

# THE HOUSEHOLDERS GUIDE TO FLAT ROOFING



# CONTENTS



Introduction.....	1
Basic Design.....	2
Warm and Cold Roofs.....	2
Essentials for a Successful Flat Roof.....	4
Maintenance.....	5
Re-Roofing : The Options.....	6
Choosing the Right Materials.....	7
Waterproof Coverings.....	10
Model Specifications.....	12
Typical Details.....	14
Getting the Work Done.....	16
Guarantees.....	18
Other Membrane Materials.....	19
Further Information.....	20

Every effort has been made to ensure the accuracy of the information in this publication. Neither the FRA or the NFRC has itself verified the information by independent testing or has any control over the circumstances in which it will be used. They, their officers, employees or members cannot therefore accept any liability arising out of its use.

## INTRODUCTION

This Guide has been produced by the Industry for the average Householder with minimal roofing knowledge. By providing information on the design, materials, construction and maintenance of successful flat roofs, we hope it will assist you to a satisfactory roof renewal.

Most domestic flat roofs use two or more built-up layers of bituminous felt as their weatherproofing, each comprising a reinforcing base coated with oxidised or modified bitumen. The nature of the reinforcing base dominates the strength and fatigue resistance of the membrane.

Traditional rag, wood-fibre or asbestos-based felts used since the 1950's could give a serviceable life of 15 years or more, if correctly installed on a stable structural deck.

Bad design, inadequate decking materials, and poor installation sometimes reduced their service life to 5 years or less. These rag/fibre-based products have now been withdrawn from British Standards, and are no longer recommended.

Modern built-up roofing products incorporate more robust polyester bases, to provide far greater strength, durability and life expectancy. Also, the bitumens used can now be improved with polymers to increase flexibility, and further extend the roof's life.

The minimum quality of roofing recommended for habitable buildings is BS747 Type 5 or possibly Type 3 for shorter service life. Correctly installed on suitable decks Type 5 products will give a life expectancy in excess of 20 years.

Although there are still some inexperienced contractors producing poor results in residential roofing, given good quality installation by reputable contractors with trained certificated operatives and simple maintenance, the householder can be assured of a dependable and long-lasting roof.

## BASIC DESIGN

In a flat roof, the waterproofing is always supported by a structural roof deck. This is usually a timber boarding of some type, which in turn is supported on joists. The ceiling, if any, is usually fixed directly to the underside of the joists.

Garages may be un-insulated, but most roofs above the habitable part of the house will be insulated. In houses the insulation is often placed immediately above the ceiling. Alternatively, it may be placed above the roof deck before the application of the waterproofing (see below).

Some specialised insulations can also be placed above the waterproofing but this sort of construction is normally confined to commercial and industrial buildings and has very seldom been used on domestic buildings.

In almost all cases the surface of the waterproofing will need protection, both from ultra violet light and from fire from external sources. The Building Regulations lay down the degree of protection required in the case of fire. This can be achieved by adding a layer of mineral chippings bedded in compound to the surface of the roof, or alternatively by using a mineral surfaced layer of felt as the top layer, or 'Capsheet'.

## WARM AND COLD ROOFS

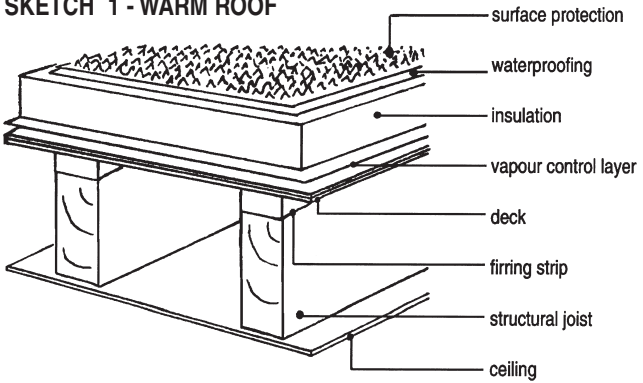
The construction of the roof deck and ceiling is has an important effect on the behaviour of the waterproofing material on top. The building industry uses the terms WARM ROOF and COLD ROOF to describe the two different types.

In Britain as a whole, the Warm roof is **strongly recommended**.

### WARM ROOF

This type of construction has the insulation above the roof deck, thus keeping the deck 'WARM' and is usually the most satisfactory construction for domestic properties as it avoids the need for ventilation of the roof structure. A typical warm roof is shown in sketch 1.

## SKETCH 1 - WARM ROOF



## COLD ROOF

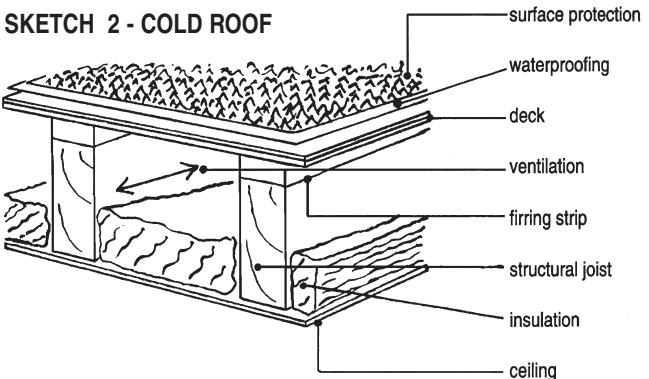
Many residential flat roofs have the waterproofing laid directly onto the deck, and any insulation placed above the ceiling. This arrangement allows the deck to become 'COLD'.

In cold weather, such roofs are inherently prone to condensation, which can cause materials to decay and distort. To reduce this risk, through-ventilation has to be provided to each space above the insulation but this is often difficult to achieve, for example if the roof abuts the wall of a house.

Cold roofs should not be endorsed for the climatic conditions in Scotland, according to the Building Standards (Scotland) Regulations. Although the Regs do not prevent the use of Cold roof constructions, Warm roof constructions are recommended.

If you have an existing Cold roof there may be no need to change it. A typical Cold roof is shown in sketch 2.

## SKETCH 2 - COLD ROOF



## **ESSENTIALS FOR A SUCCESSFUL FLAT ROOF**

Like any part of a building's exterior, flat roofs should be constructed to withstand natural and human forces with the minimum of attention.

### **PROTECTION FROM RAIN AND SNOW**

- The finished roof should have a slope of at least 1 in 80.
- It is best to drain the roof to one or two edges.
- Conventional eaves gutters are better than internal outlets.
- Internal outlets should be adequately sized to deal with storm conditions and be fitted with leaf and gravel guards.
- The waterproofing should extend up adjacent walls at least 150mm (6ins) from the roof surface in all situations.
- The top edge of felt should be protected by a cover flashing.

### **PROTECTION FROM SUN AND FROST**

- It pays to insulate: heating bills are lower and rooms are cooler in the summer.
- Insulation of new flat roofs must satisfy Part L of the Building Regulations.
- Bitumen felt should be protected from the sun.

### **PROTECTION FROM CONDENSATION**

- It is essential that Cold Roofs include adequate through-ventilation.
- Warm Roofs always require a vapour control layer (VCL).

### **PROTECTION FROM THE WIND**

- All roofs should be constructed to resist wind forces.
- An experienced contractor will be able to advise. Seek his advice if your roof is particularly exposed.

### **PROTECTION FROM PEOPLE**

- Materials should be selected to suit roof usage.
- If the use is changed, the structure may have to be strengthened.

### **PROTECTION FROM FIRE**

- Consult your local authority if you are planning a new flat roof.

## MAINTENANCE

All parts of a building benefit from care and regular checks:

### WE RECOMMEND

- Limited access unless the roof is designed for it. If occasional access is required, e.g. for window cleaning, make sure temporary boards are used.
- Inspection twice a year, in March and November. Try to do one inspection soon after rain to see how well the water is draining away.

**Before attempting any inspection, ensure that access is safe, and that if a ladder is necessary it is well secured.**

**- If you are unsure of the condition of the deck, do not step onto the roof.**

### INSPECTION CHECKLIST

- Protective finish: remedy bare patches as necessary.
- Outlets and gutters: clear leaves, etc.
- Upstands and flashings: check condition.
- Puddles on roof: – note position and approximate size.
- Joints: check condition.
- Edge trims: check condition.
- Blisters: note position and extent.

There are many excellent techniques and products available for minor repairs. Many sound roofs are renewed prematurely when a repair would be sufficient. Here are some common repair examples:

- Loose upstands and flashings: re-fix & point into adjacent walls.
- Cracked metal edge trims: repair with polyester-based felt.
- Blisters: protect with bonded chippings or paint and check at next inspection.

### WILL A REPAIR BE SUFFICIENT?

Patch repair compounds are useful because they give the householder time to organise re-roofing for a competitive price at the right time of year. But in general, such repairs are only worthwhile if they are cheaper than the effective cost per year of a new roof covering.

Other factors to consider in deciding whether to re-roof are:

- **The type and age of the present covering** (if you are a recent purchaser, try to find out from the vendor).
- **The history of the roof:** - if all past repairs have been in the same place, complete re-roofing may not be necessary.
- **If you wish to improve the insulation performance of the roof:** lower heating bills will reduce the effective annual cost.

If inspection reveals the following, re-roofing is probably inevitable:

- **Roof sagging between joists** (or puddles getting larger): this is a sign of condensation or roof overloading.
- **Felt split in the line of the deck boards:** another sign of movement in the deck due to condensation or structural problems.
- **Felt split round perimeter:** excessive movement between walls and roof.
- **Roof blisters getting bigger and more widespread:** a sign of leakage and/or condensation.
- **Widespread slippage of upstands:** materials and attachment may be inadequate to cope with movement.
- **Cable clips puncturing felt.**

## RE-ROOFING - THE OPTIONS

Renewal of the roof covering may be necessary due to normal ageing, bad design, inadequate materials or poor workmanship: whatever the cause its an ideal opportunity to consider improving its performance. Here are some examples:

- **You have a cold roof and want to improve the insulation**

– If there is **no evidence of condensation**, extra insulation could be added above the ceiling by removing part of the deck during the work. However, **through-ventilation must be maintained and the clear space between the top of the insulation and the deck must be at least 50mm (2ins).**

- If you suspect condensation, **convert to a warm roof** by applying a vapour control layer, rigid board type insulation and new waterproof covering above the deck. Any existing roof ventilation can be closed off. However **if there is existing insulation above the ceiling** the contractor should calculate how much new insulation is required **above the deck** to avoid condensation.

- **You want to reduce or remove ponding on the roof**

Renewal of the waterproofing will not stop puddles forming on the roof. The best way to remove these is to re-fix (or renew as necessary) the deck on tapered timber strips called firrings. Alternatively, if the deck cannot be disturbed, tapered insulation is available to create drainage falls on a warm roof.

- **You want to use the roof as a balcony or terrace**

Such a change in use will increase the loadings on the roof and so the structure will have to be checked and improved as necessary. If the present roof is a 'cold' type it may be possible to improve the insulation at the same time by converting it to a special type of warm roof in which insulation is placed **above** the waterproofing, with slabs to hold it in place. Seek specialist advice before proceeding with this option.

- **The existing waterproofing is reasonably sound but you wish to renew it in good time**

Provided the roof drains and there is no evidence of condensation or structural movement, it may be possible to prepare the surface and cover (overlay) it with one or two layers of high performance materials without exposing the roof deck to the elements.

## **CHOOSING THE RIGHT MATERIALS**

Flat roofing materials have advanced considerably in recent years and there is now a wider range of choice than ever before. The key to success is the right materials for the particular job.

Here are some typical ones:

### **FOR THE STRUCTURAL DECK**

- **PLYWOOD**

This should be exterior grade per BS5268-2, WBP (Water & Boil Proof) to BS EN 636-2:1997. A minimum thickness of 18mm is recommended. The contractor should ensure that it is suitable for the particular roof structure.

- **TIMBER BOARDING**

This should be tongued and grooved, and preservative treated before delivery. The first layer of bitumen felt is always nailed to timber boarding.

- **ORIENTED STRAND BOARD (OSB)**

OSB is similar in use and performance to plywood, but is manufactured from wafers of timber, rather than full sheets of veneer. Only OSB/3 or OSB/4 (BS EN 300) should be used in flat roofs.

Check that the product has an Agrément certificate before agreeing to its use. Thickness: minimum 15, ideally 18mm.

- **CHIPBOARD (Particle Board)**

Although frequently used in residential flat roofing, its ability to absorb moisture has caused many problems and early roof failure. British Standard 7916:1998 restricts its use to roofs where the possibility of condensation within the roof has been substantially eliminated, or when the roof has no ceiling, e.g. in a garage.

In these specific situations only, Type P5 and P7 boards (to BS7916) can be used. Not generally recommended.

- **CONCRETE**

Common in roofs to blocks of flats and some pre-war houses, concrete is a stable and reliable deck material. If it needs repair, provision should be made for drying out fully before the new waterproofing is laid.

## **VAPOUR CONTROL LAYERS**

All warm roofs should have a vapour control layer (VCL) fitted between the deck and the insulation. This is usually one, or two layers of bitumen felt, but metal foil-cored felts are also available for the purpose.

The contractor should select a vapour control layer to suit the degree of insulation provided and the likely humidity levels in the rooms below the roof.

## INSULATION MATERIALS

There are many types of insulation available for warm roofs. The choice depends most upon the rooftop use and the degree of energy saving required. The more ★'s there are, the less thickness will be needed to achieve energy saving.

The most common materials are:

- **CORK**

Insulation rating ★★

A stable and durable material usually supplied in slabs 500 x 1000mm in a range of thicknesses. It is a good insulator and is well suited to built-up felt waterproofing. We recommend a nominal density of 120kg per cubic metre.

- **MINERAL WOOL**

Insulation rating ★★★

A heat and fire resistant material, also available in a range of thicknesses. It should be a board of a sufficiently strong grade to withstand foot traffic on the roof.

- **PUR (POLYURETHANE, or RIGID URETHANE FOAM)**

Insulation rating ★★★★★

A very efficient insulator, RUF is lightweight and available in various sheet sizes and thicknesses. The grade used should be suited to the material used for the waterproofing and it should conform to British Standard 4841 Part 3.

- **EXPANDED POLYSTYRENE**

Insulation rating ★★★

This is also an efficient insulator but it is very heat-sensitive and will require a protective overlay (for example cork or wood-fibre soft-board) if bitumen felt is to be laid over it. It should conform to British Standard 3837, Part 1. Only HD (high duty) and EHD (extra high duty) grades are suitable for flat roofs.

- **COMPOSITE BOARDS**

Insulation rating ★★★

Some products are available which combine the advantages of two materials in a single board. (e.g. Cork / PUR)

## WATERPROOF COVERINGS

### BITUMEN FELT

Built-up bitumen felt is the most common material for residential flat roofs and there has been a lot of product development in recent years. It consists of two or three layers of sheet materials, which are rolled out over the roof and bonded together with hot bitumen. There are several ways of doing this:

- **Pour and roll:** hot bitumen is poured in front of the felt as it is unrolled, and thus acts as the adhesive and seals the laps.
- **Torching:** in this method specially designed felt is heated with a gas torch and no separate bonding bitumen is needed. Best suited to repair work, small areas, or where access to the roof is difficult. **The contractor must take precautions against fire. Torching is not suitable over or adjacent to flammable materials.**
- **Cold applied:** here, a cold adhesive is spread onto the roof surface and the felts unrolled into position. Laps are also sealed with the cold adhesive. Thus no bitumen boiler or gas torches are required, enhancing safety.
- **Self-adhesive:** the undersides of these membranes include a high-tack adhesive and release paper. Once positioned, the release paper is peeled off, and the membrane stuck down to the substrate. They are not suitable for laying over uneven surfaces or in cold conditions. They require rolling, or a soft broom applied over the whole area to assist full adhesion.

### STANDARDS FOR BITUMEN FELT

The **British Standard 747:2000** classifies a range of felts (for **pour and roll** use) by their base and function. The felts are colour-coded down one edge so you can check that you're getting the one you've been quoted for.

- **Type 5:** polyester base, BLUE colour code
  - **highly recommended**, strong and durable
  - Type 5U- underlayer
  - Type 5B- top layer requiring solar protection (paint / chippings)
  - Type 5E- mineral-finished top layer, or "Capsheet".

- **Type 3:** glass fibre base, RED colour code  
- certain grades have specific uses:-  
Type 3G- perforated sheets, used as a specialised underlayer to provide a regular partial bond (see Model Specifications).  
Type 3B- **Not** recommended as a working layer in residential buildings.  
Type 3E- mineral-finished capsheet - could be used over a type 5B felt for solar protection and additional security.

## POLYMER-MODIFIED MATERIALS

All major manufacturers have proprietary felt systems, which use polymer-modified bitumens, and meet or exceed the British Standards.

For example, 'Elastomeric', or 'SBS-modified' felts, are particularly well suited to highly-insulated Warm Roofs. Before agreeing to use one, check that the product: –

- has a polyester core / base
- has a certificate from the British Board of Agrément
- is suitable for the bonding method.

## SURFACE PROTECTION

All felt roofs need some protection. If the only access onto the roof is for inspection, use either:

- **stone chippings** (12+mm) : these should be bonded to the waterproofing in a gritting compound, not bitumen.
- **mineral finish:** small slate flakes are bonded to the felt during manufacture. Various colours are available.
- **reflective paints:** although effective when first applied, these soon wear and discolour and need re-painting every 3 to 4 years.

Please consult your Local Authority if you require advice on fire protection Regulations.

If regular access is required, or the roof is to be used for a terrace / balcony, use either:

- **porous concrete tiles** bedded in an adhesive
- **plastic or bitumen or rubber-based tiles** with a wearing surface
- **fibre cement promenade tiles**
- **concrete slabs laid on pads** – these are very heavy, so the roof must be designed to take the weight

It will also be necessary to ensure that the roof structure is designed to take the weight likely to be placed upon it, especially if this involves a change of use.

**MODEL SPECIFICATIONS**

Manufacturers will often provide a specification. Where this has been accepted they will also provide back-up in the event of a problem. The following tables give guidance on typical specifications, and are based on British Standard 747 materials for pour-and-roll installation. All layers are fully bonded (except type 3G which is laid loose). If you are going to use torch-on systems or upgrade to elastomeric felts, then proprietary systems from the manufacturers should be used.

<b>DECK</b>	<b>VAPOUR CONTROL LAYER</b>	<b>INSULATION</b>	<b>LAYERS OF WATERPROOFING</b>		
			<b>1st</b>	<b>2nd</b>	<b>top</b>
PLYWOOD or OSB or CONCRETE	Type 5U BONDED	CORK MINERAL PUR	N/A	5U	5E
			N/A	5U	5E
			3G	5U	5E
TIMBER BOARDS	Type 5U NAILED	CORK MINERAL PUR	N/A	5U	5E
			N/A	5U	5E
			3G	5U	5E

**COLD ROOF**

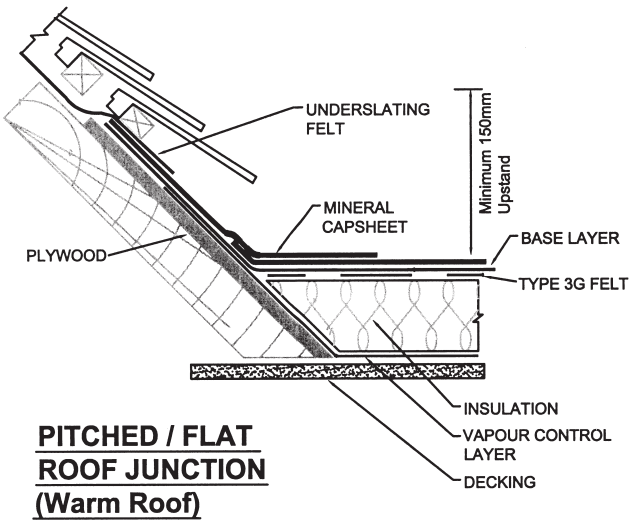
DECK	VAPOUR CONTROL LAYER	INSULATION	LAYERS OF WATERPROOFING		
			1st	2nd	top
PLYWOOD or OSB or CONCRETE	Not Applicable	usually mineral wool, laid above ceiling	3G	5U	5E
	N/A		3G	5U	5E
	N/A		3G	5U	5E
TIMBER BOARDS	N/A	as above	NAILED 5U	5U	5E

**COLD ROOF**

**PLEASE NOTE!**

1. Condensation: if there is any evidence of condensation within the roof, the contractor should take steps to introduce adequate ventilation or convert to a warm roof.
2. Conversion of cold roof: if you are converting a cold roof into a warm one, please refer to the earlier section: Re-Roofing -- The Options.
3. Vapour Control Layer: for high humidity applications (over kitchen, bathroom or utility room), two layers of BS747 type 5U felt, or a special foil-laminated product may be necessary.
4. Surface protection: the use of self-finished 'mineral felt' as the final layer of the waterproofing means that chippings are not required. If preferred, where the slope is 5° or less, the top layer Type 5E could be replaced, with a Type 5B and bonded chippings.

## TYPICAL DETAILS



Note: These are intended for guidance only, and may be adapted to suit any specific roof requirement.

### **PITCHED / FLAT ROOF JUNCTION**

WARM ROOF with a plywood or OSB deck

Junction with Tiled / Slated Roof, e.g above a dormer.

### **DRIP EDGE**

WARM ROOF with a plywood or OSB deck.

Welded Drip edge to roof or dormer perimeter:

### **WALL ABUTMENT**

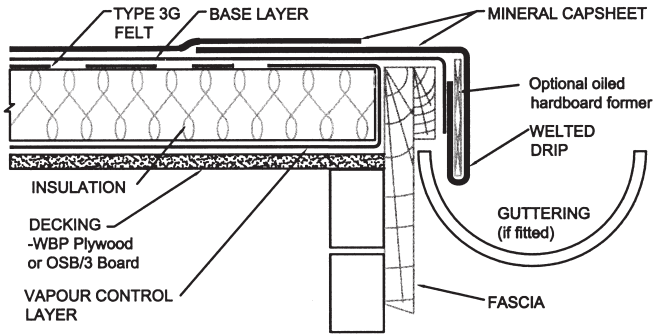
WARM ROOF with plywood deck.

Abutment to brickwork, or below window or door.

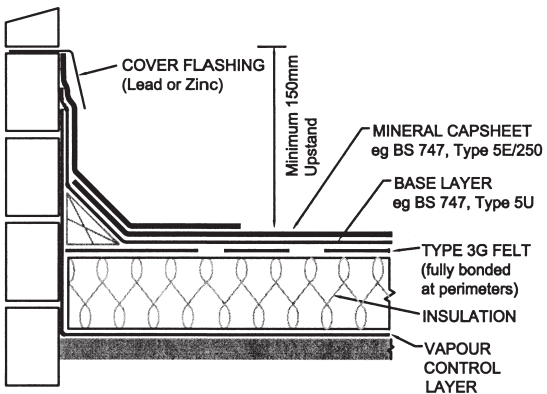
### **WALL ABUTMENT (free-standing)**

COLD ROOF with T&G Timber Board deck.

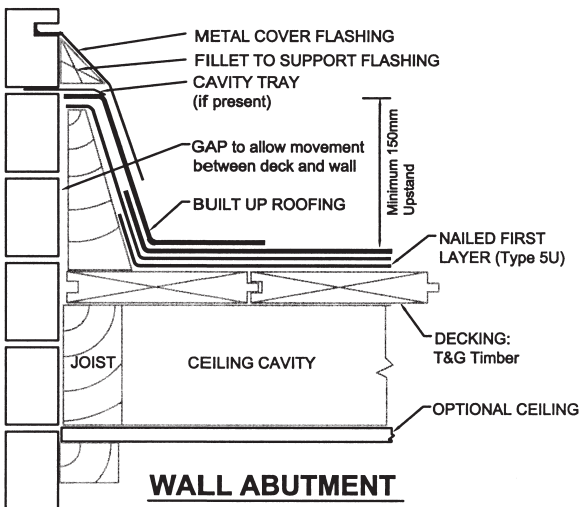
Free-standing kerb abutment to brickwork



**DRIP EDGE**  
**(Warm Roof)**



**WALL ABUTMENT**  
**(Warm Roof)**



**WALL ABUTMENT**  
**- free-standing**  
**(Cold Roof)**

## GETTING THE WORK DONE

### FINDING A CONTRACTOR

Flat roofing is a skilled job requiring training, experience and safety precautions. For best results we recommend members of:

- the Flat Roofing Alliance
- the National Federation of Roofing Contractors

Also, contractors should be approved applicators of the major manufacturers' materials.

If your chosen contractor is not a member of either of the above associations, you should satisfy yourself that they employ competent operatives who hold Construction Skills Certification Scheme cards for the type of work being carried out.

### OBTAINING QUOTATIONS

Unless the job is a minor repair, it is best to get two or three contractors to give you a *written* Quotation for the same work. A 'Core Test' should be taken and then re-sealed, to find the exact build-up and help establish the reason(s) for failure.

The Quotation should include:

- the location and area of the job
- the reason the existing roof failed
- proposals for overcoming these faults
- the degree of stripping out that is required
- whether any 'making good', for example of damaged paintwork, is included
- full details of all materials to be used, including product names, standards to which they conform, and insulation thickness
- details of the bonding method proposed
- how the contractor proposes to form details such as roof edges, abutments to walls and so on (see sketches)
- what surface protection is proposed

- the quotation and how long it is valid for
- payment terms
- details of any insurance or company-backed labour and materials guarantee that protects against latent defects
- safety precautions such as scaffolding should be costed separately

If you think some extra work may be necessary, for example to replace rotten timber, ask the contractor to give you a 'Provisional Sum' in writing, which can be confirmed later. This saves arguments about cost when the job is underway.

## **BEFORE THE WORK STARTS**

### **Health and Safety**

- you are employing a specialist to renew your roof, who should be conversant with the usual risks. However, you must inform him of any specific hazards known to you: -
- ask about safety precautions (access, storage, fire). If it doesn't appear safe to you, or is not as agreed in the quotation, do not allow work to proceed.
- check that the contractor has valid public liability insurance
- for roofs above 2 metres high, it is essential that a safety guard-rail be erected around the perimeter of the roof, prior to commencement
- all ladders should be fixed to the guard-rail and secured at the foot to prevent slipping

### **Other factors**

- jointly inspect the area of the job to agree the existing condition of paths, decorations and so on
- the contractor should confirm start and completion dates.

## **DURING THE WORK**

If possible try to be at home during the work, so that decisions can be made easily without delaying progress. Alternatively, give the contractor a contact number to reach you.

## **WHEN THE WORK IS FINISHED**

Provided the work is completed to your satisfaction, the contractor is entitled to payment within the terms of the quotation, having allowed appropriate adjustments for any extras or savings. The contractor should then issue any agreed guarantee.

If you are dissatisfied with the work, we advise that you contact the contractor immediately. Should you not get a satisfactory response then contact the Trade Association of which they are a member.

## **GUARANTEES**

Most contractors will say that the work is guaranteed and some will state it on their invoices. However, such guarantees are impossible to enforce unless the contractor is inclined to honour his word!

Similarly, some clients have been known to delay or fail to pay for works completed. For this reason, most guarantees are only issued / valid on receipt of full payment for the works.

Most manufacturers will give guarantees on their materials if they have been used properly, and where an approved contractor has applied the material they may extend the guarantee to cover workmanship.

Contractors who are members of reputable trade associations can also offer latent defect insurance, providing additional security for the Client or Householder. Here, the insurance company or broker deals directly with the enquiry.

Before placing their order, the Householder should be quite clear what kind of guarantee they are expecting and how it works.

## OTHER MEMBRANE MATERIALS

This Guide has been produced with the use of bituminous built-up roofing as the weatherproofing material. For 85% of domestic flat roofs this will be the case. There are however, other materials which can be used, and (with the exception of the specification pages) the information given will be applicable.

Other systems in use include:

Mastic Asphalt

Single Ply Sheets

Liquid-applied Waterproofing Systems

**Mastic asphalt** should only be installed by fully qualified operatives and, when properly designed, detailed and laid, has a life expectancy in excess of 50 years.

Many types of polymer-based **single ply membranes** are now available which are suitable for flat and pitched roofs.

Depending upon the product, they can be fully-adhered, mechanically-fixed or loose-laid and ballasted. Seams are formed either by hot air welding or by the use of special adhesives. No naked flame is required.

Each type has distinct properties and specific installation techniques. For this reason, they should only be fitted by operatives who have been properly trained by the membrane supplier. The Single Ply Roofing Association includes system suppliers and their network of licensed/trained contractors.

**Liquid-applied Waterproofing Systems** (LWS) are widely used for domestic flat roofs as well as industrial. Many systems exist that provide certified long-lasting waterproofing protection. Versatility is a major advantage allowing application to any shaped roof with minimal disruption.

Systems should be applied by manufacturers approved operatives. Information & further details can be obtained from ELRA (European Liquid Roofing Association).

## FURTHER INFORMATION

- **CONTRACTORS ORGANISATIONS**

### **Flat Roofing Alliance (FRA)**

Fields House,  
Gower Road,  
Haywards Heath,  
West Sussex, RH16 4PL.

Tel: 01444 440027  
Fax: 01444 415616  
Web: [www.fra.org.uk](http://www.fra.org.uk)

### **National Federation of Roofing Contractors (NFRC)**

24 Weymouth Street,  
London,  
W1G 7LX.

Tel: 0207 436 0387  
Fax: 0207 637 5215  
Web: [www.nfrc.co.uk](http://www.nfrc.co.uk)

- **MATERIALS TRADE ASSOCIATIONS**

### **Association of British Roofing Felt Manufacturers**

Fields House,  
Gower Road,  
Haywards Heath,  
West Sussex, RH16 4PL.

Tel: 01444 440027  
Fax: 01444 415616

### **Mastic Asphalt Council (MAC)**

P.O. Box 77,  
Hastings,  
East Sussex,  
TN35 4WL.

Tel: 01424 814400  
Fax: 01424 814446  
Web: [www.masticasphaltcouncil.co.uk](http://www.masticasphaltcouncil.co.uk)

### **Single Ply Roofing Association (SPRA)**

The Building Centre,  
26 Store Street,  
London,  
WC1E 7BT.

Tel: 0115 914 4445  
Fax: 0115 974 9827  
Web: [www.spra.co.uk](http://www.spra.co.uk)

### **European Liquid Roofing Association (ELRA)**

Fields House,  
Gower Road,  
Haywards Heath,  
West Sussex, RH16 4PL.

Tel: 01444 417458  
Fax: 01444 415616  
Web: [www.elra.org.uk](http://www.elra.org.uk)

### **Copper Development Association**

5 Grovelands Business Centre,  
Boundary Way,  
Hemel Hempstead,  
Herts, HP2 7TE.

Tel: 01442 275700  
Fax: 01442 275716  
Web: [www.cda.org.uk](http://www.cda.org.uk)

### **Lead Sheet Association**

Hawkwell Business Centre,  
Maidstone Road,  
Pembury, Tunbridge Wells,  
Kent, TN2 4AH.

Tel: 01892 822773  
Fax: 01892 823003  
Web: [www.leadroof.org.uk](http://www.leadroof.org.uk)

### **Zinc Information Centre**

Wrens Court,  
56 Victoria Road,  
Sutton Coldfield,  
West Midlands, B72 1SY.

Tel: 0121 362 1201  
Fax: 0121 355 8727

## **• MATERIALS TESTING ORGANISATIONS**

British Board of Agrément  
PO Box 195,  
Bucknalls Lane,  
Watford,  
Herts, WD25 9BA.

Tel: 01923 665300  
Fax: 01923 665301  
Web: [www.bbacerts.co.uk](http://www.bbacerts.co.uk)

