Code of Practice

RAISED TIMBER DECK STRUCTURES ON NEW HOMES

This Code of Practice has been produced by the Timber Decking and Cladding Association to meet the installation and performance requirements specified in NHBC home building standards.

Code of Practice: TDCA/RD0801 E5

Raised timber deck structures on new homes

- 1st edition November 2008
- 2nd edition June 2010
- 3rd edition March 2017
- 4th edition December 2017
- 5th edition February 2018

The information contained in this document has been given in good faith. Every effort has been made to ensure the guidance given is accurate. The Timber Decking and Cladding Association cannot accept any liability for loss or damage arising from the information contained herein or from any designer or contractor not complying with this guidance.

The TDCA is an independent technical and advisory organisation founded in 1999 as the Timber Decking Association later bringing cladding into its remit in 2008. It was established to promote the materials, design and installation practices required to create high performance decks, boardwalks and associated landscape structures in wood.

The TDCA operates DeckMark® – a quality assurance and performance scheme for deck construction materials and contractors. A list of approved products and contractors is available on request or online at www.tdca.org.uk/publications

The Timber Decking and Cladding Association Ltd, is a not for profit a company limited by guarantee.

CONTENTS

INTRODUCTION

This Code of Practice (CP) has been developed to assist homebuilders meet the quality and performance standards specified by NHBC which requires outdoor deck structures built as an integral part of a new home to have a design life for the substructure components of 60 years and for the deck boards, as they are readily accessible for inspection and maintenance, 30 years.

Timber decks can be designed to meet a variety of service life requirements. For quality installations, a service life of 15 years is considered to be the minimum standard by the Timber Decking and Cladding Association (TDCA) but longer service lives, typically 30 and 60 years are also achievable.

Decks that are retro-fitted to an existing property are not covered by NHBC standards and can be built in accordance with TDCA guidance for a 15 year desired service life or longer as required.

Timber has a long history of use as a structural material. It is a sustainable construction material with widely recognised environmental credentials. Increasingly, designers are turning to timber as the "green" building and engineering material of choice. The use of wood for external structures like decks, boardwalks and bridges has grown significantly. Where such structures are intended to be permanent, material selection, design, installation good practice and maintenance are key factors in ensuring fitness for purpose and long service life.

House builders are increasingly choosing to include timber decks on new properties to add customer appeal. On sloping land, raised decks are a practical solution to providing external leisure space where a traditional patio or garden is not possible.

Leading designers, manufacturers and the Wood Protection Association have been consulted in the recommendations contained in this CP. References have also been drawn from the Building Research Establishment (BRE), TRADA and British and European Standards where relevant.

Those responsible for commissioning raised domestic decks should only use designers and installers of assessed capability with the experience and expertise required to carry out the work. The TDCA maintains a list of design and installation contractors of assessed capability under the DeckMark® quality scheme.

DEFINITION OF A RAISED DECK

For the purposes of this CP, a 'raised deck' is defined as a timber structure attached to a new residential property:

1. having any part of its deck platform more than 60cms from the ground;

2. that is no higher than 2.4m from the ground;

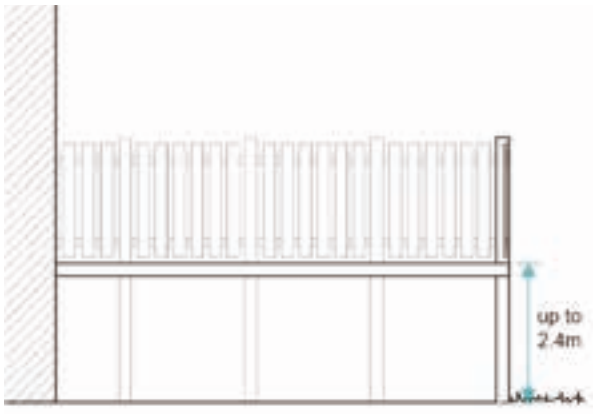
3. that was included on the original design of the property and which is;

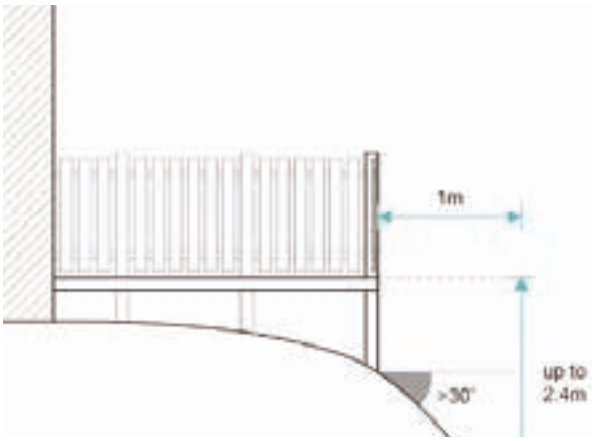
4. installed prior to the issue of a new home completion certificate.

Measurements are taken from the top of the deck board to the lowest ground level vertically below the deck edge. If the ground slopes away at an angle greater than 30° from the horizontal, the vertical drop should be measured to the bottom of the slope or a distance 1m horizontally from the deck.

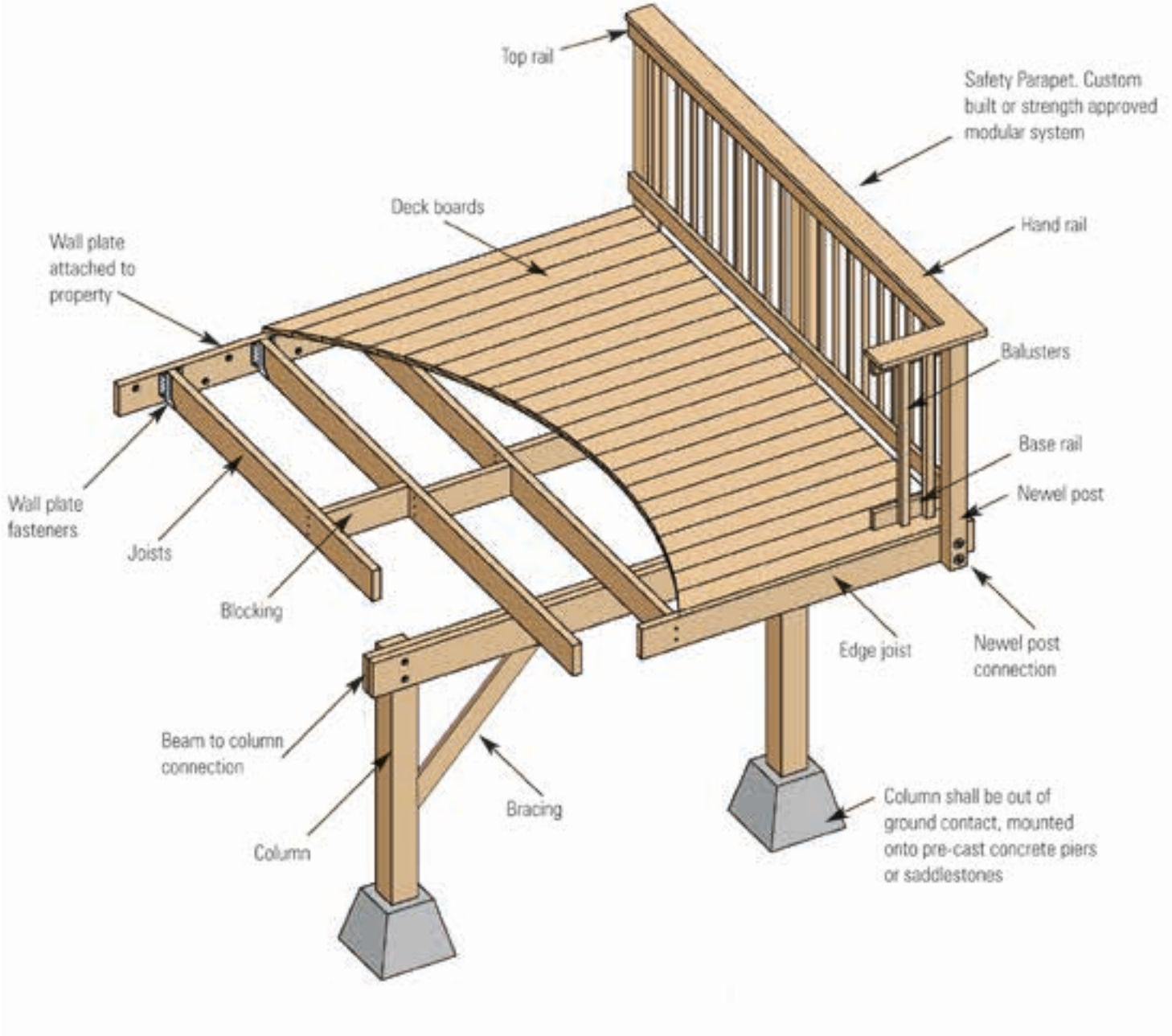
Any design having a deck platform under 60cms in height is regarded by the TDCA as garden or low level "decking". Raised decks are more complex to build because of the lateral and vertical forces that a deck may be exposed to during its service life.

RAISED DECKING





RAISED DECK – GENERAL ARRANGEMENT



SCOPE OF THIS CODE OF PRACTICE (CP)

This CP applies to raised decks for which a desired service life of 60 years is required. It includes guidance on:

- Timber selection
- Timber protection
- Column specification and foundations
- Beam size and fixing
- Joist size and fixing
- Ledger board and fixing
- Deck board specification and fixing
- Parapet design and fixing
- Stairs and ramps
- Aftercare and maintenance
- Relevant Standards and References

Note:
1 Residential decks on which hot tubs or other excessively heavy loads are to be placed are beyond the scope of this CP.
2 Raised decks should not be used or occupied until final inspection and approval has been given by the new home insurance provider or building control officer.
3 All dimensions quoted in this CP are actual sizes unless otherwise stated.
4 The illustrations in this CP are not to scale.

LOAD BEARING ASUMPTIONS

The guidance in this document provides for a uniformly distributed load of 3.0 kN/m2 and concentrated load of 1.4 kN for the main deck platform and its support. The TDCA recommends that this is the minimum standard that should be used for a raised timber deck on an individual residential property.

Parapets, whether a modular system or custom built, must be capable of withstanding a horizontal, uniformly distributed load of 0.74 kN per metre and a single point load to the infill of 0.50 kN. Refer to Section 3.10: Parapet & ballustrades for details and consult TDCA Technical Bulletin 04: Deck Parapet Design and Construction for detailed guidance.

SHARED ACCESS DECKS

When decks or boardwalks provide shared access to a number of properties, commercial load bearing capabilities shall be applied to the design i.e. the uniformly distributed load assumption is a minimum of 4.0kNm^2 with a single concentrated load 1.4kN. Full commercial specification details are available from the TDCA.

METAL FIXINGS

All metal fixings shall be made from corrosion resistant materials such as stainless steel (Grade 316 minimum), silicone bronze, hot dipped galvanised (BS 7371-6) or other high performance coated steel. The suitability of a metal fixing for the type of timber being used should be verified by the manufacturer prior to use. The same type of metal should be used for fixings and connectors on the same assembly in order to prevent any potential for galvanic corrosion. Electroplated, brass and standard ferrous metals must not be used because of their potential to corrode when used for exterior applications. Aluminium should not be used in direct contact with treated wood. Consult TDCA Technical Bulletin 08: Metal Fixings for detailed guidance.

SECTION 1: TIMBER SELECTION

1.1 GENERAL

Whilst good design and installation practice have an important bearing on the long-term performance of a raised deck the first step to achieving a desired service life of 30 to 60 years is timber selection. Such an extended service life can only be satisfied by specifying timber that:

a) has appropriate natural durability (resistant to fungal decay. Please note natural durability classifications are based on the heartwood of a species – the sapwood of all species is perishable) or

b) has been made suitably durable by an appropriate wood protection / modification process.

Table 1 lists those softwoods and hardwoods considered most suitable for structural use in extended service raised decks. Designers and builders should only use timber from certificated, legal and sustainable sources.

Components manufactured in accordance with the DeckMark® quality assurance scheme provide independent confirmation of quality and fitness for purpose.

Wood used out of doors will give a more consistent and reliable performance when it has a moisture content below 20% at the time of installation – see section 1.6 for details.

TABLE 1: TIMBERS SUITABLE FOR DECKS REQUIRING A 30 TO 60 YEAR SERVICE LIFE

Spieces	Spieces type	Natural durability class (Source BS EN 350:2016)
British pine/European redwood	Softwood	3 or 4
Corsican pine	Softwood	4v
Radiata pine	Softwood	4 or 5
Southern pine	Softwood	5
Western Red Cedar – North American	Softwood	2
Balau (yellow)	Hardwood	2
Cumaru	Hardwood	1
Ipe	Hardwood	1
Iroko	Hardwood	1 or 2
Jarah	Hardwood	1
Karri	Hardwood	2
European Oak	Hardwood	2-4*
Opepe	Hardwood	1
Tatajuba	Hardwood	1
Teak – Asian	Hardwood	1-3*
Chemically modified timber	Softwood/Hardwood	Brand specific
Thermally modified timber	Softwood/Hardwood	Brand specific

*BS EN 350:2016 supercedes BS EN 350-2:1994 which assigned European Oak and Teak to durability class 2 and 1 respectively. These species as reclassified cannot be used to meet this CP unless it can be verified that they are at the upper end of their durability range ie. 1 or 2.

v= variable

Durability classes 1 and 2 equate to a desired service life of 60 and 30 years respectively (BS 8417)

1.2 NOTES ABOUT SOFTWOODS

Components made from softwoods are likely to contain non-durable sapwood and require preservative treatment applied by an industrial process in accordance with Wood Protection Association specifications and BS EN standards. Western red cedar may be used without treatment if sapwood is excluded. Modification processes also produce timber suitable for external applications.

Guidance on wood protection is given in section 2 of this document.

1.3 NOTES ABOUT HARDWOODS

Hardwoods with well-documented performance properties and a history of external structural use are set out in the timber design code BS 5268: 2 (withdrawn) or Eurocode 5. Those considered to be the most suitable to meet this specification are set out in Table 1. All the species listed in Table 1 have a BS EN 350 class 1 (very durable) or class 2 (durable) rating and are capable of a long service life for structures such as decks, boardwalks and bridges.

There are also a number of other hardwoods, from certificated sources, that are now commercially available for deck construction. Examples include: Kempas and Massaranduba. The major suppliers, such as the DeckMark® accredited members of the TDCA, can provide technical information about their performance.

Only hardwoods from which all sapwood has been excluded should be used.

1.4 TIMBER STRENGTH CLASS

Timber used for structural purposes must be strong enough to support the loads placed upon it. This is a safety critical requirement of UK Building Regulations. Every structural component in a raised deck should be made from strength graded timber (C16 minimum). In the interests of good practice, we also recommend the use of strength graded deck boards.

Graded timber is grouped into a number of strength classes as defined in BS EN 338: Structural Timber. The strength classes for softwoods are prefixed with the letter C and hardwoods with the letter D. In the UK, softwood of strength class C16 or C24 is the most commonly available. For raised deck construction, C16 is the minimum acceptable strength class. C24 provides longer span capability or slightly smaller component sections and may have better visual appearance. C22 is included in this CP for the purposes of being relevant to Southern Yellow Pine.

Western Red Cedar should be either SS grade (special structural), in accordance with BS4978, or 'Select Structural' (Sel Str) in accordance with North American NLGA Grading Rules. Both these grades are strength class C18 and the values given for C16 in this CP may be used for determining permissible spans.

D30 is the minimum strength class for hardwoods.

The same species and strength class must be used for all the support structure elements of the deck. For aesthetic reasons, strength grade ink stamps are not normally applied to deck boards so it is important that the strength grade of the deck boards supplied is verified in accompanying documents from the supplier for scrutiny by NHBC inspectors should this be required.

1.5 TIMBER TARGET SIZES

Timber dimensions (BS EN 336) defines "target size" as the size specified (at the reference moisture content) and to which deviations, ideally zero, are to be related.

All dimensions quoted in this document are the actual finished sizes to be used. As such, they represent the target size.

If "nominal" timber dimensions are quoted, always ensure that the actual dimensions meet the specification requirements.

1.6 INSTALLATION MOISTURE CONTENT

The moisture content of wood is directly related to the humidity and temperature of the surrounding air. The equilibrium moisture content (EMC) occurs when the wood has reached an equilibrium with its environment and is no longer gaining or losing moisture.

In the UK, EMC ranges from around 19% in winter to 13% in summer. To minimise the potential for defects such as cupping, warping and cracking, timber components should have a moisture content close to the prevailing EMC at the time of its installation. As a minimum standard, the moisture content of timber components shall be below 20% at time of installation.

Deck construction components delivered to site shall be given adequate ventilated and weather protection until required for installation.

SECTION 2: TIMBER PROTECTION

There are two suitable methods of providing softwood with adequate durability tsatisfy the desired service required in this CP. They are:

a) high pressure impregnation with a wood preservative (see 2.1) and

b) wood modification (see 2.2)

2.1 PRESERVATIVE TREATMENT

BS 8417 sets out penetration and retention requirements for different timber types, end uses and service life requirements. This Standard is used as the basis for the treatment specifications set out in this CP in conjunction with BS EN 335 which classifies end use applications.

BS EN 599-1 defines the test criteria (preservative efficacy) that support the long-term performance of components treated with the wood preservatives as defined in BS 8417.

TABLE 2: PRESERVATIVE TREATMENT SPECIFICATION

GENERAL REQUIREMENTS FOR ALL COMPONENTS

The preservative should be one suitable for external use and applied by a penetrating process e.g. a copper organic preservative.

Timber species must be classed as permeable (See Table 1). If it is not possible to distinguish between heartwood and sapwood, the whole sample should be regarded as sapwood.

For glue-laminated columns only, untreated zones not exceeding 10% of the sapwood in which penetration would be expected in an individual component may be ignored in the assessment of penetration.

The two key criteria for specifying treated wood are preservative retention and penetration and this should be verified in documentation supplied with the timber. In Component Groups A & B, the retention and penetration requirements differ as follows: -

Group A components: Retention of preservative is to be R4 x 1.5. The R value is determined in the tests stipulated for Use Class 4 end uses in EN 599-1. In addition, the preservative retention R4 shall be derived from 10 years' ground contact field test data.

Group B components: Retention of preservative is to be R3 x 1.25. The R value is determined in the tests stipulated for Use Class 3 end uses in EN 599-1

COMPONENT GROUP A: COLUMNS (SUPPORT POSTS) INSTALLED OUT OF GROUND CONTACT, BEAMS, WALL PLATES AND JOISTS:

RETENTION

All components are exposed above ground in an outdoor situation; none are in contact with the ground which means they are allocated to use class 3.

However, as they have a structural element and are not easily replaced, they are treated to the retention given above (i.e. R4 x 1.5) in order to provide an extended desired service life of up to 60 years.

PENETRATION

Treatment penetration shall be in accordance with the BS 8417 30 year extended specification for BS EN335 Use Class 4 (uncoated applications) or better. To meet this specification, sapwood penetration shall be in accordance with EN351-1, NP6 rating to an acceptable quality level (AQL) of 10% (see note 'e' on page 8).

NP6 = Full sapwood plus minimum 6mm penetration into exposed heartwood. Achieving this depth of penetration into heartwood is often very difficult and processes to aid penetration, such as incising, may be required.

COMPONENT GROUP B: STAIR STRINGERS, DECK BOARDS AND PARAPETS/BALUSTRADES:

RETENTION

All components are exposed above ground in an outdoor situation; none are in contact with the ground. They are treated to the retention given above (i.e. R3 x 1.25) in order to provide an extended desired service life of up to 30 years.

PENETRATION

As any decay of these components is likely to be progressive and damaged elements can be easily repaired during the life of the structure as a whole,

the treatment penetration shall be in accordance with BS 8417 30 year specification for BS EN335. Use Class 3 (uncoated applications) or better. To

meet this specification, sapwood penetration shall be in accordance with EN351-1, NP5 rating to an acceptable quality level (AQL) of 10% (see note 'e' on page 8).

NP5 = Full sapwood penetration.

It is the responsibility of the timber treater to use the appropriate schedule to achieve the values and quality required in the specifications set out in this CP. As such, designers and builders are recommended to use timber decking whose compliance with BS8417 has been independently certificated under a quality scheme e.g. the Wood Protection Association's Benchmark quality scheme – for further details refer to wood-protection.org/quality-assurance/

Notes about high pressure wood preservation

a) Components must be machined to their final dimensions and have a moisture content prior to treatment not exceeding 20%.

b) During installation, surfaces exposed by unavoidable cross cutting, notching or boring shall be given two liberal brush coats of a suitable end grain preservative. Contact the TDCA, WPA or major preservative manufacturers for recommendations.

c) If it is necessary to cross cut columns to size then the cut end should always be at the top and never placed close to or in contact with the ground or concrete foundation.

d) Machining or regularising treated components is prohibited unless they are to be re-treated by the timber supplier. Deck platforms should always be designed to avoid the need to cut a deck board along its length.

e) Acceptable quality level (AQL): This is the number of components in a treatment charge which can be below the required penetration level before the entire charge is deemed non-compliant with the specification.

2.2 MODIFIED WOOD

Modified wood is a term used to describe certain softwoods and hardwoods that have been modified chemically, biologically or by a physical agent such as heat to provide enhanced performance properties – for example acetylated wood.

Because "modified wood" is still a relatively new construction material it is not, as yet, covered by British or European Standards. However, BRE Digest DG504 sets out the suitability of modified wood for construction purposes and decking is identified as a potential application. It should not be assumed that the structural capabilities of modified woods are the same as softwood. Always check with the manufacturer for declarations of performance and service life.

TRADA has carried out an independent evaluation of Accoya® (acetylated radiata pine) for deck structures for which 60 years service life is desired.

SECTION 3: PRINCIPLES OF RAISED DECK DESIGN AND GOOD PRACTICE

The durability of the structure and its ability to achieve the service life required depends not only on the correct selection of materials but also on design detailing and installation good practices to prevent moisture retention and facilitate good ventilation and drying. Section 3 of this CP covers the basic principles for a deck where the desired service life is 60 years for components in Group A and 30 years for components in Group B. Guidance on deck structures where shorter service lives are required, typically 15 years, is available from the TDCA.

3.1 COLUMNS

Raised deck support columns are usually square in section but round poles may be used if appropriate to the design. Traditionally columns are solid wood but increasingly designers are turning to laminated columns.

Laminated columns comprise multiple sections of strength-graded timber bonded together with glue or mechanically. Laminated columns are more dimensionally stable than solid ones of equivalent size and are less likely to develop surface defects. This gives them high aesthetic appeal for raised decks where the columns are visible.

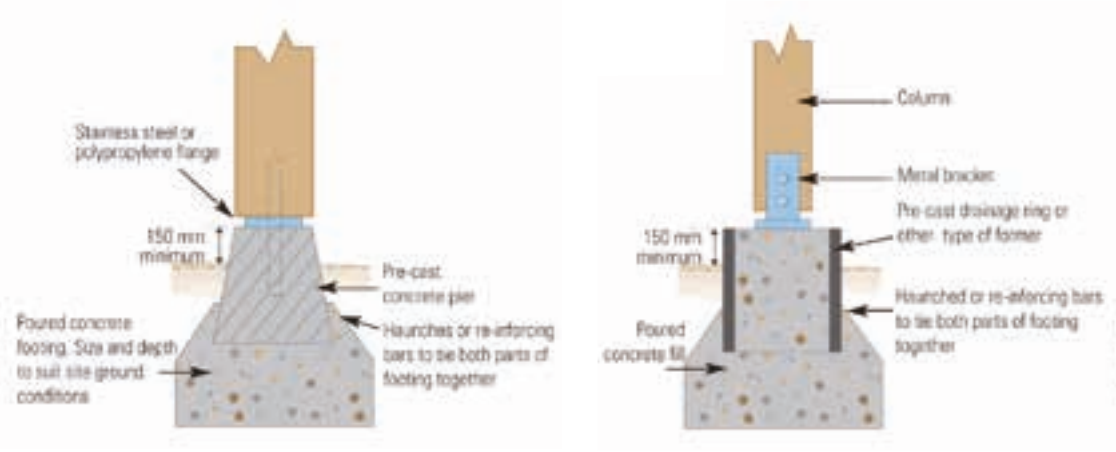
The actual finished size of support columns shall be no less than 140 mm x 140 mm.

The sole purpose of a column is to support the entire structure. It is recommended that support columns are not carried through the deck to serve as newel posts for a parapet. Parapets for raised decks should always be designed as separate features – see section 3.10 for details.

3.2 COLUMN FOOTINGS

Columns embedded in the ground are suitable for decks with a service life of up to 30 years. To deliver a 60 year desired service life, timber columns shall be installed clear of the ground on a concrete footing, pier or saddlestone – see Figure 1 below.

FIGURE 1: POST FOOTINGS



Pre-cast concrete saddlestone and stainless steel connector.

3.3 COLUMN SPACING

The correct spacing of support columns is determined by a combination of:

a) the area of the deck to be supported

b) beam position and frequency

c) the dimension of the beam

d) the nature of the ground and the 3 kN/m2 loading of the deck.

3.4 BEAM SIZE

The main support beams may be made from either solid timber or from double sections of the same size and strength component mechanically joined together.

The minimum actual size for a single solid beam is 187 x 69 mm.

The minimum actual size for each element in a double beam assembly is 170 x 44 mm.

Beam spans between columns for various recommended sizes and strength classes are set out in Tables 3.1 and 3 .2. Beams can be extended beyond a column centreline by up to 30% of its clear span – see Figures 4 and 6.

TABLE 3.1: DOUBLE MEMBER BEAMS – MAX. CLEAR SPANS BETWEEN COLUMNS IN METRES

Actual size	C16	C22	C24	C30
170 x 44 mm	1.5 m	1.55 m	1.65 m	1.7 m
194 x 44 mm	1.8 m	1.95 m	2.1 m	2.2 m
220 x 44 mm	2.4 m	2.5 m	2.7 m	2.8 m
245 x 44 mm	3.0 m	3.15 m	3.3 m	3.4 m

TABLE 3.1: SINGLE MEMBER BEAM – MAX. CLEAR SPANS BETWEEN COLUMNS IN METRES

Actual size	C16	C22	C24	C30
187 x 69 mm	1.8 m	2.0 m	2.1 m	2.2 m

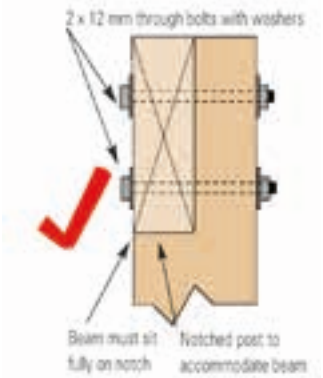
Beam Span: Maximum beam spans are based on the joist spans in Table 4 on page 10.

3.5 BEAM TO COLUMN CONNECTION

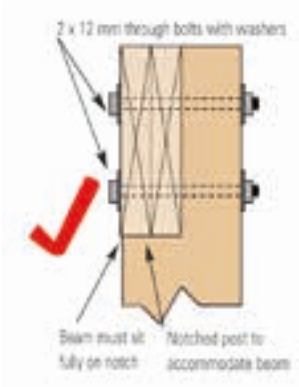
Beams are attached to support columns by means of notching the column and using 12 mm through bolts at 100 mm centres – see Figure 2. All through bolts shall have washers at the bolt head and nut. These washers shall be of a size that is the equivalent of 3 times the diameter of the bolt.

FIGURE 2: BEAM TO POST ASSEMBLY

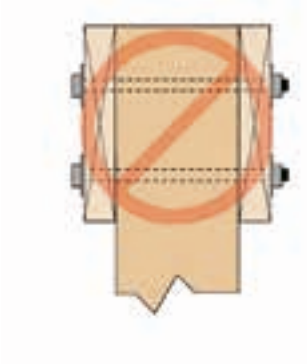
2 x 12mm through bolts with washers.



Soild beam
Beam must sit fully on notch.



Double beam
Notched post to accommodate beam



Prohibited beam
Only recommended for decks under 600mm high

3.6 WALL PLATE

The deck is secured to the wall of the property by means of a horizontal joist or beam known as a wall plate or ledger board. This supports one end of the deck joists. The other end is supported by the column and beam assembly.

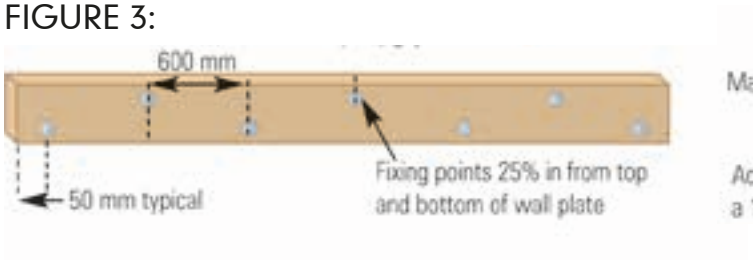
Wall plates shall be equal to or greater than the size of the joist that is to be used.

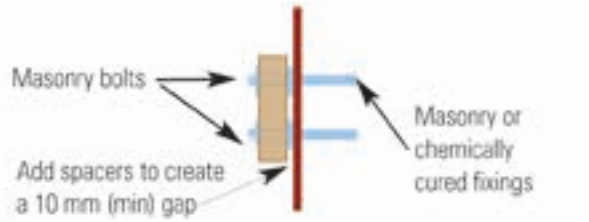
The wall plate shall be attached to the house wall using masonry anchor bolts or chemically secured bolts. The wall needs to be smooth, structurally sound and capable of withstanding the lateral and pull out loads that will be placed on it by the deck.

A gap of no less than 10 mm shall be left between the wall plate and the wall to allow any rainwater running down the wall to drain away freely. Wall plate fixing details are shown in Figure 3.

Note: Wall plates on timber frame properties. On timber frame properties decks should not be fixed to the outer skin of the property unless the deck wall plate/ ledger board fixing point has been designed to be an integral part of the property's construction.

FIGURE 3:





3.7 JOISTS

The recommended processed joist size is 170 mm x 44 mm or larger, installed at 300 mm to 600 mm centres depending upon the size and grade of deck board being used – see Table 5 in section 3.9 for details. As a general rule, it is good practice to increase the frequency of the support joists rather than the thickness of the deck board.

It is preferable to use processed joists with eased edges to assist water shedding.

The table below gives details of the maximum spans for the most popular joist sizes.

TABLE 4: MAX. JOIST CLEAR SPAN DISTANCE IN METRES (M) AT 400 MM CENTRES

Actual size	C16	C22	C24	C30
170 x 45 mm	2.7 m	2.8 m	3.0 m	3.1 m
195 x 45 mm	3.0 m	3.1 m	3.3 m	3.4 m

Joists may be mounted on top of the wall plate or the outer beam, but not both. One end shall be face fixed to prevent turning – see Figures 4 to 5.

Joists may be cantilevered over a beam by up to 30% of their permissible clear span.

FIGURE 4: JOIST OVER BEAM DECK DESIGN

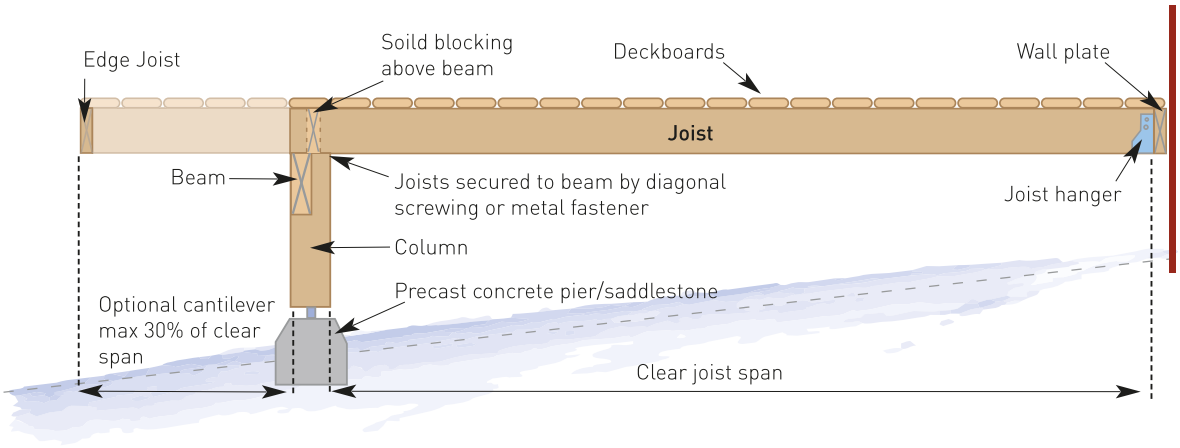
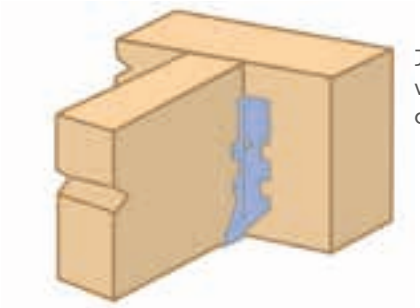
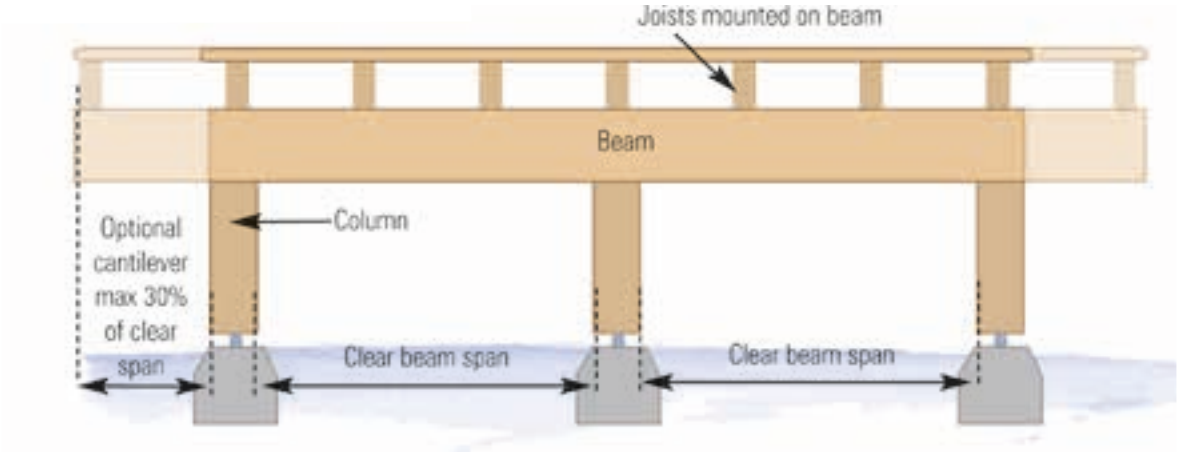


FIGURE 5: WALL PLATE FIXING



Joists can be face fixed to wall plates and beams using a suitable joist hanger

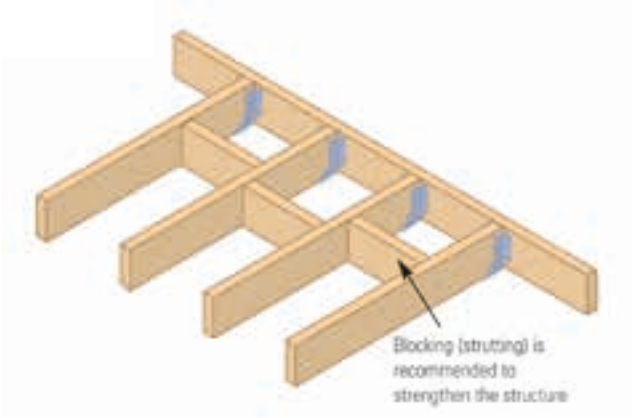
FIGURE 6: BEAM SPAN AND JOIST ARRANGEMENT



3.8 BLOCKING AND BRACING

Blocking, (also known as strutting) should be installed between joists to further reinforce the strength of the structure and prevent joists from moving in service. As a minimum requirement, all joists with a span of more than 2.5 m shall be blocked at mid-span – see Figure 7. Deeper joists will need blocking at more frequent intervals.

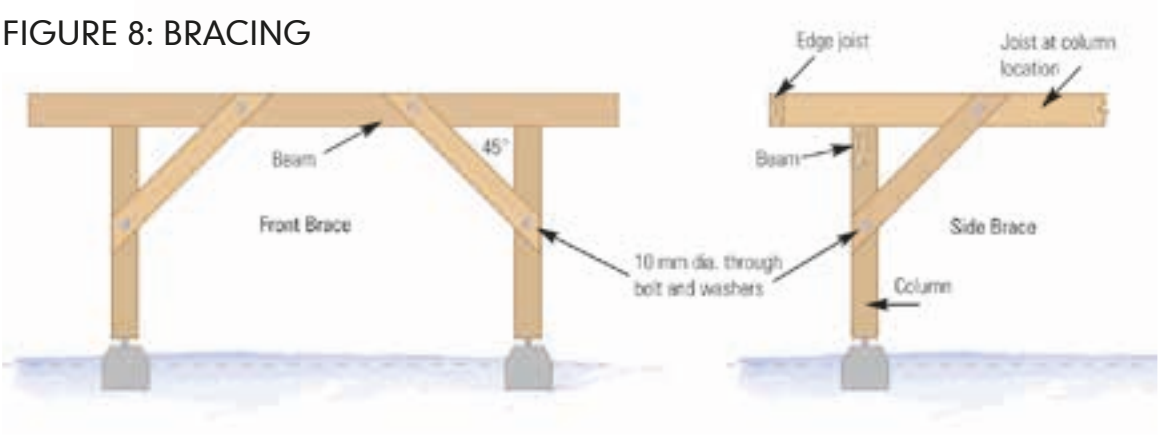
FIGURE 7: BLOCKING JOISTS



Joists adjacent to other load-bearing components such as beams and newel post fixing point should always be blocked – see Figure 11 on page 15.

Diagonal bracing provides lateral stability to tall columns and should be used on all decks that exceed 1.5m in height, whether they are free standing or attached to a property – see Figure 8.

FIGURE 8: BRACING



3.9: DECK BOARDS

The decked surface is the most visible part of a deck and provides the structural integrity for the load bearing capability of the platform. As each deck board will invariably be subjected individually to maximum design "point loading", each board, even when strength graded, should be inspected at the time of installation for any characteristic or defect that could adversely affect structural performance, serviceability and appearance.

Any sections containing "short grain" (where the grain cuts across from long grain to cross grain), sloping grain breaking the surface or grain distortion around any knots should be rejected.

Deck boards come in a range of finished sizes and styles from around 90 mm in width upwards. To minimise the effect of changes in deck board moisture content and improve drainage and underfoot grip, the maximum actual width shall not exceed 145 mm.

Table 5 details the maximum span capabilities of typically available deck boards for a platform with a design load of 3.0 kN/m2. Where diagonally boarded platforms are concerned, joist centres will need to be closer to meet the span distances detailed in Table 5.

Hardwood boards should be used in preference to softwood versions where a board under 28 mm in thickness is required.

TABLE 5: DECK BOARD MAXIMUM SUPPORT CENTRES IN MILLIMETRES (MM)

Actual size	C16	C22	C24	D30 (Oak TH1)
95 x 22	–	–	–	300
95 x 34	450	500	550	550
120 x 22	–	–	–	350
120 x 27	400	425	450	450
120 x 34	500	550	600	600
145 x 22	–	–	–	400
145 x 27	400	425	450	450
145 x 34	500	550	600	600

Note: A 10% tolerance has been built in to these recommendations to allow for grooved deck boards on the assumption that the grooves are no deeper than 5 mm and that the grooves do not cover more than 50% of the machined surface.

Deck board style – plain, ribbed or grooved – is a matter of aesthetics. Surface drainage is the most important factor in how they are laid and perform long term. Complex patterns should be avoided.

3.9.1 SURFACE DRAINAGE

All boards shall have rounded or chamfered edges to assist water shedding and minimise the likelihood of edges splintering if subject to impact. To further assist drainage, ventilation of the structure and to accommodate any seasonal movement of the wood, a gap – 5 mm minimum, 8 mm maximum – shall be left between each board. This gap shall be consistent across the entire surface. A minimum gap of 5 mm should be left where a board abuts upright surfaces.

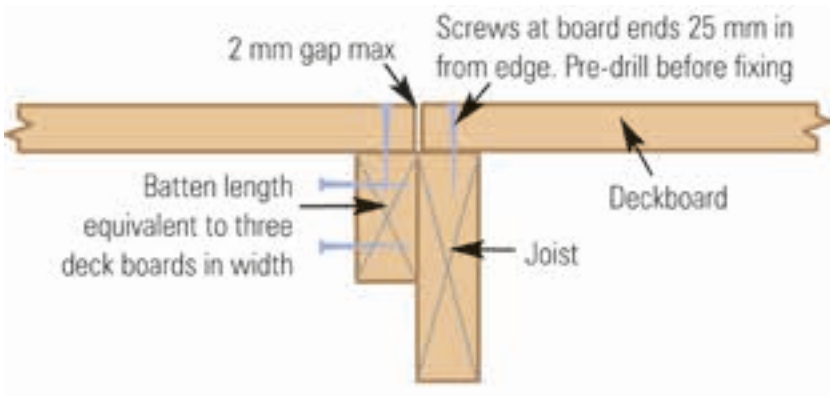
Boards that are designed to help channel surface water should be laid with the grooves running on a line of positive fall, preferably across the short dimension of the deck. No more than one board in three is to be fixed in this way on the same joist. It should not be assumed that grooved or ribbed boards alone improve the slipresistant quality of deck surfaces – only boards containing strips of anti-slip material will do this.

Plain / smooth boards may be laid in any direction and make subsequent resurfacing and refinishing a simple procedure.

3.9.2 ABUTTING DECK BOARDS

Ideally, only full lengths of boards should be used. Where it is necessary to abut two boards the junction shall be over a joist and an additional batten or section of joist shall be used to support the join (see Figure 9). A small gap, maximum 2 mm should be left between abutting board ends to allow for any lateral movement of the board throughout the seasons. No more than one board in three is to be fixed in this way on the same joist.

FIGURE 9: ABUTTING DECK BOARD CONNECTION

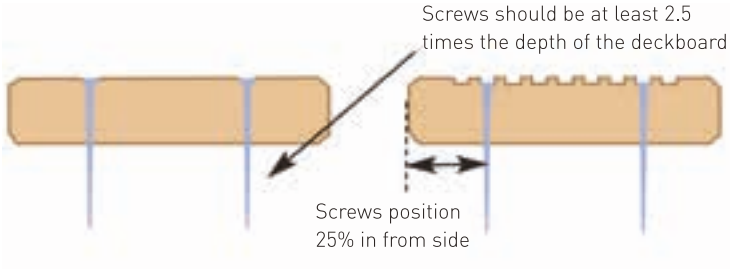


3.9.3 METAL FIXINGS

Nails and proprietary clips are not considered appropriate for installing boards on decks where the service life requirement is 30 to 60 years. Screws should be used because they are more secure; are unlikely to lift during service; can be removed to permit maintenance if required; are less likely to be damaged during installation and dents in the surface caused by hammers or high pressure guns are avoided.

Screws shall be at least 2.5 times the thickness of the board. All joist crossing points shall be secured by two screws positioned at the quarter points of the board i.e. 25% in from the side – see Figure 10.

FIGURE 10: BOARD FIXING



Screw heads should be countersunk level with the surface of the board or just slightly below the surface if the board has a moisture content higher than the equilibrium moisture content at the site – see section 1.6.

On grooved boards the fixing point should always be at the bottom of a groove, flush with the surface of the wood.

Fixing points at board ends shall be no closer than 25 mm to the board end and should always be predrilled to prevent splitting. Indeed, predrilling all fixings points is good practice and is recommended to avoid surface splitting and damage.

For hardwoods, every fixing point shall be pre drilled and countersunk level with the surface. The drill hole should be 2mm larger than the diameter of the screw shank being used to allow for any movement that may occur as the timber adjusts to its moisture content with the seasons.

3.10 PARAPETS AND BALUSTRADES

Building regulations require that decks more than 600 mm from the ground be fitted with a safety parapet or balustrade system. These shall be at least 1100 mm high and must be capable of withstanding a horizontal load of 0.74 kN per metre and a single concentrated load of 0.50 kN. In addition the parapet design shall discourage climbing and the spaces between individual elements shall measure less than 100 mm.

Parapet newel posts must be completely separate from the principal deck platform support columns.

To meet the above specification raised deck parapets are mostly custom made on-site – see Figure 11. Modular balustrade systems may be used if they have been independently tested in accordance with BS 6180 and 6399:1 for high level applications and have quality and performance certification under schemes such as DeckMark® operated by the TDCA and Q–Mark by TRADA. Modular systems must always be installed in accordance with the manufacturer's instructions.

Strength assessed raised level parapet system

Contemporary design modular systems for raised decks

3.11 CUSTOM BUILT PARAPETS

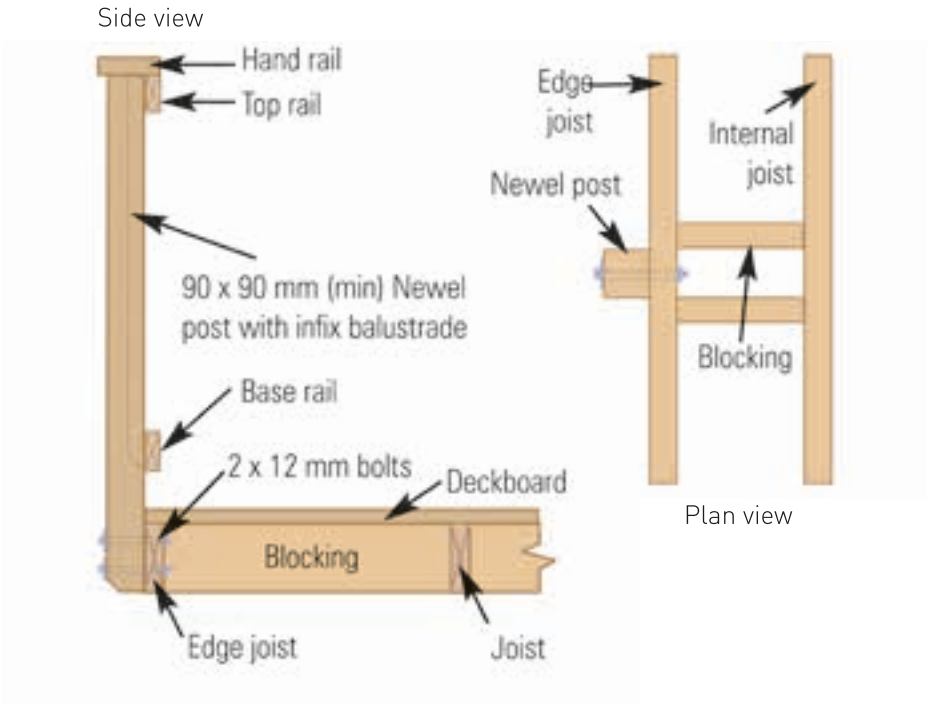
For custom-built parapets only timber from the C24 strength class (or hardwood equivalent) should be used unless all the components are part of a strength assessed parapet system.

The minimum actual size for a raised deck newel post shall be 90 mm. These shall be spaced at no more than 1500 mm centres unless the component is part of a system that has been strength assessed for use at greater centres.

Figure 11 shows a typical custom-built parapet specification. It should be noted that newel posts should be fixed directly to the edge joists and the front "header" joist. All joists must be at least 45 mm thick and suitably reinforced. Typically, newel posts are secured using two 12mm through bolts with washers at both the bolt head and nut. These washers shall be three times the diameter of the bolt in size.

Deck support columns must never be carried through the deck to serve as a newel post on raised decks.

FIGURE 11: CUSTOM BUILT PARAPET



All newel posts and vertical members should be capped to prevent end grain exposure to moisture.

Comprehensive design details can be found in TDCA Technical Bulletin 04: Parapet Design & Construction.

3.12 ACCESS STAIRS AND RAMPS

Where raised decks have stairways or ramps, the installation shall be in line with Part M of building regulations. Additionally, the following guidelines are recommended:

STAIRS

Stairs for decks up to 2.4 m in height can be accommodated in a single run. There should be no more than 14 stair treads in a single run.

For steps to be safe and comfortable the riser height and step (going) must maintain a consistent relationship. The minimum step going is 250mm. For outdoor stairways, risers are normally left open – but any openings must be less than 100mm. It is good practice to only use solid stringers on raised decks. Typical stairway styles are shown in Figure 12 and 13. A concrete pad should be created at ground level as a footing for the stairs. A typical method of fixing the stairs to the footing is shown in Figure 14.

Stairs that are less than 1.22m wide must have a handrail meeting the same requirements as the deck parapet (Section 3.10). Handrail newel posts must always be bolted to the stair stringer, never to stair treads. Specialist advice is available from the TDA for properties that require a timber ramp for wheel chair access.

FIGURE 12: TYPICAL STAIR DESIGN

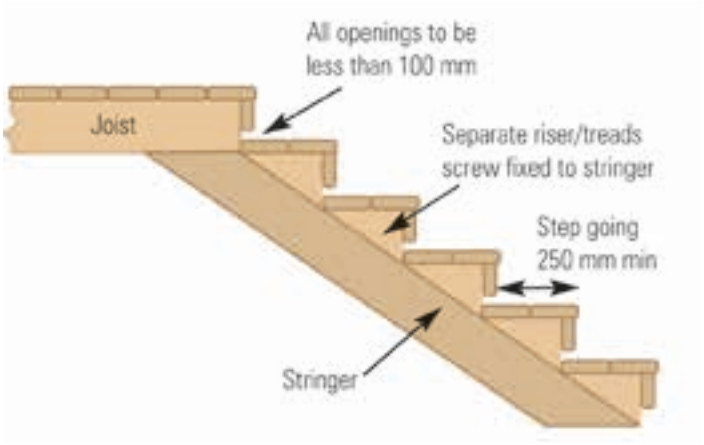


FIGURE 13: ALTERNATIVE STAIR DESIGN

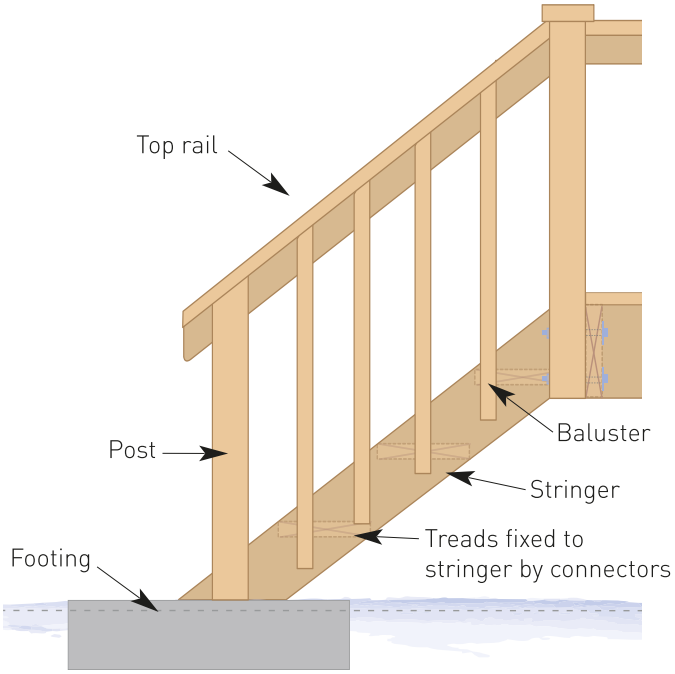
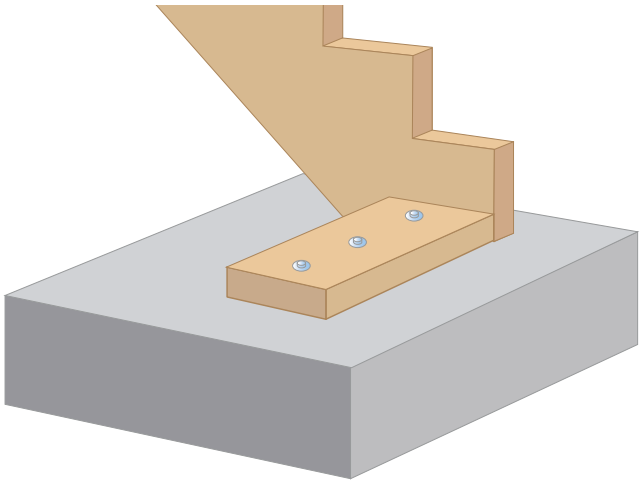


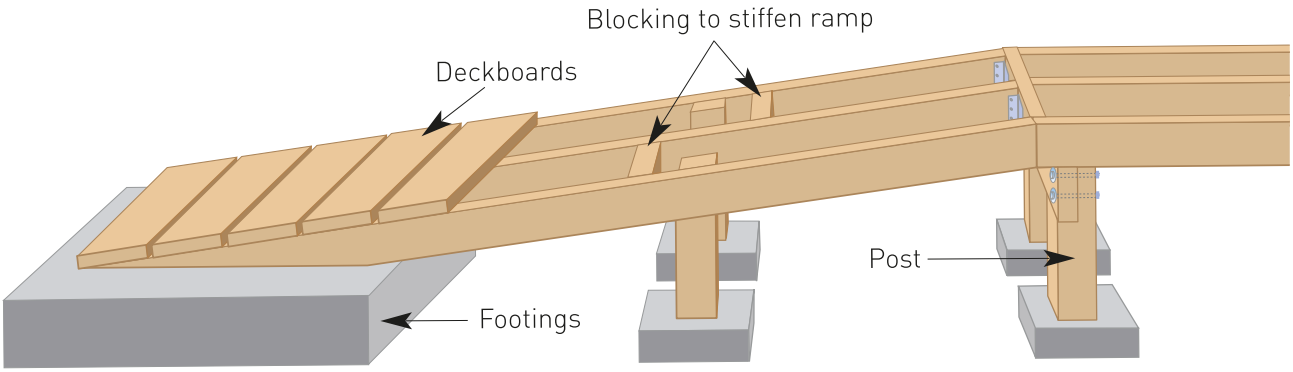
FIGURE 14: ATTACHMENT TO FOOTING



RAMPS

A ramp made from timber is essentially a narrow deck on an incline and the same construction principles are followed (see Figure 15). Deck boards should always be installed across the width of the ramp – never along its length. Enhanced grip boards incorporating anti-slip strips are recommended for this application.

FIGURE 15: BASIC RAMP DESIGN



SECTION 4: AFTERCARE AND MAINTENANCE

If the guidance on material selection, design and installation contained in this CP are followed then minimal housekeeping maintenance and cleaning will be required. In later years, the deck boards and other accessible components should be anually inspected for deterioration and replaced if no longer fit for purpose.

The principal structural timbers recommended do not require any further treatment or protective coating and can be allowed to weather naturally. Timber decks and boardwalks that have weathered for 30 to 60 years and more have considerable character that many people find attractive. However, where there is a desire to maintain the colour and appearance of the newly installed deck, or to decorate with another colour, then clear water repellent sealers, oils or pigmented stains and paints may be used. Such products may be used at any time during the life of the deck as recommended by the manufacturer. Surface preparation, application and maintenance shall be in accordance with the product manufacturers recommendations.

Components that are supplied prefinished with a factory applied decorative coating should be linked to an appropriate manufacturers maintenance and aftercare scheme.

Wood is a natural material and during the weathering process small surface splits or checks are inevitable. They are caused as wood expands and contracts with the seasons and should not be regarded as defects. They do not have any effect on the structural integrity of a deck. If however major cracks and through splits do appear within the first few years following completion of the deck then the homebuilder should be contacted immediately to carry out a structural assessment.

SECTION 5: SPECIFICATION VERIFICATION

> “We consider that a raised timber deck that is designed by a suitably qualified person in accordance with this Code of Practice using appropriate quality materials installed by a competent contractor will produce a structure of outstanding durability and stability capable of meeting the desired service lives required in the CP with minimum maintenance.”

Timber Decking and Cladding Association
January 2008 1st edition
June 2010 2nd edition
March 2017 3rd edition
December 2017 4th edition
February 2018 5th edition

SECTION 6: RELEVANT STANDARDS & REFERENCES

Produced in association with
TIMBER DECKING AND CLADDING ASSOCIATION
www.tdca.org.uk
(v5 02.2018)

- NA to BS EN 1995-1-1:2004+A1:2008 UK National Annex to Eurocode 5: Design of timber structures. General. Common rules and rules for buildings
- BS 4978:2007+A1:2011 Visual strength grading of softwood. Specification
- BS EN 14081-1:2016 Timber structures. Strength graded structural timber with rectangular cross section. General requirements – (partially replaces 4978)
- BS EN 335:2013: Durability of wood and wood-based products. Use classes: definitions, application to solid wood and wood-based products
- BS EN 350:2016 Durability of wood and wood-based products. Testing and classification of the durability to biological agents of wood and wood-based materials
- BS EN 351-1:2007 Durability of wood and wood-based products. Preservative-treated solid wood. Classification of preservative penetration and retention
- BS EN 351-2:2007: Durability of wood and wood-based products. Preservative-treated solid wood. Guidance on sampling for the analysis of preservative-treated wood
- BS EN 460:1994: Durability of wood and wood-based products. Natural durability of solid wood. Guide to the durability requirements for wood to be used in hazard classes
- BS EN 599-1:2009+A1:2013 Durability of wood and wood-based products. Efficacy of preventive wood preservatives as determined by biological tests. Specification according to use class
- BS 8417:2011+A1:2014 Preservation of wood. Code of practice
- BS EN 912:2011 Timber fasteners. Specifications for connectors for timbers
- BS EN 336:2013 Structural timber. Sizes, permitted deviations
- BS EN 338:2016: Structural timber. Strength classes
- BS EN 1912:2012: Structural Timber. Strength classes. Assignment of visual grades and species
- BS 4978:2007+A1:201: Visual strength grading of softwood. Specification (partially replaced by BS EN 14081-1:2016: Timber structures. Strength graded structural timber with rectangular cross section. General requirements)
- BS EN ISO 3506-1:2009 Mechanical properties of corrosion-resistant stainless steel fasteners. Bolts, screws and studs
- BS 6180:2011 Barriers in and about buildings. Code of practice
- BS EN 1991-1-1:2002: Eurocode 1. Actions on structures. General actions. Densities, self-weight, imposed loads for buildings
- BS EN 13556:2003: Round and sawn timber. Nomenclature of timbers used in Europe

REFERENCES

- BRE Digest DG503: External Timber Structures – preservation and durability
- BRE Digest DG504: Modified Wood
- TRADA – Timber Decking "The Professional's Manual"
- TDA – Technical bulletin 04: Parapet design & Construction
- TDA – Technical bulletin 08: Metal fixings
- TFT – Information sheet: Strength Graded Timber – the basics
- Wood Protection Association – Industrial wood preservation specification & practice
- Part M. Building Regulations England and Wales: Access to buildings
- The Scottish Building Standards. Technical Handbooks

Tell me more

Call 01283 722588
Email info@marley.co.uk
Or visit marley.co.uk/decking

Marley, Lichfield Road, Branston, Burton upon Trent, DE14 3HD