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Determination Of Condensation On The Inner Surface Of The Walls Of Canoe Buildings Under The Influence Of Aerosols

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ABSTRACT

Definition of fall condensate in unnez surface of enclaneres in aerosols operation. Attendance in induslrial fuld of alrosols notablu influence on chanching of relative humaditu and fall of condensate in inner surface of enclosures and their operation, it is nessaru to take into consideration in calculation.

KEYWORDS

Aggressive Environment, Industrial Buildings, Exterior Walls, Normal Or Dry Temperature, Moisture Accumulation Period, Wall Design, Salts, Physicochemical Properties Of Salts, Small Pores Of Saline Material, Chemical Composition Of Salt, Concentration Of Solution.

INTRODUCTION

In industrial buildings with aggressive environments, external walls are used in qualitatively different conditions compared to walls that are only influenced by moisture and temperature gradients.

In accordance with building codes and regulations, industrial premises of most modern chemical factories can be classified as premises with normal or even dry temperature and humidity conditions. Numerous field studies of the temperature and humidity regime of the air at potash plants confirm this statement.

However, in many cases, the walls of such buildings are covered with efflorescence and wet spots, which indicates an unfavorable humidity regime. Analysis of samples taken by the thickness of the clay brick walls shows that

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in some buildings the average humidity at the end of the moisture accumulation period exceeds the allowable 5%, and the local maximum humidity is higher. In the warm season, the walls do not have time to dry out. A similar picture is observed in walls made of expanded clay concrete panels with a protective layer of heavy concrete.

The increased humidity of structures in the presence of salts leads to the destruction of the wall material, especially from the outer surface, which is exposed to sharply changing temperatures. In addition, the concentration of salt dust in the outdoor air often exceeds the concentration of dust in the indoor air.

The degree of salinity, the design of the wall and some other factors affect the process of moisturizing the enclosing structures and the nature of the distribution of moisture along the thickness of the wall. However, with the correct choice of the structural solution of the wall, the decisive influence of the salt solutions contained in the thickness of the fence on the humidity regime is undoubted, since in the pores of the wall material there are solutions of salts with physicochemical properties that differ from water.

The presence of chloride salts in the thickness of the fence increases the hygroscopicity of materials (the ability to absorb moisture from the air). The sorption properties of building materials are determined by the nature of the connection between moisture and the surface of pores and capillaries. The amount of adsorbed moisture in the presence of salts will depend not only on the temperature and humidity conditions of the environment and the nature of the material to be moistened, but also on the physicochemical properties of salts and their amount in the pores of the material.

In small pores of saline material, capillary condensation occurs when the relative humidity of the air is much lower, depending on the chemical composition of the salt and the concentration of the solution.

Determination of the duration of exposure to condensate caused by aerosol hygroscopicity can be considered by the example of assessing the inner surface of the enclosing structure in buildings with aggressive environments.

The calculation of the time during which during the cold period of the year condensation will fall on the inner surface of the fences is based on the determination of the dew point temperature. The result of the calculation can serve as an approximate estimate of the time of exposure of the liquid phase to the protective coating of the fence from the inside, since it is made with the following assumptions: when determining the outside air temperature, which causes condensation on the inner surface of the wall, it is assumed that the temperature of the inner surface of the wall changes instantly after the change in the outside air temperature, i.e., the thermal inertia of the wall is not taken into account. The assumption made leads to an inaccuracy in the estimate of the total time of condensate precipitation in comparison with the actual values in the direction of increase.

The total time of exposure to the liquid phase during the cold period of the year on the protective coating is determined, without taking into account periodic increases in the outside air temperature and corresponding to the increase in the temperature of the inner

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surface of the wall, causing interruptions in condensation, which has a positive effect on the service life of the protective coatings. Consequently, the frequency of condensation is taken into account only in the annual cycle of changes in the outdoor temperature.

The thermal engineering calculation of the fence is carried out in accordance with the chapter of SNiP on construction heat engineering. It is desirable to take real values obtained on the basis of field studies as parameters of the internal air (temperature, humidity and aerosol properties). In the presence of hygroscopic aerosols in the air of the industrial premises, the nominal relative humidity of the air, determined by the formula.

$$\varphi_y = \frac{\varphi_в}{\varphi_г} 100\% ,$$

where $\varphi_в$ - is the relative humidity in the room,%;

$\varphi_г$ - hygroscopicity of aerosol,%;

Depending on the temperature of the indoor air tв and the relative relative humidity of the indoor air, the absolute relative humidity of the air and the relative temperature of the dew point tr.u. are determined. according to tables of values of maximum vapor pressure. The maximum outside air temperature at which condensate will fall out on the inner surface of the fence, under stationary heat transfer conditions and the above assumptions, can be determined by the formula

$$t_H \leq t_в - \frac{t_в - \tau_{py}}{R_в} R_0$$

where t_B - indoor air temperature, °C

τ_{py} -conditional dew point temperature of the inner surface of fences, °C

$R_в$ – heat resistance м² .ч. °C/ккал

The time in hours during which condensation will fall on the inner surface of the fence can be determined from the data of the SNiP chapter on construction climatology and geophysics.

Thus, it has been shown that aerosols present in the production environment significantly affect the change in relative humidity and condensation on the inner surface of the fences and their effect must be taken into account in the calculations. The studies carried out have established that the calculation of the time during which condensation will fall on the inner surface of the fences during the cold period of the year should be based on determining the dew point temperature, taking into account the assumptions of not taking into account the thermal inertia of the wall and the frequency of condensation.

How to care for concrete in the summer. If you decide to concrete any structural element in the summer, then you should understand that in summer there is high temperature and low humidity. That is why in the summertime the concreted area is covered with burlap and periodically moistened by pouring water every 2-3 hours. If the weather is not very hot, then it is worth watering every 10-12 hours. It is necessary to water the concrete within three days. This concrete care is needed in order to avoid the evaporation of water in the concrete solution itself, since without water, concrete will crack and corrode. In a humid environment, concrete gains greater strength.

How to care for concrete in winter. At a temperature of + 5-10 degrees, the hardening of concrete is significantly reduced. And at temperatures below 0, it stops. Therefore, there are three ways to heat concrete in winter. The first of these is the "thermos method". The concrete is covered with a film, and steam or warm air is allowed under this film. Because of what the concrete heats up and becomes a humid climate, which favorably affects the conditions for its freezing. The next method is "electrical heat treatment", that is, electrodes are inserted into the concrete around the perimeter and closed in one circuit, after which a current is started. And the most common way is the third - the introduction of chemical additives into concrete. There are various chemical additives that "make" the concrete mixture harden. The most common additives are calcium chloride and sodium chloride, sodium nitrate and urea. All supplements can be purchased at any hardware store.

How to choose heavy concrete. If your structure or structure is located in a humid area or in a humid environment, corrosion-resistant heavy concrete should be used. So you need to cover the concreted place with dense ceramic tiles or process it with liquid glass, for complete confidence that the concrete will not corrode. If your structure or structure will be located in a room or area with a high temperature, you should use heat-resistant heavy concrete. It is also worth revealing it with ceramics or heat-resistant materials.

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