

FEATURES OF HEAT TREATMENT OF HIGHLY POROUS LAYERED MATERIALS

Effectiveness of thermal insulation products is determined by a set of criteria that can be expressed in terms of energy costs: reduction of the cost of heating (the main criterion), energy consumption in the course of construction, energy consumption in the course of production of materials having pre-set properties, and service durability of the material.

On the one hand, service durability (as a property) is generated in the course of material production, and on the other hand, it depends on the conditions that the material is exposed to in the course of any construction process. The same parameter affects energy-related criteria. Insulation replacement or unplanned repairs add supplementary energy costs.

The manufacturing process of thermal insulation materials contemplates processing of a significant amount of non-renewable natural resources, namely, fuel combustion. Optimization of these costs is necessary and possible through appropriate organization of processes, including the process of heat treatment of products.

Layered materials can improve the product performance and durability. Production and heat treatment of mineral fibers are the most energy-consuming steps of the mineral wool production. Optimization of these processes can involve significant economic effects.

Key words: thermal insulation, efficiency, heat treatment, mineral wool, porosity, durability.

References

1. Gagarin V.G. *Teplozashchita i energeticheskaya effektivnost' v proekte aktualizirovannoy redaktsii SNIP «Teplovaya zashchita zdaniy»* [Thermal Protection and Energy Efficiency in Draft Revised Version of Construction Norms and Rules "Thermal Protection of Buildings"]. *Energoeffektivnost' XXI vek: III Mezhdunarodnyy kongress*. [3d International Congress. Energy Efficiency 21st Century]. St.Petersburg, 2011, pp. 34—39.
2. Khlevchuk V.R., Bessonov I.V. *O raschetnykh teplofizicheskikh pokazatelyakh mineralovatnykh plit. Problemy stroitel'noy teplofiziki, sistem mikroklimata i energosberezheniya v zdaniyakh* [Analytical Thermophysical Parameters of Mineral Wool Panels. Problems of Thermal Physics, Climate Systems and Energy Efficiency in Buildings]. Moscow, NIISF Publ., 1998, pp. 127—135.
3. Zhukov A.D. *Tekhnologiya teploizolyatsionnykh materialov* [Technology of Thermal Insulation Materials]. Moscow, MGSU Publ., 2011, Part 1 — 395 p., Part 2 — 195 p.
4. Blūdžius R., Samajauskas R. The Peculiarities of Determining Thermal Conductivity Coefficient of Low Density Fibrous Materials. Materials Science. MEDŽIAGOTYRA, 2001, 345 p.
5. Lienhard J.H. IV, Lienhard J.H. V. A Heat Transfer Text Book. Cambridge, MA, Phlogiston Press, 2003, 749 p.
6. Zhukov A.D. Smirnova T.V. *Gidrodinamika potoka teplonositelya v mineralovatnom kovre* [Hydrodynamics of Heat Transfer Agent Flow inside Mineral Wool Mats]. Nauka. Stroitel'stvo. Obrazovanie. [Science. Construction. Education.] 2012, no. 1. Available at: <http://www.nso-journal.ru>.
7. Zhukov A.D., Chugunkov A.V., Gudkov P.K. *Modelirovanie i optimizatsiya tekhnologii gazobetona* [Modeling and Optimization of the Aeroconcrete Technology]. Vestnik MGSU [Proceedings of Moscow State University of Civil Engineering]. 2012, no. 4, pp. 155—159.
8. Zhukov A.D., Smirnova T.V., Khimich A.O., Eremenko A.O., Kopylov N.A. *Raschet parametrov teplovoy obrabotki mineralovatnykh izdeliy s primenemiem EVM* [Computer-based Analysis of Thermal Treatment Parameters Applicable to Mineral Wool Products]. Stroitel'stvo: nauka i obrazovanie [Construction: Science and Education]. 2013, no. 1. Available at: <http://www.nso-journal.ru>.
9. Kurochkin V.A., Zhukov D.V., Shelepopov E.P. *Modelirovanie promyshlennogo rezhima konvektivnoy sushki izdeliy v protsesse eksperimenta* [Modeling of Industrial Mode of Convective Drying of Products in the Course of an Experiment]. Stroitel'nye materialy [Construction Materials]. 1979, no. 1, pp. 27—32.
10. Okorokov A.M., Zhukov D.V. *Issledovanie i raschet protsessa teplovoy obrabotki mineralovatnogo kovra metodom produvki teplonositelya* [Research into and Analysis of Mineral Wool Heat Treatment by Blowing the Heat Transfer Agent]. Stroitel'nye materialy [Construction Materials]. 1982, no. 7, pp. 32—37.
11. Petrov-Denisov V.G., Maslennikov L.A. *Protsessy teplo- i vлагообмена в промышленной теплоизоляции* [Heat and Moisture Transfer in Industrial Insulation]. Moscow, Energoizdat Publ., 1983, 192 p.

About the authors: **Zhukov Aleksey Dmitrievich** — Candidate of Technical Sciences, Professor, Department of Technology of Finishing and Insulation Materials, **Moscow State University of Civil Engineering (MGSU)**, 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; lj211@yandex.ru;

Smirnova Tat'yana Viktorovna — postgraduate student, Department of Technology of Finishing and Insulation Materials, **Moscow State University of Civil Engineering (MGSU)**, 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; Director, Department of Design and Technical Support, **ZAO «Mineral'naya vata»**; tatyana.smirnova@rockwool.ru;

Chugunkov Aleksandr Viktorovich — postgraduate student, Department of Technology of Finishing and Insulation Materials, Director, Department of Inspection of Buildings, Comprehensive Research Laboratory of Geotechnical Engineering; **Moscow State University of Civil Engineering (MGSU)**, 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; chugunkov@mail.ru;

Khimich Anastasiya Olegovna — student, Institute of Construction and Architecture, **Moscow State University of Civil Engineering (MGSU)**, 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; Khimichanastasia@gmail.com.

For citation: Zhukov A.D., Smirnova T.V., Chugunkov A.V., Khimich A.O. Osobennosti teplovoy obrabotki sloistykh vysokoporistykh materialov [Features of Heat Treatment of Highly Porous Layered Materials]. *Vestnik MGSU* [Proceedings of Moscow State University of Civil Engineering]. 2013, no. 5, pp. 96—102.