

# *Workplace safety for demagnetizer operators*

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# Workplace safety for demagnetizer operators

- Basics

For the general public exposure recommendations have been issued by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

The safety for workplaces within electromagnetic fields is subject to different standards and is regulated nationally. In Germany for example the regulation BGV B11 has to be applied. The safe operation of demagnetizers requires the observance of exposure limits!

Demagnetizing machines with alternating field principle work with a low frequency electromagnetic field. The safety relevant component for demagnetizers is the magnetic field strength. The strength of the magnetic field is maximum in the demagnetizing area and decreases with growing distance, according to the formula  $1/r^2$  from ( $r$  = distance to the demagnetizing area center)



Warning sign for electromagnetic field

# Workplace safety for demagnetizer operators

- Recommendations according to ICNIRP

ICNIRP's (International Commission on Non-Ionizing Radiation Protection) recommendations are based on scientific analysis and evaluation of knowledge and impose guidelines to protect people from adverse health effects of electric, magnetic and electromagnetic fields, optical radiation and lasers. From the work of the ICNIRP exposure limits have emerged. The ICNIRP guidelines from 1998 are the most famous of these recommendations.

For electromagnetic fields (50 / 60Hz) ICNIRP recommends the following exposure limits:

0,01 mT	Recommended as maximum for working environment, not yet official
0,10 mT	Current exposure limit in Germany and recommended for public
0,50 mT	Recommendation for working environment, daily, constant exposure
1,00 mT	Exposure limit for public, daily exposure for few hours
5,00 mT	Recommendation for working environment, daily exposure for few hours

RMS values

# *Workplace safety for demagnetizer operators*

- **Accident prevention regulation BGV B11 (Germany)**

The BGV B11 (berufsgenossenschaftliche Vorschrift für Sicherheit und Gesundheit bei der Arbeit ) regulates the workplace safety in areas where electric, magnetic or electromagnetic fields apply. The accident prevention regulation defines the exposure limits and the measurement and evaluation procedures of these limits.

According to BGV B11 the factory area is divided into exposure areas.

To evaluate the exposure areas, the frequency  $f$  of the field source (e.g. demagnetizer) must be known. The measurement of the electromagnetic field must be done with a standard probe of 100cm<sup>2</sup> area.

# Workplace safety for demagnetizer operators

- Accident prevention regulation BGV B11 (Germany)

According to BGV B11 the following exposure limits have been defined:

	For extremities	Area of increased exposure 2h/d	Exposure area 1
Exposure limit [mT]	318,25 / f	127,3 / f	67,9 / f
Example f = 50Hz	318,25 / 50 = 6,37 mT	127,3 / 50 = 2,55 mT	67,9 / 50 = 1,36 mT

Exposure limits: RMS values

Exposure area 1:

Area, where an exposure above the limits for the general public occurs only temporary.

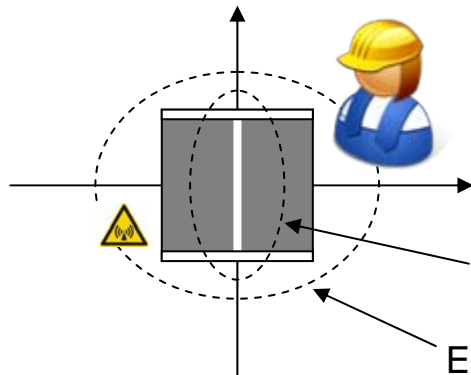
Note:

Pulsed fields by Maurer Magnetic AG demagnetizers comply with the limits of continuous fields.  
(Results from calculation according to BGV B11, part 3 pulsed fields)

# Workplace safety for demagnetizer operators

- Exposure limits of classic demagnetizers
  - Manual work, common plate demagnetizer

Qualitative diagram of the exposure areas.  
View from above.



BGV B11 limit for extremities; radius  $r \sim 100\text{mm}$ ;  
inside the circle exposure is bigger than  $6.37\text{ mT}$

Exposure limit for area 1; radius  $r \sim 250\text{mm}$ ;  
inside the circle exposure is bigger than  $1.36\text{ mT}$

The evaluation of the fields has been done by use of the instrument Narda ELT-400 with a standard  $100\text{cm}^2$  probe.



## Conclusion:

When the parts are drawn by hand over the plate demagnetizer the permissible limits are exceeded. A handling device (e.g. conveyor belt) is recommended for work conform with standards.

# *Workplace safety for demagnetizer operators*

- Exposure limits of classic demagnetizers
  - Manual work, common hand held demagnetizer

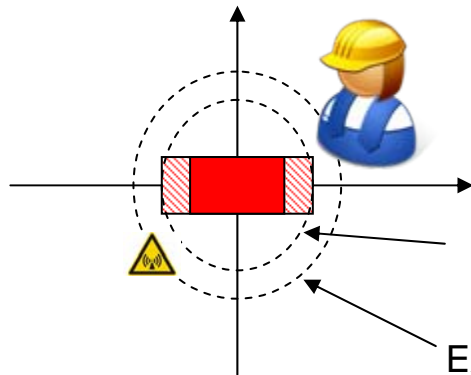
The hand held demagnetizer type MM HE2 used for this experiment, produces a small volume stray flux. In the area of the handle alternative magnetic fields below 0.4 mT were measured. As long as at the bottom of the demagnetizer is not touched, the exposure limits for working environment in accordance to BGV B11 or ICNIRP are not exceeded.



# Workplace safety for demagnetizer operators

- Exposure limits of classic demagnetizers
  - Manual work, common tunnel demagnetizer

Qualitative diagram of the exposure areas.  
View from above.



BGV B11 limit for extremities; radius  $r \sim 250\text{mm}$ ;  
inside the circle exposure is bigger than  $6.37\text{ mT}$

Exposure limit for area 1; radius  $r \sim 550\text{mm}$ ;  
inside the circle exposure is bigger than  $1.36\text{ mT}$



Conclusion:

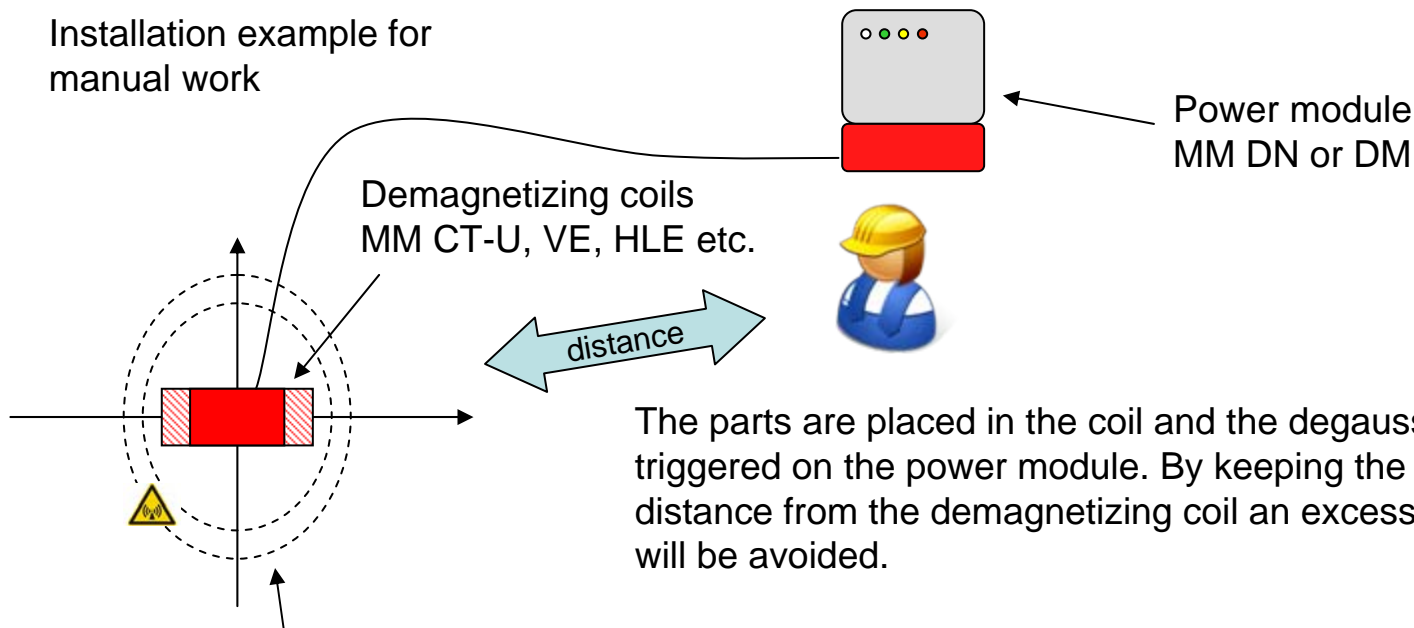
The permitted limits are exceeded, as soon as the person is staying close to the coil. A handling device (e.g. conveyor belt) is recommended for the work conform to standards.

# Workplace safety for demagnetizer operators

- Safety concept of Maurer-Degaussing demagnetizers
  - Protection by distance and / or shielding



Installation example for manual work



The parts are placed in the coil and the degaussing pulse is triggered on the power module. By keeping the necessary distance from the demagnetizing coil an excessive exposure will be avoided.

Optionally, the stray flux from the demagnetizer can be reduced with additional shielding.

Exposure according to BGV B11:  
Extremities;  $r \sim 350\text{mm}$ ;  
Exposure area 1;  $r \sim 750\text{mm}$

# *Workplace safety for demagnetizer operators*

- Maurer Magnetic AG, your specialist for
  - Industrial demagnetizers
  - Instruments for measuring magnetic fields
  - Degaussing services
  - Troubleshooting in the field of magnetism
  - Magnets and magnetic systems