HSS compliance – roof issues and moisture

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2025

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Contents

- Introduction
- HSS1 and HSS 2 requirements
- Some other benchmark standards
- Structural considerations in traditional roof structures
- Drones and camera poles
- Conclusions

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Learning objectives

- Consider some of the possible changes in the RICS HSS regarding roofs and moisture;
- Understand some of the structural 'rules' that can be applied to roof timbers;
- Consider and practice how some of those rules can be used in the real world.

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Group discussion

What sort of pitched roof issues do we typically find in a residential property in the UK and how do we assess them?

4

4

Group discussion

What sort of pitched roof issues do we typically find in a residential property in the UK and how do we assess them?

FEEDBACK

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Roof space

Survey level	Description
General	The RICS member will carry out an inspection of roof space that is not more than three metres above floor level, using a ladder if it is safe and reasonable to do so. Energy efficiency initiatives have resulted in thick layers of thermal insulation in many roof spaces. Usually it is not safe to move across this material as it conceals joist positions, water and drainage pipes, wiring and other fittings. This may restrict the extent of the inspection and the scope of the report. Consequently, this matter should be discussed with the client at the earliest stage.
Survey level one	The RICS member will not remove secured access panels and/or lift insulation material, stored goods or other contents. The RICS member will visually inspect the parts of the roof structure and other features that can be seen from the access hatch.
Survey level two	In addition to that described for level one, the RICS member will enter the roof space and visually inspect the roof structure with attention paid to those parts vulnerable to deterioration and damage.
Survey level three	The RICS member will enter the roof space and visually inspect the roof structure, with attention paid to those parts vulnerable to deterioration and damage. Although thermal insulation is not moved, small corners should be lifted so its thickness and type, and the nature of the underlying ceiling can be identified (if the RICS member considers it safe to do so). Where permission has been granted and it is safe, a small number of lightweight possessions should be repositioned so a more thorough inspection can take place.

RICS professional statement

RICS

RICS professional standards and guidance, UK

Home survey standard

1st edition, November 2019

rics.org/guidance

HSS1 guidance for roofs inside

Appendix B: Benchmarking the levels of inspection

This appendix highlights a number of different elements in a typical property where the differences between the inspection levels are illustrated. This is not a comprehensive listing of what is or is not inspected. Instead, it provides critical benchmarks around which an RICS member's service can be built.

In all other respects, the RICS member should inspect all parts of the property appropriate to the level of service agreed with the client and the nature of the property.

Please note Home Report Scotland variations apply. Refer to the current edition of *The Home Report, Scotland*, RICS guidance note.

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Safety hazards

Survey level	Description
General	The RICS member will carry out an inspection of roof space that is not more than three metres above floor level, using a ladder if it is safe and reasonable to do so. Energy efficiency initiatives have resulted in thick layers of thermal insulation in many roof spaces. Usually it is not safe to move across this material as it conceals joist positions, water and drainage pipes, wiring and other fittings. This may restrict the extent of the inspection and the scope of the report. Consequently, this matter should be discussed with the client at the earliest stage.

How to deal with this?

How to deal with this?

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Safety hazards

Survey level	Description
General	The RICS member will carry out an inspection of roof space that is not more than three metres above floor level, using a ladder if it is safe and reasonable to do so. Energy efficiency initiatives have resulted in thick layers of thermal insulation in many roof spaces. Usually it is not safe to move across this material as it conceals joist positions, water and drainage pipes, wiring and other fittings. This may restrict the extent of the inspection and the scope of the report. Consequently, this matter should be discussed with the client at the earliest stage.

Should the likelihood of this issue be dealt with in the ToE?

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Appendix A: Benchmarking the levels of inspection

A3 Safety, access and restrictions to inspection

Energy efficiency initiatives have resulted in thick layers of thermal insulation in many roof spaces. It is usually not safe to move across this material as it conceals joist positions, water and drainage pipes, wiring and other fittings. This may restrict the extent of the inspection and the scope of the report. Consequently, this matter should be discussed with the client at the earliest stage, be included in the terms of engagement and included in the report. Flat roof structures are usually inaccessible, although some information can sometimes be seen or deduced (e.g. where an accessible roof space abuts an adjoining flat roof). Parts of other elements are often visible in roof spaces, e.g. gable or party walls, chimney breasts and services – these are usually reported under each element.

Tell the client up-front in the ToE about the current limitations to roof inspections in 80% of roof spaces

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Roofs internal

Level of Service	Parts usually inspected & minimum level of inspection
General	Type and nature of parts, materials (e.g. timber, metal, concrete composite), construction form (e.g. pitched, flat, trussed, 'cut' roof, 'A' frame, panel), lateral restraint, bracing, underside of roof covering including underlay (usually reported in 'roofs external'), ventilation, insulation, storage and access alterations. The RICS member will carry out an inspection of any reasonably accessible roof space that is no more than three metres above floor level, using a ladder. See Section A6 of this appendix for flats, tenements and similar dwellings. Flat roof structures are usually inaccessible, although some information can sometimes be seen or deduced (e.g. where an accessible roof space abuts an adjoining flat roof). Parts of other elements are often visible in roof spaces, e.g. gable or party walls, chimney breasts and services – these are usually recorded under each element.
Level 1	Visual inspection ('head and shoulders') from access hatch only. The RICS member will not remove secured access panels and/or lift insulation material, stored goods or other contents. Check moisture levels of accessible timbers. The RICS member will not usually enter any roof void at this Level.
Level 2	As Level 1, including entering the roof space, paying particular attention to vulnerable locations prone to deterioration and damage, or visibly affected by damp and deterioration. Check moisture levels of an identified small sample of timbers and the functionality of the roof frame. Thermal insulation and stored items are not moved or lifted at this level.
Level 3	As Level 2, including entering all reasonably accessible parts of the roof space, with attention paid to all parts including wall plates where safe to do so and/or applicable. Check dimensions of main parts as necessary (e.g. rafters, purlins, joists, principal trusses). Check moisture levels of an identified larger sample of timbers than at Level 2. Corners of insulation should be lifted so its thickness and type (and the nature of the underlying ceiling) can be identified. A small number of lightweight possessions should be repositioned, if necessary, so a more thorough inspection can take place.

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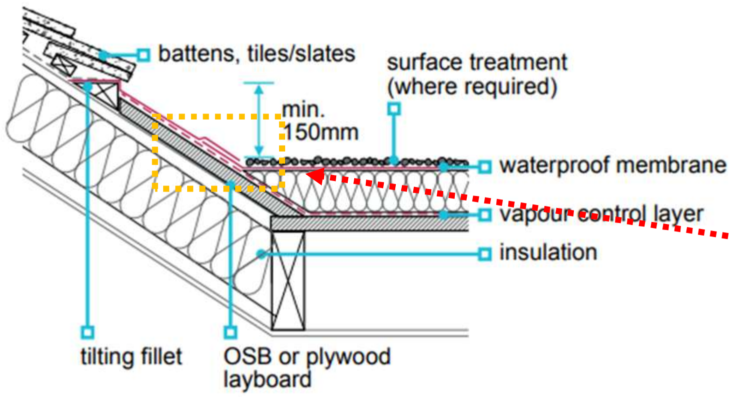
Flat roofs, terraces and balconies | 2024

Chapter 7.1

Pitched roof abutment

Good source of benchmarks of good practice



Important to ensure the lap is correct

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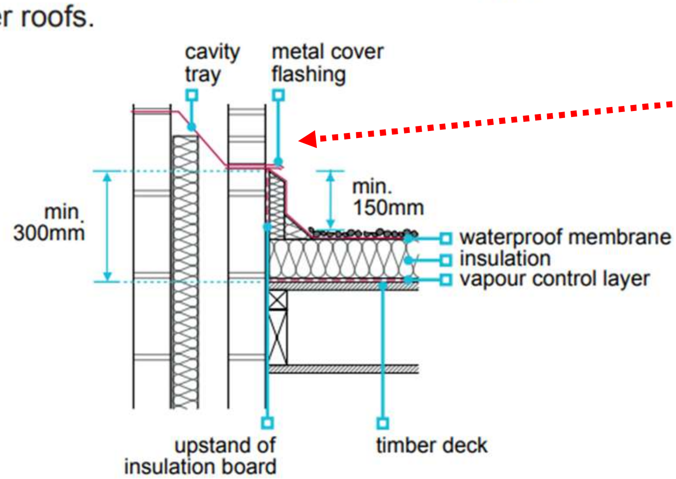
Independent skirting detail

Upstand should be kept separate from wall, and allow for movement. Upstand should be a minimum of 150mm high above surface finish. Similar details apply to cold deck timber roofs.



Any cavity tray should have weep holes

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Figure 2: Traditional roof members

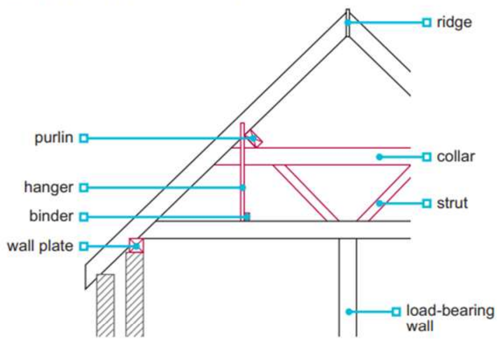
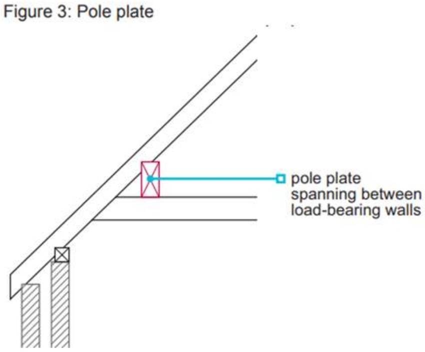


Figure 3: Pole plate

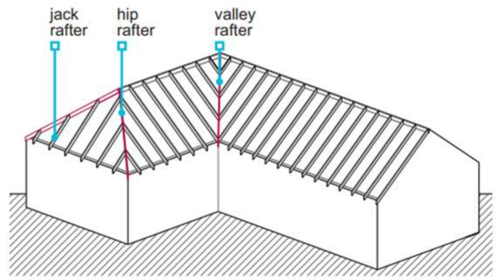


Generally sizes should be as Table 3, unless designed by an engineer in accordance with Technical Requirement R5.

Table 3: Typical sizes for timber members

Member	Minimum size
Struts	100mm x 50mm
Valley rafter	32mm thick
Ridges and hips	Rafter cut + 25mm

Figure 4: Types of rafter



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Hipped roof joints

Angle ties should be used at the corners of hipped roofs to prevent the wall plates from spreading.

Where hip rafters are heavily loaded, eg carrying purlins, they should be jointed using dragon ties, or similar, to prevent the hip rafter spreading.

Figure 10: Angle tie

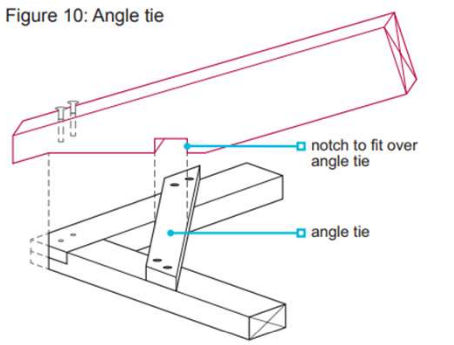


Figure 11: Dragon tie

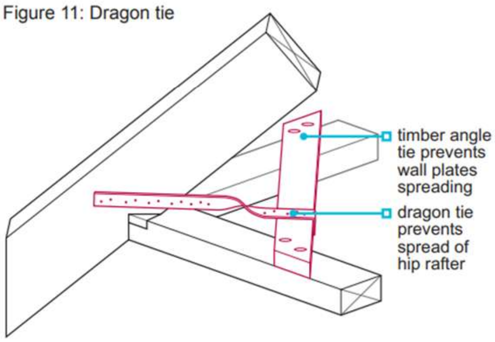
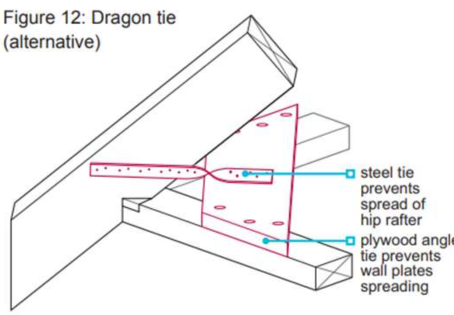


Figure 12: Dragon tie (alternative)



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The further north is the property and the taller it is, the stronger is the wind

7.2.8 Restraint

Also see: Chapter 6.

Adequate restraint shall be provided to support the structure, distribute roof loads and prevent wind uplift. Strapping shall be of adequate strength and durability, and fixed using appropriate fixings.

Restraint straps, or a restraining form of gable ladder, should be used where required to provide stability to walls, and be installed in accordance with the design.

Lateral restraint straps should be located:

- for homes up to and including three storeys (two storeys in Scotland), at a maximum spacing of 2m
- for homes four storeys (three storeys in Scotland) or over, fixed at a maximum spacing of 1.25m.

Lateral restraint straps should be fixed to the roof structure by either:

- fixing to solid noggings using a minimum of four 50mm x 4mm steel screws or four 75mm x 4mm (8SWG) round nails, with one fixing in the third rafter (Figure 15), or
- fixing to longitudinal bracing members using eight 25mm x 4mm steel screws evenly distributed along the length of the strap (Figure 16). Alternatively, 100mm x 25mm timber members, fixed over four trusses and nailed in accordance with Clause 7.2.9 can be used where the position of the strap does not coincide with a longitudinal binder.

Good fixings, not plasterboard nails!

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7.2.12 Access

This is current best practice

Also see: Clause 7.2.15

Roof voids shall be provided with suitable access.

Access to roof voids should be provided to allow for periodic inspection, maintenance and removal of permanent equipment.

Access should:

- be provided to the main roof space and to voids which contain permanent equipment (eg heating, water storage, energy producing and ventilation equipment, etc), service connection boxes or connection points for TV aerials, etc
- permit the removal of permanent equipment located in the roof space
- have a minimum opening width of 520mm in each direction
- not be located directly over stairs or in other hazardous locations
- include securely fixed boarded walkways between the opening and the permanent equipment and at each piece of permanent equipment, a minimum 1m² platform should be provided to facilitate maintenance
- boarded walkways and working platforms should be securely fixed with a minimum clearance of 50 mm between the top of the insulation and the underside of the walkway to ensure a clear ventilation space.

Access may not be required where a void does not contain any permanent equipment, service connection boxes or connection points for TV aerials, etc where:

- the main roof consists of only a small void below the ridge where the raised collar is less than 2m in length
- roof cassette systems are used in forming room-in-roof and the length of the raised collar is over 2m and the floor to ceiling dimension below the ceiling is over 2.4m
- small voids are present in the eaves (including those which contain water pipes only).

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Good insulation in the roof helps prevent excessive heat loss in winter and warming of habitable rooms such as bedrooms in the summer. However, **the existing depth of the insulation in the roof means the timbers (called 'joists') that support the ceilings underneath have been covered.** This can be a problem later when work-people such as plumbers, electricians and roofers need to get into the roof space and get access to parts of the property that need repair or maintenance. Many work-people will refuse to get into such a roof for safety reasons. This means maintenance does not get done and can also mean emergency work may not get done as quickly as is required. This is particularly important in a property such as this, with smoke detectors, electrical installations and sometimes complicated plumbing and heating systems that can in part only be accessed through the roof. [*amend or alter as required*] **I therefore recommend you consider installing a permanent access walkway fixed to the joists now / soon.** [*delete*] The best position for such a walkway is usually under the highest part of the roof, i.e. the top of the roof (called the 'ridge') at least and sometimes more extensive access is required. In this property, more extensive access walkways are required due to the size and shape of the property. [*delete and or alter as required*]

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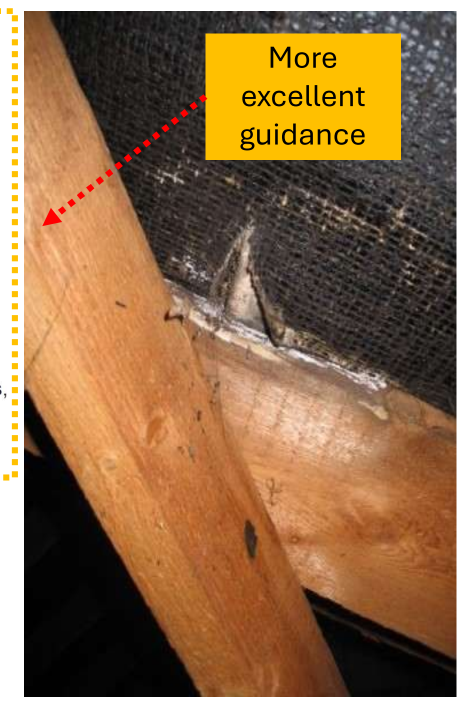
eurocode 5 span tables
for solid timber members in floors, ceilings and roofs for dwellings

4th edition



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3 Design Considerations

A superb source of information – buy it!

eurocode 5 span tables
for solid timber members in floors, ceilings and roofs for dwellings

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Notches should be not deeper than the lesser of 0.125 times the depth of a joist or 35mm, and should not be cut closer to the support than 0.07 of the span, nor further away than 0.25 times the span. Each end of the joist may be edge notched at either the top edge or the bottom edge.

Holes should have a diameter not greater than 0.25 times the depth of a joist or 65mm, whichever is smaller, and should be drilled at the joist centreline. They should be not less than 3 diameters (centre to centre) apart and should be located between 0.25 and 0.4 times the span from the support.

Drilled holes and edge notches in the same beam that comply with the above paragraphs must be horizontally separated by at least 100mm of full section.

Notches or holes should not be cut in rafters, purlins or binders unless approved by the building designer.

Rafters restrained by ceiling ties at eaves level may be birdsmouthed at supports to a depth not exceeding one third of the rafter depth.

Timber herringbone strutting should be at least 38 x 38mm but should not be used where the distance between joists is greater than 3 times their depth.

Solid blocking should be at least 38mm thick.

Strutting and blocking should extend at least three-quarters of the joist depth.

At each end of a row of strutting the outer joist should be blocked solidly at the perimeter wall.

The minimum bearing length at supports for ceiling joists should be 35mm and binders should be 60mm. However, it is normal for ceiling joists to run across at least the full width of the wallplate to accommodate the fixings between ceiling joist and rafters. Where longer bearing is required due to high bearing stresses, typically for larger sections, it is indicated in the tables by shading.

Unless justified by specialist calculation, the minimum bearing length at supports should be 35mm for rafters and 80mm for purlins. However it may sometimes be necessary to provide longer bearing for

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Weights (loads) of materials

- Plain clay tiles at 100mm gauge – 77.00 kg/m^2
- Single clay pantile at 315mm gauge – 42 kg/m^2
- Concrete tile – double roman at 343mm gauge – 45 kg/m^2
- Flat concrete tiles at 355mm gauge – 51 kg/m^2
- Best slate, 4mm thick – 31.00 kg/m^2
- Medium strong slate, 5mm thick – 35.00 kg/m^2

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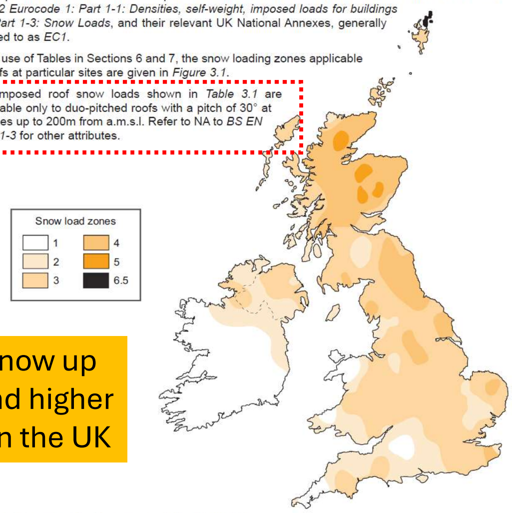
The imposed loads indicated in the span tables have been derived in accordance with *BS EN 1991-1-1:2002 Eurocode 1: Part 1-1: Densities, self-weight, imposed loads for buildings* and *Part 1-3: Snow Loads*, and their relevant UK National Annexes, generally referred to as *EC1*.

In the use of Tables in Sections 6 and 7, the snow loading zones applicable to roofs at particular sites are given in *Figure 3.1*.

The imposed roof snow loads shown in *Table 3.1* are applicable only to duo-pitched roofs with a pitch of 30° at altitudes up to 200m from a.m.s.l. Refer to NA to *BS EN 1991-1-3* for other attributes.



More snow up north and higher we are in the UK

Figure 3.1 Snow roof loading zones – derived from EC1

Table 3.1 Snow roof loads for the zones defined in Figure 3.1

Zone	Imposed roof snow loads (kN/m²)	
	Altitudes not exceeding 100m	Altitudes not exceeding 200m
1	0.36	0.59
2	0.48	0.71
3	0.60	0.83
4	0.72	0.95
5	0.84	1.07
6.5	1.02	1.25

eurocode 5 span tables for solid timber members

3.0 Design considerations

3.1 Loading

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THICKNESS OF WALLS IN CERTAIN SMALL BUILDINGS **A1/2**

Diagram 6 **Map showing wind speeds in m/s for maximum height of buildings**

See para 2C16

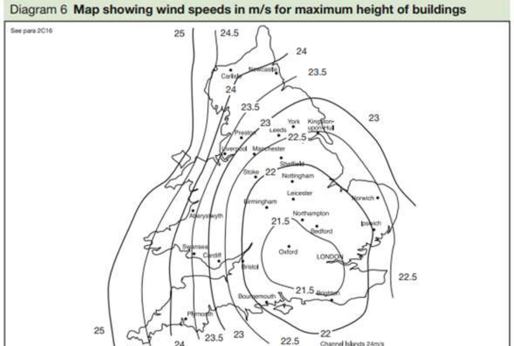

Figure 1 Map of wind speeds (V) in m/s

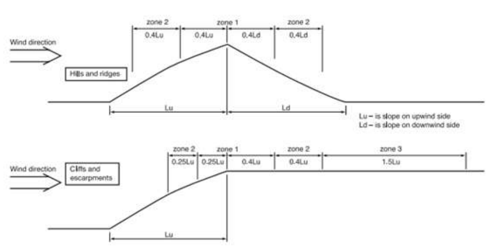

Figure 2 Orographic zones for Factor O

Note: A more detailed approach for obtaining Factor O is given by Figure 3 Diagram 6.

THICKNESS OF WALLS IN CERTAIN SMALL BUILDINGS **A1/2**

Diagram 7 **Maximum height of buildings**

Read map wind speed V from Figure 1 Diagram 6 → Find the orographic zone for the site from Figure 2 Diagram 6 and obtain Factor O from **Table a** (or use Figure 3 Diagram 6) → Obtain value of Factor A from **Table b** → Calculate value of Factor S from: S = V × O × A → Obtain maximum allowable building height from **Table c**

Table a Factor O

Orographic category and average slope of whole hillside, ridge, cliff or escarpment	Factor O Zone 1	Zone 2	Zone 3
Category 1: Nominally flat terrain, average slope < 1/20	1.0	1.0	1.0
Category 2: Shallow terrain, average slope < 1/10	1.12	1.07	1.05
Category 3: Moderately steep terrain, average slope < 1/5	1.24	1.13	1.10
Category 4: Steep terrain, average slope > 1/5	1.36	1.20	1.15

Table b Factor A

Site altitude (m)	Factor A
0	1.00
50	1.05
100	1.10
150	1.15
200	1.20
300	1.30
400	1.40
500	1.50

Table c Maximum allowable building height in metres

	Country sites			Town sites		
Factor S	Distance to the coast < 2km	2 to 20km	> 50km	Distance to the coast < 2km	2 to 20km	> 50km
≤ 25	15	15	15	15	15	15
26	11.5	13.5	15	15	15	15
27	8	11	14.5	15	15	15
28	5.5	8	11	15	15	15
29	4	6.5	8.5	12.5	15	15
30	3	5	6.5	10	12.5	15
31		4	5.5	8.5	11	13.5
32		3.5	4.5	7	9.5	11.5
33		3	3.5	6	8	10
34			3	5.5	7	7.5
35				4.5	6.5	7.5
36				4	5.5	6.5
37				3.5	5	6
38				3	4.5	5.5
39					4	5
40					3.5	4.5
41					3	4
42						3.5
43						3.5
44						3

Notes: Table a – Outside of the zones shown in **Table a**, Factor O = 1.0.
Table b – For elevated sites where orography is significant a more accurate assessment of Factor A can be obtained by using the altitude at the base of the topographic feature instead of the altitude at the site, see Figure 2 Diagram 6 or, alternatively, Figure 3 Diagram 6.
Table c – i) Sites in town less than 300m from the edge of the town should be assumed to be in country terrain.
ii) Where a site is closer than 1km to an inland area of water which extends more than 1km in the wind direction, the distance to the coast should be taken as < 2km.
Interpolation may be used in **Tables b** and **c**.

BRAD 'A'

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Propensity to suffer from wind – based on BRAD 'A'

- The higher the property is, the greater is the wind;
- Properties within 10k of the coast are subjected to more wind;
- Properties on slopes and in hilly locations are subjected to more wind ('roughness factor');
- Properties in 'town' locations suffer from less wind as compared with 'country' locations

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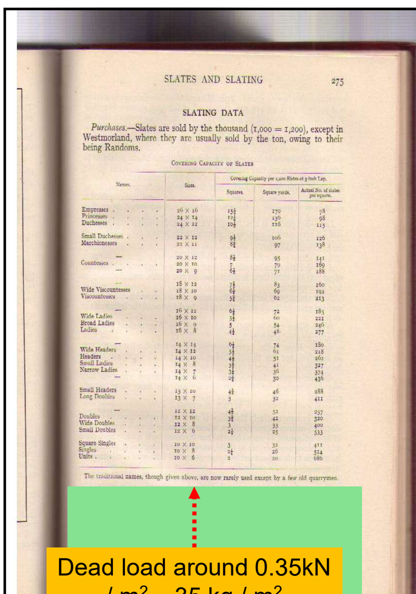

SLATES AND SLATING 275

SLATING DATA

Purchases.—Slates are sold by the thousand (1,000 = 1,200), except in Westmorland, where they are usually sold by the ton, owing to their being Randoms.

COVERING CAPACITY OF SLATES

Names.	Sizes.	Covering Capacity per 1,200 Slates at 3-inch Lap.		
		Squares.	Square yards.	Actual No. of slates per square.
Empresses	26 × 16	15½	170	78
Princesses	24 × 14	12¼	136	98
Duchesses	24 × 12	10½	116	115
Small Duchesses	22 × 12	9¼	106	126
Marchionesses	22 × 11	8¾	97	138
—	20 × 12	8½	95	141
Countesses	20 × 10	7	79	169
—	20 × 9	6½	71	188
—	18 × 12	7½	83	160
Wide Viscountesses	18 × 10	6¼	69	192
Viscountesses	18 × 9	5¾	62	213
—	16 × 12	6½	72	185
Wide Ladies	16 × 10	5½	60	221
Broad Ladies	16 × 9	5	54	246
Ladies	16 × 8	4½	48	277
—	14 × 14	6¾	74	180
Wide Headers	14 × 12	5½	61	218
Headers	14 × 10	4⅝	51	262
Small Ladies	14 × 8	3¾	41	327
Narrow Ladies	14 × 7	3¼	36	374
—	14 × 6	2¾	30	436
Small Headers	13 × 10	4½	46	288
Long Doubles	13 × 7	3	32	411
—	12 × 12	4¾	52	257
Doubles	12 × 10	3¾	42	320
Wide Doubles	12 × 8	3	33	400
Small Doubles	12 × 6	2¼	25	533
Square Singles	10 × 10	3	32	411
Singles	10 × 8	2½	26	514
Units	10 × 6	2	20	686

The traditional names, though given above, are now rarely used except by a few old quarrymen.

Three basic roof coverings and their loads

Dead load around 0.80kN / m^2 – 80 kg / m^2

Dead load around 0.35kN / m^2 – 35 kg / m^2

Dead load around 0.55kN / m^2 – 55 kg / m^2

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3.6.4 Recording all reasonably available information

The RICS member or RICS-regulated firm **must** keep a record of the inspection of the property and local area (traditionally known as 'site notes') for as long as is legally required. The RICS member or RICS-regulated firm **must** ensure that the information is in a format to allow for subsequent reflection before and during preparation of the report for the client. See sections 3.1 and 3.7.

The amount of recorded information will depend on the Level of Service but **must** include all information relevant to the instruction. Examples include:

- any material information and other relevant information obtained from the vendor, occupier, agent, neighbours or others
- the form of construction and materials, condition, defects, deficiencies, personal hazards, risks to the property, legal issues, any other matter(s) where relevant to the Level of Service and circumstances of inspection (including any limitations)
- the nature, position and results of checks (e.g. moisture meter or spirit level readings) made to the fabric, structure and other parts as necessary (e.g. building services) and what was found – see Fryer v Bunney (1982) 2 EGLR 130
- appropriate dimensions (e.g. thickness of walls or timber sizes) and diagrams (e.g. a sketch of an elevation with damage and crack patterns), sketch plans (e.g. a plan of the site, or annotated floor plans) – also see section 5.3
- any images captured during the inspection –photographs and videos are helpful for reflection during preparation of the report but are supplementary to the process and **must not** be used as an alternative or a substitute for the physical inspection that the signatory of the report **must** carry out.

Level 2 Services on additional risk properties and all Level 3 Services will include more detailed assessments of the property when compared with a typical Level 2 Service for a conventional property – the amount of recorded information will therefore be greater.

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Why we look for moisture – Fryer v Bunney [1982] 2 EGLR 130

- The defendant, in carrying out a building survey of a residential property, reported that it had been checked with a damp meter and that there was no evidence of damp. Soon after purchase, when the property was being redecorated, it was discovered that water was leaking from defective central heating pipes under the hall floor. The defendant was held negligent for not having made more use of the damp meter and thus discovering this dampness, which was not discoverable by sight or touch.
- Although the survey report indicated that a meter had been used, there were no records of any readings for parts of the house. It was shown that if sufficiently extensive readings been taken, the damp would have been shown;
- Newey J was sympathetic to the defendant surveyor, despite his finding of negligence : '*I am quite sure he did not deliberately decide to skimp his work. I am quite sure he did not say to himself that day: 'Well, I will save myself 10 minutes, a quarter of an hour or half an hour by not checking with the Protimeter the inside walls.' I am sure he did not do that. I think this is one of those cases of a man doing a job of a standard type perhaps too frequently.*'

This case means all surveyors must record where they take readings and what the results are

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Why and how we look for moisture

- '*Framework that can be used for moisture investigations in buildings of all ages and types*' – pp 3;
- '*assumes that a non-invasive inspection will be undertaken initially*' – pp 3;
- '*only suggest remedial works that are proportionate to to any defects discovered and respect the nature of the property*' – pp 3;
- '*build a holistic picture of the building…including…construction date…materials and techniques…setting elevation, wind exposure, flooding etc.)…alterations…use…condition*' – pp 5 – 6;
- '*Understand the differences between modern and traditional construction*' – pp 6;

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Why and how we look for moisture

- '*traditional building fabrics may be subject to seasonal fluctuations/cycles*' – pp 9;
- '*Understand the reasons for surface mould and condensation in buildings*' – pp 11;
- '*Understand the significance of salts in assessing moisture problems…how such salts can damage building materials*' – pp 11;
- '*Be able to conduct a thorough inspection…to enable assessment of its condition…including above- and below-ground water supply services*' – pp 12;
- '*Provide a holistic diagnosis that identifies and deals with causes, rather than focusing on symptoms…dealing with damp is often a staged process…obvious defects first…period for monitoring…reassess before moving on to other treatments*' – pp 13;
- '*remedial works…must be proportionate to the defect and significance of the building*' – pp 13.

Sometimes, or often, a quick fix isn't the answer

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How accurate are 'moisture' meters?

In relation to measuring these moisture levels in buildings, the main problem facing residential practitioners is that moisture meters cannot accurately measure the moisture content of all building materials. As a consequence, manufacturers calibrate their meters to measure the moisture content of one material only – timber. This is because timber is a reasonably consistent material and the probes of a conductivity meter can usually be pushed by a few millimetres below the surface into the timber itself. A number of leading commentators agree that the readings give a reasonably accurate measure of the actual moisture content in that timber component in percentage terms. However, Ridout and McCaig (2016) found that conductivity meters are only accurate at lower moisture contents. His research revealed that for moisture contents in excess of 22%, the accuracy of moisture meters 'diminishes considerably'.

The Timber Research and Development Association also confirmed this view. They stated that when used in timber, most of the moisture meter readings will be within plus or minus 2% of the true moisture content within the range of 8 and 25%. Outside of this range, TRADA says the readings should be viewed as indicative only (TRADA 1999). This will be discussed again in the chapter on wood rotting fungi

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So what does this mean for the residential practitioner? Here are our recommendations for conductivity moisture meters:

- **For timber components** – Where you are able to press the pins of the meter a few millimetres into the timber, the percentage values shown on the LED are likely to be close to the actual moisture content of the timber. However, where moisture levels are higher (say 24–26% and more), the accuracy of the meter is likely to reduce, so use these values with care;
- **For all other building materials** – Even if you are able to press the pins of the meter below the surface of the material, the figures shown will bear no relation to the actual moisture content. In these cases, record the colour of the LED lights on the read-out panel in your site notes.

In both cases, the information provided by a moisture meter does **NOT** provide you with a diagnosis of the moisture problem. Instead, the readings can provide you with useful data that can be combined with other information to enable you to come to a more balanced judgement. In many circumstances, higher moisture meter readings will be the start of the 'following the trail' process.

30

6.1 Rafters and purlins supporting rafters

TRADA guidance enables surveyors to consider traditional roofs and how they perform in practice

Checking timber sizes and spacings is important

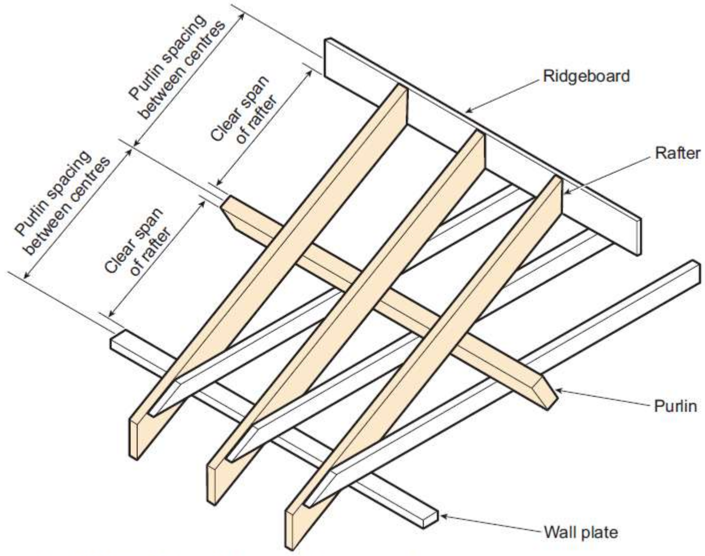

Figure 6.1 Typical rafters and purlin arrangement

31

3rd edition

Snow load in kN / m²

Dead load in kN / m², this column for loads 50 – 75 kg / m²

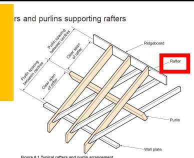

Table 6.17 Permissible clear spans for single-span common or jack rafters

Slope of roof 30.0° or more but less than 45.0° Imposed load q_k = 0.60 kN/m² or Q_k = 0.90 kN

Strength Class C16 Service Class 1 or 2

eurocode 5 span tables
for solid timber members in floors, ceilings and roofs for dwellings

Size of rafter		Dead loads g_k (kN/m²) excluding self-weight of rafter								
		g_k not more than 0.5			g_k not more than 0.75			g_k not more than 1.00		
		Spacing of rafters (mm)								
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600
		Maximum clear span (m)								
38	100	1.83	1.80	1.73	1.73	1.69	1.61	1.65	1.61	1.52
38	125	2.45	2.40	2.29	2.29	2.24	2.12	2.17	2.12	1.99
38	150	3.08	3.02	2.87	2.87	2.80	2.64	2.71	2.64	2.47
38	195	4.24	4.15	3.92	3.92	3.82	3.57	3.67	3.57	3.33
44	100	1.95	1.92	1.84	1.84	1.81	1.72	1.76	1.72	1.62
44	125	2.61	2.56	2.44	2.44	2.39	2.26	2.31	2.26	2.12
44	150	3.28	3.21	3.05	3.05	2.98	2.80	2.87	2.80	2.62
44	195	4.49	4.39	4.14	4.14	4.04	3.78	3.89	3.78	3.52
47	100	2.01	1.98	1.90	1.90	1.86	1.77	1.81	1.77	1.67
47	125	2.68	2.63	2.51	2.51	2.46	2.32	2.38	2.32	2.18
47	150	3.37	3.30	3.13	3.13	3.06	2.87	2.95	2.87	2.69
47	195	4.61	4.51	4.25	4.25	4.14	3.88	3.99	3.88	3.61
ALS/CLS										
38	100	1.83	1.80	1.73	1.73	1.69	1.61	1.65	1.61	1.52
38	140	2.83	2.77	2.64	2.64	2.58	2.43	2.49	2.43	2.28
38	184	3.96	3.87	3.66	3.66	3.57	3.34	3.44	3.34	3.12

Nominal bearing of 35mm to be doubled - See para 6.1.11

C16

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Effectively this is the distance from wallplate to purlin or purlin to ridge

6.1 Rafters and purlins supporting rafters

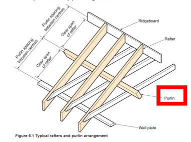

Table 6.19 Permissible clear spans for purlins supporting single-span raft

Slope of roof 30.0° or more but not more than 45.0° Imposed load q_k = 0.60 kN/m² or Q_k = 0.90 kN

Strength Class C16 Service Class 1 or 2

Size of purlin		Dead loads g_k (kN/m²) excluding self-weight of purlin																	
		g_k not more than 0.5						g_k not more than 0.75						g_k not more than 1.00					
		Spacing of purlins (mm)																	
B'dth (mm)	D'pth (mm)	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
		Maximum clear span (m)																	
63	150	2.43	2.28	2.15	2.05	1.96	1.80	2.23	2.09	1.97	1.85	1.64	1.47	2.08	1.95	1.79	1.56	1.38	1.24
63	175	2.83	2.66	2.51	2.39	2.29	2.10	2.60	2.44	2.30	2.15	1.91	1.72	2.43	2.27	2.09	1.82	1.61	1.45
63	200	3.23	3.03	2.87	2.73	2.62	2.40	2.97	2.78	2.63	2.46	2.18	1.96	2.77	2.59	2.38	2.08	1.84	1.65
63	225	3.63	3.41	3.22	3.07	2.94	2.70	3.34	3.13	2.96	2.76	2.45	2.20	3.12	2.91	2.67	2.33	2.07	1.85
63	275	4.43	4.16	3.93	3.75	3.59	3.29	4.08	3.82	3.61	3.37	2.99	2.68	3.80	3.56	3.26	2.85	2.52	2.26
75	125	2.16	2.02	1.92	1.82	1.75	1.68	1.98	1.86	1.76	1.67	1.60	1.47	1.85	1.73	1.64	1.55	1.38	1.24
75	150	2.58	2.42	2.29	2.19	2.10	2.02	2.38	2.23	2.10	2.00	1.92	1.76	2.22	2.08	1.96	1.86	1.66	1.49
75	175	3.01	2.83	2.67	2.55	2.44	2.35	2.77	2.60	2.45	2.34	2.24	2.05	2.59	2.42	2.29	2.17	1.93	1.73
75	200	3.44	3.23	3.06	2.91	2.79	2.68	3.16	2.96	2.80	2.67	2.55	2.34	2.95	2.76	2.61	2.48	2.20	1.98
75	225	3.86	3.62	3.43	3.27	3.13	3.02	3.55	3.33	3.15	3.00	2.87	2.63	3.32	3.11	2.94	2.79	2.47	2.22

Nominal bearing of 80mm to be doubled - See para 6.1.11

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4th edition

This is the 'strength class'

With a dead load of 100 kg / m², a 38 x 184mm C16 timber can safely span 3.13m

Eurocode 5 span tables for solid timber members

Table 6.17 Permissible clear spans for single-span common or jack rafters

Slope of roof 30.0° or more but less than 45.0° Imposed load q_k = 0.60 kN/m² or Q_k = 0.90 kN

Strength Class C16 Service Class 1 or 2

This table uses target (=sawn) depth

C16		Dead loads g_k (kN/m²) excluding self-weight of rafter								
		g_k not more than 0.5			g_k not more than 0.75			g_k not more than 1.00		
Size of rafter		Spacing of rafters (mm)								
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600
		Maximum clear span (m)								
38	100	1.83	1.81	1.73	1.73	1.70	1.62	1.65	1.62	1.53
38	125	2.45	2.41	2.30	2.30	2.25	2.13	2.18	2.13	2.00
38	150	3.09	3.03	2.88	2.88	2.81	2.65	2.72	2.65	2.48
38	195	4.25	4.16	3.93	3.93	3.83	3.58	3.68	3.58	3.34
44	100	1.96	1.93	1.85	1.85	1.82	1.73	1.76	1.73	1.63
44	125	2.62	2.57	2.45	2.45	2.40	2.26	2.32	2.26	2.13
44	150	3.28	3.22	3.06	3.06	2.98	2.81	2.88	2.81	2.63
44	195	4.50	4.40	4.15	4.15	4.05	3.79	3.90	3.79	3.53
47	100	2.02	1.99	1.91	1.91	1.87	1.78	1.81	1.78	1.68
47	125	2.69	2.64	2.52	2.52	2.46	2.33	2.38	2.33	2.18
47	150	3.37	3.31	3.14	3.14	3.06	2.88	2.96	2.88	2.70
47	195	4.62	4.51	4.26	4.26	4.15	3.89	4.00	3.89	3.62
ALS/CLS										
38	114	2.18	2.14	2.05	2.05	2.01	1.90	1.95	1.90	1.79
38	140	2.83	2.78	2.65	2.65	2.59	2.44	2.50	2.44	2.29
38	184	3.97	3.88	3.67	3.67	3.58	3.35	3.45	3.35	3.13

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4th edition

Better strength class of timber

A C24 timber of same size can span further than C16

Table 6.18 Permissible clear spans for single-span common or jack rafters

Slope of roof 30.0° or more but less than 45.0° Imposed load q_k = 0.60 kN/m² or Q_k = 0.90 kN

Strength Class C24 Service Class 1 or 2

This table uses target (=sawn) depth

C24		Dead loads g_k (kN/m²) excluding self-weight of rafter								
		g_k not more than 0.5			g_k not more than 0.75			g_k not more than 1.00		
Size of rafter		Spacing of rafters (mm)								
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600
		Maximum clear span (m)								
38	100	2.12	2.09	2.00	2.00	1.96	1.86	1.90	1.86	1.75
38	125	2.82	2.77	2.63	2.63	2.58	2.43	2.49	2.43	2.28
38	150	3.53	3.46	3.28	3.28	3.20	3.01	3.09	3.01	2.81
38	195	4.83	4.72	4.45	4.45	4.34	4.06	4.17	4.06	3.77
44	100	2.26	2.22	2.13	2.13	2.08	1.98	2.02	1.98	1.86
44	125	3.00	2.94	2.80	2.80	2.74	2.58	2.64	2.58	2.42
44	150	3.75	3.67	3.48	3.48	3.39	3.19	3.27	3.19	2.98
44	195	5.10	4.99	4.69	4.70	4.58	4.28	4.41	4.28	3.98
47	100	2.33	2.29	2.19	2.19	2.14	2.03	2.08	2.03	1.91
47	125	3.08	3.02	2.87	2.87	2.81	2.65	2.72	2.65	2.48
47	150	3.85	3.77	3.57	3.57	3.48	3.27	3.36	3.27	3.05
47	195	5.23	5.11	4.79	4.82	4.69	4.39	4.51	4.39	4.08
ALS/CLS										
38	114	2.51	2.47	2.35	2.35	2.30	2.18	2.23	2.18	2.05
38	140	3.25	3.18	3.02	3.02	2.95	2.78	2.85	2.78	2.60
38	184	4.51	4.41	4.16	4.16	4.06	3.80	3.91	3.80	3.54

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4th edition

This is the distance between the two points of support for the rafters; in practice for most roofs, the eaves wallplate and the purlin, or purlin and ridgeboard

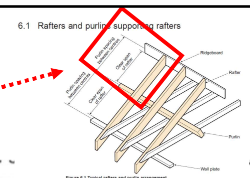


Table 6.19 Permissible clear spans for purlins supporting single-span rafters

Slope of roof 30.0° or more but not more than 45.0° Imposed load q_k = 0.60 kN/m² or Q_k = 0.90 kN

Strength Class C16 Service Class 1 or 2

This table uses target (=sawn) depth

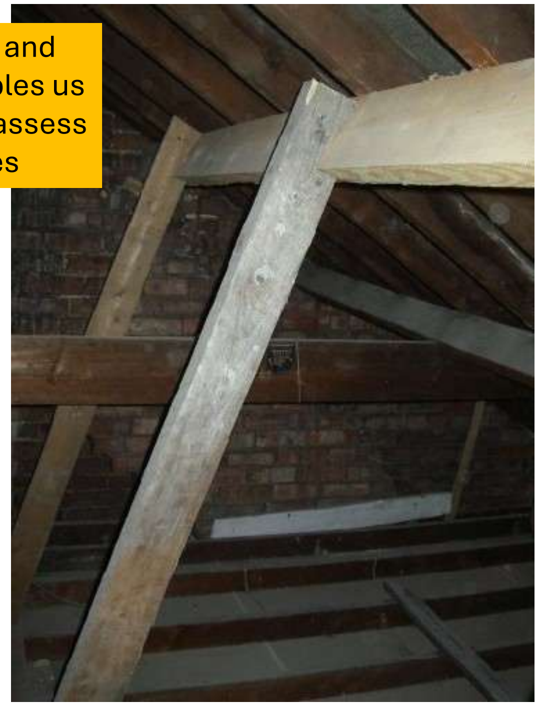
C16		Dead loads g_k (kN/m²) excluding self-weight of purlin																	
		g_k not more than 0.5						g_k not more than 0.75						g_k not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B'dth (mm)	D'pth (mm)	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
		Maximum clear span (m)																	
63	150	2.44	2.29	2.17	2.07	1.98	1.89	2.25	2.11	1.99	1.90	1.80	1.70	2.10	1.96	1.86	1.75	1.65	1.56
63	175	2.85	2.67	2.53	2.41	2.31	2.20	2.62	2.45	2.32	2.21	2.10	1.98	2.45	2.29	2.16	2.04	1.92	1.82
63	200	3.25	3.05	2.89	2.75	2.64	2.51	2.99	2.80	2.65	2.53	2.39	2.27	2.79	2.61	2.47	[illegible]	[illegible]	[illegible]
63	225	3.65	3.43	3.25	3.10	2.97	2.82	3.36	3.15	2.98	2.84	2.69	2.55	3.14	2.94	[illegible]	[illegible]	[illegible]	[illegible]
63	275	4.46	4.18	3.96	3.78	3.62	3.45	4.10	3.85	3.64	3.47	3.28	3.11	3.83	3.59	[illegible]	[illegible]	[illegible]	[illegible]
72	125	2.14	2.00	1.90	1.81	1.74	1.67	1.97	1.84	1.74	1.66	1.59	1.53	1.84	1.72	[illegible]	[illegible]	[illegible]	[illegible]
72	150	2.56	2.40	2.28	2.17	2.08	2.00	2.36	2.21	2.09	1.99	1.91	1.82	2.20	2.06	[illegible]	[illegible]	[illegible]	[illegible]
72	175	2.98	2.80	2.65	2.53	2.43	2.33	2.75	2.57	2.44	2.32	2.22	2.13	2.56	2.40	[illegible]	[illegible]	[illegible]	[illegible]
72	200	3.41	3.20	3.03	2.89	2.77	2.67	3.13	2.94	2.78	2.65	2.54	2.43	2.93	2.74	[illegible]	[illegible]	[illegible]	[illegible]
72	225	3.83	3.59	3.40	3.25	3.11	3.00	3.52	3.30	3.13	2.98	2.86	2.73	3.29	3.08	2.92	2.78	2.65	2.51

Nominal bearing increased to 80mm - See *Section 6.1.11*

This is the span between the supports for the purlin, so gables, party walls, corbels on chimneys and struts

36

Better knowledge and understanding enables us to more accurately assess these structures



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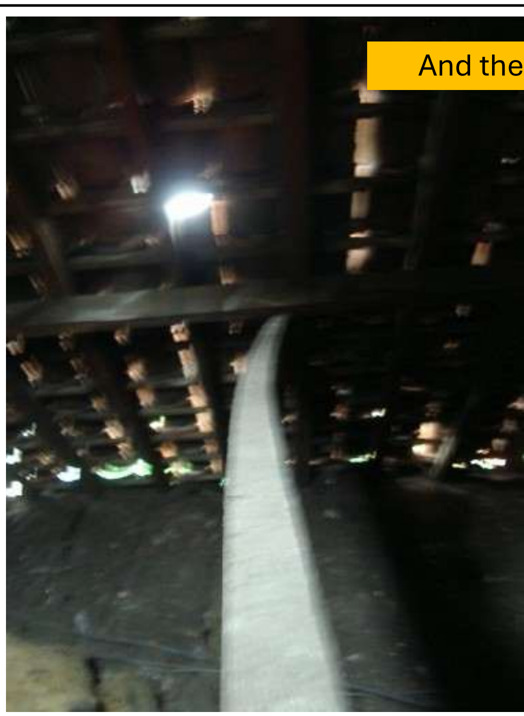
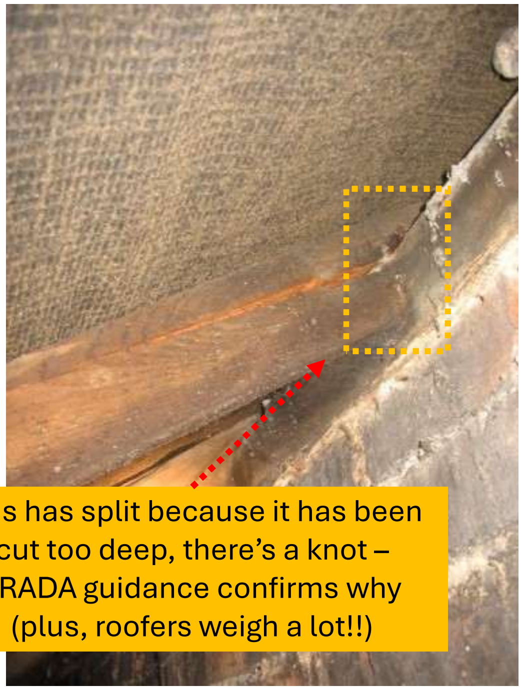
And these structures



38



This has split because it has been cut too deep, there's a knot – TRADA guidance confirms why (plus, roofers weigh a lot!!)

Gratuitous photo of spray foam

39

Moisture readings in roof voids – take care

Property

40

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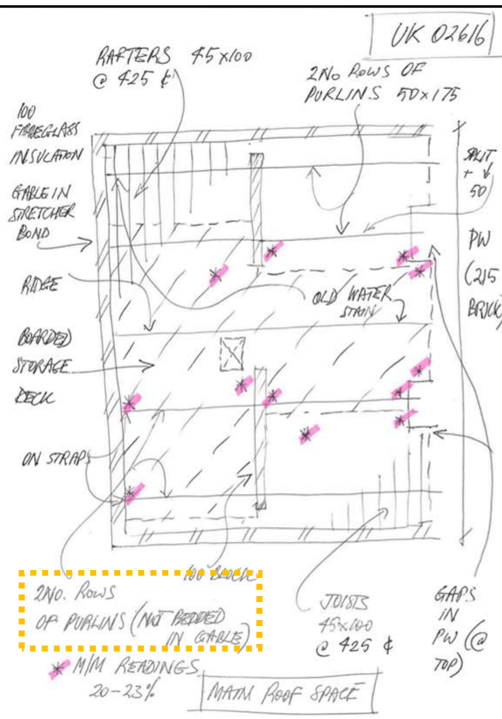
Moisture readings in January 2025 (highlighted in red)



Sketch of roof space and structure

42


Two rows
of purlins at
rear, right-
hand side


Upper front
purlin
resting on
internal
block wall

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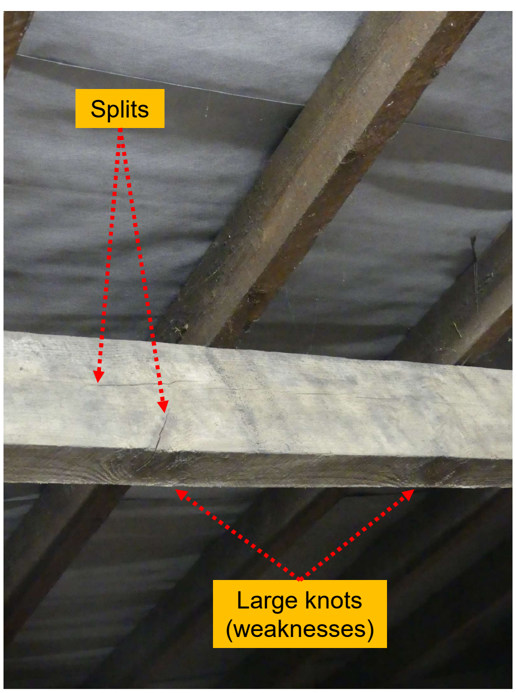
Rear
purlin
Purlin has
deflected 35
– 40mm and
split under
load

44


WARNING about 'moisture readings!
Gap in party wall to top front purlin


Typical moisture reading, to rafter
MC%
WME
21.9
January 2025

45


Splits
Large knots (weaknesses)


Typical moisture reading, to rafter
MC%
WME
11.0
MMS2
PROTIMETER
July 2025

46

Best way to deal with a parapet wall – method 1

Best way to deal with a parapet – method 2

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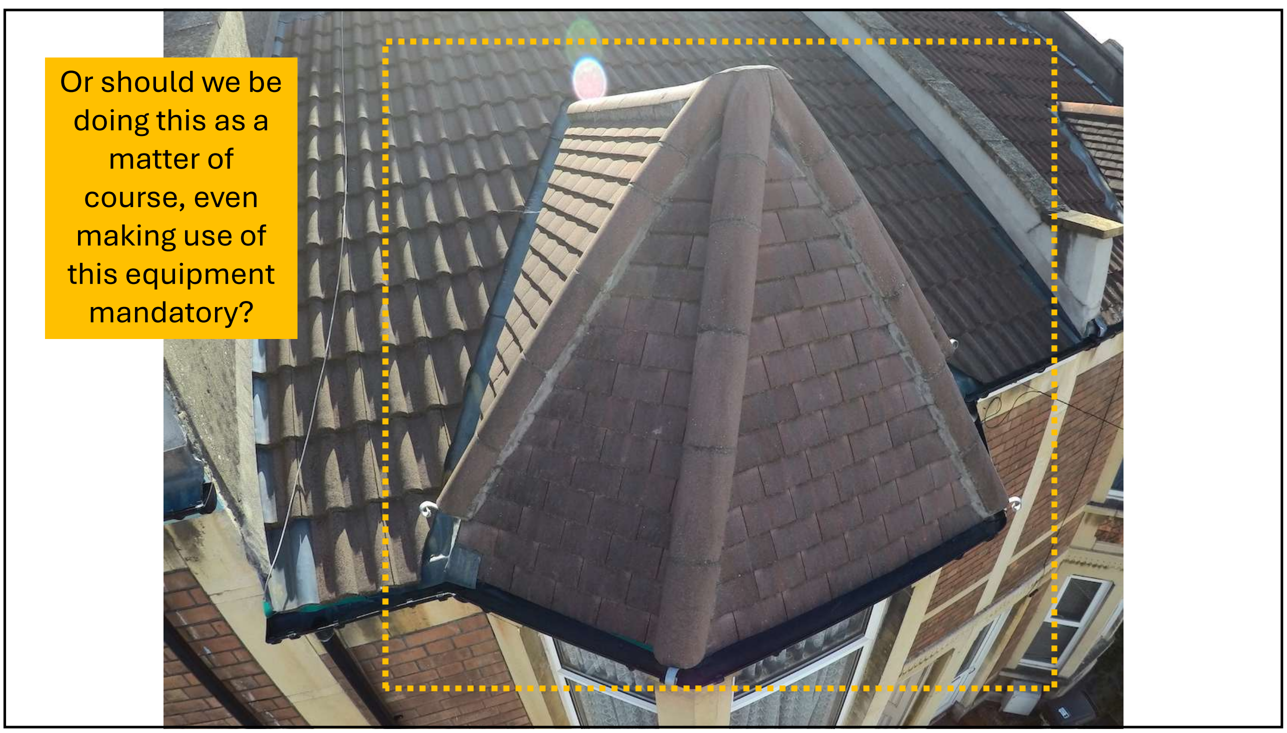
Technology

Do we need to acknowledge technology has moved on?

48


Is a report based on this view OK for your client (yes, would look better with binoculars)?
(Thanks to Mike Ridgell and Sava for allowing me to steal these two (and other) slides off the Sava DRSV course!)

49


Or should we be doing this as a matter of course, even making use of this equipment mandatory?

50

A2 General approach

Level of Service	General description of Level of Service inspection practice
Level 1	Visual inspection only unless otherwise stated, inspecting all reasonably accessible elements but without any exposure of any part(s). However, unsecured doors and access hatches will be opened, e.g. into all rooms, roof spaces, eaves voids and similar. Inspection is carried out from ground level only and/or other readily and safely accessible positions, e.g. from windows or balconies.
Level 2	As for Level 1 but with an enhanced visual inspection as above, with some checking. At this Level, RICS members should at least use binoculars or similar equipment, e.g. a camera with zoom where this is reasonably necessary.
Level 3	As for Level 2 with a more detailed visual inspection, examining each element in greater detail and to the fullest extent reasonably possible on the day of inspection, and with more extensive checking. At this Level, RICS members should use equipment appropriate for the property type and circumstances.

For some properties, especially additional risk properties, the RICS member or RICS-regulated firm could consider the advantages of using appropriate additional service equipment (e.g. a camera pole, drone, air flow meter, etc.) to further enhance their inspection of an element(s), weather and other restrictions permitting. This requirement will usually be clear or obvious from freely accessible information at the time of taking instructions and agreeing the terms of engagement with the client.

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Conclusions

- Read HSS 2 when it comes out;
- Use the benchmarks of good practice, e.g. those in the BRADs, NHBC Standards and TRADA (they're usually based on BSI or European or international Codes of practice);
- Have a documented and recorded system based on those benchmarks so you can consider and reflect on the movement and distortion;
- Judges like a system – it demonstrates professional reflection; and
- Use a 'moisture meter' with care and report accordingly!

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END

Back

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