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Calculation of the Lost Heat Balance in Buildings

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Abstract. *Excessive energy consumption, if we take into account each of the current conditions, indicates that we must use optimal techniques. The only global warming itself is evidence of the increased energy and thermal capacities produced by the excess man. Reducing excess consumption and preventing wastefulness indicate that such indicators should be avoided. In this article, however, the theoretical analysis of thermal loss mechanisms of buildings is considered to calculate them.*

Keywords. Heat balance, heat supply, heat systems, building construction.

I. Introduction.

Heating of buildings is one of the main sections of construction machinery. Heating the installation of systems and tools is the same as the beginning of the construction of the building in time, it is done together, because its elements are in the period of drafting-scraping polishing interior design processes for interior architectural appearance of rooms planned together, the construction is brought in harmony with the construction to go. Hence, Thermal Systems - an indivisible unit of building construction technology part of. It is known that the process of exploitation of heat systems, performance period in season, meteorological conditions in the coldest of the year and throughout the year depending on the variable amount of heat in the change of seasons with the term is used under a certain condition. Such cycle heating systems it is called the period of work (period of residence). When we say in general, the heat the amount of heat dissociated from their equipment is the temperature of the outside air quantity-high-low, wind speed-low, wind speed-low, sun radiation coming into the room through the outer barriers of the building control of heat more or less depending on such indicators as must. Simply put, from the heating system and appliances are supplied to the room the amount of heat should be controlled, that is, the exterior and interior of the building spending through an external barrier without emotional depending on the difference in ambient temperatures transfer of the required amount of heat into the room by means of a heat detector means. Consequently, the presence of severe frosts in winter seasons is inextricably linked to the degree of heat transfer capacity of heating systems in the case of extremely rapidly changing work must be easy to fall into the mode. The efficiency of the heating system is its efficiency and makes the system " smart" it is carried out with controls. At present, in the heating of each room there was an opportunity to apply independently adjustable systems of temperature. In systems that connect to the "air", the mode of the system is only in the room depends on the temperature, but also on the external air temperature will also be a link. This the systems can be installed at the hour of the day, the day of the week, in the absence of residents, or late during the season, you can switch to modes that you do not like. It is known that in the cold period of the year the air condition in the building is warm depends not only on the performance of the instruments, but also on the degree of Air replacement also depends. These two indicators are in addition to the heat of the air inside the building namhgini, air movement speed, pressure, composition of gases in the air, as well as determines the degree of purity of air. Heating and ventilation systems in many industrial and civil buildings used together. This is the quality of the product in production, work productivity of workers, workers feel good in the process of Labor one of the main reasons that leads to the exacerbation of the condition and diseases the place is considered. Among other branches of the technique, the state, level of thermal engineering to the level of development of the production power, like other technical processes, and it is connected with the attitude of society towards production.

II. Main part.

It is known that according to the law of conservation of energy is included in the building and the heat flow spent from the building must be equal to each other. In general, in order to calculate the heat balance of the premises, the heat flows that are introduced into the building and spent through external barriers are determined. In order to determine the heat capacity of the heating system, the heat balance is as follows determined using the formula:

$$Q_{i4} = \Delta Q = Qt_{o's} + Q_{h.a.} \pm Q_{t.i}$$

here: $Q_{to's}$ -heat flow lost through external barriers;

$Q_{h.a.}$ -consumable heat for heating the Air introduced into the room;

$Q_{t.i}$-emerging as a result of technological and household process or a stream of heat spent on the farm;

If there is a lack of heat as a result of the calculation of the heat balance to the rooms of the building additional heating devices are installed, if the heat is superfluous, plus the amount of heat is absorbed or absorbed by the ventilation. Most of the amount of heat in a number of buildings is from people the output will consist of heat. In such a room (in higher educational institutions lecture rooms, cinema, theater, circus rooms, etc.the G.) the temperature of the interior avo it is obtained by lowering. This ensures a reduced temperature heating devices and the increase in air temperature and its normal state are accumulated it

will be the instead of heat, separated from the people. Often in public buildings the approximate heat capacity of heating equipment is equal to the amount of heat spent it is obtained by doing.

Determination of the power of heating systems and all their equipment-ng (number of boilers and their heat-giving surface, heat accounting amounts and transfer them to consumers ;Hun pipe accounting) full for calculation, the heat flow of buildings with external barrier qali loss QMQ 2.04.05 - 97, qmq 2.01.04-94 I qmq 2.01.01-97 clarified on the basis of requirements must. Barriers as a result of thermal physical calculations of external barriers in accordance with the volumetric-plan solution of buildings, the legislation of thermal physics of construction for effective structures do received. Therefore, with literacy heating effective external barrier constructions selected from the physical aspect of the heat it leads to the saving of the thermal power of their systems. Part of the heat flow that is being spent from the premises to the effect of the wind inextricably linked, especially multi-storey buildings are bare in the direction of the wind heat consumption is significantly greater when it is built. Wind on the contrary in areas protected from orientation and in buildings built within the city heat consumption will be less. Therefore, for the purpose of maintaining buildings from the influence of wind from the surface of the outer wall, special fences are installed, which repel the wind force. The heat that is being spent from the building under the influence of wind is an additional heat flow it is called.

So, the heat that is being spent in the building is of two types, and the first is the main, the second is an additional heat flux.

The main heat from the building is spent on the external environment from the following structures he: floor surface, exterior wall surface, exterior window area, exterior door area and roof top closure.

From additional heat flow sources it is necessary to take into account the following:

1. Calculated if the height of the citizen's buildings exceeds 4 meters the main and additional heat consumption is 25 to 15 percent next to the height of each meter interest should be taken extra heat. This is the production of additional heat consumption untouchable for buildings and stairs.

2. Wind speed 5-10 M/s in case of 2 % additional, from 10 m/ s 3 % extra heat is obtained if it has an excess speed,

3. If the exterior doors of large buildings are given a warm air curtain, the additional costs of heat given to the exterior doors are taken into account.

4. The amount of additional heat for typical buildings in general cases it accounts for 16 percent of the main heat.

Following the flow of heat that is going to be spent through the external barriers of the building we determine by the formula;

$$Q = \frac{1}{R} F(t_i - t_m) n(1 + \Sigma\beta) = kF(t_i - t_1) n, \text{ Vt}$$

Q-total heat flow when external obstacles are lost in the back, Vt;

F-the surface of the barrier construction, m^2;

t_i-the approximate temperature of room air, °C;

t_m-the accounting temperature of the external air (in the period of the coldest five days temperature value), °C;

n-external barrier construction, the external surface of the external air attitude associated coefficient;

β-the term added to the basic heat loss;

R-thermal conductivity resistance of the calculated external barrier (thermal resistance), $m^2 \cdot$grad / Vt above are two of the barriers to the formula on the (external and internal) side, too, the temperature does not change and the heat flow is blocked the passage (to the cold side by hot) is also the same (stationary) we will accept.

Determination of the heat flow that disappears from the outer barrier structures to determine the surface surfaces of each barrier separately on the basis of a certain rule must.

Surface of fences (F, m^2) and the following rules for straight linear sizing on the basis we determine:

1. To determine the surface of windows, doors and lanterns (roof windows), they
the smallest size of the seat is obtained.

2. The thickness of the inner walls to determine the floor and the surface of the ceilings
adopt the size from the middle and to the inner surface surface of the outer fences
will be done.

3. The outer wall surfaces are determined in the following order:

A. The measure of the height of the first floor wall - if the floor is grounded, then from its surface the floor of the second floor is taken to the surface of the floor; if Paul is in the (wooden elevator), then on the densified Earth, that is, the base of the size from the bottom to the floor of the second floor is acceptable, if there is an unheated basement, then the second floor above the lower level of the 1-th floor screed the size up to the level of the Poly is acceptable.

B. Floor threshold for the height of the walls located between the floors
above it is obtained the distance from the floor to the floor, which is located above it.

D. Top floor for the wall, which is located above most of the multi-storey building from the surface of the Poly is to the top of the chordate roof construction the distance is taken.

E. Size for high floor wall height without attic over the floor the size to the surface of the roof is obtained.

F. The outer wall size of the room, which is not in the corner in the history of the building the distance between the arrows passing through the middle of the inner barriers is located in the corner the outer wall dimension in the room is the axis of the inner barrier from the outer surface of the outer barrier the distance in the range is acceptable.

G. For interior wall surfaces, the internal dimensions of the fences are acceptable.

H. If the area of the floor surface is in the corner, then in every 2 meters divide the length and E into zones by dividing the first zone by 2 times the length of the tube many will be accepted. Rip-for unheated threshold.

III. Conclusion.

It is assumed that the temperature of the air inside the premises is equal to tich=18ºC. Number of days worked during the year /IST/ heat water supply z = 350 per day it is accepted that at the same time IST does not work from 0 to 6 hours, from 6 to load on average up to 18 hours, while from 18 to 24 hours, the maximum when loading, the hourly unevenness coefficient works with X_{hour}=1,7÷2,0.

Cold water temperature in winter t_{cw}= 5, in summer t_{cs}= 15 it is obtained.

At the time of calculation, the heat loss in the network is taken as follows: will be: $t_{1,r}$=27°C / lowest temperature / if -5%, $t_{1,r}$=-7°C -3,6%, : $t_{1,r}$=+10°C / if / during the summer period, listed above $t_{1,r}$=-15°C in the case of it is obtained in the amount of 2,5% of the maximum hourly consumption of heat.

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