D. Lytvyn, Master student
L. Butovsky, PhD in Engr., As. Prof., research advisor
N. Kovalska, As. Prof., language advisor
National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute"

THE PERSPECTIVE SOLUTION FOR MINIMIZING OF HEAT LOSS IN PIPES OF THERMAL NETWORKS

Thermal power plays an important role in human life, because this industry provides humanity with thermal and electrical energy. Like other industries, it has some problems that need a lot of attention. The thesis deals with minimizing of heat loss in pipes of thermal networks. The goal is to cope with the task that has challenged the effectiveness of perspective solutions…

The major problems of the future development of thermal energy in the world remain, as before, the further technological improvement of the stations in order to increase the efficiency, reliability and environmental cleanliness of electricity and heat production, but there are other and equally important disadvantages. In particular, in the heat supply system, that has heat loss during transport of the coolant [1].

LOGSTOR has developed leading technology to address energy efficiency issues (reduced heat loss) in field of heat supply and is currently continuing to set new standards. The company is the world's leading manufacturer of pre-insulated pipe systems, so product requirements are very high. Manufacturing has a unique track record in this sector, due to constant innovation in the wake of emerging technologies.

LOGSTOR supplies peerless efficiency and high system quality documented from start to finish. The ISO 9001 and ISO 14001 standards lay the foundations for the manufacture of all pipes and components. These are also backed by a complete set of documentation in accordance with the relevant quality standards, including the European norms EN 253, EN 448, EN 488 and EN 489 [2].

The company has its own laboratory, on the basis of which it performs continuous laboratory tests on the basis of international standards, in order to document and improve products. Measurement results showed stable and high thermal insulation properties of products due to new standards in production:

- a layer added to the composition of the pipe – diffusion barrier of aluminum foil, to obstruct from the aging of the insulation because it prevents moisture from entering the environment, thereby ensuring the efficiency, reliability and durability of the insulation, since moisture that penetrates in the insulation and destroys its properties thereby increasing heat loss (Fig. 1) [2].

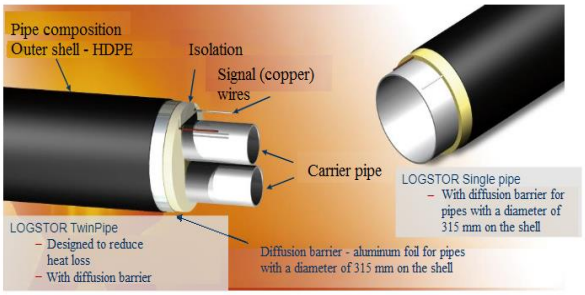

Fig. 1 – Composition of pipes

- cyclopentane is used as insulation, whose thermal conductivity coefficient λ = 0,017 W/(m·K) is lower than that of pre-insulated pipes based on foamed polyurethane (PIP) λ = 0,0296 W/(m·K). Cyclopentane more effectively reduces energy losses (Fig. 2) [2].

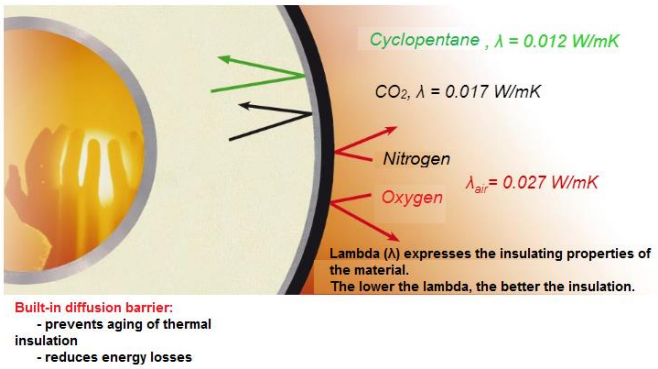

Fig. 2 – Material energy efficiency

- the technology of application of insulation on pipes has been changed, namely the pipes are made as one pipe of infinite length, and not as separate sections. Carrier pipes are inserted horizontally into the production machinery and assembled in a long, unbroken line. The insulation form is cast in place (axial process) or sprayed (spiral process) directly onto the steel pipe, depending on its size. The continuous method requires a lower volume of foam to produce better insulation than on traditionally manufactured pipes [2].

The axial process is a production method in which the pipes are continuously insulated in a rolling mold in which the polyurethane foam is poured around the pipe. The fully cast insulated pipe then proceeds through an extruder station where the HDPE outer casing is melted in place (Fig. 3) [2].

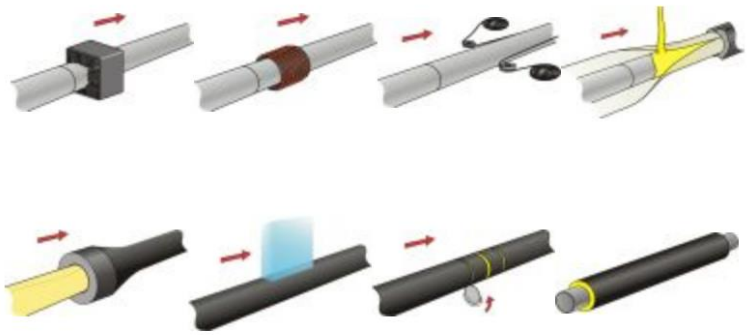

Fig. 3 – The process of axial isolation of pipes

The spiral process is a manufacturing method in which the PUR material is sprayed onto the carrier pipe while it rotates around its own axis as it passes through the production facility. The outer sheath of high density polyethylene is then coiled from the extruder in a spiral manner while the pipe continues to rotate around its axis (Fig. 4) [2].

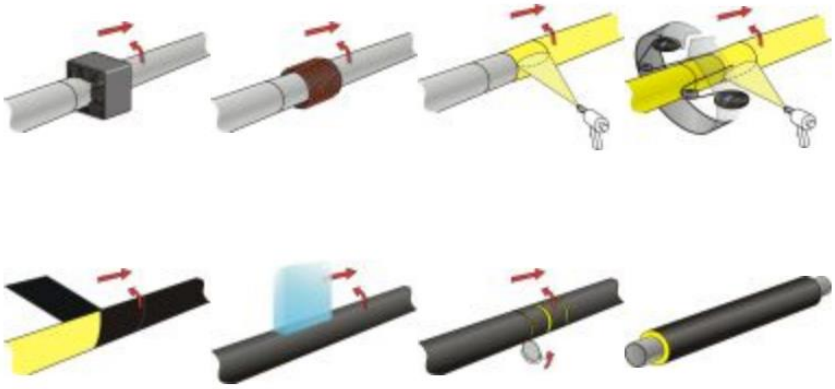

Fig. 4 – The process of spiral isolation of pipes

Based on laboratory experiments and tests of pre-insulated LOGSTOR pipes using cyclopentane, an additional diffusion barrier and using spiral and axial thermal insulation, the benefits of the company's products in energy efficiency, quality, environmental resistance, and operational reliability have been confirmed.

The results of this study have established the effectiveness of the use of pre-insulated LOGSTOR pipes in the solution of minimizing heat losses in pipelines of thermal networks.

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