

ELECTROMAGNETIC POLLUTION STANDARDS, NOISE POLLUTION AND PREDICTIVE MAINTENANCE BY HEAT DETECTION

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Résumé: Le document présente quelques concepts liés à la pollution électromagnétique, la pollution sonore et de maintenir la prévision de détection par la chaleur

1. INTRODUCTION

1.1. Electromagnetic pollution

By electromagnetic compatibility means the particularity of equipment or a system as a whole, to work in an environment polluted conditions electromagnetic without being disturbed intolerable functions and to introduce himself in the electromagnetic disturbance that.

By electromagnetic compatibility means electromagnetic interference (EMI - electromagnetic interference, or RFI - frequency radio interference) is represented by an unwanted signal, which is induced due to electromagnetic field pollutant, a signal that can affect the functioning of unwanted equipment or system.

Electromagnetic interference can be defined as electromagnetic pollution, as dangerous as air pollution or water into the environment.

The phenomenon of electromagnetic compatibility has three components: the source of a pollutant electromagnetic field (electromagnetic noise), the path of spreading and receiver affected by the equipment or system in normal operation.

Electromagnetic noise may be caused by artificial or natural phenomena, such as:

- electrical noises generated by electrical storms, are natural sources of electromagnetic noise frequencies below 10 MHz
- noises generated by solar radiation and cosmic noise represents the natural sources of noise with frequencies above 10 MHz.

Electrical noises are artificial electrical noise generated by human activities and may intentionally or unintentionally created. Sources unintentionally created by man are devices whose operation is not meant to emission of electromagnetic fields, such as electronic computers, electrical motors, equipment with the relay contacts, fluorescent tubes, arc welding, self-ignition engines, cable TV, etc. Sources of electromagnetic pollution intentionally created by human activities are those whose equipment is in normal operation emission of electromagnetic signals, such as radar equipment, radios, mobile phones, antennas and equipment in the modulation frequency or amplitude.

1.2. Sound pollution

Noise is a complex character sounds without a regularly insurgents distasteful random, affecting the state of psychological and biological humans and other organisms in nature.

These noxious noise affects all human collectivities. They are mostly in urban environment. Land and air transport, working places and industrial emit into the atmosphere unbearable noise with a high variability decibels. Because of their dwellers cities are undergoing an almost permanent stress.

High frequencies of noise are more dangerous than low. Deafness occurs in people who are in close proximity to the source of strong noise. Street noise is most acute produced trucks, buses, thousands of cars, motorcycles, subway, rail. One truck with a trailer generate noise of 90 decibels, while a column of trucks more than 100 decibels, a jet plane, generates a take-off noise of 115-120 decibels.

In the neighborhood housing threshold noise should not exceed 80 decibels. He is not never met.

Noise protection is provided as a requirement (requirement) for the European Council Directive no. 89/106/EEC and interpretative documents approved on 30 November 1993 and is defined as follows: **“Construction must be planned and executed so that the noise perceived by users or persons close to be maintained at a level that would not affect their health and enabling them to sleep, to rest and work in satisfactory conditions”**. So the requirement implies the creation of a comfort that can be filled with ensuring privacy within the meaning of non-speech intelligibility between homes, hotel rooms or similar. Protection from noise is at the same time quality construction in the context of the law no. 10/1995.

1.3. Diagnostic heat

Heat the field diagnosis is a relatively new field even addressed in the EU in civil and military applications. Mention of these applications, thermal energy expert of buildings and installations, detecting flaws while operating mechanical systems, electrical and electronics, medicine, agriculture and consumer protection. Thermograph (term vision) is a non-destructive and non-contact, which involves measuring the thermal field by recording infrared radiation and view the distribution of temperature on the areas observed. In the field of term vision there are concerns in the country of diagnosis but this method is less known. As a principle, the use term vision contrast heat involved in the objects observed in relation to the environment in which it is, when a temperature or emissive which differs from that of the environment in question. Term vision apply anywhere temperature provides useful information on functionality, on the basis of which can be achieved predictive maintenance.

One of the areas where expertise is used term vision buildings.

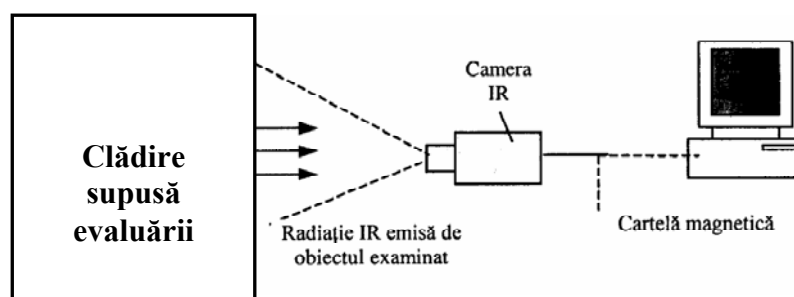


Fig.1. Schedule examination by term vision liabilities: evaluation of heat loss in buildings

With term vision to detect sources of moisture, heat loss, insulation weak, to test installations of heating, ventilation and air conditioning, identifying weaknesses of the structures.

Energy audit of a building is a specific procedure aimed at obtaining data on:

- a) profile energy consumption of building,
- b) identification and quantification of measures to achieve energy savings,
- c) reporting results.

The audit includes energy building:

- analysis of heat and energy of the building, on the basis of which produce the certificate of energy performance of the building,
- establish measures to increase energy performance of the building, with cost estimates of savings, and time to recover investment.

Energy audit of the building leads to the energy audit report.

Inspection energy air-conditioning systems in buildings are carried out in accordance with specific technical.

After inspection energy air-conditioning systems, to develop an inspection report with recommendations on improving or replacing the air-conditioning system and other possible solutions and will have the following:

- will take into account the actual costs and the possibility of their application,
- will include possible actions to apply immediately - replacement - and/or other enforcement actions over the medium term that the rehabilitation/ renovation,
- show options and indications of the possibility of the use of reusable energy and air-conditioning systems with increased efficiency.

The certificate of energy performance of the building is a technical document with information and certifying the energy performance of the building by comparing it with the building of reference established by the methodology and classification of the building in a class of energy performance.

For the categories of buildings that are built, the certificate shall be prepared by careful investor/owner, and includes documentation for the completion of the reception work.

For the categories of buildings that are sold or leases, licenses are developed through careful owner and presented at the conclusion of the contract of sale, and a rental contract.

2. Legislation specifies issues presented

2.1. Specific legislation on electromagnetic pollution

1. ORDER Nr.552/2004 to approve the list includes the competent bodies in the field of electromagnetic compatibility
2. Order no. 1.19/2006 for the Norms on the limitation of population exposure to electromagnetic fields from 0 Hz to 300 GHz
3. H.G.nr.1136/2006 concerning the minimum requirements for health and safety regarding the exposure of workers to the risks arising from electromagnetic fields
4. H.G. No. 982/2007 on electromagnetic compatibility

2.2. Specific legislation in the field of sound pollution

1. **SR ISO 2204:1997** - Guidelines for drafting standards on the measurement of noise and air assessment of its effects on humans. The standard describes the general methods of measuring noise and evaluate its effects on humans.
2. **SR ISO 9612:2000** - Guidelines for measuring and assessing exposure to noise at work. The purpose of this standard is to allow the assessment of noise at work, in relation to its various effects on workers, as a result of normal daily exposure.
3. **SR EN ISO 11690-3:2001** - Practical recommendations for jobs designing with low noise, equipped with machines. Standard handles sound propagation in a room with predetermine sound pressure levels and emission of noise at work.
4. **SR ISO/TR 3352:1996** - Assessment of noise in the light of its influence on intelligibility speech. The standard describes a method for assessing the practical control noise influence intelligibility phrases in direct verbal communication.
5. **SR ISO 2204:1997** - Indications for the drafting of standards relating to measurement and evaluation of air noise effects on humans. The standard describes the general methods of measuring noise and evaluate its effects on humans.
6. **SR ISO 9612:2000** - Guidelines for measuring and assessing exposure to noise at work. The purpose of this standard is to allow the assessment of noise at work, in relation to its various effects on workers, as a result of normal daily exposure.
7. **SR EN ISO 11690-3:2001** - Practical recommendations for jobs designing with low noise, equipped with machines. Standard handles sound propagation in a room with predetermination sound pressure levels and emission of noise at work.
8. **SR ISO/TR 3352:1996** - Assessment of noise in the light of its influence on intelligibility speech. The standard describes a method for assessing the practical control noise influence intelligibility phrases in direct verbal communication.

2.3. Specific legislation in the field of diagnostic heat

A number of acts of the European Union aimed at limiting energy consumption, through careful monitoring of consumers and by applying the most appropriate measures and solutions for saving energy and reducing emissions of pollutants, namely:

1. Nr.2006/32/CE Directive on energy efficiency to end users and energy services,
2. Directive 2002/91/EC on the "energy performance of buildings, improving the energy performance of buildings, taking into account weather conditions, the parameters of thermal comfort and cost-effectiveness,
3. Nr.92/42/CEE Directive on the requirements for efficiency for new hot water boilers fueled with liquid or gaseous fuels,
4. Nr.89/106/CEE Directive on products for construction,
5. The Kyoto Protocol, ratified by the European Union by deciding IP/02/794 of 2002, which established the legal constraints and quantifiable emissions in industrialized countries.

Romanian law stipulates a series of coherent actions and measures to increase energy efficiency and saving energy source-distribution chain-end consumers, and on the reduction of pollutant emissions. In this sense, it quotes the following acts:

1. Order no. 691/1.459/288, Official Gazette Nr. 695 of 12 October 2007, Minister of Development, Public Works and Housing, Ministrului de economie și finanțe și ministrul de interior pentru reformă administrativă și aranjamentele detaliate privind performanța energetică a clădirilor,

2. Emergency Ordinance no. 174 of November 27 2002 on the establishment of special measures for the rehabilitation of thermal blocks of flats-condominii (updated until 7 July 2006),
3. LAW NO. 372 of 13 December 2005 on the energy performance of buildings, which aims to promote increased energy performance of buildings, taking into account external climatic conditions and location, the interior temperature requirements and economic efficiency,
4. Law no. 24/1994 for the ratification of the UN Framework Convention on Climate Change and sustainable development, signed in Rio de Janeiro on 5 June 1992.

3. Fields of application of term vision

1. Construction to identify sources of moisture, heat loss detection, insulations weak, test installations of heating, ventilation and air conditioning, identifying weaknesses in structures, energy audits,
2. Energy bars collecting systems, turbines, generators, transformers, test equipment, electrical distribution, cells low, medium and high voltage compensation coils, cables, insulators, contact,
3. Term energetic in detecting heat loss, bottlenecks, insulations deficient and deposits residue pipelines and reservoirs, checking tightness of slide valve,
4. Electric windings to detect overheating caused by overload or defective insulation, or operating heavy jams in the rotating subassemblies gender camps, rolling bearings, axles, transmissions, lubricants caused by weak unbalance systems in motion, etc.,
5. Electronics to detect areas of overheating circuits, components and test contacts.

Practice term vision apply anywhere temperature provides useful information on functionality, on the basis of which can be achieved predictive maintenance. A good slider setting a thermal infrared image leads to the discovery of many more.

4. Examples of measures in predictive maintenance

4.1. Connections bar with screws (Thermograph connection indicates hot)

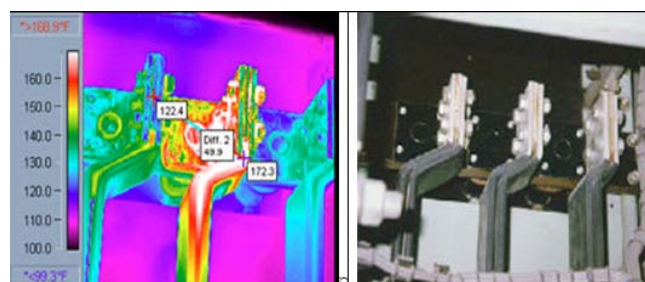


Fig.2. Thermograph for connections bar with screws

4.2. Switches

Thermograph on the left shows heating contact with losses, while the right shows the same equipment after repair.

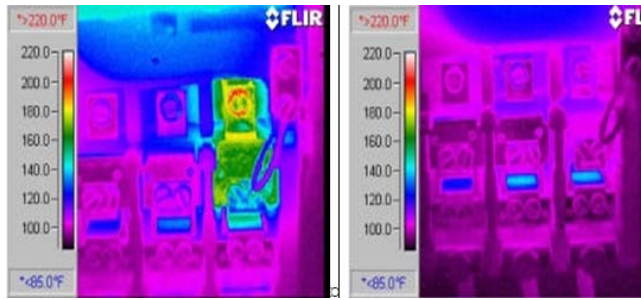


Fig. 3. Thermograph for switches with wastage

4.3. Fuses (Thermograph detected fuses hot)

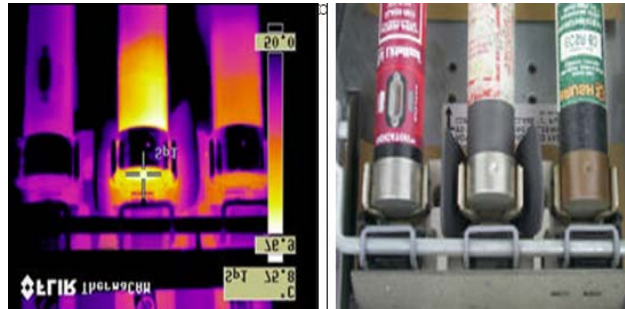


Fig. 4. Thermograph for fuses

References:

1. Mobile laboratory for measuring electromagnetic pollution, heat and noise diagnosis, grant ICPE 2007
2. Alina Dincă, Luminița Popescu, Florin Grofu, *THERMOVISION – Method for Diagnosis in Industrial Processes*, Scientific Conference, 12th edition with international participation, November 23-24, 2007, Tg-Jiu, Proceedings, Editura Academica Brancuși , pag. 243-248, ISSN 1842-4856