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TECHNICAL SOLUTIONS OF VENTILATION SCHEMES IN INHABITED AND PUBLIC BUILDINGS WITH EXTERNAL FENCES OF THE RAISED TIGHTNESS

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In the work are presented possible variants of technological schemes for an effective utilization in systems of ventilation of high-rise buildings with external protecting designs of the raised tightness to which the preference is given systems combined heat and air delivery, combined with ventilation.

Currently, any building or structure shall be operated in compliance with all applicable technical regulations, and conformity with the principles of energy conservation. For energy efficiency use of modern technical solutions, technologies and materials [1]. In modern construction, increasingly are building with outer fences high tightness. For the design, construction and operation of such facilities should provide for measures to meet the required parameters of microclimate of buildings. To ensure the required parameters of internal air heating and ventilation systems are used.

For the buildings of the inhabited and public appointment having external fencings of raised tightness, three basic technological schemes of ventilation are possible [2, 3]:

- systems of exhaust ventilation with natural gravitational prompting and the organized inflow of external air for the account of infiltration through equivalent apertures, cracks, channels or ventblocks of the various design, arranged in external protecting designs;
- systems of forced-air and exhaust, general and local ventilation with natural and mechanical prompting;
- systems of ventilation combined with air heating of buildings.

In all considered variants wide use of regeneration means of warmth deleted from ventilated premises is possible. By the first variant of ventilation the delivery of external air in ventilated premises is carried out through artificial apertures in external protections under the influence of the natural gravitational prompting resulting in difference of pressure on either side of an external protection because of a difference of temperatures of external and internal air. The normalized temperature of internal air is supported in the set limits by the system of heating of buildings with which help the cores heat loss through external protections and additional losses of the warmth are compensated. A major loss of the building occurred through external enclosures: walls, windows, floors, above the basement or attic, roof. Additional losses are linked to the heating of the intake air through the ventilation openings in the outer fencings. Devices for air flow may vary in design, such as holes, valves, channels or ventblocks. All air shafts, ducts, and openings, whether for inlet or outlet of air, must be constructed so as to be easily cleaned out. The inlets must in addition be fitted with regulating valves for opening and closing them in varying degrees [4]. The general technological scheme of such ventilation of buildings with external protections of the raised tightness is represented by Figure 1.

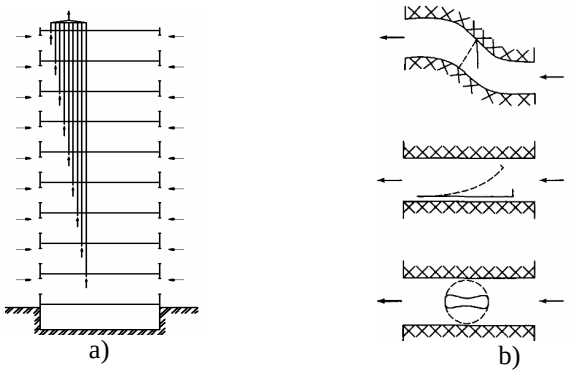

Fig. 1. The building with a natural extract and the organized inflow through apertures in external walls: a) the scheme of movement of air streams; b) constructions of devices for air flow

The second technological scheme of ventilation of buildings with external protections of the raised tightness assumes the device of forced-air and exhaust general and local systems of ventilation with the natural and mechanical prompting the circuit diagrams of which are presented in figure 2. The technological scheme of the forced-air and exhaust ventilation with the natural prompting, represented in figure 2, a) assumes the air exchange organization in ventilated premises of many-storied buildings removal of internal air through exhaust channels and giving of fresh external air through inflow channels. Air intake for the flow in the lower part of the building through natural difference of pressures. Of the total duct, located in the basement or the technical premises, outside air enters the premises operated by vertical channels. As the air warms up it gets into the accepted premises in the amount of not less than regulatory. Air elimination also occurs on vertical channels emerging on the roof or a warm attic.

The diagram shown in Figure 2, b) includes combined ventilation system of the building. This scheme provides the system of channels, fans and other equipment for air treatment. Supply and removal of air in ventilated premises can be done in two ways. If the housing is to maintain the natural draught ventilation, enough with the significant difference between the outside and inside temperatures, the fan does not operate. In the warm season of the year the outside air temperature is approaching the internal temperature, pressure difference decreases. When the exchange of air reaches the minimum value, supply and exhaust fans are automatically enabled to increase the airflow to the required values. Mechanical aeration mode space is especially necessary in the case of the alignment of internal and external air temperatures. In such cases, to create comfortable conditions for the environment there should be intensive airing of that system of mechanical ventilation well.

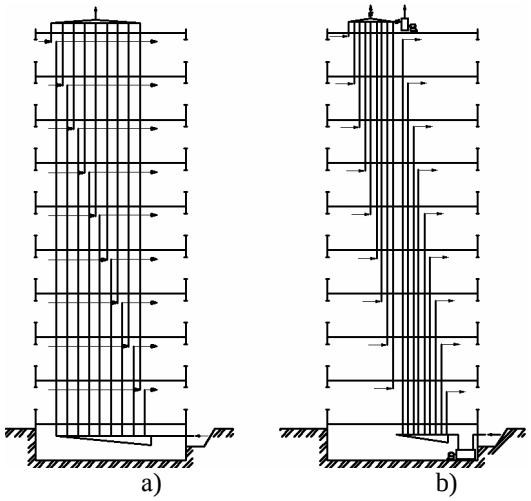

Fig. 2. The scheme of a forced-air and exhaust ventilation of buildings:
a) with natural prompting; b) with mechanical prompting of movement

In buildings with increased requirements to comfort of conditions in summer with intense exposure to sunlight may be used an inflow fans for the admission of warm external air through chambers of an intensive irrigation with delivery cooled air in the adiabatic regime in ventilated rooms according to requirements.

By the third variant ventilation of buildings with external protections of the raised tightness can be carried out under the technological scheme of combination with the air heating which circuit diagram is presented on Figure 3.

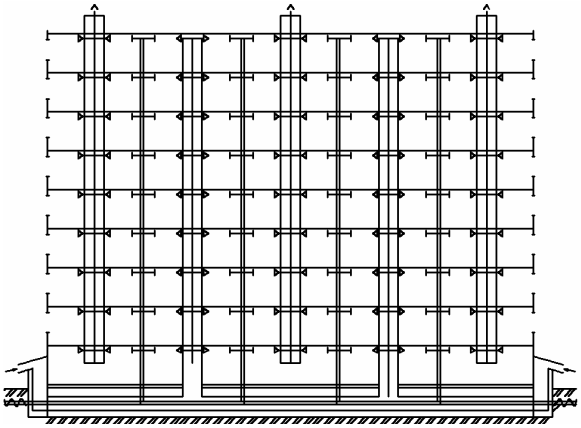

Fig. 3. The circuit diagram of air heating of the buildings, combined with ventilation

Unlike the first variant in which having heated up external inflow air it is made at the expense of a thermal overload of system of water heating, in the third variant ventilating supply air overheats to settlement values and moves in a heated premise, compensating it heat loss and maintaining temperature of internal air in normalized limits. At such combined technological scheme of the combined heating and ventilations the scheme of automatic maintenance of the set temperature mode of a building by installation of gages of temperature in control premises and the automatic regulators of the expense established before heaters of air. As a result, installations of heating supply centers are greatly simplified. .It will allow changing almost instantly parameters of air with changing of weather conditions (intensive solar radiation, wind, overcast, etc.) with considerable economy of thermal energy.

Along with economy of thermal energy the simple scheme of regulation will allow to exclude dependence of internal parameters of a microclimate from weather conditions, to create stable conditions of the air environment in ventilated premises and thus it raises the social importance of such technical decision [2, 3].

An extensive introduction in scales of town-planning of technology of ventilation of buildings of inhabited and public appointment under the schemes combined with heating assumes to all national economy of the country considerable economic benefit.

For this purpose it is enough to imagine that in new construction building there will be no necessity to lay a too much of pipes of miscellaneous diameter, expensive multipurpose armatures, numerous heating devices, various on a design. In buildings will not be installed circulation pumps that move huge masses of water heating systems and consume significant energy in the operation of hot-water heating systems of buildings. Reducing costs through the implementation of short-term introduction of new technologies of heating and ventilation in accordance with the proposed scheme, there is undeniable economic benefits and their weights for the country, the national economy. If all these expenses sharply to reduce at the expense of realization of short-term introduction of new technology of heating and ventilation under the offered scheme of the combined operating mode there are indisputable economic gains and their scales for a national economy.

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THE ANCHORAGE OF UNTENSIONED REINFORCEMENT

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The article concerns the main factors that influence the anchorage of untensioned reinforcement and it also presents the analysis of the effect of web and confinement reinforcement in welded reinforcements made by resistance spot welding, on the anchorage of longitudinal reinforcement EN 1992-1-1-2009.

Anchorage is the process of fixing reinforcement in concrete, which is achieved by putting the reinforcement behind design section to the length necessary for putting a bar into work (straight embedment of anchorage) or by taking special building measures. The nature of detensioning in reinforced-concrete structures depends on many different parameters. For examples, for the mechanism of straight anchorage they are:

1) the properties of concrete – mix proportions, consistency, shrinkage, a direction of concreting, concrete strength and so on [1, 2];

2) the properties of reinforcement – mechanical characteristics, profile, diameter, depth of concrete cover, arrangement of H-bars and so on [3, 4, 5, 6];

3) stress strain behavior of enveloping concrete. It is known that the increase of concrete compression intensity within 0,1 – 0,4 f_{ck} leads to the gain of adhesional strength during the pulling out. And conversely, the existence of force leading to web reinforcement decreases the effectiveness of anchorage greatly.

Structural anchorage (used to plain reinforcing bars) is done by fixing hooks, offsets, anchoring loops of wire at the ends of bars. When grip anchorage or anchorage with the help of hooks or loops of wire is not enough special anchorage devices are used, such as anchor washers , buttenheads, short bars and bars welded to base tables and so on [7] (Fig. 1).