

EMF electric and magnetic fields



Hammond Power
Solutions Inc.



Electric and Magnetic

**Are you
protecting your
people and
equipment from
EMF?**

HOSPITALS

UNIVERSITIES

GOVERNMENT BUILDINGS

OFFICE BUILDINGS

RESEARCH FACILITIES

SCHOOLS

BANKS

COMPUTER CENTERS

& MANY MORE!

Are you selecting transformers for locations that are:

- Adjacent to public areas?
- Adjacent to where people work?
- Near computers?
- Near medical equipment?

Then you may want to consider ways to reduce EMF levels?

WHAT IS EMF?

Electric and Magnetic Fields are produced by the distribution of electricity through current carrying devices. The extremely low frequency EMF or power frequencies fields 50 to 60 Hz are produced by the generations, transmissions and use electrical energy.

An excellent site for understanding the basics of EMF is maintained by The National Institute of Environmental Health Sciences www.niehs.nih.gov/em-frapid/booklet/basics.htm.

EFFECTS ON EQUIPMENT

Computers, servers, monitors, medical equipment and other complex electronic equipment can all be affected by the presence of EMF fields. These fields have been known to distort monitors, cause faulty readings, computer errors and even equipment lock-ups.



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HEALTH ISSUES

An even greater issue than the effect on equipment is the potential effect on humans. The debate continues as to what a safe EMF level is and what the possible health effects are. Numerous studies continue to produce contradictory results. There does not appear to be any conclusive answers available at this time to rule out or cast a verdict on the effect of EMF on humans. The EPA has stated that there is a reason for concern and suggested "prudent avoidance".



EMF TYPICAL EXPOSURE

The average exposure to magnetic fields is greater at work than at home. Exposure at work could be significantly increased if a work cell, office, or room was to be within close proximity to an equipment that produces EMF.



What EMF level do you consider safe?

What levels are you exposing people to?

What is it worth to you to reduce the level of EMF exposure for your employees?



TYPICAL TRANSFORMER EMF

The EMF produced by a typical transformer is directly dependent on the load current. The higher the current the higher the typical EMF level will be.

Table 1

Three Phase Dist. Transformers with Minimum 208V Winding		
kVA	Typical EMF range [mG]	
9	20	25
15	20	25
30	20	25
45	20	30
75	35	45
112.5	50	65
150	70	85
225	90	120
300	120	150
500	200	250
750	300	375
1000	400	500
1500	600	800

Table 2

Three Phase Power Transformer with Minimum 480V Windings		
kVA	Typical EMF range [mG]	
2000	350	450
2500	450	575
3000	550	700
4000	750	950
5000	800	1000

- These are typical EMF values with stubs up terminations
- To determine the exact EMF of a transformer it needs to be physically measured
- EMF values from a transformer are also affected by:
 - Type of transformer load
 - Transformer loading percentage
 - Site conditions and other EMF sources in the vicinity

Table 1 and 2 gives typical values of EMF at one meter distance from the enclosure of distribution and power transformers. These EMF levels will not be affected by the presence of walls and will pass directly through most non-metallic objects.



HPS Single & Three Phase Distribution Transformer





EMF SHIELDING & PROTECTION

The traditional way of meeting EMF levels is to install layers of shielding on the walls, floor and ceiling in order to reduce the EMF levels in a designated area. Another way is to deal with the EMF radiation as much as possible at the source. EMF shielded transformers are one way of reducing the total EMF exposure.

The combination of proper layout and shielded transformers will significantly reduce the additional shielding required to meet the targeted EMF levels. The cost of preventing EMF in new installations will be significantly less expensive than the cost of retrofitting locations.

As EMF is generated by current in the cables, any incoming cables to the transformer and outgoing cables from transformer will require shielding to achieve desired EMF levels. Breakers for switchgear also carry currents and create EMF and need to be addressed.

OUR PRODUCTS

New techniques have been developed by HPS that allow for a reduction of the radiated EMF levels produced on a particular side of a transformer. HPS has the ability to guarantee EMF levels as low as 10 mG on the enclosure top and four sides from a distance of one meter for most units and kVA ranges. This reduced EMF level is available as an option on most Low Voltage and Medium Voltage (Power) Distribution and Drive Isolation Transformers. (Contact HPS for details on pricing and availability.)

Through the development of this new EMF transformer technology, HPS has also developed an in depth understanding of EMF sources, field strengths and shielding.



HPS offers:

- ***Lab testing and certification for transformer EMF levels under load***
- ***Special EMF reduced transformers***
- ***Site recommendations for EMF reduction***



EMF FREQUENTLY ASKED QUESTIONS

1. What levels of EMF are found in common environments?

Exposures to magnetic fields can greatly vary from site to site for any type of environment. The data found in the table below are median measurements taken at four different sites for each category:

EMF Exposures in Common Environments		
Magnetic fields measured in milligauss (mG)		
Environment	Median* Exposure	Top 5th Percentile
OFFICE BUILDINGS		
Support Staff	0.6	3.7
Professional	0.5	2.6
Maintenance	0.6	3.8
Visitor	0.6	2.1
SCHOOL		
Teacher	0.6	3.3
Student	0.5	2.9
Custodian	1.0	4.9
Administrative Staff	1.3	6.9
HOSPITAL		
Patient	0.6	3.6
Medical Staff	0.8	5.6
Visitor	0.6	2.4
Maintenance	0.6	5.9
MACHINE SHOP		
Machinist	0.4	6.0
Welder	1.1	24.6
Engineer	1.0	5.1
Assembler	0.5	6.4
Office Staff	0.7	4.7
GROCERY STORE		
Cashier	2.7	11.9
Butcher	2.4	12.8
Office Staff	2.1	7.1
Customer	1.1	7.7
* The median of four measurements. For this table, the median is the average of the two middle measurements. Source: National Institute for Occupational Safety and Health		



2. How is EMF measured?

There are several types of personal exposure meters available. They automatically record the magnetic field as it varies over time. To determine a person's EMF exposure, the meter is usually worn at the waist or is placed as close as possible to the person during the course of a work shift or day.

EMF can also be measured using survey meters. They measure the EMF level in a location at a specific period of time. These measurements do not necessarily reflect personal EMF exposure because they are not always taken at the distance from the EMF source that the person would typically be from the source.



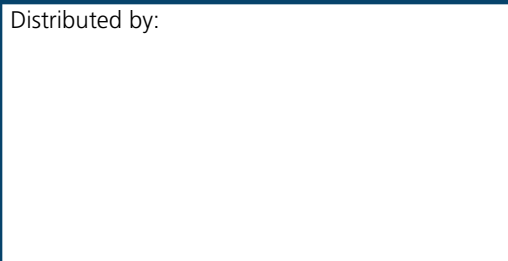
3. What can we conclude about EMF at this time?

Electricity is a beneficial part of our lives, but whenever electricity is generated, transmitted, or used, electric and magnetic fields are created. For most health outcomes, there is no evidence that EMF exposures have adverse effects, however some evidence from epidemiology studies show that exposure to power-frequency EMF is associated with an increased risk for childhood leukemia. This association is hard to interpret without reproducible laboratory evidence or a scientific explanation that links magnetic fields with childhood leukemia.



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September 2010
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