



Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**
Building and Energy

Western Australia Guide to standards and tolerances 2019



The *Western Australia guide to standards and tolerances 2019* (the Guide) has been developed for use by builders and building owners as a convenient reference for acceptable standards of workmanship in residential building construction. It is intended to address areas that are not prescribed under legislation or under a home building contract.

Generally, parties to a building contract can agree on the standards they consider appropriate to their building project. Preferably, that agreed scope and standards of work are comprehensively detailed in the contract documents. Where it is not, there is risk of dispute at a later stage.

While the parties can agree on applicable standards, they cannot apply standards lower than those required by law.

The content of this Guide is based on technical standards and industry tolerances that describe (or refer to) what is considered an acceptable standard of finished workmanship in home building construction.

It should be understood that this is a guide only and that all other documents prescribing statutory and contractual requirements, relevant to the contract, take precedence over this guide.

Acknowledgement

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Introduction

Every year thousands of homes are constructed or renovated in Western Australia. While most building projects are completed successfully, occasionally there may be concerns or unmet expectations that result in a dispute.

Most domestic building disputes arise because of disagreements between building owners and builders about the appropriate standards and quality of work. Although the minimum necessary standards for critical aspects of construction are regulated, many other aspects are not.

Builders and building owners can help prevent disputes by agreeing on the standards and quality of workmanship appropriate for the project when they enter into the building contract, although they cannot apply standards lower than those regulated by Government. However, many domestic building contracts don't include an agreed scope of work and standards.

The *Western Australia Guide to Standards and Tolerances 2019 (the Guide)* has been developed for builders and building owners to use as a convenient reference to the minimum technical standards and quality of work. The Guide provides references to relevant areas of legislation and gives guidance on areas of building standards that are not covered by legislation. Building work that does not meet the standards outlined in the Guide could be considered not to have been carried out in a proper and proficient manner or are faulty or unsatisfactory.

The Guide can be used to help resolve disputes about the quality and standards of work. However, it should be understood that this document is intended as a guide only, all other documents stating statutory and contractual requirements take precedence over this Guide.

Authority of the guide

Each state and territory in Australia has legislated to require compliance with building standards and to control the key elements of a home building contract.

Regulated building standards are predominantly contained within the National Construction Code Series (NCC). Volumes 1 and 2 of the NCC comprise the Building Code of Australia (BCA). Plumbing standards are contained within Volume 3 of the NCC, known as the Plumbing Code of Australia (PCA). These codes are adopted into law by each state or territory in Australia. In a hierarchy, the regulatory framework for building and plumbing standards starts with the relevant Act of Parliament passes to regulations made under that Act, then to the NCC and finally to Australian Standards and other documents adopted by reference in the NCC.

The guide to standards and tolerance 2019 is only a guide and an advisory document. It is not a regulated standard and is not part of this hierarchy.

In Western Australia, the *Building Services (Complaint Resolution and Administration) Act 2011* (the BSCRA Act), section 5, provides that a complaint can be made to the Building Commissioner about a regulated building service not being carried out in a proper and proficient manner or being faulty or unsatisfactory. The BSCRA Act requires that the complaint be made within six years after the completion of the regulated building service.

The Department of Mines, Industry Regulation and Safety (DMIRS) and the State Administrative Tribunal provide dispute resolution services to owners and builders under the provisions of the BSCRA Act.

The Guide can be used to determine whether or not an item is defective only where this cannot be done by reference to the contract documents, the BCA or the relevant regulations. Where there is any contradiction or difference between the Guide and an Act, a regulation, the NCC or a building contract, all of these take precedence over the Guide. The Guide does not replace the requirements of these other documents.

Any reference throughout this document to the Building Code of Australia or BCA refers to the NCC, Volume 1 and 2. Any reference throughout this document to the Plumbing Code of Australia or PCA refers to the NCC, Volume 3.

Some Australian Standards are referred to (whole or in part) in the BCA. The referenced parts of these Australian Standards take precedence over this Guide.

Fittings, equipment and some materials used in buildings are often supported by manufacturer's installation instructions. The manufacturer's installation instructions take precedence over this Guide.

C

Application of the guide

The Guide is intended to inform parties as to what is an acceptable standard of workmanship in home building work. It should be noted that builders, subsequent owners and those purchasing from owner-builders or developers can also use this Guide to resolve possible disputes, irrespective of whether or not they were a party to the original building contract.

DMIRS encourages owners and builders to use the Guide to resolve disputes by themselves. Where agreement cannot be reached, a formal complaint may be lodged with DMIRS. Before initiating a complaint with DMIRS, read the important information provided on the DMIRS' website at

<https://www.commerce.wa.gov.au/building-and-energy/building-service-and-home-building-work-contract-complaints>

This edition of the Guide is valid from 1 May 2019 and is applicable to domestic building contracts entered into from that date, or domestic building work that commences from that date (where there is no domestic building contract).

D

The measurement of time

Any time period mentioned in the Guide is to be taken to start at the date of practical completion of the building work as it is legislated in the BSCRA Act, section 6.

Generally, the date of practical completion is the day when the work carried out under the contract is completed in accordance with the terms of that contract, or the day the permit authority is given a Notice of Completion (Form BA7) which must be given by the builder within 7 days of the completion of building work. A more precise definition should be given in the contract associated with the building work or in the case of a home building work contract, the definition given in the *Home Building Contracts Act 1991*, section 11(2).

E

The measurement of tolerances

The tolerances in this Guide apply up to and including the length over which each tolerance is stated to apply. It is not intended that tolerances will be interpolated or proportioned to the actual length of the building element measured. For example, where the Guide specifies a 4mm maximum deviation measured over a 2m length of wall surface, the Guide means that the same 4mm deviation is to be applied over a 1m wall surface or a 500mm wall surface.

The tolerance cannot be interpolated to mean a 2mm deviation over a 1m wall surface or 1mm deviation over a 500mm wall surface. Similarly, deviations over longer wall surfaces would be defects if the deviation exceeded 4mm within any 2m length of that surface.

Horizontal, vertical and diagonal surface tolerances are to be interpreted in the same way.

Horizontal surfaces

Deviations of a horizontal surface are to be measured from a datum nominated in the contract documents or inferred, if none is nominated. Where there is a nominated or inferred datum, the maximum deviation from that datum will not exceed the deviation stated in the Guide. Where no datum is nominated and a datum cannot be inferred, a datum level will be taken to be at the highest or lowest points in the building element, room or area being measured. Refer to Diagram E(i).

Horizontal flatness to be measured as shown in Diagrams E(ii) and (iii).

Vertical surfaces

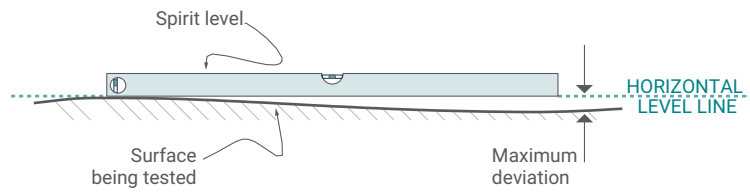
Deviations of a vertical surface from a true vertical plane are to be measured from a plumb line through a plan position or reference point nominated in the contract documents or inferred, if none is nominated. The maximum deviation of a vertical surface from that plumb line will not exceed the deviation stated in the Guide. Refer to diagram E(iv).

Vertical flatness to be measured as shown in Diagrams E(v) and (vi).

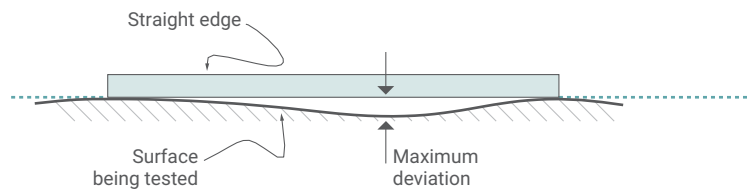
Where diagrams are provided for the clarification of details, the diagram shows only detail relevant to the issue and is not intended to be used as a general detail for construction.

DIAGRAM E MEASUREMENT OF HORIZONTAL TOLERANCES

i) Measurement of deviation from horizontal/level



ii) Measurement of bow



iii) Measurement of bow (horizontal flatness)

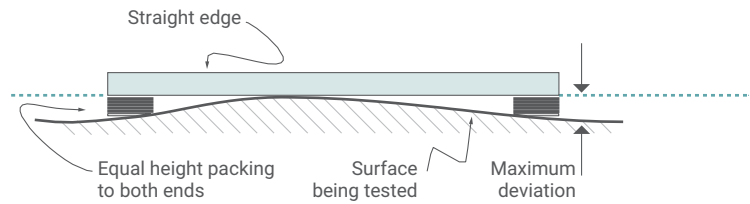
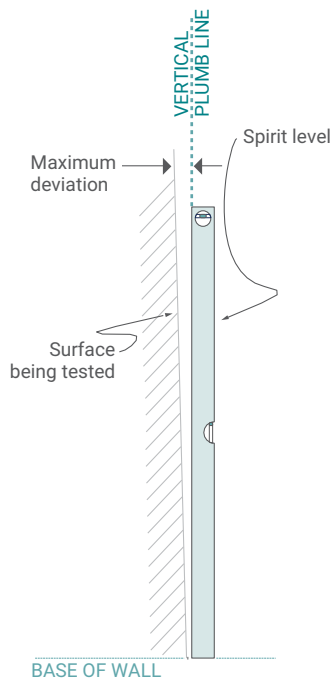
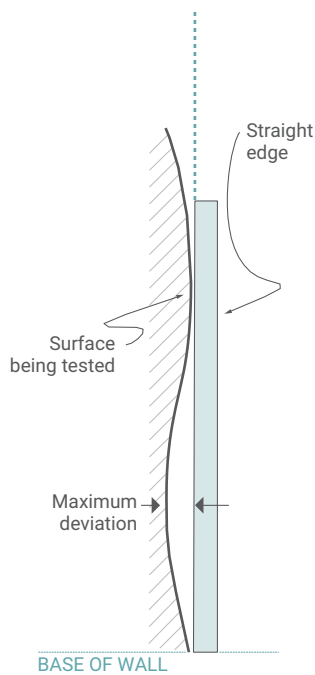


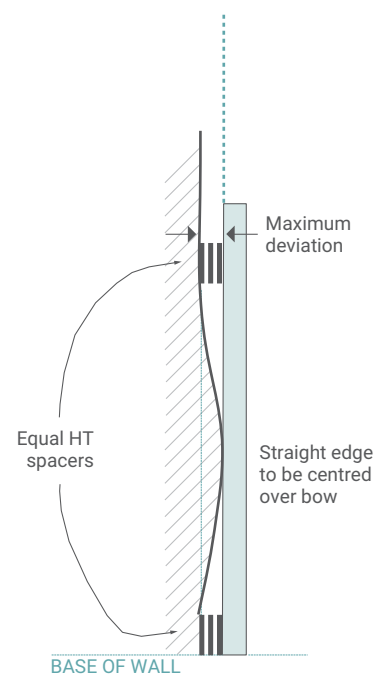
DIAGRAM E MEASUREMENT OF VERTICAL AND INCLINED SURFACES



iv) Measurement of deviation from vertical/plumb



v) Measurement of bow (surface flatness)



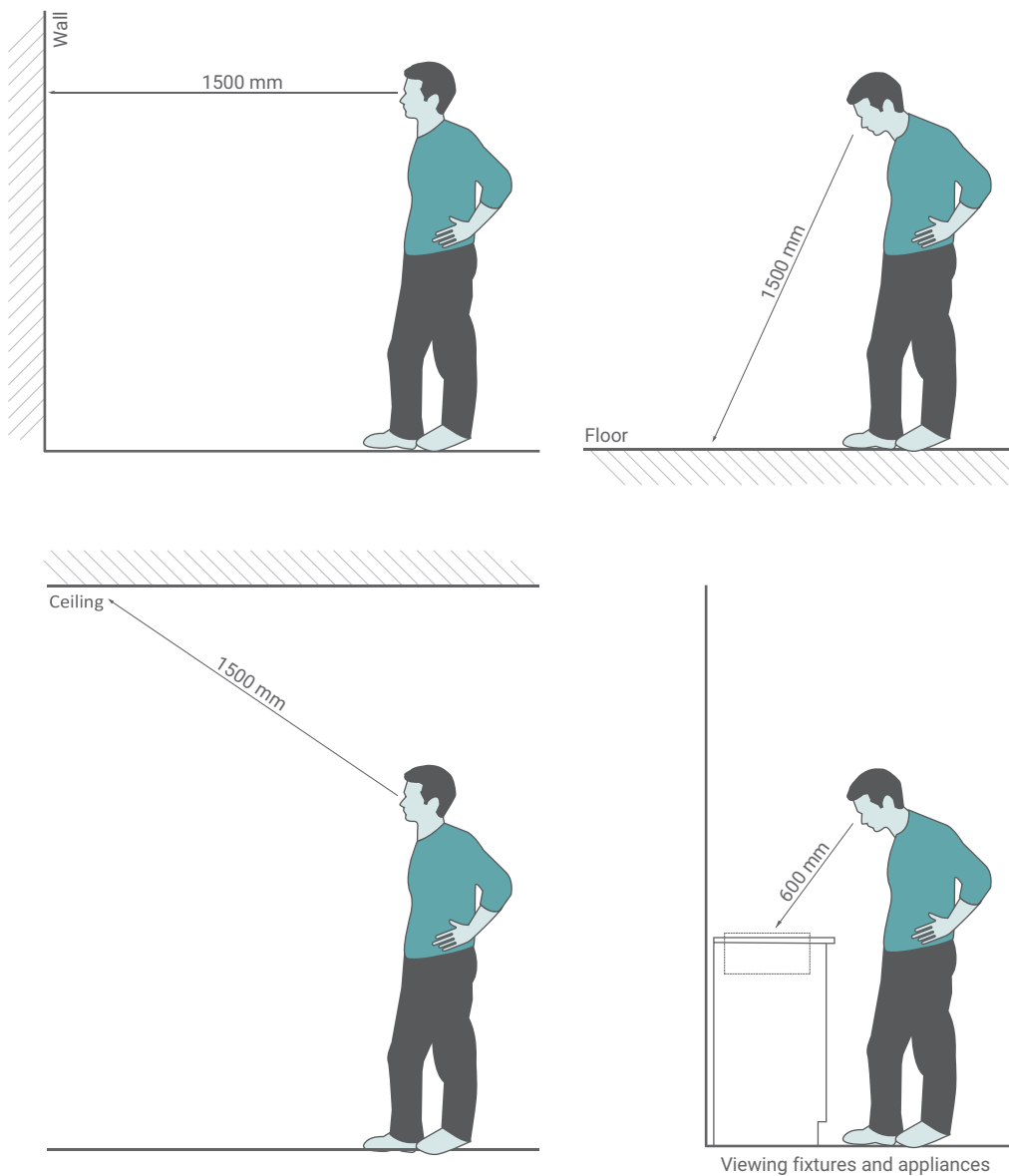
vi) Measurement of bow (surface flatness)

F

Inspecting surfaces from a normal viewing position

Generally, variations in the surface colour, texture and finish of walls, ceilings, floors and roofs, and variations in glass and similar transparent materials are to be viewed where possible from a normal viewing position. A normal viewing position is looking at a distance of 1.5m or greater (600mm for appliances and fixtures) with the surface or material being illuminated by 'non-critical light'¹. Non-critical light means the light that strikes the surface is diffused and is not glancing or parallel to that surface.

DIAGRAM F NORMAL VIEWING POSITIONS



Slight variations in the colour and finish of materials do not always constitute a defect.

1 Non-critical light is defined in appendix.B3 and D7 Australian Standard AS/NZS 2589. Refer also to CSIRO TR 90/1, Report No. L8 – 1992.

G

Remedial work

Remedial work is correction of defects usually required by the permit authority or DMIRS following a complaint against a builder.

It is envisaged that work to rectify defects will be carried out to match as closely as practical the surrounding materials, finishes, levels and other characteristics of the area to be rectified. In some circumstances, exact matching may not be possible.

Structural rectification work may need to be designed by a structural engineer and inspected or certified by a building surveyor or permit authority.

Some remedial work may need to be agreed by way of variation to a building permit or may require a new permit. If the changes affect the way in which the building or incidental structure complies with the building standards then a building permit application including a certificate of design compliance may be required to be submitted to the permit authority before the work is carried out.

H

Responsibility to rectify

A builder may not be liable to rectify building design and defects that do not arise from the builder's or the builder's subcontractor's work and design. Builders do not have to rectify damage caused by the owner's actions or those of other people engaged by the owner. Builders may be liable to repair damage caused to property in the course of completing their building work.

The following are examples of liability between the owner and the builder:

- a. A builder is unlikely to have to repaint a poorly painted wall that was painted by the building owner.
- b. A builder is unlikely to have to repair a distorted gutter when the damage was caused by an owner placing a ladder against the gutter.
- c. A builder is unlikely to have to repair a stormwater drain that was properly constructed and later blocked by tree roots.
- d. A builder is likely to have to replace untreated pine in an external deck that was installed by the builder instead of the durable timber required for this structure.
- e. A builder is likely to have to repair an existing window in a house that the builder accidentally damaged when constructing another part of the house.

Where there is subsequent damage to the building due to defective building work as a result of the:

- f. owner failing to keep the completed work reasonably maintained, or
- g. unreasonable delay by the owner in notifying the builder of the defect, the builder may not be liable to rectify or compensate the owner.

Where reference is made in the Guide to the 'builder's workmanship', 'work of the builder' or the like, this includes work by contractors or sub-contractors engaged by the builder.

I

Renovations, alterations and extensions

The standards and tolerances in this Guide only apply to the work covered in the relevant home building work contract.

It is recommended that before starting new work, the builder informs the owner of any potential circumstances and conditions of the existing building that may have a detrimental effect on the standard of the new building work.

The builder and owner should agree as part of their home building work contract, or as a written variation to that contract, on the extent of any necessary rectification works that may be required to be carried out to the existing building before commencing that work.

J

Recycled materials

The standards and tolerances in this Guide may not apply to construction with second-hand or recycled materials and products. Where there is a contract, the use of second-hand or recycled material must be stated in that contract. Second-hand or recycled materials and products must be fit for purpose and suitable for their proposed use.

K

Building maintenance - care of the building and site after completion

Building maintenance is an ongoing responsibility for all building owners to ensure their building continues to perform as intended.

Therefore it is recommended owners consider the information in Explanatory Note 2A at the start of Section 2 of this Guide. These documents and other similar documents discuss soil movement and its effects on buildings, including the effects of tree planting and site drainage. Owners can reduce the risk of cracking and damage to building structures by adopting the landscape care suggestions in these documents.

Refer to the following within this Guide:

- a. Explanatory Note at the start of Section 2
- b. Clause 2.01 – Foundation and site drainage – maintenance after occupation
- c. Clause 19.10 and 19.11 – Maintenance.

L

Australian standards and other referenced material

Where this Guide refers to Australian Standards or other reference material, the edition referred to is the one stated on the certificate of design compliance. In many cases this will be a document referred to in the edition of the Building Code of Australia referenced in the certificate of design compliance.

Where a contract specifies an alternative reference to the ones listed over the page, that reference may be applicable to the work. However, this does not override any statutory obligations to comply with the building legislation.

M

Schedule of references used in this guide

BCA 2019	National Construction Code Series, Volumes 1 and 2, Building Code of Australia
PCA 2019	National Construction Code Series, Volume 3 Plumbing Code of Australia
AS 1684–2010	Residential timber-framed construction
AS 1860.2–2006	Particleboard flooring – Installation
AS 2047–2014	Windows in buildings – Selection and installation
AS 2783–1992	Use of reinforced concrete for small swimming pools
AS 2796.1–1999	Timber – Hardwood – Sawn and milled products
AS 2870–2011	Residential slabs and footings
AS 3958.1–2007	Ceramic tiles – Part 1: Guide to the installation of ceramic tiles
AS 3958.2–1992	Ceramic tiles – Part 2: Guide to the selection of a ceramic tiling system
AS 3660.2–2017	Termite management – Part 2: In and around existing buildings and structures – Guidelines
AS 3700–2018	Masonry structures
AS 3727–2016	Pavements Part 1: Residential
AS 3740–2010	Waterproofing of domestic wet areas
AS 4654–2012	Waterproofing membranes for external above-ground use
AS 4386-2018	Cabinetry in the built-in environment – Commercial and domestic
AS 4773.2–2015	Masonry in small buildings – Construction
AS/NZS 1839–1994	Swimming pools – Premoulded fibre-reinforced plastics – Installation
AS/NZS 2311–2017	Guide to the painting of buildings
AS/NZS 2589–2017	Gypsum linings – Application and finishing
AS/NZS 3500.3–2018	Plumbing and drainage – Part 3: Stormwater drainage
HB 161-2005	Guide to plastering
CSIRO document BTF17 – June 2001	Building Technology File 17 – Plant roots in drains – Prevention and cure
CSIRO document BTF18 – Nov 2012	Building Technology File 18 – Foundation maintenance and footing performance: A homeowner’s guide
CSIRO document BTF19 – Feb 2003	Building Technology File 19 – A builder’s guide to preventing damage to dwellings: Part 1 – Site investigation and preparation
CSIRO document BTF22 – Aug 2003	Building Technology File 22 – A builder’s guide to preventing damage to dwellings: Part 2 – Sound construction method
CSIRO TR 90/1, Report No. L8	CSIRO Division of Building Research Report No TR 90/1 : Illumination and decoration of flat surfaces – 5th Edition (Revised)
ABC Handbook	Condensation in Buildings (2017) http://www.abcb.gov.au/Resources/Publications/Education-Training/Condensation-in-Buildings

Siteworks (paving and landscaping)

1.01 Cracking in concrete paving

Cracking in concrete is common and is not always attributable to unsatisfactory workmanship. Common causes of cracking include shrinkage stress, stress due to trees, commercial or heavy vehicle traffic, soil movement due to changes in the moisture content as a result of garden watering or drainage problems.

Cracking not attributable to the workmanship of the builder (e.g. trees planted too close to paving, commercial or heavy duty vehicle traffic, use of sprinkler system, etc.) is not a defect.

Cracking in concrete verandahs, garages, carports, paving, patios, driveways, etc. where the builder did not make allowances for shrinkage or general movement of the concrete (e.g. slip joints where required around penetrations such as verandah posts, pipes etc.) shall be assessed in accordance with Table 1.01 and is defective where the limits in that table are exceeded.

TABLE 1.01 CRACKS IN CONCRETE PAVING

Condition	Measure	Limit
Random cracking	Crack width	<1mm
Design profile	Variation between actual surface profile and design	<15mm
Flatness	Maximum deviation from a 3m straight edge (see Note 1)	<15mm
Stepping	Relative surface level of adjacent paving elements within the expanse of the main pavement (see Note 2)	<5mm
Subsidence	Offset under 1.5m length of the design profile (see Note 3)	<5mm

Taken from: AS 3727:2016 – Pavements Part1: Residential, Table: 2.2 Acceptance criteria. Reproduced with permission from SAI Global Ltd under Licence 1804-c061.

Notes to table 1.01

1. The straight edge is centred over the defect and supported at its ends by equal height spacers. The heave or slump is then measured relative to this straight edge. The flatness condition shall apply only to that part of a pavement in which its surface has been intended to be designed in one plane and that plane is greater than 3m in diameter.
2. The stepping criteria apply only to steps within the surface of the main pavement that are deemed to be in the same plane. It shall not be applied where the main pavement abuts other structures such as edging, drainage pits, service pits, minor pavements (such as a pathway adjacent to a driveway) and pavements constructed with materials of a different type.
3. The design profile shall be centred over the defect and supported at its end by equal height spacers. The change in offset shall be then measured relative to this design profile.
4. The performance criteria in Table 1.01 apply within the first 12 months after construction of the pavement.
5. The builder may be responsible for works after 12 months if not constructed in accordance with the standard (AS3727).
6. The 12-month period has been adopted as being long enough for a pavement to be subjected to in-service conditions and prior to undue influence of changing environmental conditions such as the effect of tree roots.

Slight variations in the colour and finish of materials do not always constitute a defect.

1.02 Finish to external concrete paving

Concrete paving finish is defective if it is not consistent in colour, texture and general appearance. Minor variations in finish may occur and may not be considered to be defective.

1.03 Surface drainage

The paving/landscaping should direct surface water away from the building.

Surface water drainage is defective if it is not in accordance with the requirements of the Building Code of Australia.

1.04 Retaining walls

As a general rule, each land owner is responsible for retaining soil when they alter the natural ground level. Site levels are altered by adding on top of or excavating below, the natural ground level.

Natural ground level, in relation to a development, means—

- the level approved, for the purposes of the development, by the local government, under a local planning scheme; or
- in any other case, the level which existed immediately before the commencement of the development (including any site works).

Retaining walls or other types of soil retaining methods are only required where the embankment slope is steeper than that described in the Building Code of Australia.

1.05 Dividing fences

The *Dividing Fences Act 1961* (the Act) combines with local government by-laws to regulate the erection and maintenance of dividing fences in Western Australia.

A dividing fence that is damaged during demolition or construction and where it can be shown to have been caused by the builder undertaking the work, will be considered a defect.

Footings, Slabs and Setting Out

Explanatory note 2A:

Footing systems and movement

Footing systems for residential buildings (new buildings or extensions) are designed and constructed according to the building legislation, site-specific soil classification, site conditions and requirements of the development; and can be adversely affected by many factors.

A footing system designed within these parameters is expected to move within acceptable limits to cope with the site-specific conditions. This movement may result in minor distress to the building, including cracking and gaps to the floors, walls and ceiling.

Therefore, distress can only be apportioned to the builder where the distress exceeds the tolerances specified in the Guide as a result of the builder's workmanship.

Abnormal moisture conditions causing building distress may be the result of many contributing factors including:

- landscaping and tree types and proximity;
- excessive and localised watering of gardens;
- poor building/site maintenance;
- water leaks (gutters, pipes and appliances); and
- adverse effects from adjoining properties.

Causes of building distress are often difficult to identify and explain, and on occasion it is difficult to identify the responsible party or parties.

Further information on foundation systems and movement can be found in the following reference material:

- CSIRO Document – Building Technology File 17 – Plant roots in drains – Prevention and cure
- CSIRO Document – Building Technology File 18 – Foundation maintenance and footing performance: A homeowner's guide
- CSIRO Document – Building Technology File 19 – A builder's guide to preventing damage to dwellings: Part 1 – Site investigation and preparation
- CSIRO Document – Building Technology File 22 – A builder's guide to preventing damage to dwellings – Part 2 – Sound construction method
- Australian Standard 2870–2011: Residential slabs and footings.

2.01 Foundation and site drainage – maintenance after occupation

The builder is not responsible for foundation movement caused by activities that were not documented at the time of entering into the contract or as variation to that contract, or that are undertaken by the owner. These include paving, landscaping, planting trees and drainage works after the site is handed over to the owner.

The builder is not responsible for foundation movement caused by the owner's failure to maintain drainage systems after the site is handed over to the owner.

Where contract documents state "stormwater by owner" or the like, does not exclude the builder from their responsibility under a building permit to comply with the specific stormwater disposal requirements.

Refer also to Item K of this Guide.

2.02 Footings and slabs

Slabs and footings are defective if they fail because they are not designed and constructed in accordance with the Building Code of Australia or AS 2870.

Slabs and footings are defective where foundation movement is caused by factors that were present during construction (e.g. poor founding material, excessive wetting and drying of site, number, type proximity and maturity of trees/shrubs or lack of site drainage). Slab and footing movement should be assessed in accordance with Table 2.10 and Table 3.02 of this Guide.

2.03 Setting out the building on the site

A building set out is defective where the set out has failed to comply with the requirements of the approved drawings, the allotment Certificate of Title, planning or development approval, relevant planning policies and schemes and building regulations.

Building work must not encroach over an allotment boundary unless authorised/approved to do so. A builder must ensure footings, gutters and any other part of the building work does not encroach an allotment boundary unless authorised/approved to do so.

Departures from documented set out of buildings are defects if the building is more than 50mm from its correct position and such deviation adversely affects the safe use or reasonable amenity of the building.

2.04 External building dimensions

Departures from documented external dimensions of buildings are defects if they exceed $L/200$ where L is the documented overall length of wall, or 5mm, whichever is the greater.

2.05 Measuring internal building dimensions

Unless shown otherwise, dimensions shown on drawings for internal walls always refer to the structure's dimensions. Structure means substrates such as masonry and timber or steel framing and does not include finishes such as plasterboard, render and skirtings. The internal room sizes will be different when thicknesses of internal finish materials are taken into account.

2.06 Building dimensions

Departures from the documented set out for service rooms such as bathrooms, toilets, laundries, kitchens etc. are defects if they exceed $L/200$ or 5mm, whichever is the greater, where L is the documented dimension.

Departures from the documented set out for habitable rooms and areas, such as bedrooms, dining rooms, lounge and living rooms, family rooms, studies, halls, entries and stairways are defects if they exceed $L/100$ or 5mm, whichever is the greater, where L is the documented dimension. Masonry work shall comply with Table 3.04.

Departures from documented set out for external elements such as garages, carports, verandahs, decks, patios, etc. are defects if they exceed $L/100$ or 5mm, whichever is the greater, where L is the documented dimension. Masonry work shall comply with Table 3.04.

The set out is defective where a specific fixture or feature is required to be accommodated, and such documented dimensions to accommodate that fixture or feature are not provided.

Ceiling heights shall be in accordance with the requirements of the Building Code of Australia, unless a greater height is specified in the contract.

2.07 Finished floor levels

Finished floor levels (FFL) or reduced levels (RL) are defective where they do not comply with specified planning and/or building permit requirements.

In other cases, FFL or RL are defective where:

- they depart from the documented RL or FFL by more than 40mm; or
- floors are documented to be on the same plane but are constructed on different planes; or
- the building work is an extension or addition and new floor levels do not match the existing building floor levels. Also refer to Item I of this Guide.

NOTE: Unless specified, finished floor level includes a screed topping, or permanent finishes such as terrazzo, ceramic tiles, slates or parquetry, but not a floor covering. Differences in height between an applied finish such as finishes detailed above and the top surface of the finished structural floor should not exceed the material thickness plus adhesive at the door threshold.

2.08 Levelness of concrete floors

Except where documented otherwise, new floors are defective if within the first 24 months of handover they differ in level by more than 10mm in any room or area, or more than 4mm in any 2m length. The overall deviation of floor level to the entire building footprint shall not exceed 20mm. Refer to Item I of this Guide where the new floor is to abut an existing floor.

2.09 Dimensions of building elements

Deviations from the documented height or cross-sectional dimension of building elements such as beams and posts are defective if they exceed $L/200$ where L is the documented dimension or 5mm, whichever is the greater.

2.10 Cracks in concrete slabs

Refer to Table 2.10 for descriptions of categories of cracks. Cracks to slabs are defective where they are Category 3 and 4.

Category 1 and 2 cracks to slabs are to be monitored for a period of 12 months. At the end of the monitoring period, cracks are defective if they are greater than category 2 and attributed to the actions of the builder.

TABLE 2.10 CLASSIFICATION OF DAMAGE TO CONCRETE FLOORS

Description of typical damage	Approximate crack width limit in floor	Change in offset from 3m straight edge placed over defect	Damage category
Hairline cracks, insignificant movement of slab from level	< 0.3mm	< 8mm	0 Negligible
Fine but noticeable cracks. Slab reasonably level	< 1.0mm	< 10mm	1 Very slight
Distinct cracks. Slab noticeably curved or changed in level	< 2.0mm	< 15mm	2 Slight
Wide cracks. Obvious curvature or change in level	2mm to 4mm	15mm to 25mm	3 Moderate
Gaps in slab. Disturbing curvature or change in level	4mm to 10 mm	> 25mm	4 Severe

Taken from AS 2870: *Residential slabs and footings – Construction*, Table C2: Classification of damage with reference to concrete floors. Reproduced with permission from SAI Global Ltd under Licence 1804-c061.

Notes to table 2.10

1. The straightedge is centred where possible over the defect, and supported at its ends by equal height spacers. The change in offset is then measured relative to this straightedge, which is not necessarily horizontal.
2. Local deviation of slope, from the horizontal or vertical, of more than 1:100 will normally be clearly visible. Overall deviations in excess of 1:150 are undesirable.
3. Account should be taken of the past history of damage in order to assess whether it is stable or likely to increase.

2.11 Finish to concrete slabs

The finish to a concrete slab is defective if it is not suitable for the documented applied finishes such as tiles, decorative concrete, carpet or sheet flooring, including set downs where required.

Where a concrete surface is not intended to have an applied finish it is defective within the first 12 months after completion of the works if it displays spalling, honeycombing or blow holes.

2.12 Repairs to exposed concrete slabs

Repairs, where failure has been due to cracking and/or movement, may involve the removal of the affected area. The repair is defective if it does not, as closely as practicable match the existing work in appearance, colour and texture. Minor variations in finish may not be considered to be defective.

Masonry

3.01 Masonry types

This section includes tolerances for generally-used types of masonry, including:

- a. clay and concrete brick construction;
- b. clay and concrete brick veneer construction; and
- c. concrete block construction.

The tolerances for the above may not always be appropriate for some types of masonry construction, such as pre-fabricated masonry panels, aerated concrete blocks, irregular cut stone, rustic finish masonry with irregular edges and appearance, etc. In these cases, parties must obtain the manufacturer's advice.

3.02 Damage to masonry walls

Refer to Table 3.02 for descriptions of categories of damage.

Category 3 or greater damage to walls is defective and requires investigation, stabilisation, monitoring and rectification work, which may include breaking out and replacing sections of the wall.

Category 2 cracks to walls are to be monitored for a period of 12 months. At the end of the monitoring period, a crack rated at Category 2 or above is defective and requires rectification. Category 2 damage is defective and requires minor repair work such as repointing.

TABLE 3.02 DAMAGE TO WALLS CAUSED BY MOVEMENT OF SLABS AND FOOTINGS AND OTHER CAUSES

Description of typical damage and required repair	Crack width limit	Damage category
Hairline cracks	< 0.1mm	0 Negligible
Fine cracks that do not need repair	< 1mm	1 Very slight
Cracks noticeable but easily filled. Doors and windows stick slightly	< 5mm	2 Slight
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weather tightness often impaired	5mm to 15mm (or a number of cracks 3mm or more in one group)	3 Moderate
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and doorframes distort. Walls lean or bulge noticeably. Some loss of bearing in beams. Service pipes disrupted	15mm to 25mm but also depends on number of cracks	4 Severe

Taken from AS 2870: Residential slabs and footings – Construction, Table C1: Classification of damage with reference to walls. Reproduced with permission from SAI Global Ltd under Licence 1804-c061.

Notes to table 3.02

1. Where the cracking occurs in easily repaired plasterboard or similar clad-framed partitions, the crack width limits may be increased by 50 per cent for each damage category.
2. Crack width is the main factor by which damage to walls is categorised. The width may be supplemented by other factors, including serviceability, in assessing category of damage.
3. In assessing the degree of damage, account shall be taken of the location in the building or structure where it occurs, and also of the function of the building or structure.

3.03 Movement; control joints in masonry walls

Where required, control joints are defective if not installed as required by the Building Code of Australia or in accordance with the contract documents.

Control joints are defective if they do not extend through the full thickness of masonry skin. Where required, control joints are defective if they are not sealed in accordance with AS 3700.

Unless documented otherwise, flexible mastic or sealant is defective if it does not match as close as practicable from available materials the colour of the adjacent surface, and has not been applied in accordance with the manufacturer's installation instructions.

3.04 Masonry construction

Masonry is defective if it exceeds the tolerances set out in Table 3.04.

Tolerances are necessary to allow for inevitable variations in the size of masonry units and inaccuracies in construction techniques.

TABLE 3.04 TOLERANCES IN MASONRY CONSTRUCTION

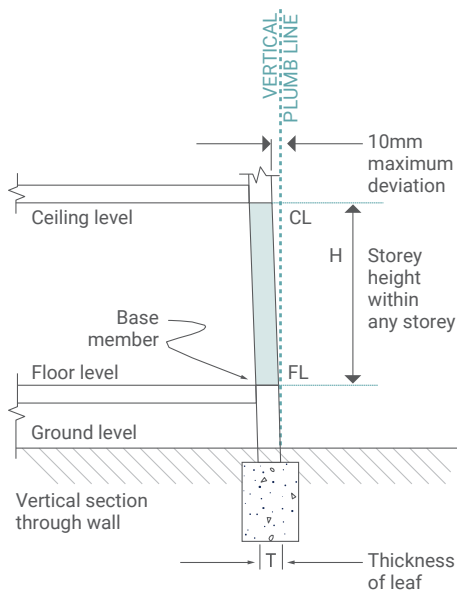
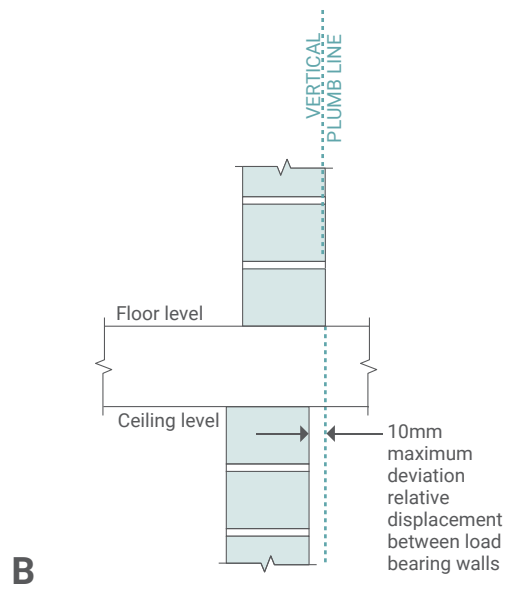
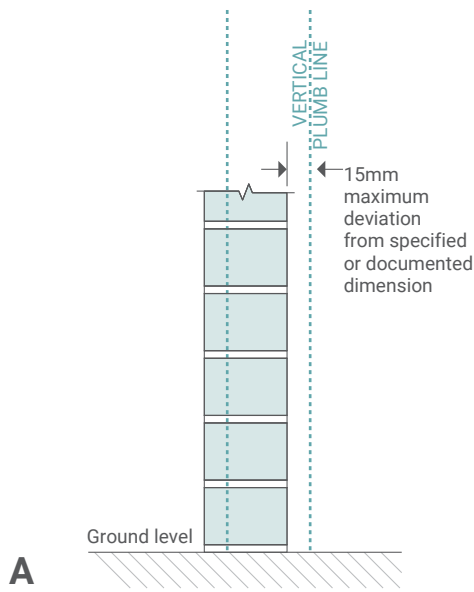
Item	Tolerance
A Horizontal position of any masonry element documented or shown in plan at its base or at each storey level	15mm
B Relative displacement between loadbearing walls in adjacent stories intended to be in vertical alignment	10mm
C Maximum deviation from plumb within a storey from a vertical line through the base of the member	The lesser of 10mm per 3m of height or 0.05 times the thickness of the leaf
D Maximum deviation from plumb in total height of the building (from the base)	25mm
E Maximum horizontal or vertical deviation of a surface from a plane surface (bow) in any 2m length (refer Appendix F in AS 3700:2018)	5mm
F Deviation (step) of any exposed masonry surface from any adjacent exposed masonry surface. The bow provision of Item E above also applies	2mm
G Deviation of bed joint from horizontal, or from the level documented or shown in elevation	10mm in any 10m length, 15mm in total Diagram 3.04(G)
H Deviation from documented thickness of bed joint	3mm
I Minimum perpend thickness	5mm
J Deviation from documented thickness of perpend	10mm maximum
K Deviation from documented width of cavity minimum width as required by the Building Code of Australia	15mm

Taken from AS 3700 – Masonry structures, Table 12.1: Tolerances in masonry construction. Reproduced with permission from SAI Global Ltd under Licence 1804-c061.

Notes to table 3.04

1. Items H, I and J are not applicable to thin-bed mortar joints.
2. Items I and J tolerances are not applicable when perpend joints are not filled with mortar as is the case with some horizontally cored masonry that is not required to resist horizontal bending.
3. Items E, F and I only apply to the true, fair or finish face of single skin masonry.
4. The tolerances within the table apply to each separate masonry panel face.
5. The nominal size of mortar joints is to be 10mm unless specified otherwise.

DIAGRAMS FOR TABLE 3.04 TOLERANCES IN MASONRY CONSTRUCTION

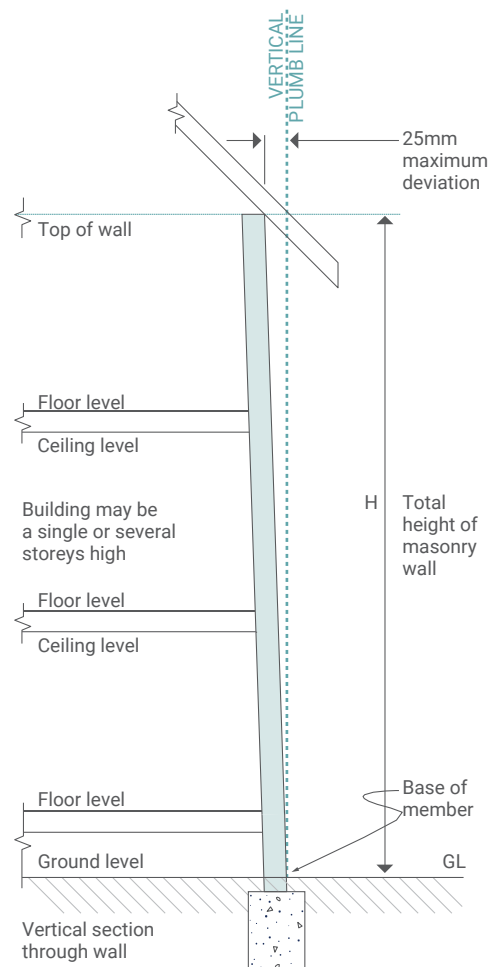


Formula:
Maximum deviation from plumb within any storey

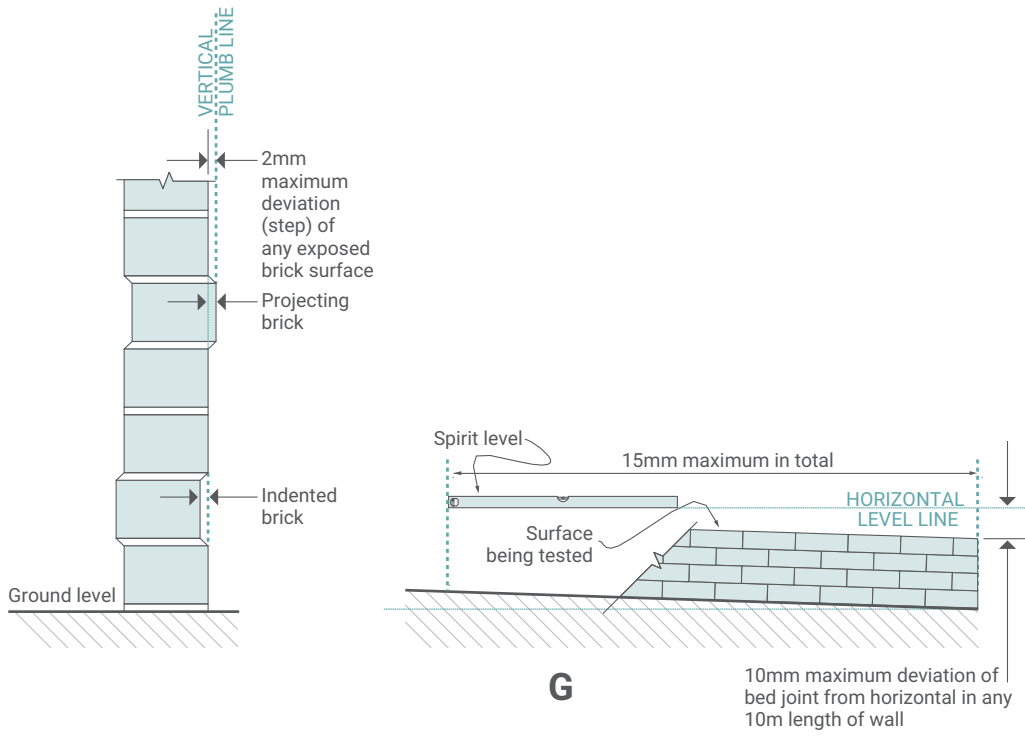
Structural lesser of $\pm \left(\frac{10H}{3}\right)$ or $\pm 0.05T$

H measured in m
T measured in mm

For example if a storey height,
H= 4000mm and leaf thickness,
T= 190mm. Tolerance is the lesser of
 $10 \times 4.0 \div 3 = 13.3\text{mm}$ or $0.05 \times 190 = 9.5\text{mm}$
i.e. 9.5mm

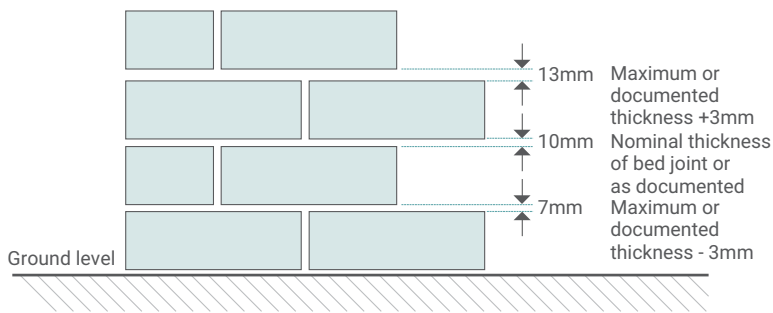


DIAGRAMS FOR TABLE 3.04 TOLERANCES IN MASONRY CONSTRUCTION

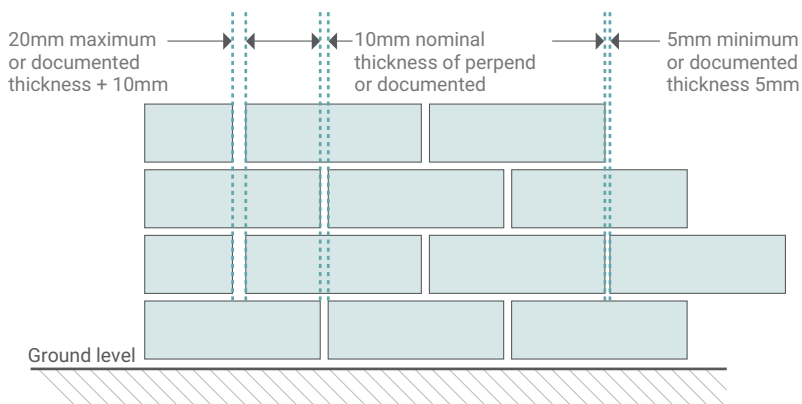


F

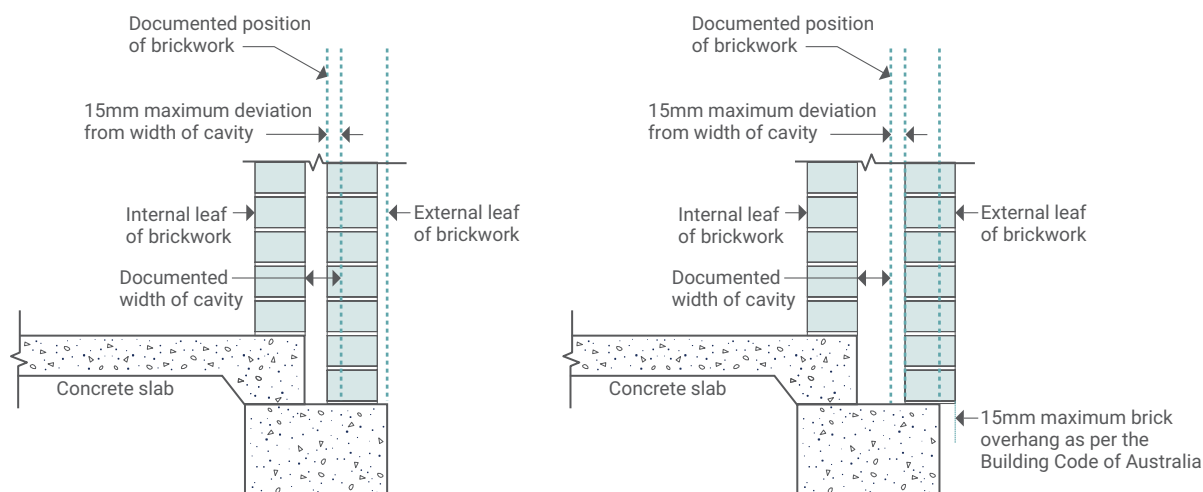
G



H



I, J



K Note: Refer to the Building Code of Australia for minimum cavity width.

3.05 Blending and matching of masonry – repair work

If matching masonry in alteration and repair work is not reasonably possible, builders should use a practical approach and where possible a physical joint, door, window, downpipes or other similar separating materials should be incorporated to 'break' the visual impact.

Mortar repairs are defective if they do not match the existing mortar as closely as practicable. A perfect colour match may not be possible and differences may diminish over time.

Some variation of masonry features such as colour, texture and pattern are to be expected between batches.

3.06 Blending and matching of masonry – new work

To avoid inconsistency in appearance, where practicable, masonry units for the building should be obtained from the same batch.

Masonry areas that vary in colour are defective if the units are not mixed and/or distributed in accordance with the manufacturer's installation instructions.

Display panels and display homes may be taken as representative of the range of variations to be expected.

3.07 Masonry facing

Unless documented otherwise, masonry is defective if it is not laid with true, fair or finish face outwards.

Unless documented otherwise, masonry faces are defective if they are not cleaned and free of excess mortar.

3.08 Mortar for masonry

Mortar is defective if it is not in accordance with the requirements of the Building Code of Australia or the contract specifications.

3.09 Voids and holes in mortar

Voids and holes in mortar in masonry walls, with the exception of weepholes and vents, are defective if they are visible from a normal viewing position.

Vertical joints in fully bedded masonry shall be filled with mortar unless otherwise specified. Vertical joints (perpend) may not require filling for horizontally cored units as per manufacturer's specific recommendations. All joints above openings should be filled.

3.10 Cracked masonry unit

It is characteristic of some masonry units to have surface cracks or crazing as part of the manufacturing process. These are not defective unless they result in the complete fracture of the unit or the crack exceeds 2mm in width.

Masonry units that are damaged, cracked or otherwise visually inconsistent with the overall characteristics of the masonry units are defective.

3.11 Cleaning, mortar smears and stains

Stains, mortar smears and damage caused by cleaning are defective if they are visible from a normal viewing position.

Vanadium salts (seen as a green or yellow efflorescence colour) or stain mainly seen on cream and light coloured clay bricks is defective if present at the time of completion where visible from a normal viewing position.

3.12 Masonry inside garages and similar spaces and under applied finishes

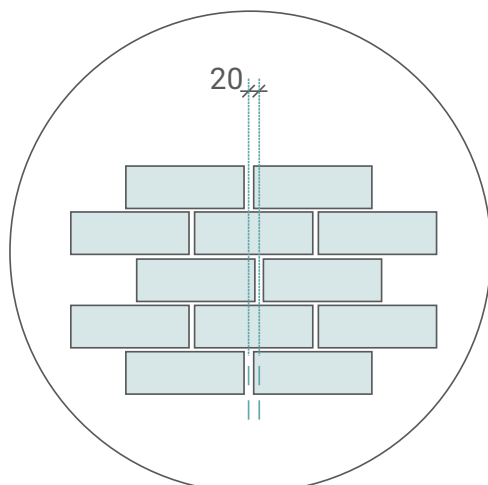
Structural masonry that is visible inside a garage or similar space or through an applied finish is defective if it does not comply with the tolerances set out in Table 3.04. However, these tolerances do not apply to the non-face side of single skin masonry.

Non-structural masonry that is visible inside a garage or similar space or through an applied finish is defective if it does not comply with the tolerances in Table 3.04. However, these tolerances do not apply to the non-face side of single skin masonry.

When there is an applied finish such as render, where the joints are not intended to be visible, masonry need not be saw cut and $\frac{1}{4}$ or $\frac{3}{4}$ units may be used in lieu of full masonry units.

3.13 Vertical alignment of perpend joints

A line of masonry perpend is defective if it exceeds a maximum deviation from vertical alignment of 20mm per 2m height of wall, measured from centre to centre of perpend joints.



3.14 Horizontal alignment of bed joints

Bed joints in walls including adjacent isolated piers and either side of openings and control joints are defective if they are not on the same horizontal plane, or do not comply with Item F of Table 3.04 of this Guide.

3.15 Base bed joint and base row of masonry

Exposed base bed joints above the finished ground level are defective if they exceed 20mm in thickness.

Base bed joints that are not exposed above the finished ground level are defective if they are greater than 40mm.

Split masonry units and units on edge used in the base course of masonry walls are defective if they are exposed.

3.16 Masonry that overhangs concrete slabs

A masonry course is defective if it is laid on a concrete slab or strip footing so as to project over the edge of the slab or footing by more than 15mm.

3.17 Damp proof courses

Damp proof courses are defective if they are not installed in accordance with the Building Code of Australia.

Rising damp occurring in any rendering or other applied wall coatings is a defect.

3.18 Raking of joints

Unless documented otherwise, mortar joints in masonry units are defective if they are raked out to a depth of more than 10mm or are not consistent (+/- 2mm) in depth throughout.

3.19 Brick sills, sill tiles and shrinkage allowance for timber framing

Window frames, sill tiles and sill bricks are defective if they are distorted or dislodged.

Eaves where the soffit and the masonry meet are defective if they are not installed with the minimum clearances set out in Table 3.19.

Brick sills are defective if they are not laid with a consistent slope to each elevation and adequate slope to provide drainage away from the opening.

Refer also to Diagram 3.19.

3.20 Efflorescence

Efflorescence is typically non-structural (apart from discoloration) and may be removed with a soft-bristled brush and washing with water. Although efflorescence may not be considered defective, the cause must be investigated so as to rule out any failed or missing flashings, damp proof course or design issues that may be the cause, in which case it would be a defect.

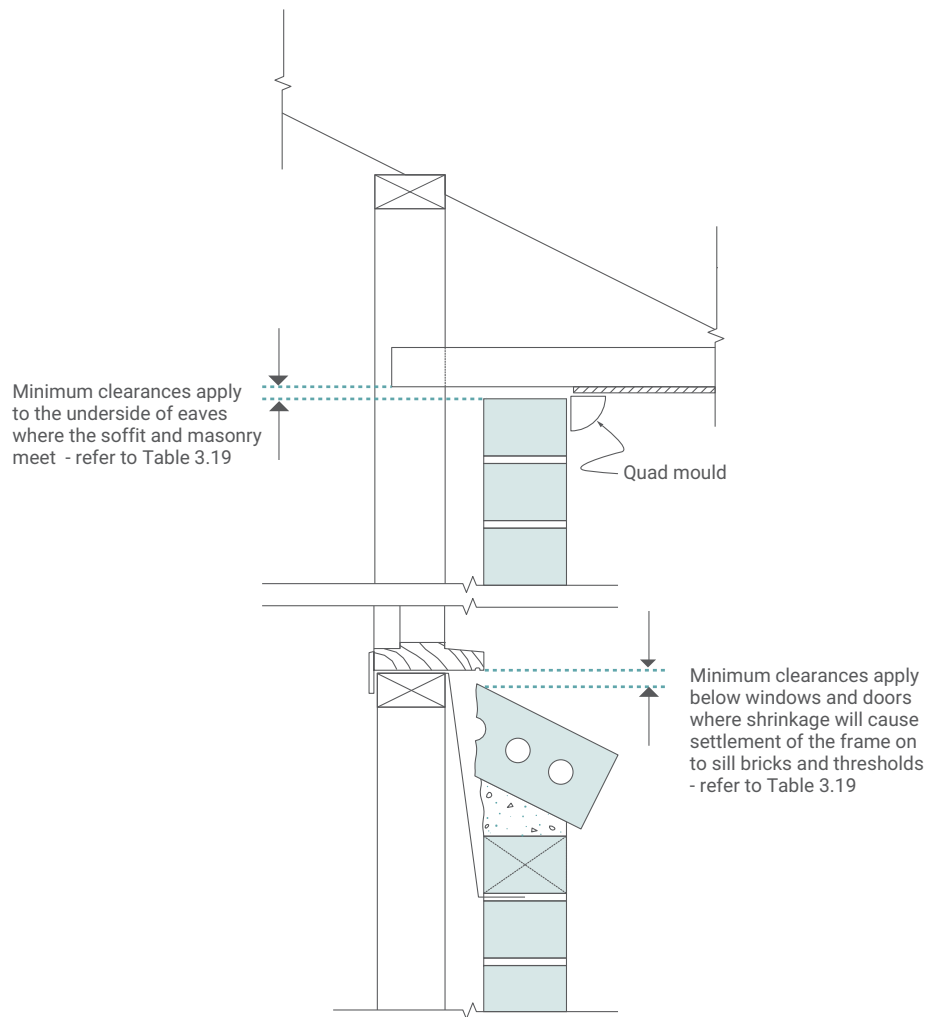
Other activities, such as watering plants, may also contribute to the efflorescence which may not be attributed to the work of the builder.

TABLE 3.19 SHRINKAGE ALLOWANCE FOR TIMBER FRAMING

Type of frame/construction	Approximate total shrinkage (mm)			
	Single storey		Two storey	
	Slab to lower floor	Timber to lower floor	Slab to lower floor	Timber to lower floor
Fully seasoned timber frame (bearers, joists and wall frame)	0	0	0	0
Seasoned softwood wall frame, unseasoned softwood joists, bearers in-line	0	10	10	20
Unseasoned softwood wall frame, seasoned joists and bearers	5	5	11	11
Unseasoned hardwood wall frame, seasoned joists and bearers	9	9	22	22
Unseasoned hardwood wall frame, unseasoned softwood joists, bearers in-line	9	19	32	42
Seasoned softwood frame, unseasoned hardwood bearers and joists	0	22	20	42

Taken from AS 4773.2-2010 - Masonry in small buildings - Construction, Table 9.1: Minimum clearance for timber framing shrinkage. Reproduced with the permission from SAI Global Ltd under licence 1804-c061.

DIAGRAM 3.19 SHRINKAGE ALLOWANCE FOR TIMBER FRAMING



4

Framing

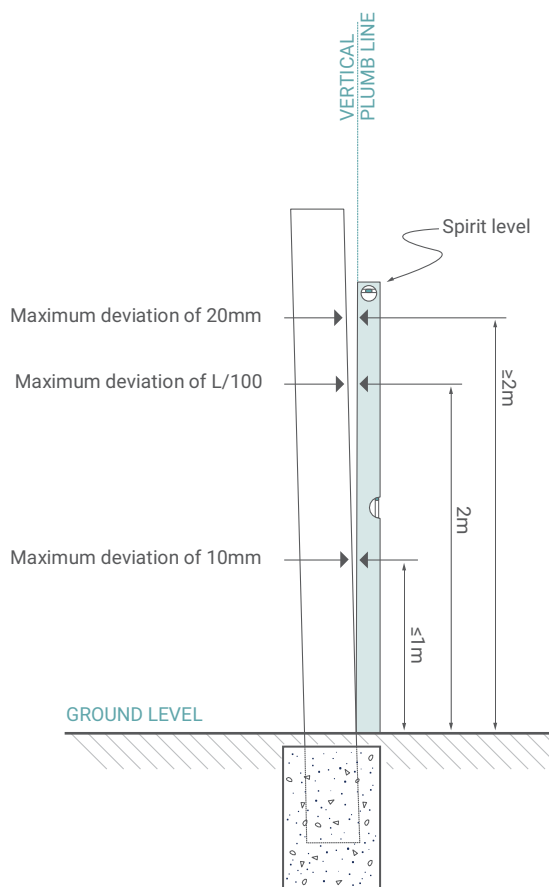
4.01 Verticality or plumbness of stumps or piles

Stumps or piles are defective if they deviate from vertical by more than:

- 10mm for stumps or piles up to 1m in height
- $L/100$ for stumps or piles up to 2m in height
- 20mm for stumps or piles greater than 2m in height.

A more stringent tolerance may apply for stumps less than 100mm wide. Refer to Diagram 4.01.

DIAGRAM 4.01 VERTICALITY OR PLUMBNESS OF STUMPS OR PILES



4.02 Verticality or plumbness of steel and timber frames and exposed posts

Posts and wall frames are defective if they deviate from vertical by more than 5mm over a 1.8m height. Refer to Diagram E on page 14 of this Guide.

4.03 Straightness of steel and timber frame surfaces

Frames are defective if they deviate from plane (horizontal or vertical bow) by more than 4mm in any 2m length of wall. Refer to Diagram E on page 14 of this Guide.

4.04 Packing under bearers

Packing to stumps or piers under bearers is defective if it is not made of durable, non-compressible materials (such as engineered plastic packers) or does not provide the minimum bearing area required by AS 1684, is more than a total thickness of 20mm, or is not fixed in a proper and proficient manner.

4.05 Packing under roof beams

Packing under roof beams is defective if it is not stable or made of durable, non-compressible material or does not provide the minimum bearing area required by AS 1684.

Unsuitable materials include unstable hollow cored bricks (laid on edge), timber that permits crushing or shrinkage and multiple shims.

4.06 Timber shrinkage

Timber is defective if it has shrunk more than 10 per cent for unseasoned timber, or three per cent for seasoned timber.

4.07 Treads and risers in timber stairs

Timber stairs are defective if they do not comply with the requirements of the Building Code of Australia.

The finished riser and going dimensions after installation of floor finishes nominated in the contract are defective if they do not result in consistent riser and going dimensions as required by the BCA.

A tolerance of up to 5mm for adjacent risers and 10mm between the largest and smallest risers consistent throughout the flight of the stair from the nominated dimensions in the approved documents, is considered acceptable.

4.08 Fixing stud walls to concrete slabs

Bottom plates are defective if they are not fixed to concrete slabs in accordance with AS 1684.

Depending on the manufacturer's requirements for the concrete nail/masonry anchor used and the required uplift pull-out force and wind category, the distance of the fixing from the edge of the slab is required to be between 50mm and 70mm for standard 20MPa concrete.

The fixing point cannot be less than five times the diameter of the fastener from the edge of the timber plate which equates to 25mm for a 5mm diameter nail and 50mm for a 10mm diameter masonry anchor.

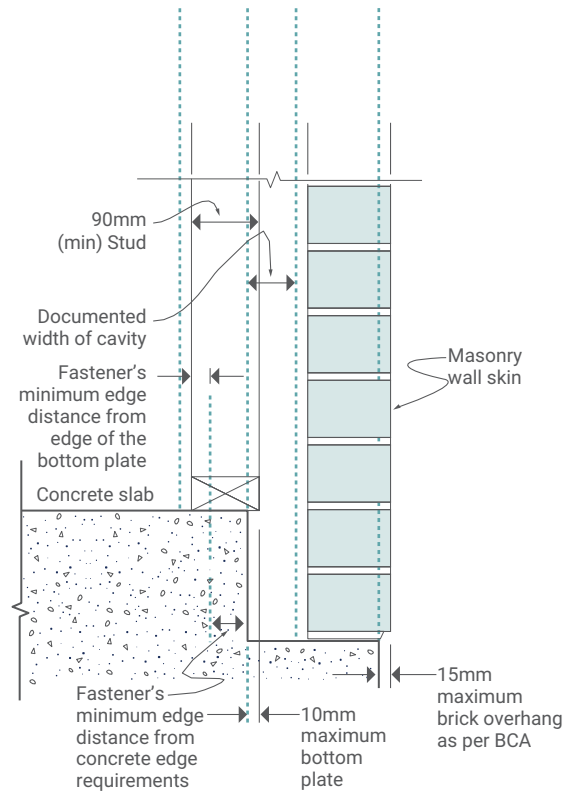
4.09 Bottom plates that overhang concrete slabs

Bottom plates that are less than 90mm wide and overhang concrete slabs are defective.

Bottom plates that are 90mm wide or greater and overhang concrete slabs by more than 10mm are defective.

Minimum cavity widths as required by the Building Code of Australia shall be maintained.

DIAGRAM 4.09 BOTTOM PLATES THAT OVERHANG CONCRETE SLABS



Wall cladding

5.01 Leaks in wall cladding

Completed wall cladding and accessories are defective if, due to the builders workmanship, they leak under normal weather conditions, cause unhealthy or dangerous conditions, loss of amenity for occupants, undue dampness or deterioration of building elements.

5.02 Wall cladding

Staining, folds, splits, dents, open joints between panels, cracking and other distortions in wall cladding are defective if they are visible from a normal viewing position at ground level or an upper floor level.

Any unintended corrosion of metal wall cladding is defective unless it is due to lack of maintenance by the owner.

Unless otherwise documented, joints between boards are defective if they are not staggered or occur in adjacent boards on the same stud or within the same span.

Roofing

6.01 Leaks in roofing, flashings and accessories

Roofing, including flashings and accessories, is defective if it leaks under normal weather conditions and is due to the builder's workmanship, causes unhealthy or dangerous conditions, loss of amenity for occupants, undue dampness or deterioration of building elements.

6.02 Roof cladding

Staining, folds, splits, dents, open joints between panels, cracking and other distortions in roof cladding are defective if visible from a normal viewing position at ground level or an upper floor level.

Any corrosion of roof cladding is defective unless it is caused by a lack of maintenance or damaged by the owner.

Painting of scratches that have occurred to pre-coated sheeting where not recommended by sheeting manufacturers will be considered a defect. Minor scratching will not affect the life of the sheet and where it is not obvious to the casual observer would not require replacement. Should damage be substantial, replacement of the affected sheeting will be required.

6.03 Roof tiles

Roof tiles are defective if they do not conform to the manufacturer's sample. Irregularities in tiles are defects if they are visible from a normal viewing position at ground or upper floor levels.

Minor surface marks or blemishes arising from the tile manufacturing process are not defective.

Cracked or broken roof tiles are defective if caused by the builder's workmanship.

6.04 Roof tile pointing

Unless documented otherwise, the absence of pointing where required is defective.

Pointing is defective if it becomes dislodged or washed out within 12 months of completion.

The pointing is defective if it is not uniform in colour and texture and trowelled off to provide a neat appearance.

The rectification of pointing shall match the existing colour and texture as close as practicable.

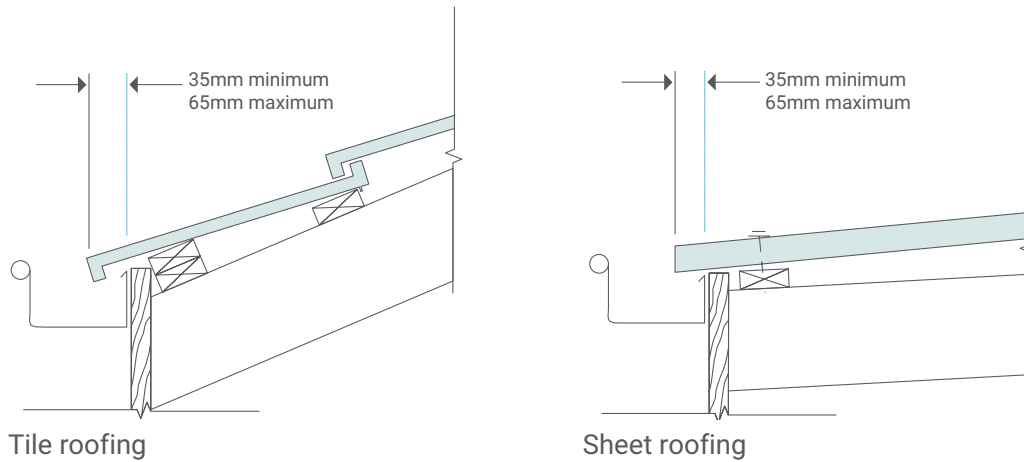
Minor cracking of pointing is not defective.

6.05 Overhang of roofing (tiles and sheet roofing)

Tiled roofing is defective if tiles overhang the inside face of a gutter by less than 35mm or by more than 65mm.

Sheet roofing is defective if it overhangs the inside face of a gutter by less than 35mm or by more than 65mm.

DIAGRAM 6.05 OVERHANG FOR ROOFING



6.06 Cutting of roof tiles

Tiles are defective if they are not cut neatly to present a straight line at ridges, hips, verges and valleys.

6.07 Roof valley construction

Roof valleys, where they are documented, are defective if they are not constructed in accordance with the Building Code of Australia or the manufacturer's installation instructions.

6.08 Undulating tiled roof lines

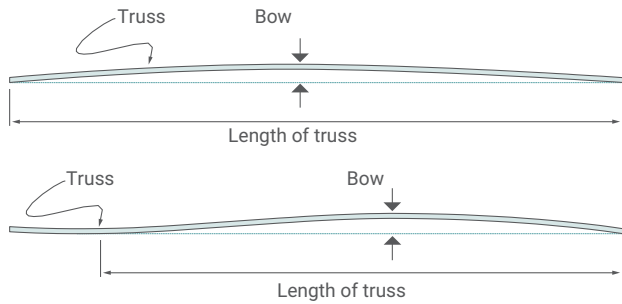
Undulations in the line of roof tiles are defective if the variation exceeds 20mm in any 4m length measured in the roof plane.

The gutter course of tiles is defective if it does not sit on the same plane as the remainder of the roof.

6.09 Alignment of trusses

Trusses or chords of trusses that bow more than the lesser of $L/200$ or 50mm are defective, where L is the length of the truss or chord.

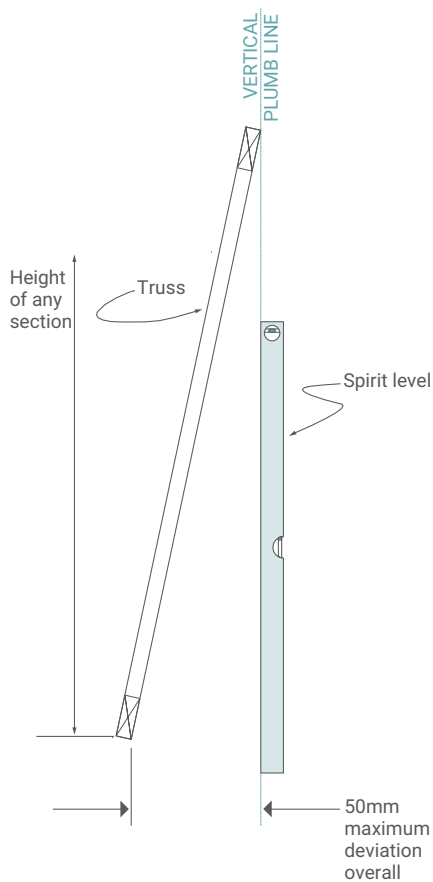
DIAGRAM 6.09 ALIGNMENT OF TRUSSES



6.10 Verticality or plumbness of trusses

Trusses or parts of trusses that are erected with a vertical deviation more than the lesser of $H/50$ or 50mm are defective, where H is the height of the truss.

DIAGRAM 6.10 VERTICALITY OR PLUMBNESS OF TRUSSES



Plumbing

7.01 Plumbing

Plumbing work is defective if it does not comply with the Plumbing Regulations, the contract documents and, where applicable, the Plumbing Code of Australia.

7.02 Water hammer

Water hammer is defective if it is caused by the plumber's workmanship. The slow closing of a tap is not considered an acceptable remedy.

7.03 Pipe penetrations through external walls and inside cupboards

Gaps around pipes are defective if they are not:

- a. properly sealed as appropriate: or
- b. fitted through neat minimal size penetrations (in the case of cabinetwork); or
- c. fitted with tight fitting cover plates or collars with penetrations kept to the smallest size practicable.

7.04 Water supply outlets

Water supply outlets (excluding hose taps) are defective if they are not located to discharge clearly into the vessels such as baths, basins, sinks, troughs or the like.

7.05 Water drainage from baths, basins, sinks, troughs or the like

Baths, basins, sinks, troughs or the like are defective if they retain a pool of water after they have drained, with the exception of water retention due to surface tension.

7.06 Discharge of water from evaporative air conditioners

Waste water that discharges onto roofs or into gutters and downpipes is defective, due to its corrosive nature.

7.07 Heated water use efficiency

The pipe from the heated water system or re-circulating heated water system to the furthest heated water outlet is defective if it exceeds 20m in length or 2 litres of internal volume.

Roof plumbing & gutter systems

8.01 Positioning of gutters

Unless documented otherwise, installation of gutters is defective if the fascia, when viewed from a normal viewing position, is:

- a. visible above a gutter; or
- b. not concealed by a flashing finished to match the gutter.

8.02 Installation of gutters

Gutters are defective if they allow rainwater to enter the building, even if the downpipes are blocked. Provision must be made to include overflow measures or the like.

8.03 Water retention in gutters

Gutters are defective if they retain a depth of more than 10mm of water.

8.04 Joints in gutters

Unless documented otherwise, gutters are defective if they have joints lapped less than 25mm. Laps that are not in the direction of flow to the outlet are defective.

Joints that leak are defective.

8.05 Down pipes

Unless documented otherwise, down pipes are defective if there is a decrease in the throat size at a change of direction or bend. Bends shall be made so that all tabs are folded to the sides of the downpipe to ensure full water flow.

Laps that are not in the direction of flow to the outlet are defective.

Joints that leak are defective.

Unless documented otherwise down pipes shall not be directly connected to storm water drainage. Downpipes that do not discharge efficiently over a drainage system grate are defective.

8.06 Fixing of gutters and downpipes

Gutters and downpipes are defective if they are not securely fixed.

8.07 Flashings

Flashings are defective if they are not provided in accordance with the requirements of the Building Code of Australia.

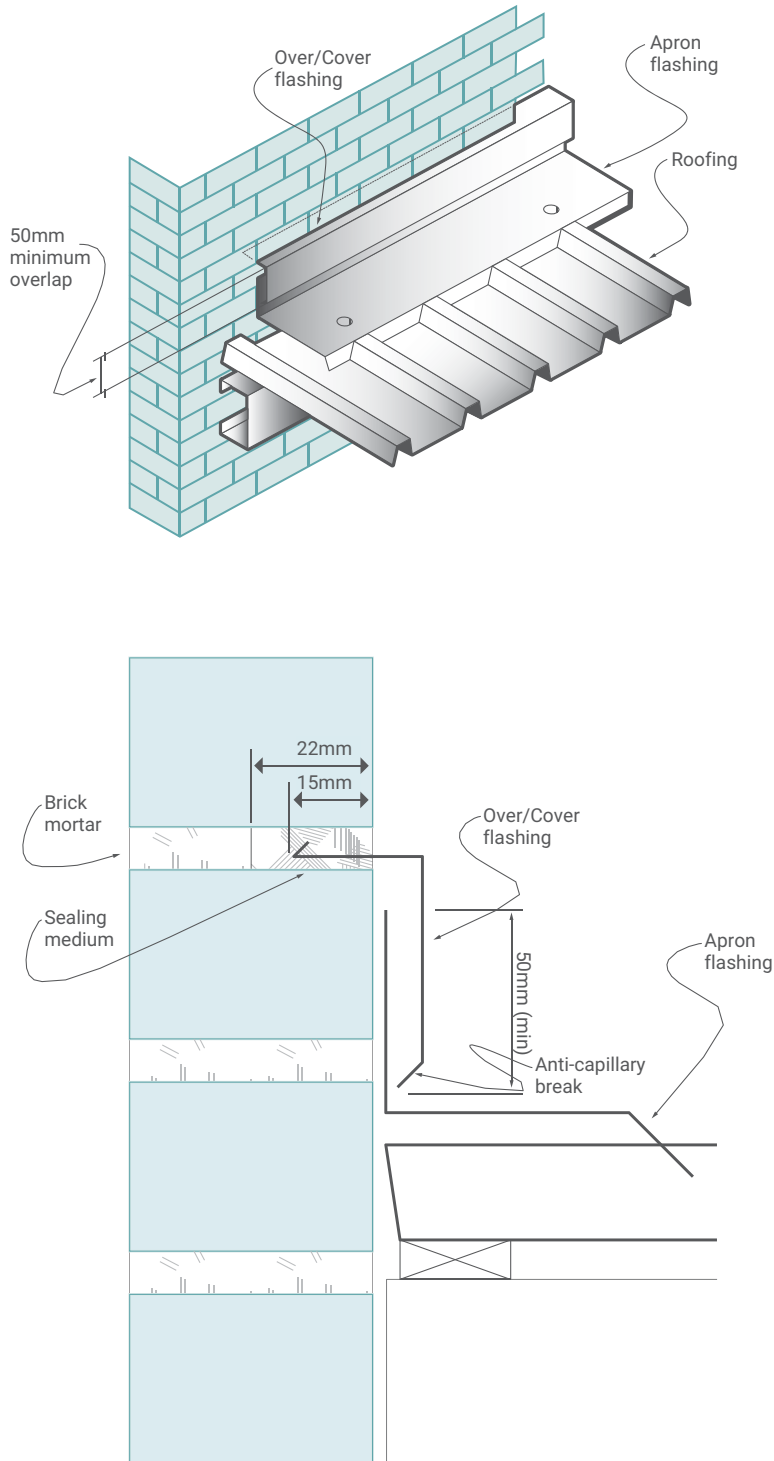
Wall and step flashings, and sloping flashings cut into walls are defective if they do not incorporate weathering folds, anti-capillary breaks and sealing, or do not enter the masonry walls by at least 15mm as shown in Diagram 8.07(A) and Diagram 8.07(B). Intermediate fasteners are defective if spacing's between fasteners exceed 500mm.

Pressure flashings are defective if they are not fixed on appropriate surfaces, or are not fixed in accordance with Diagram 8.07(C).

8.08 Parapet flashings/cappings

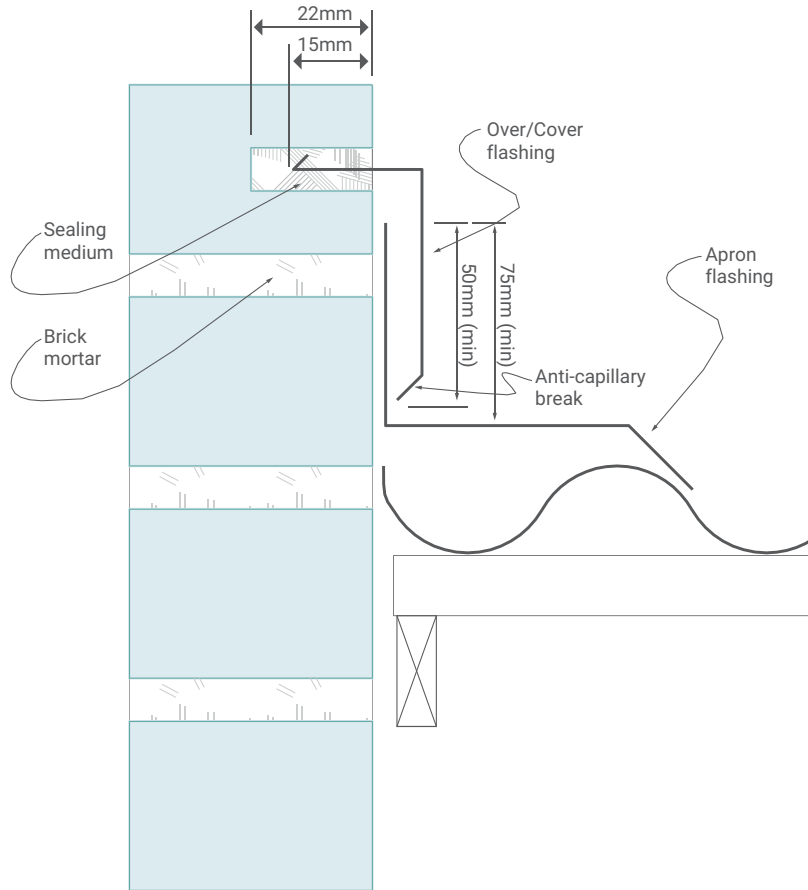
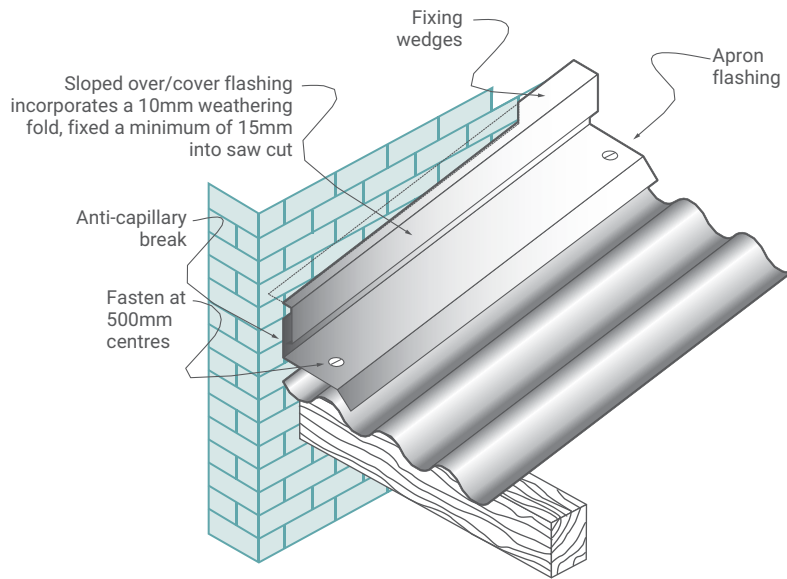
Parapet flashings/cappings are defective if a minimum fall of three degrees is not provided across the width of the flashing to divert water runoff from dripping down the fascia and causing unsightly staining.

DIAGRAM 8.07 FLASHINGS



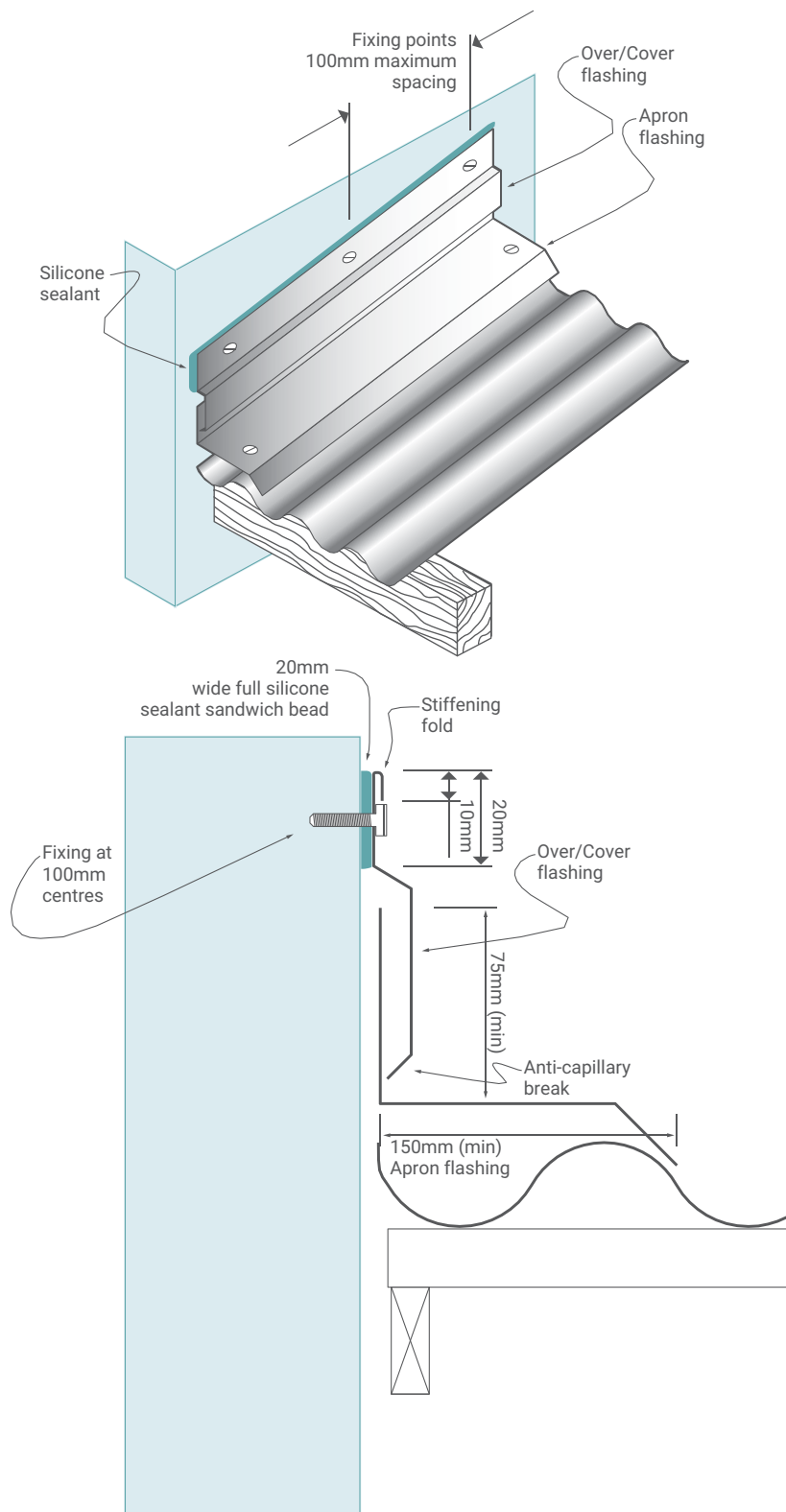
A Traditional raked joint and step method

DIAGRAM 8.07 FLASHINGS



B Sloping wall cut method

DIAGRAM 8.07 FLASHINGS



C Pressure flashing

Windows and doors

9.01 Installation of external windows and doors

Unless documented otherwise, external windows and doors are defective if they are not installed and flashed in accordance with the manufacturer's installation instructions and the Australia Window Association publications "Fixing - An Industry Guide to the Correct Fixing of Windows and Doors" and "Installation - An Industry Guide to the Correct Installation of Windows and Doors".

9.02 Weather-tightness of windows, doors, and window and door frames

Window frame and door frame installations are defective if, due to the builder's workmanship, they leak or cause unhealthy or dangerous conditions, loss of amenity for occupants, undue dampness or deterioration of building elements.

Windows and doors are defective if, when closed, they allow the entry of water.

Water entry through doors is not defective if they are not intended to prevent water entry. For example, vehicle access doors.

Windows and doors are defective if they are not sealed in accordance with the requirements of the Building Code of Australia, where required.

9.03 Door furniture

During the documented maintenance period after completion, handles, locks and latches are defective if they do not operate as intended by the manufacturer. If the maintenance period is not documented, four months is the assumed time period after completion.

After the end of the maintenance period, failure is not a defect unless it is caused by the builder's workmanship or a faulty product supplied by the builder.

9.04 Internal door clearances

Unless documented otherwise, the installation of doors is defective if, within 12 months of completion:

- a. Clearances between door leaves and frames, and between adjacent door leaves are not uniform.
- b. Clearances between door leaves, or between a door leaf and the frame, are less than 2mm or greater than 5mm in width.

Unless additional clearance is required for removable toilet doors or air ventilation, a clearance between the door and the floor finish is defective if it is greater than 20mm after installation of the floor covering.

Note: Clearances under doors will generally be determined by the nominated floor coverings.

9.05 Distortion of doors

Door leaves are defective if, within 12 months of completion, they twist or bend greater than the limits listed in Table 9.05. Any distortion that prevents the door from not latching or locking is defective.

TABLE 9.05 DISTORTION OF DOORS

Item	Limit
Twisting measured diagonally across door	5mm
Bending in door heights up to 2150mm high	4mm
Bending in door heights between 2150 and 2400mm high	6mm
Bending in door heights over 2400mm high	7mm
Bending in door widths up to 1020mm wide	2mm
Surface (face) misalignment, at the meeting edges of double swing or French doors, when the doors are fully closed	5mm

9.06 Sealing of door edges

Door leaves are defective if they do not have all sides, top and bottom edges (including behind door seals) sealed/painted in accordance with the manufacturer's specifications.

9.07 Operation of windows and doors

The installation of doors and windows is defective if, within twelve months of completion, they:

- a. bind or jam as a result of the builder's workmanship; or
- b. do not operate as intended by the manufacturer.

9.08 Bowed window heads, sills and jambs

Windows frames are defective if they are distorted to the extent that the function of the window is adversely affected.

Refer also to Item 3.19 – Brick sills, sill tiles and shrinkage allowance for timber framing.

Explanatory Note 10A:

When assessing the finish of a plaster surface, consideration should be given to the tolerances set out in HB 161-2005 Guide to plastering.

Vertical, plumbness and straightness of internal and external wall surfaces**10.01 Verticality or plumbness of internal and external wall surfaces**

Plastered wall surfaces and other vertical structures are defective if they deviate from vertical by more than 6mm over a 2.4m straight edge. Refer to Diagram E on page 14 of this Guide. A more stringent tolerance of 4mm over a 2.0m straight edge will be required where tiling is to be installed on to the plaster surface using a thin-bed adhesive.

10.02 Flatness of internal and external wall surfaces

Walls are defective if they deviate from the plane (bow) by more than 3mm over a 2.4m straight edge. This tolerance includes internal walls with a build-up of plaster at internal and external corners of the plasterwork. Refer to Diagram E on page 14 of this Guide.

10.03 Matching and repairing existing rendered surfaces

The builder must try to match existing work.

In some instances this may not be possible as the original finish may have significantly aged or the material composition may be impossible to determine without expensive research.

When matching an existing finish, a practical approach must be adopted, and where possible a physical joint, door, window, downpipe or other similar separator should be incorporated to lessen the visual impact of the new work. Where this is not possible, the whole of that wall from corner to corner should be re-finished.

Where appropriate, defective work such as cracking should be monitored for 12 months or any other agreed period before determining what, if any, remedial work is required.

10.04 Cracking and other blemishes in rendered or hard plastered surfaces on a masonry substrate

Explanatory note 10B:

When assessing cracks in Item 10 of this Guide, Explanatory Note 2A at the start of Item 2 should be taken into consideration.

Assess damage categories and defects in rendered or hard plastered surfaces on a masonry substrate where the crack originates in the masonry, in accordance with Item 3.02.

Where cracking is only present in the render or hard plastered surface, defects are to be assessed in accordance with Table 10.04.

Cracking that occurs in a plastered surface as a consequence of structural movement or material shrinkage is considered to be unacceptable if the severity of the cracking exceeds that outlined in Table 10.04.

The soil classifications used in Table 10.04 below are foundation classes defined for housing in AS 2870. The degree of movement of the footings over time is related to the class of the site.

TABLE 10.04 Recommended crack limits for site soil classes A, S and M

Description of typical cracking	Approximate max. crack width (mm)		
	A	S	M
Vertical cracks above window openings spaced no closer than 600mm average over span.	>0.2	>0.4	>0.6
Stepped cracks above and below windows and above doors in the cavity wall.	>1.0	>1.5	>3.0
Stepped cracking above interior door openings	>0.2	>0.5	>2.5
Vertical cracks at locations of electrical or gas chasings.	>0.3	>1.5	>3.0
Stepped cracks in internal and external walls	>0	>1.5	>3.0
Vertical cracks at corners of intersecting walls.	>0.3	-	-
Vertical cracks not at locations of chasing.	>0.15	-	-
Cracking around individual blocks or bricks.	>0.05mm but must not be casually observed from a distance of 2.0m under normal light and moisture conditions		
Cracks not covered by above.	>0.05mm but must not be casually observable from a distance of 2.0m under normal light and moisture conditions		

Taken from HB 161-2005 Guide to plastering, Table 9 - Recommended crack limits for site soil classes A, S and M. Reproduced with permission from SAI Global Ltd under Licence 1804-c061.

Obvious spot rust marks, due to the composition of the material and other blemishes are defective if they are visible from a normal viewing position.

10.05 Bond failure in rendered or hard plastered surfaces on a masonry substrate

Bond failure between a plastering system and the surface of a masonry wall, concrete ceiling or soffit is defective if it has occurred:

- a. within an area in excess of 200mm in any direction; and
- b. the area of bond failure is in excess of 4 per cent in any square metre of surface of the plastering system.

10.06 Repairs to applied finishes

Repairs to surfaces that have been rendered are defective if they do not match the colour and texture of the remaining wall or adjacent area as close as practicable.

10.07 Movement; control joints – provision and cracking

Unless documented otherwise, cracks in rendered surfaces as determined in accordance with Item 3.02 of this Guide are defective if recommended movement control joints have not been installed.

10.08 Covering movement control joints and damp-proof courses

Mouldings and inflexible covering strips are defective if they are installed across movement control joints and are fixed or restrained on both sides.

Applied finishes are defective if they impede the performance of any damp-proof course or sub-floor ventilation required in accordance with the Building Code of Australia.

With the exception of paint and recommended mastic sealants, render or other applied finishes are defective if they cover movement control joints.

Unless documented otherwise, flexible mastic or sealant is defective if it does not match as close as practicable from available materials the colour of the adjacent surface and has not been used in accordance with the manufacturer's installation instructions.

10.09 Cracking in applied finishes used over lightweight substrate

Cracks or open joints in finishes applied to lightweight substrate are defective if they exist at handover or exceed 1mm in width within the first 24 months and can be seen from a normal viewing position².

Cracks or open joints in finishes applied to lightweight sheet substrate are defective if they allow the ingress of water.

10.10 Rendered surfaces

Rendered or hard plastered surfaces are defective if they do not conform to the documented surface, sample or description.

10.11 Cracking in external mouldings

Cracks in mouldings and/or other architectural features, including joints between those features and adjacent surfaces, are defective if they exist at handover or exceed 2mm in width within the first 24 months and can be seen from a normal viewing position.

2 Where diagonal cracking occurs, the underlying cause should be considered.

Internal plastering

10.12 Plasterboard sheeting

The installation and jointing of plasterboard sheeting systems is defective if it does not conform to AS/NZS 2589 and the manufacturer's installation specification.

10.13 Other sheeting systems

Defects in the installation of other sheeting systems, such as fibre cement sheeting, shall be assessed in the same manner as plasterboard sheeting.

10.14 Level of finish for plasterboard

Unless documented otherwise, a plasterboard finish is defective if Level 4 finish (as defined below) is not provided.

Level 4 finish³

A Level 4 finish shall be the default level for gypsum lining, unless specified otherwise. Flat or low sheen paints shall be used for this Level 4.

All ceiling and wall joints and interior angles shall have tape embedded in jointing cement/jointing compound and a minimum of two separate coats of jointing cement/jointing compound applied over all joints, angles, fastener heads and accessories.

All jointing compound shall be finished evenly and be free of tool marks and ridges in preparation for decoration.

Notes:

1. In critical lighting conditions, surface imperfections may still be apparent in a Level 4 surface finish.
2. Where gloss, semi-gloss and deep tone paints are used, surface imperfections will be more evident.

10.15 Cracking in plasterboard, hard plaster and other plaster elements

Cracking in walls, ceilings and bulkheads is defective if it exists at handover or exceeds 1mm in width within the first 24 months of completion and can be seen from a normal viewing position.

Cracking in recessed and butt joints is defective if it exists at handover or exceeds 1mm in width within the first 24 months of completion and can be seen from a normal viewing position.

³ [AS/NZS 2589 Gypsum linings – Application and Finishing – Clause 3.1.4 – Level 4] – Reproduced with permission from SAI Global Ltd under Licence 1804-c061.

10.16 Cracking in cornices

Cracking of cornice joints such as butt joints and mitres, and at junctions with walls and ceilings, is defective if it exists at handover or exceeds the tolerance set out below within the first 24 months of completion and can be seen from a normal viewing position where:

- where the plastering system becomes loose by more than 10mm below the underside of the cornice;
- where the cornice has pulled away from the wall by more than 2mm;
- where the cornice pulls away from the ceiling by more than 1mm;
- where a crack occurs through a joint or change in wall direction (corner) and is larger than 1mm; or
- where a crack occurs through the body of the cornice and can be seen from a normal viewing distance.

10.17 Cracking at junctions of dissimilar materials

Cracking at junctions between dissimilar materials is defective if it exists at handover or exceeds 1mm in width within the first 12 months of completion and can be seen from a normal viewing position.

After the first 12 months, cracking that exceeds 2mm is considered defective⁴.

10.18 Straightness and alignment of plaster cornices

Plaster cornices are defective if they deviate from a straight line greater than 4mm over a length of up to 2m and are visible from a normal viewing position.

10.19 Flush joints in plasterboard

Plaster peaking or jointing is defective if it is visible from a normal viewing position⁵. Further reference can be obtained from clause 4.7 Assessment of the surface condition at handover of AS/NZS 2589.

Screw/nail popping

10.20 Screw or nail popping in surfaces

Screw or nail popping in sheeting is defective if it exists at handover or occurs within the first 24 months of completion and can be seen from a normal viewing position.

⁴ Consider installing movement control joints or mouldings in these locations.

⁵ CSIRO Report No L8 and TR90/1 Illumination and decoration of flat surfaces should also be consulted.

Internal fixing

11.01 Gaps associated with internal fixing

Unless documented otherwise, gaps between mouldings or between mouldings and other fixtures, at mitre or butt joints, or at junctions with a wall or other surfaces, are defective if they exist at handover, or exceed 1mm in width within the first 12 months of completion and are visible from a normal viewing position.

After the first 12 months, gaps are defective if they exceed 2mm in width and are visible from a normal viewing position.

Gaps between skirting and flooring are defective if they exceed 2mm within the first 24 months after handover and are visible from a normal viewing position.

11.02 Joints in fixing of internal mouldings

Unless documented otherwise, the faces of architraves and skirtings are defective if they are not aligned and flush at mitres and butt joints and the misalignment can be seen from a normal viewing position.

11.03 Architrave quirks

The width of the quirk (set back from the edge) of each length of an architrave is defective if it is not consistent and where the irregularity can be seen from a normal viewing position.

11.04 Bench tops, cabinet doors and drawer fronts⁶

Unless otherwise specified, cabinet door and drawer fronts are defective if they are not aligned, or do not have consistent gaps between them at handover and can be seen from a normal viewing position.

Where the time limit for defects in bench tops, cabinet doors, drawer fronts and similar joinery is not documented, it is to be taken as six months from completion.

11.05 Natural materials

Materials such as timber, granite and marble are natural products that may have blemishes and variations in pattern and colour that are natural characteristics of the material.

Stone materials are often brittle and may be easily cracked. Polished stone surfaces can be porous and subject to staining.

Any cracking, displacement, pitting or similar blemishes in natural stone, marble or similar materials are defective if they are caused by the builder and can be seen from a normal viewing position.

11.06 Manufactured material

Any cracking, displacement, pitting or similar blemishes in surfaces of manufactured materials are defective if they are caused by the builder and can be seen from a normal viewing position.

Manufactured materials are defective if they are not installed in accordance with the manufacturer's requirements.

11.07 Rectification of defective natural materials and manufactured materials

The rectification of surfaces is defective if the rectification work does not reasonably match the adjacent areas. If reasonable matching is not possible, the entire surface shall be replaced⁷.

11.08 Joints in timber, stone and laminated bench tops

Bench tops of timber, laminate, natural stone or similar materials are defective if within six months of handover they have joints that are not uniform, close-fitted, aligned and in the same plane.

These requirements also apply to vertical surfaces of similar material and finish.

Joints are defective if they are not sealed or flush-filled with a suitable flexible sealant of matching colour at the time of handover.

11.09 Sealing around benches and items installed in benches

Where required, junctions between bench tops and adjoining surfaces are defective if they are not sealed with a suitable flexible sealant of matching or agreed colour.

Seals around items such as sinks, hand basins or the like are defective if the joint leaks or they are not installed in accordance with the manufacturer's installation requirements.

11.10 Sealing of wood panel cut edges

Where unit wood panels or worktops are cut, the cut edges should be sealed with a waterproof sealant to prevent the ingress of moisture. Similarly cut outs required for sinks, pipe cut outs and so on should also be sealed to prevent the ingress of moisture.

⁷ In these circumstances it is not normally necessary to replace areas of the material that are not adjacent to and contiguous with the affected area.

Ceramic floor and wall tiling

12.01 Floor and wall tiling

Unless documented otherwise, tiling work and materials are defective if they do not comply with AS 3958.1 and AS 3958.2 or the manufacturer's installation instructions for the materials selected.

The builder is responsible for tiling that fails because of defective building work in framing or slab construction, including tiling not laid by the builder.

Where the builder has to match tiles that are no longer available, a practical approach must be adopted. The use of a slightly different tile is not defective if it is used with the written agreement of the owner.

Where non-matching tiles have to be used, a joint location such as the aluminium channel of a shower screen, a separating doorway, an intersecting wall, a change in wall direction or similar should be selected to separate the different tiles.

12.02 Floor and wall tiling where the builder supplies the tiles

Where the supply and laying of tiles is by the builder, the failure of the tiles, substrate, adhesive or grout is defective.

12.03 Floor and wall tiling where the owner supplies the tiles for laying by the builder

Faulty installation of tiles is defective if caused by the builder's workmanship.

Any fault in the tiles is the responsibility of the owner, except where faults in the tiles should have been apparent to the builder at the time of laying, and these faults were not brought to the owner's attention.

12.04 Floor and wall tiles where the owner supplies and lays the tiles

The owner is responsible for checking the adequacy of the substrate before laying the tiles. Any failure of tiles, adhesive or grout, where the owner supplies and lays the tiles, is the responsibility of the owner.

12.05 Cracked, pitted, chipped, scratched, sharp or loose tiles

Tiles are defective if they are cracked, pitted, chipped, scratched, or loose at handover. Cut edges of tiles are defective if they are not smooth and have jagged or flaked edges.

After handover, tiles are defective where the builder's workmanship causes the tiles to become cracked, pitted, chipped, scratched or loose within 24 months.

After handover, cracked, pitted, chipped, scratched or loose tiles are defective if they are part of a water proofing system and allow water penetration, or compromise the health and safety of those who use the building.

12.06 Grouting and joints

Grouting is defective if it is not carried out in accordance with the requirements of Clause 5.7 of AS 3958.1.

Joints are defective if they are not, as far as is practicable, of consistent width and any inconsistency can be seen from a normal viewing position.

Finished grout is defective if it is not uniform in colour or smooth (without voids, pinholes or low spots) and finished to the cushion on cushion edged tiles and flush with square edge tiles.

- a. The top surface of the grout may be tooled to provide a contoured depression of no deeper than 1mm for up to 6mm wide joints and up to 2mm for a 6-10mm wide joint (clause 5.7(e) of AS 3958.1).
- b. Joint widths for floor tiles should not exceed 3mm for pressed tiles and 6mm for extruded tiles (clause 4.6(c)(i) of AS 3958.1).
- c. Joint widths for wall tiles should not exceed 1.5mm for pressed tiles and 6mm for extruded tiles (clause 5.4.6(c)(ii) of AS 3958.1).
- d. Joint alignment should be consistent throughout the installation within a tolerance of 4mm in 2m⁸ (clause 5.4.6(d) of AS 3958.1).

Grout is defective if it becomes loose within 24 months of handover.

Grout is defective if used at a tile to dissimilar materials junction where grout may be expected to become dislodged due to movement.

12.07 Flexible sealants to junctions

Flexible or waterproof sealants to junctions are defective if they are not installed when required by the Building Code of Australia and AS 3958.1, or in accordance with the manufacturer's installation requirements.

12.08 Uneven tiling

Except where tiles have distortions inherent in the manufacture, tiling is defective if it has joints that are not uniform, of even width, aligned or in the same plane.

Large tiles could present problems when required to fall and drain to a floor outlet.

12.09 Lippage (stepping) between tiles

Lippage is inherent in all installation methods and may also be unavoidable due to the tile tolerances. Lippage may also be unavoidable where tiles larger than 150mm × 150mm are graded to a waste outlet, unless transverse cuts are incorporated.

When measured with a straightedge, tiling is defective if the finished surface of the tiling is not flat and true to within a tolerance of ±4mm in 2m from the required plane.

Tiling is defective if the lippage between two adjacent tiles exceeds 2mm. In the case of tiles where the surface has been ground flat, for example polished tiles, tiling is defective if the lippage exceeds 1.5mm; for joint widths of 3mm or less the lippage should not exceed 1mm.

8 This requirement does not apply to an interface between vertical and horizontal tiled surfaces.

12.10 Movement joints

Tiled floors are defective if intermediate movement joints are not inserted at evenly spaced positions at approximately 4.5m centres or at locations where stress might reasonably be expected in:

- a. internal floors where any dimension exceeds 9m or 6m if subjected to sunlight (clause 5.4.5.2(b)(i) of AS 3958.1)
- b. external floors where any dimension exceeds 4.5m (clause 5.4.5.2(b)(ii) of AS 3958.1).

12.11 Mitre joints

The non-mitring of tiles at corner junctions is not defective, unless specified in the contract documents.

Painting

13.01 Standard of painting

Coatings used are to be suitable for the relevant conditions and relevant wear and tear.

Painting is defective if it does not comply with the manufacturer's installation instructions or AS/NZS 2311.

13.02 Painting of building elements where the owner carries out the painting

The owner is responsible for checking the adequacy of the substrate before painting of any building elements. Any failure of the paint system, where the owner supplies and carries out the paint work, is the responsibility of the owner. A faulty substrate is the responsibility of the builder unless it is affected by the paint system (i.e. wrong paint system applied to the substrate which may affect its durability).

13.03 Surface finish of paintwork

Paintwork is defective if the application has blemishes such as paint runs, paint sags, wrinkling, dust, bare or starved painted areas, colour variations, surface cracks, irregular and coarse brush marks, sanding marks, blistering, non-uniformity of gloss level and other irregularities in the surface that are visible from a normal viewing position.

Paintwork is defective if the application results in excessive over-painting of fittings, trims, skirtings, architraves, glazing and other finished edges.

13.04 Nail and screw fixings

Fixings or unfilled depressions caused by fixings are defective in painted or stained surfaces if they can be seen from a normal viewing position.

13.05 Natural characteristics and mechanical imperfections/damage

Unless the contract specifies otherwise, natural characteristics such as gum pockets, surface splits or sap bleeding are defective if they can be seen from a normal viewing position.

Mechanical imperfections/damage, holes or any other unfilled depressions are defective if they can be seen from a normal viewing position.

13.06 Paint durability

Unless documented otherwise, coatings are defective if they fail by lifting, blistering, flaking, fading etc. within the minimum period shown in Table 13.06.

TABLE 13.06 MINIMUM DURABILITY OF COATED FINISHES

Coating	Minimum durability
Exterior acrylic	36 months
Exterior enamel	24 months
Exterior semitransparent stains	12 months
Exterior clear finishes	not recommended
Interior – all finishes	36 months

Wet areas, decks and balconies

14.01 General

Flashings are defective if they are not installed in accordance with the requirements of the Building Code of Australia.

Shower recesses, decks and balconies mainly fail because of poorly installed waterproofing membranes and incorrect detailing. The greatest care should be taken to ensure the horizontal surface falls, flashing up-stands, vertical joints and drainage systems are installed exactly as specified for the particular system.

Internal wet areas

14.02 Wet areas

Waterproofing of wet areas is defective if not installed in accordance with the requirements of the Building Code of Australia and AS 3740.

14.03 Shower recess and components

Shower recess and components are defective if they crack, leak or don't perform as intended.

Scratches in shower bases, screens and glass are defective if they are due to the builder's workmanship and are visible from a normal viewing position.

All cracks in shower bases, screens and glass are defective if they exist at handover or are due to the builder's workmanship.

A shower component is defective if it allows the shower recess to leak during normal usage. Unenclosed shower screens are not intended to prevent the spread of water from the shower enclosure and are not considered defective.

Silicone sealants may require replacement after five years. This is regarded as normal house maintenance which is the owner's responsibility.

Beading of water on surfaces such as poly-marble shower bases and polished porcelain tiles is considered normal and is therefore not regarded as a defect.

External decks and balconies

14.04 Leaks in waterproof decks and balconies

Waterproof decks and balconies that leak are defective.

14.05 Waterproof decks and balconies substrate

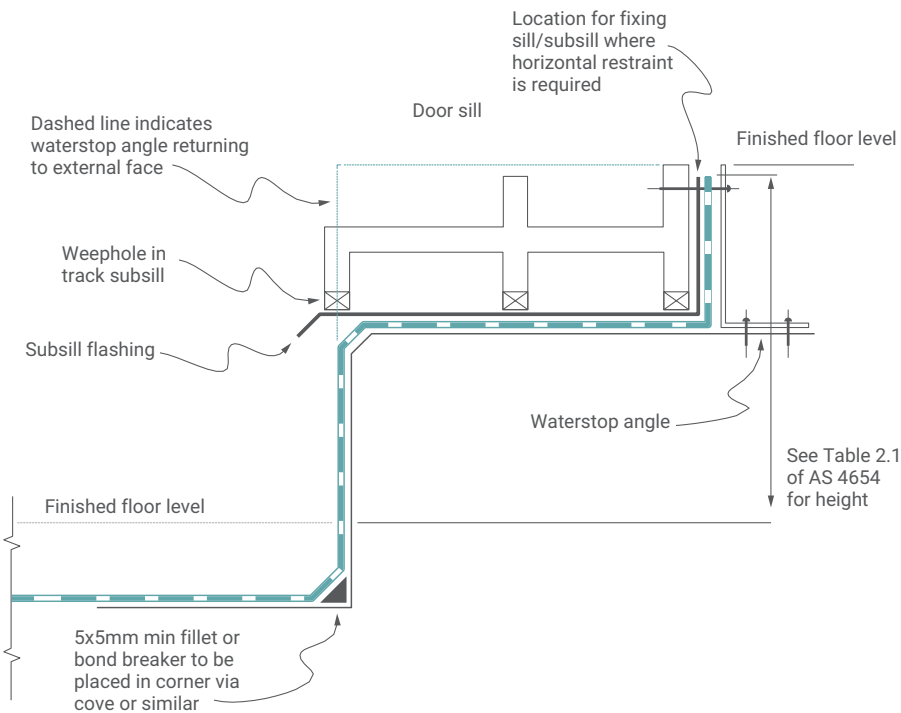
Waterproof decks and balconies are defective if they are not constructed in accordance with the Building Code of Australia and AS 4654 Parts 1 and 2.

Waterproof decks and balconies are defective if the waterproofing system is not installed in accordance with the manufacturer's installation requirements.

14.06 Decks and balcony freeboard outside windows and doors

Waterproof decks and balconies are defective if they do not have a drainage system sufficient to withstand wind-driven water surging from the deck or balcony that complies with the Building Code of Australia and AS 4654 Parts 1 and 2. See Diagram 14.06 as an example of a complying method.

DIAGRAM 14.06 UPSTAND REQUIRED TO DOORWAYS OPENING ONTO EXTERNAL DECKS



14.07 Ponding on waterproof decks and balconies

Waterproof decks and balconies are defective if water ponds (with the exception of residual water remaining due to surface tension) or does not drain to the outer edge⁹ or a stormwater outlet.

Decks and balconies that are required to be waterproofed are defective if they are not provided with adequate drainage and provision for overflow.

14.08 Calcification and efflorescence associated with decks and balconies

Calcification or efflorescence caused by water coming from a deck or balcony that occurs on walls below or beside the deck or balcony, or that appears in the mortar joints of the deck or balcony tiling, is defective. Activities of others, such as owners watering plants, may also contribute to the efflorescence, which may not be attributed to the work of the builder.

15.01 Timber flooring – shrinkage and swelling

Timber flooring will shrink or swell according to its internal moisture content, timber species used and the installation environment. The internal moisture content will adjust to the surrounding atmosphere after the timber is installed and this may lead to permanent or seasonal swelling, splitting or shrinkage creating gaps at board edges.

Exposure to sunlight, cooling, heating or other heat generating appliances is likely to cause localised shrinkage of timber that cannot be allowed for at the time of construction. This is to be taken into consideration when determining if there is defective workmanship.

When assessing the appearance of a floor it is to be done from a normal viewing position.

15.02 Timber flooring

Flooring, including tongue and groove strip flooring; structural plywood and particleboard sheet flooring, is defective if it is not installed according to AS 1684 and the manufacturer's installation requirements.

Colour variations due to natural causes such as sunlight are not defective.

Ghosting, where blemishes appear beneath the finish coat, is defective when visible from a normal viewing position.

Due to necessary machining tolerances a step (lipping) of up to 0.5mm or slight movement may exist between adjacent floor boards. This step (lippage) should not be evident at handover if the floorboards are also sanded and polished by the builder.

15.03 Gaps in exposed timber flooring

Except where affected by exposure to sunlight, cooling, heating or other heat generating appliances, flooring is defective if it has gaps of more than 2mm between adjacent boards that extend for more than 1m, or more than 5mm in total of three gaps between four consecutive boards¹⁰.

15.04 Joint swelling in timber, plywood and particleboard flooring

Joints in plywood and particleboard floors are defective if they can be detected through normal floor coverings.

Swelling in tongue and groove strip timber flooring is defective if it causes tenting, buckling or crowning of the boards and can be seen from a normal viewing position.

Cupping in boards of more than 1mm per 100mm is a defect (Table C3 of AS 2796.1).

¹⁰ Flooring with gaps that exceed the allowances stated above is not defective when the builder in writing has made the owners aware that the flooring system installed could suffer significant shrinkage and has obtained this acknowledgment in writing.

15.05 Nail popping in timber, plywood and particleboard floors¹¹

Nail heads that can be detected through floor coverings or nail popping that is clearly visible in exposed flooring are defective if they occur within 24 months from handover.

15.06 Squeaking floors

Floors that consistently squeak by a person walking normally in a trafficable area within the first 24 months from handover are defective.

15.07 Springy floors

Floors that bounce in a way that can be detected by a person walking normally in a trafficable area are defective if the substructure has not been constructed in accordance with the Building Code of Australia and AS 1684.

15.08 Levelness of timber floor

New floors are defective if within the first 24 months of handover they differ in level by more than 10mm in any room or area, or more than 4mm in any 2m length.

The overall deviation of floor level to the entire building footprint shall not exceed 20mm within 24 months of handover. Refer to Item I of this Guide where the new floor is to adjoin an existing floor.

15.09 Splitting of timber decking

Splits in timber decking that extend to the end or side edge of the timber is defective if they are due to the fixing method.

¹¹ Owners who undertake their own floor polishing of exposed flooring or who lay floor coverings after completion of the builder's works are responsible to ensure that all nails and other fixings are properly punched or countersunk and stopped.

Electrical

16.01 Electrical

Under electrical safety regulations electrical installations must comply with Australian Standard AS/NZS 3000, known as the "Wiring Rules", including any relevant related standards referred to in AS/NZS 3000. Any electrical work which does not comply with AS/NZS 3000 or the contract documents is considered 'non-compliant' to the legislation.

Pools and spas

17.01 Concrete pools and spas

Concrete pools and spas are defective if they do not comply with AS 2783.

17.02 Premoulded fibre-reinforced plastic pools and spas

Premoulded pools and spas are defective if they are not installed in accordance with AS/NZS 1839.

17.03 Variations from documented dimensions in concrete pools and spas

Departures from the documented set out for concrete pools and spas are defective if they exceed $L/100$, where L is the documented dimension, or 5mm, whichever is the greater.

17.04 Variations from documented datum in concrete pools and spas

Set outs that depart from documented reduced levels or finished floor levels by more than 40mm are defective.

17.05 Pool surrounds

Paving or ground surrounding a pool is defective if it does not divert splashed water and storm water away from the pool (Refer: Department of Water - Water quality protection note 55.)

Restumping

18.01 Restumping

Owners should understand the limitations imposed on re-levelling of existing structures by such factors as:

- a. existing structural conditions;
- b. fixed points;
- c. attached buildings;
- d. extensions to the dwelling;
- e. plumbing installations;
- f. the likelihood of consequential damage to wall claddings; or
- g. any other factor that may restrict the re-levelling process.

18.02 Consequential damage due to restumping

Consequential damage caused by restumping works is not defective where the builder has documented evidence that the owner has been informed of the nature and likelihood of such damage.

In the absence of documented evidence that the owner has been informed of the nature and likelihood of damage associated with restumping, consequential damage caused by restumping work may be considered defective.

18.03 Floor levels after restumping

Except where documented otherwise, re-levelled floors are defective if within the first 24 months they differ in level by more than 15mm in any room or area or more than 8mm in any 2m length.

General

19.01 Appliances and fittings

The owner is responsible for organising warranty service for faults in appliances and fittings supplied as part of the building contract where the builder has provided the warranty documents to the owner. Service outside the warranty period is the responsibility of the owner.

19.02 Faults and damage to appliances and fittings

Damage to appliances and fittings supplied as part of the building contract is defective if it is due to the builder's workmanship.

During the documented maintenance period after handover, fittings are defective if they do not operate as intended by the manufacturer. If the maintenance period is not documented it is to be taken as four months.

19.03 Condensation

Condensation is a common problem in buildings (particularly in bathrooms and laundries) and can occur on windows, under unlined roofs or elsewhere. Further information is available in the Australian Building Codes Board Handbook – *Condensation in Buildings (2014)*.

Where the requirements of the Building Code of Australia have been complied with, the responsibility for controlling condensation by maintaining adequate natural or mechanical ventilation through the use of openable windows, exhaust fans, or other means, is the responsibility of the owner.

Condensation is defective if the builder has not complied with the relevant clauses of the BCA.

19.04 Glazing

Scratches, fractures, chips or surface blemishes on glazing and mirrors are defective if they exist at handover and can be seen from a normal viewing position.

Tolerances for imperfections for cut to size and processed glass can be found in AS/NZS 4667:2000.

19.05 Lyctus borer

Timber is defective if it is used during construction with evidence of lyctus borer attack, unless the timber product has been approved by the manufacturer.

19.06 European house borer (EHB)

The installation or use of untreated pine in a Restricted Movement Zone (RMZ), is defective if the timber is not resistant to EHB.

Further information on RMZ's can be found at

<https://catalogue.data.wa.gov.au/dataset/european-house-borer-restricted-movement-zones>

19.07 Termites

Termites are a widespread problem in all areas of Australia and it is the owner's responsibility to regularly inspect the property, including sub-floor inspections, to detect evidence of termite attack.

Termites can circumvent properly executed termite protection measures, such as building tunnels around barriers. Tunnels can be identified through regular inspections and, if found, the termite nest should be located and destroyed by a suitably qualified pest controller.

Termite management systems are intended to reduce the risk of damage to the structural members of buildings by deterring concealed entry of termites into a building. Termite management systems cannot prevent the entry of termites into the building. In Western Australia, a termite management system is only required to be installed where the primary building elements are susceptible to termite attack, as defined in the Building Code of Australia.

19.08 Termite damage

Damage caused by termites in buildings within designated termite risk areas is defective if the termite management system has not been installed in accordance with the Building Code of Australia.

Damage caused by termites in buildings within designated termite risk areas is not defective if the termite management system has not been regularly maintained by the owner, made non-compliant by the owner after handover or not maintained in accordance with the manufacturer's instructions and AS 3660.2.

19.09 Cleaning

Owners are entitled to expect that the building site and works are clean and tidy on completion. Where handover is delayed for any reason the owner must expect that dust may have settled on interior exposed surfaces.

At the time of handover, building sites are defective if they are not clear of building debris.

Building works are defective where windows are not clean, floors are not swept, mopped or vacuumed as appropriate, tiles, sinks, basins, troughs, baths, etc. are not cleaned, and shelving, drawers and cupboards are not ready for use.

19.10 Maintenance in relation to the performance of building foundations/footings

Proper ongoing maintenance of the building is a normal part of homeownership and the homeowner is responsible for all maintenance after handover.

An important part of building maintenance is maintaining a consistent moisture level in the foundation soils around the building. This is important for sites that have reactive soils in order to prevent excessive wetting (expansion) or drying (shrinking) of the foundation soils and subsequent building movement.

Many things can adversely alter the moisture level in the foundation soils around the building, but most of them are preventable with careful ongoing maintenance. Diagram 19.10 lists common causes of excessive wetting and drying that are likely to alter moisture level in foundation soils around the building if not managed effectively.

DIAGRAMS 19.10 MAINTENANCE



1. Trees planted too close to house (Refer to CSIRO document *BTF18 Foundation Maintenance and Footing Performance*).
2. Blocked gutters, eaves, valley and box gutters to house, enclosed roofs and decks.
3. Air-conditioner overflows: roof and ground.
4. Faulty, unmaintained or poorly placed sprinkler systems.
5. Garden beds and large shrubs placed too close to house.
6. Ground level above damp-proof courses, weepholes and subfloor vents.
7. Surface drainage pits, silt pits and underground stormwater drainage system not regularly cleaned out.
8. Damaged or unconnected stormwater downpipes.
9. Overflowing water tanks.
10. Dripping external taps.
11. Dripping water heater relief valves.
12. Paving, landscaping or ground surfaces slope towards building.
13. Water runoff from higher adjoining properties.
14. Resealing of wet area junctions: shower screens and bath hobs.

19.11 Steel structure maintenance

Proper ongoing maintenance of a pre-painted steel structure (patio, garage door, wall sheeting located under eaves, or the like) by regular washing with water and mild detergent is a normal part of homeownership and the homeowner is responsible for all maintenance after handover.

Surfaces that are regularly washed by rainwater such as roof sheeting do not usually require cleaning.

Areas of pre-painted steel not regularly washed by rain should be cleaned every six months and more frequently in coastal areas where marine salt spray is prevalent and in areas subject to high levels of industrial fallout.

Stainless steel products also require ongoing maintenance through regular washing every three months for external applications.

19.12 Floor coverings

Carpet and vinyl is defective if it is not installed in accordance with the manufacturer's installation recommendations.

Joins in carpet and vinyl are defective if they peak, fray or misalign and are visible from a normal viewing position within 12 months from handover.

Floating floors which rest on the structural floor are defective if not installed in accordance with the manufacturer's installation requirements. Movement noises are an inherent characteristic of this type of flooring.

Appendix A

Relevant legislation

These principal pieces of legislation are applicable to home building construction in Western Australia:

- a. *Building Act 2011*
- b. Building Regulations 2012
- c. *Building Services (Complaint Resolution and Administration) Act 2011*
- d. Building Services (Complaint Resolution and Administration) Regulations 2013
- e. *Building Services (Registration) Act 2011*
- f. Building Services (Registration) Regulations 2011
- g. *Construction Contracts Act 2004*
- h. *Dividing Fences Act 1961*
- i. *Home Building Contracts Act 1991*
- j. *Plumbers Licensing Act 1995*
- k. *Energy Safety Act 2006*

History of editions

This version of the *Guide to standards and tolerances* applies to building work and/or contracts for domestic building work entered into after 1 May 2019.

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