# CALCULATION OF EXCELLENT LOADING CAPACITY OF EXTERIOR BARRIER WALLS MADE OF POLYSTYROBONE CONCRETE BLOCKS.

**Muminov A.R**
Teacher, Namangan Engineering Construction Institute Republic of Uzbekistan,
Namanagan city, 12 Islam Karimov street.
***muminov19921924@gmail.com***

***Annotation:*** *This article provides information on the calculation of the load-bearing capacity of external barrier walls made of polystyrene concrete, used as a lightweight structure, and the physical and mechanical properties of polystyrene concrete and its field of application .*

***Key words:*** *Polystyrene concrete, construction - thermal, insulation polystyrene concrete, expanded polystyrene granules, medium density .*

**Walls not designed to carry loads.**

Non-load-bearing (suspended) walls assembled from full blocks are assembled at a height of one floor and fastened to the inter-storey covering above. It is also attached to the transverse load-bearing walls using steel mounting elements. These walls mainly absorb wind load. The window and other openings are covered by reinforced polystyrene concrete screeds, which absorb the weight of all blocks except the weight and the weight of the elements attached to the wall (between the screed and the screed) and the weight of the plaster layers and hanging equipment. In some cases, specially reinforced switches also absorb the bed stresses that the wind gives to the window or door fillings. Curtains outside the load-bearing transverse wall are calculated as the resistance of a freely supported beam to the action of a uniformly distributed stress generated by the wind, determined in accordance with the “Loads and Impacts” section of the QMQ. Normal wind load for buildings less than 40m in height (W):

$$W = W_m = W_0 kc (1.1)$$

Here the coefficient ( *k) is* QMQ is determined by the level passing through the middle of the floor height in question from the tables. Amount of wind load for buildings 40m and higher:

$$W = W_m = W_p, (1.2)$$

Here is the $W_p$pulsating component of the wind load . This is a size

$$W_p = 1.4\frac{z}{H}\varepsilon w_{mh}\Omega \qquad (1.3)$$

Calculated by the equation.

z is the step height in question (m).

*H* - Building height ( m).

$\varepsilon$ - Dynamic coefficient ( determined by QMQ graph). However, the magnitude of the oscillations depends on the logarithmic decrement / - 0.3 / $\varepsilon = 0{,}004T\sqrt{w_0}$ 0.05 /

$\xi = 1{,}18 + 10\varepsilon$

It can be determined using a formula.

Here $W_0$ - the normative value of wind pressure is kg / m $^2$ .

T-Period of specific oscillations sec $^{-1}$ . Its amount can be assumed to be equal to 0.021 * H.

$W_{mh}$ is the average component of the wind load. $W_{mh}$ is found from formula ( 1.1 ) .

Determined when *K - z = H.*

/-7.Wind bomsimi pulsation coefficient found from the table QMQ (when z = H).

V-9QMQ (when / = H, / = B) is the correlation coefficient of the wind pressure pulsation selected from the table.

*H* and *V* is the width of the building on the windward side.

The calculated length of the curtain is taken as the distance between the curtains. The wind load is concentrated from the load area with a width equal to the distance between the sides of the side holes. The load on the curtain is:

$$q = w\left(b + \frac{b_л + b_п}{2}\right)\gamma_f \gamma_n \quad \textbf{(1.4)}$$

Where *b* is the width of the curtain

$b_n$ and $b_l$ is the width of the right and left holes

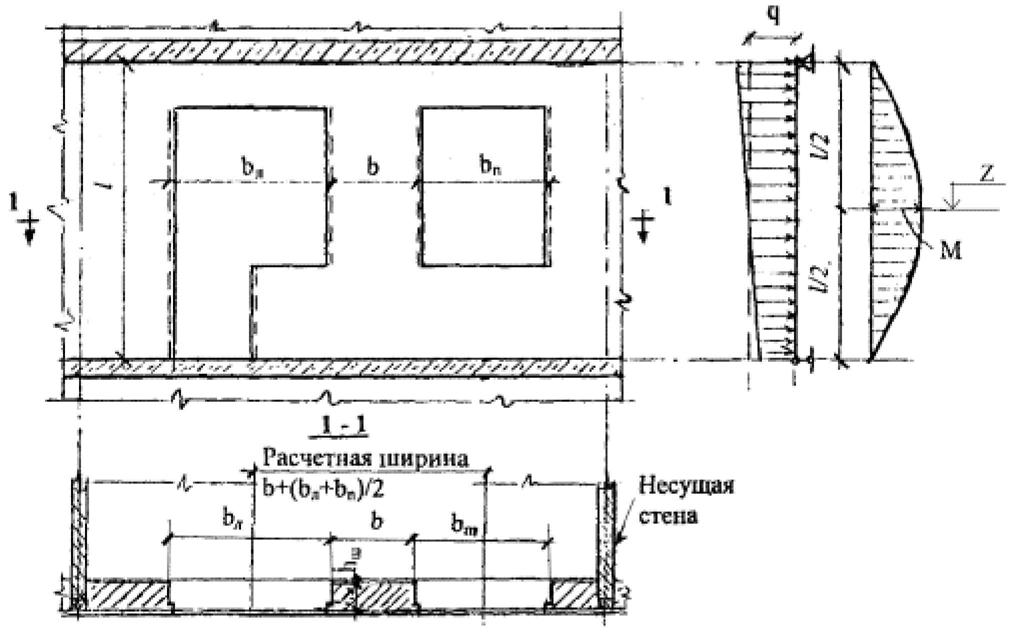
*w* - Wind load ( found from formula 1.2 . )

$\gamma_r = 1.4$ - load reliability coefficient

$\gamma_n$ is the coefficient of reliability in essence. Its amount is for class I buildings (educational institutions, hospitals, kindergartens, etc.) = 1.0 ha.

- For Class II buildings ( residential and other public buildings ) = 0.95

*The* calculated moment $M = ql\,2/8$ ga teng. (1.5)




**1 .1. Calculation of the wall to wind load.**

The calculation is based on the conditions (1.6) .

$$M \leq R_s A_s (h_p + h_{sh}) \quad (1.6)$$

Here- $h_p$ and $h_{sh}$ thicknesses of polystyrene concrete wall and plaster layer.

The calculated resistance of QMQ as reinforcement for reinforced cement structures in Annex 2 is $R_s = 2500kgs / cm^2$ steel grids are used. The plaster layer is made of sand-cement or sand-lime-cement mixture (not less than 50 marks and not less than polystyrene concrete mark). In addition, the density of polystyrene concrete should not be less than $200kg / m^3$. The effect of the moment M ((1.3) on both $s = 0.8$ and $s = -0.6$ (negative wind pressure) * is calculated) under the influence of the moment *M* of the brick oblitsovka and reinforced internal plaster curtain . Note: A positive sign in front of the aerodynamic coefficient indicates that the wind pressure is on the corresponding surface, and a negative sign indicates that it is in the opposite direction from the surface.

The calculation is performed first without taking into account the brick oblitsovka. Calculation at positive wind pressure

$$M \leq R_s A_s (h_0 - x/2) \quad (1.7)$$

It is carried out on condition.

Here- $h_0$ working height of the cut. It is equal to $h_{p+} h_{sh}/2$ .

$x$ is the height of the compressed zone. Its value is $x = R_s A_s / (\bar{R}_b b)$ .

$\bar{R}_b$-computed resistance of polystyrene concrete wall to compression. It is multiplied by the compressive strength of polystyrene concrete, which is determined from Table *1.6* with a coefficient $k = 0.7$ , taking into account the effect of adhesive joints, taking into account the operating conditions of the wall . Consider the values of the remaining characters from *(1.3)* and *(1.4)* .

Calculation of negative wind pressure

$$M \leq \bar{R}_{btf} W_{red} \quad (1.8)$$

carried out according to the condition. Here is the calculated resistance of the wall made of $\bar{R}_{btf}$ polystyrene concrete blocks to elongation. It is obtained by multiplying the coefficient of operating conditions of the wall $k = 0.85$ *by* the calculated resistance to elongation of $W_{red}$ *, which is* determined from Table *1.6* , taking into account the effect of adhesive welds.

$W_{red}$ is the moment of resistance of the cut. It represents the area of the polystyrene concrete and the area of the compacted plaster layer multiplied by the modulus of virginity of the mixture to the modulus of virginity of polystyrene concrete ( $E_{sh} / \bar{E}_v$ ). *The modulus of acceptance is taken from* Table *18* of the section "Concrete and reinforced concrete structures" of the EM QMQ , depending on the concrete class of fine-grained concretes of group *B (natural hardening) V = 0.07M* or selected from Table *1.1* . Taking into account the effect of the virginity modulus *and adhesive* seams of the polystyrene concrete block wall $\bar{E}$, the coefficient of operating conditions of the wall with $k = 0.8$ *is taken* as the product of the virginity modulus of polystyrene concrete from Table 317 .

$$W_{red} = I_{red} / y_{red} \quad (1.9)$$

$W_{red}$ *is determined* by the formula . Where- $I_{red}$ is the moment of inertia of the selected section , $y_{red}$ -the distance from the center of gravity of the selected section to the elongated edge of the polystyrene concrete block in front of the brick lining. If condition (1.7) or (1.8) does not meet the requirements, the torque M can be reduced. To do this, it is necessary to distribute it between the brick oblitsovka and the main part of the wall in proportion to their stiffness ( gesture). Oblitsovka hardness:

$$V_{obl} = a\, Rbh^3_{obl} / 12 \quad (1.10)$$

Here- *a* The virginity of the wall is taken from Table 15 of the "Stone and Reinforced Structures" QMQ.

R- QMQ Table 2 is the calculated resistance of the wall to compression.

$h_{obl}$ -brick wall thickness.

Hardness of the main part of the wall :

$$V_{st} = \bar{E}_b I_{red} \quad (1.11)$$

However

$$M \frac{В обл}{В обл + Вст} \leq \left(0.85 R_{tb} + \frac{0.9G}{bh обл}\right) W_{obl} , \quad (1.12)$$

Depending on the condition, it is necessary to check the strength of the oblitsovka. Here- $R_{tb}$ *is* the calculated resistance of the brick wall to elongation at bending in the unconnected section taken from Table QMQ 10. $R_{tb}$ ning A coefficient of 0.85 is introduced to eliminate excessive stresses in the unbound joints of the brick wall. *G is* the weight of the oblitsovka above the calculated section

$$W_{obl} = bh^2_{obl} / 6. \quad (1.13)$$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1.12 is met, the brick oblitsovka is joined to the polystyrene part of the wall using flexible joints. In this case, it is not required to fully attach the oblitsovka to the main wall section. However, in an air gap with a thickness of 5mm, it is necessary to take into account the fire-fighting layers. *1.7, 1.8* or *1.12* Calculation of a brick oblitsovkali wall (positive or negative pressure) in the presence of wind impact , cement-sand or adhesive joints, polystyrene concrete wall part and reinforced plaster layer as a complex cutting element. In this case, the hypothesis of flat cuts is accepted and the stresses at different points of the cut are determined according to the cut-off scheme given in the example, however, the tensile stresses in the unbound (horizontal) welds of the brick lining should not exceed 0.85 * $R_{tb}$.

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