The invention relates to an outer-wall system of building blocks optimally suited for application in a building with dimensions which are an integer multiple of a modular measurement. To this end the length and height of a building block of the outer-wall system are equal to the modular length and height measurements respectively less the horizontal and vertical distance respectively between the building blocks. Preferably the building blocks are attached to each other in a vertical direction by means of a special mortar with a layer thickness of 3 mm, while in the horizontal direction the building blocks are placed at a distance of 5 mm from each other. The usual modular length measurement is 300 mm and the usual modular height measurement is 100 mm. The length of the building block according to the invention is then 295 millimetres and its height is 97 millimetres.
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Outer-wall system of building blocks, as well as a building block for application in the outer-wall system.

BACKGROUND OF THE INVENTION:

Field of the invention

The invention relates to an outer-wall system of building blocks each comprising two end faces and four lateral faces, of which two lateral faces opposite each other are visible faces and the other two lateral faces are joining faces, which building blocks are suitable for application in a building with horizontal dimensions which are a multiple of a modular length measurement and with vertical dimensions which are a multiple of a modular height measurement, in which building the visible faces of the building blocks in a horizontal direction are situated at a preferred horizontal distance from each other and in a vertical direction are situated at a preferred vertical distance from each other, and the building blocks can be attached to each other at any rate at their joining faces by means of a binder course.

By visible faces are meant those surfaces which could function as visible faces considering their location, but this does not have to be the case, for example, because due to the manufacturing process they are too rough to be employed as a visible face and therefore form the inside surface of a cavity wall.

By horizontal dimensions are meant the length and width dimensions of a building, for example, the total length and width of the building or an extension, the length of the outer walls, division walls, etc. By a modular length measurement is meant a unit of which other dimensions in a horizontal direction of the building are multiples, though it is not necessary that all horizontal dimensions be a multiple of a modular length measurement.

The preferred vertical distance between the visible faces is equal to the thickness of the binder course applied between the joining faces. This can therefore vary depending on the bonding technique employed to join the building blocks. In a horizontal direction the building blocks can also be joined to each other by means of a binder course,
but this is not essential. The preferred horizontal distance is determined by aesthetic and/or
ventilation requirements.

The end faces of the building blocks can be flat as well as profiled. Profiled
end faces are used, for example, in order to be able to place the building blocks more easily
in a line and/or to obtain better sealing between the building blocks.

By the term building block is meant every possible brick-like building
component irrespective of the material it is made of. To this end, bricks are often used, but
a building block can also be made of other materials, such as calcium silicate or concrete.

Prior art

Such an outer-wall system of building blocks is known generally. Known
building blocks are, for example, bricks, sand-lime bricks, or concrete bricks for walls in
houses and office buildings. With these, the length and height of the visible face is equal
to the brick's length and height. The dimensions of these known bricks have been
determined historically, in other words, they have been determined in earlier times taking
into account the properties of the kind of clay they were made of. These days the
dimensions of buildings, particularly in house and office building construction, are usually
an integer multiple of modular measurements. These modular measurements are roughly
one and a half times the length of the known bricks. This means that in many situations it
is necessary to cut bricks to size in order to obtain the dimensions desired.

Summary of the invention

An objective of the invention is to provide an outer-wall system of building
blocks of the type described in the preamble which is better adapted to the modular
measurements employed in the construction industry. For this purpose, the outer-wall
system of building blocks according to the invention is characterised in that the visible
faces of the different building blocks of the outer-wall system have a length of at least
nearly one and two thirds respectively times the modular length measurement less the
preferred horizontal distance, or have a length the half of at least nearly one and two thirds
respectively times the modular length measurement less the preferred horizontal distance,
and that the visible faces of the different building blocks of the outer-wall system have a
height of at least nearly the modular height measurement less the preferred vertical distance.
With this set of building blocks and its basic dimensions, it is possible to create all the usual
and/or desired bonds in construction without having to cut the building blocks to the exact
length. In addition it is possible to build more rapidly with this outer-wall system because
the building blocks are larger than the known bricks.

Because in actual practice the number of joints or spaces between the end
faces is one less than the number of building blocks, in order to obtain a wall with a length
dimension which is an integer multiple of the modular length measurement, one or more
building blocks will have to be laid with their end faces at a distance from each other which
is a little greater than the preferred horizontal dimension.

In new construction methods the building blocks are no longer attached to
each other by masonry mortar but are bonded to each other by a bonding agent, which is
usually a special mortar. This mortar is generally applied in layer thicknesses of up to 6
mm, preferably 3 mm. The building blocks are often not bonded together at the end faces,
but a gap is left open between neighbouring building blocks, preferably 5 mm. Furthermore,
a modular length measurement of 300 mm is often worked with in construction. An
advantageous embodiment of the outer-wall system according to the invention is therefore
characterised in that the lengths of the different building blocks of the outer-wall system are
at least nearly 295, 195, 147.5 and 97.5 millimetres respectively and that the height of the
different building blocks is at least nearly 97 millimetres.

A further advantageous embodiment of the outer-wall system according to
the invention is characterised in that the building blocks have a width of at least nearly 80
mm. By using thinner building blocks a wider cavity can be obtained while the width of the
wall remains the same. Because of this, thicker insulating material as well as a wider air
cavity can be used, as a result of which the insulating value of the wall is increased without
needing to increase its width.

In order to be able to make a right-angled corner in a wall with building
blocks 80 mm wide without altering the bond employed, a further embodiment is
characterised in that the outer-wall system comprises a building block with a length of 210
or 215 millimetres. These dimensions in combination with the dimension of 80 mm and a
preferred distance of 5 mm give a length of 295 and 300 mm respectively, dimensions with
which the desired bond can be continued.

In order to build walls with corners without building blocks which are 210 or 215 mm long without having to cut building blocks to size and in order to be able to make angles of various sizes with the outer-wall system according to the invention, a further embodiment is characterised in that at least one of the end faces of at least one of the building blocks is at an angle of less than 90° with respect to the visible face.

In order to be able to make right-angled corners with this system a further embodiment is characterised in that at least one of the end faces of at least one of the building blocks is at an angle of at least nearly 45° with respect to the visible face. By laying two such building blocks with the oblique end faces opposite each other, a wall with a 90° corner is obtained. In the event that only one face can be used as a visible face there should therefore be building blocks with an oblique end face at the right end and building blocks with an oblique end face at the left end. This applies to the whole building blocks as well as to the half building blocks.

The invention also relates to a building block for application in the outer-wall system according to the invention.

**Brief description of the drawings**

The invention will be elucidated more fully below by means of drawings in which embodiments of the outer-wall system of building blocks according to the invention are shown. In these drawings:

Figure 1 is a perspective view of a first embodiment of a building block of the outer-wall system according to the invention;

Figure 2 is a wall in stretcher bond built of building blocks according to Figure 1;

Figure 3 is a perspective view of a second embodiment of a building block of the outer-wall system according to the invention;

Figure 4 is a wall in stretcher bond built of building blocks according to Figure 3;

Figure 5 is a course of building blocks in a wall with corners built in stretcher bond and in which further embodiments of the building blocks of the outer-wall
system have been employed;

Figure 6 is a different course of building blocks in the wall according to Figure 5;

Figure 7 is a wall in a different bond; and

Figure 8 is a portion of a wall with an opening for a frame.

**Detailed description of the drawings**

In Figure 1 a first embodiment of the outer-wall system of building blocks according to the invention is shown. The building block 1 has a rectangular shape and has been provided with through holes 3 for the purpose of drying and baking the building block during its manufacture and also for reducing the building block's weight. The building block 1 has two end faces 5 situated opposite each other and four lateral faces of which two joining faces 7 are situated opposite each other and two visible faces 9 are situated opposite each other. The visible face 9 has a length L and a height H which are identical to the length and height of the building block 1. The length L and height H are adapted to the modular measurements used in the construction industry.

This embodiment of the building block 1 according to the invention is suitable for application in buildings with a modular length measurement 10 of 300 mm and a modular height measurement 12 of 100 mm in which the building blocks in a horizontal direction are situated at a distance of 5 mm and in a vertical direction at a distance of 3 mm from each other. In a vertical direction this distance is determined by a binder course 11 of a special mortar with a layer thickness of 3 mm; see Figure 2. In a horizontal direction there are no filled joints between the building blocks 1, but open spaces 13 between the building blocks. The building blocks 1 have been thus incorporated without filled vertical joints in a wall 15. The visible faces 9 are situated at vertical and horizontal distances 17 and 19 respectively from each other. These distances 17 and 19 are equal to the thickness of the binder course 11 and the dimension of the space 13 respectively, which in this embodiment are 3 and 5 mm respectively. The length L and height H of the visible face 9 and thus of the building block 1 as well are 295 and 97 mm respectively. The width W of the building block 1 is 80 mm. The wall 15 has been built in stretcher bond. Because of this, half building blocks 18 have been used at the end of the wall. The visible faces of these building
blocks have a length of 147.5 mm.

Because of the open vertical joints between the end faces of the building blocks, differences in air pressure may occur inside and outside the cavity as result of which rainwater, for example, could be drawn into the cavity. This may be a problem particularly in high-rise buildings. In conjunction with the advantage of rapid construction with the outer-wall system according to the invention, it is not advantageous to solve a problem as the above-mentioned, should it occur, by applying a binder course or filling the joints between the end faces. Therefore a solution has been sought in the building blocks themselves and has been found in the application of profiled end faces.

In Figure 3 such a building block of a second embodiment of the outer-wall system according to the invention is shown. The building block 21 has profiled end faces 23. The profiles have been executed as a recess 25 in one of the end faces and as a projection 27 at the other end face. If two building blocks 21 and 29 (the latter is shown by a broken line) are laid with their end faces 23 against each other, the visible faces 31 will be situated at a distance 33 from each other and there will be no open space between the end faces 23.

The horizontal distance 33 between the visible faces is also 5 mm here and the vertical distance 35 is also determined here by the thickness of the binder course 37; see the wall 39 shown in Figure 4. This wall 39 has also been built in stretcher bond using half building blocks 38. A special mortar has also been used here as a bonding agent between the joining faces. The modular length measurement 10, modular height measurement 12, dimensions L and H of the visible face 31 and the width W of the building block 21, moreover, are equal to those of the building block 1 shown in Figure 1.

In Figures 5 and 6 two different courses 40 and 48 of building blocks in a wall with corners are shown. The wall has been built in stretcher bond. In order to build this wall, without having to cut building blocks to size, as well as the whole building blocks 41 and half building blocks 47, additional building blocks 43, 45, 49, 51 of the outer-wall system according to the invention have been employed. An end face of these additional building blocks is at an angle of 45° with respect to the visible face 44, 46, 50, 52. With the building blocks 43 and 49 the short lateral faces 44 and 50 are the visible faces and with the building blocks 45 and 51 the long lateral faces 46 and 52 are the visible faces. The modular length measurement 10 is 300 mm and is equal to the length of a whole building
block's visible face and the dimension of a filled joint or an open space between the end faces if no filled joint is used. The dimension 53 is equal to half the length of a whole building block's visible face. The joints between the end faces of the building blocks in both courses are not identical to each other. The joints in Figure 6 are narrower than those in Figure 5 because there is one joint more in the course in Figure 6.

In order to be able to build walls in different bonds, the outer-wall system also has building blocks with a visible face the length of which is two thirds of the modular length measurement less the distance between two neighbouring building blocks. In order to make the outer-wall system a total system, there are also half building blocks of this building block. Figure 7 shows a wall in a different bond, built with these building blocks and the whole building blocks. With this wall as well the height and length of the visible faces are equal to the height and length of the building blocks. The wall 55 has been built of two different courses which alternate with each other. One of the courses has been built of building blocks 57 with a length 59 of 195 mm and with half building blocks 61 having a length 63 of 97.5 mm. The other course has been built of building blocks 1 with a length of 295 mm and with building blocks 18 having a length of 97.5 mm at the ends.

The wall shown in Figure 7 has been designed not so much for technical as for aesthetic reasons. Another application of the building blocks 57 with a length of 195 mm, but then mainly for technical reasons is shown in Figure 8. A part of a wall 65 is shown in which there is an opening for a frame 67. The wall 65 has been built in stretcher bond with building blocks 1 and 18 having a length of 295 and 147.5 mm respectively. The soldier course 69 above the opening for a frame 67 has been built of vertically placed building blocks 57 with a length 59 of 195 mm.

Although the invention has been elucidated in the foregoing by means of drawings, it should be established that the invention in no way is limited to the embodiments shown in the drawings. The invention applies to all embodiments deviating from the embodiments shown in the drawings within the framework defined by the claims. Thus the end faces can be profiled other than as shown here, such as a V-shaped profile, and the end faces can be attached to each other by a binder course whether the end faces are profiled or not. The building blocks shown can also be solid thus without the holes shown and the visible faces of the building blocks can also have dimensions other than the dimensions shown. If working with special mortars with a different layer thickness or with
masonry mortar with greater layer thicknesses, the length and height dimensions should be adapted accordingly. Also if the building blocks are used for buildings with different modular measurements, the dimensions of the building blocks' visible faces should be adapted.
CLAIMS:

1. Outer-wall system of building blocks each comprising two end faces and four lateral faces, of which two lateral faces situated opposite each other are visible faces and the other two lateral faces are joining faces, which building blocks are suitable for application in a building with horizontal dimensions which are a multiple of a modular length measurement and with vertical dimensions which are a multiple of a modular height measurement, in which building the visible faces of the building blocks in a horizontal direction are situated at a preferred horizontal distance from each other and in a vertical direction are situated at a preferred vertical distance from each other, and the building blocks can be attached to each other at any rate at their joining faces by means of a binder course, characterised in that the visible faces of the different building blocks of the outer-wall system have a length of at least nearly one and two thirds respectively times the modular length measurement less the preferred horizontal distance, or have a length the half of at least nearly one and two thirds respectively times the modular length measurement less the preferred horizontal distance, and that the visible faces of the different building blocks of the outer-wall system have a height of at least nearly the modular height measurement less the preferred vertical distance.

2. Outer-wall system of building blocks according to claim 1, characterised in that the lengths of the different building blocks of the outer-wall system are at least nearly 295, 195, 147.5 and 97.5 millimetres respectively and that the height of the different building blocks is at least nearly 97 millimetres.

3. Outer-wall system of building blocks according to claim 1 or 2, characterised in that the building blocks have a width of at least nearly 80 millimetres.

4. Outer-wall system of building blocks according to claim 3, characterised in that the outer-wall system furthermore comprises a building block with a length of 210 or 215 millimetres.

5. Outer-wall system of building blocks according to one of the preceding claims, characterised in that at least one of the end faces of at least one of the building blocks is at an angle of less than 90° with respect to the visible face.

6. Outer-wall system of building blocks according to claim 5, characterised in that at least one of the end faces of at least one of the building blocks is at an angle of at least nearly 45° with respect to the visible face.
7. Building block for application in the outer-wall system according to one of the preceding claims, characterised in that the building block has a length of at least nearly 295, 215, 210, 195, 147.5 or 97.5 millimetres and a height of at least nearly 97 millimetres.

8. Building block according to claim 7, characterised in that the building block is at least nearly 80 millimetres wide.

9. Building block according to claim 7 or 8, characterised in that at least one of the end faces of the building block is at an angle of at least nearly 45° with respect to the visible face.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E04B2/04 E04B2/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Date of the actual completion of the international search

14 April 2000

Date of mailing of the international search report

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