COMMENT: BS 6229:2025

Overview of changes to the standard for flat roofs with continuously supported flexible waterproof coverings

Author: Nigel Blacklock, Standards and Compliance Director, Bauder Limited
Published: May 2026

Document Title: COMMENT BS 6229:2025
Author: Nigel Blacklock, Standards and Compliance Director, Bauder Limited
Published date: May 2026

BAUDER
making roofs secure.

Overview of changes to BS 6229:2025 Flat roofs with continuously supported flexible waterproof coverings – Code of practice

Published by: British Standards Institute

Supersedes: BS 6229:2018

The 2018 edition of BS 6229 was under its 5-year review for approximately one year. The revision came into effect in December 2025, and the 2018 version has been withdrawn. The technical committee comprised representatives from (non-exhaustive): the BBA, BRE, NHBC, Premier/LABC Warranty, NFRC (Convenor), LRWA, MAC, SPRA, GRO, other trade associations, and flat roof consultants.

BS 6229:2025 describes current best practice in the design, specification, construction, installation, and aftercare of a flat or curved roof with a pitch not greater than 10° to the horizontal, with a continuously supported flexible waterproof covering on a supporting structure that is both dense and heavy (i.e. a concrete slab), or consists of framing members supporting a lightweight deck of metal or of timber-based material. The standard provides guidance on weathertightness, structure, drainage, thermal performance, control of condensation, sound attenuation, fire safety, surface protection (including rooftop components), materials, exchange of information, maintenance, and repair.

The standard also recognises that the best practice identified may be applicable to roofs with pitches greater than 10° as well as to green roofs.

The 2025 standard has changes from the 2018 version mainly to clarify topics that had previously been queried. New terminology has also been introduced to reflect current roof design approaches and to clarify the use of products and their role within flat roof construction.

This document focuses on the main changes introduced in the 2025 version.

The standard does not cover fully supported metal roof coverings; these are now under the responsibility of British Standards Technical Committee B/542 Roofing and Cladding Products for Discontinuous Laying.

The following subject areas are better covered in other British Standards of guidance and so are shortened:

Condensation Risk Analysis – BS 5250:2021 Management of Moisture in Buildings

Sound and noise reduction – BS 8233:2014 Guidance on Sound Insulation and Noise Control for Buildings

Terms and Definitions – Section 3

Several definitions have been updated or added and notable additions include:

Balcony and Terrace	defines each and the difference between them for the purpose of fire safety referring to BS8579.
Boards (Cover Boards, Recovery Boards, Roof Boards)	defines and states where each should be used in a flat roof build-up.
Emergency Overflow and Overflow	distinguishes between them and confirms the emergency overflow(s) should be capable of taking the full capacity of the blocked outlet(s) and be on a secondary system.
Absolute Zero Fall Roof	now specifically defined for blue roofs as a "finished fall of 0° after accounting for construction tolerances and deflection with no back fall(s)".
Exposed Roof	not covered with hard and/or soft landscaping or water and makes the distinction that the minimum fall is 1:80 and should not be zero fall.
Podium Structure	defined as "structural slab, either below ground level, at ground level, or supported on columns over a heated, partially heated, or unheated space, which provides an external amenity space incorporating hard and/or soft landscaping." Intending to help clarify a common debate on fire safety, NOTE 1 states that they are not "specified attachments".
Water Check	defined as "obstruction interrupting roof falls and restricting the drainage of rainwater, resulting in ponding water if not properly accommodated by adjusting falls" but with a NOTE stating "Lap build ups in the waterproof layer, delaying drainage and resulting in temporary non-detrimental water pooling are not water checks." So, water pooling is deemed non-detrimental and distinguished from ponding by duration.

Design – Section 4

Types of Flat Roof System - Section 4.2

Warm Roof System - Sub-Section 4.2.1

In recognition of Passivhaus and heat loss at insulation joints, NOTE 1 states that boards might be square-edged but “ideally” in multiple layers with staggered joints or a single layer of boards with overlapping or interlocking edges to minimise thermal bridging. Figure 1 shows a multiple layer insulation with staggered joints, and the NOTE refers to the possibility of a cover board in the roof build up.

Figure 1: *The illustration shows a single layer of insulation with interlocking edges to minimise thermal bridging. Bonding the air and vapour control layer (AVCL) reduces wind load on the roof coverings.*

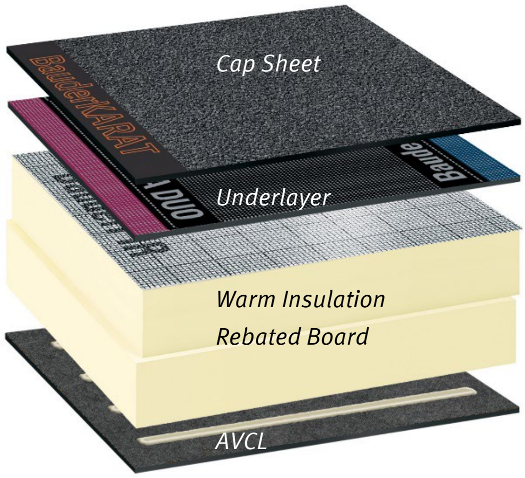

Figure 1: Warm Roof Build Up

Inverted Warm Roof System – Sub-Section 4.2.2

It is important to note that the revised terminology now formally recognises inverted roofs as a form of warm roof construction.

This section also illustrates multi-layer insulation, staggered and rebated, and refers to the assessment of the insulation’s suitability in relation to water absorption. For inverted warm blue roofs, the WFRL laps should be sealed (with no further prescription). For inverted warm roofs, the WFRL should be lapped by 300 mm, and where this is not possible, the laps should be sealed. LRWA Guidance Note No. 14 is referenced for further information.

Figure 2: *The illustration shows insulation atop the waterproofing layers. The water flow reducing layer (WFRL) reduces the cooling effect of rainwater between the insulation and the waterproofing.*

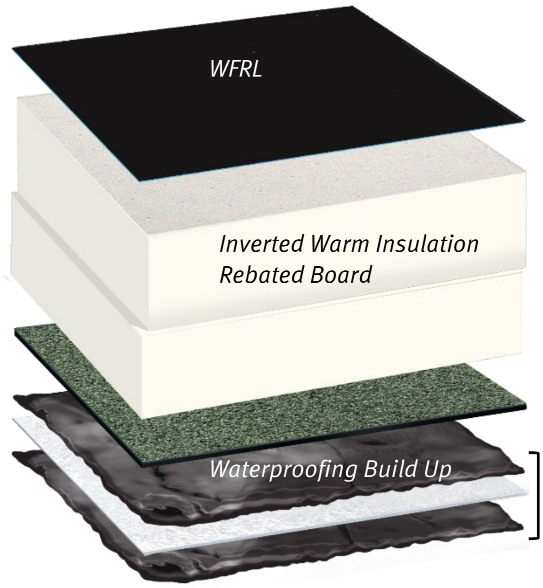

Figure 2: Inverted Warm Roof Build Up

Hybrid Roof System – Sub-Section 4.2.5

The commentary covers the increased risk of interstitial condensation with hybrid roofs especially the continuity of the AVCL at panel joints. A condensation risk analysis is recommended to highlight the risks of retained insulation in refurbishment and of below-deck insulation in new builds, including acoustic insulation. With SIPs, if a vented void is used above the panel (see BS 5250), it becomes a cold roof and is limited to a maximum 5-metre span.

Roof Falls to Achieve Drainage – General – Sub-Section 4.4.1

The previous standard recommended that all flat roofs be designed with a fall of 1:40 to ensure that a minimum fall of 1:80 was achieved on the completed roof. This requirement has been removed, and the standard now states that a minimum fall of 1:80 is required (for most roofs).

To achieve this on new-build projects, a detailed structural analysis is required. For refurbishment projects, a level survey—ideally presented in contour map format—is required to inform the fall to be provided. In many cases, a fall of 1:60 will be sufficient; however, it is important to understand when a fall of 1:40 may be necessary. For roofs smaller than 50 m², the design fall should be a minimum of 1:60.

Interruption to Falls – Sub-Section 4.4.2

Where drainage paths are interrupted by, for example, plant rooms and rooflights, falls should be adjusted locally to facilitate drainage. This can be achieved using local deflectors (crickets). Best efforts should be made to avoid installing lapped membranes with laps running against the fall. Outlets should be installed in sumps to prevent them from standing proud, and hard edges should be formed slightly thinner than the adjacent insulation to reduce the risk of localised ponding.

Zero Falls Roofs – Sub-Section 4.4.3

Some waterproofing systems are acceptable for use with zero falls (0–1:80), typically where the system is ballasted and supported by third party certification. However, back falls within the roof deck are not acceptable and must be corrected, either by installing additional recessed rainwater outlets or by providing localised screeding to falls.

A detailed structural analysis undertaken by a qualified engineer will identify areas of risk and should be followed by a site level survey carried out by the deck installer prior to commencement of waterproofing works, to confirm that no back falls exist. As a proxy for quality, the maximum permissible deviation from the datum should comply with BS 8204-2, achieving a surface regularity of SR1 (3 mm) or SR2 (5 mm). It is acknowledged that SR2 is more commonly achieved in practice and is preferable to SR3.

Blue Roofs – Sub-Section 4.4.4

For blue roofs, even 0-1:80 is not well suited due to the hydraulic design constraints where any fall reduces the roof water retention capacity. Therefore, they should be designed to absolute zero falls with no positive fall and no back fall. To feasibly do this, the deck (most likely concrete) is installed as close to flat as possible with allowance made for the corrective labours (e.g., screed/localised screed).

Back Falls – Sub-Section 4.4.5

Back falls are to be corrected by the roof slab or deck installer. Where decks are not laid to falls, Principal Contractors are encouraged to ensure that the slab or deck installer provides a flat deck, thereby avoiding the need for a more expensive prefabricated or site formed solution (i.e. minimum 1:40).

Prefabricated or Site-Formed Falls – Sub-Section 4.4.6

To prevent designers from applying the guidance to "design for 1:40 to achieve a minimum of 1:80" too literally, the revision clarifies the need to account for deck deflection and construction tolerances.

Flat roofs should have a positive fall (i.e. no back falls). The previous guidance of designing to 1:40 to achieve a minimum of 1:80 has been updated to indicate that a design fall of 1:60 may be an appropriate starting point.

However, this is subject to structural analysis and/or a detailed level survey, ideally presented in contour map format.

If the analysis or survey indicates deflection greater than 17 mm over 1 m (i.e. worse than 1:60) from level, a minimum design fall of 1:40 is required. For roofs smaller than 50 m², it can generally be assumed that 1:60 is a suitable minimum. An exception applies where zero falls are permitted: for ballasted roofs, falls may range from zero to 1:80, and for blue roofs an absolute zero fall is acceptable, provided no back falls occur.

For new-build projects, where the roof slab or deck installer is responsible for delivering a corrected level roof, the roof designer may assume that a design fall of 1:60 is sufficient.

Internal gutters continue to require a minimum completed fall of 1:80. In practice, this typically necessitates a design fall of 1:60 for tapered insulation, as any deck deflection—whether occurring during construction or already present in refurbishment scenarios—will reduce the completed fall below 1:80. Where analysis or survey data indicate deflection greater than 12.5 mm over 1 m (i.e. worse than 1:80), a design fall of 1:60 is required, increasing to a minimum of 1:40 where deflection exceeds 17 mm. In complex refurbishment scenarios, however, a fall of 1:80 is still preferable to a flat condition.

NOTE2 states that the 1:85 intersection of two 1:60 slopes is acceptable and (in 4.4.1 NOTE1) that the 1:113 fall where two 1:80 slopes intersect is not. The standard also recognises that, in refurbishment projects, achieving a fall within gutters may be difficult due to constraints such as outlet spacing. In these cases, a dispensation is provided for the use of flat insulation boards up to 2400 mm in length between tapered sections, provided these achieve a minimum U-value of 0.35 W/m²K.

Sumps – Sub-Section 4.4.7

Previously, there was no clear definition of a sump area. Insurers pressed for this to be addressed after sump designs began to take on the dimensions of small roofs, often with no falls.

The 2025 revision states that the sump area should be no greater than 0.72 m² per outlet and should measure between 400 mm and 1200 mm in any direction.

As a result of this inclusion, Insurers are now comfortable with the sump base being flat. It remains important, where practicable, that sumps are formed around all outlets, as even the thinnest apron at the outlet body can create a potential area for water pooling.

Where tilt fillets are used, sump dimensions may be taken from the leading edges of the fillets.

A 500 mm × 500 mm sump accommodates the Bauder vertical rainwater outlet (RWO), and BS 8217 recommends a minimum gutter width of 500 mm. However, to improve board efficiency and reduce waste, Bauder's default sump size is 600 mm × 600 mm (600 mm × 700 mm for box scupper outlets). It is preferable to align the sump width with the gutter width to avoid awkward waterproofing details adjacent to the outlet. This should be considered when reducing gutter widths to achieve insulation advantages within area weighted calculations.

In refurbishment projects, where an existing sump is built into the deck, dimensions of less than 400 mm are acceptable, provided it is possible to adequately flash to the rainwater outlet.

Rainwater Disposal - Section 4.5

It is a requirement of Building Regulations Part H (H3(1)) that ‘adequate provision is made for rainwater to be carried from the roof of the building’, and BS 6229:2025 considers it good practice for flat roofs to be designed to clear surface water as rapidly as possible.

Rainfall intensity for the site should be determined in accordance with BS EN 12056-3. Where multiple roof levels exist, a holistic drainage design assessment is required. This assessment should also include adjacent walls where these form part of the rainwater catchment. *See Figure 3.*

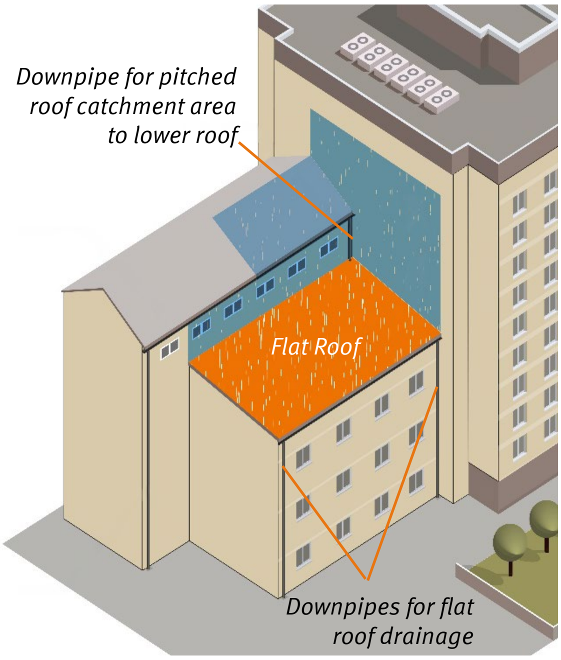

Figure 3: Illustration of rainfall catchment area for drainage design

Where a flat roof is designed to drain to external gutters or internal downpipes, the number and size of outlets should be determined in accordance with BS EN 12056-3. Outlet placement should avoid proximity to supporting structures (e.g. columns) and should be evenly spaced, while avoiding tortuous drainage routes caused by obstructions such as plant equipment.

Roofs with one outlet/downpipe and all blue roofs should have an emergency overflow on a secondary system to mitigate the risk of flooding resulting from a blocked outlet or pipe. The capacity of the emergency overflow should be not less than that of the outlet or outlets.

A drainage engineer, or other suitably competent person, should determine the requirement for, and positioning of, emergency overflows based on project specific variables, including the number of outlets, underlying structure, risk assessment, and the planned maintenance regime.

Where a roof design drains internally, rather than at the perimeter, directly to sump or outlet locations, additional emergency overflow(s) to separate downpipe(s) should be provided. When these operate, there is no visible tell-tale. Without such provision, a blocked outlet could result in significant water back up to the high point, potentially leading to structural overload.

This requirement should be clearly identified at the early stages of building design, particularly for tapered insulation layouts, to allow for the provision of additional secondary downpipes. A consequence of no longer relying on flat gutters is the need for increased focus on the overall overflow strategy.

At all abutments and penetrations, the waterproofing layer should be installed to a minimum height of 150 mm above the finished roof level. For protected roof systems, the finished roof level is defined as the top of the paving, gravel, planted vegetation, or similar surface finish. *See Figure 4.*

Figure 4: Illustration of minimum height of waterproofing at upstands

Where a flat roof incorporates level access—such as door thresholds for disability access—the NHBC technical standard was previously adopted. The 2025 revision introduces changes to the associated annotations. It permits a reduced upstand height of 75 mm beneath an overhanging door sill (now with minimum projection of 30 mm)provided that the roof falls away from the doorway and that an adequate outlet and emergency overflow are provided. *See Figure 5.*

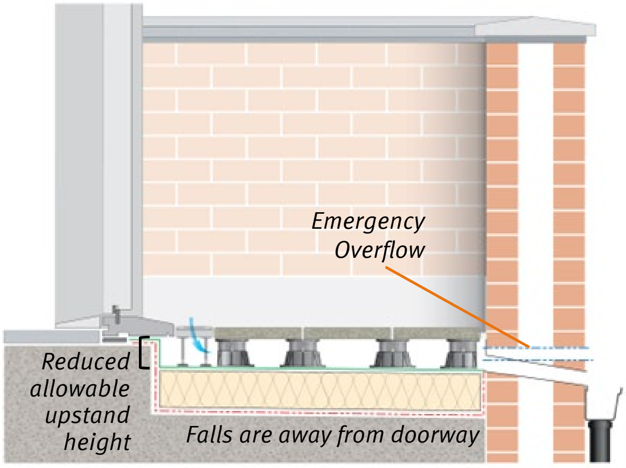

Figure 5: Illustration of level access

Figure 5: *The illustration shows level access and the reduced permitted upstand height of the waterproofing (75 mm) when the overhang of the door sill is a minimum of 30 mm.*

A minimum 10-mm gap is required between decking or paving and perimeter upstand or thresholds. This supports the additional drainage from perimeter parapet/walls.

Bauder's recommendation is for a linear drain to be incorporated in front of the door to further assist effective drainage away from the building entrance.

Alternatively, the standard allows for a balcony kerb to be set at a minimum of 25 mm (±10 mm) above the waterproofing layer for warm roofs, or 25 mm (±10 mm) below the door sill for inverted warm roofs. For cold roof constructions, a variant is shown where a low water check is formed 50 mm (±10 mm) below the door sill to act as an overflow.

Bauder upholds BS 6229:2025 in specifications where level threshold details must adhere to the criteria of the standard and NHBC Standards Chapter 7.1 Flat Roofs and Balconies for Level Thresholds.

Where a level threshold detail on a Bauder project does not meet all applicable criteria, it will be identified as a noncompliance and excluded from the guarantee.

Thermal Performance - Section 4.6

General – Sub-Section 4.6.1

Cold bridging occurs where an area of a building's construction exhibits significantly higher heat transfer than the surrounding materials, resulting in additional heat loss. Guidance is provided on the calculation of cold bridging, including linear thermal transmittance (psi value) and significant point thermal bridges (chi value). Reference is also made to consultation of the current Building Regulations.

The BR 443 U-value Conventions revision published in 2019 now differs from BS 6229:2025 due to changes introduced to correction values for warm inverted roofs, particularly warm inverted blue roofs.

Installers of insulation are reminded of the importance of high-quality workmanship in achieving tight-fitting insulation, a principle long promoted by the Passivhaus standard. Emphasis is also placed on ensuring that building materials, such as concrete decks and CLT decks, are given adequate time to dry before construction proceeds.

To maintain the thermal performance of a heated building, the minimum U-value permitted at any point on a roof is 0.35 W/m²K (Clause 4.7.2 of the new standard). The inclusion of this requirement in BS 6229:2025 reinforces its presence within the Building Regulations across the UK nation states, while placing additional emphasis on the phrase "at any point". This explicitly encompasses areas of minimum insulation thickness, including tapered roof zones and gutters.

Bauder Limited's design guidance, in line with good practice, is now based on BS 6229:2025. Where this guidance cannot be followed by you or your client, it is recommended that Building Control is consulted.

Inverted Warm Roofs – Sub-Section 4.6.2

In an inverted roof construction, the primary thermal insulation layer is located above the roof structure and waterproofing. As a result, the waterproofing, structural deck, and supporting structure remain at a temperature close to that of the building interior.

To prevent water from passing around the insulation, migrating through joints, and reaching the waterproofing layer—where it could have a cooling effect on the building—the correct installation of a Water Flow Reducing Layer (WFRL) is required.

However, construction tolerances and variations in the installation of the WFRL can lead to differing levels of water flow reduction, and therefore the effectiveness of the corrective action may vary.

It is now suggested that it is prudent to increase the design thickness of thermal insulation in an inverted roof where reliance is placed on a Water Flow Reducing Layer (WFRL). "Where the declared and design values are the same, the design thickness of the thermal insulation should be increased by not less than 2.5%"

To improve the quality of WFRL installation, laps should be overlapped by a minimum of 300 mm; where this cannot be achieved, the laps should be taped.

Inverted Warm Blue Roofs – Sub-Section 4.6.4

As defined in BS 6229:2025, a blue roof is designed to attenuate stormwater—that is, to slow the release of rainwater into the drainage system.

The nature of an inverted warm blue roof exacerbates the issues already associated with inverted warm roofs, making it more susceptible to increased heat loss due to rainwater cooling. This is because blue roofs increase both the frequency and duration of water in contact with the insulation and waterproofing system.

In addition, the current test method for determining water flow around insulation and through the joints with a WFRL does not consider that a blue roof will likely generate a head of water. Consequently, the correction method commonly used for inverted roof thermal calculations incorporating a WFRL is not, on its own, sufficient.

Following research and testing (not peer reviewed), the Technical Committee responsible for drafting BS 6229:2025 has developed a pragmatic solution, set out in Annex A and supported by two worked examples. To improve drainage performance, it is recommended that all WFRL laps are sealed.

Designers should assess and evidence the frequency and duration of rainfall events during which an inverted warm blue roof operates in attenuation mode (i.e. retaining a head of water). This introduces uncertainty regarding the quantity of water likely to penetrate the WFRL and reach the waterproofing layer, together with the associated additional heat loss. For each such day, a default F factor of 0.75 should be adopted for rebated, jointed insulation boards, with a conventional F factor applied for the remaining days of the heating season.

The two worked examples - one based on London rainfall levels and the other on Glasgow's - demonstrate insulation thickness corrections of 7 mm and 31 mm respectively. The primary differences arise from a longer heating and rainfall season and a greater number of days operating in attenuation mode in Glasgow.

Control of Condensation - Section 4.7

General – Sub-Section 4.7.1

The Technical Committee responsible for drafting the 2025 revision considered it important to highlight that the flat roof section of BS 5250:2021, Management of Moisture in Buildings, includes additional guidance on "appropriate external temperature". This guidance sits alongside the requirement that, when assessing the risk of interstitial condensation, designers should assume an external temperature of −5°C for a period of 60 days (typically January and February) during the heating season, to account for the cooling effects of clear sky radiation.

Surface Condensation – Sub-Section 4.7.2

BS 6229:2025 replicates Building Regulations guidance—Approved Document C (Section 6) for England and Wales, and the Technical Handbook (Section 6) for Scotland—which require the roof of a heated building to achieve a U-value not exceeding 0.35 W/m²K at any point. For new build projects in Northern Ireland, the corresponding requirement is 0.30 W/m²K.

In such roofs, the risk of surface condensation is mitigated where continuity of insulation is maintained at upstands and roof penetrations. The new standard also seeks to eliminate the practice of providing thinly insulated gutter soles and excessively low points within tapered insulation schemes.

For reference, a U-value of 0.35 W/m²K can be achieved using approximately 60 mm of BauderPIR FA TE or 100 mm of BauderROCK insulation.

Interstitial Condensation - Sub-Section 4.7.3

A warm roof does not require ventilation; however, the vapour resistance of the air and vapour control layer (AVCL) should be equal to or greater than that of the waterproofing layer. For example, a 1000-gauge polyethylene AVCL should not be used beneath a polyolefin waterproofing membrane.

A note within the standard refers to guidance in BS 5250 on the treatment of structural insulated panels (SIPs), recommending the provision of a ventilated cavity above the panel, thereby forming a cold roof construction. Caution is also given regarding the difficulty of achieving an effectively sealed AVCL on offsite fabricated panels and cassettes. Bauder's experience indicates that achieving a continuous and effective AVCL seal in such situations is rarely successful. As a result, providing a ventilated cavity above the panel is generally the preferred solution for cassette systems. However, limitations in achieving effective ventilation mean that this approach will limit their use for small roof areas.

Fire Safety – Section 4.9

To reflect developments in external fire performance of roofs, NOTE 3 covers scenarios where certain roof covering products or materials may be considered to satisfy all relevant requirements without the need for further testing. These notional designations are referenced in European Commission Decision 2000/553/EC, the GRO Fire Performance of Green Roofs – Best Practice Guide, the DCLG Fire Performance of Green Roofs and Walls, Approved Document B, and equivalent regulatory documents in Wales, Scotland, and Northern Ireland.

NOTE 4 clarifies that while Commission Decision 2000/553/EC specifies an aggregate size range of 4–32 mm, the size commonly used in the UK is 20–40 mm to better resist wind scour. This aggregate size is referenced in the DCLG Fire Performance of Green Roofs and Walls and in BRE Digest 311, which addresses wind scour considerations.

NOTE 6 reflects industry experience gained through testing, indicating that gaps of up to 10 mm between paving slabs (e.g. when installed on plastic pedestals) do not affect compliance with the characteristic external fire performance classification BROOF(t4). Based on this experience, it is suggested that no further testing is required and that such configurations should be considered implicit within the scope of Commission Decision 2000/553/EC.

Rooftop Components and Installations – Section 4.11

Designers are reminded that, to facilitate future maintenance, all large items of plant—including air conditioning units, water storage vessels, solar panels, and PV arrays, together with associated ducts, pipework, and cabling—should be adequately raised above roof level. Adequate allowance should also be made for wind loading on these items and for any potential impact this may have on the underlying roof system.

Materials – Section 5

Updates were made to reflect the inclusion of several newer materials, with the principal addition being roof deck materials—specifically, Cross Laminated Timber (CLT). Following close consultation with the Structural Timber Association, the following guidance is provided:

- Design out the use of CLT in flat roof decks wherever possible. Where CLT is used, the finished fall of the deck's top surface should be no less than 1:40.
- Use factory applied end grain sealers.
- Avoid rebated deck joints.
- Protect the deck from moisture ingress during transportation and while exposed on site.
- To avoid fungal decay, do not apply waterproofing until moisture testing of both the deck surface and core confirms levels below 20%.
- Where a factory applied protective membrane is proposed, consult the roof waterproofing system manufacturer, as this may affect the roof specification.

Another notable addition to this section is guidance encouraging the use of Environmental Product Declarations (EPDs), together with a cautionary note where Reinforced Autoclaved Aerated Concrete (RAAC) or Folded Plate Timber (FPT) deck constructions are identified within existing roofs. This caution would also be prudent where CLT decks installed flat are identified.

Exchange of Information and Project Schedule – Section 6

Workmanship – Section 7

Care and Maintenance – Section 8

The 2025 revision introduces a new section, Exchange of Information and Project Schedule (Section 6). This section provides lists of commonly required information and includes a sub-section addressing considerations related to programme sequencing.

Workmanship (Section 7) continues the focus on sequencing, including NOTE 3, which highlights issues associated with trapped construction moisture in concrete roof slabs and CLT roof decks.

Care and Maintenance (Section 8) now includes guidance on deconstruction to maximise recycling and re use, as well as considerations for the addition of photovoltaic (PV) systems to existing roofs.

IN SUMMARY

Bauder would like to draw attention to four distinct changes introduced in BS 6229:2025 that affect the design considerations for flat roofs.

While the minimum completed fall on a flat roof is typically 1:80 (except where zero falls are permitted), allowance must be made for construction tolerances in new build projects and for deflection and creep in both new build and refurbishment scenarios.

Rainwater outlets should generally be designed with a sump to reduce the risk of the outlet standing proud and to improve drainage performance. Appropriate provision for emergency overflows should also be included.

Where inverted warm roofs or inverted warm blue roofs are proposed, particular attention must be given to the detailing of the Water Flow Reducing Layer (WFRL), together with any necessary corrections for heat loss resulting from rainwater cooling.

The increased use of Cross Laminated Timber (CLT) in flat roof construction should be carefully managed, with strict adherence to the minimum design requirements necessary to ensure safe and durable performance.

Need more information?

Please contact our technical department on: **T:** 01473 257671 **E:** technical@bauder.co.uk

Bauder Limited, 70 Landseer Road, Ipswich, IP3 0DH

Click here to view this content online.

Or visit: bauder.co.uk/technical-centre/standards-and-knowledge