

The Guide to



Flat Roof Construction

The flat roof should be carefully designed and build to avoid leakages, thermal movement, membrane detachment or flashing defects. It is important to prepare roof structure and install roof covering adequately. The structure should last at least 60 years, while roof coverings often are with at least 15 years guarantee.

We can distinguish between three types of flat roofs based on the insulation method - warm deck and cold deck or hybrid roof. In case of a warm deck, insulation is placed above the roof deck and below waterproofing. In case of a cold deck, insulation is placed between the flat roof joists at ceiling level. The hybrid roof is when the ventilation gap is above the warm roof what will eliminate the moisture build up. It is a warm roof with air flow.

When it comes to roof coverings, we can choose from felt, single ply or rubber and GRP. Each option requires a different method of installation.

Flat roof deck structure

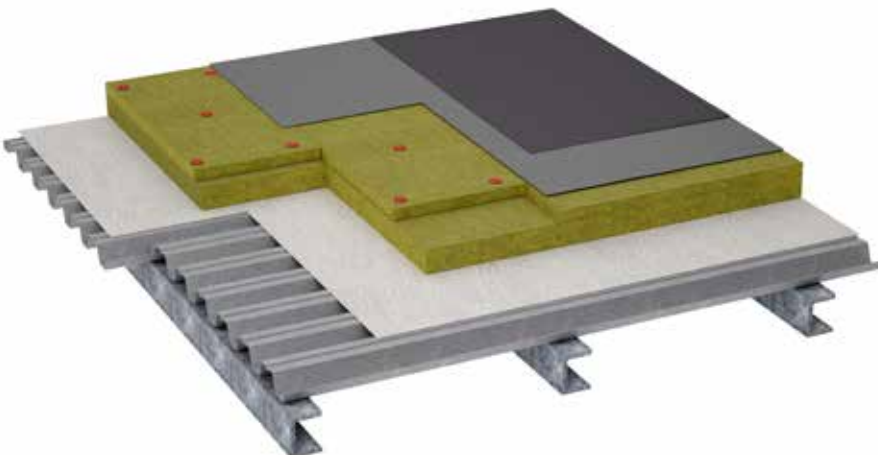
The roof deck construction is usually made of roof rafters, timber joists or steels laid across two walls. Roof framing and structure design should be installed in compliance with Building Regulation, British Standards, Eurocodes and others. Roof deck structure needs to have the connection to the walls. Steel beams or rafters are installed with the joists hangers or built into the walls to ensure the stability of the roof structure. Joist hangers are inserted into walls to carry the end of the rafters. The battens are installed between the rafters or steel beams or on top of them. Battens should be at least 1200mm in length and supported at each end and intermediately by at least three rafters, trusses or walls. Nail fixings should be positioned along the centre of the batten and rafter below. The overlap of battens onto

the outer skin of brickwork is required for. The roof construction requires lateral support in the form of lateral restraint straps. Lateral restraint straps are required for flat roof member levels or in case of the pitched roof at ceiling joist levels. To achieve the slight slope of 1:40 in the flat roof construction it is recommended to install battens on top of the roof joists or install tapered insulation. Lead flashing is used to seal the joint between the wall and roof structure properly. It is inserted into the horizontal joint of the existing wall and finished with mortar. It is recommended to apply a coat of patination oil to lead flashings after installation.

Flat roof insulation thicknesses

The uninsulated flat roof has the U-value 1.5W/m²K and the insulation of 100-160mm above the structural level will give the U-value of 0.25W/m²K or better. Typically 80-100mm of PUR insulation laid over the plywood or board insulation with 38mm of PIR insulation fitted between joists below the deck. Here are the approximate figures but always take into account the requirements of the specification:

- timber roof - 12.5mm plaster board, 150mm timber roof space with no insulation, 20mm timber decking, insulation, 6mm felt
- concrete roof - 12.5mm plasterboard, 22mm battens, 150mm concrete deck, insulation, 6mm felt.



IMPORTANT TIPS!

1. Flat roof should not be 100% flat. BS 6229 recommends that a flat roof should have a minimum design fall of 1:40.
2. All roofs should be insulated- the thickness of the insulation will be determined by its type
3. Always lay the external wall insulation over the underside of the roof to prevent cold bridging
4. Remember to provide ventilation - in case of cold deck roof it is required to leave a minimum 50mm gap above the insulation
5. Between an insulation and the ceiling finish leave a vapour barrier
6. Leave ventilation openings of at least equal to a 25mm continuous gap running the full length of the eaves on two opposite sides
7. Anchor the flat roof to the wall to prevent uplift and ensure all flashing over joints is robustly fitted to prevent water seeping in and causing damage
8. All materials used should have appropriate accreditation that meets Building Regulations
9. Choose experienced roofers to avoid bad workmanship

Source:

LABC www.labcwarranty.co.uk

WATERPROOFING SYSTEMS FOR FLAT ROOFS

The roof is the main component of the building. The most important parts of it are both the structure and the covering. IBB BUILDER presents the comparison of three different roof covering systems available- the liquid rubber system, the roofing felt and the GRP roofing system.

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Liquid Rubber system

It is the seamless and waterproofing system based on the cold liquid application by brush or roller and mainly used for repair, as the curing two coat membrane settles within 20 minutes and can be walked on within an hour. This system provides a fully bonded and tough surface with 200% elasticity. It is available in various colours and both as standalone system or with an Anti-skid finish.

Application

This advanced liquid waterproofing technology is perfect for use on a variety of new and existing surfaces. It was developed to solve problems caused by conventional roofing systems and is

made of eco-friendly polymer. Easy and fast to apply on both horizontal, vertical or complex geometry surfaces. It is applied without joints and seams, and it is resistant to acids, moisture or salt. It is perfect to use on roofs of occupied buildings as the process of the application does not disturb occupants. There is no need to use flame and heat. It can easily penetrate on surfaces with obstacles such as antennas or solar panels etc.

Guaranteed Performance

The Liquid Rubber System is subject to a standard 10-year guarantee, which can be extended to 20 years when applied by an approved contractor.

The advantages:

- Fast application
- Flame free and flexible
- Minimum wastage
- Ready to use single component
- Root resistant
- Allow foot trafficking within an hour
- Suitable for flat roofs, balconies, walkways
- Can be applied on asphalt, timber, felt, concrete and metal
- Can be applied down to -30C
- Various colours available
- 10 years guarantee

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The felt system

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The felt is the most common form of roof covering that can be used on timber, metal or concrete. It has been in use for more than 100 years

High performance felts are supplied in rolls and are laid in multi-layers bonded together with hot bitumen. There are different kinds of roofing felt, and the choice of proper felt should be considered based on the purpose and application system. The felt roof is a durable and affordable solution. The available felts on market are:

Pour and roll – the traditional installation requiring bitumen heated to over 200°C. **Torch-on** – it is treated with thermo-fusible bitumen, heated with a

propane torch as it's rolled and applied hot. **Self-adhesive** – no need for heating.

The felt installation process depends on materials used but usually felt is laid in few layers and bonded with hot bitumen or adhesives in the case of cold application.

Application of the roofing felt

Here is the general guidance but always follow the manufacturer manual as the installation might vary between products, for instance we can distinguish between cold and hot installation. Firstly it is required to make sure that roof deck is clean of debris, nails and others. Roof deck structure will be covered with the OSB board or external plywood. Roofing felt underlay is applied in overlapping layers that starts at the bottom of the roofline to avoid wa-

ter staying underneath. The stripes of felt underlay are laid horizontally. Roll the felt across the deck right up to the edge of the rake and eaves but not over the sides of the building. Align the felt strip and secure it with nails. Do not insert nails along the edge that will be overlapped by the next strip. The overhang to the next strip of felt should be approximately 10cm and each strip should be attached to the surface with the nail or staples. Bigger overlaps should be left when the roll finishes or in valleys, ridges or hips. Around pipes cut the slit and put it over the pipe. Smooth the felt paper on the area, ensure its flat without any wrinkles, spots, bubbles of air. Over the underlay felt strips lay down the top bonded layer. For flats roof most of the roofing tapes are glued to the surface by heating it with butane torch or in cold installation by glueing.

Felts are classified according to the British Standard 747:2000, by their base and function:

- **Type 5 Blue:** polyester base, recommended, strong and durable
- **Type 5U** - under layer
- **Type 5B** - top layer/cap sheet requiring solar protection (paint or chippings)
- **Type 5E** - mineral-finished top layer
- **Type 3 Red:** glass fibre base - certain grades have specific uses:-
- **Type 3G** - perforated sheets, used as a specialised under layer to provide a regular partial bond (see Model Specifications). Type 3B - Not recommended as a working layer in residential buildings.
- **Type 3E** - mineral-finished cap sheet - could be used over a type 5B felt for solar protection and additional security.

source: cardiffroofer

The advantages:

- Price
- Well-known installation process
- Range of application methods available
- Reliability
- Properly installed can last to 50 years
- Improve fire rating of the home

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The GRP flat roofing system

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It is the fully integrated seamless system that can be used on all types of flat roofs and roof coverings. It consists of specially developed glass reinforced polyester resin in liquid form, reinforcement fibreglass mat and a range of trims and edge, what after installation create hard wearing seamless roof.

GRP (Glass Reinforced Polyester) was discovered in the late 1940's. It was quickly adopted during the 1950's and 60's for a wide range of applications where its corrosive-proof properties, allied with its high strength and excellent appearance, soon proved to be invaluable. Its first main application was for boat building, where it gained acceptance in the 50's and is still widely used today. The uses for GRP have since broadened to the extent that it has now become the standard material for the construc-

tion of small craft, water tanks, building cladding panels, roof lights and of course high performance waterproof coatings. In the last ten years a rapid growth has occurred in the GRP roofing industry as more and more people realise the benefits of GRP.

A GRP roof is a single-ply GRP laminate applied in situ over a good quality OSB3 deck. The roof is finished with pre-formed GRP edge trims and a coat of pre-pigmented top-coat.

GRP has been used as a waterproofing material for over fifty years for applications as diverse as boats, water tanks, lorry and car bodies, roof lights, ponds and pools. When used to construct a boat, GRP will provide complete waterproofing protection for the boat's entire lifespan of twenty plus years without the need for maintenance or replacement. This same level of performance is easily replicated on a domestic roof.

The advantages:

- Wet laid, will form to any shape
- Quick installation
- No joints
- Variety of colours
- 25 years guarantee
- Maintenance free
- More environmentally friendly
- UV resistant and Fire retardant
- Strong, lightweight and long-lasting



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