

# [Selection of insulation materials for a civil engineering structures](https://assignbuster.com/selection-of-insulation-materials-for-a-civil-engineering-structures/)

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The paper " Selection of Materials for a Civil Engineering Application" is a brilliant example of a term paper on engineering and construction. When selecting insulation materials for engineering structures, for example, sound or thermal insulation, it is necessary to consider the various attributes of the insulating material. Of great importance is whether the material meets the recommended R-value for the specific field of its application whether in heat or sound insulation (Ashby & Johnson, 236). Further, it is necessary to establish the effectiveness of the material towards satisfying the insulation needs as expected. The insulation material should be one that is covered by national testing authorities as well as local building authority requirements in regard to the use of the insulation material. The thermal properties of such insulating materials are more important than the cost since it is based on this that they can be able to achieve the desired objective. If we consider polyurethane foam, fiberglass and natural wool as insulation materials, it is necessary to analyze their properties to understand their applicability. Fiberglass is made from melted glass which is usually modified or spun to form a mat of fibers and are normally packaged as batts or blankets in rolls making them specifically applicable in insulations in roofing scenarios for large or big buildings such as churches. The fibers interlace with each other into a fleecy mass bound together by a chemical binder. As such, glass wool or fiberglass as they are commonly referred to is easy to cut and install and together with the attribute of being dense and thin with a reflective aluminum foil, they are better insulation materials (Ashby & Johnson, 256). They always come with their R values clearly specified and labeled. Their effectiveness for use in bulk insulation is based on the ability to trap still air within the material. It is, therefore, necessary that the material is not compressed as this may remove the air that is the main cause of insulation.
The other insulation material which is also a bulk insulation material apart from glass wool is the Rockwool. This is made from volcanic rock materials which are melted at very high temperatures and spun to form the insulation mats and are therefore available as blankets or batts. They have a higher density than glass wool with a corresponding higher R-value and as a result, have a better sound absorption property. R-value is a ratio between the thermal conductivity and heat flux. Therefore, higher density will result in higher R-value. Despite the advantages, when used as an insulation material, Rockwool is known to have an irritating effect on the skin and upper respiratory tract which calls for caution and special protective gear when using it (Ashby & Johnson, 263). Glasswool is also irritating and will require protective gear such as masks and gloves when being installed.
The other available bulk insulation material is the extruded polystyrene which comes in the form of a sandwich of polystyrene in between waterproof boards. This material has high compressive strength and is manufactured with flame retardants with very high R-value per unit thickness and some are modified with reflective foil backing. This makes the material applicable for walls and ceilings of large buildings such as cathedrals. The only important precaution is that the material should be used between surfaces that are non-combustible such as bricks and plasterboards (Ashby & Johnson, 278). The material can be closely compared for similar usage with expanded polystyrene which is not water-resistant and has a lower R-value per unit thickness as well as lower compressive strength. The process of extrusion for the extruded polystyrene results into the formation of foam which is later compressed. It is this foam that is responsible for the inferior properties when compared with expanded polystyrene.
Natural wool is insulation material that is very significant, especially when environmental consideration is a factor to uphold. Since it is natural, it is, therefore, biodegradable and helps to conserve the environment. For insulation purposes, natural wool should only be manufactured from new scoured wool which is treated with vermin and with a rotproofing agent (Ashby & Johnson, 254). To reduce the settling effect, most blankets for insulation are made of wool polyester, a blend that reduces settling and compression of the material. Although natural wool is flame resistant, the addition of polyester and other synthetic fibers increases flammability to an appreciable degree. Their R values are always varied depending on different types of wools.
It is, therefore, necessary that when selecting an insulation material for a building, one should consider the compressive strength, flammability, and applicability for the desired purpose or area.
Work Cited
Ashby, M. F., and Kara, Johnson. Materials and design: the art and science of material selection in product design. 2nd ed. Amsterdam: Butterworth-Heinemann, 2010. Print.