Department of Building Egineering

EXERCISE No. 1

Building ceramics

Checking the dimensions of selected ceramic elements,
Marking density of selected wall components,
Preparing the samples for testing compressive strength

1.0. Introduction

The PN-EN 771-1 standard distinguishes two groups of wall elements in terms of protection against external factors:

- **P** element is a ceramic masonry element with a low gross density in a dry state for use in protected masonry
- **U** element is a ceramic masonry unit for unprotected masonry, and a ceramic masonry unit with a high gross dry density for use in protected masonry.

Secured masonry means masonry protected against water penetration.

2.0. Checking the dimensions

The dimensions length (l_u) width (w_u) and height (h_u) should be measured in the four corners of the element (Fig. 1).

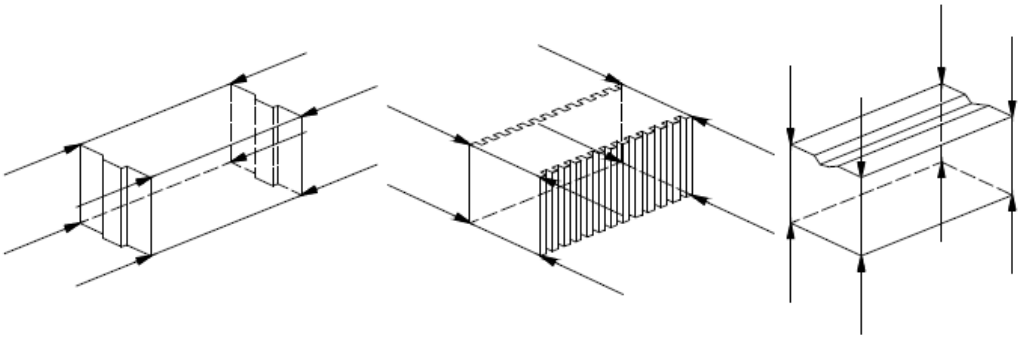

Fig. 1.0 Places measurements of the elements with irregular surfaces

The difference for all dimensions between the declared value and the mean value (determined by the measurement of the test sample) should not be greater than one of the following declared categories (T1, T1+, T2, T2+). The calculated value should be approximated to 1.0 mm:

T1: $\pm 0{,}40\sqrt{\textit{the nominal dimension}}$ mm or 3 mm - the higher value is assumed;

T1+: $\pm 0{,}40\sqrt{\textit{the nominal dimension}}$ mm or 3 mm for length or width – the higher value is assumed and

$\pm 0{,}05\sqrt{\textit{the nominal dimension}}$ mm or 1 mm for height – the higher value is assumed;

T2: $\pm 0{,}25\sqrt{\textit{the nominal dimension}}$ mm or 2 mm - the higher value is assumed;

T2+: $\pm 0{,}25\sqrt{\textit{the nominal dimension}}$ mm or 2 mm for length or width – the higher value is assumed and

$\pm 0{,}05\sqrt{\textit{the nominal dimension}}$ mm or 1 mm for height, the higher value is assumed.

The thickness of the external and internal wall should be measured at spaced between points at three different locations. The average thickness of the external and internal wall the each sample should be calculated with accurate to within 0.2 mm.

3.0. Marking gross density of the ceramic element in the dry state

Marking gross density of the ceramic element in the dry state (acc. PN-EN 772-13) involves determining the ratio of weight to gross volume of the element after drying to constant weight.

The samples must be dried for 6 hours in drying oven at 105°C. The ceramic element must be weighed accurate to within 5g. Note the weight m_{dry} [kg].
Calculate the gross volume of the ceramic element. Note the volume V [m^3].

The gross density in the dry state [kg/m^3] calculated from the formula:

$$\rho = \frac{m_{dry}}{V}\left[\frac{kg}{m^3}\right]$$

The gross density in the dry state must be calculated for each sample accurate to within:
- 5 kg/m^3 for density to 1000 kg/m^3;
- do 10 kg/m^3 for density above 1000 kg/m^3.

4.0. Marking compressive strength of the ceramic element

Compressive strength (acc. PN-EN 772-1) – is evenly distributed loading on the element and to increase it until to destroying the sample.

The surfaces of the ceramic element can be prepared by:
- grinding,
- alignment mortar

Preparing of the sample

Alignment mortar – cement mortar is used, which has a compressive strength of not less than the compressive strength of masonry element, or 30 N/mm^2.
The glass plate must be coated with a layer of oil to prevent sticking mortar to glass plate.
Put the mortar layer with a thickness of about 5 mm, about 25 mm longer and about 10 mm wider than the element.
Put the element on the cement mortar and press one surface of the element to mortar layer.
All sides of the element get rid of unnecessary the mortar.
The sample with the mortar must be covered a damp cloth and keep it wet until the mortar has hardened.

The samples with the mortar must be stored under folic bags, or in the climate chamber (relative humidity greater than 90%) for a period sufficient to has reached the minimum strength of the mortar.

Team ……. Date ……

1. ……
2. ……
3. ……
4. ……
5. ……

Exercise 1

TESTING THE SELECTED MASONRY ELEMENTS

DIMENSIONS AND DENSITY TESTING

Product name and its dimensions: ……

Quantity	Measurements value		Average value	Dimensions deviations	Standard dimensional tolerances			
					T2+	T2	T1+	T1
Length, l_u, mm								
Width, w_u, mm								
Height, h_u, mm								
External wall thickness, mm				-	-			
Internal wall thickness, mm				-	-			

Quantity	Value
Dry sample mass, kg	$m_{dry,u}$ =
Gross volume, m^3	$V_{g,u}$ =
Gross density in dry state, kg/m^3	ρ_{gu} =
Element's group	

Product evaluation: ……

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