CHARACTERIZATION OF THE POROUS STRUCTURE OF CEMENT MORTARS ADDITIVATED WITH ARCHITECTURAL RESIDUES INSULATED FROM MINERAL WOOL

[1]Carolina Piña Ramírez; [2]Evangelina Atanes Sánchez; [3] Marta Kosior-Kazberuk; [4]Dorota Małaszkiewicz

[1] Departamento de Construcciones Arquitectónicas y su Control, Escuela Técnica Superior de Edificación, Universidad Politécnica de Madrid, Avda. Juan de Herrera 6, 28040 Madrid, Spain.
[2] Departamento de Ingeniería Mecánica, Química y Diseño Industrial, Escuela Técnica Superior de Ingeniería y Diseño Industrial, Universidad Politécnica de Madrid, C/ Ronda de Valencia 3, 28012 Madrid, Spain.
[3] Department of Building Structures and Architecture, Faculty of Civil and Environmental Engineering, Bialystok University of Technology, 15-351 Bialystok, Wiejska 45E, Poland.
[4] Department of Construction and Road Engineering, Faculty of Civil and Environmental Engineering, Bialystok University of Technology, 15-351 Bialystok, Wiejska 45E, Poland.

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The Mineral wool is currently the European Union's most used building insulation, which has led to the fact that the volume of this waste from insulating materials stored in landfills (Figure 1) has increased alarmingly in the last decade [1], making it essential to recycle or reuse it, in oder to reduce the environmental impact of the product [2].

Fig. 1: Residues of mineral wool stored in the Complex Treatment of Construction and Demolition Waste located in El Molar.

In this research work the study of the characterization of the porous structure of cement mortars with different types of mineral fiber waste from construction and demolition for recycling is addressed.

The microstructure and porosity of the material has been described, from an analysis based on two experimental techniques: scanning electron microscopy (SEM) (Figure 2) and mercury porosimetry.

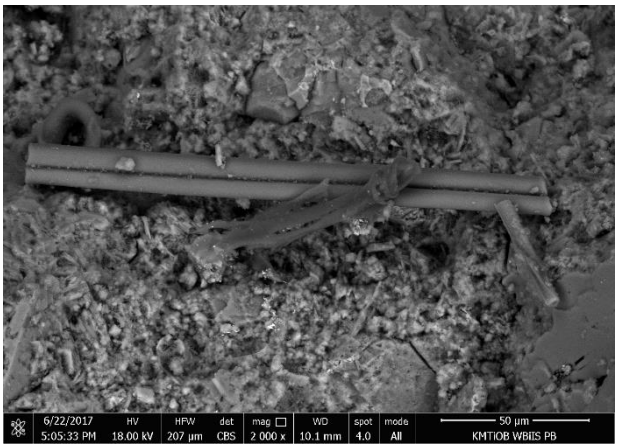

Fig. 2: SEM micrographs of a cement mortar with the incorporation of 30% mixed waste of mineral wools.

The SEM scanning electron microscopy has characterized both the three types of fiber waste used in the research, as well as the mortar mixtures made with fibers. Using the technique of mercury intrusion, the distribution of porosity was obtained indirectly, based on the pores' apparent access size, thus characterizing the porous system of ready-made mortars that will be of interest for its application -since the porosity of a material affects its physical properties [3].

The results show that the incorporation of mineral wool residues to a cement mortar matrix is a viable alternative for its recycling, as the porosity of the new compounds analyzed increases -but not in a considerable way-, which could suppose, in any case, an improvement of its insulating properties.

REFERENCES

[1] Väntsi, O., & Kärki, T. (2014). Mineral wool waste in Europe: a review of mineral wool waste quantity, quality, and current recycling methods. Journal of Material Cycles and Waste Management, 62-72.

[2] Cerdan, C., Gazulla, C., Raugei, M., Martinez, E., & Fullana-i-Palmer, P. (2009). Proposal for new quantitative eco-design indicators: a first case study. Journal of Cleaner Production, 17(18), 1638-1643.

[3] OLIVA RES, M., et al. Evaluación de la resistencia mecánica de un hormigón según su porosidad. Materiales de Construcción, 2004, vol. 54, no 273, p. 21-33.