

THE APPLICABILITY OF BUILDING PRODUCTS WITH THE FUNCTION TO REDUCE THE EMF EXPOSURE

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Summary

The recent technological development has led to a sharp increase in electricity demand and use of new technologies in communications, leading to radical changes in consumption and behaviour of individuals.

The environment in which man now lives is profoundly modified for the increase of intensity of electric, magnetic and electromagnetic fields. It comes out, therefore, an entirely new type of pollution, such as electromagnetic pollution, which has the special characteristic of being invisible and only recognizable when we verify the effects of exposure for the human health.

In general, the rules in place at various European, national and regional levels, statutory or consensual, are aimed primarily at the prevention of acute effects and not protecting against the long-term ones, since the assessment of potential risks of exposure to EMF is still under study. It is therefore important to study what are the possible techniques to reduce the electromagnetic waves and their effects.

In recent years, to this end, several companies have marketed products that have a specific function to mitigate the intensity of the unwelcome electromagnetic field, in such a way as to return those affected by the phenomenon within the limits set by the rules safeguarding the health of exposed persons.

The aim of this work was to analyze the products in the building market in Italy, which are proposed as shielding of electromagnetic fields, their characteristics and fields of use, and to highlight the underlying issues.

Keywords: building products, electromagnetic fields, electromagnetic pollution, shielding products

1 Introduction

The pollution has become more and more attention in the field of scientific and technical publications in scientific conferences and in articles, because of the proliferation of artificial sources that have caused an increase of electromagnetic fields in many towns and thereby worsening the problem of general pollution. We need to consider that in the frequencies ranging from 100 kHz to 300 GHz, only sixty years ago just 10 pW / cm² were measured; today, depending on localities, there are values from one million to one billion times more high, due to the application of radio frequency and microwave especially in the telecommunications sector.

While from one side, therefore, the increase in number of non-ionizing radiation sources is a signal of technological characteristics of the countries with higher industrial

development, from the other side other scientists are confronted with the need to assess the possible health risk to which the population is subjected.

Numerous scientific studies (see references [3]) showed that the electromagnetic radiation produced in the human body effects that are reliable and attentively considered and on which it is possible to establish well defined exposure limits. But are still under study a number of biological and health effects which may have impacts on human health. In these cases, many experts of this phenomenon suggest to use the "precautionary principle" which both the legislator and owners or administrators of sources of pollution, can be taken through rehabilitation; but also individuals can do it through self-help initiatives.

This principle is applied when you are in a situation characterized by high scientific uncertainty and you need to take action against a risk that could be severe with the process of time, without waiting for results of scientific research. So if legislators cannot impose more constraining limitations, not to slow the development of technology and considering the high economic cost of interventions on existing installations, individual municipalities and population can adopt innovative technical solutions such as using products that can mitigate the action of electromagnetic waves.

2 Products

The need to shield electromagnetic fields stimulated the marketing of products that can be used to cancel or reduce unwanted electromagnetic signal. In the wide range of choices of materials and technical possible solutions, it should take into account properties of shielding as well as the requirement for the technical identified solution and what are services actually provided in the specific field of application.

Products used to shield environments concerned with the electromagnetic radiation are: wiry meshes and textiles; textile structures that are conductive thanks to electrochemical processes, electrically conductive silicones and fluorin silicones; honeycomb panels made of steel. Any material can be appropriately transformed into screening gaskets, conductive panes, honeycomb panels and more; it is processed in the desired geometrical dimensions taking into account that it must also have good resistance to corrosion and heat and good outfit to water and flame. The interposition of the product in the radiative areas defines, by its attenuation value in dB corresponding to frequencies, its power to reduce or stop incident electromagnetic waves.

Fields of application.

Many are fields of use of shielding products due to several sources that emit electrical magnetic and electromagnetic fields. The legislation requires the exposure limits be observed for workers and the public. Shielding products are used in the workplace and even in areas where people spend the most hours during the day; for that reasons shields are put in place in the industrial, residential and service sectors.

Given the vastness of the fields of employment, the following analysis is whether to stay to look what are products offered by the market for a limited time provisionally to those contexts where most of the population is exposed; that means residential, social and service building.

The low-frequency fields are different from high frequency ones, resulting in different interactions with the human body and therefore in different effects. In addition,

the screening effectiveness of materials used in devices differs with the frequency. For this reason, the current market offers shielding products for high and low frequencies.

Products for low frequencies.

Applications are mainly nearness of: high-voltage lines, underground, electrical boxes, electrical panels.

Products identified are classified into the following types of technical information: electrically conductive textile structures, vertical perimeter walls - vertical panels; topcoat of exterior/internal walls, inner horizontal partition - horizontal panels, mortars, screeds. The survey identified 22 products of 17 different companies, of which 13 are screening textiles, 3 panels, 5 plasters and 1 is a raised floor.

Products for high frequencies.

Applications are mainly nearness of: radar equipment, radio transmitters, television transmitter equipments, antennas of base stations (SRB) for mobile phones.

Products identified are classified into the following types of technical information: electrically conductive textile structures; vertical perimeter walls - vertical panels, interior shading curtains, vertical window frames - screening panes and films, screeds and mortars; vertical perimeter walls - plasters and wallpapers. The survey identified 61 products of 25 different companies, of which 28 are screening textiles, 13 internal screening curtains, 8 screening panes and films, 6 plasters and 6 wallpapers.

The analysis, for both types of product, i.e. for low and high frequencies, took into account several parameters, including: the screening material, standard sizes, the mode of screening, mitigation and documented performances.

Many of analysed products are subject to testing in the laboratory that tested the effectiveness of shielding. Reference standards, to perform measurements are as follows: MIL STD 285 - "Method of Military Standard Attenuation Measurements for Enclosures, Electromagnetic Shielding, for electronic test purposes." (1956) set aside in 1997 and replaceable with standard IEEE Std IEEE 299-1997 - "Standard Method for Measuring the effectiveness of electromagnetic shielding enclosures" (IEEE, Institute of Electrical and Electronic Engineers). This standard provides uniform measurement procedures for determining the shielding effectiveness of electromagnetic fields in the frequency range from 9 kHz to 18 GHz (extendable to 50 Hz to 100 GHz).

To this end it was interesting to note that 36% of products tested does not present performances documented and related to tests performed by outside laboratories.

From what discussed in relation to building products that mitigate electromagnetic fields, has emerged as the electrically conductive textiles, for both vertical walls and roofings, are the most popular and commercialized. Immediately after are internal shielding curtains, highly publicized in recent years largely because they are suitable for residential construction, since it does not require action on the built and are easy to install. Finally, it emphasizes the most market presence of products for high frequencies (76%) than for low frequencies (24%). In fact the sources that emit high frequency fields (such as radio stations, TV stations, radio base stations for mobile phones) have become widespread in towns and villages, and nearless of residential and public buildings.

3 Conclusion

Shielding products, if properly installed, can reduce or totally eliminate the value of the electromagnetic field; identified the area to be protected, followed the appropriate technical measures, analyzed the type of field to be mitigate, it will be possible to single out the most appropriate product to use, including those offered by the market for this specific application in that specific context.

In the market there are various shielding products, but not all are equipped with appropriate certification tests; more and more are companies specialized in the design and production of mitigating products, because of the high social interest arising from the phenomenon of the electromagnetic pollution.

In conclusion, the conducted analysis for the products on the market that claim to provide the mitigation of electromagnetic pollution was found that:

- the most popular on the market are electrically conductive textiles for both vertical perimeter walls and roofings; these are followed by internal screening curtains for the ease of installation;
- products for high frequencies are more used than ones for low frequencies, but not all products surveyed have certified evidences of the claimed performance;
- the problem concerning the selection and the implementation of the product cannot be separated from the context of application;
- operators of sectors concerned with the choice and the application of these products require a specific training.

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