TEST REPORT

SQM_423_2025

CUSTOMER
Kebe S.A.

PRODUCT NAME
K300PLUS

TYPE OF PRODUCT
Masonry unit

TYPE OF TEST

Determination of the thermal design conductivity of the block and of masonry made with it

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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 25/07/2025

Test executed by: Eng. Mattia Morganti
Report drafted by: Eng. Mattia Morganti
Approval: Technical director Eng. L. Laghi

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

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1. Object of the test

The following test report describes the determination of thermal design 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. In this calculation, the input data have been modified taking into account the effect of humidity as indicated by the technical standard in Ref. 2-a.

2. Reference standards and documents

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

a. EN ISO 10456:2007. Building materials and products - Hygrothermal properties -Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)

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 ISO 6946:2008. Building components and building elements – Thermal resistance and thermal transmittance – Calculation method.

d. Test report SQM_422_2025 - Determination of the equivalent thermal conductivity of the block K300PLUS and of masonry made with it.

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 Tables 1 and 2.

Figure 1. Geometry of the block
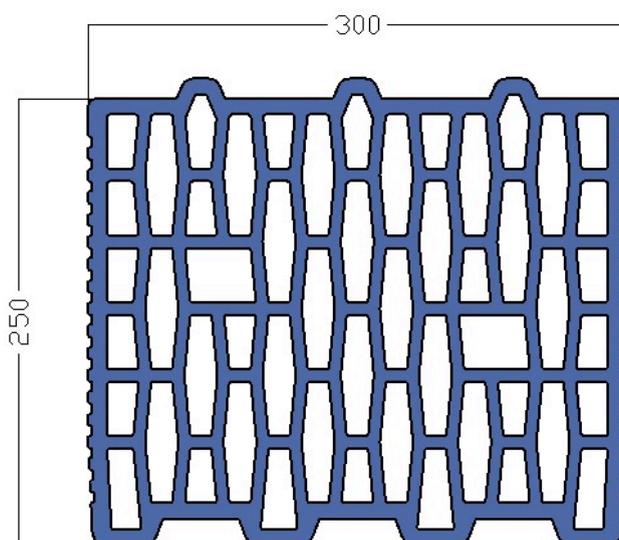
Table 1. Input data

Physical quantity	Nominal value	Ref.
Material thermal conductivity $\lambda_{10,dry,mat}$	0.401 W/mK	Provided by the Customer
Equivalent thermal conductivity of voids	Test Report K300PLUS	Ref. 2-d

The adopted mortar properties refer to the product "**ORTHOBLOCK BOND**", drawing on thermophysical data made available by the Client.

Table 2. Input data of the masonry

Masonry n. 1	Nominal value	Ref.
Horizontal mortar joints	Thickness = 3 mm λ_{mortar} = 0.61 W/mK	Provided by the Customer
Internal plaster	Not present	Provided by the Customer
External plaster	Not present	Provided by the Customer

4. Determination of the thermal design values

Thermal design values of the masonry are determined as defined by the standards at Ref. 2-a and 2-c, increasing the thermal conductivity of the materials in relation to the moisture content, using the following conversion coefficient (moisture content volume by volume):

$$F_m = e^{f_\psi(\psi_2 - \psi_1)}$$

The standard sets as operating conditions a temperature of 23 ° C and a relative humidity of 80% (precautionary hypothesis), which is related to the test condition at 10 ° C, dry.

5. Results

Table 3 shows the results of Finite Elements Analysis performed with design thermal values at Ref. 2-a.

Table 3. FEM results

Heat flow [W/m]	Thermal coupling coefficient L^{2D} [W/mK]	Thermal transmittance U [W/m²K]	Total thermal resistance R_T [m²K/W]	True thermal resistance of the masonry unit R_t [m²K/W]	Equivalent thermal conductivity $\lambda_{design,unit}$ [W/mK]
1.5198	0.0760	0.3040	3.2900	3.1200	0.0962

6. Determination of thermal values of the masonry

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

Table 4. Results of the calculation for the masonry (design values)

Masonry n. 3	Result
Thermal resistance only of the layer R_t [m²K/W]	2.8695
Equivalent thermal conductivity of the masonry λ_{equ} [W/mK]	0.1045
Thermal resistance of the masonry including superficial thermal resistances R_T (m²K/W)	2.8697
Thermal transmittance U (W/m²K)	0.3290

SUMMARY TABLE OF RESULTS

The tests previously described gave the following results, taking into account the effect of humidity:

Product	Thermal design conductivity λ_{equ} [W/mK]	Thermal design transmittance U [W/m²K]
Block K300PLUS	0.0962	0.3040
Masonry n. 1	0.1045	0.3290

7. List of distribution

ENEA	Archive	1 copy
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In charged of technical test execution	In charged of technical report drafting	Technical director Approval
Eng. Mattia Morganti	Eng. Mattia Morganti	Ing. Luca Laghi

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

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