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LIMITATIONS OF THE USE OF COMPACT FLUORESCENT LAMPS FROM THE COLORIMETRIC AND PHOTOMETRIC ASPECTS

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The leading manufacturers of compact fluorescent lamps (CFLs) declare that these lamps represent an adequate replacement for incandescent lamps from the consumer's point of view, providing considerable energy and financial savings for both individuals and the electric power system. However, manufacturers hardly ever state the fact that CFLs generate a high content of higher current harmonics, resulting in a very low power factor. Since the number of such appliances is constantly rising, the mass application of CFLs can seriously deteriorate the quality of the delivered energy in the future, the solution of which will be costly.

Some of the other disadvantages of CFLs are well known: they are up to 50% larger than incandescent lamps, which makes them incompatible for a number of luminaires constructed for incandescent lamps; their sensitivity to humidity makes them inappropriate for bathrooms and other humid spaces; sensitive to heat, they are not suitable for any enclosed and for most recessed luminaires; they are not recommended for use with conventional dimmers and various sensors; their lifetime depends on the switching frequency, making them unsuitable for spaces which are used frequently, but for short time periods (storage rooms, food cupboards, wardrobes,...).

The essential parameters of compatibility of CFLs and incandescent lamps, represented by their colorimetric and photometric characteristics, are rarely discussed by independent researchers. Therefore, it is most often assumed that there are no problems in this domain. Since our research showed that this is not the case, this paper is devoted to the detailed colorimetric and photometric comparison of CFLs and incandescent lamps, with the aim to determine the additional limitations for the application of CFLs. In this sense we analyzed both lamp types regarding the following parameters: color of light, color rendering, lumen maintenance and life expectancy, polar diagrams, glare (both disability and discomfort), time needed for CFLs to reach the rated luminous flux, sensitivity to the mains voltage fluctuations, etc. Our analysis resulted in additional restrictions which should be taken into account in order to gain maximum benefits from replacing incandescent lamps with CFLs.