Via University College

Horsens, Denmark

# External walls

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# Summary:

This report contains knowledge about different types of external walls in Denmark. We started on describing external wall and the main function of it. We will tell you about the strength and the stability which external wall has to have. There are also many types of external wall which are described in our report, like brick and stone wall, block wall, concrete wall, timber wall and glass and steel wall.

The main part of the report contains the knowledge about the brick wall, history of brick, construction of brick wall and all of the elements inside and it's connection with openings. We paid the main attention to this type of brick wall because we find it interesting and the best wall construction. What's more it is the most common one in Denmark. We put some pictures in here to make it easier to understand the topic.



# Key words:

1. External wall
2. Types of walls
3. Brick wall
4. Bricks history
5. Bricks
6. Connection with openings


# Problem statement:

This report is written as a compulsory part of the 1st semester international Constructing Architect education at VIA University College. In this report we will go deeper into a specific topic which is 'External wall' that is relevant to our education. By doing this, we aim to develop our Basic skills in writing academic reports and construction knowledge.

We have decided to study more about external walls, because it's very important part of the building and improper fixing may mean that the building will collapse.

We explain the construction of most common wall types, the function and materials. Furthermore we will talk about brick wall particularly which is the most common one in Denmark. We will also talk about connections of openings with the brick wall and it's construction.

We chose not to include prices of materials, as they can vary in time and region. We concluded it would not resonate with the theoretical approach of the report.

## Specific research questions:

1. What types of external walls are available?
2. What is the function of external wall?
3. What is the most common wall in Denmark?
4. What are the main topics connected with brick wall? What is it's construction?
5. How to make connections with the openings and a brick wall?
6. What are the advantages and disadvantages of brick wall?

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# External wall

## Description:

A wall is a continuous, usually vertical structure, which is thin relative to its length and height. The prime function of an external wall is to provide shelter against wind, rain and the daily and seasonal variations of outside temperature normal to its location, for reasonable indoor comfort.

4.1(2) Load-bearing structures must be designed to withstand normally occurring static and dynamic loads. */Building Regulations 2008*

4.1(1) Buildings must be constructed so as to provide satisfactory conditions in terms of function, safety, sustainability and health. Buildings must be constructed in accordance with best practice, using materials which are appropriate for the purpose. */Building Regulations 2008*

*Regulations:*

*Building Regulations 2008*

## Function:

The function of a wall is to enclose and protect a building or to divide space within a building. A wide variety of materials are used to construct walls, ranging from the familiar stone, brick and block, Tiber, concrete, glass and steel, through to the less common straw bale and earth construction and various hybrid systems, Regardless of the materials used, the commonly accepted functional requirements of a wall are:

- Strength and stability
- Resistance to weather and ground moisture
- Durability and freedom from maintenance
- Fire safety
- Resistance to the passage of heat
- Resistance to airborne and impact sound
- Security
- Aesthetics

## Strength and stability

The strength of the materials used in wall construction is determined by the strength of a material in resisting compressive and tensile stress and the way in which the materials are put together. Stability of a wall may be affected by foundation movement, eccentric loading, lateral forces (wind) and expansion due to changes in temperature and moisture.

## Resistance to weather and ground moisture

Requirement of the Building Regulations is that wall should adequately resist the passage of moisture to the inside of the building. Moisture includes water vapour and liquid water. Moisture may penetrate a wall by absorption of water from the ground that is n contact with the foundations or through rain and snow falling on the wall. Impermeable materials are used to form dpcs and dpms to prevent water rising in floors and walls.

## Durability and freedom from maintenance

The durability of a wall is indicated by the frequency and extent of the work necessary to maintain minimum functional requirements and an acceptable appearance. Where there are agreed minimum functional requirements such as exclusion of rain and thermal properties, the durability of different walls may be compared through the cost of maintance over a number of years.

## Fire safety

Walls are an important element in providing fire protection. The requirements are that the elements should resist collapse for a minimum period of time in which the occupants may escape in the event of fire. Periods of fire resistance vary from 30 minutes for an industrial building, without sprinklers, whose top floor is not more than 30 m above ground.

## Resistance to the passage of heat

The building interior is heated by the transfer of heat from heaters and radiators to air (conduction), the circulation of heated air and the radiation of energy from heaters and radiators to surrounding colder surfaces. This internal heat is transferred through colder enclosing walls, roofs and floors by conduction, convection and radiation to colder outside air.

*References: Barry's introduction to construction of buildings, Second Edition, Stephen Emmitt, Christopher A. Gorse*

# Types of external walls:

## Brick and stone walls:

The earliest settlements and architectural structures which have survived through time are made of stone. Stone is solid, heavy and creates a sense of safety and security. We can say that the most basic of building materials comes from the ground and men can find it in their landscape, which can be stones and rocks. People can also source from the earth, than we are talking about clay which we can moulded into bricks. Buildings which are made from that can literally become a part of its surrounding landscape.

*Fig. 1: Brick and stone wall.*

Stone is a versatile material and can be used for many things. Stone can be put on walls, ground and roof. When we use stones in walls than they can hold heat on the winter or retain it and cold on summer times. There are many protocols which are associated specifically with bricks and stones. A foundation will create stability for wall and when openings for windows or doors are made you have to put lintels above openings to support stone and brick walls for example. Lintels can be made out of steel or concrete and they can be hidden or expressed.

Walls made out of stone and brick were made to support buildings, load and weight from it. We can also say that rubble walls are built from found stones which are organized and selected so that they can complement each other. Smaller stones

are than usually used to fill out in the bases which are made out of large stones, and when the wall gets higher you use smaller stones.

*Fig. 2: Brick and stone wall*

Cavity wall consists of two skins separated by a hollow space called cavity which are connected with wall ties. The skins are commonly masonry such as brick or concrete block. Masonry is an absorbent material, and therefore will slowly draw rainwater or even humidity into the wall. The cavity serves as a way to drain this water back out through weep holes at the base of the wall system or above windows. A cavity wall with masonry as both inner and outer skins is more commonly referred to as a double masonry wall.

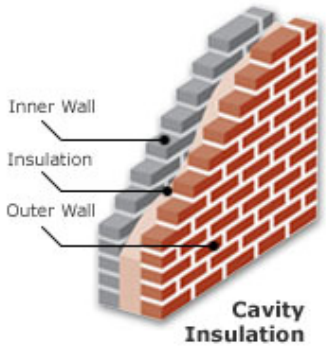


*Fig. 3. Brick and stone wall construction*

The masonry skins of a cavity wall can be brickwork, block work or similar. Different masonry materials can be used on either side of the cavity. The cavity is initially empty but can be filled with insulation by various methods. Cavity walls are more time consuming and therefore slightly more expensive to build than walls with the two skins bonded together, but they provided better sound and heat insulation and most importantly resistance to rain penetration.

*Fig. 4: Brick and stone wall construction*

The cavity wall method of construction was introduced into the United Kingdom (England, Scotland and Ireland) during the 19th century and gained widespread use from the 1920. In some early examples stones were used to tie the two leaves of the cavity wall together. Initially cavity widths were extremely narrow and were primarily implemented to prevent the passage of moisture into the interior of the building. The widespread introduction of insulation into the cavity began in the 1970 with it becoming compulsory in building regulations during the 1990.

## Block walls:

Block Walls are made out of different types of blocks. It can be used Solid blocks, cellular blocks, hollow blocks, composite with insulation filled, composite with bonded insulation, and also sound absorbing with insulation filled. Concrete blocks, sometimes called cinder blocks, are an inexpensive component of masonry work. Because the blocks are cheap, block walls are generally much less expensive to build than stone or brick walls, but are also usually considered less attractive. However, there are many different types of blocks that can be used to make walls, some are quite attractive.

*Fig.5: Block wall*

The first thing to consider when building a block wall is what type of blocks you are going to use. Lightweight, or cinder, blocks are much lighter than standard blocks, which weight is about 20.4 kg. Standard blocks are 20 x 20 x 40 cm and have plain faces. These blocks are not very attractive but are often used for block walls that will have a stone or brick facing covering up the blocks.

*Fig.6: Block wall construction*

Decorative blocks come in a variety of shapes, sizes, and styles. Some decorative blocks have patterns cast into their faces and can be put together to produce patterns in a block wall. Slump blocks are a type of decorative block that appear not as often and more natural, like adobe or stone. Screen or grille blocks form patterned screen walls which provide privacy but allow light to enter. Split-face blocks are broken during manufacturing and resemble cut stone. Finally, glass blocks can be clear, wavy, or patterned, and are usually square. Block walls can be built by amateurs, and is much quicker than laying brick. Some people add steel reinforcing rods and grout in the hollow core of the blocks to add strength. The same mortar can be used for block walls as in bricklaying.

Glass blocks are trickier to install, but skilled amateurs should still be able to construct a glass block wall. If a block wall is taller than about 0.91 m, it may need to be reinforced with steel. Vertical steel rods can be placed in the footing trench of the block wall, extending up through the cores of the blocks. When the block cores are filled with concrete or grout, the steel bars will be fixed in place. Local building authorities can give more information about reinforcement requirements in your area. If the block wall looks too boring, there are many finishing techniques to make block walls more attractive. Solid cap blocks can be used on the top of a block wall to give a more finished look. A block wall can be simply covered in plastering stucco, or plaster can be mixed with colouring oxides to create a brilliantly colour wall. Bricks or stones can be added to a concrete block wall, giving the appearance of a solid masonry wall.

## Concrete walls:

People have use concrete in buildings and construction since Roman times. Concrete as an industrial was considered rough and brutal material that was typically used to create structure but also to a finished surface. Constructions techniques have become more refined, exposed concrete surface have become more and more popular. If steel reinforcement is put into concrete it can be incredibly strong and last very long.

*Fig.7: Concrete wall*

Walls made out of concrete are sometimes using formwork with the construction to get dynamic and different shapes. It is also possible to use concrete as cladding to cover existing wall surfaces.

You can have reinforced, precast concrete panels in different finishes and colours such as; polished, smooth, sand blasted and acid etched. It is also possible that various materials can be incorporated to the panels and that can be glass or marble for example, which can offer architect tactile possibilities.

Concrete:

- Mixture of cement
- Aggregates
- Water
- Other admixtures can be added to modify the placing and curing processes or the ultimate physical properties.

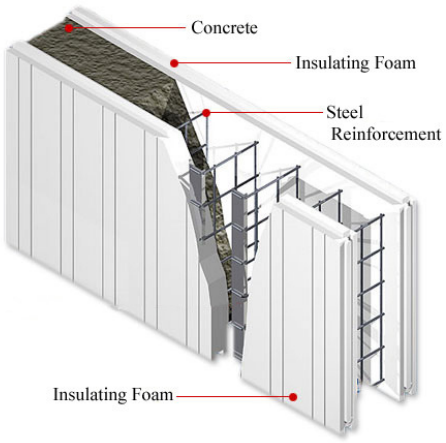


*Fig. 8: Concrete wall construction.*

## Timber walls:

Timber is good building material because it is a versatile. We can use it to effect for internal and external finishes and to create a buildings skeleton structure for example. It is possible to use a timber to construct, design and built a building entirely of timber, from walls covering to the roof. There are also many different techniques finishes that can cultivate the beauty of timber to walls. It can be waxed, stained, painted, smoothed, sanded and varnished. Timber is ultimately flexible and can be adapted to suit great number of possibilities, tastes and applications.

*Fig.9: Timber wall*

External cladding of buildings with timber can be clad with a different application of timber that can be shingles or solid boards, to suit a difference of functional demands. There are also many other advantage of using timber to clad buildings, it can be design to suit most buildings in every environments and fit most sites with a minimum of expense.

When you have to deal with the weather conditions it is different coating system to be applied to timber to protect its finishes. Timber can also be used to quickly and effectively change the colour and style of a building as well as prolonging the life of the material.

Open, vented timber rain screen have become more and more popular form of cladding in much contemporary architecture. The outer screens allow the rain to drain away from the building with help of airspace and watertight wall system which is beneath it and can provide an interesting aesthetic to the architecture.

*Fig.10: Timber wall construction.*

## Glass and Steel walls:

Stainless steel has become a popular cladding material because it is strong, can offer a variety of aesthetic effects, from highly reflective to surfaces and durable. Engineering and methods in the manufacture of glass have also evolved. Steel and glass represent a manufactured form of architecture. Those materials are used frequently in contemporary architecture to produce buildings that are both functional and practical.

*Fig. 11: Glass and steel wall*

For the architect, most of the important properties by using glass and key advantages of specifying the use of glass it are transparency, like it allows light into space. Aluminium cladding panels are light weight and available in many colours and provide a variety of finishing possibilities for architect. Glass can also be treated with chemicals so that it can clean itself. That can be very good to use on areas in high altitude which are hard to access for maintenance.

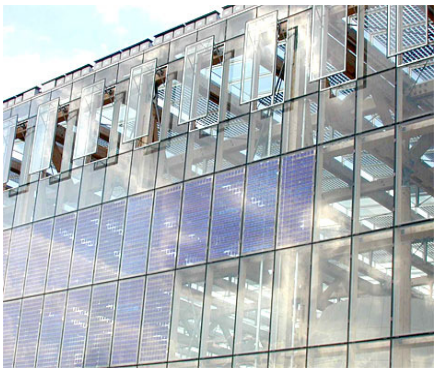

*Fig.12: Glass and steel wall*

When you are choosing external walls on your house you always have to consider about the look and quality. Not all walls are good for all houses. You for example don't have timber walls for a big building which is like eight or nine floors. Than you choose glass and steel or like concrete external walls for example.


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*Materials for Architects and builders second edition* *Author: Arthur Lyons*

# Heavy external walls:

Heavy external walls are walls where outer leaf is usually a brick wall, while the inner leaf can be a brick wall, a clinker concrete wall or a cellular concrete wall. The outer and the inner leaf shall be connected with wall **ties** in order to make sure that the two parts of the wall are connected and are functioning together and to ensure the combined resistance to wind load. Corrosion proof wall ties shall be used e.g. stainless steel and there should be at least 4-6 ties per m2 wall. The distance between ties should not exceed 0.6 m. below the top courses two rows of ties should be inserted at intervals of 0.3 m. Furthermore an extra row of wall ties should always be placed at intervals of 0.3 m along the edge of all openings e.g. windows.

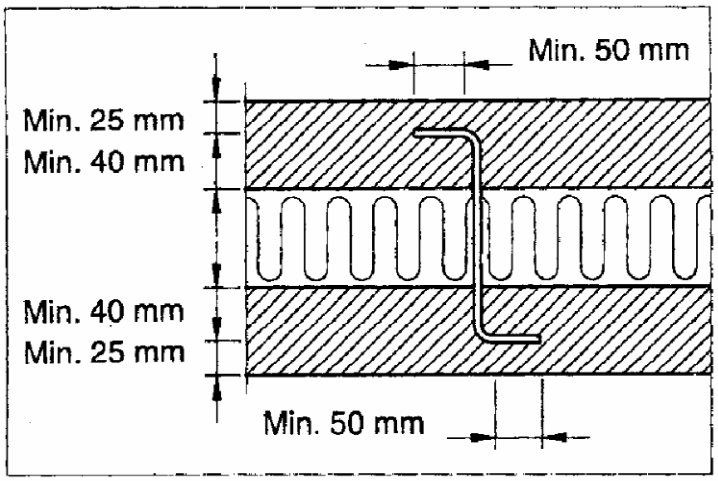


*Fig.13: Wall ties. Directions for the correct design and embedding. Inner and outer leafs are both constructed in brickwork.*

Wall ties embedded in prefabricated elements shall be straightened in such a way that they are rectilinear and parallel when embedded in the outer leaf. If wall ties are not embedded in prefabricated elements they are usually hammered into the edge of the element simultaneously to erecting the elements.

*References: Single Family Houses SBI 189*

# History of bricks:

Bricks are one of the oldest known building materials dating back to 7000BC where they were first found in southern Turkey and around Jericho. The first bricks were sun dried mud bricks.

Fired bricks were found to be more resistant to harsher weather conditions, which made them a much more reliable brick for use in permanent buildings, where mud bricks would not have been sufficient. Fired brick were also useful for absorbing any heat generated throughout the day, then releasing it at night.

The Ancient Egyptians also used sun dried mud bricks as building materials. Paintings on the tomb walls of Thebes portray slaves mixing, tempering and carrying clay for the sun dried bricks. These bricks also consisted of a 4:2:1 ratio which enabled them to be laid more easily.

*Fig.14: The ancient Jetavanaramaya stupa in Anuradhapura, Sri Lanka is one of the largest brick structures in the world.*

The Romans further distinguished those which had been dried by the sun and air and those bricks which were burnt in a kiln. Preferring to make their bricks in the spring, the Romans held on to their bricks for 2 years before they were used or sold. They only used clay which was whitish or red for their bricks. Roman bricks were more commonly round, square, oblong, triangular or rectangular. The kiln fired bricks were generally 1 or 2 Roman foot by 1 Roman foot, but with some larger bricks at up to 3 Roman feet.

*Fig.15: The world's highest brick tower of St. Martin's Church in Landshut, Germany, completed in 1500*

The Greeks also considered perpendicular brick walls more durable than stone walls and used them for public edifices. They also realized how the modern brick was less susceptible to erosion than the old marble walls.

During the 12th century bricks were reintroduced to northern Germany from northern Italy. This created the brick gothic. The buildings around this time were mainly built from fired red clay bricks.
During the renaissance and Baroque periods, exposed brick walls became unpopular and brickwork was generally covered by plaster. Only during the mid 18th century did visible brick walls again regain some popularity.

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# Types of bricks:

## Clay bricks:

In this country there are very extensive areas of clay soil suitable for Brickmaking.Clay is ground in mills, mixed with water to make it plastic and molded, either by hand or machine, to the shape and size of a brick. Bricks that are shaped and pressed by hand in a sanded wood mould and then dried and fired have a sandy texture, are irregular in shape and color and are used as facing bricks due to the variety of their shape, color and texture.

Machine made bricks are either hydraulically pressed in steel moulds or extruded as a continuous band of clay. The continuous band of clay, the section of which is the length and width of a brick, is cut into bricks by a wire frame. Bricks made this way are called 'wire cuts'.

Length: 228 mm
Height: 54 mm
Width: 108 mm

The bricks modular dimension
1/1 brick + one joint = 228 + 12 = 240MM
3/4 brick + one joint = 168 + 12 = 180MM
1/2 brick + one joint = 108 + 12 = 120MM
1/4 brick + one joint = 48 + 12 = 60MM

All dimensions are a multiple of 60MM

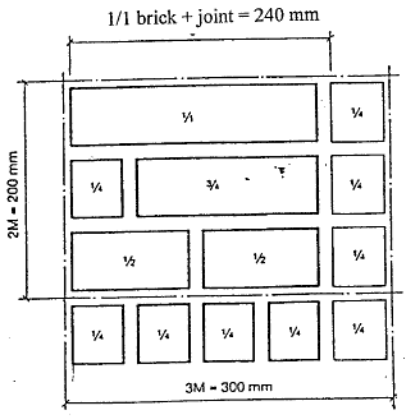


*Fig.16: Examples of dimensions of clay brick in Denmark*

## Calcium silicate bricks (sand-lime):

Calcium silicate bricks are generally known as sand-lime bricks. The output of these bricks has increased over the past few years, principally because the output of Fletton bricks could not keep pace with the demand for a cheap common brick and sand-lime bricks have been mainly used as commons. The bricks are made from a carefully controlled mixture of clean sand and hydrated lime which is mixed together with water, heavily moulded to brick shape and then the moulded brick is hardened in a steam oven.

*Fig.17: Calcium silicate brick*

Coloured sand-lime bricks are made by adding a colouring matter during manufacture. These bricks are somewhat more expensive than Flettons. The advantage of them however is that the material from which they are made can be carefully selected and accurately proportioned to ensure a uniform hardness, shape and durability quite impossible with the clay used for most bricks.

## Concrete bricks:

Concrete bricks are manufactured in the same size as clay bricks. They tend to be more consistent in shape, size and colour than clay bricks and come to variety of colours and finishes. Appearance and properties vary between manufacturers, although the concrete brick does have a different appearance from clay bricks, which extends the choice available.

*Fig.18: Concrete brick*

*References: Barry's introduction to construction of buildings, Second Edition, Stephen Emmitt, Christopher A. Gorse*

# Mortar:

Because of the variations in shape and size, the courses of bricks would not lie anywhere near horizontal. One of the functions of brickwork is to support floors and if a floor timber were to bear on the brick marked A it would tend to cause it to slide down the slope on which it would be resting. It is essential, therefore, that brickwork be laid in true horizontal courses, and the only way this can be done with bricks of differing shapes and sizes is to lay them on some material which is sufficiently plastic, while the bricks are being laid, to take up the difference in size, and which must be able to harden to such an extent that it can carry the weight normally carried by brickwork. The material used is termed mortar.

The basic requirements of a mortar are that it will harden to such an extent that it can carry the weight normally carried by bricks, without crushing, and that it be sufficiently plastic when laid to take the varying sizes of bricks. It must have porosity similar to that of the bricks and it must not deteriorate due to the weathering action of rain or frost.

*References: Barry's introduction to construction of buildings, Second Edition, Stephen Emmitt, Christopher A. Gorse*

# Damp proof courses/ Damp proof membrane:

External walls shall be so constructed that they will not be damaged by moisture. Further, the construction shall be so made that any ingress of water can be lead out again. The insertion of damp proof courses and damp proof membranes can ensure this.

**A damp proof course** is a layer, which apart from hindering diffusion also secures against moisture transport via capillary rise

**A damp proof membrane** is a layer, which apart from hindering diffusion is at the same time airtight, that is, the joints between any lengths of barrier must not permit air leakage.

Diffusion is defined as “The transport of water vapor through the pores of a material”. Insulation against moisture from the foundation or from a basement wall is established by placing a bitumen felt damp proof course at least 150 mm above ground level, see figure 19. The most appropriate material is bitumen felt type PF 2000, which is polyester reinforced felt with a mass of 2000g/m2. Alternatively, type GF 2000 can be used which is a glass fibred reinforced bitumen felt.

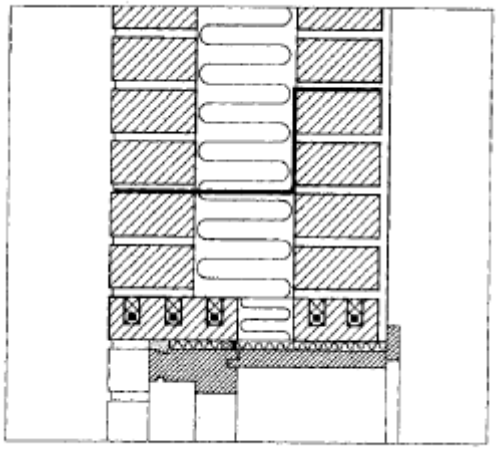

*Fig. 19: Bitumen felt in the brick wall*

*References: Barry’s introduction to construction of buildings, Second Edition, Stephen Emmitt, Christopher A. Gorse; Single Family Houses SBI 189*

# Bounding bricks:

In building a wall it is usual to lay bricks in regular, horizontal courses so that each brick bears on two bricks below. The bricks are said to be bonded as they bind together by being laid across each other along the length of the wall. The advantage of bonding is that the wall acts as a whole so that the load of a beam carried by the topmost.

Because of the bond, window and door openings may be formed in a wall, the load of the wall above the opening being transferred to the brickwork each side of the openings by an arch or lintel. The effect of bonding is to stiffen a wall along its length and also to some small extent against lateral pressure, such as wind.

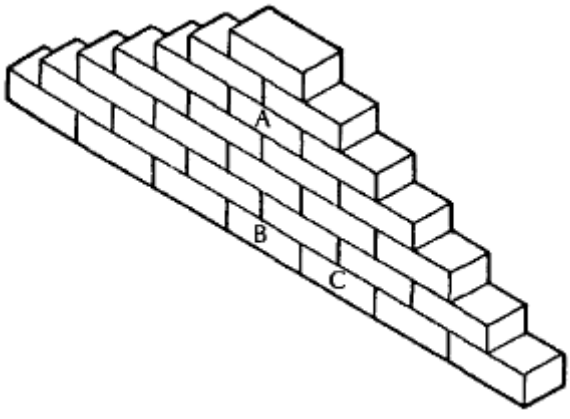


Fig.20: Bounding bricks

Examples:

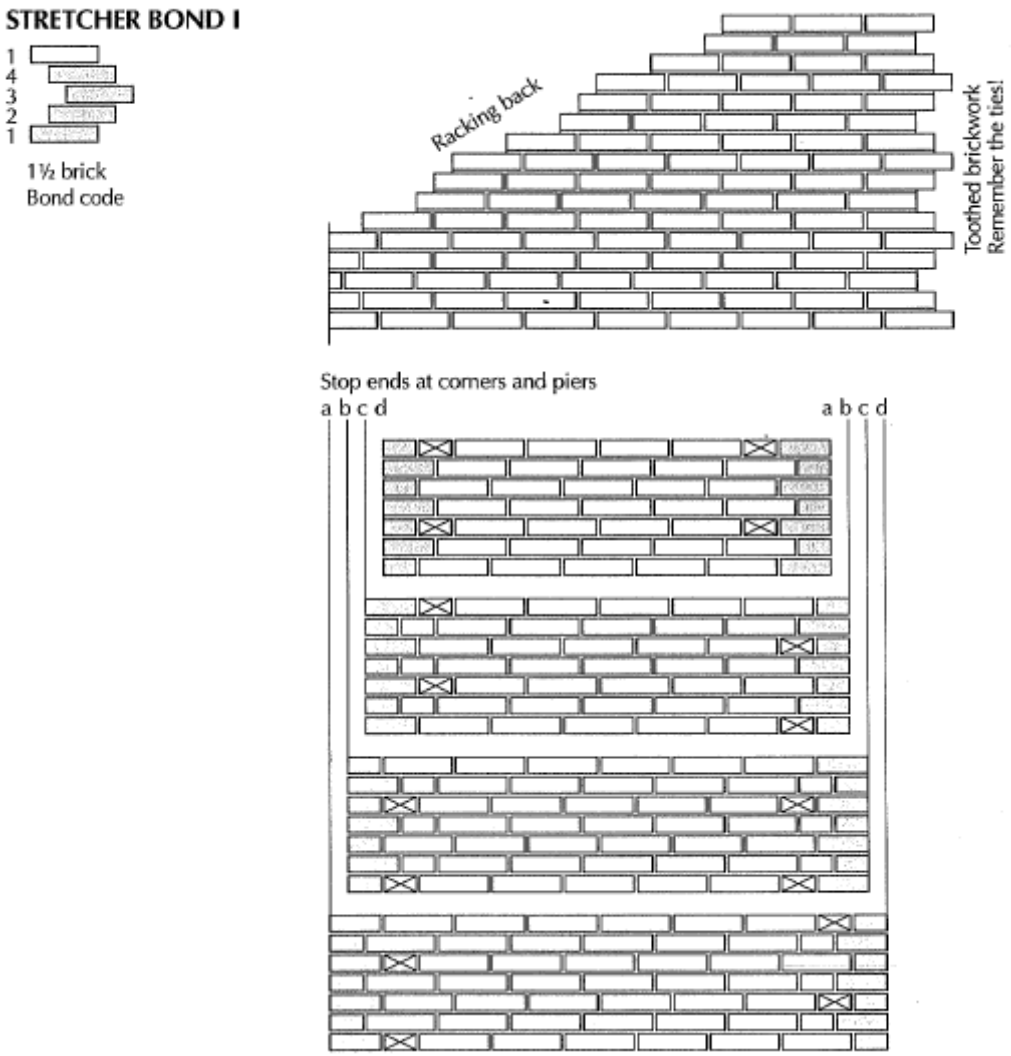


*Fig. 21: Characteristic of stretcher bond I*

**Characteristic of stretcher bond I**

All courses are stretcher courses. The courses are staggered so that the stretchers for every other and every fourth course are in plumb. The bond code's width is 1 ½ brick ad its height is 4 courses. Racking back is irregular with two times ¾ brick and ¼ brick jump. Toothed brickwork is also irregular with ¼ brick jump. The bond's characterization is like the cross bond with runners above each other in every second course (the courses two and four in the bond code are equal to the header course in the cross bond).

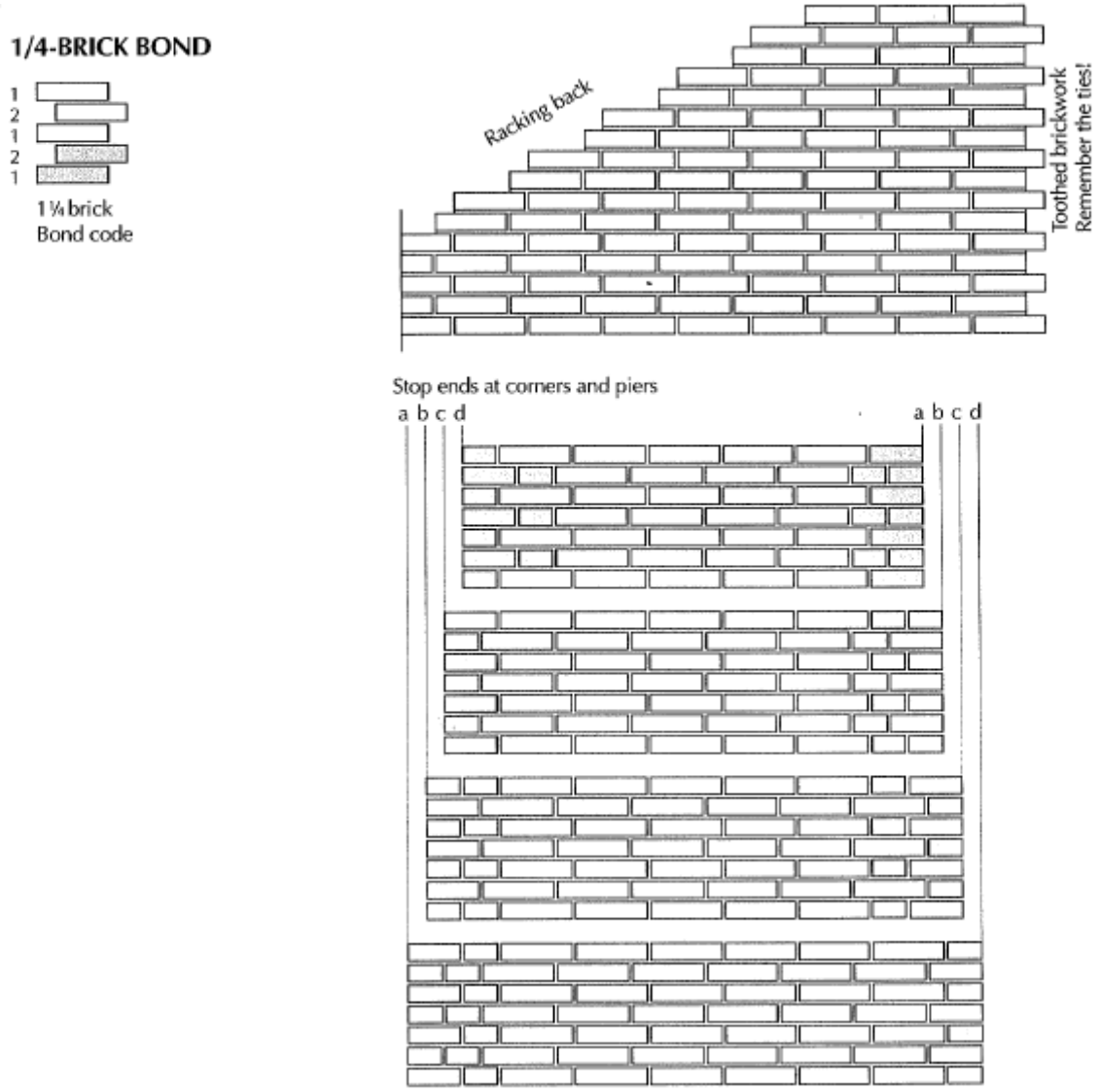


*Fig. 22: Characteristic of a ¼ brick bond.*

**Characteristic of a ¼ brick bond.**

All courses are stretcher courses. The courses are staggered ¼ brick, so that the stretchers for every other course are in plump. The bond code's width is 1 ¼ brick and its height is 2 courses. Racking brickwork is irregular with ¼ brick and ¾ brick jump. Toothed brickwork is regular with ¼ brick jump.

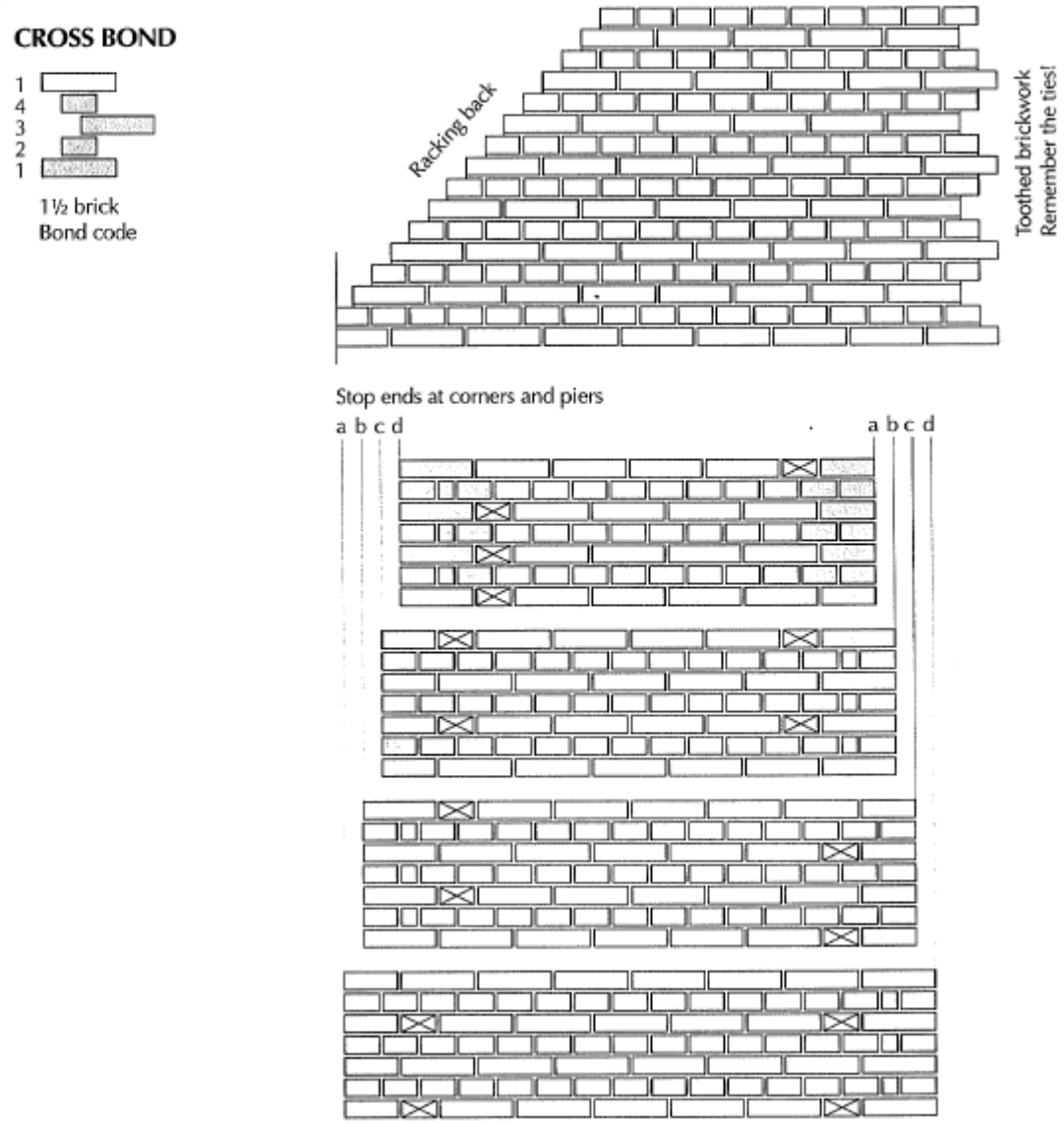


*Fig. 23: Characteristic of cross bond*

**Characteristic of cross bond**

Shifting stretcher course and header course. The stretcher courses are staggered a ½ brick, so that every other stretcher course is in plumb. All stretcher courses are staggered ¼ brick for header courses, and headers are in plumb in all header courses. Racking brickwork is regular with ¼ brick jump. Toothed brickwork is irregular with ¼ brick jump.

# Connection between brick wall and openings:

Window and door lintels shall be so dimensioned that they are sufficiently strong to prevent structures above the lintel from stressing the window or door. With regard to brick lintels one must be aware that the beam partly consists of a prefabricated lintel partly of a number of courses of bricks. It is important not to destabilize the beam e.g. by the insertion of bitumen felt or air vents.

## *Joints*

When fixing windows and external doors the joint between the post of frame and the window reveal should always be made as a so-called two-step seal.
The sealing principle of the two- step seal consists of placing a rain seal and a wind seal in two separate layers with a pressure equalizing chamber and a heat insulating caulking in between. The pressure equalising chamber is connected to the outside through natural leaks in the rain shield and through openings at the bottom of the post of frame.

Consequently, the air pressure in the chamber will by and large be equal to the outside pressure. Using this system will prevent small amounts of rainwater, which may leak through the rain shield along the post of frames, from being pressed further into the joint. Instead the water will seep down along the backside of the rain shield and out into the open just in front of the setback seal at the windowsill.

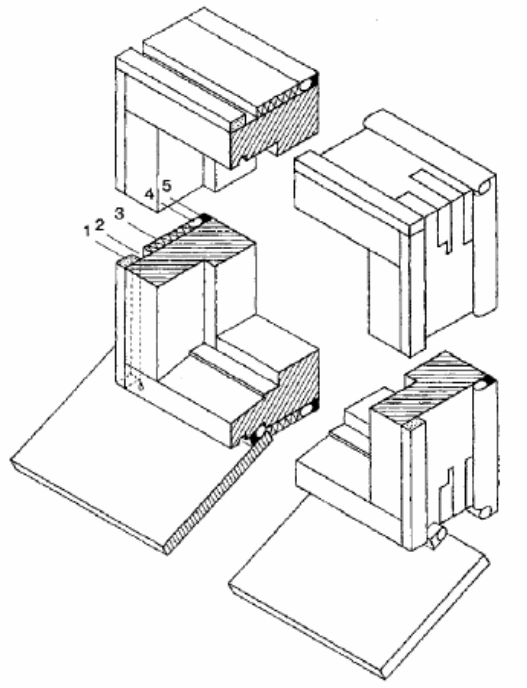


*Fig. 24: A two-step seal between the post of frame and the window reveal. 1) Rain shield on the outer part of the joint, 2) Pressure equalizing chamber with an outlet to the open at the bottom, 3) Caulking with mineral wool, 4) Polyethylene backing 5) Airtight sealant.*

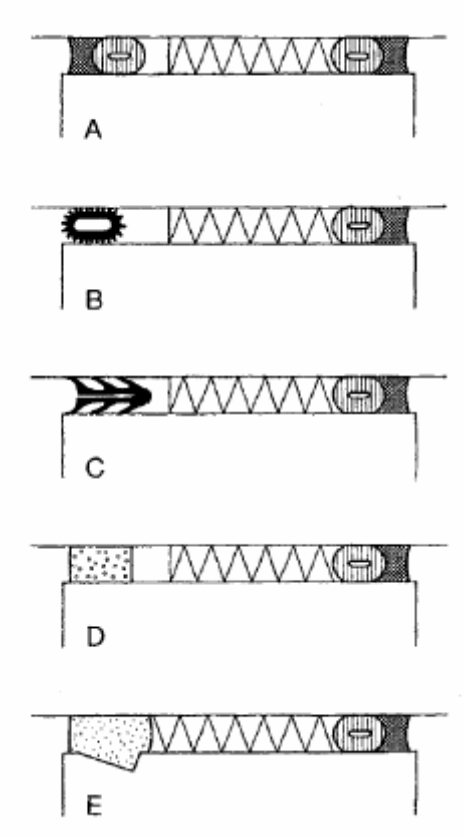


*Fig. 25: Five examples of design of the two-step seal shown in figure. Different rain shields are used: A) Mastic seal and polyethylene backing, B) Round rubber profile, C) Multi rubber profile, D) Impregnated self expanding seal, E) Mortar joint.*

*References: Single Family Houses SBI 189*

# Advantages and disadvantages of brick wall:

Brick is virtually maintenance free, will not burn, is energy efficient, can block sound, and are excellent for resale. The sound blocking qualities and the warm, cosy look of bricks means that it can be a very efficient design element in the bedroom.

However, they add a lot of weight to the foundation, is expensive to repair and it is difficult to change the look of the brick if you tire of it. Brickwork is cheaper, easier, and quicker to lay than stone, and is actually stronger (for a given thickness of wall).

*http://www.homeimprovementpages.com.au/article/brick_work_stone_work*

## Advantages of Masonry Walls:

Masonry cavity walling is almost certainly the cheapest structural system for your new self-build - although the difference will be marginal on a one-off house and so relative cost should be considered in the context of the other pros and cons of the alternatives. A masonry structure gives a house a feeling of solidity, as the density of the blocks provides a high level of acoustic mass, helping to deaden noise outside the building. Building internal partition walls from masonry, as opposed to timber stud walls covered with plasterboard, will further enhance the feeling of solidity and provide sound deadening between rooms.

The high strength of masonry walls allows the option to use suspended concrete upper floors, rather than conventional timber floor joists. This provides sound deadening between storeys, as well as making it possible to build first floor partition walls in solid masonry, rather than in timber studwork, extending the qualities of solidity and sound deadening to upstairs rooms. Dense blockwork also provides a solid fixing for built-in furniture, curtain rails, pictures etc. With the addition of steel, or glue-laminated timbers, masonry is extremely versatile and is suitable for the construction of most house designs.

However, ordinary dense concrete blockwork is a poor insulator and so in order to meet the energy requirements under the building regulations, insulation has to be added into the wall structure. It is possible, however, to achieve extremely high levels of energy efficiency using masonry construction. One way of improving the thermal performance of a masonry structure is to use lightweight concrete blocks – also known as aircrete. These have a proportion of air added into the mix during manufacture, creating tiny air bubbles which act as an insulant. The disadvantage is that the more air that is added into the blocks, the weaker they become. This can be a problem when it comes to fixings as special anchors are often necessary to fix heavy furniture or curtain rails.

## Disadvantages of Masonry:

Whilst it is possible to increase the thermal performance of masonry walls to achieve very low U-values, there are limitations to how much insulation can be added within the cavity - the cavity cannot be built much beyond 100mm without creating structural problems. The alternatives are to use high performance partial fill insulation products, such as urethane boards, which have a relatively high cost factor, or to fully fill the cavity. This does raise concerns over damp penetration, especially in harsh weather areas where many local authorities do not allow it.

The other alternative is to add insulation on the inside face of the walls, which presents a whole different set of issues, not to mention additional labour and material costs. As a form of ‘wet’ construction, masonry needs time to dry out between blockwork ‘lifts’. As a result, masonry is likely to be slower than timber frame

construction.  The tall, slender walls in cavity construction may also be prone to settlement cracks. There are also fears over the cleanliness of the cavities, the fear being  that if too much mortar is allowed to drop on cavity ties above the damp proof course level, or besides the insulation bats, bridges could be formed that might transfer damp to  the inner skin. It should be remembered, however, that where a timber frame structure is clad in brick or blockwork, the cleanliness of cavities is also an issue.

Another disadvantage is that masonry cannot be laid when it is raining heavily or when temperatures fall below freezing. This is one reason for the popularity of timber frame construction systems over cavity systems in Scotland,  where the climate can be aggressive. With timber frame much of the construction process takes place in a factory and the frame is then erected on site in days.

*http://www.cyprus-property-buyers.com/files/constructionmethods.pdf*