TEST REPORT

SQM_416_2025

CUSTOMER

Kebe S.A.

PRODUCT NAME

ORTHOBLOCK NK250

TYPE OF PRODUCT

Masonry unit

TYPE OF TEST

DETERMINATION OF THE DRY THERMAL CONDUCTIVITY VALUES OF THE UNIT (EN ISO 6946) AND OF THE MASONRY MADE WITH IT

Ordering Kebe S.A.
Product placed on the market from Kebe S.A. - 61100 Nea Santa - Kilkis - GREECE
Data related to the sample examined Masonry unit
Sample origin sampled and provided from the Customer
Manufacturing plant Kebe S.A. - 61100 Nea Santa - Kilkis - GREECE

Estimate prot. 25349/lab of 06/04/2025
Order confirmation email of 06/04/2025
Receipt of the samples June 2025
Test execution June 2025
Laboratory and location of test execution Certimac - via Ravegnana, 186 - Faenza (RA)

Report issued 16/06/2025
Revision n° 01 of 20/06/2025

Test executed by: Eng. S. Marianini
Report drafted by: Eng. S. Marianini
Approval: Technical director Eng. L. Laghi

This test report is part of a file in PDF format digitally signed by Luca Laghi

Chief Technical Officer
(Eng. Luca Laghi)

1. Object of the test

The following test report describes the determination of the equivalent thermal values of a masonry brick. The calculations were performed by means of a Finite Element Model implemented in Ansys 18.2 (Ref. 2-b), applied to a planar cross section (unit length), perpendicular to the holes axis and parallel to the thermal flux.

2. Reference standards and documents

The tests have been executed according to the methods defined in the following documentations and reference standards:

a. EN 1745:2012. Masonry and masonry products – Methods for determining thermal properties.
b. CertiMaC calibration report 040219-C-17/Rev01. Calibration of a two-dimensional model for the calculation of the equivalent thermal conductivity of a masonry unit.
c. EN 6946:2008. Building components and building elements – Thermal resistance and thermal transmittance – Calculation method.

3. Input data

The technical drawing of the block and the thermal conductivity of fired clay were supplied by the client (Figure 1). All input data used for the calculation are shown in Table 1.

Figure 1. Geometry of the block

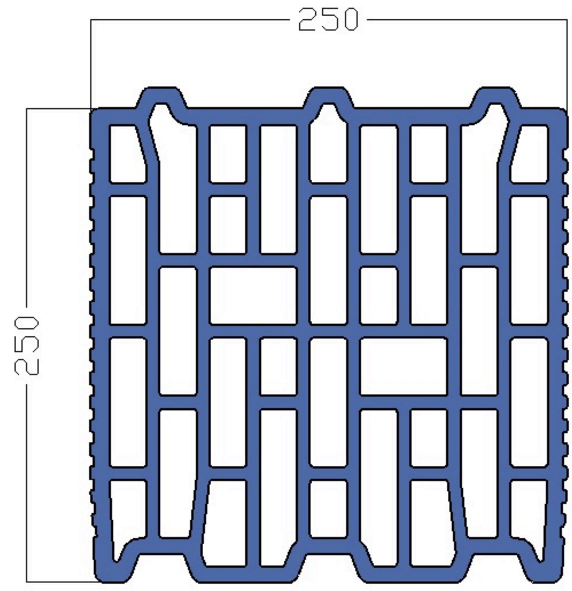
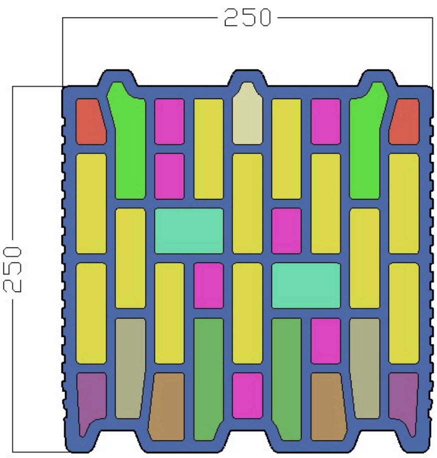


Table 1. Input data

Physical quantity	Nominal value	Ref.
Internal temperature Ti	20 °C = 293.15 K	Ref. 2-a and 2-c
External temperature Te	0 °C = 273.15 K	Ref. 2-a and 2-c
Internal superficial resistance Rsi	0.13 m^2K/W	Ref. 2-a and 2-c
External superficial resistance Rse	0.04 m^2K/W	Ref. 2-a and 2-c
Material thermal conductivity $\lambda_{10,dry,mat}$	0.401 W/mK	Provided by the Customer
Brick dimensions	250 x 250 x 240 mm	Provided by the Customer

Equivalent thermal conductivity values of air voids were determined according to the methodology outlined in Ref. 2-a and 2-c., approximating convective and radiative heat transfer inside the void (Figure 2).

Figure 2. Cross section of the block and air voids



4. Results

Table 2 shows the results of the Finite Elements Analysis; Figures 3 and 4 graphically show the distribution of the isotherms and the vector state of the heat flow.

Table 2. FEM results

Heat flow [W/m]	**Thermal coupling coefficient** L^{2D} [W/mK]	**Thermal transmittance** **U** [W/m^2K]	**Total thermal resistance** R_T [m^2K/W]	**True thermal resistance of the masonry unit** R_t [m^2K/W]	**Equivalent thermal conductivity** $\lambda_{10,dry,unit}$ [W/mK]
2.9891	0.1495	0.5978	1.6727	1.5027	0.1664

Figure 3. Distribution of isotherms in the block [°C]

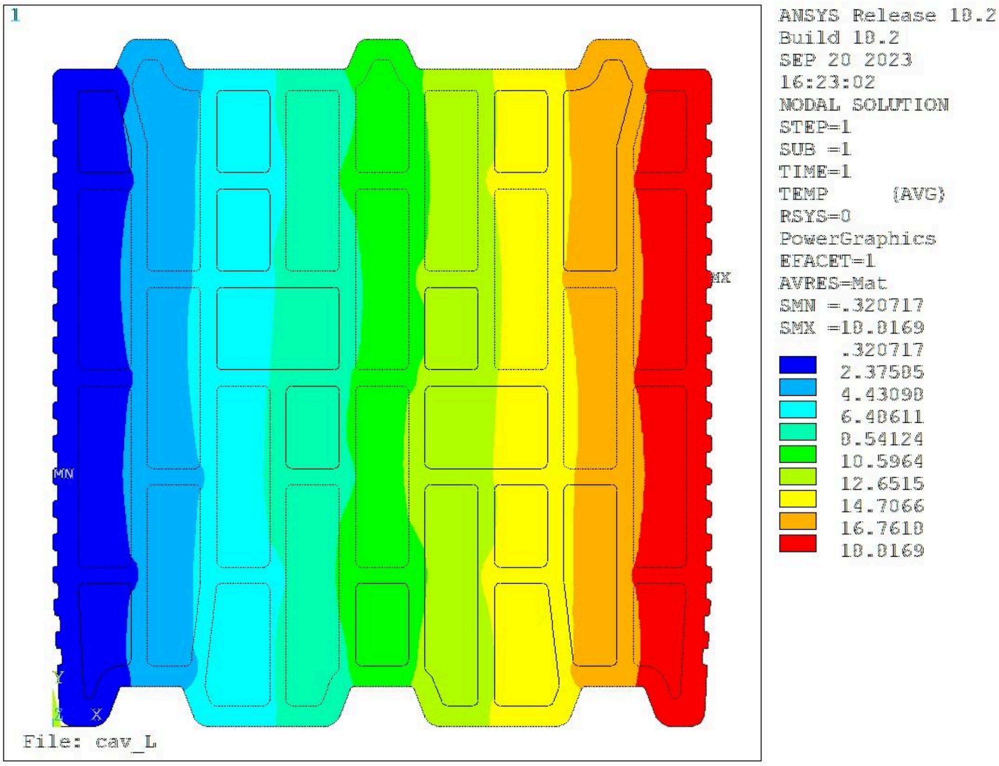
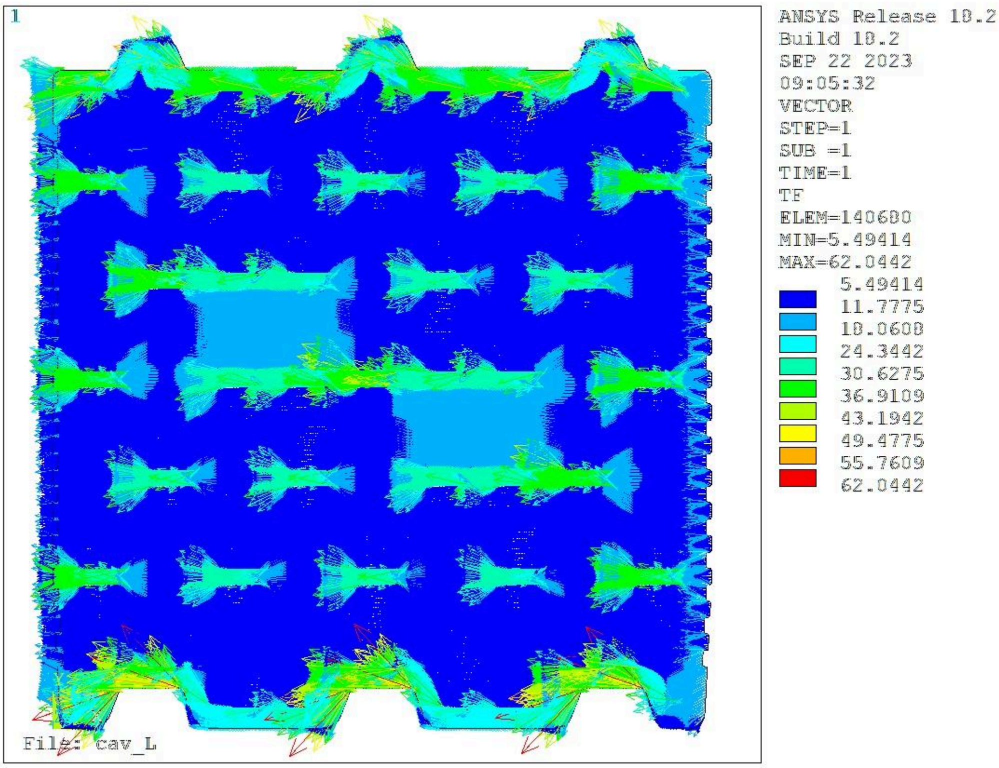


Figure 4. Average heat flow vectors [W/m^2]



4. Determination of thermal values of the masonry

To conduct a comprehensive assessment of the thermal performance of the masonry, only the horizontal mortar joints were taken into account, without plaster layers. Given the interlocking geometry of the blocks, the vertical joints were not considered in the analysis, as they do not contribute significantly to the overall thermal behavior. In order to ensure a thorough evaluation, the thermal properties of the masonry were analyzed by studying the configuration as detailed in Table 3. Table 3. The adopted mortar properties refer to the product "**ORTHOBLOCK BOND**", drawing on thermophysical data made available by the Client.

Table 3. Masonry configurations

Masonry	**Description**		
1	Horizontal mortar joints	Thickness = 3 mm λ_{mortar} = 0.61 W/mK	Provided by the Costumer
	Internal plaster	Not present	Provided by the Costumer
	External plaster	Not present	Provided by the Costumer

Table 4 shows the thermal values of the masonry, in the configuration described above.

Table 4. Results of the calculation for the masonry no. 1

Physical quantity	**Result**
True thermal resistance of the masonry $\mathbf{R_t}$ [m^2K/W]	1.4549
Equivalent thermal conductivity $\boldsymbol{\lambda_{dry,masonry}}$ [W/mK]	0.1718
Total thermal resistance $\mathbf{R_T}$ [m^2K/W]	1.6249
Thermal transmittance **U** [W/m^2K]	0.6154

SUMMARY TABLE OF RESULTS

The tests previously described gave the following results:

Product	Equivalent thermal conductivity $\lambda_{dry,masonry}$ [W/mK]	Thermal transmittance **U** [W/m²K]
Orthoblock NK250	**0.1664**	**0.5978**
Masonry no. 1	**0.1718**	**0.6154**

5. List of distribution

ENEA	Archivio	1 copia
Certimac	Archivio	1 copia
Kebe S.A.	Archivio	1 copia

In charged of technical test execution	**In charged of technical report drafting**	**Technical director Approval**
Eng. Sebastiano Marianini	Eng. Sebastiano Marianini	Ing. Luca Laghi
[signature]	[signature]	[signature]

-------- End of the Test Report ------