NATURAL THERMAL INSULATION (DOĞAL TERMAL YALITIM) KAYNAKÇASI

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1)

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Search results: 9 results found for TITLE(**natural thermal insulation**).

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M. Palumbo, J. Avellaneda, A.M. Lacasta, Availability of crop by-products in Spain: New raw materials for natural thermal insulation, **Resources, Conservation and Recycling**, Volume 99, June 2015, Pages 1-6, ISSN 0921-3449, http://dx.doi.org/10.1016/j.resconrec.2015.03.012.

(http://www.sciencedirect.com/science/article/pii/S092134491500066X)

Abstract: Abstract

Vegetal materials were one of the first construction materials used by humans, but the development of petrol-based synthetic materials in the last century replaced them in mainstream construction techniques. However, since environmental impact and resource depletion are increasingly becoming a central issue, vegetal materials are revisited. Natural thermal insulations are mainly developed from woody materials and industrial fibres, but these raw materials are not always locally available. Thus, the use of crop by-products is proposed here. The availability of crop by-products to be used as raw materials for building thermal insulations in Spain is evaluated. It is then compared to demand forecasts based on two different scenarios. Results vary greatly from one scenario to another, but they indicate that the amount of crop by-products is sufficient to meet estimated demand. Barley and wheat straw are by far the most abundant by-products, followed by corn, rice and sunflowers. Available corn by-products would be sufficient to insulate between 250,000 and 450,000 dwellings yearly.

Keywords: Food crop by-products; Natural thermal insulation materials; Cereal straw; Corn stalks

2/

Jiří Zach, Jitka Hroudová, Jiří Brožovský, Zdeněk Krejza, Albinas Gailius, Development of Thermal Insulating Materials on Natural Base for Thermal Insulation Systems, **Procedia Engineering,** Volume 57, 2013, Pages 1288-1294, ISSN 1877-7058, http://dx.doi.org/10.1016/j.proeng.2013.04.162.

(http://www.sciencedirect.com/science/article/pii/S1877705813008953)

Abstract: With regard to the requirements of EU directive 2010/31/EU [1] is necessary in the construction and reconstruction of existing buildings to implement effective measures for reducing their energy consumption. From 1. 1. 2021 should get virtually all new buildings, buildings with almost zero energy. These facts mean that the construction of new and reconstruction of existing structures growing consumption of thermal insulation materials. From the perspective of sustainable development from the perspective of environmental (CO2 emissions) are thermally insulating materials based on natural organic fibers promising alternative to synthetic thermal insulation of mineral fibers

and foam-plastic substances. The main disadvantages of the thermal insulation materials based on natural, which very often precludes their use in thermal insulation systems structures are: high water absorption and poor response to fire. The paper deals with the possibility of modifying of thermal insulation materials based on technical hemp with a view to reducing water absorption and hygroscopicity.

Keywords: Insulating materials; Natural fibers; Technical hemp; Water absorption; Sorption moisture; Thermal conductivity

3/

J. Zhang, R. Rajkhowa, J.L. Li, X.Y. Liu, X.G. Wang, Silkworm cocoon as natural material and structure for thermal insulation, **Materials & Design**, Volume 49, August 2013, Pages 842-849, ISSN 0261-3069, http://dx.doi.org/10.1016/j.matdes.2013.02.006.

(http://www.sciencedirect.com/science/article/pii/S0261306913001027)

Abstract: Silkworm cocoons are important biological materials that protect silkworms from environmental threat and predator attacks. Silkworm cocoons are able to provide significant buffer against temperature changes outside of the cocoon structure. We present our investigation of the thermal insulation properties of both domestic and wild silkworm cocoons under warm conditions. Wild cocoons show stronger thermal buffer function over the domestic cocoon types. Both the cocoon walls and the volume of inner cocoon space contribute to the thermal damping behaviour of cocoons. Wild silkworm cocoons also have lower thermal diffusivity than domestic ones. Calcium oxalate crystals affects the thermal behaviour of wild silkworm cocoons, by trapping still air inside the cocoon structure and enhancing the thermal stability of the cocoon assembly. The research findings are of relevance to the bio-inspired design of new thermo-regulating materials and structures.

Keywords: Biological composite; Silk cocoon; Thermal insulation; Protection

4/

D.A.S. REES, J.L. LAGE, The effect of thermal stratification on natural convection in a vertical porous insulation layer, **International Journal of Heat and Mass Transfer**, Volume 40, Issue 1, October 1996, Pages 111-121, ISSN 0017-9310, http://dx.doi.org/10.1016/S0017-9310(96)00060-9.

(http://www.sciencedirect.com/science/article/pii/S0017931096000609)

Abstract: We consider the two-dimensional free convection flow in a rectangular porous container where the impermeable bounding walls are held at a temperature which is a linearly decreasing function of height. Attention is focused on the case where the local temperature drop across the container is zero. Two cases are considered, namely, containers of finite aspect ratio and those of asymptotically large aspect ratio. For both cases it is found that modes bifurcate in pairs as the linear stability equations admit an infinite set of double eigenvalues. The weakly nonlinear evolution of the primary pair of eigenmodes is analysed, and it is found that the resulting steady-state flow is nonunique as the realized steady flow is dependent on the precise form of the initial disturbance. For asymptotically tall boxes the weakly nonlinear evolution of the pair of modes is governed by coupled

pair of Burger-like equations. These are analyzed both numerically and using asymptotic methods. No evidence of persistently unsteady flow is found. Copyright © 1996 Elsevier Science Ltd.

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Azra Korjenic, Vít Petránek, Jiří Zach, Jitka Hroudová, Development and performance evaluation of natural thermal-insulation materials composed of renewable resources, **Energy and Buildings**, Volume 43, Issue 9, September 2011, Pages 2518-2523, ISSN 0378-7788, http://dx.doi.org/10.1016/j.enbuild.2011.06.012.

(http://www.sciencedirect.com/science/article/pii/S0378778811002611)

Abstract: Because energy efficiency in buildings will be evaluated not only based upon heating demand, but also according to the primary energy demand, the ecological properties of the building materials for the whole assessment has become essential. The demand for green building materials is rising sharply, especially insulating materials from renewable resources. The application of natural materials has become increasingly important as a consequence of the increasing need to conserve energy, use natural materials, incorporate architecture and construction into sustainable development processes, and the recently promulgated discussions on appropriate disposal of used insulation materials such as polystyrene (EPS).

Due to the fact that natural materials are more sensitive to moisture, decomposition factors such as temperature, material moisture content, attacks by microorganisms, and possible decomposition of the material or shorter durability, it is necessary to evaluate the degradation rate of built-in materials and also determine their real in situ hygrothermal properties according to their moisture content, and volume changes.

This paper describes the results of a research project carried out at the Vienna University of Technology and Brno University of Technology. The objective is to use jute, flax, and hemp to develop a new insulating material from renewable resources with comparable building physics and mechanical properties to commonly used insulations materials. All input components are varied in the tests. The impact of moisture content changes in relation to the rate of change of other properties was the focus of the investigation. The tests results show that the correct combination of natural materials is absolutely comparable with convectional materials.

Keywords: Thermal insulating material; Jute; Flax; Hemp

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A.J. Oliver and P.L. Stephenson, HEAT TRANSFER CALCULATIONS INCLUDING NATURAL CONVECTION IN POROUS INSULATION AND THERMAL RADIATION, In **The Institution of Chemical Engineers Symposium Series,** edited by H C SimpsonG F HewittD BolandT R BottB N FurberW B HallP J HeggsP N RoweE A D SaundersD B Spalding, Pergamon, 1984, Pages 839-848, ISSN 03070492, First U.K. National Conference on Heat Transfer, ISBN 9780852951750, http://dx.doi.org/10.1016/B978-0-85295-175-0.50018-7.

(http://www.sciencedirect.com/science/article/pii/B9780852951750500187)

Abstract: In some engineering plant, components have to be thermally insulated from a hot fluid. The insulation used is often fibrous and in some conditions it can have a natural convection flow within it which can dramatically effect its insulating performance. As high temperatures are often involved thermal radiation is usually important and this will be influenced by local temperatuare variations produced by the insulation performance. A computer model has been developed that can handle both these physical processes in general 3-d geometries. The aim is to calculate the temperature distribution of the insulated component and of the insulation hot face. Details of the model are described and some results are presented.

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H.Y. Andoh, P. Gbaha, B.K. Koua, P.M.E. Koffi, S. Touré, Thermal performance study of a solar collector using a **natural vegetable fiber, coconut coir, as heat insulation**, Energy for Sustainable Development, Volume 14, Issue 4, December 2010, Pages 297-301, ISSN 0973-0826, http://dx.doi.org/10.1016/j.esd.2010.09.006.

(http://www.sciencedirect.com/science/article/pii/S0973082610000554)

Abstract: There are few solar water heaters in Africa because of their acquisition cost, which makes it difficult for the populations to afford them. This article presents a solar water heater designed with a local vegetable material as insulating material, coconut coir, widespread in tropical countries. The study focuses on the comparative thermal performance of this collector and another collector, identical in design, fabrication, and operating under the same conditions, using glass wool as heat insulation, as well as with eight other designs, chosen randomly, using various materials as heat insulation, with performance data from the literature.

The materials cost of the coconut coir collector is 25% less than the glass wool one. The results of the study show very good thermal performance of the collector using coconut coir compared to the traditional ones. For example, the outlet hot water temperature of the coconut coir collector was more than 80 °C. Internal hot water temperature rise was more than 40 °C. The thermal efficiency was a little over 51% although it was generally below 50% for the collectors using traditional insulation. It has a good pair of values of FR(τα) and FRUL. So, the lower cost of this type of solar water heater and its performance suggest that this design may be more suitable for application in tropical countries where coconut coir is commonly available.

Keywords: Solar water heater; Natural circulation; Coconut coir; Polyurethane; Glass wool; Fiber glass; Polystyrene

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M.M. Abdel Kader, S.M. Abdel-wehab, M.A. Helal, H.H. Hassan, Evaluation of thermal insulation and mechanical properties of waste rubber/natural rubber composite, **HBRC Journal**, Volume 8, Issue 1, April 2012, Pages 69-74, ISSN 1687-4048, http://dx.doi.org/10.1016/j.hbrcj.2011.11.001.

(http://www.sciencedirect.com/science/article/pii/S1687404812000119)

Abstract: The influences of waste rubber loading on mechanical and thermal conductivity properties were investigated for NR composite. An experimental investigation was carried out to obtain low cost construction material with desirable mechanical and thermal insulation properties. Natural rubber was loaded with different concentrations of waste rubber (200, 400, 600, 800, and 1000) phr. The addition of waste rubber leads to a slight increase in thermal conductivity values of composites but it still lies around range of thermal insulating materials. Also addition of waste rubber leads to improvement of mechanical properties of composites. The crosslink density of NR composite increases with the increase of waste rubber loading until 600 phr and after that it decreases due to the stronger the rubber–filler interaction. This leads to the decrease of the swelling index that has the opposite trend of crosslink density. So, the sample with 600 phr waste rubber is considered the optimum concentration from the swelling measurement. Filler loading results in pronounced increase in the tensile modulus and decease in the elongation at fracture which reflects the reinforcement effect of the filler. The yield stress increases with waste rubber loading increment. This delays the permanent disruption of matrix morphology. So, the optimum concentration which is 600 phr waste rubber loading agrees with the swelling and mechanical measurements which has desirable thermal insulation and high mechanical properties and decreases the cost of materials to 82% of the NR cost.

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Palumbo, Mariana – Julissa Avellaneda – Ana María Lacasta: Availability of crop by-products in Spain: New raw materials for natural thermal insulation. **Resources Conservation and Recycling** 99:1–6 · June 2015. DOI: 10.1016/j.resconrec.2015.03.012.
http://www.researchgate.net/publication/276120746_Availability_of_crop_by-products_in_Spain_New_raw_materials_for_natural_thermal_insulation

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Palumboa, M. – J. Formosaa – A.M. Lacastaa: Thermal degradation and fire behaviour of thermal insulation materials based on food crop by-products.
http://upcommons.upc.edu/bitstream/handle/2117/26981/Palumbo_CBM_2015_preprint.pdf?sequence=1&isAllowed=y

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Palumbo, Mariana – Antonia Navarro – Jaume Avellaneda – Ana Maria Lacasta: Characterization of thermal insulation materials developed with crop wastes and natural binders.
http://wsb14barcelona.org/programme/pdf_poster/P-188.pdf

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Palumbo, Mariana: Contribution to the development of new bio-based thermal insulation materials made from vegetal pith and natural binders: hygrothermal performance, fire reaction and mould growth resistance. A thesis submitted to Universitat Politècnica de Catalunya In partial fulfilment of the requirements for the degree of Doctor of Philosophy in Architecture. Barcelona, 2015.
http://www.tdx.cat/bitstream/handle/10803/314580/TMPF1de1.pdf?sequence=1