9.3 Concrete lintels

9.3.1

For spans up to 2.0 m, lintels shall be seated a minimum of 300 mm on the earth wall on either side of the opening. Lintels with a clear span of more than 2.0 m shall be seated a minimum 450 mm on the earth walls. For splayed reveals greater than 100 mm there is to be a 300 mm bearing at the widest part of the opening (450 bearing for spans above 2.0 m).

9.3.2

Concrete lintels shall be continuous with the concrete bond beam on either side of the opening.

9.3.3

A concrete lintel shall be the same width as the wall supporting it minus the width of any external insulation shown as 56 mm in Figure 9.7.

9.3.4

Where required, the deepening of the concrete bond beam for the concrete lintel shall be as shown in Figure 9.5.

9.3.5

Concrete cover to steel reinforcement and concrete strength shall be in accordance with 2.6.5.1.

9.3.6

Sizes, reinforcement, and maximum spans of lintels supporting timber-framed walls, and roof above, shall be in accordance with Table 9.3 to Table 9.5 according to the snow load and Figures 9.5, 9.6 and 9.7. Loaded dimensions are shown in Figure 9.1. The strength of the lintels incorporates provision of insulation on the exterior face of the concrete.

C9.3.6
While this insulation is not essential to achieve compliance with NZBC clause H1, the insulation of this thermal bridge is a prudent insulation improvement. The bond beam and lintel tables in this standard have been calculated to accommodate an overall width reduction of 56 mm, made up of 50 mm polystyrene insulation and 6 mm fibre-cement sheet to weather it.

9.3.7

Concrete lintels supporting gable end earth walls higher than 1.2 m, or interior earth walls that are more than 300 mm higher than adjacent wall heights, shall be specifically designed. Such lintels are outside the scope of this standard.

9.3.8

Where a concrete lintel is combined with a concrete bond beam and with a structural diaphragm, the bond beam reinforcement may be included in the area of the lintel ➤

reinforcement provided that the area of the lintel reinforcement exceeds the minimum area of the bond beam reinforcement. See Figure 9.8.

9.3.9

Where a concrete lintel is combined with a concrete bond beam without a structural diaphragm, the reinforcement of the lintel shall be either:

(a) The maximum amount required by either the lintel or bond beam where the total length of the lintel lies within the middle two-thirds of the bond beam span; or

(b) The summation of the reinforcement required by the bond beam and lintel where the lintel or any part of it is located outside the middle two-thirds of the bond beam span. Refer to Figure 9.8.

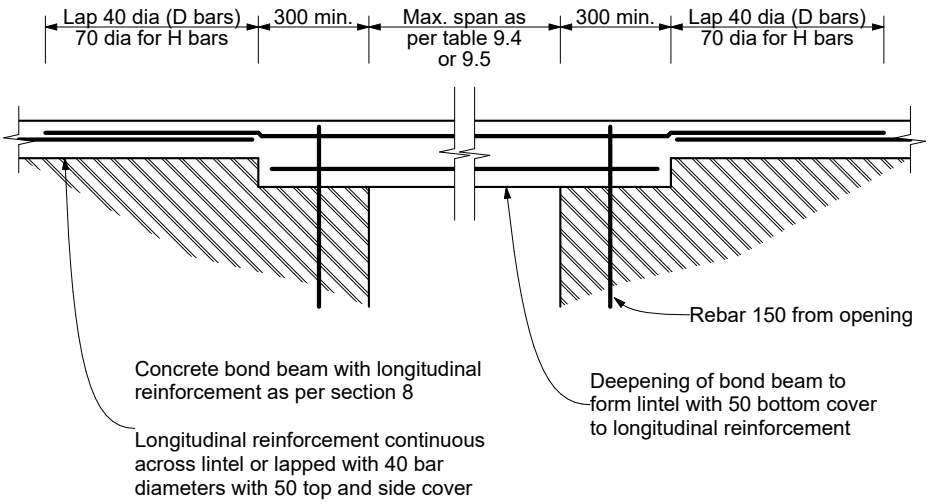
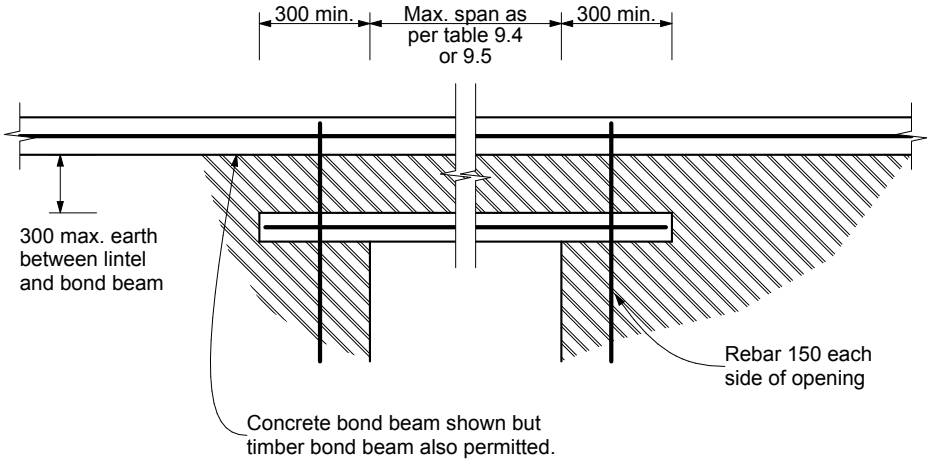


Figure 9.5 – Concrete lintel general arrangement where lintel forms bond beam



GENERAL ARRANGEMENT OF CONCRETE
LINTELS WHERE LINTEL BELOW BOND BEAM

Figure 9.6 – Concrete lintel supporting concrete bond beam and wall above

Table 9.3 – Concrete lintel details

Type	Depth	Longitudinal reinforcement
A1	125	2/D12
A2	200	4D/12
B1	150	2/D16
B2	200	4/D16
C1	175	2/D16
C2	250	4D/12
D1	200	2/D16
D2	250	4/D16
E1	200	2/D20
E2	250	4/D20
A2H	200	4/H12
B2H	200	4/H16
C2H	250	4/H12
D2H	250	4/H16
E2H	250	4/H20
NOTE – Lintel width equals the wall width minus 56 mm for insulation and protection although the insulation and its protection may be omitted.		

Table 9.4 – Gable end concrete lintels with ground snow loads up to 2.0 kPa

	Lintel type	
Lintel clear opening (m)	Timber gable (mm)	Earth gable (mm)
0.6	B1	B1
0.9	A2	D1
1.2	A2	A2
1.5	A2	C2
1.8	A2	B2H
2.1	C2 (1)	D2H (1)
2.4	B2H (1)	E2H (1)
2.7	B2H (1)	OS (3)
3.0	D2H (1)	OS

NOTE –

(1) 450 mm long by wall width or equivalent bearing required under each end.

(2) For low-density earth with greater than 1.0 m clear lintel span, SED shall be used to check the bearing stresses under the ends of the lintels.

(3) OS – outside scope.

Table 9.5 – Concrete side wall lintels with 1.0 kPa, 1.5 kPa or 2.0 kPa ground snow loads

	Ground snow load (kPa)		
Maximum span (m)	≤ 1.0	> 1.0 ≤ 1.5	> 1.5 ≤ 2.0
	Type		
0.6	A2	A2	A2
0.9	A2	A2	A2
1.2	A2	B2	B2
1.5	C2	C2	D2
1.8	B2	B2	D2
2.1	D2	D2	D2
2.4	D2	E2	E2
2.7	E2H	D2H	E2H
3.0	D2H	E2H	OS

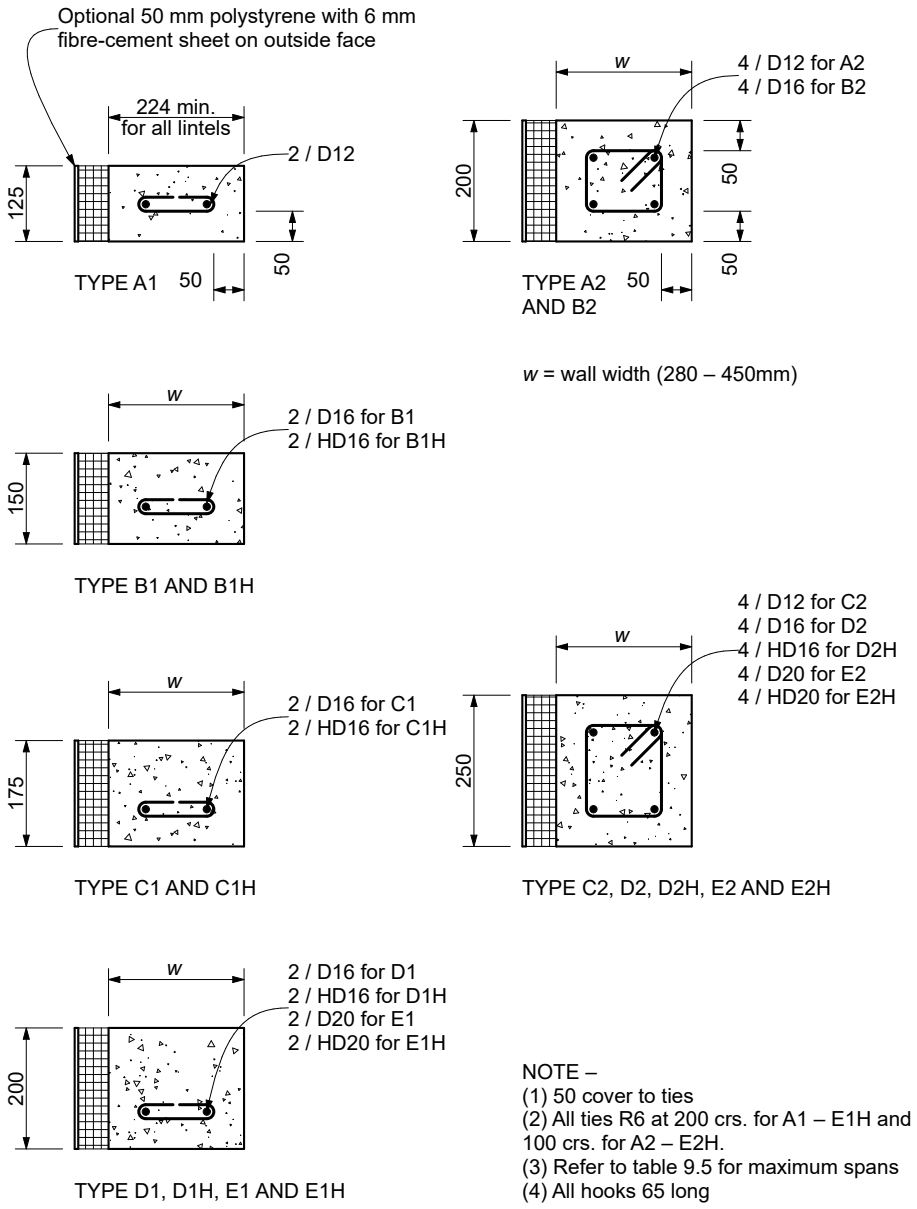


Figure 9.7 – Concrete lintel sizes and reinforcement

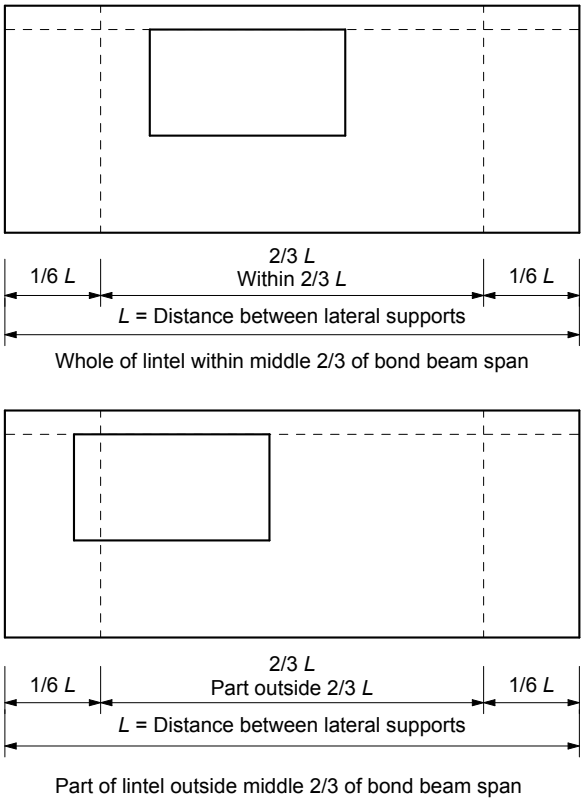


Figure 9.8 – Concrete lintel within and outside middle two-thirds of bond beam span

9.3.10

The reinforcement of concrete lintels shall extend to at least 900 mm either side of the opening as shown in Figure 9.5. Where the lintel contains four longitudinal bars, this clause applies to the upper two bars only.

9.3.11

Laps for joining lintel and bond beam reinforcement shall be 600 mm.

9.3.12

No laps in reinforcement shall be within 300 mm of the opening.

10 WALL OPENINGS AND FIXINGS

10.1 Windows

10.1.1 Anchoring of joinery frames to walls

Windows and door frames shall be anchored securely to the earth wall. Details of anchor devices for anchoring door and window frames are shown in Figure 10.1.

Joinery may be fixed to earth walls by screw or nail fixing to wooden inserts as per Figure 10.1 or by masonry nail or non-expanding masonry screws to rammed earth or pressed brick walls.

C10.1.1

The drawing note '20 diameter hole for D12 vertical reinforcing rod (if required)' relates to the accommodation of wall reinforcing and is not a requirement for additional reinforcing for the frame fixing.

Anchor devices may be installed after construction but the most secure and economic devices are generally installed as the wall is being constructed.

Alternatively a rough frame may be built into the wall as it is being constructed and the 'finished' frame fixed to this frame after the completion of wall and door construction although care is to be taken to ensure that all necessary shrinkage can take place without 'hang-up' on the rough frame. One method is to leave a gap of approximately 50 mm between the bottom of the rough frame and the concrete foundation.

10.1.2 Door and window details

Details are shown in Figures 10.2 to 10.11.

Vertical settlement occurs in earth walls and is to be provided for to prevent hang up and jamming of doors and windows.

Windows frames shall be fixed at the sides to earth walls only after the wall has settled. The trims only shall be fixed to either the wall frame or the window frame but not to both until settlement is complete.

Windows and exterior doors with arched or sloping heads are outside the scope of this standard.

C10.1.2

The detailing of doors and windows in earth walls requires special consideration when compared to conventional timber and masonry construction. The earth walls are thicker, the surface of the earth wall less uniform, and the wall material more fragile.

The major enemy of earth walls is water and careful attention to flashing and water control details is essential.

Requirements for window and door joinery are not included in this standard. For more information, designers may refer to:

(a) NZS 3504:1979 Specification for aluminium windows;

(b) NZS 3610:1979 Specification for profiles of mouldings and joinery;

(c) NZS 3619:1979 Specification for timber windows.

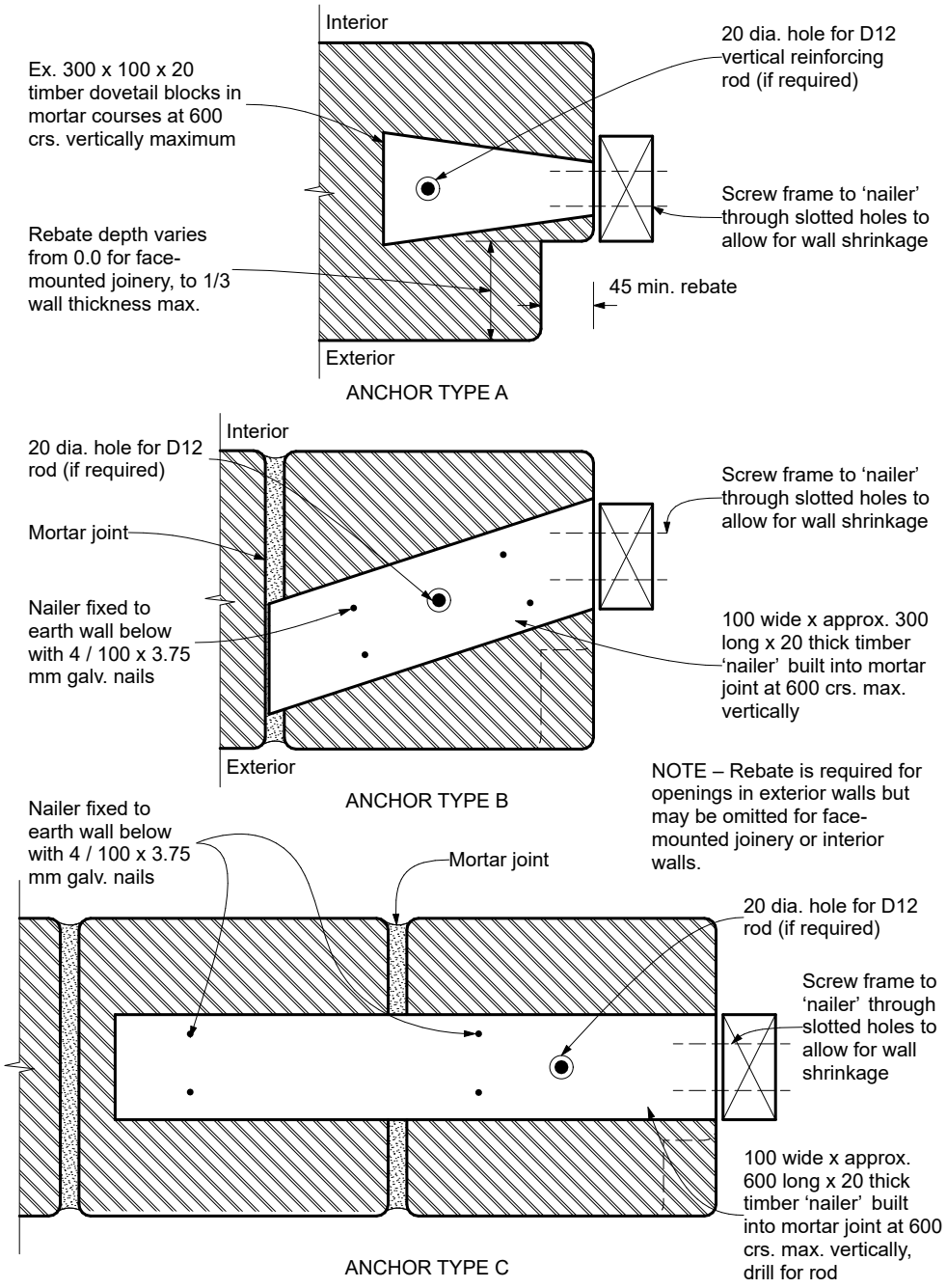


Figure 10.1 – Anchors for door, window, and timber partition frames for earth walls

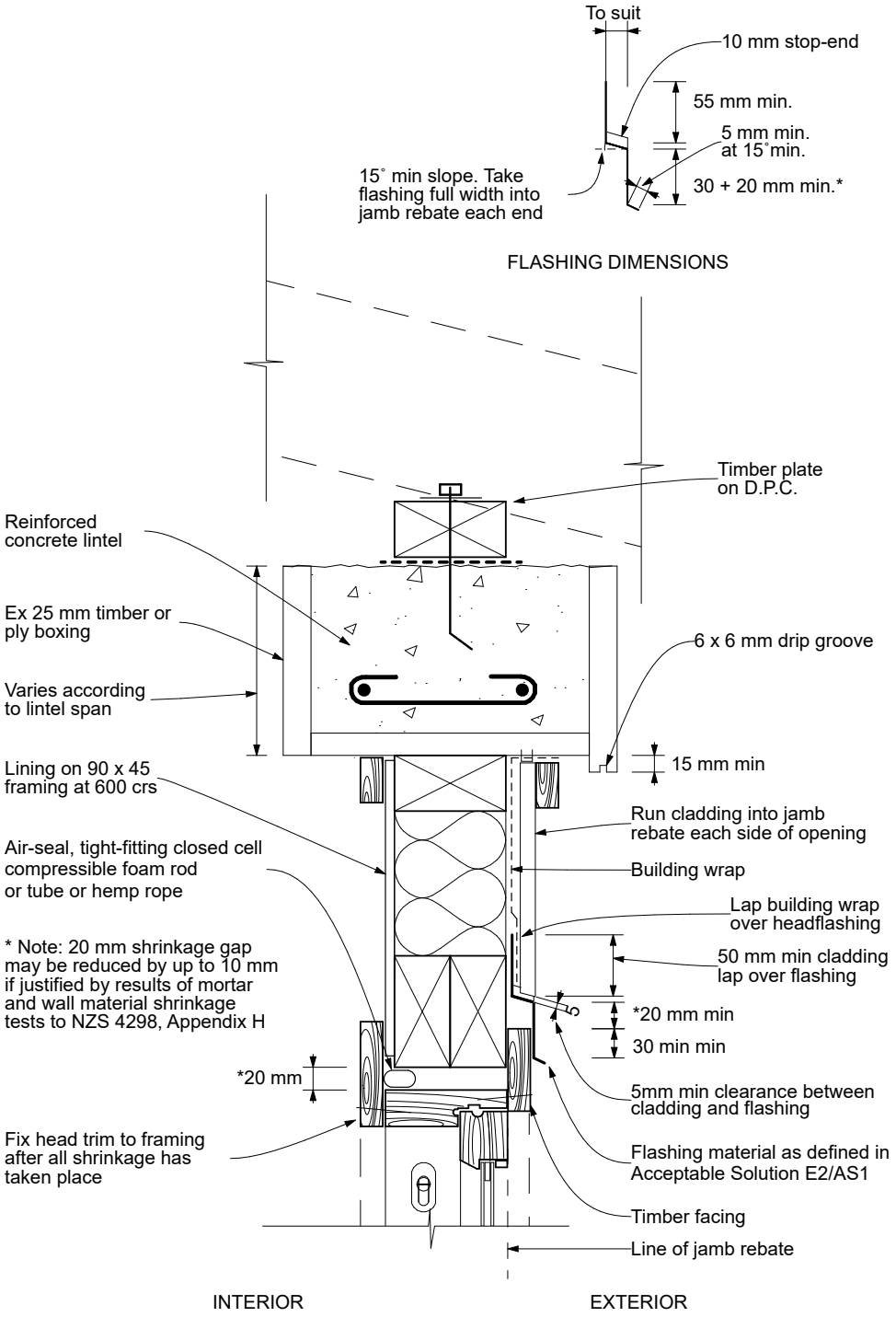


Figure 10.2 – Window head – Timber joinery with timber-framed wall insert

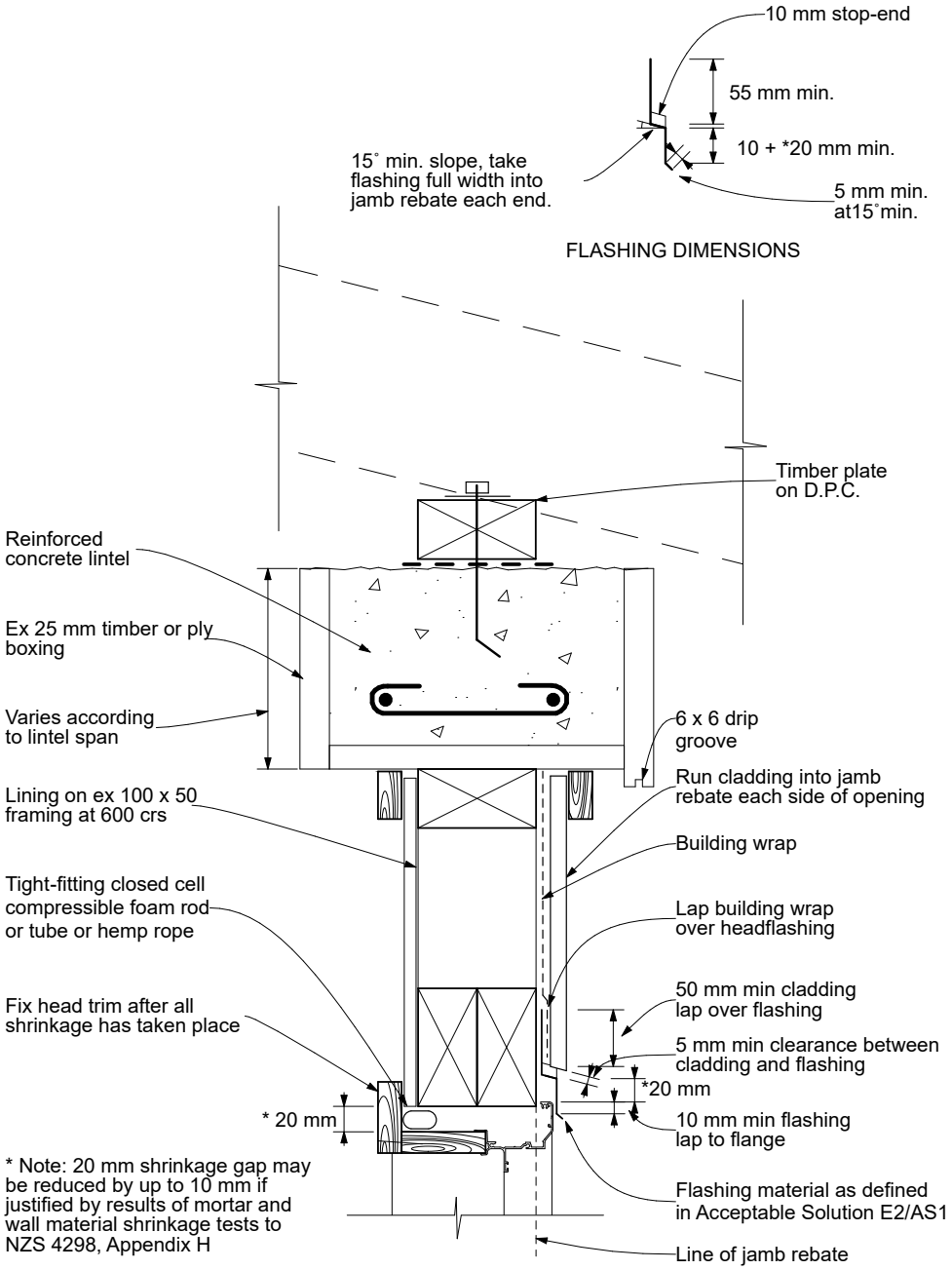


Figure 10.3 – Window head – Aluminium joinery with timber-framed wall insert