



Republic of South Africa

EDICT OF GOVERNMENT

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SANS 10400-L (2011) (English): The application of the National Building Regulations Part L: Roofs



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Edition 3

SOUTH AFRICAN NATIONAL STANDARD

The application of the National Building Regulations

Part L: Roofs

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Table of changes

Change No.	Date	Scope

Acknowledgement

The SABS Standards Division wishes to acknowledge the work of the South African Institution of Civil Engineering, the National Home Builders Registration Council, and the Institute for Timber Construction in updating this document.

Foreword

This South African standard was approved by National Committee SABS TC 59, *Construction standards*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in November 2011.

This document supersedes the corresponding parts of SABS 0400:1990 (first revision).

Compliance with the requirements of this document will be deemed to be compliance with the requirements of part L of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977).

SANS 10400 consists of the following parts, under the general title *The application of the National Building Regulations*:

Part A: General principles and requirements.

Part B: Structural design.

Part C: Dimensions.

Part D: Public safety.

Part F: Site operations.

Part G: Excavations.

Part H: Foundations.

Part J: Floors.

Part K: Walls.

Part L: Roofs.

Part M: Stairways.

Part N: Glazing.

Foreword (*concluded*)

Part O: Lighting and ventilation.

Part P: Drainage.

Part Q: Non-water-borne means of sanitary disposal.

Part R: Stormwater disposal.

Part S: Facilities for persons with disabilities.

Part T: Fire protection.

Part V: Space heating.

Part W: Fire installation.

Part X: Environmental sustainability.

Part XA: Energy usage in buildings.

This document should be read in conjunction with SANS 10400-A.

Annex A is for information only.

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The application of the National Building Regulations

Part L:

Roofs

1 Scope

This part of SANS 10400 provides deemed-to-satisfy requirements for compliance with part L (Roofs) of the National Building Regulations.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

ASTM E 1646, *Standard test method for water penetration of exterior metal roof panel systems by uniform static air pressure difference*.

SANS 457-2, *Wooden poles, droppers, guardrail posts and spacer blocks – Part 2: Softwood species*.

SANS 457-3 (SABS 457-3), *Wooden poles, droppers, guardrail posts and spacer blocks – Part 3: Hardwood species*.

SANS 542, *Concrete roofing tiles*.

SANS 1288, *Preservative-treated timber*.

SANS 1460, *Laminated timber (glulam)*.

SANS 1707-1, *Sawn eucalyptus timber – Part 1: Proof-graded structural timber*.

SANS 1707-2, *Sawn eucalyptus timber – Part 2: Brandering and battens*.

SANS 1783-2, *Sawn softwood timber – Part 2: Stress-graded structural timber and timber for frame wall construction*.

SANS 1783-4, *Sawn softwood timber – Part 4: Brandering and battens*.

SANS 2001-CT2, *Construction works – Part CT2: Structural timberwork (roofing)*.

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SANS 10005, *The preservative treatment of timber*.

SANS 10177-2, *Fire testing of materials, components and elements used in buildings – Part 2: Fire resistance test for building elements*.

SANS 10177-5, *Fire testing of materials, components and elements used in buildings – Part 5: Non-combustibility at 750 °C of building materials*.

SANS 10400-A:2010, *The application of the National Building Regulations – Part A: General principles and requirements*.

SANS 10400-B (SABS 0400-B), *The application of the National Building Regulations – Part B: Structural design*.

SANS 10400-C, *The application of the National Building Regulations – Part C: Dimensions*.

SANS 10400-K, *The application of the National Building Regulations – Part K: Walls*.

SANS 10400-R (SABS 0400-R), *The application of the National Building Regulations – Part R: Stormwater disposal*.

SANS 10400-T, *The application of the National Building Regulations – Part T: Fire protection*.

SANS 10400-V, *The application of the National Building Regulations – Part V: Space heating*.

SANS 10407, *Thatched roof construction*.

3 Definitions

For the purposes of this document, the definitions given in SANS 10400-A (some of which are repeated for convenience) and the following apply.

3.1

accredited testing laboratory

laboratory that has been accredited by the South African National Accreditation System (SANAS)

3.2

adequate

adequate

a) in the opinion of any local authority, or

b) in relation to any document issued by the council, in the opinion of the council

3.3

Agrément certificate

certificate that confirms fitness-for-purpose of a non-standardized product, material or component or the acceptability of the related non-standardized design and the conditions pertaining thereto (or both) issued by the Board of Agrément South Africa

3.4

batten

small section timber member, fixed parallel to the line of the eaves, at right angles to the rafters, and onto which tiles or slates are fixed

3.5

bearing

structural support, usually a wall, positioned under the top chord or bottom chord or between the end points of a roof truss, beam or rafter

3.6

Board of Agrément South Africa

body that operates under the delegation of authority of the Minister of Public Works

3.7

brandering

small section timber member which is usually fixed to the underside of a truss chord to support a fixed ceiling

3.8

category 1 building

building which

- a) is designated as being of class A3, A4, F2, G1, H2, H3, or H4 occupancy (see Regulation **A20** in SANS 10400-A),
- b) has no basements,
- c) has a maximum length of 6,0 m between intersecting walls or members providing lateral support, and
- d) has a floor area that does not exceed 80 m²

NOTE 1 Table C.1 of SANS 10400-A:2010 outlines the difference in performance between category 1 buildings and other buildings that have the same occupancy designation in respect of a number of building attributes.

NOTE 2 A building may be classified as a category 1 building for the purposes of one or more parts of SANS 10400. Additional limitations may accordingly be imposed on category 1 buildings. For example, a category 1 building in terms of SANS 10400-T (Fire protection) will be restricted to a single storey.

NOTE 3 Fire requirements for category 1 buildings are based on occupants escaping quickly from buildings. The design population for occupancies as set out in table 2 of part A of the Regulations (see SANS 10400-A) should therefore not be exceeded.

3.9

chord

main member that forms the outline of a truss

3.10

clear span

horizontal distance between the opposite faces of supporting walls (see figure 1)

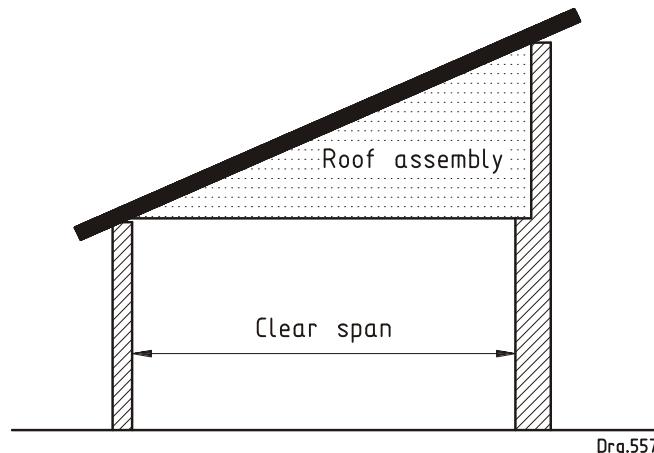


Figure 1 — Definition of clear span

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3.11

combustible

opposite of non-combustible

3.12

competent person

person who is qualified by virtue of his education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him in terms of the National Building Regulations

NOTE This is a generic definition, to be used where no other definition is given, or no references are made to other standards. Other parts of SANS 10400 contain definitions of a more specific nature relevant to their disciplines.

3.13

competent person (built environment)

person who

- a) is registered in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000), as either a Professional Engineer or a Professional Engineering Technologist, or
- b) is registered in terms of the Architectural Profession Act, 2000 (Act No. 44 of 2000), as a Professional Architect or a Professional Senior Architectural Technologist, and
- c) is generally recognized as having the necessary experience and training to undertake rational assessments or rational designs in the field of roofs and roofing

3.14

deemed-to-satisfy requirement

non-mandatory requirement, the compliance with which ensures compliance with a functional regulation

3.15

drip, noun

step or groove formed at the underside of a roof slab overhang parallel to the edge of the slab

3.16

fall

slope of a roof

3.17

fire resistance

shortest period for which a building element or building component complies with the requirements for stability, integrity and insulation when tested in accordance with SANS 10177-2

3.18

flat roof

roof with a slight fall which is designed and constructed to allow rainwater to be shed by gutters, outlets or to the perimeter of the roof

3.19

functional regulation

regulation that sets out in qualitative terms what is required of a building or building element or building component in respect of a particular characteristic, without specifying the method of construction, dimensions or materials to be used

3.20

heel joint

position on a truss at which the top chords and bottom chords intersect, or where the first vertical web intersects with the bottom chord in stub-ended trusses

3.21

nail plate

steel plate punched to form a nail pattern integral with the plate, and which is used as a structural connector

3.22

non-combustible

classified as non-combustible when tested in accordance with SANS 10177-5

3.23

pitch

angle of inclination of rafters to the horizontal, or angle of inclination of the surface on which tiles or sheeting is laid

3.24

purlin

horizontal member attached to, and placed perpendicular to, the rafter in order to support roof sheeting materials

3.25

purlin beam

beam that is parallel to the eaves and that serves the purpose of a rafter

3.26

rafter

top chord

horizontal or inclined member that establishes the upper edge of a truss or general roof line

3.27

rafter beam

sloping roof member of engineered or rational design size that supports the roof covering material with or without the use of purlins or battens

3.28

rational assessment

assessment by a competent person of the adequacy of the performance of a solution in relation to requirements including as necessary, a process of reasoning, calculation and consideration of accepted analytical principles, based on a combination of deductions from available information, research and data, appropriate testing and service experience

3.29

rational design

design by a competent person involving a process of reasoning and calculation and which may include a design based on the use of a standard or other suitable document

3.30

roof assembly

building cover and its supporting structure, including any ceiling attached to such structure and any additional components such as insulation

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3.31

softwood timber

timber derived from trees of the genus *Pinus* grown in Southern Africa and which has been appropriately graded with respect to its intended use

3.32

suitable

capable of fulfilling or having fulfilled the intended function, or fit for its intended purpose

3.33

tie beam

bottom chord

horizontal or inclined member that establishes the lower edge of a truss

3.34

truss

triangulated combination of members and joints which, when fitted together, form a rigid structural component capable of withstanding loads

3.35

underlay

flexible membrane fitted between the roof support structure and the battens

3.36

web

member that joins the top chords and bottom chords to form triangular patterns that give truss action

4 Requirements

4.1 General

The functional regulations pertaining to roofs contained in part L of the National Building Regulations shall be deemed to be satisfied where

- a) roof coverings and waterproofing systems are in accordance with the requirements of 4.2,
- b) flat roofs, in addition to complying with the general requirements of 4.2, are
 - 1) in accordance with the requirements of 4.3, or
 - 2) the subject of a rational design or rational assessment prepared by a competent person (built environment) and are inspected by such a person during installation,
- c) the roof assembly and any ceiling assembly, in addition to complying with the requirements of SANS 10400-C, are in accordance with the requirements of either
 - 1) 4.4, provided that the roof assembly is supported on walls that comply with the requirements of SANS 10400-K, or
 - 2) SANS 10400-B, subject to any nail-plated connectors having engineering properties for application with softwood determined by an accredited testing laboratory, and corrosion resistance at least equivalent to that provided by a galvanizing coating of 275 g/m²,
- d) gutters and downpipes, where provided, are sized in accordance with the requirements of SANS 10400-R, and

- e) the fire resistance and combustibility of the roof assembly or any ceiling assembly are in accordance with the requirements of SANS 10400-T or 4.5.

NOTE 1 SANS 10243 provides guidance on the manufacture, erection and bracing of timber roof trusses.

NOTE 2 Walls supporting roof trusses which do not have a bottom chord in a straight line between the supports, for example scissor or A-frame trusses, should be designed to withstand the horizontal thrusts that develop. Such walls should be designed in accordance with the requirements of SANS 10400-B.

4.2 Roof coverings and waterproofing systems

4.2.1 General requirements

4.2.1.1 Any roof covering and waterproofing system, or part thereof, shall

a) resist the penetration of rain to the extent that

- 1) in buildings other than category 1 buildings, any water which might penetrate the roof is of insufficient intensity to run down the inside surface of the roof, or drip onto the ceiling or floor, and
- 2) in the case of category 1 buildings, water which penetrates the roof is of insufficient intensity to run down the internal face of walls onto the floor or form a damp patch on the ceiling or floor;

b) be capable of being effectively repaired in the event of being damaged, despite aging of the materials; and

c) resist, with an appropriate degree of reliability over its design working life when being suitably maintained,

1) temperatures from -10°C to $+80^{\circ}\text{C}$ and rapid reversals of temperature of the order of 60°C , without deterioration,

2) the effects of UV radiation without the deterioration of its essential properties,

3) the effects of condensation at the undersurface,

4) chemical attack from common atmospheric gases and saline atmospheres in marine environments,

NOTE 1 Aluminium zinc or galvanized or similarly coated roof sheets should be made of steel with a minimum thickness of 0,5 mm.

NOTE 2 The steel should be coated with a minimum coating thickness of

a) AZ 150 or Z275 for coastal areas (within a strip of 5 km along the coastline), and for areas subjected to aggressive environments (e.g. exposed to industrial pollutants), and

b) AZ 100 or Z200 for all other areas.

NOTE 3 In addition, the material specified in note 2 should be coated with an appropriate paint coating (e.g. bituminous aluminium paint, factory pre-painted and baked coating, modified polyester or a suitable acrylic paint).

NOTE 4 All sheeting products with the AZ 100 or Z200 coating, as specified in note 2(b), should be clearly marked as "NOT SUITABLE FOR COASTAL AND AGGRESSIVE ENVIRONMENTS".

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- 5) the growth of bacteria, lichens, fungi, etc.,
- 6) puncturing and penetration when the roof is in use, and
- 7) any reversible and irreversible movement emanating from the roof structure.

4.2.1.2 Products used in roof coverings and waterproofing systems shall preserve their properties satisfactorily with normal maintenance specified by the manufacturer for at least the following periods:

- a) in systems which can be readily repaired or replaced: 10 years; and
- b) in systems that are difficult to replace: 20 years.

4.2.1.3 Accumulated hail on roofs after moderate hail storms shall not cause water to penetrate the interior of the building.

4.2.1.4 The requirements of 4.2.1.1 to 4.2.1.3 may be complied with where the roof covering or waterproofing system is

- a) in accordance with the requirements of 4.2.2,
- b) the subject of an Agrément certificate and such roof covering or waterproofing system is used within the scope, conditions and limitations prescribed in the certificate and is compatible with other elements or components of the roofing system, or
- c) installed by a specialist and is provided with a five-year written guarantee for watertightness.

NOTE SANS 10021 provides some guidance on the waterproofing of roofs.

4.2.2 Roof coverings in pitched roofs

4.2.2.1 Roofs shall be provided with a pitch of not less than that given in tables 1 and 2, provided that sheeted roofs without hips and valleys in category 1 buildings may have a roof slope of 5° subject to all end laps in such sheeting being sealed and having a minimum lap of 250 mm. The slope of valleys in such roofs shall not be less than 11°.

4.2.2.2 Tiles, when laid at a pitch of 30° and tested for 2 h in a rain-penetration testing rig as described in SANS 542 and where a relative humidity of at least 70 % is maintained under the tiles while the test is in progress, shall not permit the formation of water drops on the underside of the roof construction in respect of buildings other than category 1 buildings, and the flow of water down the inside of the tiles in respect of category 1 buildings.

Flow in the test rig shall be induced by a sparge pipe placed over the top of the roof frame to simulate rain that runs down from higher courses of a full-size roof and a suitable spray to simulate direct rainfall. The flow rates for the sparge and spray shall be 150 mm/h and 75 mm/h, respectively.

4.2.2.3 Sheeted roofs, when tested in accordance with ASTM E 1646, shall exhibit no leakage in respect of buildings other than category 1 buildings, and shall not cause water to drip onto the ceiling or floor from the underside in respect of category 1 buildings.

4.2.2.4 Suitable tiled and sheeted roof coverings shall be installed either in accordance with the manufacturer's instructions or with the skill and care normally used by workers working with similar materials.

4.2.2.5 Thatching shall comply with the materials requirements of, and be installed in accordance with the requirements of, SANS 10407. The thickness of the thatch upon installation shall be in accordance with table 3.

4.2.2.6 Undertile membranes shall be laid loose so that water can drain between rafters and shall be installed strictly in accordance with the manufacturer's instructions where tiles, slates and shingles are laid

- a) in roofs that have a pitch of less than 26°, or
- b) in roofs that have a pitch of 45° or steeper, and
- c) in those areas between the coastline and an imaginary line 30 km inland, parallel with the coastline, or the top of the escarpment or watershed of the first mountain range inland, if these are less than 30 km from the coastline.

NOTE The entire area of jurisdiction of any local authority, the area of which is cut by the line demarcating these coastal areas, is taken as falling within the coastal area.

Table 1 — Minimum roof slopes of sheeted roofs

1	2	3	4
Roof covering	Minimum angle of slope degrees	Minimum end lap mm	
		End laps sealed	End laps not sealed
Corrugated (including box rib) profile (galvanized iron, polycarbonate and fibre glass)	11	150	250
	15	150	225
	17	150	200
	22	150	150
Corrugated fibre-cement sheets	11	200	300
	15	175	275
	17	150	250
	22	150	200
	26	150	150
Specialized long span sheets (metal and fibre cement)	3 to 5, depending upon manufacturer's design and specification	As specified by the manufacturer	
NOTE The manufacturer's instructions should be followed.			

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Table 2 — Minimum roof slopes of non-sheeted roofs

1	2	3
Type	Roof covering Description	Minimum angle of slope degrees
Tiles, slates and shingles	Fibre-cement slates: a) with an approved underlay b) without an approved underlay	11 17
	Concrete and clay tiles and shingles: a) with an approved underlay b) without an approved underlay	17 26
	Metal tiles: a) with an approved underlay b) without an approved underlay	11 15
	Natural slate on open battens: a) with an approved underlay b) without an approved underlay	20 30
Thatch	Thatch	45 in general but 35 at dormer windows

NOTE 1 When metal roof tiles are used over an existing roof, the existing roof slope may be retained.

NOTE 2 An undertile membrane, when properly laid, will provide a highly effective impermeable barrier against the ingress of wind-driven rain and dust. Underlays should therefore be provided on all tiled and slated roofs, irrespective of the slope and also if ceilings are not installed, so as to minimize the effect of wind-blown dust entering through the tiles.

NOTE 3 Under strong gusts of wind, the suction force on the roof tiles might exceed the mass of the tiles, requiring the tiles to be securely fixed in order to prevent them from being lifted from the roof. An undertile membrane can substantially lower these pressures and so reduce the risk of wind uplift.

NOTE 4 Increasing the slope at the dormer windows to 40° reduces the maintenance requirements in this area.

NOTE 5 The manufacturer's instructions should be followed.

NOTE 6 Refer to SANS 10062 for fixing specifications.

Table 3 — Minimum thickness of thatch layer

1	2	3
Type	Stem/butt diameter mm	Layer thickness mm
Fine thatching grass or reed	1,2 to 2,5	175
Coarse thatching grass or reed	2,5 to 4	200
Water reed	1 to 7	300

4.2.3 Roof lights

Roof lights shall

- a) have a maximum opening area of 0,6 m² or, if in the form of a translucent roof sheet, an installed width of 700 mm,
- b) resist ultraviolet radiation degradation for a period of at least 15 years,

- c) resist hail impacts of 10 J in accordance with the requirements of SANS 10400-B, and
- d) be designed and installed in a manner that does not allow rainwater to penetrate the roof.

4.3 Drainage and waterproofing of flat roofs

4.3.1 General

4.3.1.1 Flat roofs shall have a fall towards external gutters, outlets or roof edges of not less than 1:80 where there is no interruption in the flow of water, and 1:50 where there is an interruption in the flow. Where two directional falls intersect, the minimum finished fall of 1:80 shall be maintained along the mitre. (See figure 2.)

NOTE 1 Flat roofs should be constructed with a fall of 1:80, including cross falls. To ensure that a finished fall of 1:80 is achieved, it might be necessary to provide a limiting design slope of 1:50 in concrete slabs to allow for construction inaccuracies and for deflection under dead loads and imposed loads.

NOTE 2 The required slope can be achieved on a concrete roof by casting or finishing concrete to the required fall, by applying sand-cement screeds to the concrete to achieve the required levels, or by a combination thereof. When laying a screed in the rainy season, especially in winter rainfall areas, consideration should be given to adding a suitable polymer modifier to the screed mix.

NOTE 3 The falls and cross falls to timber flat roofs should be created in the rafter design.

4.3.1.2 Construction drawings shall clearly designate ridges and valleys and state relative falls as shown in figure 2.

4.3.1.3 Penetrations through roofs shall, as far as possible, be avoided and be located away from low points. Such penetrations shall not be flexible and shall be kept at least 200 mm away from all vertical surfaces, e.g. upstand beams and walls.

4.3.1.4 Plumbing pipes, electrical conduits, air conditioning pipes, etc. shall not be in clusters.

4.3.1.5 Precast panels and precast roof structures shall be designed in such a manner that any subsequent movement of the concrete elements will not impair the performance of the waterproofing system.

4.3.1.6 A suitable step shall be formed between internal and external areas to prevent the ingress of water to the interior of the building.

NOTE The height of the step should take account of the requirements for falls to outlets or gutters, finishes and waterproofing systems.

4.3.2 Gutters and downpipes

4.3.2.1 Gutters, if provided, and unless designed by a competent person (built environment), shall be located only along the perimeter of the building. They shall be so designed that stormwater does not penetrate the interior of the building if they become blocked.

4.3.2.2 Outlets shall be set flush with the concrete or recessed into the timber decking to prevent ponding around the outlets.

4.3.2.3 The position of all outlets shall be at least 500 mm away from upstands, parapet walls and 1 000 mm away from expansion joints.

4.3.2.4 The installation requirements of the supplier of rainwater goods, such as rainwater outlets, gutters and downpipes, shall be adhered to.

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4.3.3 Flat concrete roofs

NOTE The requirements of 4.3.3 do not cover the structural design or the thermal performance of concrete roofs. Concrete roof designs should take into account the thermal properties of the concrete, which may be determined by the thickness and density of the concrete and its built-up waterproofing layer. If a thermally insulating layer is desired, it should be incorporated above the concrete structural deck and attention should be given to the provision of ventilation to allow moist air, which might accumulate below the waterproofing layer, to be vented to the outside air.

4.3.3.1 Unless the expansion joints are designed by a competent person (built environment) to accommodate the flow of water over such joints, twin kerb upstand-type joints (see figure 3) shall be installed over expansion joints in concrete roofs, which shall be located away from outlets.

4.3.3.2 Upstand beams of height not less than 170 mm shall be provided in concrete roofs at all intersections between the masonry walling and the roof surface. Corner fillets that have horizontal and vertical dimensions of not less than 75 mm shall be provided at such intersections. (See figure 4.)

4.3.3.3 Drips shall be provided beneath all concrete roof overhangs. (See figure 5.)

4.3.3.4 All concrete or screeded surfaces to be waterproofed shall be sound, smooth and even in a wood-floated finish to the correct falls and cross falls, and without undulations or any protrusions or contaminants.

NOTE Concrete and screeded surfaces should not be highly polished, e.g. power floated.

4.3.4 Waterproofing systems

4.3.4.1 A waterproofing system shall be installed on top of a flat roof by a competent person strictly in accordance with the manufacturer's instructions such that the roof remains watertight for a period of at least five years without any maintenance other than the cleaning of gutters, downpipes and surfaces. Such competent person shall satisfy himself that the materials selected are appropriate for the application, taking into account the degree of exposure of the waterproofing, the protection to the material provided, and the area in which the building is located.

NOTE 1 Delamination of the waterproofing system from dense substrates, such as concrete, can occur due to the inability of the substrates to dissipate retained moisture vapour. A less dense sand-cement screed permits the dissipation of any retained moisture vapour and, as a result, delamination is avoided.

NOTE 2 A 20 mm thick sand-cement screed should be laid on top of all lightweight screeds to receive waterproofing as such screeds can be too porous and friable for good adhesion of some waterproofing systems.

NOTE 3 All concrete and screeded surfaces should be left to dry before applying any waterproofing system. Concrete should not contain more than 7 % moisture by weight. Sand-cement or lightweight screeds should not contain more than 10 % moisture by weight.

4.3.4.2 Where the outlets are not the full-bore outlet type of the coned type, the pipe shall be flanged to allow the waterproofing to be dressed onto a flat surface, not into a round hole.

4.3.4.3 Where penetration of the waterproofing layer by services (overflow pipes, flues, etc.) occurs, particular attention shall be paid to the proper coving and dressing of the waterproof material up against the penetrating element. Penetration of the waterproof layer by fixings (for example, stands of elements, such as storage tanks or solar absorbers) shall be avoided.

NOTE The waterproofing membrane dressed around protruding pipes should be mechanically clamped (e.g. with a hose clamp) around the pipes and then counter flashed over the mechanical clamp.

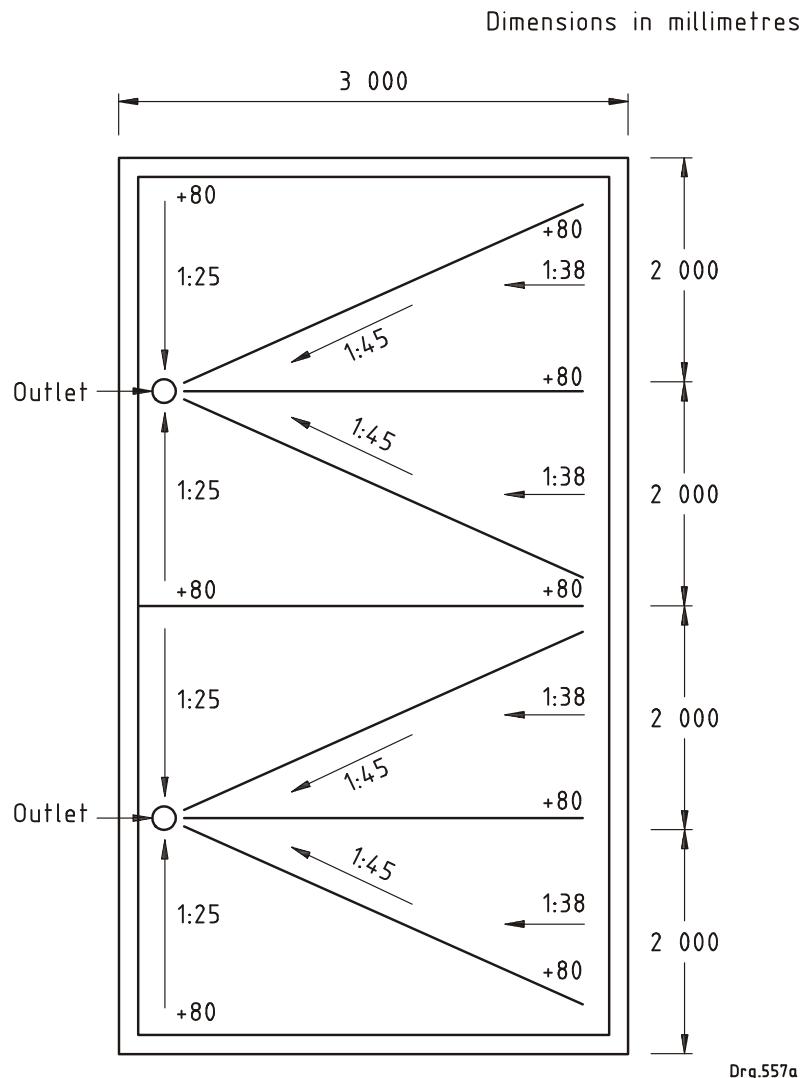
4.3.4.4 Waterproofing turn-ups against masonry, if not linked to the stepped damp-proof courses in cavity walls, shall be counter flashed with the same membrane and cut into the walls to a depth of at least 40 mm to prevent delamination due to moisture penetration into the walls above the waterproofing system. (See figure A.6.)

4.3.4.5 Unless a specific waterproofing system does not require them, sand-cement coves with radii of not less than 45 mm shall be formed at all internal corners of horizontal and vertical surfaces or 38 mm timber fillets shall be fixed at all junctions of horizontal and vertical surfaces on timber decks.

4.3.4.6 All external corners or edges where the waterproofing is to be dressed over shall be suitably rounded.

4.3.4.7 The height of all damp-proof courses shall be at the level of the top of all waterproofing turn-ups.

NOTE Typical waterproofing details are shown in annex A.



NOTE Dimensions are provided for illustrative purposes. Levels indicated are with respect to the outlets.

Figure 2 — Drainage of flat roofs

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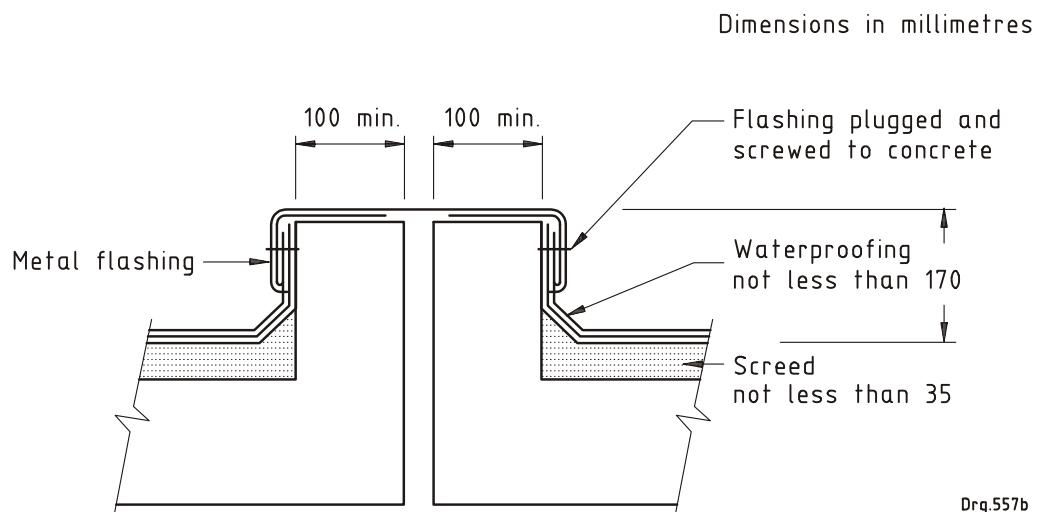
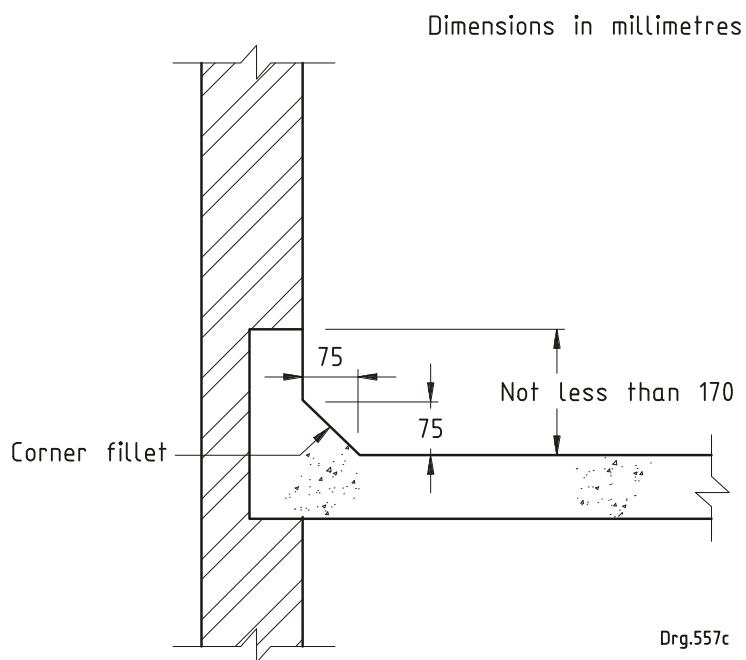


Figure 3 — Twin kerb detail at expansion joint in concrete



NOTE Fillet can be cast in the concrete or built-up in the screed.

Figure 4 — Upstand beam at intersection between masonry walls and concrete roof slabs

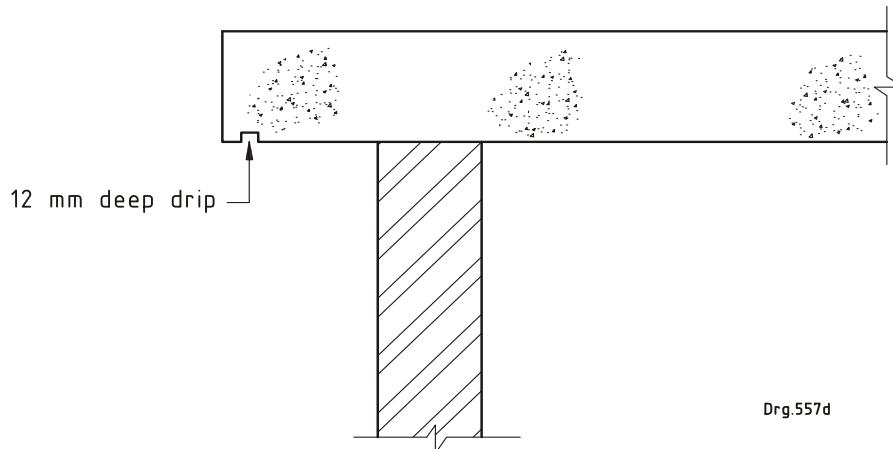


Figure 5 — Drip detail

4.4 Timber roof construction

4.4.1 Softwood timber construction

NOTE Only the commonly available sizes and grades of sawn SA Pine structural timber (in accordance with SANS 1783-2) and laminated pine (in accordance with SANS 1460) are given in this part of SANS 10400. Constructors should always confirm that the required sizes and grades are currently available in the required quantities. It is especially advisable to check the availability of the 50 mm × 228 mm and 76 mm × 228 mm sizes before specifying these sizes.

4.4.1.1 General

4.4.1.1.1 The requirements of 4.4.1 apply only to softwood timber roof assemblies that

a) are not subjected to snow loading for a continuous period of 24 h;

b) have trusses that

1) are of the Howe type (see 4.4.1.2), and either monopitched or double-pitched, with a clear span that does not exceed 4,0 m or 8,0 m, respectively,

2) are fully triangulated,

3) are used in gable-to-gable construction without any hips or valleys,

4) have roof pitches within the following limits:

– tiles and slates: between 17,5° and 35°

– metal or fibre-cement sheets: between 15° and 30°

– metal tiles: between 15° and 30°

5) are supported at the heel joint or at the intersection between a web member and the bottom chord (tie beam) at the end of a truss, and at no other intermediate position; and

c) have rafters with a pitch of less than 26° and purlin beams or purlin rafters that have a clear span that does not exceed 8,0 m.

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4.4.1.1.2 All softwood timber roof and ceiling assemblies shall

- a) be constructed in accordance with the requirements of SANS 2001-CT2,
- b) comply with the relevant requirements of SANS 1460, SANS 1783-2 or SANS 1783-4, SANS 1707-1 or SANS 1707-2 and be structurally graded and stamped (in signal red or black) with the appropriate grade mark, and
- c) be treated in accordance with the requirements of 4.4.1.1.3.

4.4.1.1.3 Softwood timber used within the municipal boundaries (coastal areas) identified in figures 6, 7, 8 and 9 shall be treated against the effects of rot, fungus and insect attack in accordance with the requirements of SANS 10005 and SANS 1288. The cut areas of treated timber shall be thoroughly brushed with two coats of a preservative belonging to the same class as that used for the original impregnation. During transport and installation, impregnated timber shall be protected and so handled that the impregnated shell is not broken through, and the timber is not damaged in any way that might reduce the effectiveness of the preservative.

4.4.1.1.4 The spacing of trusses, rafters and purlins or battens for the different roof coverings shall be in accordance with the manufacturer's instructions, or in accordance with table 4.

4.4.1.1.5 Trusses, rafters and purlin beams shall be supported on wall plates of minimum size 38 mm × 76 mm or similar flat bearing surfaces which are levelled and positioned so as to ensure that the ends of such members are vertically aligned. Alternatively, trusses, rafters and purlin beams shall be supported on hangers twice bolted to walls with masonry anchors. Hangers joining timber to timber shall be either nailed in each hole with 32 mm long clout wire nails or bolted with 12 mm diameter bolts in the holes provided.

4.4.1.1.6 Metal masonry anchors shall be of the expanding type, be corrosion resistant, have a diameter and length of not less than 10 mm and 75 mm, respectively, and shall be installed in accordance with the manufacturer's instructions. Such anchors, when embedded in grade 20 concrete for standard test purposes, shall have a safe working load in shear of not less than 2,5 kN certified by the manufacturer. Such certification shall be substantiated by test report certificates from an accredited testing laboratory.



Figure 6 — Section of KwaZulu-Natal Province (new municipal boundaries)

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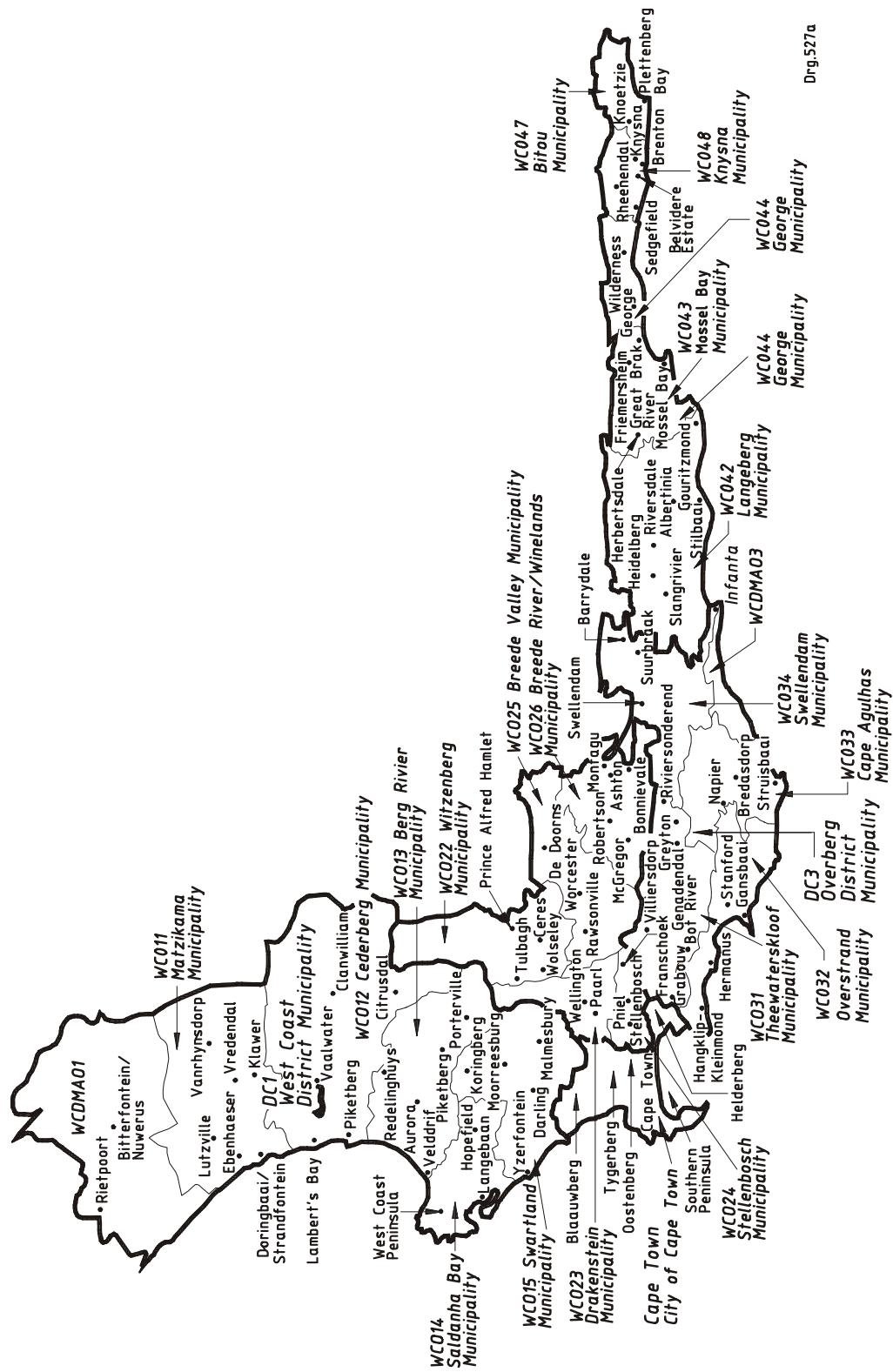


Figure 7 — Section of Western Cape Province (new municipal boundaries)

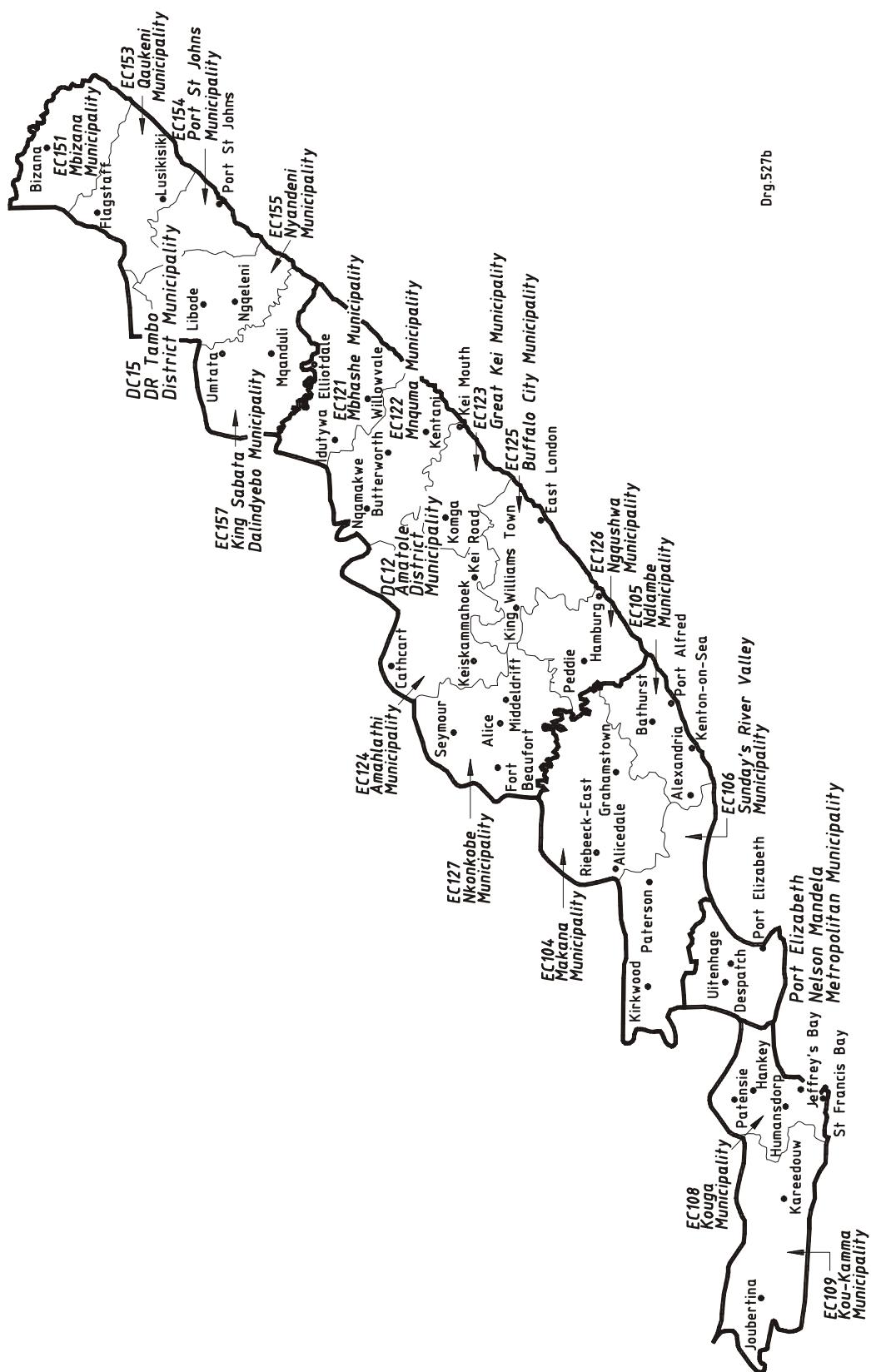


Figure 8 — Section of Eastern Cape Province (new municipal boundaries)

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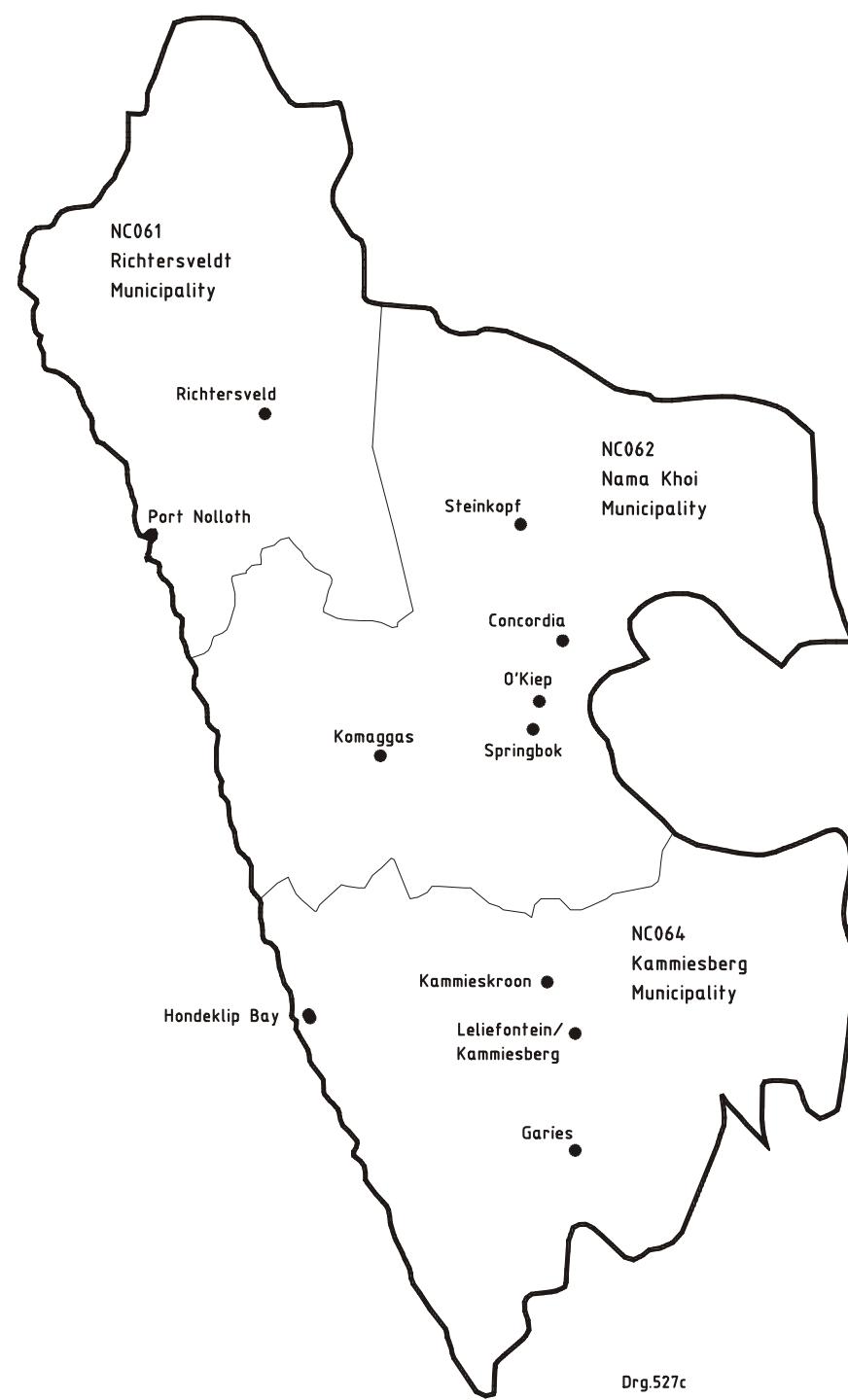


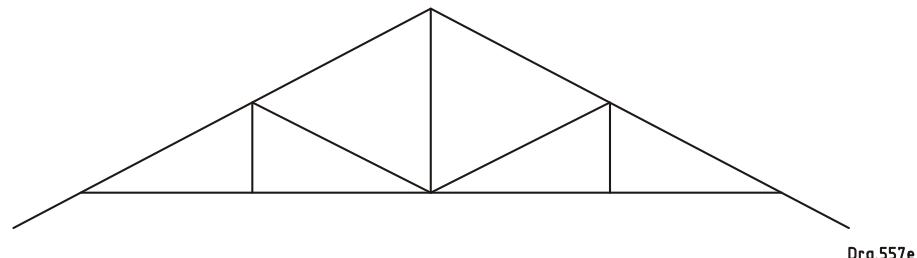
Figure 9 — Section of Northern Cape Province (new municipal boundaries)

4.4.1.2 Trusses

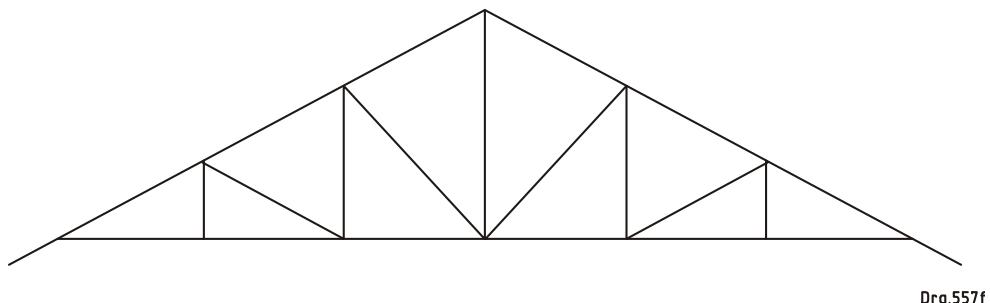
4.4.1.2.1 Monopitched and double-pitched nailed and bolted trusses shall be of the Howe type (see figure 10), with the number of bays, bolts at connections, timber sizes and grades, roof pitches and

centre-to-centre spacing in accordance with table 4 and figure 11, provided that no member of any truss shall have a length greater than 60 times its least dimension.

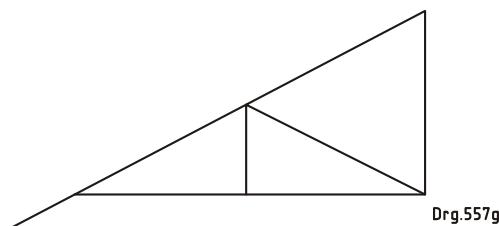
NOTE The requirement (member not to exceed 60 times least dimension) limits the length of 38 mm thick members to 2 280 mm. This limitation can, depending upon the pitch of the roof, limit the span of a truss. For example, a three-bay monopitched Howe truss will have a span that does not exceed 3,9 m, unless the width of the end member is increased.



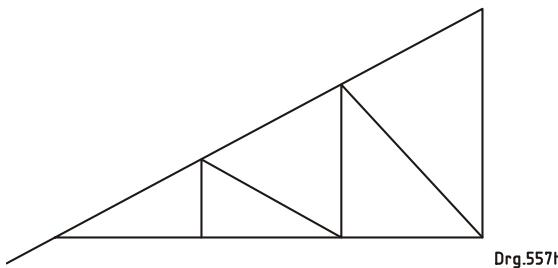
a) Four-bay Howe truss — Maximum clear span of 6 m



b) Six-bay Howe truss — Maximum clear span of 8 m



c) Two-bay monopitched Howe truss — Maximum clear span of 3 m



d) Three-bay monopitched Howe truss — Maximum clear span of 4 m

No member of any truss shall have a length greater than 60 times its least dimension.

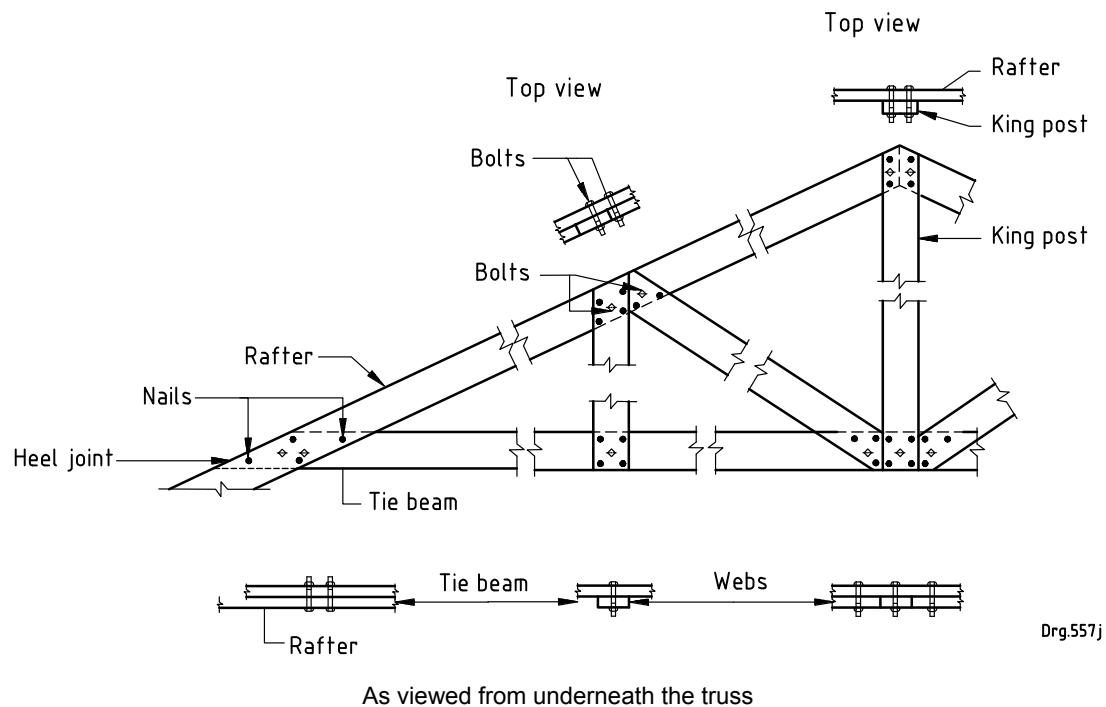
NOTE See table 4 for member sizes and bolt arrangements at heel and splice joints.

Figure 10 — Howe trusses

Table 4 — Howe-type roof trusses

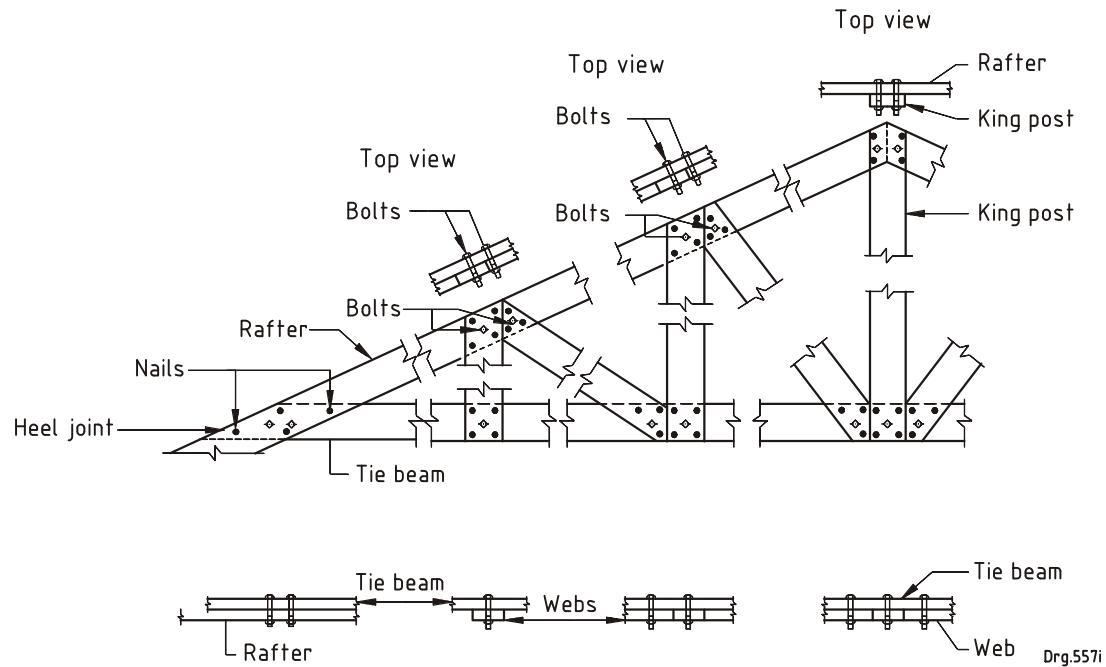
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Roof covering	Pitch degrees			Maximum clear span m	Maximum centre-to-centre truss spacing mm	Bolts at heel and splice joints (number × type) ^a	Member sizes and grade of timber in accordance with SANS 1783-2 ^{b, c}						Number of bays	
	Minimum	Maximum	Recommended				TC ^d		BC		Web			
	mm	mm	mm				Size mm	Grade	Size mm	Grade	Size mm	Grade		
Tiles and slates with 38 mm × 38 mm battens spaced at centres that do not exceed 345 mm maximum, and in accordance with the manufacturer's instructions	17,5	35	26	3,0 4,0 5,0 6,0 6,5 7,0 7,5 8,0	760 (650 where slates or tiles have a self-mass in excess of 55 kg/m ²)	2 × M12	114	5	114	5	114	5	2 4 4 4 6 6 6 6	
Metal or fibre-cement sheets with 50 mm × 76 mm purlins on edge spaced at centres that do not exceed 1 200 mm	15	30	17,5	3,0 4,0 5,0 6,0 6,5 7,0 7,5 8,0	1 200	2 × M12	114	5	114	5	114	5	2 4 4 4 6 6 6 6	
Metal tiles with 38 mm × 38 mm battens spaced in accordance with the manufacturer's instructions	15	30	20	3,0 4,0 5,0 6,0 6,5 7,0 7,5 8,0	1 000	2 × M12	114	5	114	5	114	5	2 4 4 4 6 6 6 6	

TC = top chord or rafter
 BC = bottom chord or tie beam



As viewed from underneath the truss

a) Four-bay Howe truss



As viewed from underneath the truss

b) Six-bay Howe truss

Bolts shall have a diameter of 12 mm.

Nails shall have a length of 100 mm and shall be clinched over.

Figure 11 — Howe truss joint details

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4.4.1.2.2 Bolts and nails, unless otherwise directed, shall not be located closer to the edge of the members than the distances shown in figure 12.

4.4.1.2.3 Trusses shall be supported only at the heel joints (and not on internal walls) as shown in figure 13, except where walls are set back and where extra web members are provided in accordance with figure 14.

4.4.1.2.4 Splices may be provided in the tie beam (bottom chord) in accordance with figure 15.

4.4.1.2.5 Roof trusses shall be tied down to the supporting walls and columns by means of a galvanized steel strap or galvanized steel wires which are built into the walls in accordance with figure 16.

4.4.1.2.6 Rafter (top chord) bracing shall be in accordance with the details shown in

a) figures 17(a), 18 or 19, and 20, if applicable, in respect of tiled roofs with the connection of diagonal bracing at the wall plate for stub-ended trusses in accordance with figure 21; and

b) figure 17(b), in respect of sheeted roofs.

4.4.1.2.7 Bottom chord bracing shall be in accordance with figure 22.

4.4.1.2.8 Permanent continuous runners of size 38 mm × 76 mm shall be provided and fixed to the bottom chord at the centre of each bay where no boarded ceiling, in accordance with the requirements of 4.4.1.6, or timber ceiling is provided.

4.4.1.2.9 Trusses which are not supported at heel joints (see figure 14) shall have runners installed in accordance with figure 23 with cross bracing at intervals that do not exceed 10 m, or T-bracing on each additional web as shown in figure 14.

4.4.1.2.10 Wherever possible, water tanks and hot water geysers shall be supported on timber bearers on internal walls. Where there are insufficient internal walls to support these bearers, the hot water tank or geyser may be supported on trusses by using a timber platform constructed in accordance with figure 24.

4.4.1.3 Rafter beams

4.4.1.3.1 Rafter beams shall be in accordance with tables 5 to 7.

4.4.1.3.2 Rafters shall be tied down to the supporting walls and columns by means of a galvanized steel strap or galvanized steel wires which are built into the walls in accordance with figure 16.

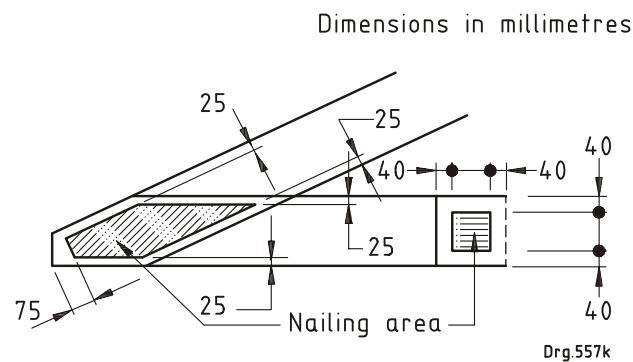
4.4.1.4 Purlin rafters and purlin beams

4.4.1.4.1 Where pitched trusses or rafters are not used to support the roofing sheets, purlin beams or purlin rafters shall be in accordance with tables 8 and 9 and erected at the required pitch (see figure 25).

NOTE 1 Purlin beams and purlin rafters are members which double as purlins. This form of construction is only applicable to sheeted roofs.

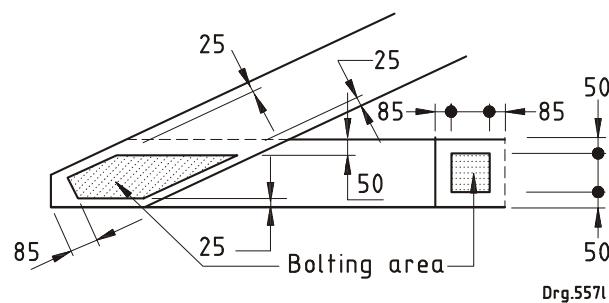
NOTE 2 It is impractical to fix sheeted roofs to purlins of width less than 45 mm. For this reason, members of width less than 32 mm and 38 mm are not included in tables 8 and 9.

4.4.1.4.2 Purlin rafters and purlin beams shall be tied down to the supporting walls and columns by means of a galvanized steel strap or galvanized steel wires which are built into the walls in accordance with figure 16.



Nails shall be spaced at least 20 mm away from each other.

a) Minimum nail spacing



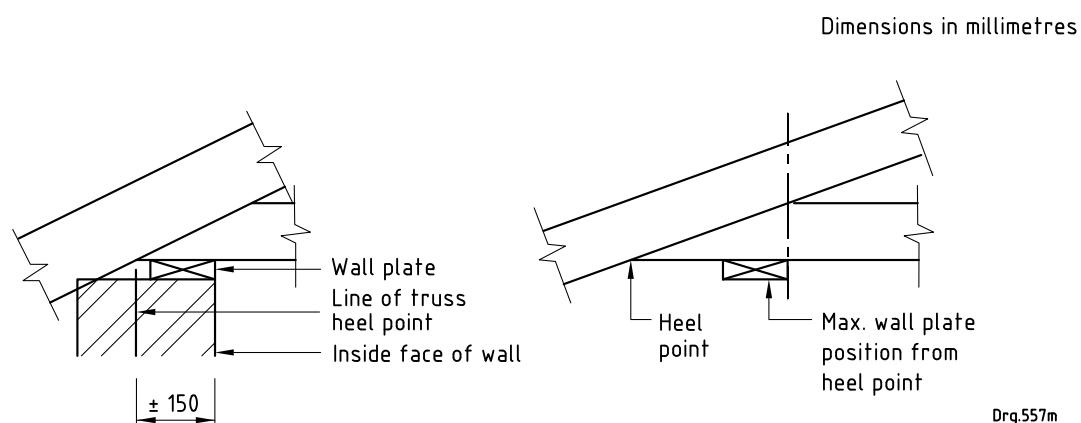
Bolts shall be spaced at least 50 mm away from each other.

b) Minimum bolt spacing

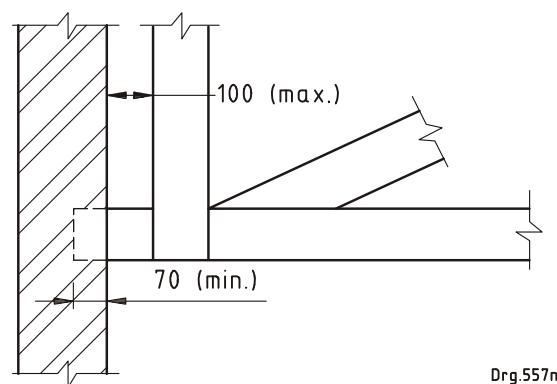
Figure 12 — Nail and bolt spacing in joints between timber members

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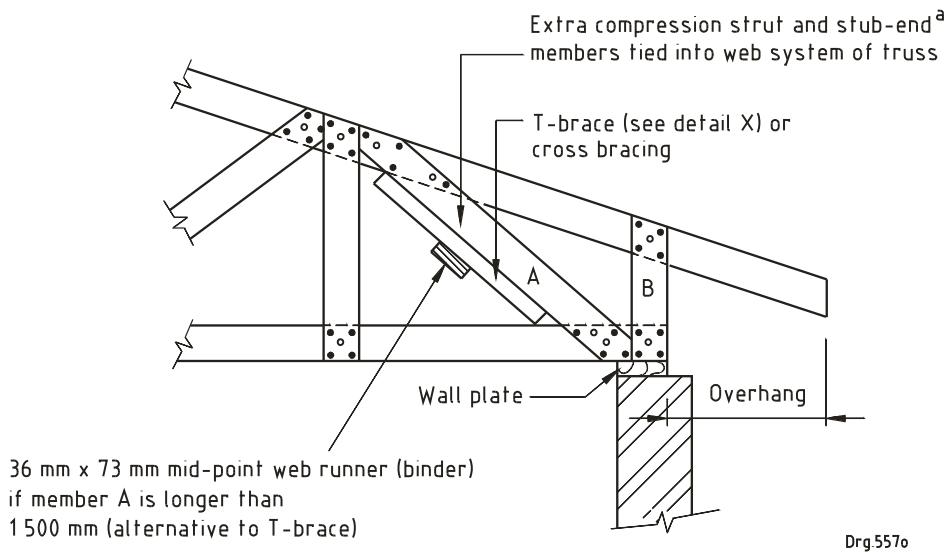


a) Position of wall plates at heel points



b) End bearing of monopitched trusses

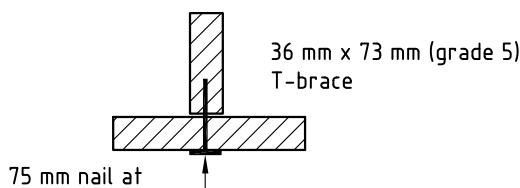
Figure 13 — Truss supports



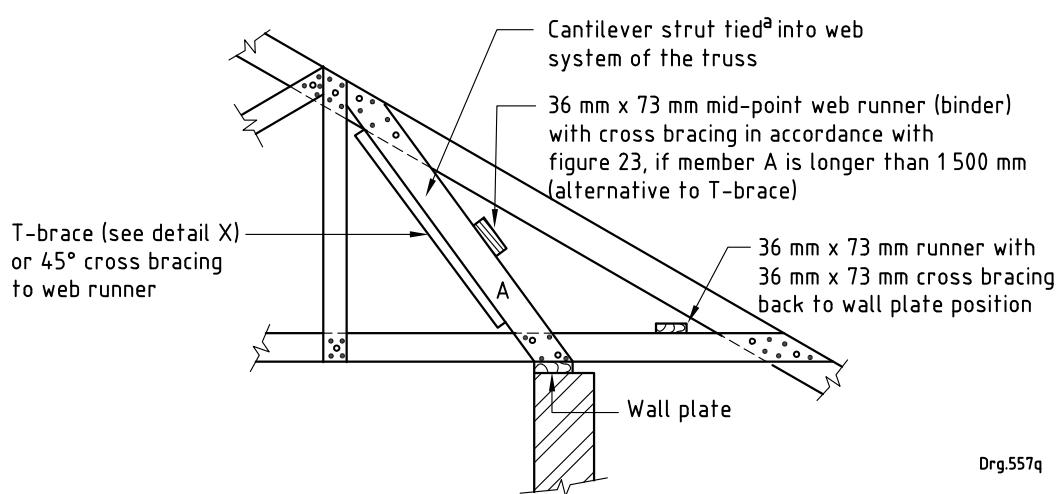
Member A and member B shall be the same size and grade as the top chord. All other web members shall be 111 mm (grade 5). Member A shall be T-braced in accordance with detail X. All bolts shall be M12.

^a Stub end shall be located over a wall plate.

a) Stub-end trusses



Detail X



Member A shall be the same size and grade as the top chord. Member A shall be T-braced in accordance with detail X. All bolts shall be M12.

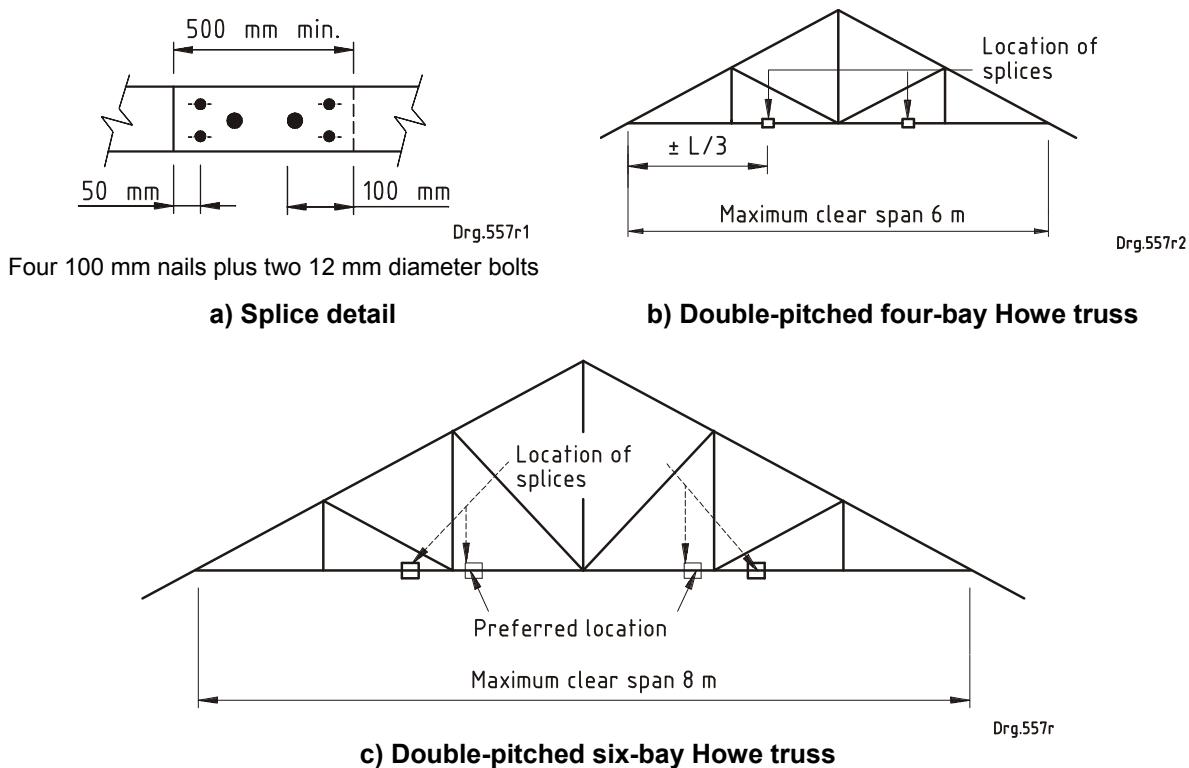
^a Strut end shall be located over a wall plate.

b) Howe truss supported away from heel joint

Figure 14 — Supports where truss is not supported at heel joint

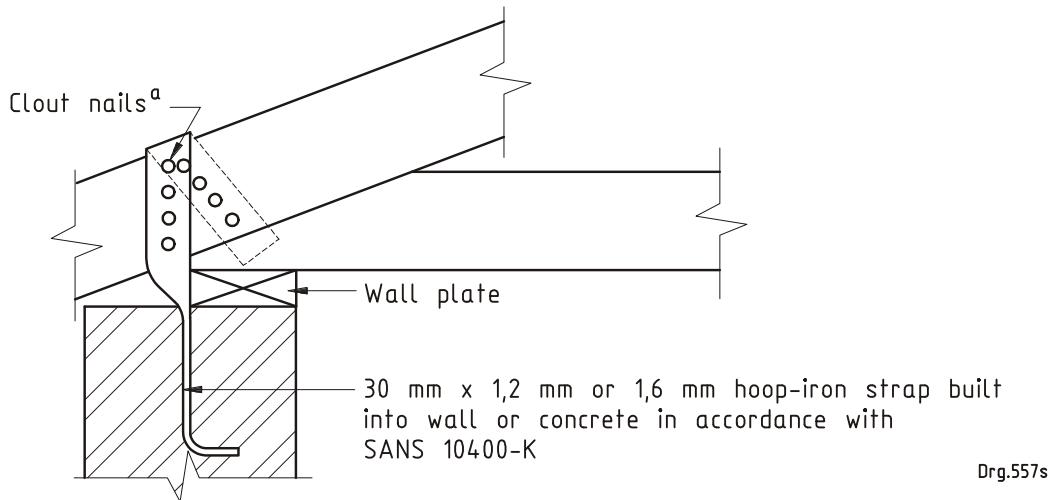
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NOTE No splices are permitted in end bays.

Figure 15 — Splices in Howe trusses

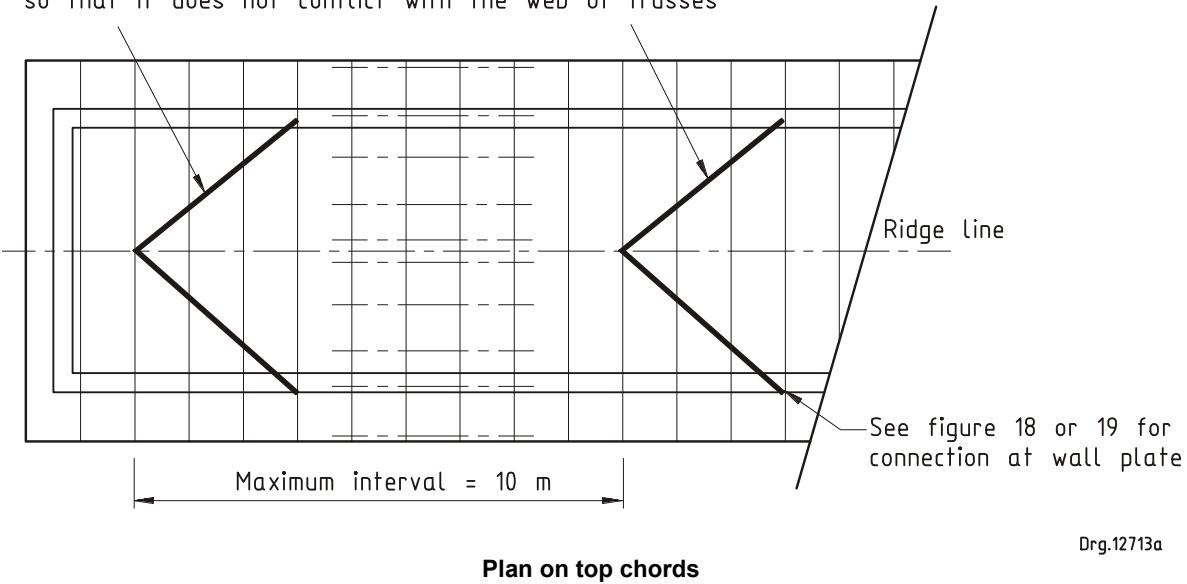


NOTE A double strand of 2,4 mm diameter galvanized steel wire may be used in place of hoop-iron straps in light roofs where the trusses are at centres that do not exceed 750 mm, and in all heavy roofs (see SANS 10400-K).

^a Four 32 mm clout nails (min.) (for a heavy tiled roof) or eight 32 mm clout nails (min.) (for a light sheeted roof) or three 75 mm nails.

Figure 16 — Holding-down detail

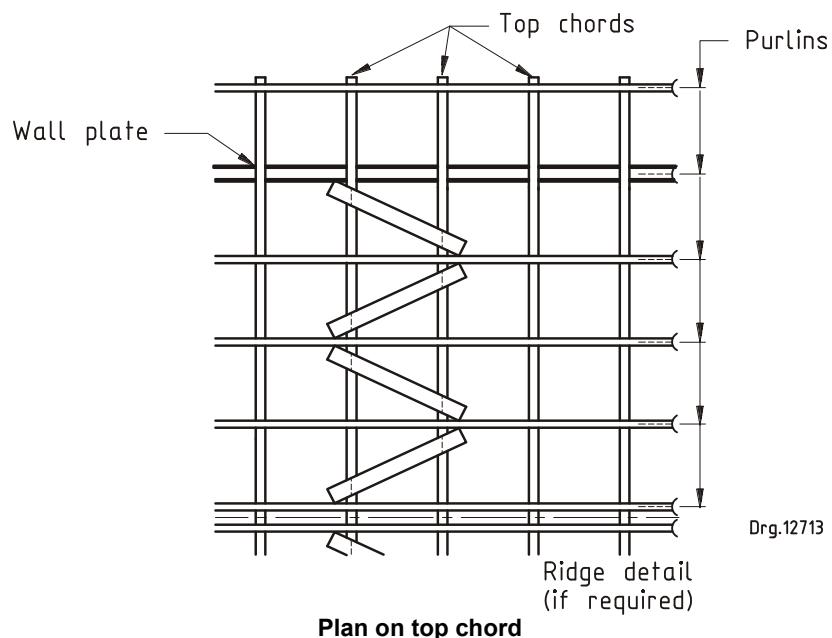
36 mm x 73 mm (grade 5) continuous bracing member with splice, if necessary, nailed with three 76 mm nails to underside of top chord at approximately 45° so that it does not conflict with the web of trusses



Drg.12713a

Plan on top chords

a) Tiled roofs



Drg.12713

Plan on top chord

Bracing shall be joined above the wall plate as shown. Three 75 mm wire nails shall be provided at each connection. Bracing members shall be 36 mm x 73 mm (grade 5), wire-nailed to the top chord at approximately 45° ("zig-zag" bracing).

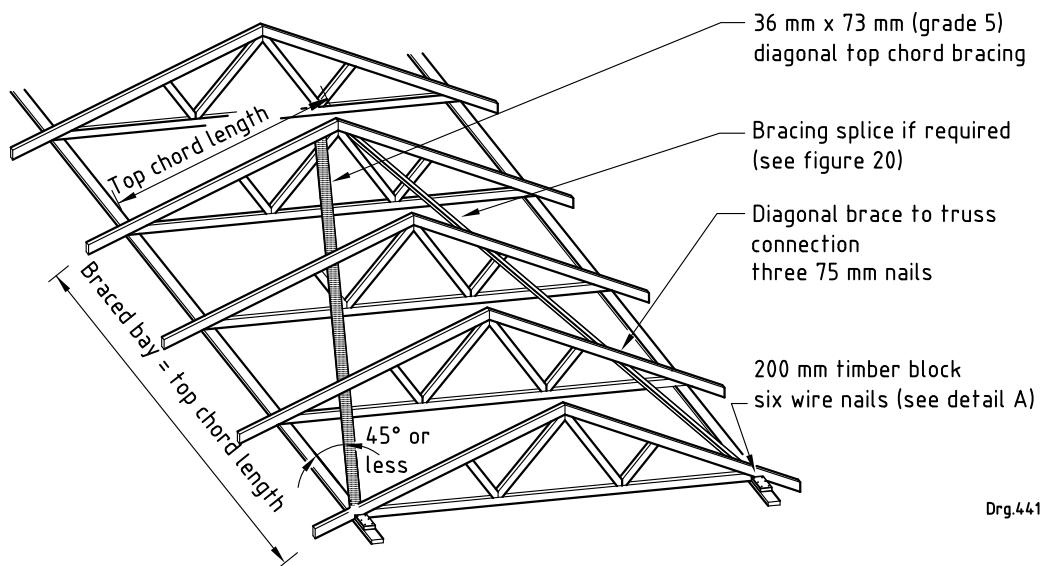
NOTE Similar bays should be installed at intervals that do not exceed 10 m.

b) Sheeted roofs

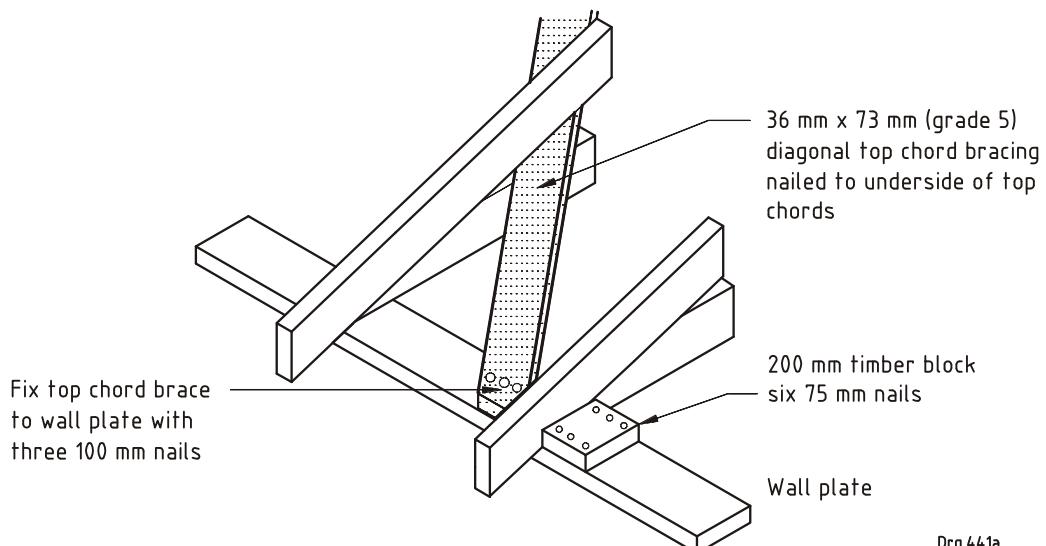
Figure 17 — Top chord bracing for tiled and sheeted roofs that have clear spans that do not exceed 8 m

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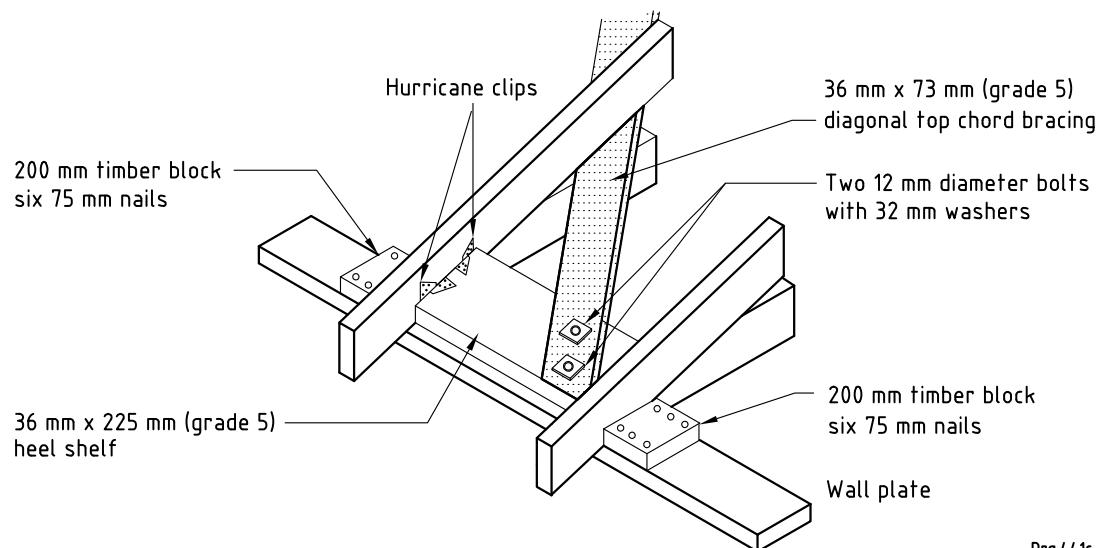
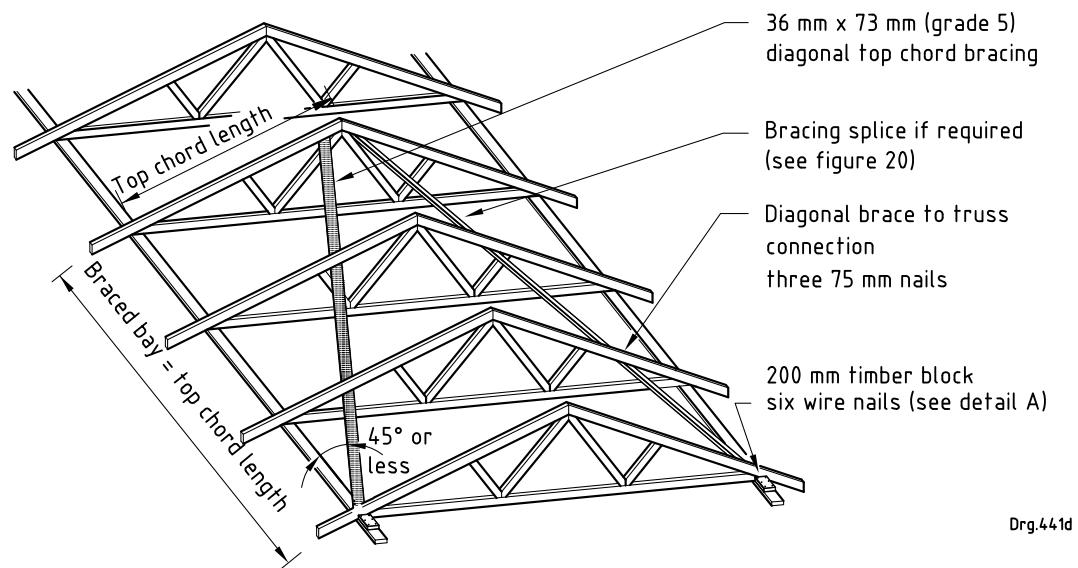
Drg.441



Drg.441a

Detail A

Figure 18 — Alternative top chord bracing connection for tiled roofs that have a clear span that does not exceed 6,6 m

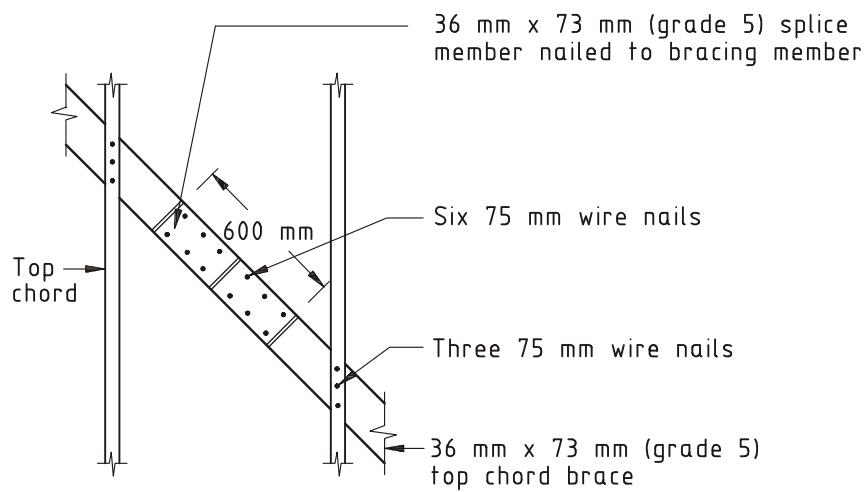


Detail A

Figure 19 — Alternative top chord bracing for tiled roofs that have a clear span that exceeds 6,6 m

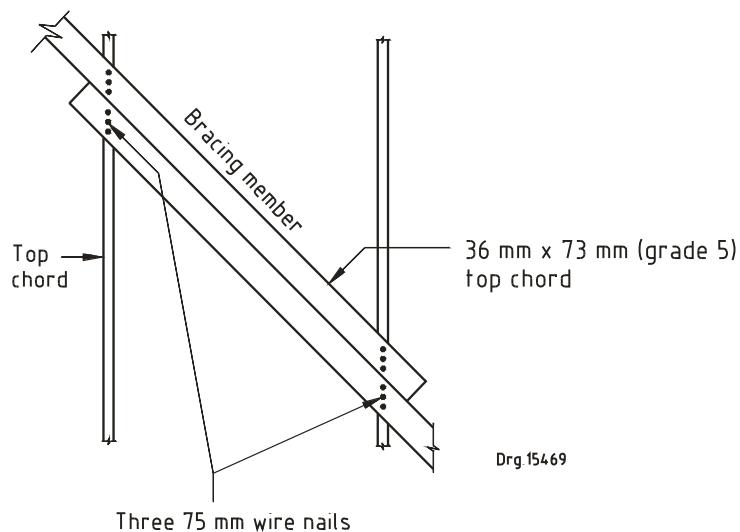
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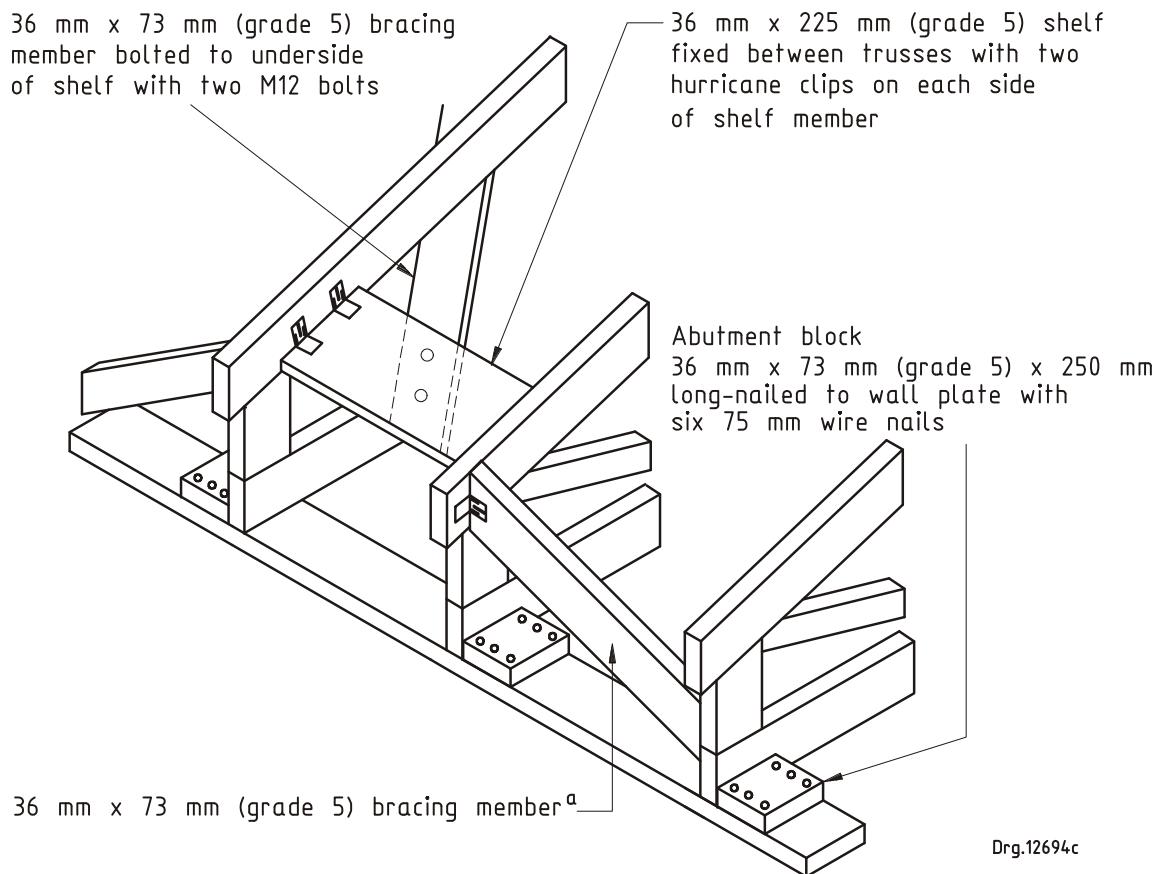
Alternative 1



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Alternative 2

Figure 20 — Details of bracing splices



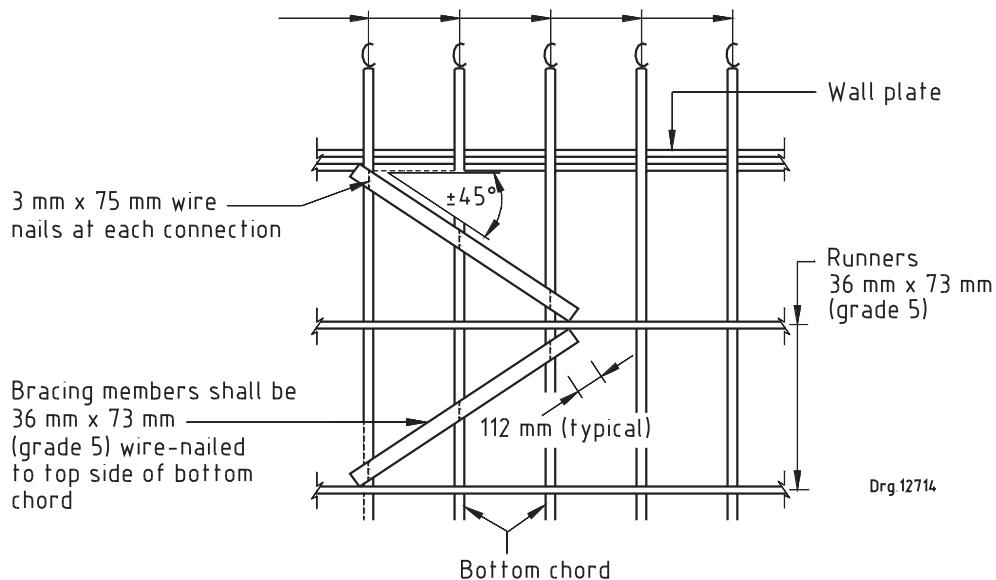
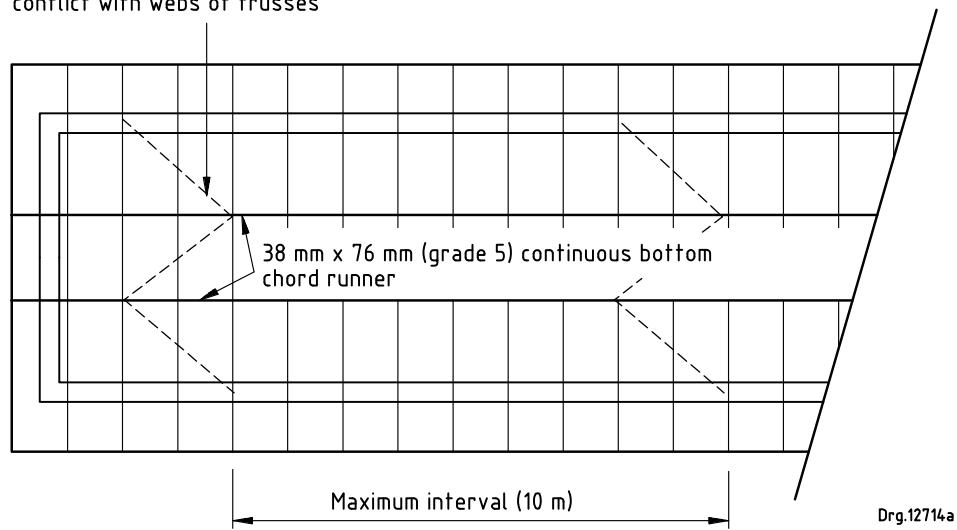
^a Provide bracing member on either side of shelf bay complete with abutment block and fixed with four hurricane clips. Where beam infill exists and is structurally sound, these two braces may be omitted.

Figure 21 — Connection of diagonal bracing at wall plate for stub-end trusses

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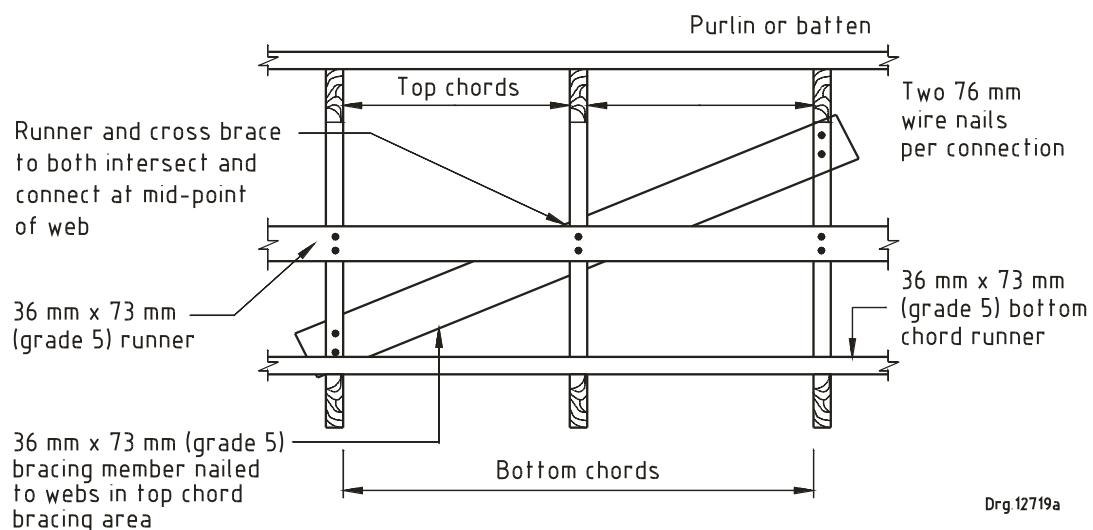
36 mm x 73 mm (grade 5) herring-bone bracing member with splice, if necessary,
nailed to top of bottom chords at approximately 45° so that it does not
conflict with webs of trusses



Plan on bottom chords

NOTE There are two 75 mm wire nails at each connection.

Figure 22 — Bottom chord bracing for sheeted and tiled roofs

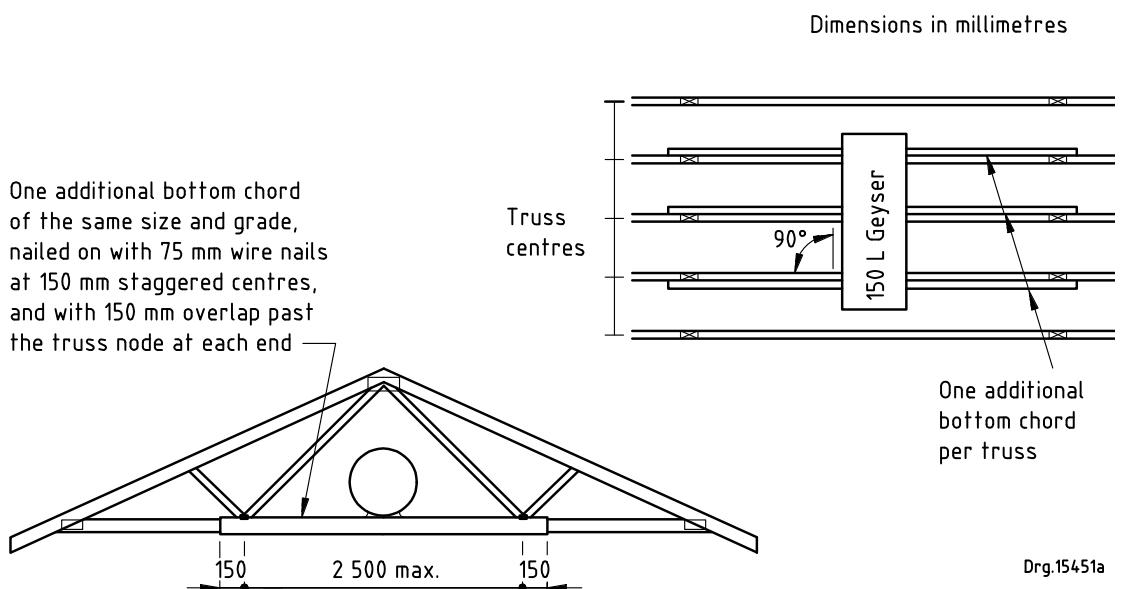


Runners and cross bracing shall be on opposite sides of webs, where possible (blocking out might be necessary).

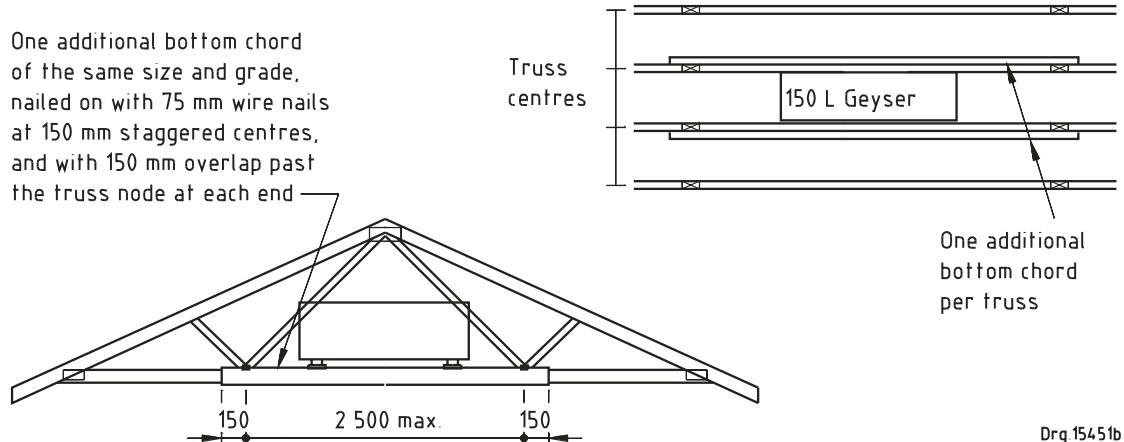
Figure 23 — Typical runner/binder and cross bracing

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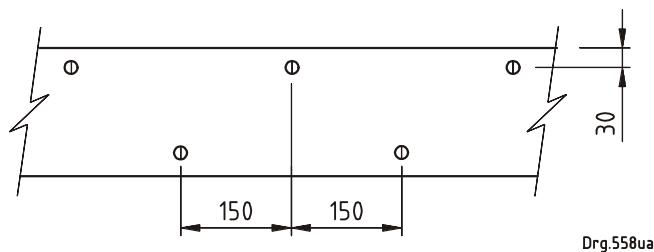
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a) Geyser perpendicular to trusses



b) Geyser parallel to trusses



c) Pattern for staggered nailing

Figure 24 — Geyser support deck for geysers up to 150 L supported on trusses that have a clear span that does not exceed 8 m (only one geyser allowed per three trusses)

Table 5 — Maximum clear spans for sawn softwood rafter beams that have a pitch of less than 26°

1	2	3	4	5
Nominal timber size mm	Timber grade			
	5		7	
	Maximum rafter clear span m			
Type of roof covering	Rafter spacing			
Tiles or slates^a	600 mm	760 mm	600 mm	760 mm
38 × 114	2,0	1,8	2,2	2,0
38 × 152	2,8	2,4	3,0	2,8
38 × 228	4,3	3,8	4,7	4,3
50 × 152	3,1	2,8	3,4	3,1
50 × 228	4,8	4,4	5,1	4,8
76 × 228	5,4	5,2	—	—
Metal or fibre-cement sheets	Rafter spacing			
	1 000 mm	1 400 mm	1 000 mm	1 400 mm
38 × 114	2,2	1,8	2,5	2,1
38 × 152	3,0	2,5	3,5	2,9
38 × 228	4,5	3,8	5,3	4,4
50 × 152	3,4	2,8	4,0	3,4
50 × 228	5,2	4,3	6,0	5,1
76 × 228	6,3	5,3	—	—
Metal tiles	Rafter spacing			
	1 000 mm	1 200 mm	1 000 mm	1 200 mm
38 × 114	2,2	2,0	2,6	2,3
38 × 152	3,0	2,7	3,5	3,2
38 × 228	4,5	4,1	4,3	4,8
50 × 152	3,4	3,1	4,0	3,6
50 × 228	5,2	4,7	6,0	5,5
76 × 228	6,3	5,7	—	—

^a Maximum mass of tiles or slates, including battens or purlins, shall not exceed 65 kg/m².

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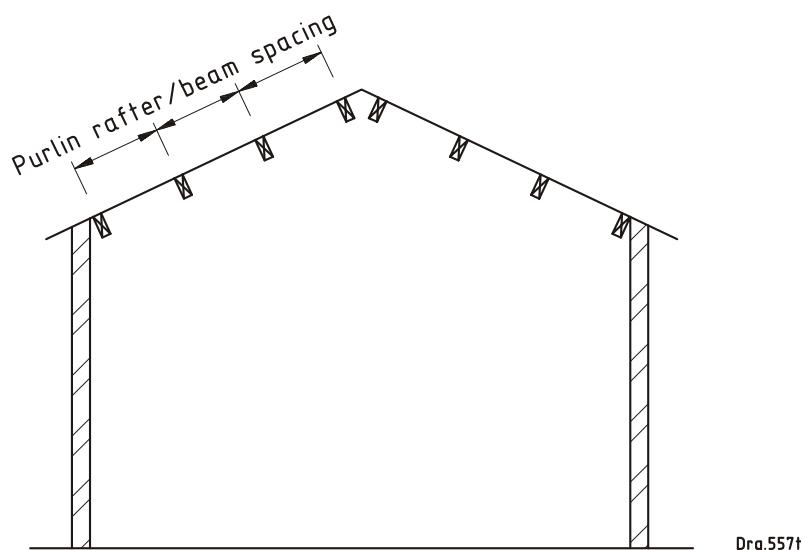
Edition 3

Table 6 — Maximum clear spans for laminated SA Pine rafters that support tiled or slated roofs that have a pitch of less than 26°

1 Nominal timber size mm	2	3
Nominal timber size mm	Maximum rafter clear span m	
	Rafter spacing	
	600 mm	760 mm
32 × 133 ^a	2,0	1,8
45 × 133 ^a	2,5	2,2
70 × 133 ^a	3,0	2,7
32 × 166	2,6	2,3
45 × 166	3,2	2,8
70 × 166	3,8	3,5
45 × 200 ^a	3,9	3,5
70 × 200 ^a	4,9	4,2
45 × 233	4,6	4,1
70 × 233	5,3	4,9
70 × 266 ^a	6,1	5,7
70 × 300	6,9	6,4
70 × 333 ^a	8,0	7,1
70 × 366	8,0	7,8
70 × 400 ^a	8,0	8,0
100 × 400	8,0	8,0
Laminated beams shall comply with the requirements of SANS 1460.		
Laminated beams shall be grade 5 or higher.		
The maximum mass of tiles or slates, including battens or purlins, shall not exceed 65 kg/m ² .		
^a Commonly available sizes.		

Table 7 — Maximum clear spans for laminated SA Pine rafters that support profiled metal or fibre-cement sheeting or metal tiles that have a pitch of less than 26°

1	2	3	4	5
Nominal timber size mm	Maximum rafter clear span m			
	Rafter spacing			
	750 mm	900 mm	1 000 mm	1 200 mm
32 × 133 ^a	2,5	2,2	2,1	1,9
45 × 133 ^a	3,0	2,8	2,6	2,3
70 × 133 ^a	3,8	3,5	3,3	3,0
32 × 166	3,1	2,8	2,7	2,4
45 × 166	3,8	3,5	3,3	3,0
70 × 166	4,8	4,4	4,1	3,8
45 × 200 ^a	4,6	4,2	4,0	3,6
70 × 200 ^a	5,3	5,3	5,0	4,6
45 × 233	5,4	4,9	4,7	4,2
70 × 233 ^a	6,7	6,2	5,8	5,3
70 × 266 ^a	7,7	7,0	6,7	6,1
70 × 300	8,0	7,9	7,5	6,8
70 × 333 ^a	8,0	8,0	8,0	7,5
70 × 366	8,0	8,0	8,0	8,0
70 × 400 ^a	8,0	8,0	8,0	8,0
Laminated beams shall comply with the requirements of SANS 1460.				
Laminated beams shall be grade 5 or higher.				
^a Commonly available sizes.				



Drg.557†

**Figure 25 — Typical arrangement of purlin rafter/purlin beam construction
(see tables 8 and 9)**

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Table 8 — Maximum clear spans for sawn SA Pine/purlin rafters/purlin beams that support profiled metal or fibre-cement sheeting

1	2	3	4	5	6	7	8	9
Nominal timber size mm	Maximum clear span m							
	Purlin rafter or purlin beam spacing							
	750 mm		1 000 mm		1 200 mm		1 400 mm	
	Timber grade							
5	7	5	7	5	7	5	7	7
50 × 152	4,0	4,7	3,4	4,0	3,1	3,6	2,9	3,4
50 × 228	6,0	6,8	5,2	6,0	4,7	5,5	4,3	5,1
76 × 228	7,2	—	6,3	—	5,7	—	5,3	—

Table 9 — Maximum clear spans for laminated SA Pine purlin rafters/purlin beams that support profiled metal or fibre-cement sheeting

1	2	3	4	5
Nominal timber size mm	Maximum clear span m			
	Purlin rafter or beam spacing			
	750 mm	900 mm	1 200 mm	1 500 mm
45 × 133 ^a	3,0	2,8	2,3	2,1
70 × 133 ^a	3,8	3,5	3,0	2,7
45 × 166	3,8	3,5	3,0	2,7
70 × 166	4,8	4,4	3,8	3,4
45 × 200 ^a	4,6	4,2	3,6	3,2
70 × 200 ^a	5,8	5,3	4,6	4,1
45 × 233	5,4	4,9	4,2	3,8
70 × 233	6,7	6,2	5,3	4,8
70 × 266 ^a	7,7	7,0	6,1	5,4
70 × 300	8,0	7,9	6,8	6,1
70 × 333 ^a	8,0	8,0	7,5	6,7
70 × 366 ^a	8,0	8,0	8,0	7,6
70 × 400 ^a	8,0	8,0	8,0	8,0
Laminated beams shall comply with the requirements of SANS 1460.				
Laminated beams shall be grade 5 or higher.				
^a Commonly available sizes.				

4.4.1.5 Battens and purlins

4.4.1.5.1 Battens and purlins shall be continuous over at least three rafters (i.e. two rafter spacings) and shall be fixed to every rafter that they cross. Battens of size 38 mm × 38 mm shall be nailed to rafters with 75 mm wire nails and 38 mm × 50 mm battens shall be set on edge with 90 mm wire nails. Purlins shall be fixed to rafters in accordance with figures 26 and 27. The sizes and spacing of battens and purlins shall be in accordance with table 4.

4.4.1.5.2 The ends of battens and purlins shall be sawn square and butt-jointed centrally over the rafter member so as to provide adequate bearing and fixing. Alternatively, battens may be spliced in close proximity to rafters by means of nailed splices or connector plates as shown in figure 27.

4.4.1.5.3 Joints in battens shall be arranged so that not more than one batten in three is joined on any one rafter or truss.

4.4.1.5.4 Purlins shall be spliced in accordance with the details shown in figure 28. Splices shall be located in close proximity to rafters and shall be staggered so that there is not more than one splice in three consecutive purlins. Purlins and batten splices shall not be located within 1,5 m of the gable ends.

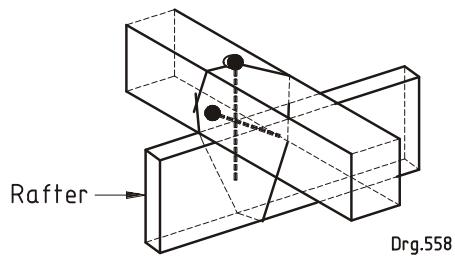
4.4.1.6 Ceiling assembly

4.4.1.6.1 Brandering shall comply with the requirements of SANS 1783-4 or SANS 1707-2 and shall be installed in accordance with the relevant requirements of SANS 2001-CT2. Where saligna brandering is used, it shall be treated against the effects of rot, fungus and insect attack with CCA (Copper Chrome Arsenate) or a similar approved preservative, for example Boron, in accordance with the requirements of SANS 10005 and SANS 1707-2.

4.4.1.6.2 Pine brandering of size 38 mm × 38 mm required to support gypsum plasterboard, fibre-cement board or similar board shall be securely spiked to the supporting timbers with 75 mm wire nails at centres that do not exceed 450 mm. Cross brandering shall be cut in between the longitudinal brandering and skew-nailed to the same using 75 mm wire nails at centres that do not exceed 900 mm.

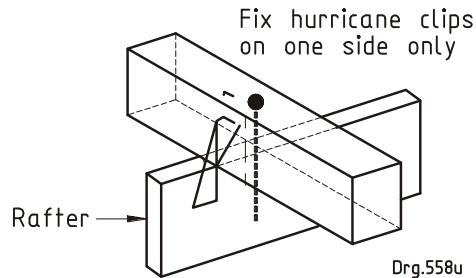
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One 100 mm skew nail and one 125 mm straight nail, tied with double-strand 2,4 mm galvanized wire at each connection.

a) Tied connection

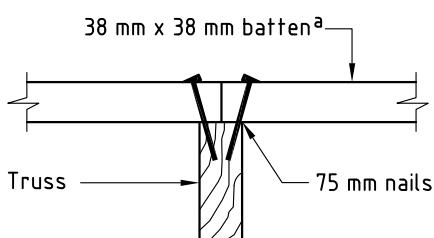


All hurricane clips shall be fully nailed with 32 mm clout nails, and with one 125 mm straight nail at each connection.

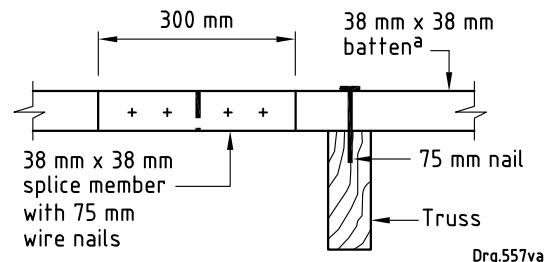
b) Hurricane clip connection

NOTE For aesthetic purposes, the hurricane clip connections are usually used at eaves overhangs, whilst wire is often used for connections hidden by ceilings.

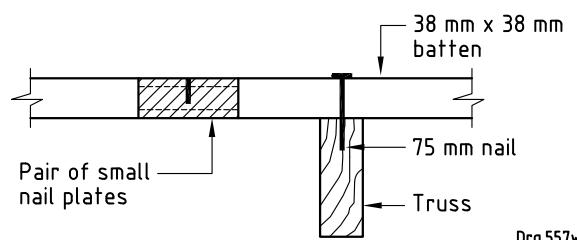
Figure 26 — Purlin to rafter connection details



a) Batten splice
(general practice)



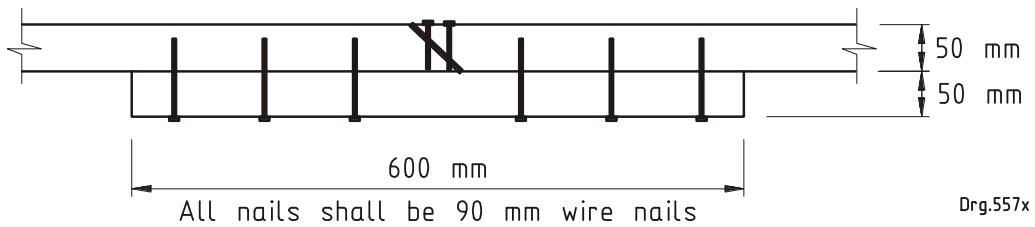
b) Nailed timber splice



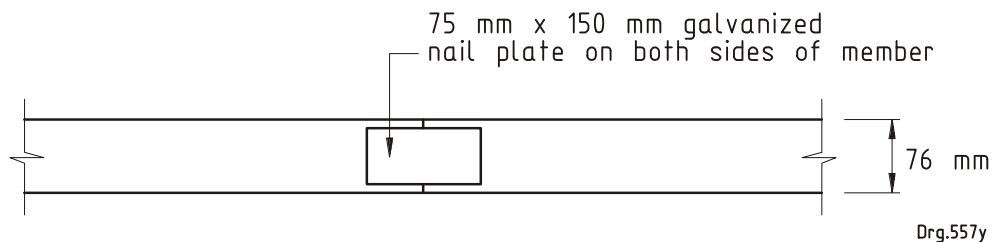
c) Connector plate splice

^a Joints in battens shall be staggered so that not more than one in three is spliced on any one rafter.

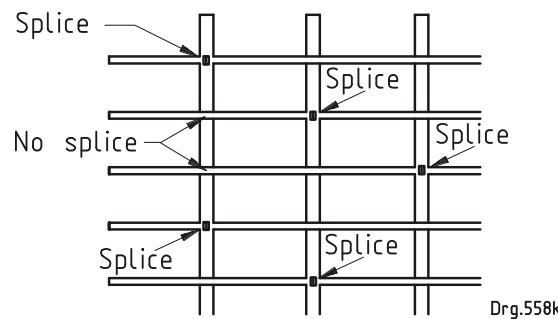
Figure 27 — Splicing of battens



a) Block purlin splice



b) Plated purlin splice



Joints in battens shall not be within 1,5 m of gable ends and shall be staggered so that not more than one in three is spliced on any one rafter.

c) Batten splice layout

Figure 28 — Typical layout of batten and purlin splices

4.4.2 Pole construction

4.4.2.1 Poles shall comply with the requirements of SANS 457-2 (softwoods) or SANS 457-3 (hardwoods) and shall be treated in accordance with the requirements of SANS 10005. Poles which have cracked or split pole ends within one pole diameter location of a bolt location, shall not be incorporated into such structures.

4.4.2.2 When poles are reshaped or re-sawn to a different length, the end grain of the exposed ends shall be treated with a class W preservative. A new nail plate, that covers at least 35 % of the surface area of the pole end, shall be nailed to the end to prevent and minimize excessive cracking.

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4.4.2.3 Laths used in thatched roof construction shall have a minimum diameter of 25 mm, shall comply with the requirements of SANS 1288, and shall be spaced in accordance with the requirements of SANS 10407.

4.4.2.4 Thatched roofs constructed of poles in gable-to-gable construction without any hips, valleys or dormer windows, and that have a pitch of 45° and a clear span that does not exceed 6 m, shall be in accordance with figure 29, and shall be constructed in accordance with the requirements of SANS 10407.

4.4.2.5 Pole rafters shall have a clear span in accordance with table 10.

4.4.2.6 Pole trusses and rafters shall be tied down to the supporting walls and columns by means of galvanized steel wires, which are built into the walls in accordance with the requirements of SANS 10400-K.

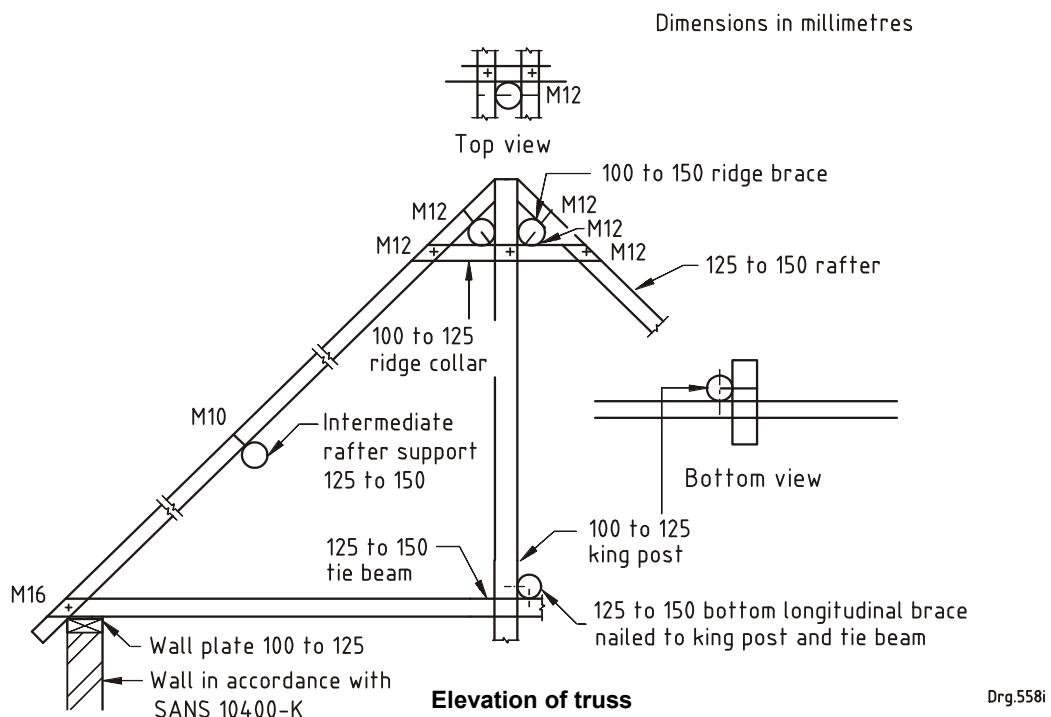
Table 10 — Maximum clear spans for gum pole rafters

1	2	3	4
Type of roof covering	Diameter of pole mm	Maximum clear span m	
		Rafter spacing	
		750 mm	900 mm
Tiled roofs that have a pitch of less than 26°	100 to 125	2,7	2,5
	125 to 150	3,5	3,3
	150 to 175	4,4	4,1
Sheeted roofs that have a pitch of less than 26°	100 to 125	3,8	3,5
	125 to 150	4,8	4,5
	150 to 175	5,8	5,5
The maximum mass of the tiles or slates, including battens or purlins, shall not exceed 65 kg/m ² .			

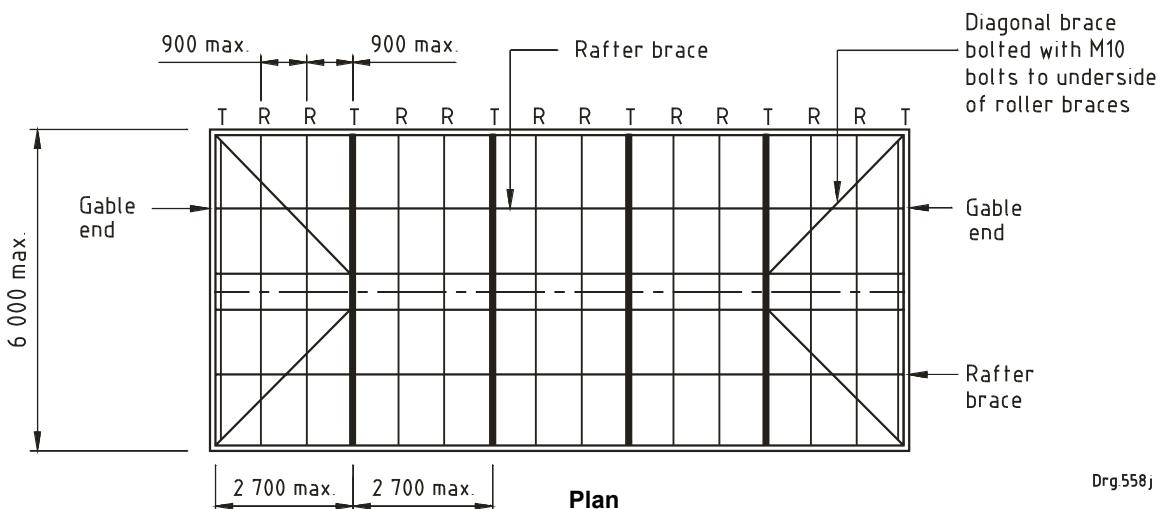
4.5 Fire resistance and combustibility

4.5.1 The fire resistance of any roof or ceiling assembly (or both), complete with light fittings or any other component which penetrates the ceiling, and the degree of non-combustibility of such assembly shall comply with the relevant requirements in SANS 10400-T and SANS 10400-V, as applicable.

4.5.2 No part of the roof or ceiling assembly, made of wood or any other combustible material, shall pass through a separating element of a building (in accordance with the requirements of SANS 10400-T).



Member	Size
Rafters	100 mm to 125 mm for truss clear spans \leq 4 m 125 mm to 150 mm for truss clear spans > 4 m but < 6 m
Ridge brace	125 mm to 150 mm
Ridge collar	100 mm to 125 mm
King post	100 mm to 125 mm
Bottom chord	125 mm to 150 mm (tie beam)
Rafter brace	125 mm to 150 mm
NOTE Pitch = 45°.	



T = truss
R = rafter

NOTE The diameter of the pole is 125 mm to 150 mm.

Figure 29 — Truss for thatch roofing in gable-to-gable rectangular buildings that have a clear span that does not exceed 6,0 m

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Annex A (informative)

Principal waterproofing details

Figures A.1 to A.11 show a few principal waterproofing details and should be adapted to suit the relevant situation. More principal waterproofing details can be obtained from experienced and reputable specialist waterproofing contractors, or waterproofing material manufacturers/suppliers.

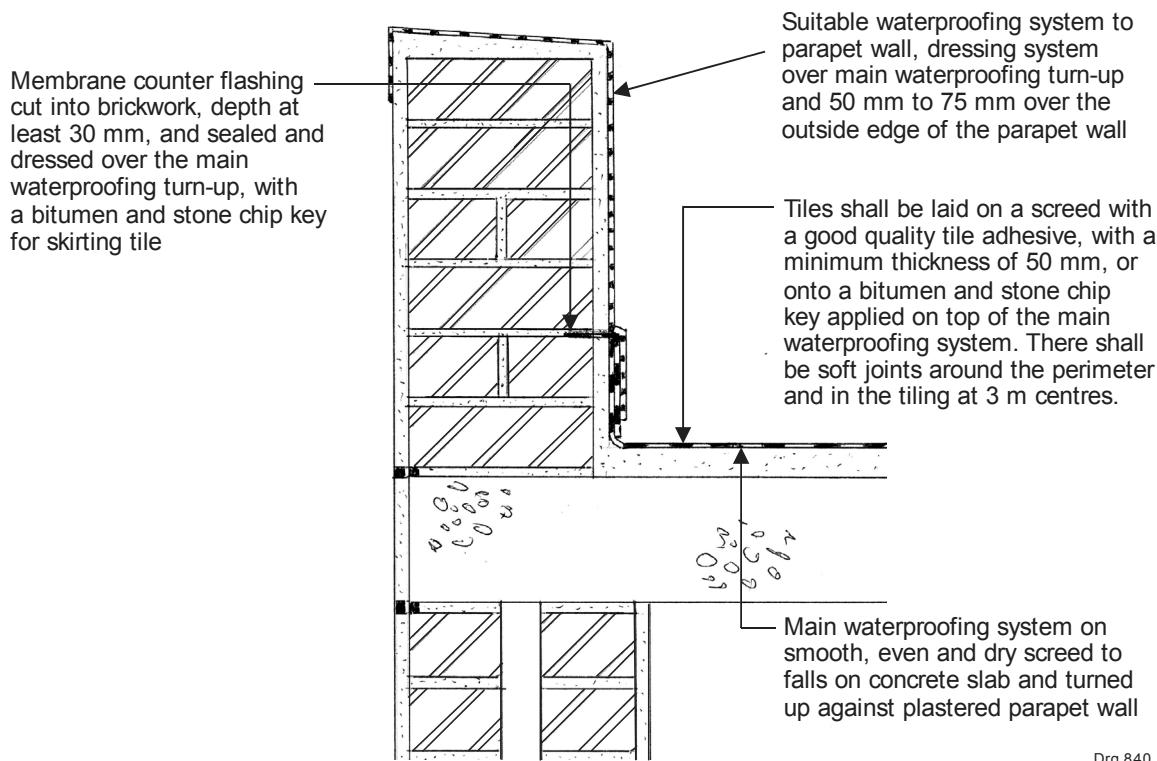


Figure A.1 — Parapet wall waterproofing detail on balcony

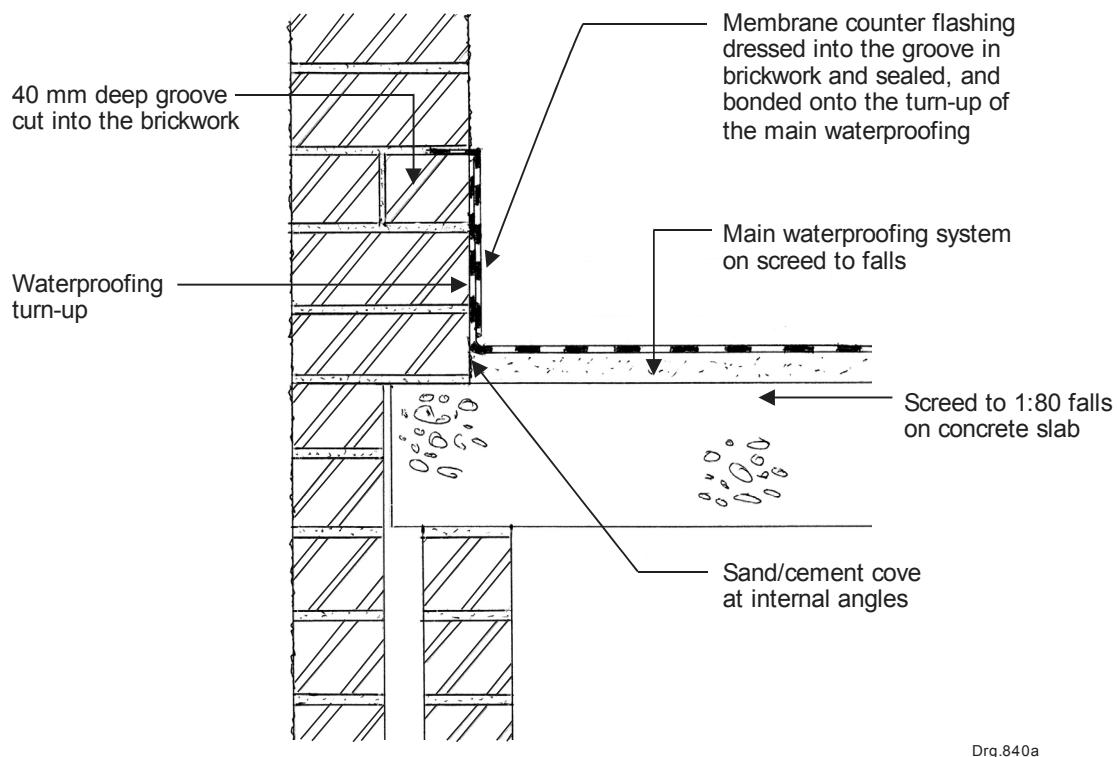


Figure A.2 — Waterproofing turn-up detail against solid brick wall

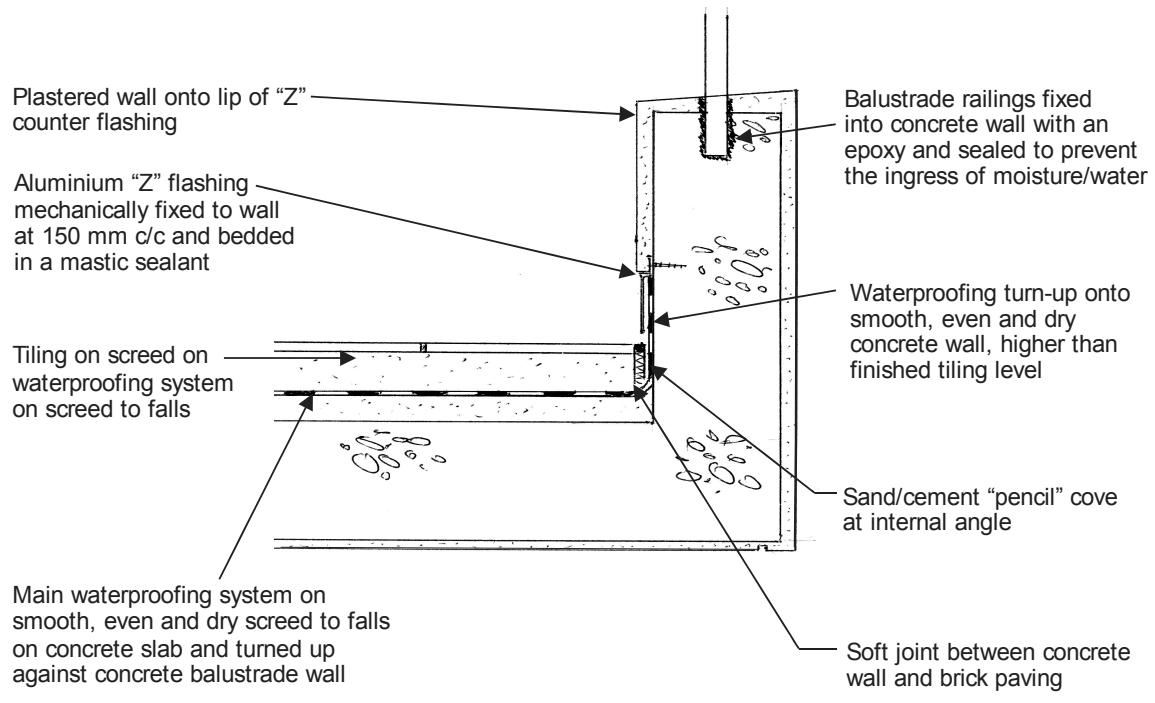


Figure A.3 — Waterproofing turn-up detail at concrete balustrade wall on balcony or against concrete wall

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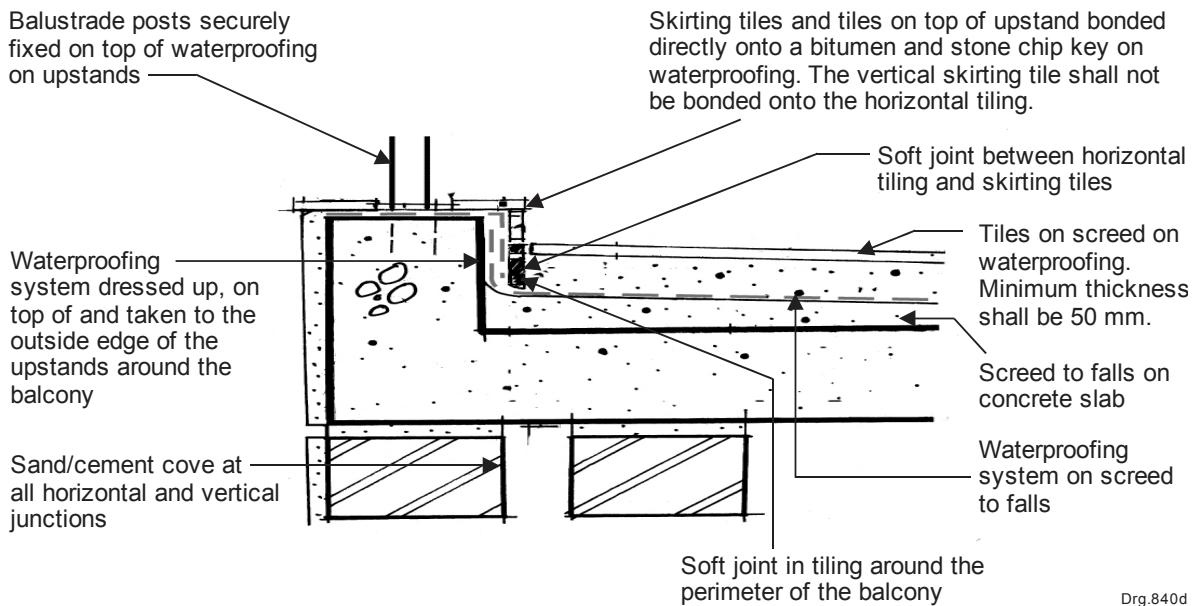


Figure A.4 — Waterproofing detail at perimeter upstand around a balcony

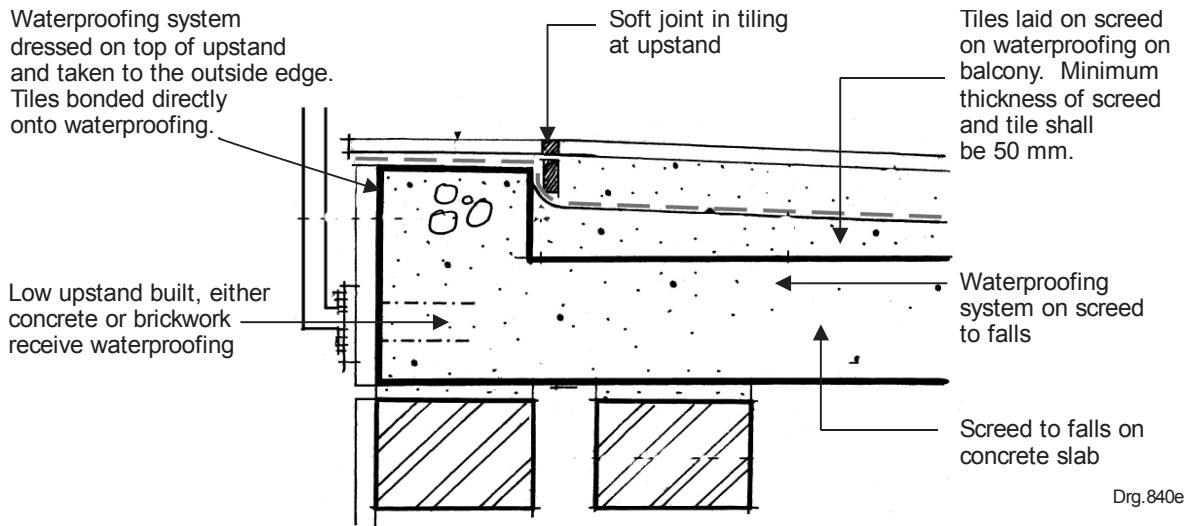


Figure A.5 — Waterproofing detail at low perimeter upstand at the edge of a balcony

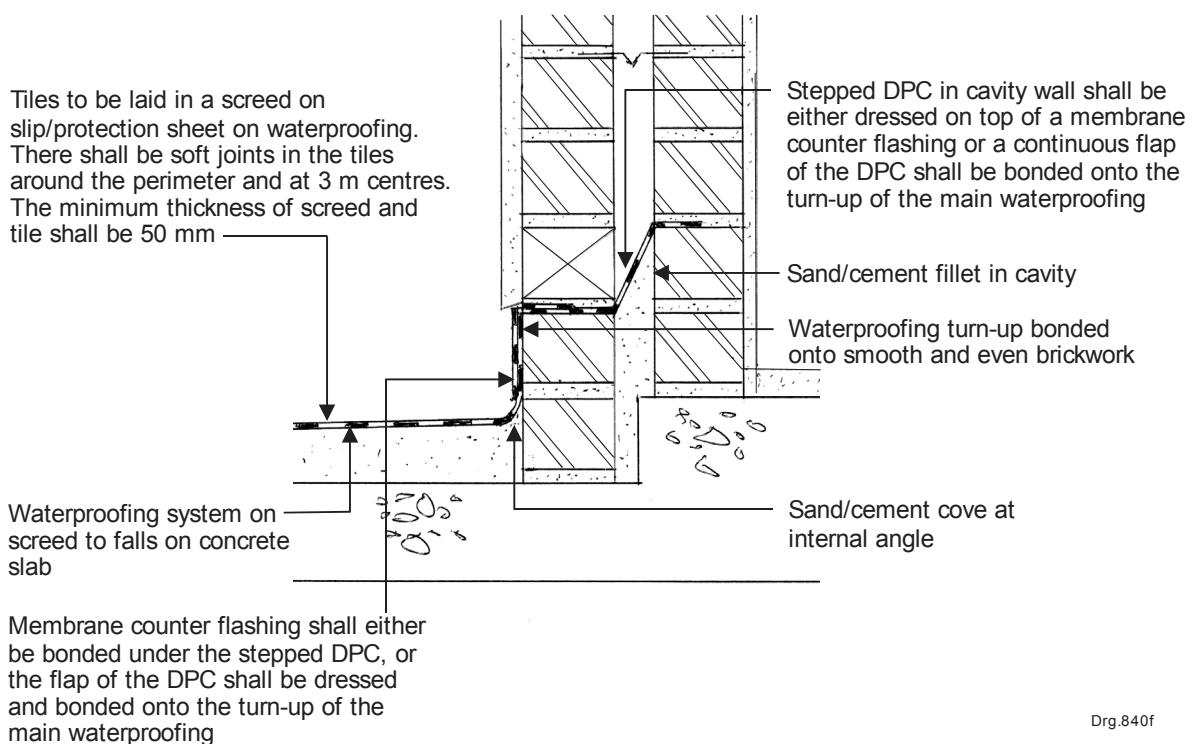


Figure A.6 — Turn-up detail at interface of stepped DPC in cavity wall

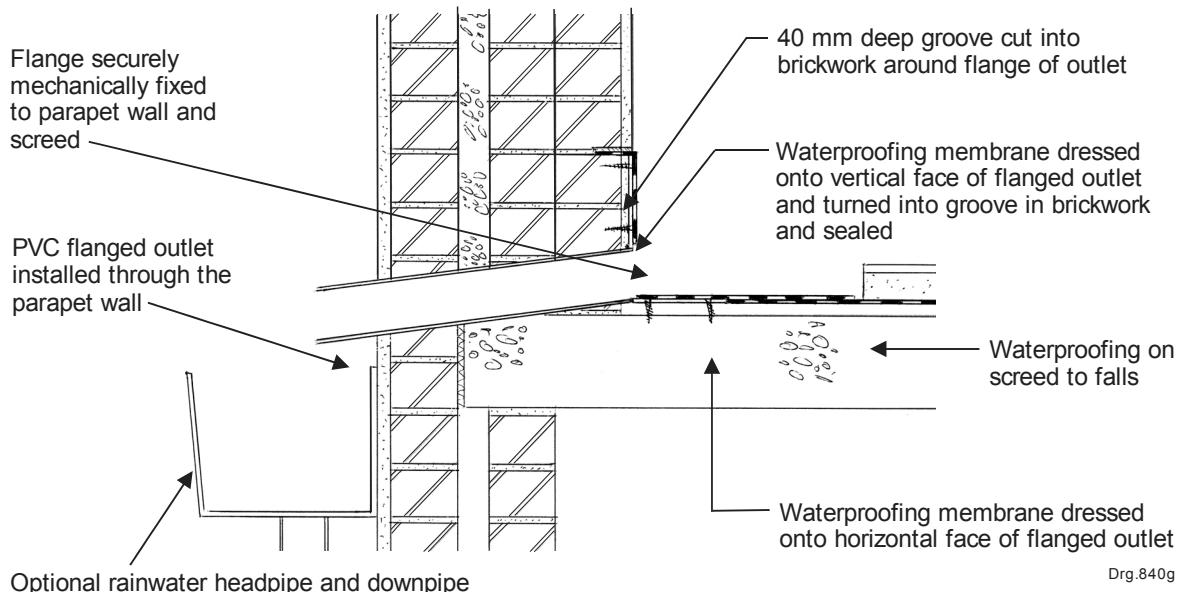


Figure A.7 — Detail for a flanged outlet through a parapet wall on a balcony

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Waterproofing system dressed onto step in concrete slab and then returned up onto a solid metal angle, or the sound prepared edge of the internal screed at the back of the timber frame

Timber door frame built into structure in the normal way with DPCs

Tiles on screed on waterproofing taken under timber door sill. Minimum thickness shall be 50 mm.

Correct step in concrete slab to allow for a screed to falls, a waterproofing system and screed and tiles on external balconies, etc.

Soft joint around the perimeter of the balcony

Waterproofing system on screed to falls and dressed underneath timber door frame

Drg.840h

Figure A.8 — Waterproofing detail underneath timber door frames

Aluminium angle securely fixed to concrete slab

Aluminium door frame fixed to the back of the aluminium angle and bedded in a flexible sealant

Waterproofing system on screed to falls and dressed up and onto aluminium angle underneath door frame

Tiles on screed on waterproofing. Minimum thickness shall be 50 mm.

Soft joint around the perimeter of balcony

Screed to falls on concrete slab

Drg.840i

Figure A.9 — Waterproofing detail underneath aluminium door frames

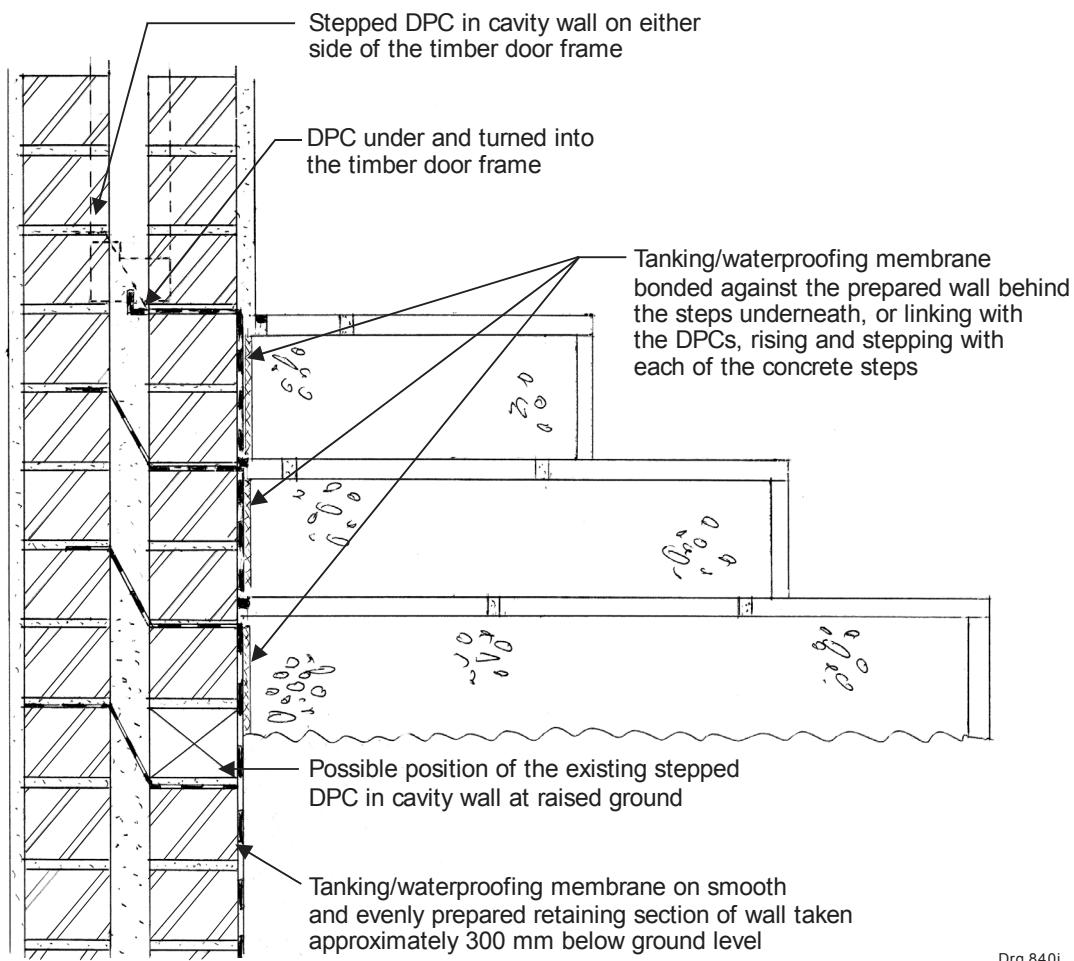
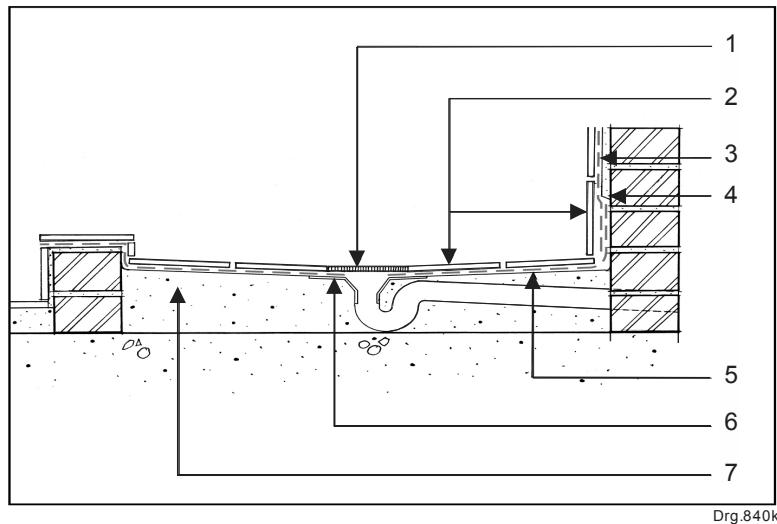


Figure A.10 — Proposed tanking/waterproofing and DPC detail at steps against a cavity wall

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- 1 The shower grating shall either be fixed to the shower outlet/trap, or fixed into the floor tiling.
- 2 Wall and floor tiles are fully bonded to the waterproofing systems.
- 3 Suitable waterproofing system to smooth plastered walls of shower, including dressing over turn-up of shower base waterproofing system.
- 4 Termination of plaster 150 mm above shower base to allow for turn-up of waterproofing system.
- 5 Suitable waterproofing system on screeded shower base turned up 150 mm against smooth shower walls, dressed onto the flange of the outlet/trap and up and on top of upstand.
- 6 Special flanged shower outlet/trap level with the screeded shower base. The shower outlet/trap shall have a flange to dress the waterproofing system onto (not into) a round outlet/trap. There are a number of different manufacturers of shower outlets/traps, other than the standard "U" type PVC trap.
- 7 Resin bonded screed to falls to form shower base, including a small "pencil" cove at internal angles.

Figure A.11 — Waterproofing detail at a shower base and walls

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