power. This focuses primarily with electric and magnetic fields in the low frequency range, primarily 50 or 60 Hz which is produced by the generation, transmission and use of electricity.

Electric Fields

Electric fields are produced by voltage and increase as the voltage increases. The strength of the electric field is measured in units of volts per meter (V/m). Electric fields often are present even if the equipment is turned off, as long as it remains connected to the power source. Electric fields decrease rapidly the further you get from the source. They are also shielded or weakened as they pass through buildings, trees, clothes etc.

Magnetic Fields

The magnetic fields result from the flow of current through wires or electrical devices and increase in strength as the current increases. Magnetic fields are measured in units of Gauss (G) or Tesla (T). Gauss is most commonly used in the United States and Telsa is the internationally accepted term. Unlike an electric field, a magnetic field is only produced when the current is flowing. Magnetic fields also decrease rapidly the further you get from the source but are not as easily shielded as electrical fields; magnetic fields tend to pass through most materials which is why they tend to be more of a concern.

Health Effects of Electric and Magnetic Fields

Reported symptoms from the general public to electric and magnetic field exposure include headaches, anxiety, depression, nausea and fatigue. To date, scientific evidence does not support a link between these symptoms and exposure to electric and magnetic fields. The most recent research has been focused on magnetic fields because some epidemiological studies have suggested an increased risk of cancer with exposure to magnetic fields while no similar associations have been reported for electric fields. Although there is some weak scientific evidence to suggest a link between electric and magnetic fields and cancer, at this time, there have been no confirmed links between EMF exposure and an increase risk of cancer, leukemia or other non-cancer related disease.

Electric and Magnetic Field Exposure Standards

Currently there are no federal standards that limit occupational or residential exposure to 60 Hz EMF. Several states have standards for electric fields on transmission lines and a few have standards for magnetic fields. Some states further limit electric field strength at road crossing to ensure that electric current induced into large metal object like trucks and buses does not represent an electric shock hazard. Personal exposure limits as low as 1–3mG have been suggested by manufacturers of electric and magnetic field meters and different organizations have developed their own exposure guidelines which are 10 Gauss or higher. Since there isn’t consistency in recommended exposure levels, common

sense would dictate that a practice of minimal exposure be exercised whenever possible.

Measuring Electric and Magnetic Fields

Many manufacturers make instruments for measuring electric and magnetic fields. Most of the instruments that are called EMF meters may only be capable of measuring magnetic fields and not electrical fields; this is because most of the health concerns seem to come from the magnetic fields. Check the measuring ranges to see what frequencies the instrument is capable of measuring. The entry level meters that measure magnetic fields are usually single axis meters. Since magnetic fields are oriented in space, a single axis meter only has one sensor and will need to be rotated in space until you get the highest reading. A triple axis meter has 3 sensors at right angles. This type of meter does not require rotation to get the correct readings.

Click here for an EMF tester.

Frequently Asked Questions

Q: Do electric and magnetic fields affect pacemakers?

A: According to the U.S. FDA, interference from electric and magnetic fields can affect various medical devices including cardiac pacemakers and implantable defibrillators. Check with the manufacturer of these specific devices for their limitations.

Q: Are cell phones and towers sources of electric and magnetic field exposure?

A: These items involve radio-frequency and microwave-frequency electromagnetic fields. These are a much higher frequency than power generation electric and magnetic fields. At radio and microwave frequencies, electric and magnetic fields are considered together as the two components of an electromagnetic wave. Power density, measured in watts per square meter (W/m^2), describes the intensity of these fields. These items are regulated by the Federal Communications Commission (FCC) to ensure compliance with exposure standards. These types of items cannot be measured by

most EMF meters because they are outside of the frequency range of the meters. There are EMF meters available for this application just make sure to check the application and frequency range of the instrument before you purchase.

Q: How do I convert between Gauss and Tesla?

A: 1 Tesla = 10,000 Gauss
1 Milligauss is 1/1000 of a Gauss
1 Microtesla is 1/1,000,000 of a Tesla

To convert from Microtesla to Milligauss, multiply by 10
1 Microtesla = 10 Milligauss and 0.1 Microtesla = 1 Milligauss

Q: How are EMF meters used in paranormal research?

A: There are many websites that specialize in these types of applications where you can obtain information, but generally for this application, EMF Meters are used to seek out unexplainable levels or changes in the natural magnetic field, hopefully providing credible evidence of paranormal activity.

Sources

www.lessemf.com
World Health Organization
NIOSH

Source: Grainger Know How – https://www.grainger.com/know-how