BRICK BLOCK CONCRETE
BUILDING A BETTER FUTURE

Acoustic Ratings

This section describes the measurement of acoustic ratings, the BCA requirements for residential buildings and details of Brick and Block Company's research and development of successful wall systems.

R_w (weighted sound reduction index)
"R_w" is a type of average of low to high frequencies, calculated from a wall's sound transmission losses over 16 frequencies. It is measured in decibels (dB).

Low frequency sound waves (e.g. from a bass guitar) are large and intrusive. Their sound transmission loss is below R_w (average). At the other end of the scale, high frequency sound waves (e.g. violin, piccolo) are short wave, less intrusive and their sound transmission loss is above average.

A typical sound rating is expressed as R_w 55 (-1; -5). The first figure in the brackets is "C" which indicates irregular performance in the high frequencies. It is not addressed in the BCA. The second figure in the brackets is "C_{tr}" and is essential in BCA requirements for party walls.

C_{tr} (low frequency spectrum adaptor)
"C_{tr}" is an indicator of how much lower the wall's performance would be if the noise source was mainly low frequency. C_{tr} is a negative number. The sound rating above of R_w 55 dB with a C_{tr} of -5 gives $R_w + C_{tr} = 50$.

Party Walls:

These walls are described in the BCA, Part F5, as walls that "separate sole-occupancy units" (also known as inter-tenancy walls). This includes townhouses, high-rise home units, three-storey flats, hotels and similar residential buildings. Except for Class 9c buildings (aged care units); party walls require a minimum sound rating of $R_w + C_{tr}$ 50.

A party wall that separates one sole-occupancy unit's wet area (a bathroom, laundry, kitchen etc.) from a habitable room in another sole-occupancy unit is required to be of *discontinuous construction*

Discontinuous Construction:

The BCA describes *discontinuous construction* as "a wall having a minimum 20mm cavity between 2 separate leaves". See diagrams 6.1 and 6.2 for details.

Where the 2 separate leaves are both masonry, the BCA allows resilient wall ties "if required". As they are rarely required, their omission will not only save money but improve the acoustic performance of cavity (double-leaf masonry) walls.

Discontinuous construction is also required where a wall separates a sole-occupancy unit from a plant room or lift shaft.

Corridor Walls:

Walls that separate a sole-occupancy unit from a plant room, lift shaft, corridor, stair, foyer or similar public area, require a minimum sound rating of R_w 50. There is no C_{tr} adjustment. See diagrams 6.3 and 6.4 for details.

Walls that separate a sole-occupancy unit from a plant room or lift shaft are required to be of *discontinuous construction*: e.g: the independent stud or Continuous Stud-sheeting systems.

Research and Development:

In 2007, the National Acoustic Laboratory tested 110mm thick Alphalite 12-01 Chaser masonry with various lining systems. Test 2057, with a 64mm independent stud wall system, achieved $R_w + C_{tr}$ 50 (the BCA requirement for walls separating home units).

This wall also meets the BCA requirement to resist the transmission of impact-generated sound wherever an inter-tenancy wall separates a wet area (bathroom / laundry / kitchen etc) from a habitable room.

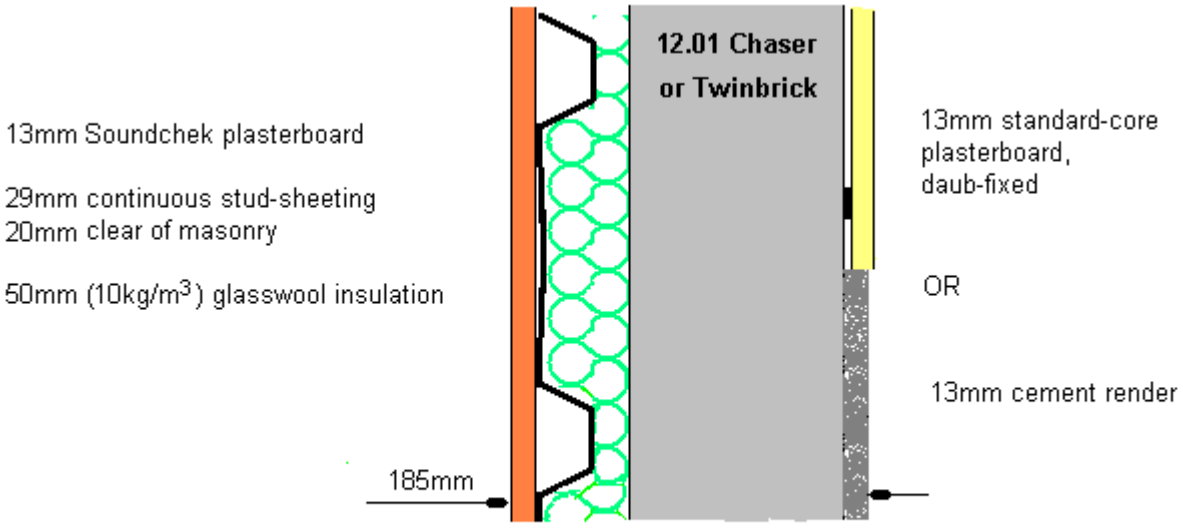
Alphalite Twinbrick masonry has 5% more mass per m² than the 12-01 Chaser. It was therefore assessed to perform as well as the Chaser block.

Both the Twinbrick and Chaser block exceed the BCA fire rating requirements for typical home unit walls before adding any lining system. All the home unit masonry can be done with either Twinbricks or Chaser blocks, avoiding the risk of using unrated masonry where fire or acoustic ratings are required.

Further tests and assessments identified other inter-tenancy wall (party wall) options: the innovative Continuous Stud-sheeting system uses metal sheeting in lieu of independent studs. This saves space, a valuable commodity in high-rise apartments. A 64mm stud, 20mm clear of the masonry takes 84mm of extra space.

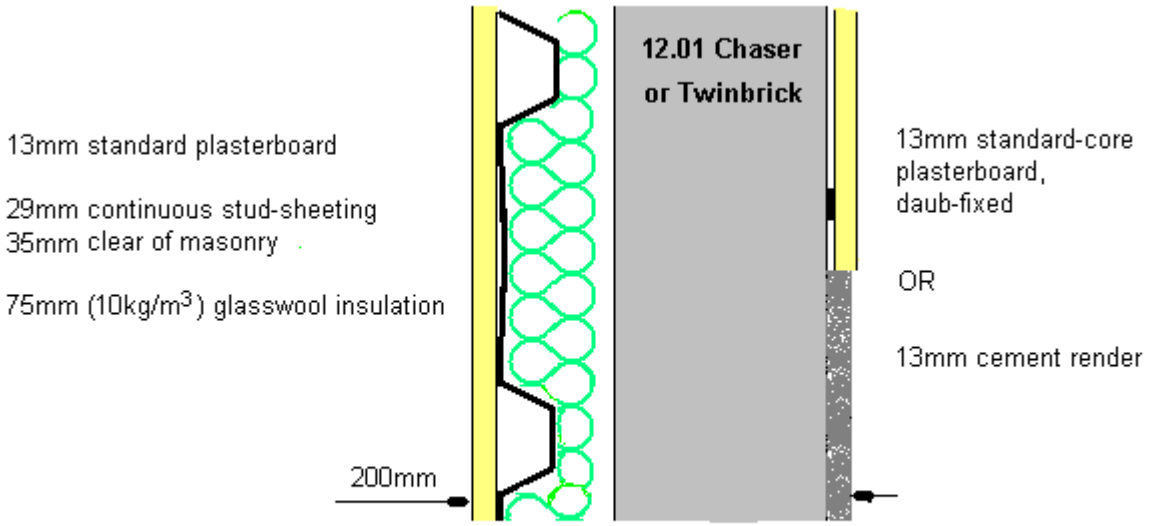
$R_w + C_{tr} \geq 50$: Walls between home units

Diagram 6.1



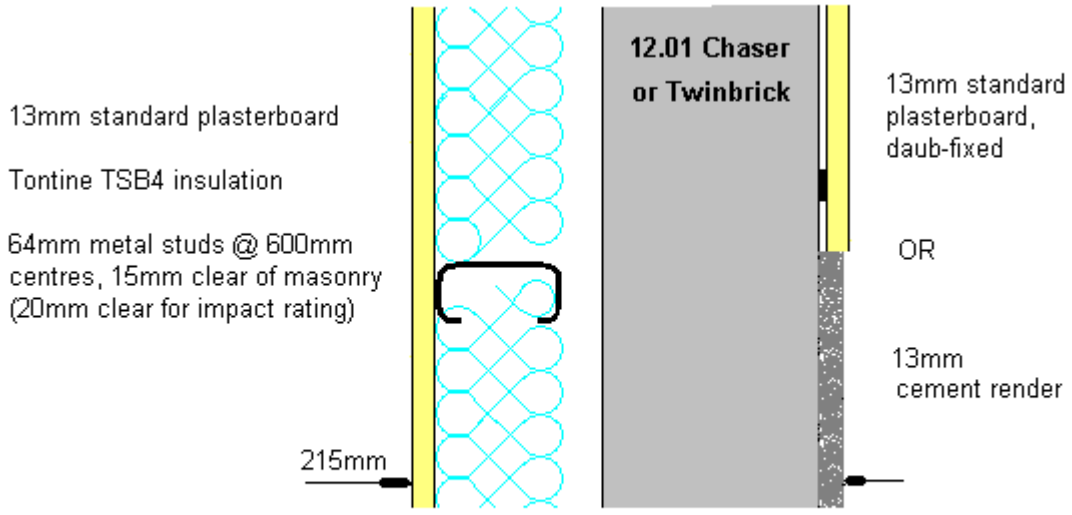
Compact Continuous Stud-sheeting System (impact rated)

Diagram 6.2



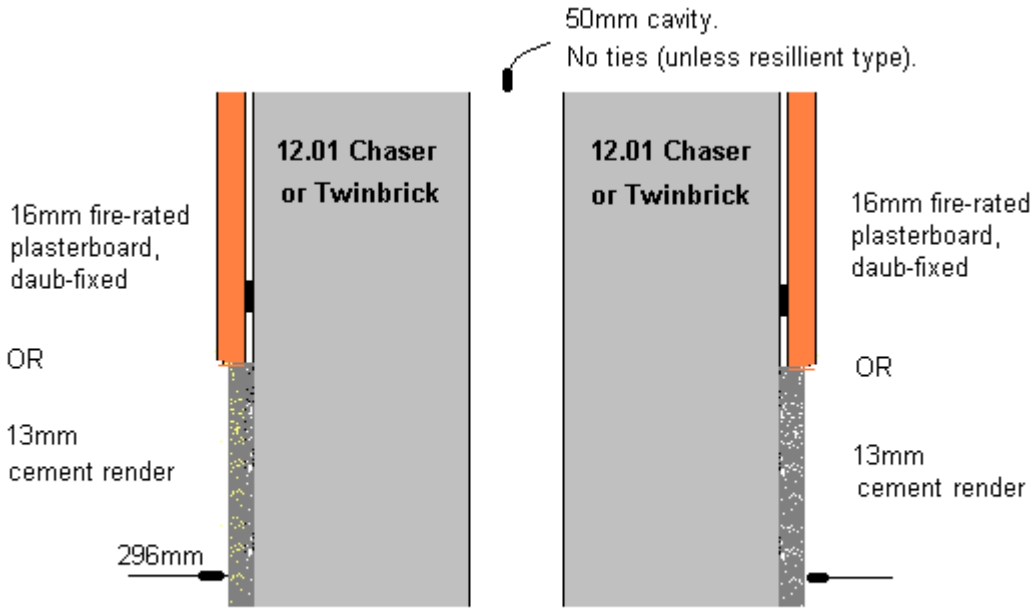
Standard Continuous Stud-sheeting System (impact rated)

Diagram 6.3 shows another 110mm thick Alphalite option for walls between home units: the independent stud system.



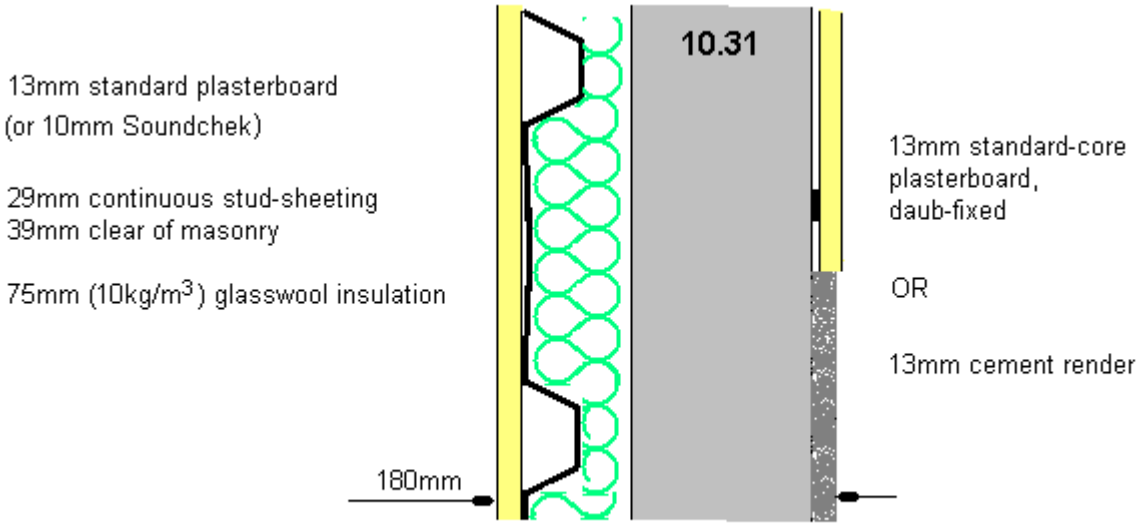
Independent Stud System (impact rated)

Diagram 6.4 shows 110mm thick Alphalite options for cavity walls between home units



Cavity Wall Options (impact rated)

Diagrams 6.5; 6.6 and 6.7 show 90mm thick Alphalite options for walls between home units including:-
the Continuous Stud-sheeting system,
the independent stud system and
the solid 2 x 90mm thick wall of 10.31 Alphalite blocks.



Continuous Stud-sheeting System (impact rated)

Diagram 6.6

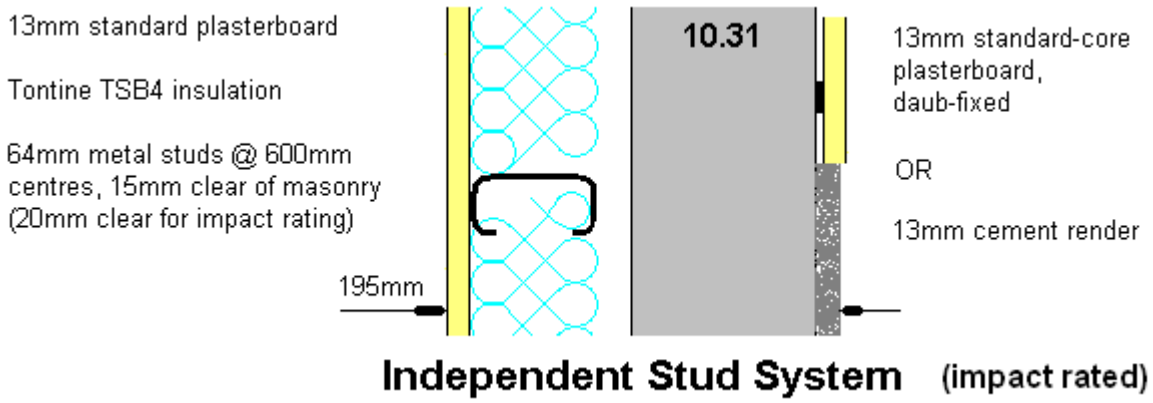
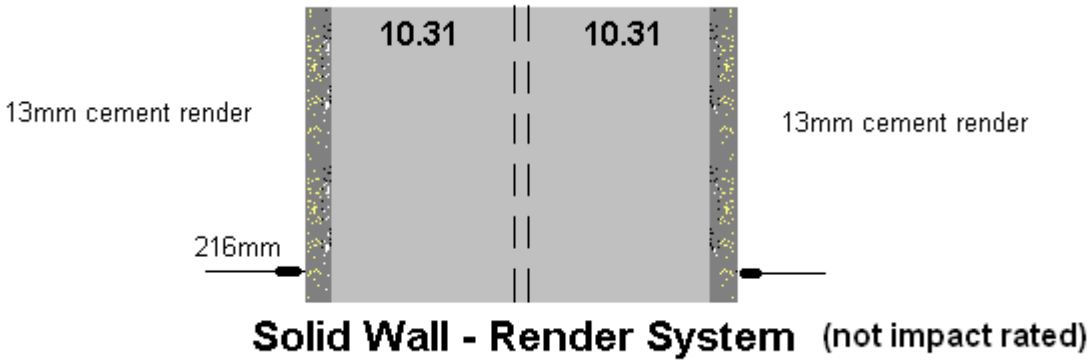


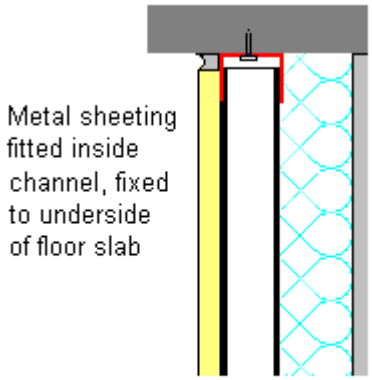
Diagram 6.7



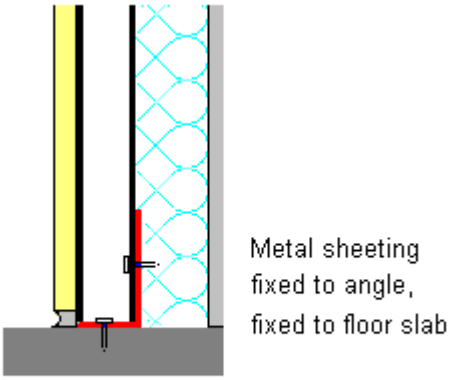
This is basically a render system however, if an inter-tenancy wall separates a wet area from a habitable room (i.e. requires an impact rating), the independent stud or the continuous stud-sheeting system can be used with wet-area plasterboard or fibre-cement board lining with an equal or higher mass/m²

The Continuous Stud-sheeting system

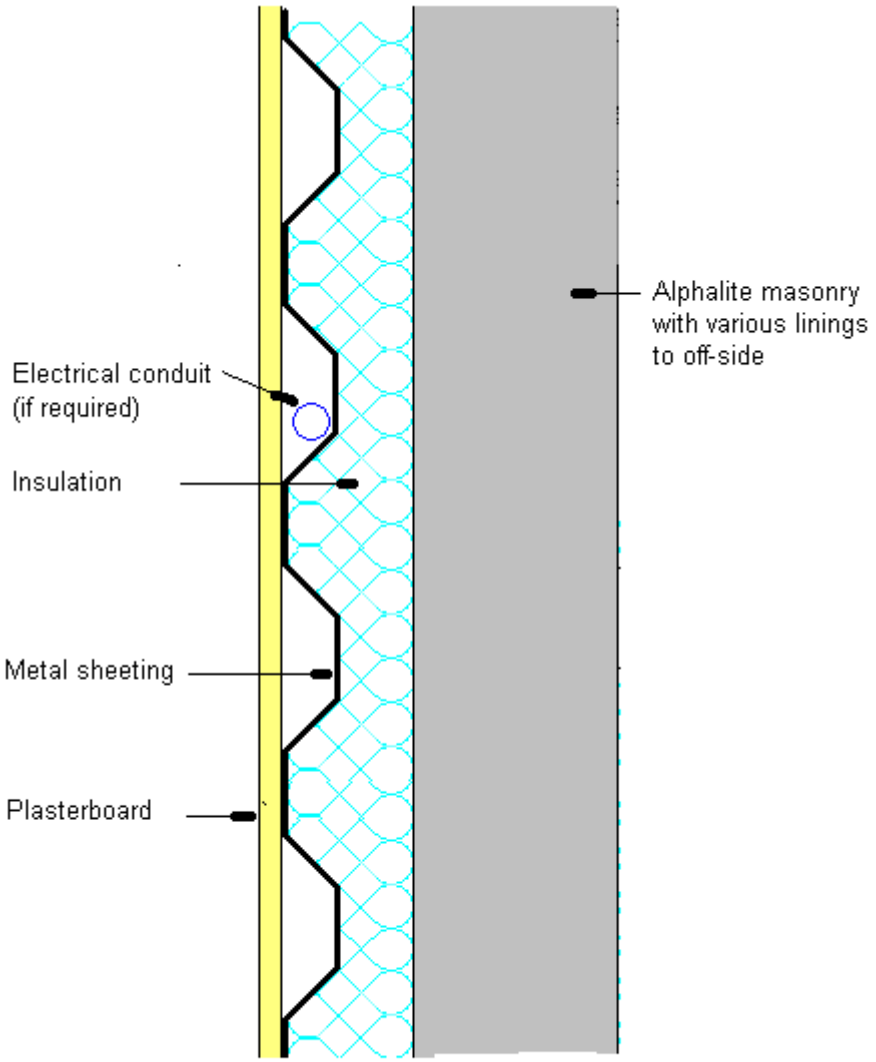
Diagram 6.8 shows fixing details for the Continuous Stud-sheeting system.



Top Fixing



Base Fixing

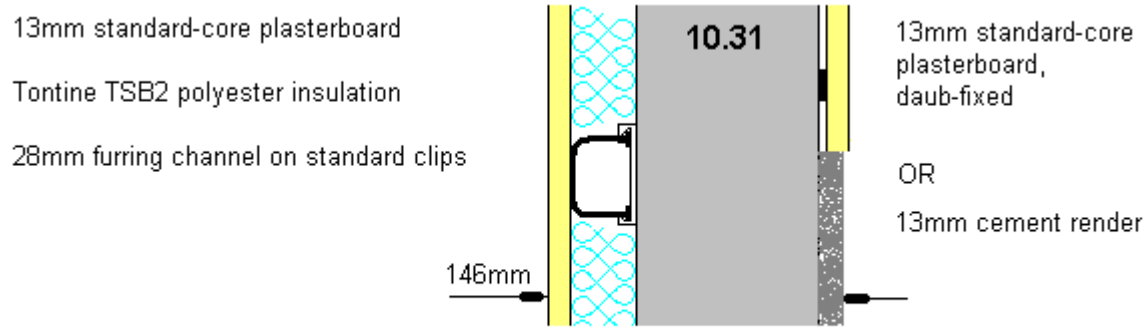


Plan View

$R_w \geq 50$: Unit walls to corridor / stairs / foyer

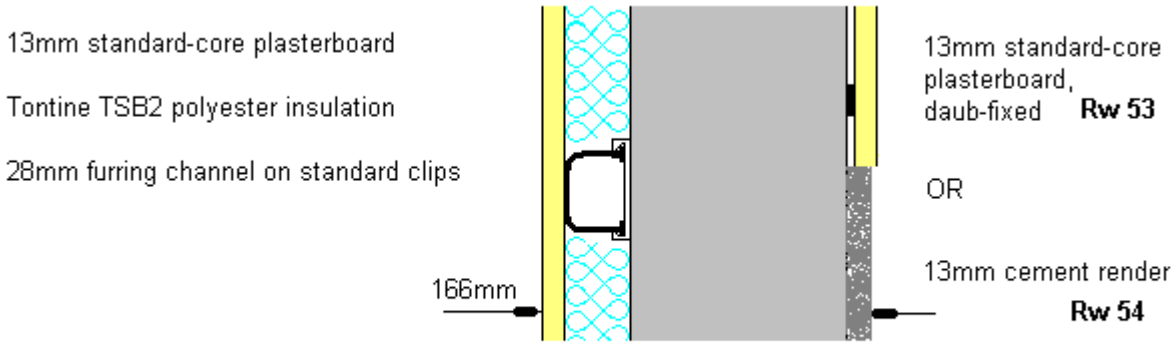
Diagrams 6.9; 6.10 and **6.11** show lining details for 90, 110 and 140mm thick masonry that separates a home unit from a corridor, foyer or stairs, where the BCA requirement is R_w 50 (no C_{tr} adjustment).

Diagram 6.9



90mm Alphalite 10.31

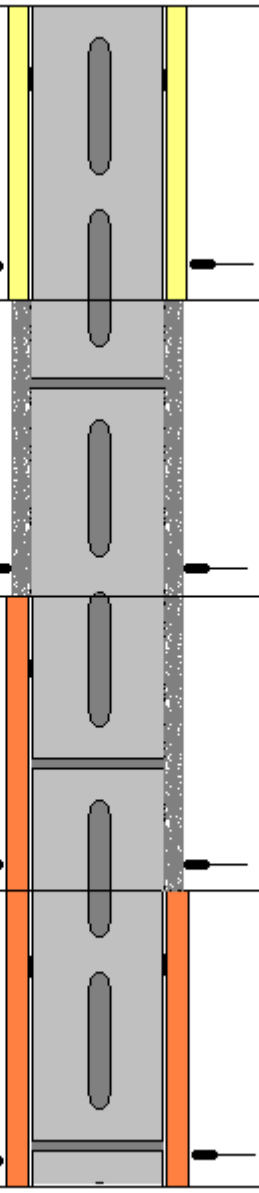
Diagram 6.10



110mm Twinbrick or 12.01 Chaser

Diagram 6.11

R_W 50 Assessment PKA-A062	15.401 cores filled with mortar density not less than 2000kg/m^3 13mm standard plasterboard daub-fixed with small daubs 170mm	13mm standard plasterboard daub-fixed with small daubs
R_W 52 Assessment PKA-A062	15.401 cores filled with mortar density not less than 2000kg/m^3 13mm cement render 166mm	13mm cement render
R_W 52 Assessment PKA-A062	15.401 cores filled with mortar density not less than 2000kg/m^3 16mm Firechek plasterboard daub-fixed with small daubs 171mm	13mm cement render
R_W 51 Assessment PKA-A062	15.401 cores filled with mortar density not less than 2000kg/m^3 16mm Firechek plasterboard daub-fixed with small daubs 176mm	16mm Firechek plasterboard daub-fixed with small daubs

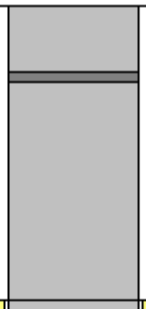
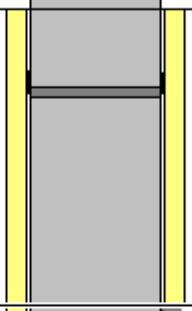
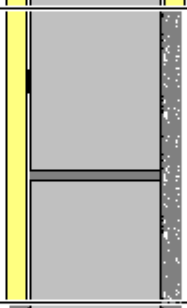
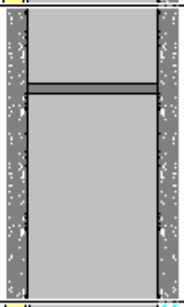
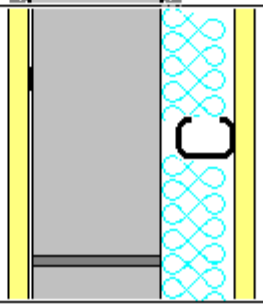


$R_W \geq 50$ Wall between Unit and Corridor / Stair

Acoustic Tests on 12-01C

Applies to Twinbrick also as mass/m² is slightly higher than 12-01C

Diagram 6.12

R_w 42 **(-1; -4)** NAL Test No 2054	110mm thick Alphalite 12-01C Chaser Block or Twinbrick Bare wall		Bare wall
R_w 46 **(-1; -5)** NAL Test No 2058	110mm thick Alphalite 12-01C Chaser Block or Twinbrick 13mm standard plasterboard daub-fixed with small daubs		13mm standard plasterboard daub-fixed with small daubs
R_w 46 **(-1; -4)** NAL Test No 2059	110mm thick Alphalite 12-01C Chaser Block or Twinbrick 13mm standard plasterboard daub-fixed with small daubs		13mm cement render
R_w 47 **(-1; -5)** NAL Test No 2060	110mm thick Alphalite 12-01C Chaser Block or Twinbrick 13mm cement render		13mm cement render
R_w 57 **(-3; -7)** ($R_w + C_{tr}$ 50) NAL Test No 2057	110mm thick Alphalite 12-01C Chaser Block or Twinbrick 13mm standard plasterboard daub-fixed with small daubs		13mm standard plasterboard on 64mm metal studs 20mm clear of masonry. Tontine TSB4 in cavity