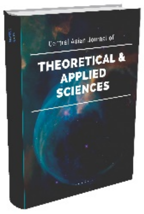

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Application of Thermal Insulation Materials in the Heat Supply System

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Abstract: *This article mainly discusses the efficiency of thermal supply and their optical utility ratios by optimizing the thickness of thermal insulation materials in a particular order and examining their working parameters. It will also help to create the necessary heat supply for more effective insulation materials.*

KeyWords: *temperature, Heat flow, thickness, energy, heating, heat transfer, thermal resistance*

Today, the performance of industrial enterprises is tied to the effective use of thermal energy. The main disadvantage in the transfer of heat carriers is thermal insulation.Therefore, the determination of heat dissipation in the transportation of heat carriers is an acute issue.

Thermal insulation of insulating structures is carried out in compliance with the temperature regime of operation:

1. Designs designed for ambient temperature (above 200C) ;

2. Designs designed for ambient temperature (190C and below) ;

3. Constructions in which the temperature regime changes dramatically (from positive to negative temperatures).

There are different ways of insulating pipes.Heating using a heated cable is convenient and effective, because the storage of the pipe from freezing will last on winter days. When heating pipes with cables, the power and cost are charged.There is practically no work on isolating non-insulated pipes or determining the optimal thickness of insulation. Depending on the density of the heat flux, it is possible to determine the thickness of the thermal insulation. The thickness of the insulation depends on the thermal conductivity coefficient (ICC) of the thermal insulation material (TIM), the temperature of the heat carriers and the environment, the diameter of the pipe, the method of conducting pipes, the period of exploitation.

We determine the thickness of the thermal insulation material for the hot water supply pipe.

Thermal resistance for cylindrical pipeilikni we calculate according to the following formula:

$$R_1 = \frac{l_n(\frac{d_{из}}{d_H})}{2\pi\chi_{из} + \frac{1}{\alpha_\beta \cdot \pi \cdot d_{из}}} \qquad (1)$$

d-the outer diameter of the thermal insulation material;

d_H-outer diameter of the pipe;

coefficient of thermal conductivity of thermal insulation material;

coefficient of heat transfer from thermal insulation material to air.

Linear density of heat flow:

$$q_1(d_{из}) = \frac{t_H - t_{из}}{R_1(d_{из})} \quad (2)$$

external surface temperature of the pipe;

heat insulation material external surface temperature.

Internal surface temperature of thermal insulation material:

$$t_{em} = t_n - \frac{q_1(d_{из})}{\pi} \cdot \left(\frac{1}{\alpha_T \cdot d_\beta} + \frac{1}{2\chi_T} \cdot ln\frac{d_n}{d_\beta}\right) \quad (3)$$

inner diameter of pipe;

coefficient of heat transfer from liquid to Wall;

thermal conductivity coefficient of pipe material;

We fix the heat balance:

$$2.75\frac{d_n \cdot \chi_{из}^{1.35} \cdot t_H^{1.73}}{q_1(d_{из})^{1.5}} - \frac{d_H \cdot 2.75\frac{d_n \cdot \chi_{из}^{1.35} \cdot t_H^{1.73}}{q_1(d_{из})^{1.5}}}{2} = 0 \quad (4)$$

Using the above formula, you can determine the diameter of the thermal insulation material. Then calculate the thickness of the pipe insulation:

$$\delta = \frac{d_{из} - d_H}{2}, m; \quad (5)$$

If this thickness is greater than this, the thermal insulation material does not have an additional effect, resulting in excessive costs. Considering the simplified option, the optimal thickness of the thermal insulation material can be calculated from the following formula:

$$\delta_{onm} = (10^{-3} \cdot C_y \cdot \tau \cdot N \cdot \Delta t \cdot \chi)^2 \quad (6)$$

Conclusions: In determining the optimal thickness of the material in the application of thermal insulation materials, we can determine the optimal option through these parameters, depending on the cost of the material, operating time per year, heating surface and thermal conductivity.

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