

GREEN AND SUSTAINABLE POROUS MATERIALS FOR NOISE CONTROL IN BUILDINGS: A STATE OF THE ART

Francesco Asdrubali

University of Perugia, Industrial Engineering Department

Via Duranti, 67 – Perugia – Italy

fasdruba@unipg.it

ABSTRACT

According to the definition of sustainability of the Brundtland Report, "*Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs*".

A product can be therefore considered sustainable if its production enables the resources from which it was made to continue to be available for future generations and has the lowest possible impact on human health and on the environment. A sustainable product is generally made from natural or recycled materials and its production requires a small amount of energy, makes a limited use of non-renewable resources and has a low environmental impact.

Many currently used acoustic materials cannot be considered sustainable, at least as far as energy consumption and greenhouse gases emissions; moreover, some of them can be harmful for human health. Mineral wools are widely used for thermal and sound insulation, because of their good performance and low cost, but their fibres, when inhaled, can lay down in the lung alveoli, and can cause skin irritation. Hence such materials must be adequately overlaid if directly exposed to the air. Moreover they can pulverize and are not resistant to water, oil and chemical agents and this can make their application not suitable for absorbing noise barriers.

In the last years a great attention has been focused on "green" porous materials, especially in the building sector. Many research centres have developed new sustainable materials, in many cases with interesting acoustical

and thermal properties. Also the public sector started to consider these materials; in Italy, for instance, many Municipalities have introduced into Building Regulations specific recommendations to improve the use of ecological materials in new constructions, allowing a reduction of construction taxes. These Regulations also contain a list of materials that should be avoided (e.g. mineral fibres).

An increasing attention has been turned to natural fibres as alternatives to synthetic ones, in order to combine high acoustic and thermal performance with a low impact on the environment and human health. Natural fibres have very low toxicity and their production processes can contribute to protect the environment. Recycled materials, such as recycled plastic, textile fibres and rubber mats, can even be regarded as a sustainable alternative, as they contribute to lower waste production and use of raw materials.

It is however very important to assess the "sustainability" of a natural or recycled material, and to verify the total energy use in its production process.

The paper presents an updated survey of the characteristics and the acoustical properties of sustainable materials for noise control and in particular sound absorption coefficient, airborne and impact sound insulation data, as well as an analysis of the procedures to assess the sustainability of these materials (LCA, Ecoinvent, Ecoprofiles).

SESSION: SUSTAINABLE MATERIALS AND APPLICATIONS

PRESENTATION: ORAL

EQUIPMENT: PC AND VIDEO