

# Heat Engineering Calculation

## Heat Engineering Calculation

REGION: Vinnytsia region

Valid from November 20, 2020

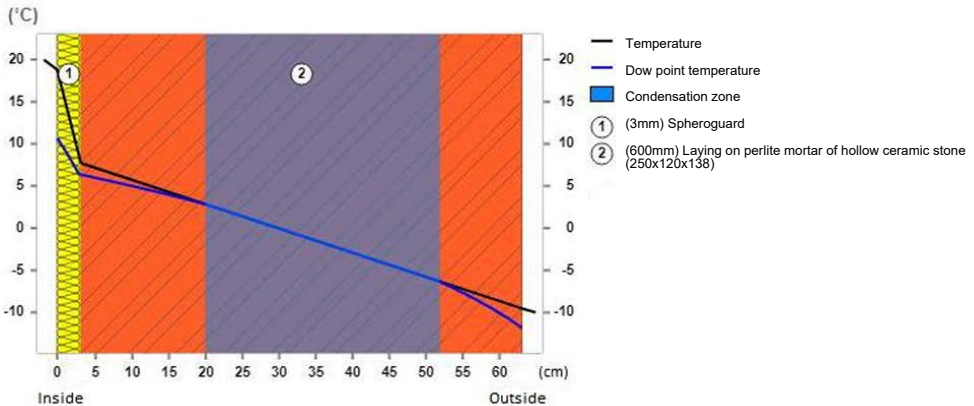
NAME: Vinnytsia

PREMISES: Residential premises

CONSTRUCTION TYPE: Wall

### THERMAL PROTECTION

|  |      |                        |
|--|------|------------------------|
| Temperature of a cold five-day week with a probability of 0.92   | -21  | °C                     |
| Duration of the heating period                                   | 180  | Days                   |
| Average air temperature during the heating period                | -0.7 | °C                     |
| Operating conditions of the premises                             | B    |                        |
| Number of degree days of the heating period (GSOP)               | 3726 | °C•Day                 |
| Sanitary and hygienic requirements [Rc]                          | 1.18 | (m <sup>2</sup> •°C)/W |
| Normalized value of element-by-element requirements [Re]         | 1.70 | (m <sup>2</sup> •°C)/W |
| Basic value of element-by-element requirements [R <sub>T</sub> ] | 2.70 | (m <sup>2</sup> •°C)/W |



### HEAT TRANSFER RESISTANCE: 2.9 (m<sup>2</sup>•°C)/W

| Nº | mm  | Material   | λ       | R    | Tmax | Tmin  |
|----|-----|--|---------|------|------|-------|
|    |     | Resistance to heat perception  |         | 0.11 | 20   | 18.8  |
| 1  | 2,7 | Low-Emission SPHEROGUARD Coating 120 kg/m <sup>3</sup>   | 0.0025* | 1.07 | 18.8 | 7.7   |
| 2  | 600 | Masonry on perlite mortar of hollow ceramic stone 250x120x138 mm), γ <sub>0</sub> = 1000 kg/m <sup>3</sup> | 0.36    | 1.67 | 7.7  | -9.5  |
|    |     | Heat Transfer Resistance   |         | 0.04 | -9.5 | -10.0 |

Thermal resistance of the enclosing structure

2.74

Heat Transfer Resistance of the Enclosing Structure [R]

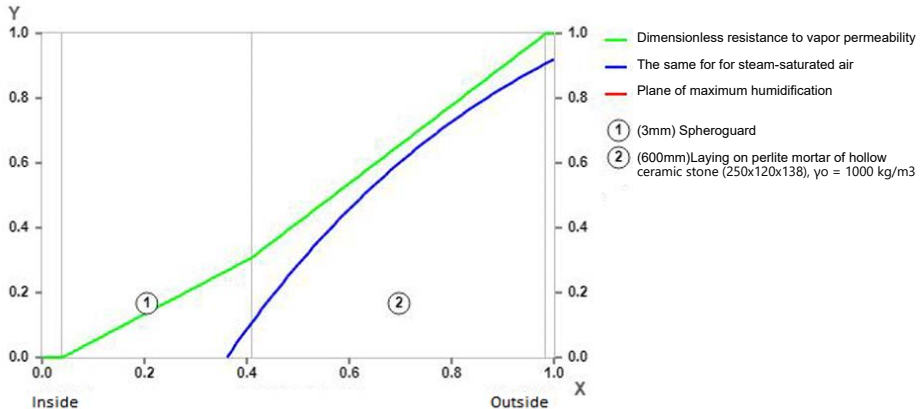
2.90

## Protection against over watering

Valid from November 20, 2020

### DIMENSIONLESS QUANTITY METHOD

Coordinate of the plane of maximum possible moisture



Coordinate of the maximum moisture plane  
In the enclosing structure, waterlogging is impossible.

### LAYER-BY-LAYER CALCULATION OF WATERLOGGING PROTECTION

Structural layers (from inside to outside)

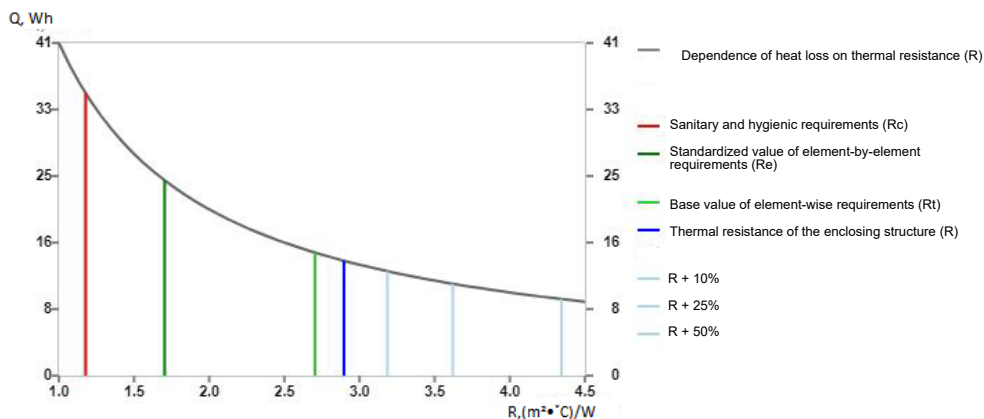
| Nº | mm  | Material   | $\mu$ | $R_n$ | $X$      | $R_n(b)$ | $R_n.tp1$ | $R_n.tp2$ |
|----|-----|--|-------|-------|----------|----------|-----------|-----------|
| 1  | 2,7 | Low-Emission SPHEROGUARD Coating $120 \text{ kg/m}^3$  | 0.018 | 1.67  | 30(74.4) | 1.67     | -1.87     | 0.14      |
| 2  | 600 | Masonry on perlite mortar of Hollow ceramic stone (250x120x138 mm), $\gamma_0 = 1000 \text{ kg/m}^3$ | 0.16  | 3.75  | 371.3    | 3.99     | 0.00      | 0.00      |

Designed to meet waterlogging protection requirements

## Heat Loss

Valid from November 20, 2020

### HEAT LOSS PER SQUARE METER OF ENCLOSING STRUCTURE



### HEAT LOSS PER HOUR WITH HEAT TRANSFER RESISTANCE (Wh)

| Heat Transfer Resistance                                 | R    | ±R, %  | Q     | ±Q, Wh |
|--|------|--------|-------|--------|
| Sanitary and hygienic requirements [Rc]                  | 1.18 | -59.32 | 34.80 | 20.65  |
| Normalized value of element-by-element requirements [Re] | 1.70 | -41.19 | 24.07 | 9.91   |
| Basic value of element-by-element requirements [Rt]      | 2.70 | -6.64  | 15.16 | 1.01   |
| Heat Transfer Resistance of the Enclosing Structure [R]  | 2.90 | 0.00   | 14.15 | 0.00   |
| R + 10%  | 3.19 | 10.00  | 12.87 | -1.29  |
| R + 25%  | 3.62 | 25.00  | 11.32 | -2.83  |
| R + 50%  | 4.34 | 50.00  | 9.44  | -4.72  |
| R + 100%   | 5.79 | 100.00 | 7.08  | -7.08  |

Heat loss during the heating season: 30.87 kWh

The indicator used in the calculation \*  $\lambda = 0.0025$  for the Spheroguard coating is determined on the basis of data of test reports provided by manufacturer of Spheroguard material.