Indoor air quality at the University of Trás-os-Montes e Alto Douro

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The indoor air quality (IAQ) is an issue that increasingly commands the attention of the scientific community. The population spends much of his time indoors, thus the study of IAQ is becoming increasingly important for the welfare and human health. The main objective of this work was to study the methodology suitable for IAQ measurements at the University of Trás-os-Montes e Alto Douro, as it is a public and collective environment with a great complexity. It was intended to determine the representativeness of the temporal monitoring of indoor air quality, as well as optimize the timing and duration measurements in the classrooms, according to the type of occupation, area and location of spaces under consideration for each pollutant in value limit on the Regulation of Energy Systems in Buildings HVAC (RSECE). This research was carried out with continuous measurements of CO_2, COVT, PM_{10} in indoor air, as well as physical parameters such as temperature and humidity, which are subject to verification of compliance in the context of periodic audits referred to in RSECE. These measurements were carried out during a week in each classroom, having been selected a total of five rooms in the building of Geosciences at the University of Trás-os-Montes and Alto Douro. Radon concentration was evaluated in the basement of this building. The experimental work took place during the period 15 November 2010 to May 29, 2011. The variation of the pollutants concentration throughout the night is similar in all rooms. The results obtained in five classrooms showed that the average temperature and humidity in indoor air do not differ much from the values accordingly. It was also observed that the most likely period of maximum occupancy, and of course, the maximum concentration of CO_2 and COVT is the middle or late morning. For the period of measurement, it was found that the most appropriate is about 30-45 minutes past the start of the first class. For the duration of these measurements, in unventilated classrooms, one can conclude that five minutes is sufficient, since the measurements are performed about 45 min after the activity onset. The optimum time for radon concentration measurements would be during daytime. Regarding the results of the bivariate analysis (Spearman correlation), is observed that there is a strong relationship between the con-

centrations of CO_2/pollutants and physical parameters/COVT. It is also observed a positive correlation between the concentration of CO_2 and occupation, between the concentration of PM10 and COVT, and between the various pollutants and the physical conditions (temperature and humidity) in the room. Nevertheless, there was a negative correlation between relative humidity and the number of open windows.

This study was pioneer and aimed to establish the bases for further studies in this domain. Indoor air quality is of most importance in what human health concerns, particularly respiratory pathologies. The first step to address this issue in unventilated spaces was the development of a Good Practice Book.

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