**THE THERMAL RESISTANCE CALCULATION OF WALLING IN THE WARM SEASON**

## Source data

1. Construction area – Kuwait.

2. Average monthly outdoor temperature of the hottest month (July) according to SNiP $t_{ext} = 38{,}7℃$.

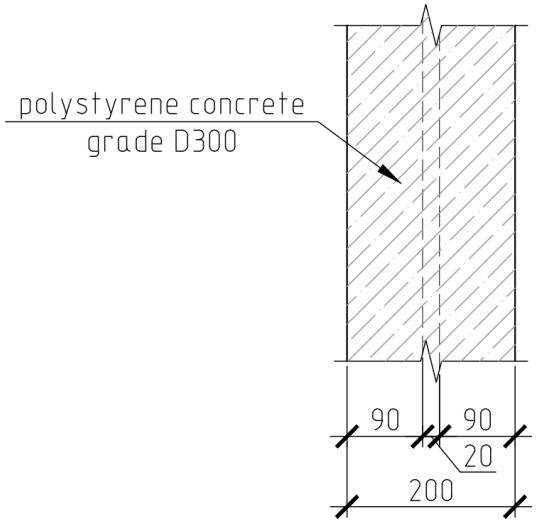
3. Maximum amplitude of daily fluctuations of outdoor air temperature according to SNiP $A_{t,ext} = 17℃$.

4. Maximum and average values of total solar radiation in July at a clear sky for the vertical surface of the Western orientation $I_{max} = 712\frac{W}{m^2}$, $I_{av} = 184\frac{W}{m^2}$.

5. The estimated wind speed according to SNiP $v = 10\frac{m}{s}$.

6. Thermal characteristics of the panel materials are selected according to the operating conditions A:

$$\lambda = 0{,}9\frac{W}{m\cdot℃},\ s = 1{,}55\frac{W}{m^2\cdot℃}.$$




## Procedure of calculation

1. Thermal resistance of wall panel layer:

$$R = \frac{\delta}{\lambda} = \frac{0{,}2}{0{,}09} = 2{,}22\frac{m^2\cdot℃}{W}.$$

2. Thermal inertia of the wall panel layer:

$$D = Rs = 2{,}22\cdot 1{,}55 = 3{,}45.$$

Because the thermal inertia of the wall panel D < 4, then requires the calculation of the panel for heat resistance.

3. Normalized oscillation amplitude of the temperature of the inner surface of the enclosing structure is determined by the formula:

$$A_{\tau}^{req} = 2{,}5 - 0{,}1(t_{ext} - 21) = 2{,}5 - 0{,}1(38{,}7 - 21) = 0{,}73℃\,.$$

4. The heat transfer coefficient of the outer surface of the enclosing structure under summer conditions is determined by the formula:

$$\alpha_{ext} = 1{,}16\left(5 + 10\sqrt{v}\right) = 1{,}16\left(5 + 10\sqrt{10}\right) = 42{,}48\frac{W}{m^2 \cdot ℃}.$$

5. The calculated oscillation amplitude of the outside air temperature is calculated by the formula:

$$A_{t,ext}^{des} = 0{,}5A_{t,ext} + \frac{\rho(I_{max} + I_{av})}{\alpha_{ext}} = 0{,}5 \cdot 17 + \frac{0{,}7(712 - 184)}{42{,}48} = 17{,}2℃\,.$$

6. For polystyrene concrete layer, having D>1, the heat absorption coefficient of the outer surface is taken to be equal to the heat absorption coefficient of the material:

$$Y = s = 1{,}55\frac{W}{m^2 \cdot ℃}.$$

7. The value of attenuation of the calculated amplitude of fluctuations in the temperature of the outside air in the enclosing structure is calculated by the formula:

$$v = 0{,}9e^{D\sqrt{2}}\left[\frac{(s_1 + \alpha_{int}) \cdot (\alpha_{ext} + s_1)}{(s_1 + Y) \cdot \alpha_{ext}}\right] = 0{,}9e^{3{,}45\sqrt{2}}\left[\frac{(1{,}55 + 8{,}7) \cdot (42{,}48 + 1{,}55)}{(1{,}55 + 1{,}55) \cdot 42{,}48}\right] = 406{,}0$$

8. The amplitude of the temperature fluctuations of the inner surface of the wall panel is determined by the formula:

$$A_{\tau}^{des} = \frac{A_{t,ext}^{des}}{v} = \frac{17{,}2}{406{,}0} = 0{,}042 < 0{,}73℃\,.$$