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THE ANALYSIS OF TECHNICAL REQUIREMENTS TO THE QUALITY OF BLOCK RAW MATERIALS

The most common initial product is a commodity raw block unit. Product unit designed for manufacturing cladding panels, architectural building products and other products made of stone. In accordance with the requirements of the standard they are characterized by shape, length, width, height and volume, quality of facial surface, physical and mechanical properties of the rock block. In addition, the rock from which the blocks are made, is assessed for decorative, physical and mechanical properties and petrographic composition at the stage of geological exploration. However, a different range of customers put different demands to the quality of products that can be significantly changed from the range of ISO requirements.

The separation of rocks monoliths or blocks from the massif is held by mechanical, wedge-drilling, drill and fire system, thermal methods or the combination of these methods, as well as with non-explosive destructive methods.

The blocks of natural stone can be sawn or chipped. The sawn blocks are the blocks all side of which are formed by sawing, and the chipped blocks are the blocks in which at least one side was formed by directional split.

In Ukraine there was the DSTU B V.2.7-59-97 “Natural stone blocks for facing products manufacturing. General technical characteristics” which provided the division of blocks according to the volume into six groups (m³): I -> 5; II – 3.5-5; III – 2.0-3.5; IV - 1.0-2.0; V – 0.7-1.0; VI – 0.01-0.7. For sawn and chipped blocks of the first-third groups the deviation from the perpendicular to two adjacent faces at 1 m height was no more than 60 and 110 mm, respectively; height ledges and hollows lateral faces were less than 150 and 200 mm, respectively, and the top and bottom - 100 mm.

In 2007 in Ukraine the European standard EN 1467: 2003, called DSTU B EN 1467: 2007 “Natural stone. Rough blocks. Requirements” came into practice. This standard specifies requirements to the natural stone rough blocks which the products used in construction, tombstones and other products of similar usage are made of and it does not cover mineral fillers, artificial materials from agglomerated stone and installation [1, p.118].

According to this standard the natural stone blocks are divided into four types:

- rough block - basis of the usable stone consisting of rocks obtained directly from quarries or erratics, with no processing whatsoever excepted extraction and shaping by cutting or splitting;

- shapeless rough block - rough block without regular shape and size;

- squared rough block - rough block which corresponds approximately to a regular parallelepiped. Normally the ratio obtainable by dividing the mass of the squared rough block by the apparent density should be bigger than 80% of the gross

size; in case such a ratio is equal or less than 80% then the block is considered a shapeless rough block.;

- rough block of specific size - squared rough block with certain given dimensions[4, p.47].

All measurements shall be carried out in accordance with EN 13373, and indicated in metres to two decimals places (*Fig.1*). The six sides of squared rough block shall be approximately flat, right-angled and parallel, and correspond to the shape of a parallelepiped. Local deviations from the parallelepiped shape are permitted.

Shapeless rough blocks for commercial purposes are only measured by mass: gross size shall be provided upon request (*Fig.2*). Rough blocks of specific size shall have dimensions not lower than the minimum values and not greater than the maximum values agreed between the purchaser and supplier.

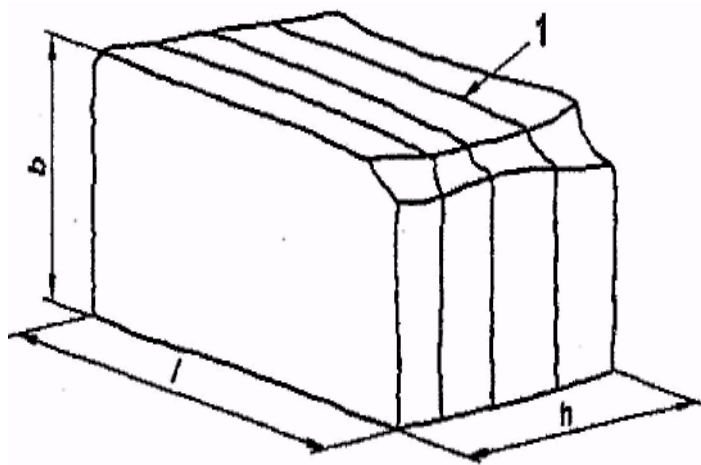


Fig.1. Dimensions of the rough block:

- 1 - natural layer*
- b - width of the block*
- l - length block*
- h - height of the block*

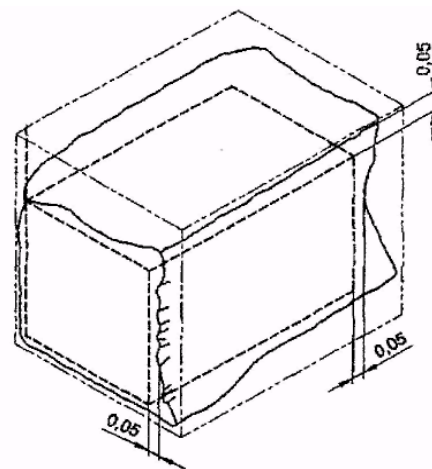


Fig. 2. Gross size, the commercial size of the rough block

The volume of a rough block shall be stated in cubic metres to three decimals places. The volume may be calculated by dividing the mass of the block by the apparent density. The mass of a rough block shall be stated in tonnes with three decimals. The mass shall be obtained by weighing; for squared blocks approximate mass may be obtained by multiplying the volume by the apparent density [2, p.6].

The crack of tectonic origin that violates its integrity and extends to two adjacent facets of a width of not more than 0.05 mm and in a length of 1/3 the size of the smallest faces is allowed in the block. The streaks and stripes created by tectonic origin and cemented with secondary minerals that are not crumbled into small pieces can also be in the blocks.

The declared values shall be representative of the current production, however due to natural variations of the stone materials, deviations from the declared values may occur and the expected deviation shall be indicated by the manufacturer.

The colour, veining, texture, etc. of the stone shall be identified visually for example by a polished reference sample. The reference sample shall be provided by the supplier.

Any visual variation, for example, inclusions and veins, are permissible provided that they are characteristic of the relevant type of natural stone and provided that they do not adversely affect the performances of the stone products.

The denomination shall always be declared in accordance with EN 12440 (it means traditional name, petrological family, typical colour and place of origin). The petrological family shall be determined in accordance with EN 12407. This characteristic shall be declared upon request.

The apparent density and open porosity shall be determined using the test method in EN 1936 and mean value, lower expected value and standard deviation shall be declared. This characteristic shall always be declared.

The flexural strength shall be determined using the test method in EN 12372 or EN 13161 and mean value, lower expected value and standard deviation shall be declared [3, p.9].

Ukrainian manufacturer recently began to focus on foreign standards of raw block quality, but each country has its own standard. The main exporters of Ukraine are Norway (NSF), Iceland (IST), Netherlands (NEN), Belgium (IBN), Ireland (NSAI), United Kingdom (BSI), Portugal (IPQ), Spain (AENOR), France (AFNOR), Switzerland (SNV), Italy (UNI), Greece (ELOT), Austria (ON), Czech Republic (CSNI), Germany (DIN), Denmark (DS), Finland (SFS), Sweden (SIS) [4, p.33].

Different standards of block raw materials quality are oriented to different ranges of customers from different countries, but they are not perfect. The State Standards of Ukraine describe the requirements to physical, geometrical and technological parameters of the block, but they do not take into account the requirements to the parameters that can vary from the separate stage in the massif to the stage of processing at the enterprise. Foreign Standards describe various methods to determine different parameters of the block excluding specific standards for different parameters. So, we can conclude that the current standards are not universal and need to be detailed.

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