

BS 8000-6:2013

Incorporating Corrigendum No. 1



BSI Standards Publication

Workmanship on building sites –

Part 6: Code of practice for slating and tiling of roofs and walls

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Foreword

Publishing information

This part of BS 8000 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 September 2013. It was prepared by Subcommittee B/542/1, *Slating and tiling*, under the authority of Technical Committee B/542, *Roofing and cladding products for discontinuous laying*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 8000 supersedes BS 8000-6:1990, which is withdrawn.

Relationship with other publications

BS 8000 is published in the following parts:

- *Part 1: Code of practice for excavation and filling;*
- *Part 2: Code of practice for concrete work;*
- *Part 3: Code of practice for masonry;*
- *Part 4: Code of practice for waterproofing;*
- *Part 5: Code of practice for carpentry, joinery and general fixings;*
- *Part 6: Code of practice for slating and tiling of roofs and claddings;*
- *Part 7: Code of practice for glazing;*
- *Part 8: Code of practice for plasterboard partitions and dry linings;*
- *Part 9: Cementitious levelling screeds and wearing screeds – Code of practice;*
- *Part 11: Internal and external wall and floor tiling – Ceramic and agglomerated stone tiles, natural stone and terrazzo tiles and slabs, and mosaics – Code of practice;*
- *Part 12: Code of practice for decorative wallcoverings and painting;*
- *Part 13: Code of practice for above ground drainage and sanitary appliances;*
- *Part 14: Code of practice for below ground drainage;*
- *Part 15: Code of practice for hot and cold water services (domestic scale);*
- *Part 16: Code of practice for sealing joints in buildings using sealants.*

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- new clauses to take into account revisions to BS 5534;
- updated clauses to reflect product innovations, e.g. dry fix systems;
- updated sitework practices to reflect new health and safety legislation;
- the addition of guidance on the installation of solar roof panels.

Where reference is made to proprietary products and to manufacturers' recommendations, the user is advised to obtain evidence that these products and recommendations have been proven by relevant experience or relevant test method data, based on the conditions and methods of use in the UK climate, to be fit for purpose.

It is advisable that all parties seek assurances at the outset of a project that such recommendations are appropriate for the product in its intended use and location.

Use of this document

The purpose of this code of practice is to encourage good workmanship by providing:

- a) the most frequently required recommendations on workmanship for building work in a readily available and convenient form to those working on site;
- b) recommendations on how designers' requirements for workmanship can be satisfactorily realized;
- c) guidance on good practice for supervision and for training purposes;
NOTE This guidance is not intended to supplant the normal training in craft skills.
- d) a reference for quality of workmanship;
- e) recognition that design, procurement and project information are likely to be conducive to good workmanship.

This code of practice has generally been arranged in accordance with the *Common Arrangement of Work Sections (CAWS) for Building Works* [1] so that it can be used easily with project specifications and bills of quantities using CAWS.

As a code of practice, this part of BS 8000 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 8000 is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This part of BS 8000 gives recommendations on basic workmanship on building sites, both commercial and domestic, and covers those tasks which are frequently carried out in relation to the slating and tiling of roofs and walls of newly constructed buildings or buildings being refurbished and re-roofed. It makes recommendations and gives guidance on basic workmanship for conventional types of building work. The recommendations given are not necessarily comprehensive; particular project documents, e.g. project specifications, might be needed to cover recommendations not dealt with by this code of practice.

Some of the recommendations might not apply to historic building conservation or heritage roofing.

The recommendations given in this British Standard apply to the laying and fixing of clay and concrete tiles, natural slates and fibre cement slates and their associated fittings and accessories.

NOTE 1 The manufacture of concrete roofing tiles and fittings, fibre cement slates, clay roofing tiles and fittings and natural slates for use in the UK is covered in BS EN 490, BS EN 492, BS EN 1304 and BS EN 12326-1, respectively.

NOTE 2 Design aspects of slating and tiling are covered in BS 5534.

NOTE 3 The installation of timber shingles and shakes are described in NFRC Technical Bulletin 34 [2]. Manufacturers' instructions will apply to the installation of asphalt shingles and sheet metal or proprietary discontinuously laid roofing products.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

BS 5534, *Code of practice for slating and tiling (including shingles)*

BS 6100-6, *Building and civil engineering – Vocabulary – Part 6: Construction parts*

BS 8000-3, *Workmanship on building sites – Part 3: Code of practice for masonry*

Other publications

[N1] NATIONAL FEDERATION OF ROOFING CONTRACTORS. *Standard roofing mortar*. Technical Bulletin 27. London: National Federation of Roofing Contractors, 2012.

[N2] NATIONAL FEDERATION OF ROOFING CONTRACTORS. *Pitched roof underlay*. Technical Bulletin 06. London: National Federation of Roofing Contractors, 2012.

3 Terms and definitions

For the purposes of this part of BS 8000, the definitions given in BS 6100-6 apply.

4 Handling and preparation of materials

4.1 Checking, handling and site storage of materials

4.1.1 Checking

Materials and products should be checked to ensure that they conform to the project specification.

Battens, roofing underlays, clay and concrete roof tiles, natural and fibre cement slates and fittings should be checked to identify them, either by their third-party certification mark or other certification of conformity, or by manufacturers' labelling.

NOTE Attention is drawn to The Construction Products Regulation (EU) No 305/2011 (CPR) [3], which requires all construction products manufactured to a harmonized European standard to be CE marked and supported by a Declaration of Performance, made available by the manufacturer.

4.1.2 Handling

Tiles, slates and fittings should be unloaded and handled with care to avoid damage, soiling from ground conditions or mortar preparation, breakage in stacking or damage from passing traffic.

4.1.3 Storage (on ground)

Concrete tiles, clay tiles, fibre cement slates, natural slates and fittings with wrappings and banding should be stored in place on a firm, even base free from soiling.

When fibre cement slates are stored outside, the sides of the plastic wrappings should be split open to allow free air movement between the slate stacks. The slates should then be covered with a tarpaulin or similar cover.

Concrete, clay, natural slate, fibre cement slates and fittings should be stored as close as possible to the roof to avoid excessive handling, and in compact, stable stacks. Loose product should not be stacked flat.

Roofing underlays should be stored on end on a firm, clean base protected from direct sunlight.

Battens and counterbattens should be stored on bearers sufficient to prevent sagging or twisting. They should be protected from water saturation when stored in bales or bundles horizontally.

Accessories should be stored in a safe weatherproof store.

Provision should be made for the storage and protection of all materials on site. If a hard standing area is not available, a firm flat area should be selected, which is clear of rubbish and vegetation and free from soiling and risk of damage from access traffic.

4.1.4 Storage (on roof)

Clay, concrete, natural and fibre cement slates should be stacked out safely on the roof to avoid slippage and should be distributed to prevent unbalancing or overloading of the roof structure.

4.2 Preparation for work

4.2.1 General

The recommendations contained in this British Standard should be carried out in accordance with BS 5534 or the Zonal Fixing Method and the manufacturers' instructions. Where contract specifications deviate from these recommendations, clarification should be obtained prior to commencing work as to which takes priority.

Manufacturers' sitework instructions should be in accordance with BS 5534. If the sitework instructions do not comply with these, the designer or specifier should seek assurances at the preparation stage of the project that such recommendations are appropriate.

NOTE 1 Recommendations for mechanical fixing in this British Standard generally refer to nailing and/or clipping but might also refer to screws or proprietary products.

The responsibility for carrying out sheet metal work should be decided prior to the start of work.

NOTE 2 The detailing for flashings included in this British Standard is designated sheet metal work.

NOTE 3 This British Standard has been written on the basis that its use will be supported by documentation on the fixings for roofing underlays, battens, slates and tiles and other materials for the works of a generic nature. It also makes reference to appropriate manufacturers' instructions.

4.2.2 Working instructions

The building designer responsible for the specifications should ensure that British or harmonized European Standards are fully employed where required by the building contract; in the case of this standard, BS 5534.

The specifications should be translated into "working instructions" which the craftsman assembling the roof covering should follow in carrying out the work. These working instructions may be in the form of written instructions, manufacturers' recommendations or specific detail from the designer and technician. They may be supplied by the designer but should be passed to the craftsman by the person responsible for carrying out the roofing part of the main contract.

4.2.3 Liaison

Other contractors should be liaised with and agreement should be reached on the timing and sequence of work with other trades, e.g. sheet metal workers for flashings.

Agreement should be reached on the requirements for and provision of sufficient working space, e.g. for sorting and grading natural slates; plant hoisting facilities; mortaring materials; mechanical cutting; access; safety; services and security.

Necessary work by other contractors should be sufficiently complete and should not delay the continuity of work or leave uncompleted work vulnerable to damage by inclement weather.

NOTE It is good practice to treat lead work, where the rainwater discharges on to slates or tiles, with a patination oil to avoid staining (see Rolled lead sheet – the complete manual [4] for guidance).

4.2.4 Acceptability of the roof structure

Before commencing work, the following should be checked:

- a) roof trusses and rafters are structurally sound and to a true line and adequately secured and braced as specified; timber noggings and lay boards are installed where required at hips, valleys and other details to support the ends of tiling battens;
- b) the roof structure is to the specified pitch, to an acceptable squareness tolerance and curved roofs are without abrupt curve changes;
- c) the level of stepped cavity trays and flashings at abutments suit the line of the roof covering, and that flashings and secret gutters, which will be covered by the slating or tiling, are positioned and secured to specification;
- d) fascia boards and gutters are positioned and secured to specification;
- e) gable brick work has been parged to be below the rafter or truss level;
- f) fascia boards or tilting fillets are positioned to provide a base datum for setting out the correct tilt (taking into account any over fascia accessory). Also that they allow the eaves course of tiles or slates to be in the same plane as the main roof, i.e. not drooped or elevated unless sprocketed eaves have been specified;
- g) pitches of roof slopes to ensure suitability of specification and detailing of the slates and tiles and coordinating fittings.

4.2.5 Fire-break walls

The space between the top of the wall and the slates or tiles should be completely filled with mortar or non-combustible packing above and below the underlay to fill all gaps. Packing should be compressed by the slates or tiles.

There should be no path for smoke or flame to penetrate from one side of the wall to the other. The battens should be encapsulated tightly with the non-combustible material, where they are carried over the party wall. In all cases the lifting of the tiles or slates at the party wall should be avoided.

4.2.6 Insulation

Where slabs of over-rafter insulation are used, adequate stop-battens should be fixed to the rafters to prevent the roof assembly from sliding.

Fixings securing counterbattens through slab insulation should have adequate withdrawal resistance from the rafters and be used in sufficient quantity to ensure security.

All air passages should be kept clear of debris to avoid impedance of air flow.

Support trays at eaves should be fixed to give adequate air-flow.

NOTE BS 5534 provides design guidance for the fixing of counterbattens and stop battens where over-rafter insulation slabs are used.

4.3 Mortar preparation

Mortar for use with slating and tiling should be in accordance with BS 5534 and NFRC Technical Bulletin 27 [N1].

NOTE Lime mortar mixes suitable for roofing are given in NFRC Technical Bulletin 42 [5].

Mortar should be prepared in accordance with BS 8000-3.

Mortar should be mixed to obtain a uniform consistency and colour.

4.4 Application of mortar

COMMENTARY ON 4.4

The following refers to the general application of mortar on roofs. More specific information is provided in Clause 6.

Wherever possible, the same mix and colour (where applicable) of mortar should be used for pointing as for the bedding. However, where this is not possible, pointing should take place as soon as possible to ensure that the bedding and pointing mortar set as one piece.

NOTE 1 It might be necessary to dampen the mortar bed prior to pointing.

The mortar bed should be of sufficient depth to compress when the slate or tile is fixed and firm enough to withstand the vibrations of nailing tiles or the pressure applied as a result of mechanical fixings.

Mortar should be used within two hours of mixing and should be protected from extremes of heat or cold and rain.

Water should not be added to mortar which has become too dry to use. All unused mortar should be discarded.

Staining due to rainwater run off from fresh mortar should be avoided by covering where necessary.

NOTE 2 It is good practice to wet the underside of all concrete products prior to bedding with mortar and ensure that all bedding surfaces are clean and free from release agents used in the manufacturing process. Whilst release agents are not used on clay products, the practice of wetting is particularly important when bedding in hot weather to prevent premature drying out of the mortar.

5 Preparation, laying and fixing

5.1 Roofing underlays

5.1.1 General

The documentation for all products should be checked to ensure that it conforms to the specification and working instructions.

The roofing underlay should be laid parallel to the eaves or ridge with the horizontal overlaps as specified for the rafter pitch and roof construction (see BS 5534). On tightly curved roofs the underlay should be laid up the slope.

The underlay should be laid and fixed in accordance with BS 5534 and NFRC Technical Bulletin 06 [N2]. The gap at the laps resulting from different tautness between underlay courses should be minimized.

The underlay should be fixed with clout nails or other fixings as recommended by the manufacturer. The overlap should be nailed to each rafter or counterbatten, 25 mm in from the top edge of the lower sheet and 25 mm from the exposed edge of the upper sheet.

The underlay should be handled and fixed with care to ensure no tears or punctures occur. Any tears or punctures should be repaired prior to tiling or slating.

The underlay should not obstruct the flow of air through ventilators.

Where proprietary underlays are to be used, the manufacturers' instructions should be followed as directed by the specification.

Contact should be avoided between the underlay and the underside of the slates or tiles to prevent the wind uplift load being transmitted to the slates or tiles. There should be a nominal 10 mm drap in the underlay between supports to provide a drainage path for any moisture and to prevent excessive deflection under wind load.

NOTE Some underlay types might have specific conditions of use or limitation. The underlay provides a barrier to minimize the wind load generated under wind gusts acting on the slates or tiles and also provides a barrier to prevent wind driven snow and rain or dust from entering the roof space (see BS 5534).

Underlay laps should be covered by a batten and, where necessary, the lap of the underlay adjusted to coincide with the nearest slating or tiling batten (see 5.2.3). Laps may also be sealed using proprietary means in accordance with manufacturers' instructions.

5.1.2 Boarding and sarking

The fully supporting boards or sarking should be dry.

The underlay may be laid and fixed either over or under the counterbattens (depending on the specification).

Where boarding is required for curved roofs, swept valleys or curved dormers the underlay should be laid onto the rafters under the boarding to eliminate the need for counterbattens and battens, the slates or tiles being fixed direct to the boards.

NOTE In traditional Scottish slating, practice slates are laid over the underlay and nailed directly into sarking boards.

5.1.3 Eaves

If the underlay types are suitable for external exposure they should be laid directly into the gutter. If they are not suitable for external exposure, then a strip of external grade (UV resistant) underlay or proprietary underlay support trays should be used at the eaves. Where this is the case, the first course of underlay should be laid to maintain the necessary laps and leave the lower edge set back from exposure above the gutter.

No trough should be formed behind the fascia board and a support should be provided for the underlay to prevent any collection of water. The underlay should allow any water reaching it to freely drain into the eaves gutter.

NOTE Where a proprietary eaves fascia ventilator is specified, special detailing of the underlay might be recommended by the manufacturer.

5.1.4 Verge

The underlay should be laid or cut neatly onto the outer skin of the wall, or onto the flying rafter in the case of an overhanging verge.

NOTE Where proprietary verge tiles or dry verge systems are specified, special detailing of the underlay might be recommended by the manufacturer.

5.1.5 Ridge

5.1.5.1 Duopitch ridge

The top courses of underlay should be overlapped.

5.1.5.2 Monopitch ridge

The top course of underlay should be laid or cut and fixed about 100 mm over the top fascia board.

5.1.5.3 Vented ridge

Where specified, the top edge of the underlay should be laid and fixed down from the apex by the required distance.

NOTE Where proprietary ventilating ridge tiles or dry ridge systems are specified, special detailing of the underlay might be recommended by the manufacturer.

5.1.6 Hip

The underlay should be overlapped across the hip by the specified amount.

Excessive thickness of underlay at hips should be avoided. Roof structures should include a continuous member at hips to which the underlay can be fixed.

5.1.7 Valley

Lay boards to support valley linings should be fixed beneath the underlay between the rafters or counterbattens to finish flush with the tops of the rafters.

Other than for sheet metal valleys, a continuous strip of underlay should be laid down the valley and should overlap the underlay at the sides by no less than 300 mm.

On continuously supported valley linings, such as lead and other metals, the underlay should be cut to rake and lap onto the valley lining by no less than 50 mm but not beyond the tilt fillet.

In the case of mitred valleys or purpose made plain tile valley tiles, the adjacent underlays should be brought into the centre of the valley to create a double layer.

Punctures should be avoided in the valley underlay and any fixings within 100 mm of the centre line.

Continuously supported metal valleys, e.g. lead, should not be laid directly on to bituminous underlays, as melting, which results in sticking, might lead to a deterioration of the metal valley lining. Lay boards should not interrupt the roof covering alignment.

5.1.8 Abutments

5.1.8.1 Side/front abutment

The underlay should be turned up the abutment so that the top edges are covered by the flashings by no less than 50 mm.

5.1.8.2 Back abutment

The underlay should be dressed or cut neatly to provide not less than a 100 mm overhang into the back gutter (see 5.1.3 for exposure recommendations).

5.1.9 Underlay penetrations

Any penetrations through the underlay should be protected from water ingress, where specified, using tapes or proprietary seals in accordance with manufacturers' instructions.

Where proprietary ventilation units and similar products are specified, the manufacturer's sitework instructions should be followed.

5.2 Battens and counterbattens

5.2.1 General

The battens and counterbattens should conform to BS 5534 and should be of specified size and marked with the supplier's name, size, grade, species and "BS 5534".

If a preservative treatment is used, it should be checked that it is of the correct type or has environmental accreditation, e.g. FSC or PEFC.

NOTE Unmarked battens or battens not marked with the full information given above will not conform to BS 5534. They could pose a health and safety risk and might be inadequate for fixing requirements.

5.2.2 Setting out

The roof should be set out carefully using the eaves tilt datum to ensure that minimum cutting of slates and tiles is necessary and the horizontal lines of the courses are regular and true.

The eaves or bottom course batten should be set to provide the required overhang into the gutter or over the tilting fillet.

The top course batten should be set to allow the required overlap by ridge tiles or flashing.

For variable gauge tiling, the distance between the top of the eaves batten to the top of the top batten should be divided to give an equal batten gauge not greater than that specified for the product used.

It might be necessary to retain the gauge calculated for the main roof slopes onto projecting roof slopes. Where two roof slopes of varying pitch intersect, the batten gauge should be set out to the lower roof pitch.

For fixed gauge tiling, the shunt available should be assessed prior to setting out the battens.

For single sized slating, battens should be fixed to provide a headlap not less than that specified.

For random (diminishing courses) slating, the batten gauges should be adjusted where necessary to ensure that the margins do not show an increase upwards at any part of the roof slope and that the specified head lap is achieved.

5.2.3 Fixing

Where the roof width allows, battens not less than 1.2 m long should be fixed to each rafter or support in straight lines to the calculated gauge parallel with the ridge or top course or at right angles to the line of drainage.

All joints should be square-cut and butted centrally on the supports. Each batten end should be splay nailed.

Battens should be fixed to each rafter, using the specified type and size of fixings.

For trussed rafter roofs where the batten gauge is greater than 200 mm, batten joints should be staggered at a ratio of no more than one in four courses on the same support.

For trussed rafter roofs where the batten gauge is less than 200 mm, batten joints should be staggered at a ratio of no more than three joints in twelve courses on the same support.

On rafter and purlin roofs occasional batten joint staggers should be used.

NOTE When there are other roof or vertical details such as chimneys or windows, etc. it might be necessary to gauge out the battens to suit each of the fixed points. Equal batten gauges are important with high profiled tiles to avoid distorted diagonal lines.

Underlay laps should be covered by a batten and, where necessary, the lap of the underlay adjusted to coincide with the nearest slating or tiling batten. Additional battens between courses should be avoided, as these can cause trip hazards and loading issues. Underlay laps may also be sealed using proprietary means in accordance with manufacturers' instructions.

5.2.4 Counterbattens

5.2.4.1 Roof

The specified counterbattens should be fixed up the roof slope directly over the rafters or alternative structural member.

5.2.4.2 Wall

The specified counterbattens should be fixed to the boarding/sheathing/sarking in line with vertical supports or to the masonry wall as specified.

The counterbattens should be secured to masonry walls using timber pads built into the mortar joints, or directly into the masonry with plugs and screws or other appropriate fixings.

Battens should be fixed to counterbattens secured to the wall using appropriate fixings and not directly fixed to brick or blockwork. Fixings used to secure counterbattens and battens to proprietary roof decks or panels should be able to provide adequate resistance to wind uplift and shear loads (see BS 5534).

5.3 Verge undercloak

The edge of the battens should be finished 25 mm to 50 mm from the outer edge of the undercloak with the pretreated ends at the verge or, if cut, treated with a suitable preservative.

The undercloak should be installed under the battens, and above or below the underlay as specified.

On masonry walls, the undercloak should be bedded on mortar or mastic.

On timber rafters/bargeboards, the undercloak should be fixed securely to the rafters with clout nails.

The undercloak should be no less than 150 mm wide and should be formed from plain tiles, fibre-cement or natural slate.

Where plain tiles are used as an undercloak they should be laid face down.

The undercloak should overhang the verge 38 mm to 50 mm for slate and plain tile roofs.

For single lap tiles on a verge to verge roof, the undercloak should overhang the verge 30 mm to 60 mm to aid setting out and reduce cutting.

Plain tiles should not be used on timber bargeboard construction. The undercloak should be positioned not to tilt inwards towards the roof.