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Sustainable Urban Rehabilitation in Europe

# *GENERAL BUILDING ENGINEERING*

# ***BUILDING LINTELS***

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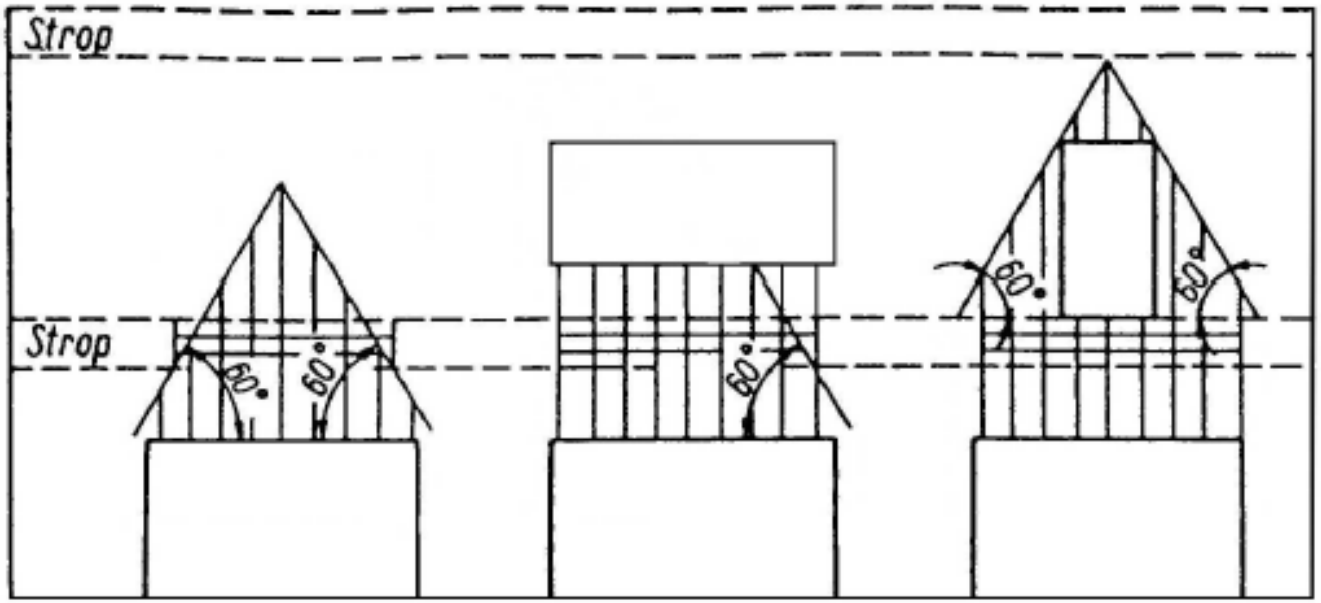
# DEFINITION, LOAD SCHEME

Lintels are structural elements covering window or door openings, usually in the form of straight beams, but they can also be made in the form of arches, triangles or trapezoids adapted to individual woodwork. They transfer loads from walls and ceilings above the holes for intersubricary fillers. The load collection area for the lintels is usually in the shape of an equilateral triangle, which results from the way stress is spread in masonry structures. [7]




The way loads are transferred through the lintel. [7]

# PREFABRICATED LINTELS

Prefabricated lintels are made of ready-made beams laid over the opening and merged with mortar or concrete on the construction site.

The length of the backrest on the wall is from 9 to 25 cm, depending on the construction material of the lintels and walls themselves. The back should be made through mortar and in the case of wide openings or walls made of brittle materials such as ceramic blocks or gazebeton, the lintel should be laid on the masonry on 2/3 layers of solid bricks or on a concrete cushion. This prevents the wall from breaking in place by applying considerable force. [7]

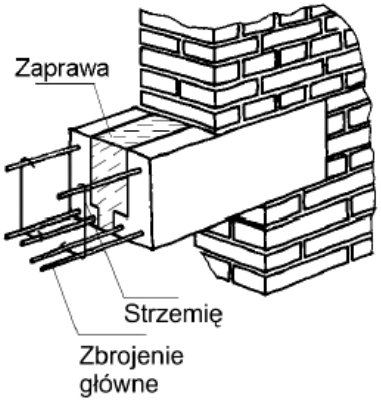
The construction and shape solutions of individual types of pre-assembled lintels are the most common system solutions and their dimensions, material and bearing capacity are adapted to the system in which they were designed.

# ADVANTAGES OF PREFABRICATED LINTELS

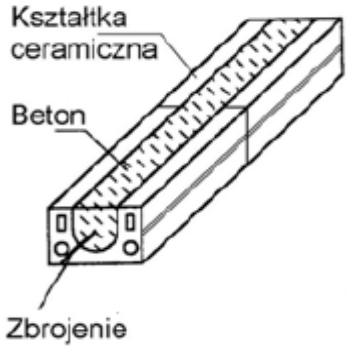
- No need for formwork
- Fast assembly time
- No technological breaks
- Relatively low price
- In most types of lintels used there is no need for stamping
- Higher thermal insulation
- Walls ceilings and lintels of the same material (lintels)

# DUE TO LOAD CAPACITY

- self-supporting (high), being an independent structure. They can be loaded with ceilings and do not require additional support during assembly
- unattainable (low), having a load capacity not sufficient to self-relieve external loads, ceiling beams can not be supported on them and other loads should be set. A completely supporting lintel construction is a composite beam with at least one layer of bricks laid on it. Lintels from low beams should be supported during assembly. [7]




Self-supporting lintel L-19 [ 7]




Non-self-supporting lintel Porotherm [7]

# *DIFRENT TYPES OF LITNELS*

I. L19 LEIER

II. Ytong

III. Porotherm

IV. Termalica

V. SOLBET

VI. LEIER STRONG

VII. Pre-stressed concrete lintels

# DIFRENT TYPES OF LITNELS

## I. L19

These are reinforced concrete lintels made of "L" shaped beams with a height of 19 cm and a width of 9 cm and are designed to cover openings up to 2.5 m wide. They are produced in three varieties.

Type D (door) with a length of 119 to 179 cm

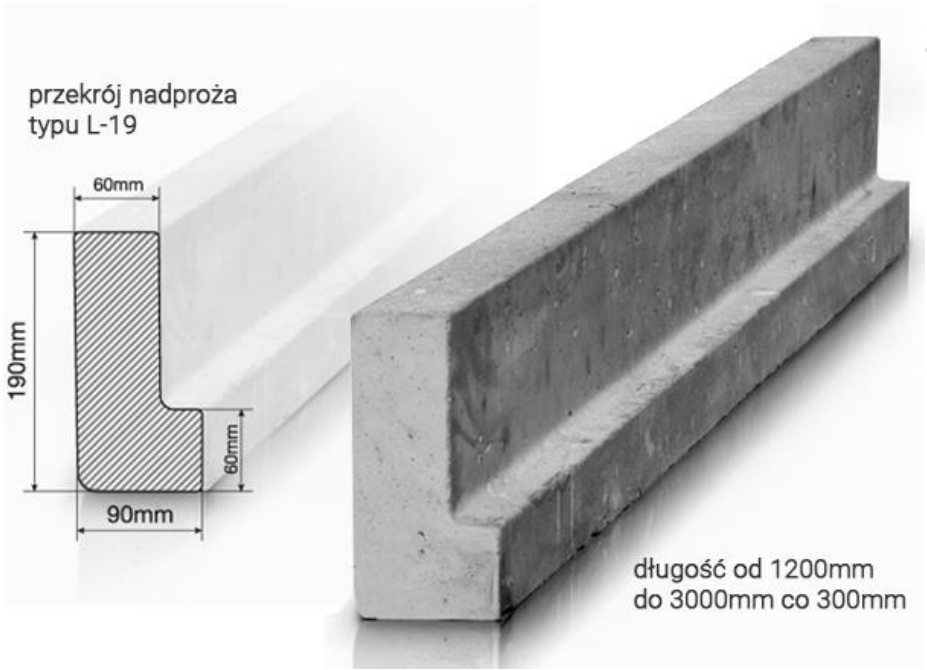
Type N (loaded with ceilings) from 119 to 299 cm long

Type S (unloaded with ceilings) with a length from 119 to 299 cm

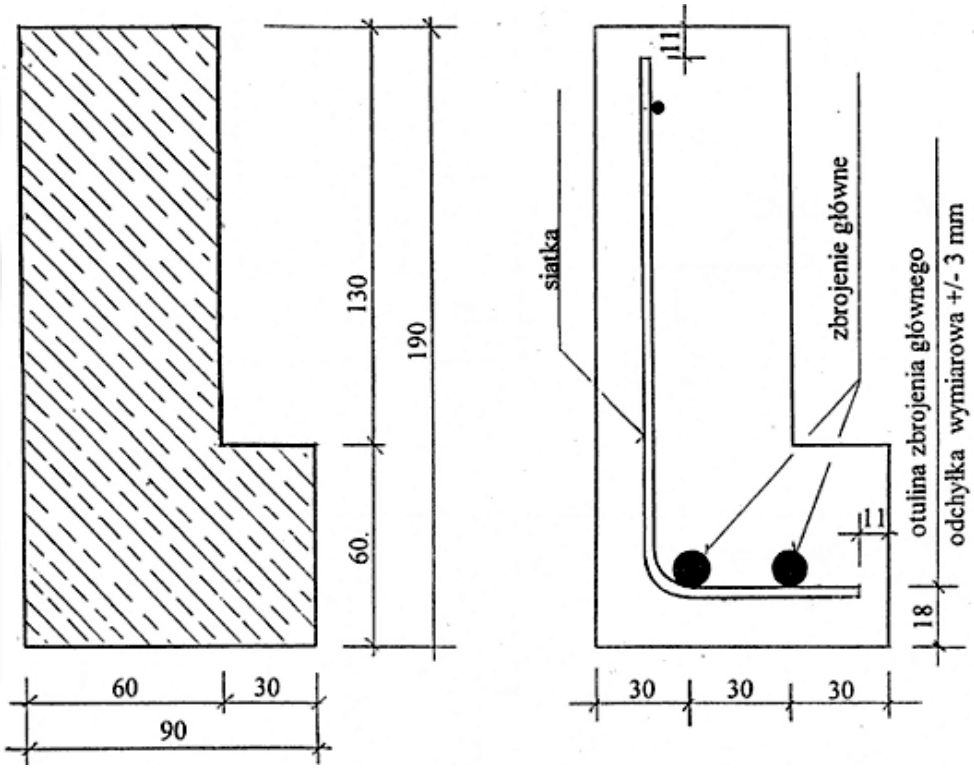
Laying beams does not require formwork and takes place quickly - hence their high popularity. The number of beams used depends on the width of the wall and the size of the loads, after laying and leveling the beams, spaces between them are filled with mortar or concrete.

The length of the beams' support on the wall should be at least 9 cm, but not more than 19 cm, this is due to the way of reinforcement of the support zone with stirrups.

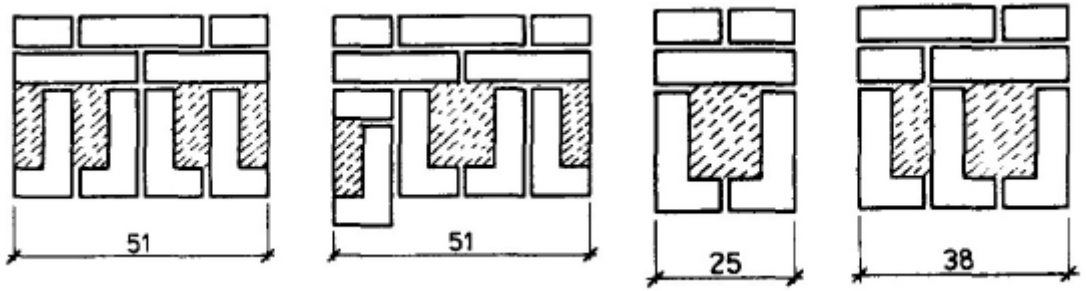
LEIER was the first L-19 lintel manufacturer, currently many manufacturers produce lintel types of this type [7].




Section of L-19 [3]




Reinforcement of L19 [3]




Method of laying lintels over the opening [7]

# II. Ytong

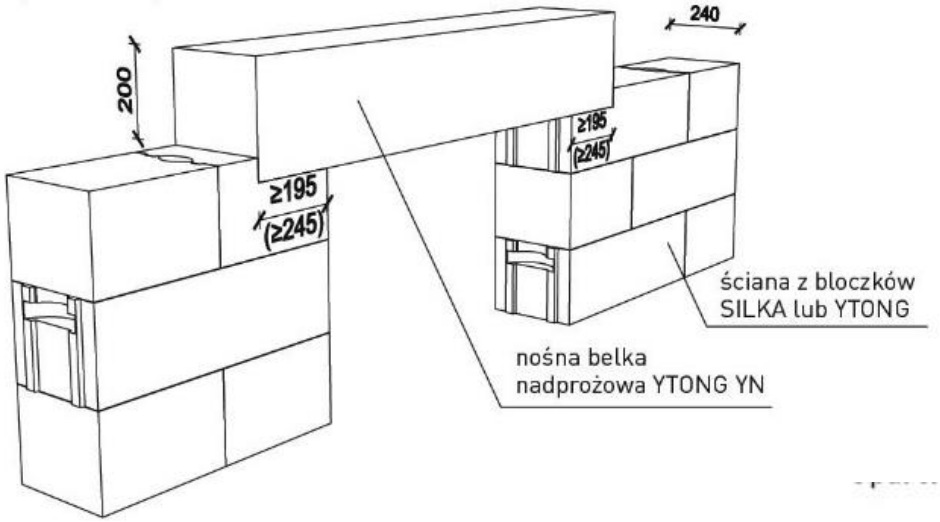
These lintels are made of reinforced aerated concrete, the lintel cross-section has the shape of a rectangle with a height of 25 cm and a width of 20-36.5 cm. Beam lengths range from 130 to 225 cm and are used to cover holes up to 175 cm wide. The backrest on the walls should be 20/25 cm. They are most often used in the Silca system.

In the case of this type of lintels, ceiling beams above the opening can not be directly supported on them, they should be fixed in the wall by means of a reduced reinforced concrete rim.

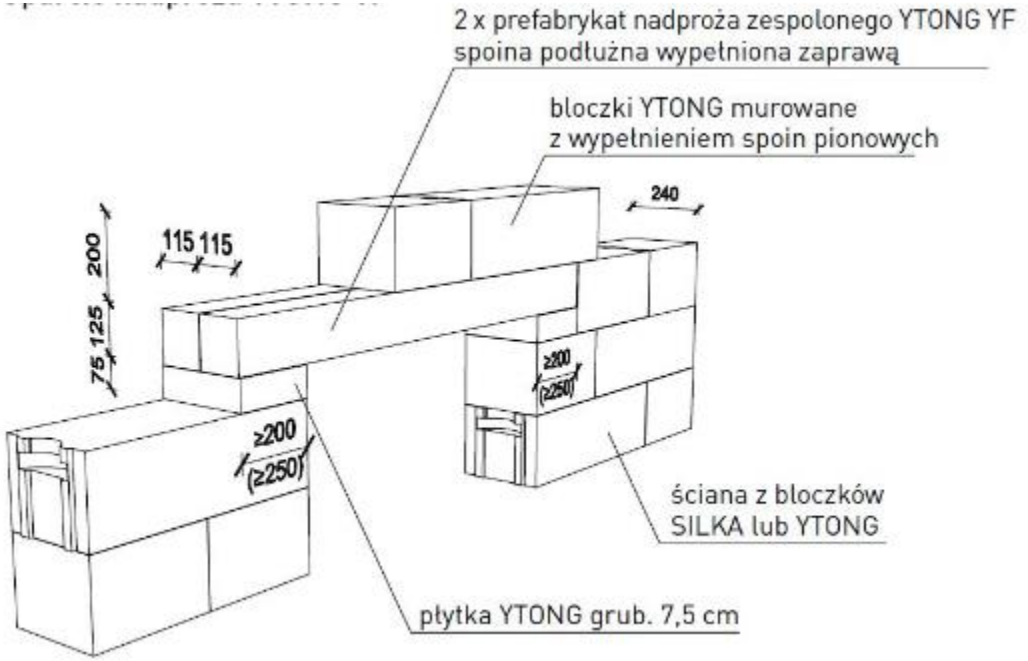
The advantage of these lintels is thermal insulation equal to wall insulation - they do not create thermal bridges. The disadvantage - not very high load capacity. [1]

During assembly, special attention should be paid to the correct positioning of the header because the cross-section of the upper reinforcement is half of the lower reinforcement.

# DIFRENT TYPES OF LITNELS




Scheme of lintel support YTONG YN [1]




Scheme of lintel support YTONG YF [1]

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# III. Porotherm lintel

Porotherm reinforced concrete and ceramic lintels are used in walls made of Wienerberger Porotherm blocks. The beams are produced in lengths from 100 to 300 cm, with steps of 25 cm and are used to cover openings up to 2.5 m wide. The depth of the backrest on the wall ranges from 12.5 to 25 cm.

Porotherm beams come in two types:

Self-supporting beams type 23.8

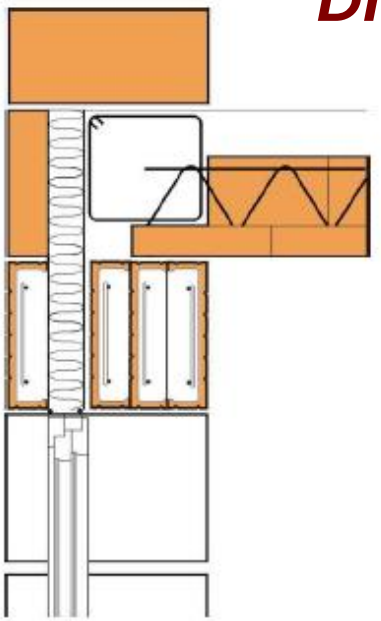
11.5 type self-supporting beams

Porotherm 23.8 lintels are 23.8 x 7 cm (h x b) and are made of C-shaped ceramic elements armed inside with a truss of two longitudinal bars joined by stirrups and filled with B25 concrete.

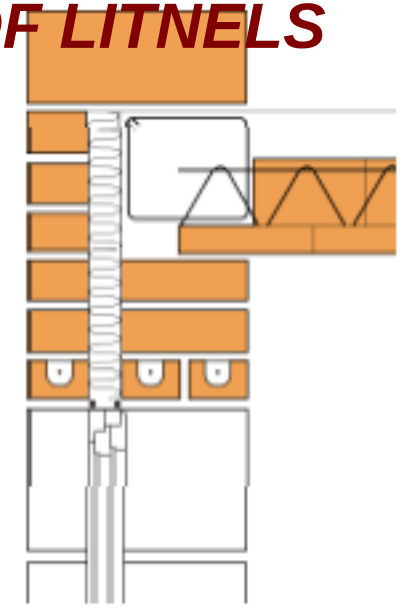
The Porotherm 11.5 lintel is 7.1 x 11.5 cm (h x b). In "U" fittings, a single rod with a diameter of 8/12 mm is placed, and the whole is filled with B25 concrete, due to the low cross-sectional height, the appropriate structural load capacity is obtained after joining with the layer of hollow bricks above the lintel.

The lintel type 11.5 should be stamped for the time of assembly at distances of no more than 1 m. The supports can be removed after 14 days from laying the top layer of bricks. [2]

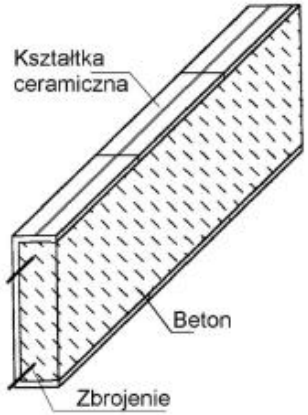
# DIFRENT TYPES OF LITNELS



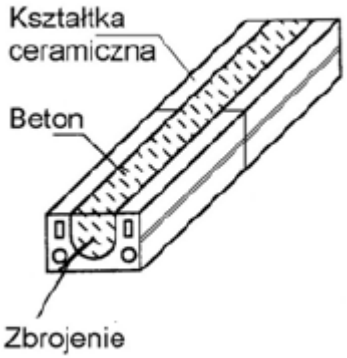
Porotherm lintel [7]



Porotherm lintel [7]




Porotherm lintel [7]




Porotherm lintel [7]

# IV. Termalica lintel

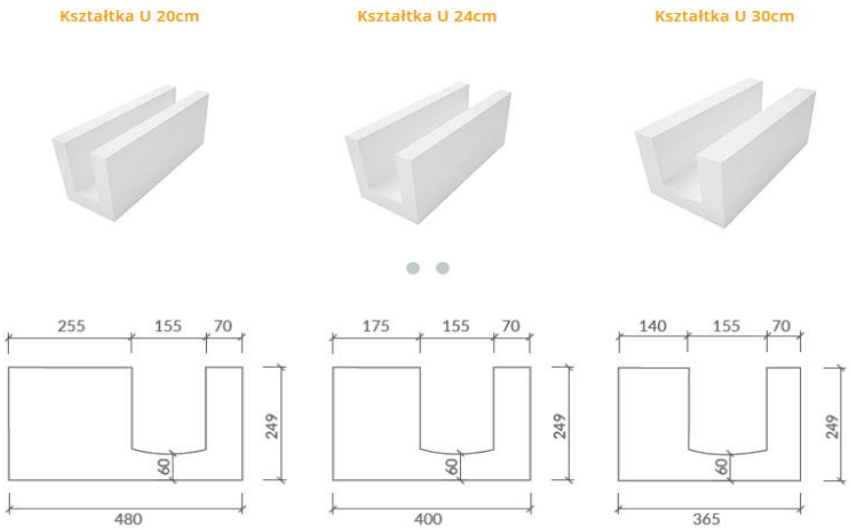
Termalica company, like Ytong-Silca, manufactures prefabricated cellular aerated lintels, besides typical lintel shape lintels, U-shaped lintel is offered.

U-type elements are used to cover window and door openings with large widths, such as patio windows or garage doors. Thanks to the reinforced concrete core made on the construction site, surrounded by a layer of gas concrete with a significant porosity, these lintels eliminate most of the thermal bridges.

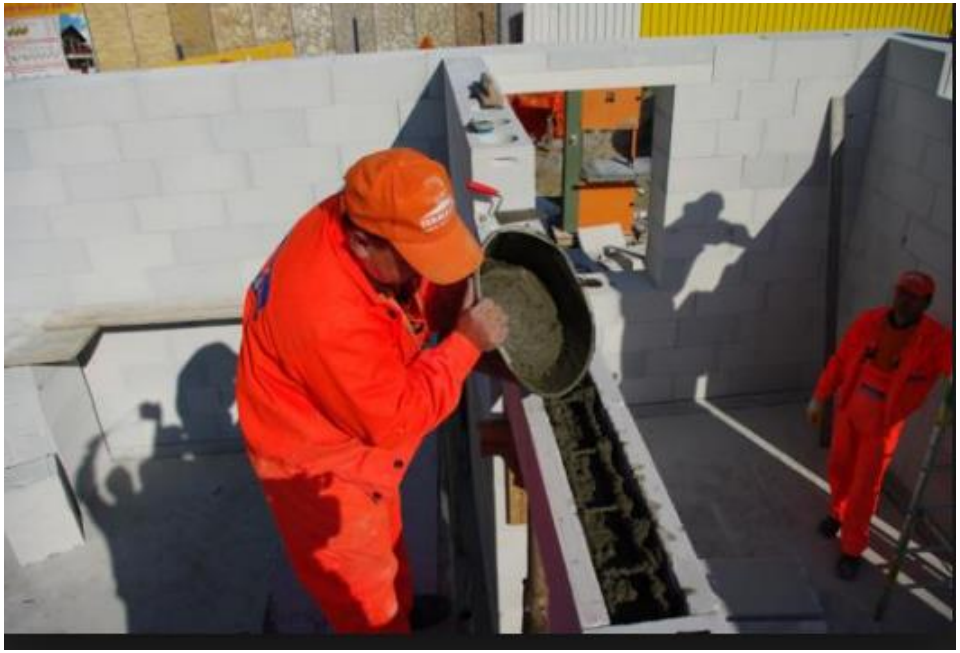
These lintels are available in two classes of concrete density - 400 and 600 kg / m3 and six widths from 20 to 48 cm. Fixed length (599 mm) and height (249 mm) ensure perfect fitting of fittings to the rest of the Termalica system.

These lintels should be laid on a stamped board at a minimum of 0.6 m

# DIFRENT TYPES OF LITNELS




Termalica lintel [6]



# V. Nadproża SOLBET

SOLBET piles are another type of aerated concrete lintels, they do not differ structurally from the Ytong lintel

They come in several lengths. From 130 to 230 cm, which allows you to cover them with a 180 cm wide opening.

Lintels have the same height as the other wall elements in the SOLBET system, which facilitates the course of work, while the appropriate width is obtained by comparing the appropriate number of lintels with each other. [4]

To obtain a lintel over walls with a thickness of: 24 cm - two lintels should be juxtaposed 12 cm, 30 cm - two lintel headers 12 cm + 18 cm, 36 cm should be joined - 18 cm + 18 cm lintels or three lintels 12 cm, 42 cm - three lintel 18 cm + 12 cm + 12 cm should be put together. [4]

# DIFRENT TYPES OF LITNELS



Solbet lintel [4]

# VI. LEIER STRONG

Prefabricated ceramic - pre-stressed prestressed concrete beams LEIER STRONG are placed directly above the openings and form a stretched part of the whole lintel. They consist of ceramic channel fittings, prestressing wires and concrete. The transverse dimensions of such an element are: 11.5 x 7.1 cm (b x h). After installation, the beam is superstructured with several layers of ceramic bricks. [5]

Compressed beams are available in lengths from 115 to 305 cm, which allows you to cover holes up to 270cm. These lintels are used in the Thermopor system.

The characteristic feature of this system is the increase of the load-bearing capacity of the lintel together with the height of the superstructure and the possibility of adjusting the load-bearing capacity of the beam in the prefabrication plant to individual needs. [5]

# DIFRENT TYPES OF LITNELS

LEIER STRONG [5]

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