

BULLETIN ON INDUCTION HEATING AND EMF EXPOSURE

GENERAL OVERVIEW

Everyone in our modern society is exposed to electric and magnetic fields (EMF) from many sources. The majority of sources of EMF found both in the home and the workplace produce extremely low levels of exposure. Electric current flowing through any conductor causes localized EMF. The current from induction heating operations creates EMF near the heating circuit.

EFFECTS OF EMF

The effects EMF from induction heating operations have on people are dependent upon frequency and intensity. Documented short-term direct effects include stimulation of nerve and muscle tissue. EMF can also cause indirect effects to equipment in the field, which could result in a safety or health hazard. All effects show a threshold below which there is no risk, and exposures below the threshold are not cumulative. The effects caused by exposure are limited to the duration of the exposure, and will stop or decrease once exposure ceases. There is no well-established scientific evidence of long-term effects of exposure to EMF from induction heating operations.

WORKERS AT PARTICULAR RISK

Some groups of workers are considered to be at particular risk from EMF. These include:

- Workers wearing active implanted medical devices;
- Workers wearing passive implanted medical devices containing metal;
- Workers wearing body-worn medical devices; and
- Pregnant workers.

These individuals should consult their doctor and device manufacturer before going near induction heating operations.

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PRECAUTIONS TO MINIMIZE EXPOSURE

- Keep cables close together by twisting or taping them, or using a cable cover;
- Do not place your body between cables. Arrange cables to one side and away from the operator;
- Do not coil or drape cables around your body;
- Keep metal jewelry and other metal personal items away from heating circuit during operation;
- Keep head and trunk as far away from the heating circuit as possible; and
- Do not work next to, sit or lean on the induction heating power source.

DISTANCE AND EXPOSURE

The magnitude of EMF decreases rapidly with distance from its source. Although the United States does not currently regulate exposure to EMF, the European Union has released Exposure Limit Values (ELV) for EMF. When using a Miller ProHeat™ 35 for example, 30 cm is the distance where all occupational ELV Exposure Indices fall below 0.20 (20%), and 56 cm is the distance where all general public ELV Exposure Indices fall below 1.00 (100%). This information as well as minimum approach distances of various body parts to the pipe/coil where EMF exposure limit values are not exceeded (as shown in Figure 1 below) is provided in the EMF Datasheet found in the Miller ProHeat™ 35 Owner's Manual.

Figure 1: * Values are based on Miller's ProHeat™ 35, 400-460v (CE)

Output Power	Body Part			
	Head	Trunk	Hand	Thigh
35 kW	12 cm	14 cm	6 cm	12 cm
25 kW	11 cm	13 cm	4 cm	11 cm
15 kW	9 cm	11 cm	2 cm	9 cm
5 kW	4 cm	6 cm	0 cm	4 cm

ADDITIONAL INFORMATION CAN BE FOUND AT:

The National Institute for Occupational Safety and Health (NIOSH) – EMF (Electric and Magnetic Fields):

<https://www.cdc.gov/niosh/topics/emf/default.html>

European Union – Occupational Safety and Health Administration (EU-OSHA). Directive 2013/35/EU – Electromagnetic Fields:

<https://osha.europa.eu/en/legislation/directives/directive-2013-35-eu-electromagnetic-fields>

International Commission on Non-Ionizing Radiation Protection (ICNIRP) – Low Frequency Guidelines:

<https://www.icnirp.org/en/frequencies/low-frequency/index.html>

American Welding Society (AWS) – Safety and Health Fact Sheets:

<https://www.aws.org/standards/page/safety-health-fact-sheets>

Miller Electric Mfg. LLC Safety Precautions:

<https://www.millerwelds.com/resources/safety-precautions>