

Guide to Standards and Tolerances



Guide to Standards and Tolerances

Introduction

The *Guide to Standards and Tolerances* is a valuable tool to clarify areas of building standards that are not prescribed in legislation, building control and policy.

Generally a builder and a building owner, parties to a building contract, can agree to apply the building standards they consider appropriate to a building project. But they may not agree to standards less than those prescribed by Government. Sometimes the agreed standards are detailed in the contract documents but often they are not.

The purpose of this Guide is to indicate the Building Commission's view of reasonable standards and tolerances for domestic building work, where such standards and tolerances are not articulated by the contract documents and are not prescribed in:

- the *Building Act 1993*;
- the *Building Regulations 1994*;
- the *Building Code of Australia* (BCA); and
- the *Australian Standards* referenced in the BCA.

Where there is any contradiction or difference between the Guide and the BCA, relevant legislation or the building contract, the BCA, legislation or building contract will take precedence.

The standards and tolerances including those that relate to the passage of time are intended as a guide. They may not apply to some building projects where the specific circumstances of the project or the contract conditions of that project require or imply other standards or tolerances.

The commencement of any time period mentioned in the Guide is to be taken from the date of the occupancy permit or certificate of final inspection for a building project.

Some information in this Guide has been extracted from the BCA or referenced *Australian Standards* to assist users.

This document is intended to serve as a general guide only, and is always subject to prevailing legislation, regulations and related Ministerial orders issued from time to time.

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1 Application

The primary obligation of a domestic builder under the *Domestic Building Contracts Act 1995* (the Act) is to carry out the domestic building work in accordance with the domestic building contract, including any plans and specification which form part of the contract. Further, as set out in section 8 of the Act, "all domestic building contracts carry implied warranties as to workmanship and materials and compliance with all laws and legal requirements".

The contractual obligations and the statutory warranties require levels of performance from the domestic builder. The minimum levels of acceptable performance are normally set out in the building contract and the relevant building codes and standards in force at the time. Nevertheless, there are some particulars of performance that are not specified in any of these documents. It is the purpose of this Guide to indicate levels of performance which are considered acceptable by the Commission as well as assist builders and owners with matters commonly the subject of dispute.

This Guide may not be applicable where a domestic building contract requires an alternative Standard or tolerance to that shown in this Guide. However, this does not relieve the domestic builder from attaining any performance level required by the applicable building codes and standards.

Where there is any contradiction between the *Building Code of Australia* (BCA) or other relevant legislation the BCA or legislation will take precedence.

Timing is sometimes an issue. Construction that may be considered a defect when observed soon after the building work is complete may be considered fair wear and tear sometime later. Building contracts normally include a defects liability clause specifying a period after completion when the builder will rectify defects that become apparent in that period.

Fittings and equipment are often supported by manufacturers' warranties. The defects liability period stated in a contract and manufacturers' warranties should be considered in association with this Guide.

The Commission recognises the dynamic nature of the domestic building industry and to ensure acceptable practice and competency throughout the industry, the Commission will regularly review this Guide.

Most *Australian Standards* that are referenced in this Guide are referenced in the BCA. The Standards are indicated by "AS" followed by the appropriate reference number.

The previous *Guide to Standards and Tolerances* dated 1 April 1999 issued by the Commission shall apply to all contracts entered into prior to 1 July 2002. This Guide is applicable to contracts entered into after 1 July 2002.

The tolerances specified herein are not applicable where second hand materials and products are proposed to be used with the structure of a new building, i.e. door and window clearance tolerances.

2 Appliances

Defects occurring in appliances and/or fixtures will only be considered the builder's liability if the actions of the builder have contributed to the defect.

3 Masonry

3.1 Definition of Masonry

The following definition of "Masonry" has been extracted from *AS 3700 - 2001*.

"Scope

This Standard sets out minimum requirements for the design and construction of masonry, including unreinforced, reinforced and prestressed, using manufactured units of clay, calcium silicate and concrete laid in mortar, autoclaved aerated concrete (AAC) laid in thin-bed mortar, and square-dressed natural stone laid in mortar.

The Standard does not give values or material properties for the design and construction of square-dressed natural stone.

Notes:

1. This Standard assumes that the structural design of masonry is entrusted to experienced structural engineers or similar appropriately qualified persons, and that the execution of such work is carried out under the direction of appropriately qualified persons who are experienced in masonry construction and who understand the structural requirements.
2. The Standard does not give specific requirements for prefabricated masonry panels or masonry in composite action with steel or concrete structural members. The principles of this Standard should be followed, as far as they are applicable, for such types of construction.
3. The provisions of this Standard do not include specification for design and construction of AAC laid in other than thin-bed mortar. However, for masonry so constructed the general principles of this Standard may be used."

3.2 Masonry Distress

Where distress is rated at Category 3 or more (i.e. more than 5mm; refer *AS 2870 - 1996 Residential Slab & Footings Construction*), appropriate rectification works will be required.

If distress is Category 2 (between 1mm to less than 5mm) it is considered a defect, however, minor repairs would be acceptable e.g. repointing.

Refer to Table C1 in Clause 4 "Concrete Slab Distress".

Refer to Notes in Table C2 in Clause 4 "Concrete Slab Distress".

Guide to Standards and Tolerances

3.3 Bed Joints and Perpend

Where masonry matching is no longer appropriate a practical approach may be adopted in the case of renovations and or additions.

TABLE 11.1
AS 3700 - 2001 – TOLERANCES IN MASONRY CONSTRUCTION

Item	Structural Tolerance	Non-Structural Facework Tolerance
A Horizontal position of any masonry element specified or shown in plan at its base or at each storey level	±15mm	±15mm
B Relative displacement between load-bearing walls in adjacent storeys intended to be in vertical alignment	±10mm	±10mm
C Maximum deviation from plumb within a storey from a vertical line through the base of the member	The lesser of ±10mm per 3 m of height or 0.05 times the thickness of the leaf	±10mm
D Maximum deviation from plumb in the total height of the building (from the base)	±25mm	±25mm
E Maximum horizontal or vertical deviation of a surface from a plane surface (bow) when measured as described in Clause 11.5.2	±5mm	±3mm
F Deviation (step) of any exposed brick surface from any adjacent exposed brick surface. The bow provision of Item (E) above also applies	Not applicable	2mm
G Deviation of bed joint from horizontal, or from the level specified or shown in elevation	±10mm in any 10 m length, ±15mm in total	±10mm in any 10 m length, ±15mm in total
H Deviation from specified thickness of bed joint	±3mm	±3mm
I Minimum perpend thickness	5mm	5mm
J Deviation from specified thickness of perpend	+10mm maximum	±5mm average
K Maximum difference in perpend thickness in any wall	No limit	8mm
L Deviation from specified width of cavity	±15mm	±15mm

Notes:

- Items H, I, J & K are not applicable to thin-bed mortar joints.
- Items I & J 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.

See Appendix B for diagrams explaining content of above table.

3.4 Masonry Facing

Bricks shall generally be laid with true brick face outwards. Brick faces shall be cleaned and free of excess mortar unless otherwise specified.

When bricks in batches supplied from manufacturers vary in colour, they shall be mixed/distributed in accordance with manufacturers recommendations unless otherwise specified.

3.4.1 Mortar

Mortar shall generally be mixed in accordance with the requirements of the BCA as applicable.

3.4.2 Masonry Voids

Where masonry construction or cleaning results in obvious holes excepting weepholes, these are deemed to be a defect.

Making good is to be carried out so that any repair or the like is as close as practically possible to the existing mortar.

3.4.3 Dampproof Courses

To be in accordance with the BCA as applicable.

3.4.4 Raking of Joints

Raking of mortar joints in masonry units shall not exceed 10mm depth and be consistent throughout.

3.5 Brick Sills - Shrinkage Allowance for Timber Framing

Reference to brick sills includes for sill tiles.

Distortion of window frames and or dislodgment of sill bricks shall be a defect where such distortion and or dislodgment was caused by lack of initial sill brick clearance from the window sill refer to BCA.

In masonry veneer walls a gap must be left between the timber frame and the top of the masonry wall, including window sills etc, to allow for initial settlement of the timber framing caused by timber shrinkage. These clearances must be provided at the time of construction and must not be not less than-

- (i) 5mm at sills of lower and single storey windows; and
- (ii) 8mm at roof overhangs of single storey buildings; and
- (iii) 10mm at sills of second storey windows; and
- (iv) 12mm at roof overhangs to two storey buildings.

The clearances described in (i)-(iv) above must be doubled if the timber framing is unseasoned hardwood.

3.6 Flashings

3.6.1 General

Flashings shall be provided in accordance with the requirements of the BCA.

3.6.2 Timber Frames

Flashings should be provided to all timber windows in accordance with the BCA and/or manufacturer's specifications to prevent ingress of rain or moisture from reaching the inner face of a wall.

3.6.3 Aluminium Frames

Aluminium windows and doors shall be installed according to manufacturer's specifications unless otherwise specified.

3.7 Render and Applied Finishes for Masonry

3.7.1 Cracking

Cracking of finishes to be assessed in accordance with Clause 3.2.

Obvious spot rust marks due to the composition of the material is considered a defect.

3.7.2 Matching Colour and Texture

When matching a finish, a practical approach must be adopted, and where possible a physical joint, a door/window, downpipe or other similar separating materials be incorporated. The purpose of this is to "break" the visual impact.

The builder should make every effort to match existing so as to be as close to a match as possible, where this is practicable. In some instances this may not be practical as the original finish may have significantly aged or chemical additives used which are impossible to determine without expensive research.

3.7.3 Cracking at Articulation Joints

Provision for the control of cracking in articulation joints should be allowed for or otherwise specified.

If the owner or agent at the time of construction specifies construction that does not allow for movement, cracking will not be considered a defect.

4 Concrete slab distress

If distress is rated at less than Category 3, the defect is to be monitored for a period of twelve months. If, at the end of the monitoring period, the distress rating is assessed as greater than Category 2, this will be considered a defect.

AS2870-1996 – Residential slabs and footings – construction

TABLE C1
CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS (APPENDIX C OF AS 2870-1996)

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage Category
Hairline cracks.	< 0.1mm	0
Fine cracks which do not need repair.	< 1mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly.	< 5mm	2
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
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames 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

TABLE C2
CLASSIFICATION OF DAMAGE WITH REFERENCE TO CONCRETE FLOORS
(APPENDIX C OF AS 2870-1996)

Description of typical damage	Approx. crack width limit in floor	Change in offset from a 3m straight edge centred over defect (see Note 6)	Damage Category
Hairline cracks, insignificant movement of slab from level.	<0.3mm	<8mm	0
Fine but noticeable cracks. Slab reasonably level.	<1.0mm	<10mm	1
Distinct cracks. Slab noticeably curved or changed in level.	<2.0mm	<15mm	2
Wide cracks. Obvious curvature or change in level.	2mm to 4mm	15mm to 25mm	3
Gaps in slab. Disturbing curvature or change in level.	4mm to 10mm	>25mm	4

Notes:

- 1 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.
- 2 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 Where the cracking occurs in easily repaired plasterboard or similar clad-framed partitions, the crack width limits may be increased by 50% for each damage category.
- 4 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.
- 5 Account shall be taken of the past history of damage in order to assess whether it is stable or likely to increase.
- 6 The straight edge is centred over the defect, usually, and supported at its ends by equal height spacers. The change in offset is then measured relative to this straight edge.

5 Condensation

Condensation on walls, windows and in bathrooms can be caused by conditions beyond the builder's control and will not usually be considered a defect. Roof condensation will be considered a defect if caused by incorrect positioning of sarking, or vapour barrier where installed. The effects of condensation will not be considered a defect if the builder has complied with the requirements of the BCA.

6 Doors

6.1 Door Handles and Latches

Door handles and latches installed shall be fit for purpose and will operate as intended by the manufacturer. Defects occurring in the first three months of completion shall be the responsibility of the builder. Thereafter defects occurring will only be considered the builder's liability if the actions of the building have contributed to the defect.

6.2 Doors and Door Frames

This clause only applies to the 3 months maintenance period as specified under the contract.

6.2.1 Internal Doors

Unless specified in the contract, or where an increased clearance is required for:

- removable toilet doors;
- return air ventilation for ducted heating or air-conditioning units;
- inlet ventilation to rooms where the only ventilation is provided by ventilated skylights and/or exhaust fans;
- between double swing doors and French doors.

Within the first three months an even gap to the sides and top of individual doors shall be consistent throughout to within 1mm and shall be not less than 2mm or exceed 5mm wide and a maximum gap of 20mm between the bottom of the door and the top of any finished floor covering unless otherwise specified.

6.2.2 External Doors

External doors shall be appropriate for their intended purpose and shall be installed in accordance with the manufacturer's recommendations.

6.2.3 General

Tolerances for twisting and bending in the first three months are as listed below.

1 **Twist.** Twist in a door shall not exceed 5mm.

2 **Bending.** Bending in a door shall not exceed the following:

(a) In the height of the door:

(i) up to and including 2150mm high – 4mm, or

(ii) over 2150mm and up to and including 2400mm high – 6mm.

(b) In the width of the doors up to and including 1020mm wide – 2mm.

Doors which bind or jam, as a result of the builder's work, shall be considered defects.

7 Lightweight substrate with applied finishes

Applied finishes (excluding painting) to lightweight sheet substrate that have cracking or open joints greater than 1mm will be considered a defect within the first 12 months.

8 External mouldings

Cracking at joints or in external mouldings and architectural features greater than 2mm will be considered a defect within the first 12 months.

9 Articulation joints

Provision for the control of cracking in articulation joints should be allowed for or otherwise specified.

If the owner or agent at the time of construction specifies construction that does not allow for movement, cracking will not be considered a defect.

10 Internal fixing

Only gaps between mouldings, and between mouldings and other fixtures which exceed 1mm within the first 12 months will be considered defects.

11 Floor and wall tiling

11.1 General

Tiling will be considered defective where:

a. the builder supplied, laid and constructed the sub-strata for the tiles; and

- (i) any of the materials are defective, and/or
- (ii) the application of adhesive, tiles or backing sheet is not carried out in accordance with manufacturer's instructions, and/or
- (iii) there is unsatisfactory workmanship beneath the tiling system.

b the owner supplied materials and the builder laid the tiles and carried out preparatory works, and

- (i) any materials not supplied by the owner are defective, and/or
- (ii) application of adhesive, tiles or backing sheets is not carried out in accordance with manufacturer's instructions, and/or
- (iii) there is unsatisfactory workmanship beneath the tiling system.

c. the owner supplied and laid the tiles and the builder carried out preparatory works other than the tile laying, and there is unsatisfactory workmanship beneath the tiling system (e.g. faulty stud work and trimming, nogging work, or concrete slab failure)

Where the owner installs the substrate, it is the owner's responsibility to ensure that the substrate has been installed in accordance with the manufacturer's instructions and that the framing is satisfactory for the fixing of the substrate.

Cracked, loose or drummy tiles will be considered a defect if the cause is attributed to the builder. Subject to the above, these items will only be considered a defect if more than 10% of the tiled room or area is affected, whichever is applicable.

Where the owner lays and supplies floor tiles that are defective (i.e. cracked or loose) using a method of tiling application, adhesive and/or bedding not in conformity with the manufacturer's instructions then the builder's liability would only extend to where consequential damage had occurred due to the concrete slab distress as specified in this document. The owner has to prove the damage is attributable to the builder. The onus of proof is on the owner.

11.2 Tile Matching

Where tile matching is no longer possible, a practical approach must be adopted and where possible, a slightly different tile may be used. A tile separation joint may be provided – for example, by means of an aluminium channel of the shower screen, separating doorway, intersecting wall, change in wall direction or similar.

11.3 Tiling Workmanship

Abutting tiles shall be flush excepting for any distortion inherent in the manufacture of supplied tiles.

Grout lines/widths to tiling should be consistent as far as practicable unless otherwise specified.

12 Floors

12.1 Gaps in Exposed Timber Flooring

The effect of sunlight, heating or other heat generating appliances are to be taken into consideration and if determined that they have contributed to the higher rate of shrinkage then it is not considered a defect.

A gap of more than 2mm between adjacent boards will be considered a defect.

A total measurement of gaps between four consecutive boards in timber strip flooring of more than 5mm is a defect in areas other than those which may be affected by direct sunlight, heating or other heat generating appliances.

The builder shall not be liable for gaps considered as defects where the builder has made the owners aware, as acknowledged by them in writing, that the flooring system installed could suffer significant shrinkage leading to visually obvious movement resulting in gaps well in excess of the tolerances listed above.

If only one gap exists that is defective within the meaning of this section, and it extends over 1 metre in length, it is considered a defect.

12.2 Plywood and Particle Board Flooring

Plywood and particle board flooring will be installed in accordance with AS 1684 -1999 and the manufacturer's recommendations and data sheets.

Where swelling occurs at joints to such an extent that it can be detected through normal floor coverings then it will be considered a defect.

12.3 Nail Popping

If in timber floors nail heads can be detected through floor coverings or nail popping is clearly visible in exposed flooring, this will only be considered a defect if occurring within the first 24 months and only where the builder laid the floor covering or polished the floor as part of the contract.

Where owners have polished exposed flooring or laid floor coverings after completion of the builder's works, due consideration shall be given by the owners in regards to the effects of shrinkage of the floor frame and the subsequent effects of nail popping.

12.4 Squeaking Floors

If floors squeak in trafficable areas within the first 24 months then a defect exists. Normal timber shrinkage is not considered unsatisfactory workmanship of the builder.

12.5 Floor Levels - Concrete and Timber – As Built

Generally, the floor is to be within $\pm 10\text{mm}$ of level over the entire room and at all times, within $\pm 5\text{mm}$ of level over any 3 metre length within the first 24 months.

13 Footings and foundations

13.1 General

Natural movements of the site soils shall not exceed the parameters as outlined in AS 2870. 1-1996 *Residential Slabs and Footings*. Surface movements shall be applicable to the site classification as identified by foundation data.

Foundation movements which are the result of localised drying caused by the effects of trees or excessive wetting caused by unsatisfactory workmanship or lack of site drainage by the builder will be considered a defect.

13.2 Foundation and Site Drainage – Maintenance

Where defects have been caused by the lack of proper maintenance of foundations and/or site drainage (where not the responsibility of the builder) such defects shall not be attributed to unsatisfactory workmanship. The CSIRO publication *Guide to Home Owners on Foundation Maintenance and Footing Performance (August 1996)* shall be used as a guide.

13.3 Distress

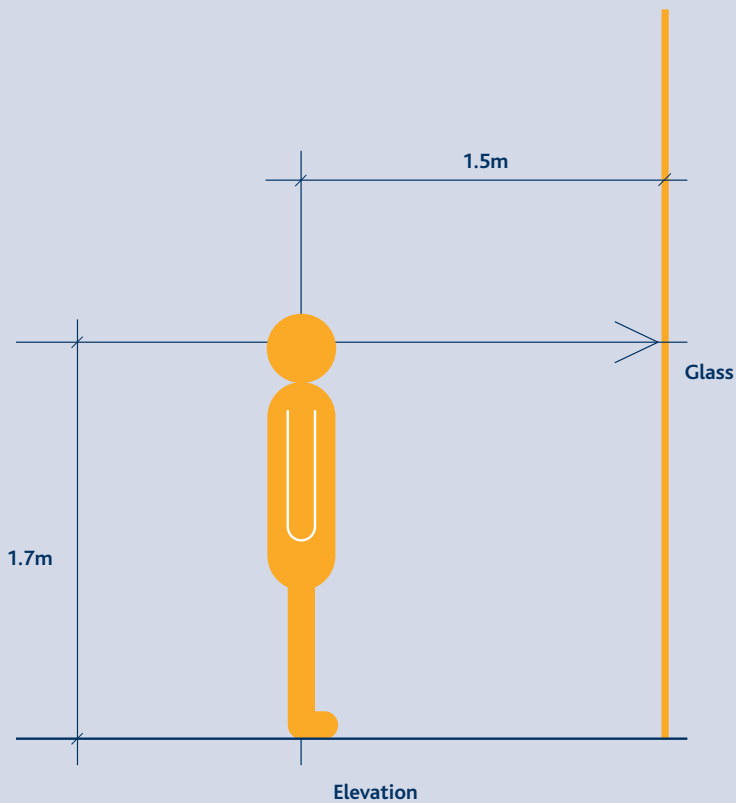
Where natural movements of the soil do not exceed the parameters as referenced in AS 2870 -1996 and where such movements have caused distress to the fabric of the building, this will be considered to be a defect unless construction methods done in a workmanlike manner were adopted to accommodate those movements such as the provision of isolation or movements joints.

14 Glazing

Scratched, fractured, chipped or blemished glazing which has resulted from the builder's unsatisfactory workmanship will be considered a defect.

Assessment is to be based on the following:

- Scratches, fractures, chips or blemishes must be visible when viewed internally, from a line of sight measured 1.7m above the finished floor, and a minimum distance of 1.5m perpendicular to the face of the glass (see diagram) in normal daylight conditions.
- Minor scratches, fractures, chips or blemishes within 5mm of glass edge will not be deemed a defect. Minor is less than 10mm in length and not more than 3 per panel.



15 Lyctus borer

Evidence of Lyctus borer will not be considered a defect.

16 Painting

Coatings used are to be suitable for the relevant conditions and relevant wear and tear. They are to be applied in a workmanlike manner and to manufacturer's instructions unless otherwise specified.

The minimum durability e.g. lifting, blistering, flaking etc. required is as follows:

Exterior finishes:

- Acrylics – 3 years
- Enamel – 2 years
- Semi transparent stains – 1 year
- Clear finishes – not recommended

Interior finishes:

- Acrylics, enamels, stains and clear finishes – 3 years

17 Paving and driveways

For verandahs, garages, carports, paving, patios, driveways etc; any uncontrolled cracking of concrete will be considered a defect if the builder did not make allowance for shrinkage or general movement of the concrete (i.e. slip joints around verandah posts, control joints, isolation joints etc.) or where uncontrolled cracking is the result of unsatisfactory workmanship.

Cracking resulting from causes not attributable to unsatisfactory workmanship (e.g. trees planted too close to paving, commercial/heavy vehicle traffic, use of sprinkler systems etc.) are not a defect.

Cracking resulting from trees planted or sprinkler systems installed by others after construction and not part of the builders obligations are not a defect.

AS3727 -1993 TABLE 1 - PERFORMANCE CRITERIA

Condition	Measure	Limit
Cracking in bound pavements	Crack width	≤1.5mm
Subsidence	Offset under 1.5 m length of the design profile (See Note 2 below)	≤15mm
Stepping	Relative surface level of adjacent paving elements within the expanse of the main pavement.	≤5mm

Notes:

1. The above figures are additional to the construction tolerances used at the time of construction.
2. The design profile is centred over the defect and supported at its ends by equal height spacers. The change in offset is then measured relative to this design profile.
3. Shrinkage cracking in reactive subgrades can lead to loss of bedding sand under segmental pavements. A geotextile separation layer will prevent sand from entering the shrinkage cracks.
4. Cracking in this context applies to bound pavements and not to segmental pavements.
5. The stepping criterion applies only to steps within the surface of the main pavement. 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.

18 Plasterboard

18.1 General

Installation and jointing of plasterboard will conform with the manufacturer's recommendations and data sheets.

18.2 Peaking or Jointing

If plaster peaking or jointing is obvious in normal daylight conditions, it will be considered a defect. CSIRO Report No L8 (1960) *Illumination and decoration of flat surfaces* will be used as a guide.

18.3 Plaster Board Cracking

- (a) Cracking less than 1mm is not a defect except where such cracking occurs in recessed and butt joints.
- (b) Diagonal cracking, except for cracks less than 1mm, will be considered a defect and the cause will be investigated.

18.4 Nail Popping

Nail popping will only be considered a defect within the first 24 months if evidence exists that such is caused by unsatisfactory workmanship. Normal timber shrinkage is not considered to be unsatisfactory workmanship of the builder.

18.5 Matching Existing Plaster and Texture

Refer to 3.7.2 - Matching Colour and Texture

19 Hard plaster

Cracking of more than 1mm will be considered a defect in rendered finishes.

Provision for the control of cracking in articulation joints should be allowed for or otherwise specified.

If the owner or agent at the time of construction specifies construction that does not allow for movement, cracking will not be considered a defect.

20 Restumping works

20.1 Consequential Damage

The builder will not be responsible for any consequential damage caused by the builder's restumping if the builder can show in writing, signed by the owner, that the owners had been sufficiently informed by the builder of the likelihood and nature of such consequential damage arising as a result of the builder's restumping works.

Notwithstanding the above, the builder will be responsible for consequential damage caused by unsatisfactory workmanship.

20.2 Floor Levels

Re-levelling of the existing dwelling floor levels shall be within $\pm 15\text{mm}$ over any room unless physical or statutory restrictions exist.

Re-levelling of existing structures shall be carried out having regard to limitations imposed by:

- Existing structural conditions
- Fixed points
- Attached buildings
- Extensions to the dwelling
- Plumbing installations
- Or any other factor which may restrict the re-levelling process.

20.3 Packing Material

Packing material should be a suitable non-compressible material.

21 Roofing systems

21.1 Metal Roofing/Components

Installation will be in accordance with the manufacturer's recommendations and data sheets.

Rectification of pre-colour coated components shall be carried out in accordance with the manufacturer's recommendations.

21.2 Pointing

If pointing becomes dislodged or washed out, it will be a defect if caused by unsatisfactory workmanship or materials.

Minor cracking of pointing is not a defect.

21.3 Roof Batten Alignment

Battens shall be aligned to within a tolerance of $\pm 20\text{mm}$ in 4m. Refer to *AS 2050 - 1995*.

Refer to Appendix A for an illustrative example of the interpretation of tolerances.

21.4 Roof Batten Spacing

Spacing of tiling battens shall be in accordance with manufacturer's requirements. However *AS 2050 - 1995* allows a tolerance of $\pm 5\text{mm}$.

Battens over 75mm in thickness shall be blocked or otherwise restrained from overturning. (Refer to *AS 2050 - 1995*).

21.5 Dry Valley Construction

Dry Valley construction must be carried out in accordance with the publication *Dry Valleys to Tiled Roofs* published by the Victorian Roofing Tile Association, April 1999 edition.

21.6 Undulating Roof Lines

Undulations due to unsatisfactory workmanship or loose truss chords will be considered a defect when the deflection exceeds $\pm 20\text{mm}$ in any 4m length.

Notwithstanding, consideration shall be given to the effects of long term deflection of roof frame members.

Refer to Appendix A for an illustrative example of the interpretation of tolerances.

22 Shower enclosures

22.1 Shower Screens

Fair wear and tear of shower screen components will not be considered a defect. Cracking of shower screens and cracking of shower glass will not be considered to be a defect where such cracking has been caused by factors other than unsatisfactory workmanship or a manufacturing process.

22.2 Shower Bases

Shower bases which crack, leak or don't perform as intended will not be considered to be a defect where such cracking has been caused by factors other than unsatisfactory workmanship or a manufacturing process.

23 Gutters and downpipes

Generally gutters shall not retain more than 10mm of water. Leaking of joints in gutters may be considered a defect where such defect has been caused by unsatisfactory workmanship.

24 Steel framing

Steel framing shall be suitable for the particular application and installed in accordance with the manufacturer's specifications. Where defects arise due to the effects of thermal/structural movements of the framing members and no allowance has been made for such movements then the consequential damage shall be attributed to the builder's unsatisfactory workmanship.

25 Stormwater systems

Stormwater drainage systems shall function as intended. Where stormwater drainage systems fail to perform as intended and the failure is attributable to unsatisfactory workmanship, then a defect exists.

Defects caused by factors beyond the builder's control such as intrusion of tree roots etc will not be attributed to unsatisfactory workmanship.

Where new stormwater systems are connected to existing stormwater drainage systems in the case of renovations or additions, then unless the contract allows for any works to the existing system the builder shall only be liable for any defects that arise for works carried out under the contract.

26 Straightness/plumbness of walls

Generally walls are to be within $\pm 5\text{mm}$ from the vertical over any 3 metre height.

Refer to Appendix A for an illustrative example of the interpretation of tolerances.

27 Termites (White Ants)

Evidence of termites will not be considered a defect in areas not designated by local councils as termite prone areas.

In termite designated areas, evidence of termite activity will be considered a defect if the builder did not install a termite barrier in accordance with the BCA unless the relevant building surveyor approved otherwise.

28 Timber shrinkage and splitting

Up to 10% shrinkage will be accepted for unseasoned timber. For seasoned timbers, a maximum of 3% shrinkage will be accepted.

Timber stairs may have the following tolerances, and not be considered a defect, when applied where conditions such as movement of materials due to atmospheric moisture changes (i.e. cupping of timber stair treads) affect finished stair dimensions.

- Variation in the tread/going no greater than 5mm
- Variation in a riser height no greater than 5mm.

These tolerances should not be applied to allow poor construction practice.

29 Water hammer

Any water hammer is a defect.

30 Water leaks

Roofs, gutters, flashings, skylights, window frame joints or window seals which leak under normal weather conditions for the particular terrain, will be considered a defect.

A defect will not exist if the roofing system has not been regularly maintained by the owner or where the owner has failed to maintain the protective coating system to timber window frames.

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Appendix A

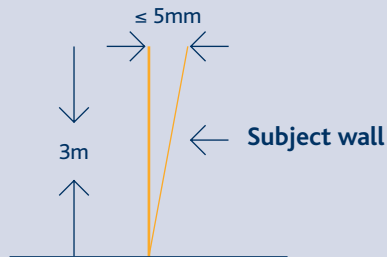
Interpretation of \pm tolerances given in *Australian Standards Codes*.

Introduction: some tolerances that occur in the *Guide to Standards and Tolerances* are expressed in terms of \pm measurements. The question of the definition of this terminology has not been addressed.

This Appendix seeks to provide this definition. This advice has been prepared in consultation with Standards Australia.

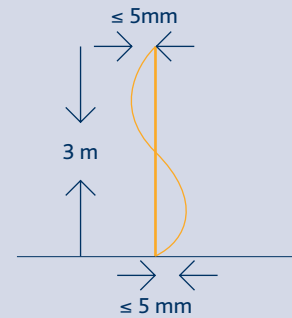
Case examples: for a tolerance of $\pm 5\text{mm}$ over 3 metres

(A) Less than or equal to 5mm



Case (A) is acceptable

(B) Less than or equal to 5mm



Case (B) is acceptable

This element is $\leq 5\text{mm}$ out of vertical

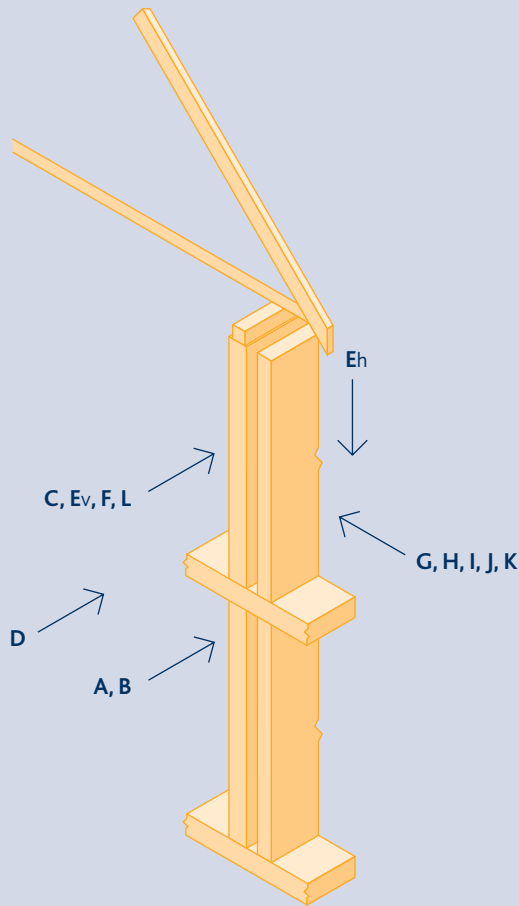
Appendix B

Engineering Diagrams explaining content of Table in Clause 3.3 - Bed Joints and Perpend

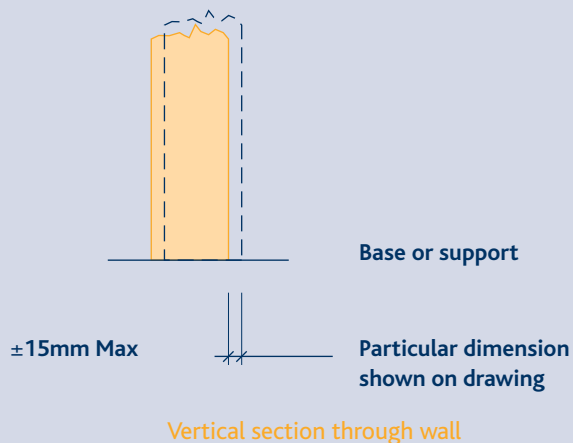
relating to AS 3700 -2001 *Tolerances in Masonry Construction*

These diagrams have been prepared in consultation with Standards Australia.

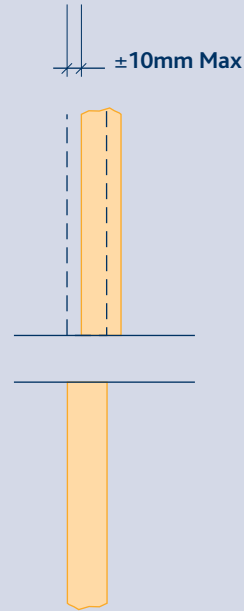
Key diagram showing views



A Horizontal position of any masonry element specified or shown in plan



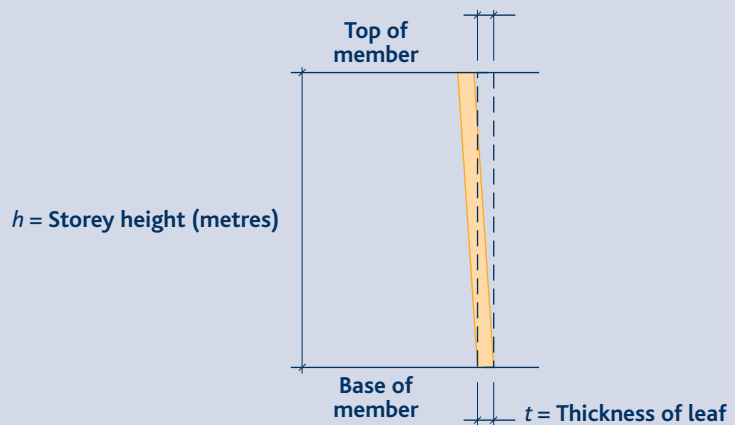
B Relative displacement between load bearing walls



Vertical section through wall

C Maximum deviation from plumb within a storey

Non-structural facework $\pm 10\text{mm Max}$



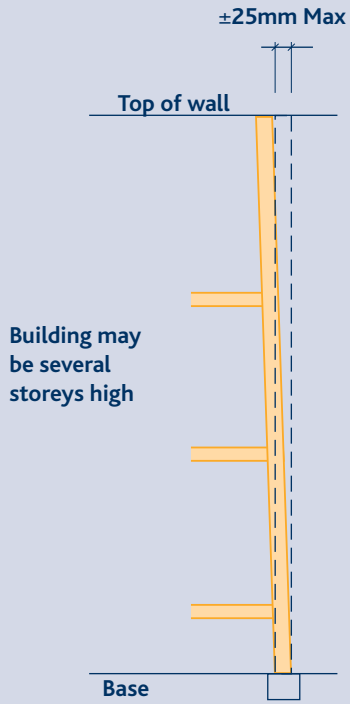
Structural lesser of $\pm \left(\frac{10h}{3} \right)$ OR $\pm 0.05 t$

For example, if storey height, $h = 4.0\text{m}$ and leaf thickness, $t = 190\text{mm}$. Tolerance is the least of

$$\frac{\pm 10 \times 4.0}{3} = 13\text{mm} \quad \text{or} \quad \pm 0.05 \times 190 = 9\text{mm} \quad \text{ie } \pm 9\text{mm}$$

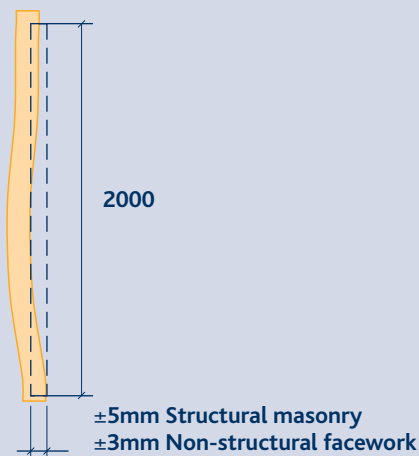
Vertical section through wall

D Maximum deviation from plumb in total height



Vertical section through wall

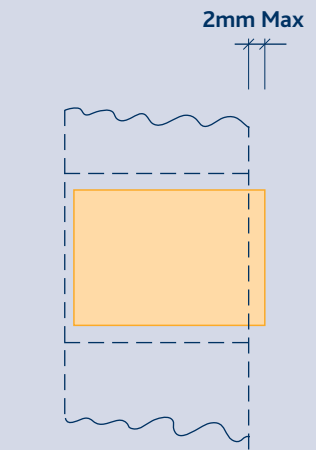
E Maximum horizontal or vertical deviation of surface (bow)



Must comply when measured horizontally or vertically

Vertical section through wall

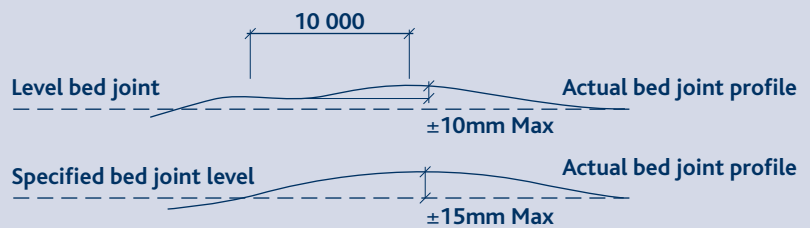
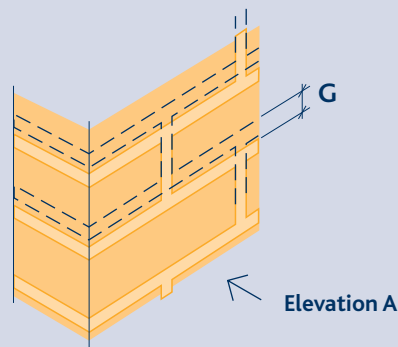
F Deviation step of exposed surface



Non-structural facework only

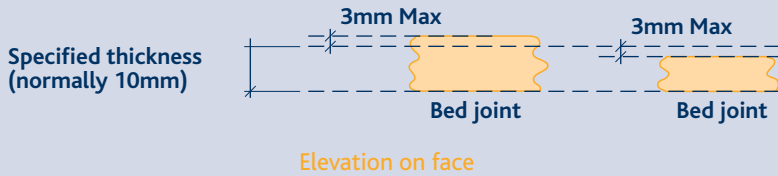
Vertical section through wall

G Deviation of bed joint from horizontal etc.

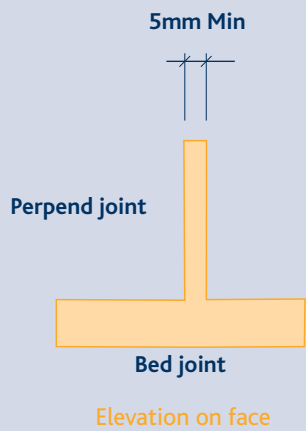


Elevation A on face

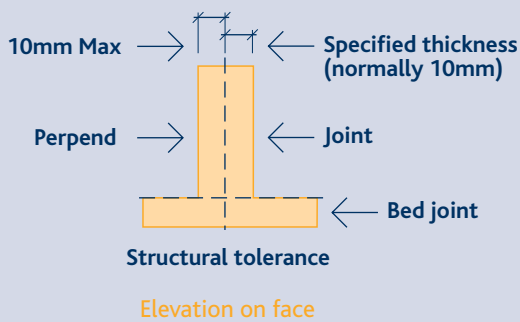
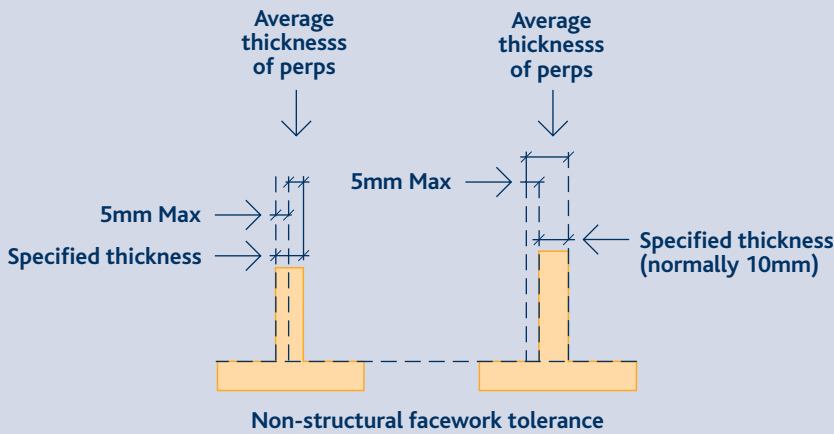
H Tolerance on bed joint width



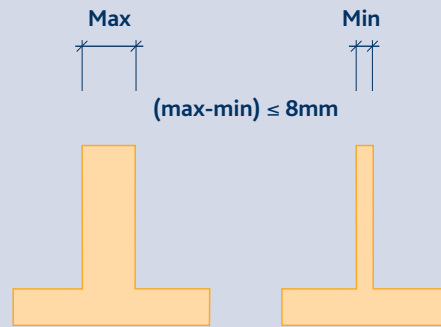
I Minimum perpend thickness



J Deviation from specified thickness of perpend



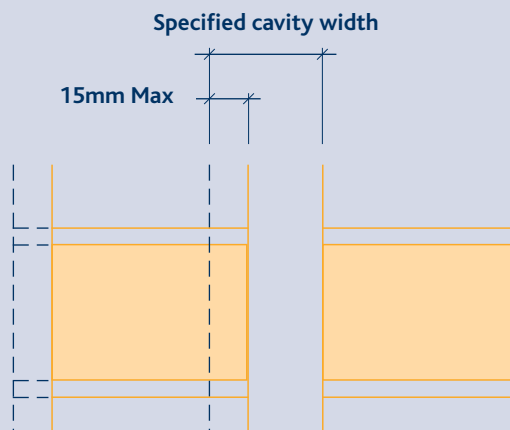
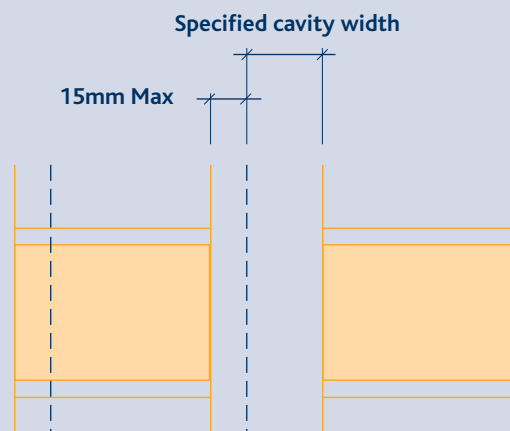
K Maximum difference in perpendicular thickness



Non-structural facework only

Elevation on face

L Deviation from specified cavity width



Section through cavity wall

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