

6	IEQ	<p>6.1 SAFETY AND SECURITY</p> <p>6.1.2 ELECTROMAGNETIC COMPATIBILITY</p>
	EXCLUSIONS	None.
	OBJECTIVE	Reduce occupant exposure and the potential interference of susceptible devices to interference from power distribution equipment.
	CREDITS ATTAINABLE	1
	PRE-REQUISITES	None.
	CREDIT REQUIREMENT	1 credit for designs that meet the electromagnetic compatibility requirements in respect of power quality and low frequency magnetic fields.
	ASSESSMENT	<p>The Client shall submit a report prepared by a suitably qualified person detailing the design of the electrical distribution system in the building. The report submitted shall demonstrate that the designs of the installations are such as to avoid excessive external magnetic fields, and the selection of power consuming equipment is such as to mitigate the impact of non-linear loads. As a minimum the report shall confirm compliance with:</p> <p>a) Section 6 of the Code of Practice for Energy Efficiency of Electrical Installations [1] in respect of power quality; and</p> <p>b) the occupational exposure in the ELF frequency range from 1 to 300 Hz not exceed the ceiling value given by:</p> $B_{TVL} = 60/f;$ <p>where f is the frequency in Hz, and B_{TVL} is the magnetic flux density in millitesla (mT) [2].</p>
	BACKGROUND	<p>Electromagnetic compatibility or, in another sense, electromagnetic interference, is major issues in respect of safe and reliable operation of sensitive equipment in buildings [e.g. 3]. Problems caused by harmonics, which affects both power quality, and power factor, are not uncommon in buildings in Hong Kong [e.g. 4]. The tendency is to seek solutions to any problems through power conditioning, rather than treating the problems at sources, through the proper selection of equipment.</p> <p>Interest in magnetic fields has been stimulated in recent years by concern over the physiological effects they may have on humans and animals and the deleterious effects they have on the performance of some electrical equipment, particularly video display units. Investigations have yielded results which are presented in an IEC report [5] as reference values.</p> <p>Small commercial buildings experience general levels of magnetic fields similar to those present in residential environments. Large and multi-storey buildings experience higher background levels of magnetic fields</p>

- 1 Electrical and Mechanical Services Department. Code of Practice for Energy Efficiency of Electrical Installations. http://www.emsd.gov.hk/emsd/e_download/pee/eleccop.pdf
- 2 American Conference of Government Industrial Hygienists. Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices.
- 3 Wu M K T. Interference Problems of Fluorescent Lamps Operating on High Frequency Electronic Ballasts with Infrared Remote Control Equipment and Infrared Simultaneous Interpretation System. Electrical and Mechanical Services Department. August 2003. http://www.emsd.gov.hk/emsd/e_download/pee/infrared_interference_emsdweb.pdf
- 4 Wu M K T. Standards of Power Quality with reference to the Code of Practice for Energy Efficiency of Electrical Installations. Energy Efficiency Office, Electrical & Mechanical Services Department. September 2003. http://www.emsd.gov.hk/emsd/e_download/pee/EEC&harmonic.pdf
- 5 International Electrotechnical Commission. Technical Report 6100-2-7. Electromagnetic compatibility (EMC) – Part 2: Environment – Section 7: Low frequency magnetic fields in various environments. 1998.

because their electrical installations carry high currents and behave more like power distribution networks, often with a significant third harmonic current in neutral conductors. It is not uncommon for distribution substations to be sited within premises and this practice often produces relatively high levels of magnetic field in occupied spaces located within 10 m of a substation. 1 micro-Tesla (μT) is representative of flux density in the centre of an office and not in proximity to any electrical appliances.

In general the internal wiring and equipment within a building do not contribute significantly to the background level of magnetic field. However, in apartment blocks the conditions may be similar to those encountered in multi-storey commercial buildings where rising mains and a substation are adjacent to dwellings. The background level of magnetic field within a residence is dependent on the proximity and loading of adjacent power supply network cables. In general strengths are within the range of 0,01 to 10 μT , unless wiring is incorrectly installed.

OCCUPATIONAL EXPOSURE

It is believed that below the threshold limit value's (TLVs) recommended by ACGIH [2] building users may be exposed repeatedly without adverse health effects. At 50 Hz the TLV is 1.2, and 0.4 mT for the third harmonic frequency. For occupants wearing cardiac pacemakers the recommended level is 0.1 mT (100 μT). These levels are in general agreement with those suggested by other authorities such as IRPA/INIRC [6].

In normal circumstances levels of magnetic fields found to be produced by electrical distribution circuits [e.g. 7] are of an order of magnitude below the recommended threshold value, and should not be a cause for concern on the grounds of direct health impact.

- 6 International Non-ionizing Radiation Committee of the International Radiation Protection Association. Interim guidelines on limits of exposure to 50=60 Hz electric and magnetic fields. Health Physics. Vol. 58(1), pp113–22. 1990.
- 7 Burnett J, Du Y P. Mitigation of extremely low frequency magnetic fields from electrical installations in high-rise buildings. Building and Environment. Vol. 37. pp. 769 – 775. 2002.