VICTORIAN BUILDING AUTHORITY

Fact sheet

June 2025

Research insights: Roofing: Common roof drainage faults and enquiries – box gutters

Q&A

The following answers have been provided to questions asked during the Roofing: Common roof drainage faults and enquiries – box gutters Practitioner Education Series webinar on 9 March 2023.

The answers provided are correct as at 22 March 2023.

Will the VBA provide a copy of the presentation slides?

A copy of the presentation slides and recording of the webinar is available from the VBA website: https://www.vba.vic.gov.au/plumbing/PES-previous-sessions

We do a lot of work on old shopping centres and industrial buildings. How do we ensure that these standards are met on old buildings when we are simply replacing rusted out old box gutters and sumps are within spaces without access- i.e. we can't always provide the extra overflow provisions due to locations that were compliant in the 70-80s?

The compliance pathway for roofing doesn't make any provision for like-for-like replacement, and instead only specifies what the Deemed-to-Satisfy provisions are. As a result, all new and replacement works need demonstrate compliance with the Performance Requirements of the National Construction Code, through either a Deemed-to-Satisfy or Performance Solution.

Why aren't all roof plumbers producing a set of documents of their intended design solutions first and then reviewed and approved by a qualified person prior to implementation?

Plumbers are seldom involved in the design process and are generally provided with an approved set of plans and specifications. The plans should indicate the standards to which the work must comply. If the plumber identifies a roof design that is not consistent with the Deemed-to-Satisfy provisions, they must contact the Builder and Relevant Building Surveyor in the first instance, to clarify how the work will be certified.

Regarding galvanised sheet products, how does this affect a plumber's certificate of compliance?

Please refer to the material manufacturer for information about these products.

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Do plumbers need to consider warranty of materials used when certifying plumbing work they have carried out? Example (Where a manufacturer will not provide warranty for galvanised roof sheets due to white rust and the plumber is requested to install galvanised roof sheets).

Product warranty is not a general requirement of a certified plumbing installation, but it is recognised and a requirement for that the product must be fit for its intended purpose.

Can you please clarify whether a box gutter can discharge to a sump with a rainhead?

To be considered a Deemed-to-Satisfy design, a box gutter must discharge to either a sump or rainhead.

What is the VBA's position on the Dambuster rainhead/performance solution they provide?

The VBA does not endorse any specific plumbing products and is satisfied as long as the products are fit for the intended purpose & meet the relevant Performance Requirements of the NCC Volume Three.

When sizing to meet DTS, what is the VBA wanting the sizing based on? AS3500:3 or is it acceptable to size from the HB114 even though it has been withdrawn? VBA licence exams are still referencing the HB114 as an acceptable sizing method.

HB114 & HB39 both reference AS/NZS3500:3 for all sizing requirements. Some practitioners find the steps/examples in HB114 easier to follow, however, there are some inconsistencies between these documents and in such cases, the AS/NZS3500:3 takes precedence.

A performance solution will mean that a hydraulic engineer would need to create the performance solution??

The performance solution process requires the preparation of a Performance Based Design Brief. This may be prepared by a person with appropriate qualifications and experience in the specific area of plumbing. This may be a professional engineer or potentially even a licenced plumber who has the appropriate knowledge and experience.

Do Building Surveyors need to list plumbing Performance Solutions on Building Permits or Occupancy Permits or is having it referenced on the plumbing compliance certificate enough?

The Performance Solution should be documented in the Building Permit conditions. The licenced practitioner must also indicate this on their compliance certificate.

Can you discuss:
a) the approval approach for leer gutters where the side of the box gutter follows the slope of the roof;
b) approval of box gutter discharging onto an apron flashing into an eaves gutter and;
c) upper roofs dropping via spreaders onto lower roofs or via DP dropping directly to box gutters/sumps etc.

The Deemed-to-Satisfy provisions are explicit in the following:
a) box gutters (including leer gutters) must have a uniform grade/consistent grade.
b) box gutters must discharge to a sump or rainhead.
c) discharge of higher catchments to lower roofs, sumps or rainheads is explicitly prescribed by the standards. Where any of these requirements cannot be achieved, a Performance Solution should be developed prior to works commencing.

Can the VBA clarify the role of the building surveyor to complete these calculations?

The Relevant Building Surveyor (issuing the building permit) is responsible for ensuring compliance, which may include a review of calculations to ensure they comply with the NCC requirements.
A Building Surveyor may be involved in the design and calculations however, caution must be exercised to ensure that they are not performing a statutory function in the process, e.g. acting as the RBS for their design.

Please define "clear of neighbourhood properties". It's very common to have a box gutter on a boundary.

All stormwater drainage should be controlled to the nominated Legal Point of Discharge for the property it serves. In circumstances where side overflows will discharge onto a neighbouring property, the design of the box gutter system should be reviewed prior to construction to ensure the correct overflow provisions can be accommodated.

Who at the VBA reviews a performance Solution?

The VBA is not involved in the design process and does not approve performance solutions. The role of the VBA is to confirm that the mandatory documentation requirements of the PCA have been followed and confirm that an acceptable Verification Method has been used.

If a Performance Solution ticks every box as per the NCC requirements in conjunction with the ABCB process, can the VBA reject the Performance Solution and if so, on what grounds and who is the expert in the VBA reject these?

A VBA plumbing inspector or compliance auditor may reject a Performance Solution if they believe that the assessment methods used to verify that the Performance Solution are unacceptable.

It's not the role of the VBA to assess the design – please refer NCC Governing requirement A2.4.

Are you allowed to install a cover around the rainhead that has a 50mm space around it to keep the look neat and tidy but still has all overflow provisions?

The following is not specific to any particular product, however, where the rainhead is fitted with a shroud it forms a vertical chute or duct for which there is no DtS examples nor methods of sizing. AS/NZS 3500.3:2018, Figure I2 is a normative figure which depicts a compliant rainhead. Note 4 to this figure requires rainheads to be left open above the weir, which is expressed in mandatory terms. Statements expressed in mandatory terms in notes to figures and tables are deemed to be requirements of this Standard.

Can the downpipe be located anywhere within a high-capacity sump?

Downpipes from high-capacity sumps can be moved longitudinally but must not cross the centre line of the sump and the centre of the downpipe must not be further to the edge of the sump than; if round, the diameter of the downpipe, and if square or rectangle, the average of the 2 side dimensions of the downpipe.

Can 800mm & 1000mm wide box gutters be used?

800 mm or 1000 mm box gutters are outside the scope of AS/NZS 3500.3 and could only be designed, installed and certified as a performance solution.

How far below the rainhead is the downpipe to be vertical? Often there is a bend to offset the downpipe to the drain.

The standards do not specify a distance and only stipulate downpipes to be connected to the base of rainheads or sumps.

Is there a maximum length of a box gutter before a sump is required for a straight run only?

Box gutter length is only limited by the maximum design flow and the provisions for thermal variation e.g. expansion joints and expansion saddles must be at the high point of the gutter to prevent causing obstructions to flow.

NCC 3.5.3.5 notes maximum 12.0m gutter length for each downpipe – does this apply to box gutters too? Isn't roof area not considered too?

Victoria has a variation to NCC 2019, Volume 2, Clause 3.5.3.0 which states; *In Victoria, except for 3.5.3.0 - Acceptable construction manuals, Part 3.5.3 does not apply*. The Vic variation removes the acceptable construction practice (ACP) but keeps the acceptable construction manual (ACM) under 3.5.3.0. So, the variation only removes the ACP option, meaning both builders and plumbers need to comply with AS/NZS 3500.3 for the sizing and design of all roof drainage systems.

What is the maximum length of a box gutter in one slope direction?

There is no specific maximum length as such, but any box gutter must have appropriate expansion provision for the material used and it must also be noted that under the Deemed-to-Satisfy provisions of AS/NZS 3500.3 and not have a downpipe with a flow rate of greater than 16 litres.

Why is the bottom of the overflow above the bottom of the gutter?

Sumps and rainheads have different provisions for overflow. Box gutters that discharge to a sump require an increase in depth relative to the gradient. This is not the case for box gutters that discharge to a rainhead unless the gutter tapers toward the outlet. The hydraulic flow within a box gutter might discharge via the overflow rather than the outlet if the overflow was to be submerge into the sump.

Why is there a limit for the spreader to flow on the lower roof?

Spreader discharge is only limited to 15m^2 for tiled roofs or corrugated roof profiles. This catchment area can be increased provided the additional upper roof discharge does not exceed the lower roof profile manufacturer's design-carrying capacity, and the lower roof gutter and downpipes are sized to accommodate the additional flow.

How come there are no calculations for box gutters larger than 600mm?

There are no calculations for box gutters wider than 600mm as this is the maximum sole width that can be plotted from the standard.

Could it be worthwhile to do away with side overflow ducts and just have high-capacity overflows give the extent of calculations, they can still terminate the same?

The Deemed-to-Satisfy provisions provide options for both side and high-capacity overflow devices. Sumps with side overflows are prescribed by the standard and must discharge to atmosphere, sumps with high-capacity overflows can be piped to a safe location but are beyond the scope of the standards.

Why are not standard DtS rainheads and high-capacity sumps provided by suppliers for various flow rates and sole widths? This will reduce costs and reduce errors?

The VBA cannot speak for any specific manufacturers however, as there a several combinations of width and depth for rainheads and sumps depending on the design flow, this would be a very large range of products to produce. Additionally, the plumber would still be required to size the roof catchment areas to ensure they purchase the correct sized rainhead or sump.

Can it be clarified if all design and documentations should be by architects/draftsperson/building designer or plumber?

Building designs that incorporate box gutters rarely include box gutter sizing details. Instead, the approved plans should specify whether the box gutters are required to comply with AS/NZS 3500.3 or whether a performance Solution has been agreed. It is incumbent on the licenced plumber to confirm the compliance of the gutter when developing the incidental design for the site.

Can we use two smaller downpipes in lieu of one larger downpipe of same cross-sectional area as the two smaller?

As there are no examples of this within the Deemed-to-Satisfy provisions, this design would need to demonstrate compliance with the Performance Requirements of the Plumbing Code of Australia, through a Performance Solution.

Are nylon anchors approved for fixing flashings to parapet and building masonry walls? This is hard to discern this from HB39.

SA HB39 only states that the fixings are compatible to the materials being fixed and fit for purpose.

How are plumbers to interpret DtS box gutter sizing for very low flow rates below 3 litres per second when AS/NZS3500.3 chart only provides for greater than 3 L/s?

Design flows of less than 3 litres per second are beyond the scope of the standard.

How does the DtS rainhead accommodate hail protection for outlets?

The Performance Requirements for roof drainage systems set out in the Plumbing Code of Australia are based on extreme rainfall events and only require access for maintenance and clearing blockages. Similarly, the general method for sizing Deemed-to-Satisfy rainheads makes no allowance for blockages caused by snow, hail or debris.

Given the requirements of calculations, should this not fall upon a hydraulic engineer to calculate?

Under the definition of Roofing (Stormwater) Work, prescribed by the Victorian Plumbing Regulations 2018, a plumbing practitioner licenced in that class of work can perform the associated design. Additionally, where a Performance Solution is proposed a person who holds the relevant knowledge and experience may also develop the design.

Can a cap be installed to the top of a high-capacity overflow to prevent water from the roof constantly falling into the overflow from the roof?

A note in the AS/NZS3500.3 advises 'where water flowing directly into the overflow is a problem, a deflector or cap may be installed to divert the water' however, the standard does not provide a DtS provision for the deflector.

When the VBA carries out an audit of a DtS roof drainage installation, does the auditor request computations for the installation? Why or why not? The Audit Form simply asks, 'Has the roof drainage system been designed and sized properly?' Computations are required for all roof drainage installations, not just Performance Solutions.

A Plumbing Inspector or Compliance Auditor may request documentation if compliance with either a Performance Solution or Deemed-to-Satisfy solution is in doubt.

Are you able to clarify synthetic rubber expansion joints? The regulations seem to state gutters must overlap by 50mm under the rubber. Rubber manufacturer states a 50mm gap between gutters under the rubber. I've heard examiners are saying gutters must be lapped 50mm.

Synthetic rubber expansion joints should be installed in accordance with the standards and the manufacturer’s instructions to ensure the joint avoids pinching and is supported appropriately.

Can you explain again the approved size of box gutters in domestic application? Is 200x75 the minimum?

Box gutters that have minimum dimensions of 200mm x 75mm, or 300mm x 75mm are beyond the scope of the AS/NZS 3500.3, and as such they could only be designed through the Performance Solution process.

How can you provide a Deemed-to-Satisfy solution to an existing box gutter replacement when you'll be lucky to get even 75mm, which was the previous minimum? Will you have to reconstruct the gutter support?

The compliance pathway for roofing doesn't make any provision for like-for-like replacement, and instead only specifies what the Deemed-to-Satisfy provisions are. As a result, all new and replacement works need demonstrate compliance with the Performance Requirements of the National Construction Code, through either a Deemed-to-Satisfy or Performance Solution.

Is the minimum box gutter depth measured from the highest point or the point where box gutter meets railhead/sump?

The minimum box gutter depth is measured from the upstream end and increases in depth towards the sump, this ensures that box gutters discharging to a sump are at their deepest at the entry to the sump. For box gutters that discharge to a rainhead the minimum depth is measured in the same location (upstream end). The difference with a box gutter discharging to a rainhead is that it must still be on grade but is not required to increase in depth.

Why are sump overflows above the box gutter base height but that cannot be done for a rainhead?

Sumps and rainheads have different provisions for overflow. Box gutters that discharge to a sump require an increase in depth relative to the gradient. This is not the case for box gutters that discharge to a rainhead unless the gutter tapers toward the outlet.

High flow overflow devices have constant water run-off from the roof in all rains. What is the solution to stop this occurring?

A note in the AS/NZS3500.3 advises 'where water flowing directly into the overflow is a problem, a deflector or cap may be installed to divert the water' however, the standard does not provide a Deemed-to-Satisfy provision for the deflector.