

# Section K Installation

Logicwall® Installation, Panel Set out, Panel Erection, Reinforcement Installation, Core Filling of Walls, Removal of Braces, Routine QA Procedures, Safety, Tools and Accessories



# Contents

---

<b>K1. INSTALLATION GUIDE . . . . .</b>	<b>.5</b>
<b>Introduction . . . . .</b>	<b>.5</b>
<b>Delivery and Set Out . . . . .</b>	<b>.6</b>
First step.....	6
Delivery to Site.....	6
Unloading.....	6
<b>Delivery and Set Out (continued) . . . . .</b>	<b>.7</b>
Panel Set Out .....	7
<b>Floor Track Installation . . . . .</b>	<b>.7</b>
Floor Track Fixing.....	7
Floor track – external wall flashing requirements.....	7
<b>Panel Erection. . . . .</b>	<b>.8</b>
Starting Point for Wall Installation .....	8
Variation in wall dimensions.....	8
<b>Panel Erection (continued) . . . . .</b>	<b>.9</b>
Commencement of panel installation.....	9
Application of adhesive to floor track edge.....	9
<b>Panel Erection (continued) . . . . .</b>	<b>10</b>
Placement and positioning of braces .....	10
Fixing of braces .....	10
Bracing considerations - high panels, high wind.....	10
<b>Panel Erection (continued) . . . . .</b>	<b>11</b>
Panels screwed at floor track.....	11
Panel installation .....	11
<b>Panel Erection (continued) . . . . .</b>	<b>12</b>
Fixing of panel at bottom and joiner .....	12
Repeat of process .....	12
<b>Panel Erection (continued) . . . . .</b>	<b>13</b>
Location of openings - doors and windows.....	13
Creation and capping of openings .....	13
<b>Panel Erection (continued) . . . . .</b>	<b>14</b>
continued.....	14
Doorway openings.....	14
<b>Panel Erection (continued) . . . . .</b>	<b>15</b>
Set-up of metal door frames .....	15
Window and door openings - additional reinforcing.....	15
Creation of 'T'-junction.....	15
Straightening of AFS Logicwall® panels.....	15
<b>Panel Erection (continued) . . . . .</b>	<b>16</b>
Erection of 'T' wall .....	16
Change of wall direction.....	16
<b>Panel Erection and Reinforcement Installation (continued) . . . . .</b>	<b>17</b>
Connection to Pre-Cast / In-Situ Concrete - Structural and Non-Structural.....	17
Raking walls.....	17
<b>Panel Erection (continued) . . . . .</b>	<b>18</b>
Cast in items.....	18
Temporary patching of minor damage to panels.....	18

<b>Reinforcement Installation . . . . .</b>	<b>19</b>
Installation of Straight horizontal reinforcing bars .....	19
Reinforcing placement in short run lengths of wall .....	19
<b>Reinforcement Installation (continued) . . . . .</b>	<b>20</b>
Installation of Vertical Reinforcement Bars .....	20
Use of Alignment Bars .....	20
<b>Reinforcement Installation (continued) . . . . .</b>	<b>21</b>
Installation of Vertical Reinforcing Bars .....	21
<b>Reinforcement Installation (continued) . . . . .</b>	<b>22</b>
U bar Reinforcement Installation .....	22
<b>Reinforcement Installation (continued) . . . . .</b>	<b>23</b>
Vertical Reinforcement Tie Off .....	23
<b>Reinforcement Installation . . . . .</b>	<b>24</b>
Installation of Horizontal Hooked Bars and Ligatures in Logicwall® Panels.....	24
<b>Reinforcement Installation (continued) . . . . .</b>	<b>25</b>
Installation of Lowest Ligatures Over Starter Bars .....	25
<b>Reinforcement Installation (continued) . . . . .</b>	<b>26</b>
Installation of Subsequent Ligatures in the AFS Logicwall® Over Starter Bars .....	26
<b>Reinforcement Installation (continued) . . . . .</b>	<b>27</b>
Panel Installation .....	27
<b>Reinforcement Installation (continued) . . . . .</b>	<b>28</b>
Installation of Subsequent Ligatures in Panels Above Starter Bars .....	28
<b>Reinforcement Installation (continued) . . . . .</b>	<b>29</b>
Installation of Horizontal Reinforcement with Hooks .....	29
<b>Reinforcement Installation (continued) . . . . .</b>	<b>30</b>
Installation of Standard Hook Bars with Open Corner Capping .....	30
<b>Reinforcement Installation (continued) . . . . .</b>	<b>31</b>
<b>Reinforcement Installation (continued) . . . . .</b>	<b>32</b>
Site Installation of closed Ligatures or Hooked U Bars in Logicwall® Panels with Open Corner Capping .....	32
<b>Reinforcement Installation (continued) . . . . .</b>	<b>33</b>
<b>Panel Erection. . . . .</b>	<b>34</b>
Final check before concrete pour .....	34
<b>Core Filling of Walls. . . . .</b>	<b>34</b>
Introduction .....	34
Concrete Pour Limitations.....	34
<b>Core Filling of Walls (continued) . . . . .</b>	<b>35</b>
Additional equipment required for concrete pour.....	35
Number of concrete passes required per panel.....	35
Concrete pour.....	35
Concrete mix design .....	35
<b>Core Filling of Walls (continued) . . . . .</b>	<b>36</b>
Concrete delivery and placement .....	36
<b>Core Filling of Walls (continued) . . . . .</b>	<b>37</b>
Concrete pour procedure.....	37
Securing of temporary patches/bracing if area bulges/blows out.....	37
Filling of sills .....	37
<b>Core Filling of Walls (continued) . . . . .</b>	<b>38</b>

Filling of horizontal panels .....	38
Use of the concrete vibrator in AFS Logicwall® .....	38
Finishing of sills/top of wall .....	38
<b>Core Filling of Walls (continued) . . . . .</b>	<b>39</b>
Placing of 'L' bars at the top of the AFS Logicwall® .....	39
Concrete clean-up .....	39
<b>Removal of braces . . . . .</b>	<b>39</b>
Early removal of braces .....	39
<b>Routine QA Procedures . . . . .</b>	<b>40</b>
Removal of temporary patches .....	40
Repair of panels if concrete has bulged/panel blown out .....	40
Repair of voids in panels .....	40
Cleaning and tidy up .....	40
<b>Workplace Health Safety and the Environment. . . . .</b>	<b>41</b>
Personal Protective Equipment .....	41
Recommended Safe Working Practices .....	41
Sanding/Drilling/Screwing/Other Machining .....	41
Important Reminders .....	41
<b>Tools and Accessories . . . . .</b>	<b>42</b>
Hand Tools .....	42
<b>Tools and Accessories (continued) . . . . .</b>	<b>43</b>
Power Tools .....	43
<b>Tools and Accessories (continued) . . . . .</b>	<b>44</b>
<b>Tools and Accessories (continued) . . . . .</b>	<b>45</b>
Adhesive/Sealant .....	45
Access tools .....	45
Concrete pour tools .....	45

# K1. INSTALLATION GUIDE

**Disclaimer:** AFS is a supplier of AFS Logicwall® only and is in no way responsible for the installation and/ or finishing of AFS Logicwall®. Whilst every endeavour has been made by AFS in section K to provide an example of a successful method of installation for AFS Logicwall®, it is not possible for AFS to cover every situation that could arise on a project.

## Introduction

AFS Logicwall® cannot be installed using traditional compaction or vibration methods as it will result in blowouts.

The contractor or installer of AFS Logicwall® (as well as any other person involved in the installation process) is responsible for:

- Proper installation of AFS Logicwall®, Achieving compaction for the concrete mix and ensuring dense and homogeneous coverage is achieved whilst avoiding blow outs,
- Avoiding over vibration of the concrete mix
- Ensuring that good building practice is followed in the installation of AFS Logicwall® and in accordance with proper safety and environmental laws and regulations as well as the requirements of the BCA.

AFS has carried out various tests and used methods which achieved compaction and the desired density and homogeneity required, whilst avoiding vibration of the concrete mix and blow outs. In this section, AFS have set out an example of a procedure for installation based on its own tests and experience in achieving desired compaction

It is entirely at the discretion of the contractor or installer to use this guide or an equivalent procedure when installing and achieving compaction and ensuring dense and homogeneous coverage is achieved.



## Delivery and Set Out

### First step

Collect the AFS Logicwall® Shop Drawings and the 'as packed' paperwork from AFS. Assess the pallets and



work out a loading scheme - where to put each pack on the deck to minimise handling of panels



### Delivery to Site

Take delivery of the AFS Logicwall®. Transport to site is arranged by AFS and lifting forks are provided with the delivery for unloading with a crane. If there is no crane a forklift will be required to unload the pallets. The crane driver and dog man are responsible for the safe

and damage free unloading of the AFS Logicwall®.

It is important to have sufficient gluts available to land the pallets on. In some situations the supply of these can be negotiated with AFS.



### Unloading

AFS recommend the use of an approved and certificate pallet lifter for the unloading of panels and packs on site. Pallet lifter safety guide handbook is available upon request.

Care must be taken to avoid damage to the panel edges, ends and surfaces. To ensure optimum performance, store panels under cover and keep them dry prior to erecting. If the panels become wet, allow to dry before erecting and core filling.



## Delivery and Set Out (continued)

### Panel Set Out

Using the pins/markings provided by the surveyor and the AFS Logicwall® Shop Drawing plan, ensure that the walls are clearly and accurately set-out. The builder should be responsible for this. At the least the builder should sign-off on the set-out.



**Note:** AFS Logicwall® panels can not be moved without demolition once filled with concrete. Identify each wall with the wall number as per the AFS Shop Drawings.



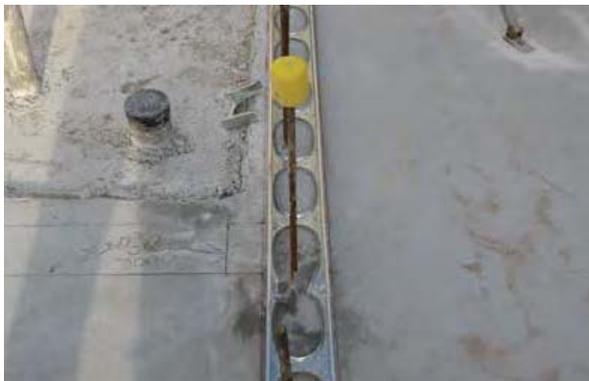
## Floor Track Installation

### Floor Track Fixing

A double bead of polyurethane sealant (eg. Sikaflex, Bostik Seal and Flex) must be applied (in accordance with manufacturers' instructions) under the floor track on all external walls and any portion of wall that separates or adjoins wet-areas (bathrooms, kitchens, laundries). Working off the chalk-lines, using an off-cut

of board as a spacer, shoot the floor track provided to the concrete slab. Ensure that the correct size (width) floor track is used for the required wall thickness.

Wall thickness may vary wall to wall, level to level



### Floor track – external wall flashing requirements

Attention must be paid at this time to external walls and the detailing specified for the horizontal joint and

any flashings required must be installed/fitted.



## Panel Erection

### Starting Point for Wall Installation

It is important to consider the wall layout and to establish the best starting point and sequence in which to proceed with installation of panels to ensure that the most working space possible is kept clear.



Consideration should also be given to the positioning of braces to provide the best results and also to minimise restriction of free movement by personnel around the site. If the walls are going to need to be filled off a mobile scaffold, it is preferable to run the braces in a way that leaves one face of each wall clear.

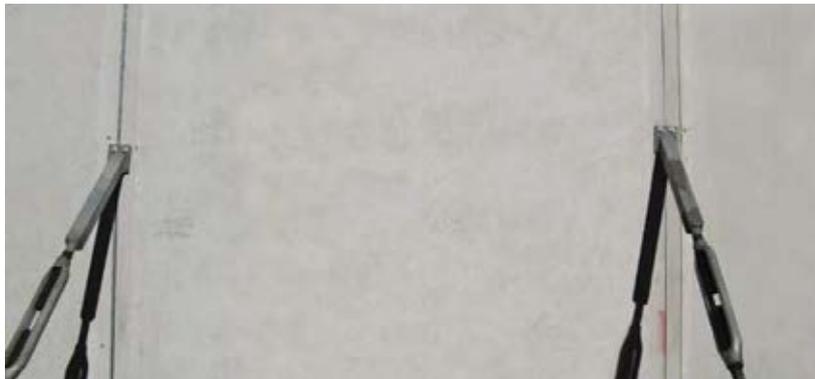
### Variation in wall dimensions

When ready to start putting up panels, it is advisable to compare the wall dimension on site to the dimension on the drawing.

If necessary the panels can creep at the joint (i.e. the panels not butted tight together, to make up the wall length).

If the site dimension is noticeably shorter, identify

which is going to be the easiest way to take some length out of the wall. Depending on the amount, it may be easiest to trim a few panels back or it may be necessary to take a larger cut off one panel. The effect of this on the panel and how it will impact on the joiner needs to be considered. However the golden rule is "dial" before you cut - there may be some basic discrepancy in drawings or even on rare occasions, an incorrect label.



## Panel Erection (continued)

### Commencement of panel installation

The panel to be placed (whether a straight panel or a prefabricated corner panel) is stood vertically beside the floor track (with the joiner at the appropriate end as per the drawings) working in a three man team and following safe manual handling procedures. Mechanical lifting should be considered for panels over 3.6m and must be used for panels over 4.2m.

The panel is then lifted clear of the starter bars, aligned with the track and then lowered into position, dropping down over the floor track. The track may occasionally be belled out a little and the panel rest on top of the

track. It is important to tap the track inwards and ensure the panel has dropped down and is sitting on the slab.

Should any of the starter bars foul on the studs within the panel, the bars can normally be pushed/pulled clear of the stud and the panel successfully lowered as normal. Occasionally it may be necessary to lift the panel completely clear and actually bend the starter bar/s that are fouling to re-align them sufficiently for the panel to easily be lowered into position.

### Application of adhesive to floor track edge

It is not normally necessary to apply any adhesive to the edge of the floor track however it is standard procedure to do so in certain situations (ie. basement/retaining walls, external walls and even the first and last panels on each run of wall).

## Panel Erection (continued)

### Placement and positioning of braces

When the first panel of a wall is stood, it is essential to ensure that the panel is square, straight, plumb and true before further panels are installed.

Additional braces may be used and fitted in varying



positions to push/pull the panel into alignment. AFS Logicwall® needs to be installed to achieve a tolerance of +/- 4mm over any 1800mm plane. In the case of corners it is not uncommon to use 3 or 4 braces.



### Fixing of braces

Braces are screwed to the panel using 2-3 off tek-screws per brace, ensuring that the screws engage into a metal stud/ joiner within the panel. It is not acceptable to only screw into

the board. The base of the brace is fixed to the slab using an 'Excalibur' style screw bolt.

The panel is plumbed with a spirit level before the brace is fixed. Refer to Section L for the standard bracing design certification.



### Bracing considerations - high panels, high wind

The standard braces used by installers of AFS Logicwall® are engineer certified and are more than adequate for normal applications. In situations where panels higher than 3.6m are being installed or onsite in areas known to be subject to wild or squally weather it is the responsibility of the builder and the installers to

ensure that AFS Logicwall® panels are suitably/safely braced to maintain their integrity whilst filling with concrete.

If in doubt check with project structural engineer

## Panel Erection (continued)

### Panels screwed at floor track

Once the first panel is securely in place and plumbed, screw along the floor track at 400mm centres.

### Panel installation

The next panel is now brought alongside the floor track, and then lifted clear of the starter bars and the joiner engaged in the first panel. This is done by lifting the leading end of the panel higher and getting the bottom of the joiner into the first panel. The trailing

end of the panel is now lifted, bringing the base of the panel parallel with the slab and at the same time feeding the joiner into the first panel.

The panel is then lowered into position, plumbed and the joint and floor track screwed at 400mm centres. Do not screw within 10mm of the edge of the board.

A brace is fitted at the joint and the next panel is positioned using the same technique.

As each panel is about to be placed, visually check whether there is any build up of excess adhesive on the joiner. If there is, scrape it off with a chisel prior to placing the panel.

1.



2.



3.



4.



5.



## Panel Erection (continued)

### Fixing of panel at bottom and joiner

It is advisable to glue and screw the bottom of the panel edges of the floor track and the joiner of every panel of any wall run.

### Repeat of process

The process is repeated for the length of the wall.



## Panel Erection (continued)

### Location of openings - doors and windows

Where there is a scheduled opening (typically a door or window, occasionally a large mechanical opening) the surveyor should have provided marks or pins either

side of the opening to ensure it is the right spot. Do not proceed without confirmation of opening location.

### Creation and capping of openings

If the opening is a window, the sill is installed as per normal panel installation. The lintel is then sat on the top of the sill (on gluts) and the next full height panel installed.

The vertical sides of the opening and the window head are capped using the capping provided. The capping provided is cut to the appropriate lengths and is fitted into the panels using adhesive and screws. As the capping creates the reveal, care must be taken to ensure that it is fixed neatly, square and flush and creating an opening that is within tolerance of the specified opening size.

Once this next panel is in place or at a convenient time thereafter the lintel is then raised to its correct height to provide the correct size opening. Use timber struts to maintain its position.

Capped ends may need to be temporarily strapped during pour in some situations, for example, blade wall ends.

It is occasionally necessary, particularly if the lintels are a large span, to temporarily strap across the lintel and onto the wall panels on either side using a structural top-hat/strong-back to ensure the lintel is held straight and to maintain the true alignment of the overall wall.



## Panel Erection (continued)

### continued

Large span lintels will need temporary propping during and after pour until adequate cure time has been

reached. Refer to project structural engineer for advice.



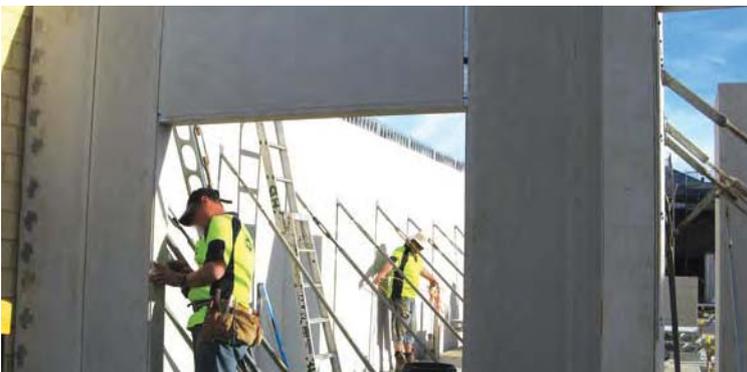
### Doorway openings

Where the opening is a doorway, if a metal door frame is to be fitted, the frame is slid into position with the throat of the frame over or into the last panel. The next full size panel is then placed in position having been engaged into the throat of the door frame.

A piece of AFS Logicwall® track is flush fitted into the end of the AFS Logicwall® panels to provide a solid element to fix the frame to.

Alternatively the panels either side are fixed into position and plumbed (ensuring the opening between them is accurate for the frame). The frame can then be lowered between the panels. The lintel panel is lowered into position, engaging into the panels on both sides and dropping down into the head of the door frame.

A door opening that is going to have a retro-fitted door frame is created and capped in the same way as a window opening, without out the sill panel.



## Panel Erection (continued)

### Set-up of metal door frames

Built in metal door frames must be set up accurately and squared/plumbed correctly.

They also require sufficient bracing to prevent distortion during filling, which can be achieved by timber separators or timber bracing.

Purpose-made metal clips can also be manufactured which fix over the frame to prevent distortion.



### Window and door openings - additional reinforcing

All window and door openings require additional local horizontal reinforcement for crack control. It is essential

that this is placed in accordance with the structural drawings/ reinforcing specifications.

### Creation of 'T'-junction

Where a T-junction is required, the 'through' wall is erected first. This wall must be fully braced, straight,

squared plumbed and true prior to the 'T' wall being connected.

### Straightening of AFS Logicwall® panels

Walls are straightened by fixing a piece of conduit (normally 20-25mm diameter and approximately 100mm long) at either end of the wall. Then using a piece of the same conduit as a gauge, start at one end

of the wall and at each panel joint beside the recess (but not in the recess) check the distance between the stringline and the face of the panel. Using the turn-buckle in the brace, adjust as necessary.



## Panel Erection (continued)

### Erection of 'T' wall

When the through wall is ready, the location of the 'T' wall is established and accurately marked on the through wall.

A piece of AFS Logicwall® track is then cut to the appropriate length and fixed to the face of the through wall.

Using a hammer, break out the fibre cement board of the through wall within each hole in the AFS Logicwall® track. (This ensures concrete flow between the two walls). Remove the broken out board from inside the panel via the bottom hole.

The 'T' wall is then erected as normal.



The initial joint connecting the 'T' wall to the AFS Logicwall® track on the through wall should be glued and screwed.

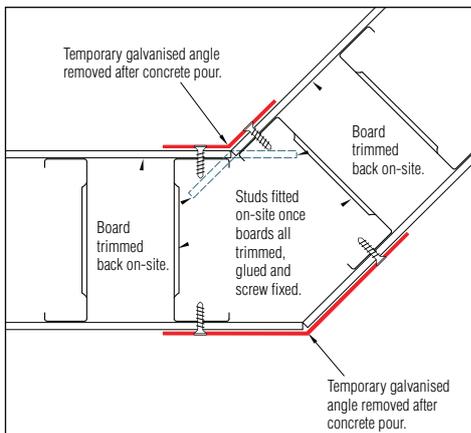
Where the 'T' wall takes off from the through wall at an angle other than 90°, AFS provide custom folded metal profiles to take the place of the AFS Logicwall® track. Prior to fitting this profile to the through wall, using a piece of AFS Logicwall® track as a template, cut holes in the web that basically match the holes in AFS Logicwall® track. The pressing is then installed as outlined for the AFS Logicwall® track section above

### Change of wall direction

Where a wall changes direction at any angle other than 90°, the surveyor should clearly mark/pin the location of the 'corner.' When fixing the floor track, mitre cut it to suit. Build the wall, working up the 'corner.'

The two panels that form the corner (one either side) are made with the frame stopped back inside the panel and both boards long enough to run past the inside and outside edge of the corner. The AFS Logicwall® Shop Drawings provide the dimensions that the boards on the panel should be trimmed by to finish at the corner. Confirm the dimension on site and

trim the boards. A piece of AFS Logicwall® track (supplied loose) is then fitted inside each panel using adhesive and screws. These are fitted close enough to the edge of the panel to ensure that when the metal profiles provided are screwed into the inside and onto the outside of the corner, the screws go through the profiles, through the board and engage into the AFS Logicwall® track, locking the corner for pour. After the concrete pour, the metal pressings are removed and later the joint is taped and set.



## Panel Erection and Reinforcement Installation (continued)

### Connection to Pre-Cast / In-Situ Concrete - Structural and Non-Structural

Where AFS Logicwall connects to pre-cast or in-situ concrete panels or columns, the connection can be done two ways - structural and non-structural.

#### A STRUCTURAL CONNECTION

For a structural connection the pre-cast or in-situ element must be in position prior to installation of AFS Logicwall®. Once the alignment of the AFS Logicwall® is confirmed, a piece of AFS Logicwall® track is fitted to the pre-cast/in-situ elements. If ferrules have been placed in position, located over the stater bars/floor track and into the AFS Logicwall® track on the pre-cast/on-situ elements

When the panel is in position, reaching through the holes in the AFS Logicwall® frame, screw the dowel bars (provided by builder) into the ferrules in the pre-cast/in-situ elements.

- i. If ferrules have not been cast in, once the alignment is confirmed, fit the AFS track to the pre-cast/in-situ element and drill appropriate sized holes into the precast/ in-situ elements. Place the first panel. It is preferable if this detail is going to be used, to coordinate with the AFS Shop Drawing team and ensure that this first panel is approximately

600mm long, not a full size panel. Then working through the holes in the frame (this is difficult and care needs to be taken to ensure no injuries) fill the holes with chemical adhesive and insert dowel bars. This must be done strictly in accordance with the manufacturer's and structural engineer's instructions.

#### B NON- STRUCTURAL CONNECTION

- i. For non-structural connection between AFS Logicwall® and pre-cast or in-situ elements, it doesn't matter whether the AFS Logicwall® is installed before or after the pre-cast or in-situ element. The AFS Logicwall® is simply installed as normal, the panel abutting the pre-cast/in-situ element "capped" at the end (in accordance with normal "capping procedure") and a gap of 10-25mm. as specified, left between the AFS Logicwall® and the pre-cast/in-situ element. At the appropriate time this joint is treated like a normal pre-cast panel joint, (i.e. backing rods and fitted into the joint and the joint is filled using a suitable jointing product in accordance with good trade practice and manufactures instructions.



### Raking walls

Raking walls are supplied to site as "stepped height" panels. Once these panels are installed the raking angle is established on-site and marked with a chalk line (or other appropriate ways). The rake is then cut on-site, prior to the panels being reinforced and filled

with concrete. After the pour the rake is trowelled smooth.

The builder must provide adequate and safe access for this procedure.



## Panel Erection (continued)

### Cast in items

Cast-in items are sometimes required to be fitted into AFS Logicwall® eg. brackets for lift rails in lift shafts. The position of such items needs to be clearly established and the panel cut out as required.

The items to be cast-in need to be securely fitted to a piece of form-ply significantly larger than the cast-in item. The item is then located in the cut out in the panel gap and the form-ply securely screwed to the face of the panel, ensuring that the screws have engaged in the studs within the panel. After pour, the form-ply is removed and if required at some later point the screw holes can be patched/flushed.



### Temporary patching of minor damage to panels

When the installation of panels is complete and all capping has been fitted, the walls need to be checked over and any areas of minor damage, as inevitably happens (eg. a corner of a panel gets broken away, a panel gets a hole punched in the face by some mishap), need to be temporarily patched to ensure that these spots don't become weak points and let go during the concrete pour. This is done using appropriate sized

pieces of form-ply tek-screwed over the area, ensuring the screws engage in the studs within the panel.

After pour these patches are simply removed by reversing out the tek-screws. Such areas are patched and flushed at the time when the joints are taped and set.



## Reinforcement Installation

### Installation of Straight horizontal reinforcing bars

Horizontal reinforcing shall be installed as the panels are erected, in strict accordance with the project engineers design.

Once the Logicwall® profiles are fixed in place, slide the horizontal reinforcement bars through the holes. The shape of the cut hole will help hold the bars in the correct position.

Typically 5 panels are erected and 6m lengths of reinforcement bars are placed at the centres as specified. Another 4 panels are erected and 6m long bars are placed to provide lap as specified.

### Reinforcing placement in short run lengths of wall

In short run lengths of wall, the reinforcement needs to be cut to the appropriate length and, in the case of a blade wall, placed prior to the end of the wall being capped. In a situation (typically lift shafts and stairwells) where there are short runs of wall, closed at each end with a pre-fabricated corner panel; the wall section is erected and the corners fitted into position.

Reinforcement bars as specified is cut to the appropriate length, the required centres are marked on the outside face of one of the corners and using piece of bar as a punch, neat holes are made in the board, through which the pre-cut lengths of reinforcement are inserted.



These holes are covered with a temporary patch (duct tape is often sufficient) until after pour. Later when the corners have a bead fitted and are flushed, these holes are patched and flush set.

## Reinforcement Installation (continued)

## Installation of Vertical Reinforcement Bars

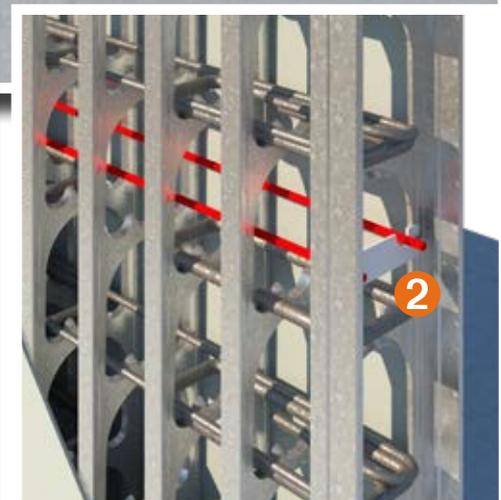
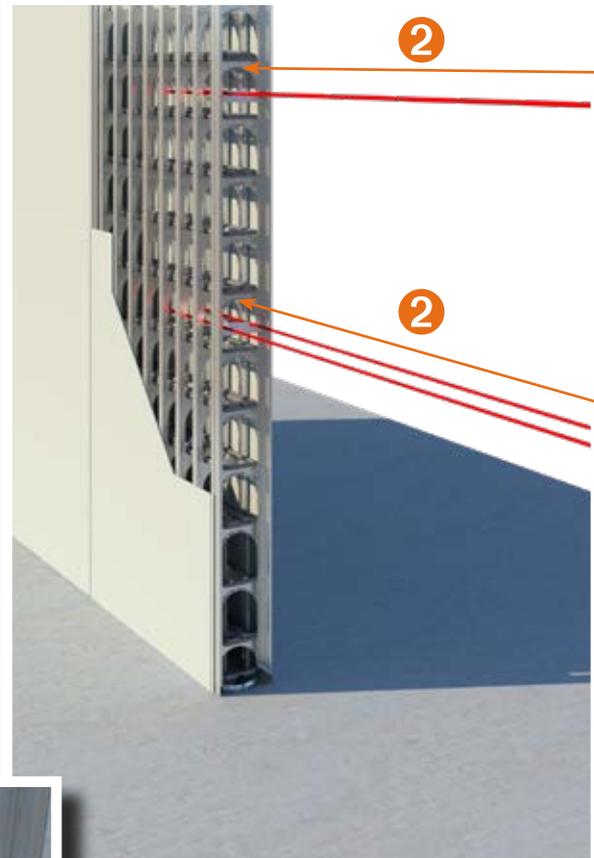
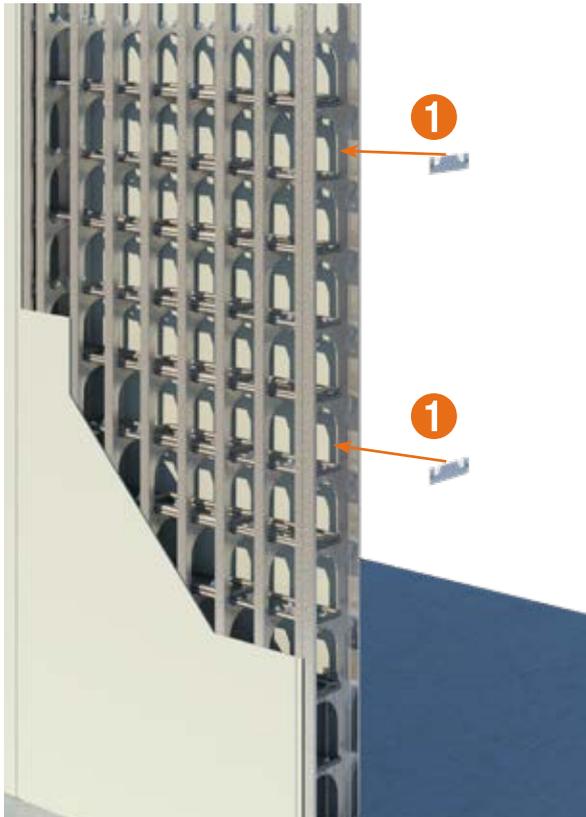
## Use of Alignment Bars

R10 alignment bars can be used to assist with location and installation of the vertical reinforcement bars. These alignment bars shall be installed horizontally on both sides of the wall generally at one third the wall height and are installed progressively as the wall is built.

A precut locator can be used to ensure consistent spacing/location of the guide bar.

- 1 Fix the locator to the Logicwall® stud face at the desired locations of the alignment bars.
- 2 Slide the alignment bar through the locator. Guide locators should be placed at approximately 2200mm centres (every second panel) horizontally.

**Note:** These guide bars are **NOT** to be considered as part of the wall structural reinforcement.



## Reinforcement Installation (continued)

### Installation of Vertical Reinforcing Bars

If a normal formwork deck is being erected, once the deck is in and it is safe to do so, the vertical reinforcing bars are lifted onto the deck.

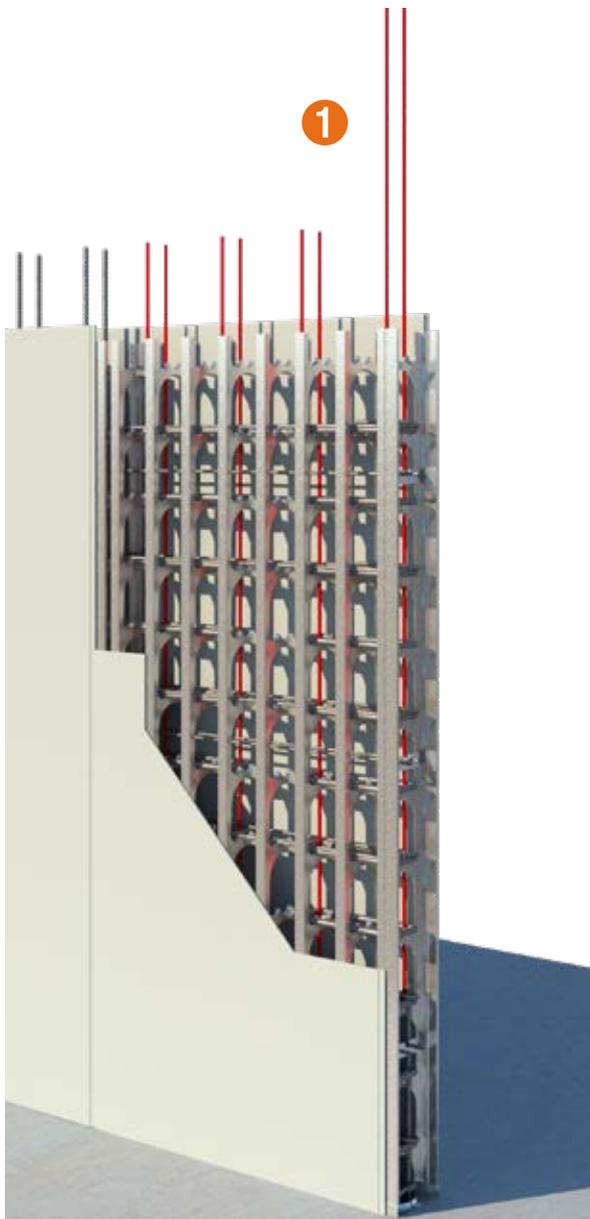
- 1 The vertical reinforcement bars are then lowered into the Logicwall® panel at the correct locations.
- 2 Ensure that the vertical bars are on the internal side of ligatures and horizontal bars, and on the outer side of the alignment bars.

An extra joggle bar with small 20mm bend at the base

can assist in installing vertical bars.

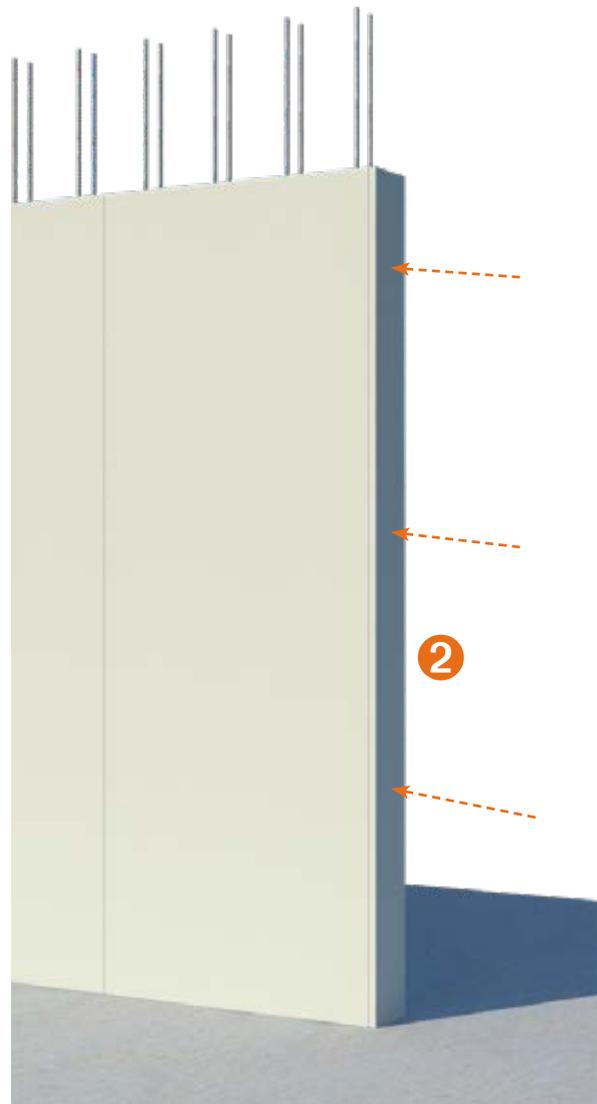
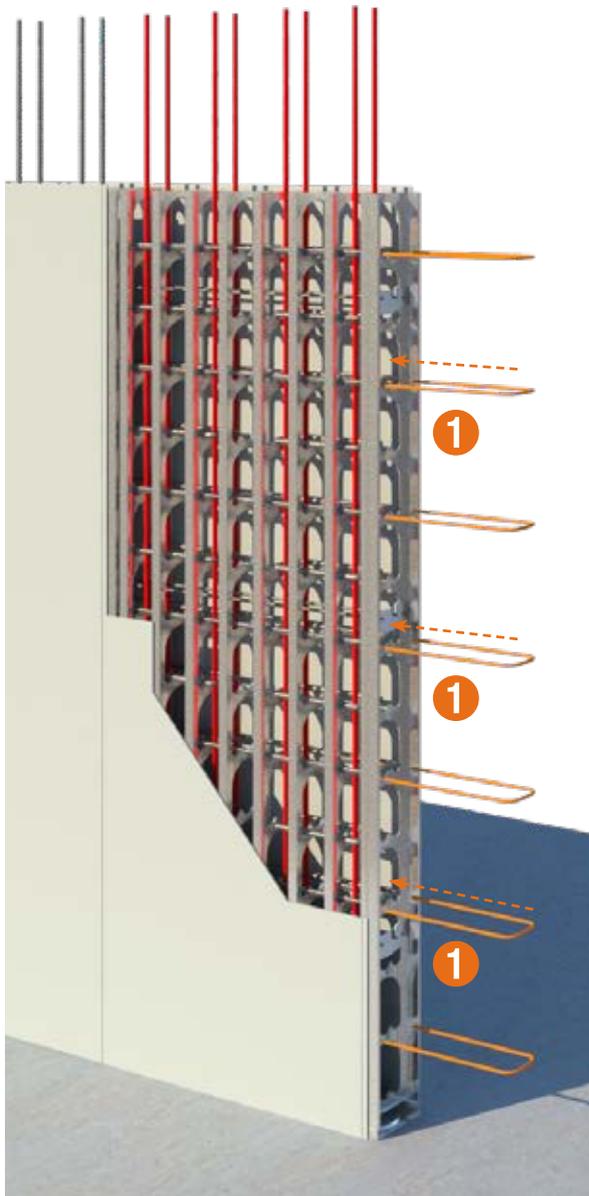
The offset makes it easy when lowering the vertical reinforcing bars into the wall to weave it in between the locator bars and the outer horizontal reinforcing bars.

A mark on the vertical joggle bars can facilitate locating the alignment bars so that the joggle bars can be paused just above the horizontal locator bar can speed up reinforcement installation.



## U bar Reinforcement Installation

- 1 Install U bars as per the project specification.
- 2 Close off end caps as per details.

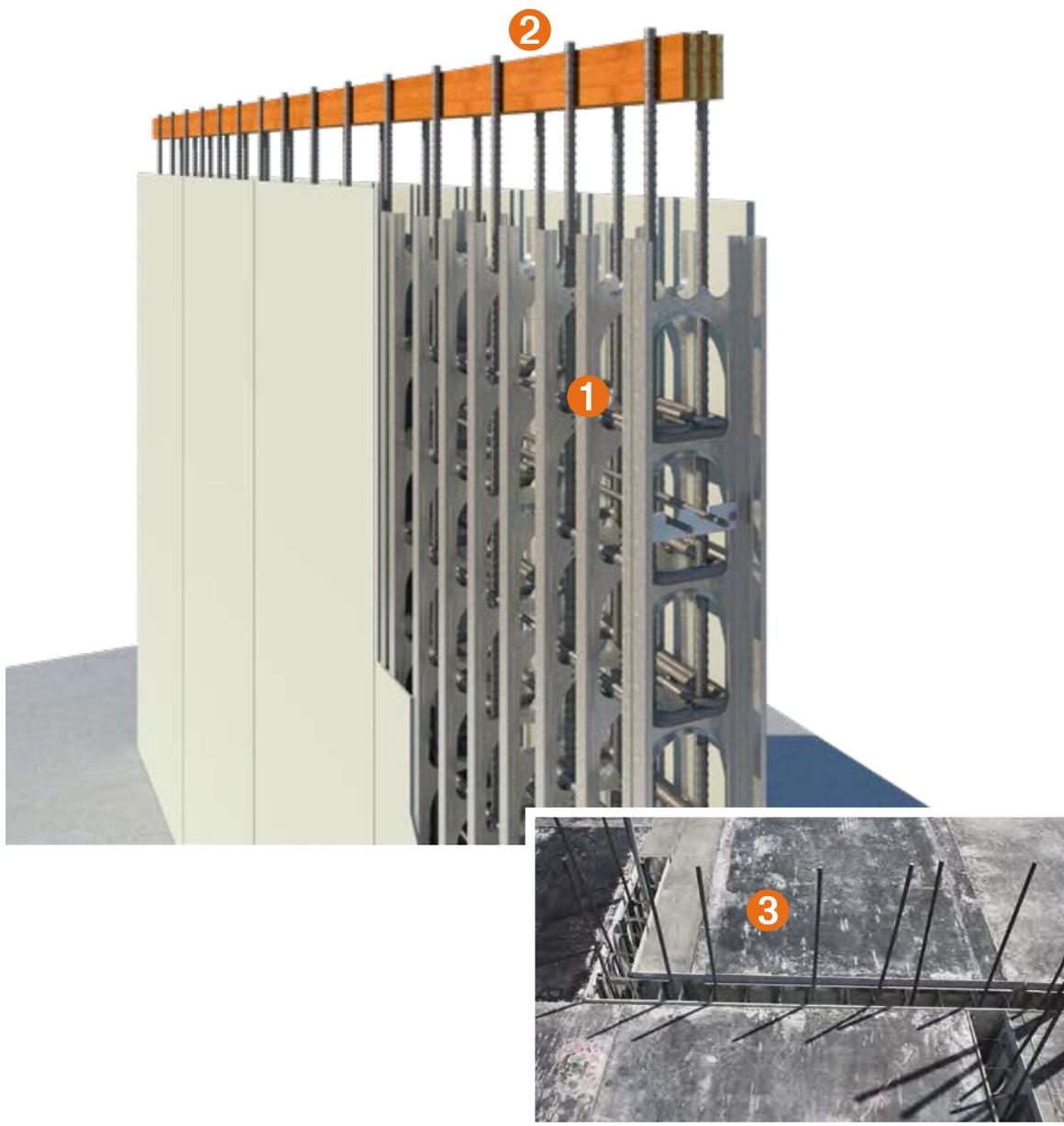


## Reinforcement Installation (continued)

### Vertical Reinforcement Tie Off

- 1** When the vertical bars have been placed in position, tie the top of each vertical bar to the top horizontal reinforcement as required to ensure bars remain in correct position during concrete pour
- 2** The top of the vertical bars can also be spaced and locked in correct position by using and LVL timber or similar.

- 3** Where the walls are going to continue through on the next level, the vertical bars are left longer by the amount required to clear the slab and act as the starter bar for the wall over. Ensure that the bar will maintain the correct overlap with the previous and subsequent bars where applicable. Refer to the Project Engineer's specifications for correct overlap and spacing of reinforcing bars. On projects where a pre-cast slab system such as Ultra-floor is being used, and it is necessary to pour the AFS Logicwall® prior to the 'deck' going in, it is necessary to place the vertical reinforcement from either a mobile or temporary scaffold.



## Reinforcement Installation

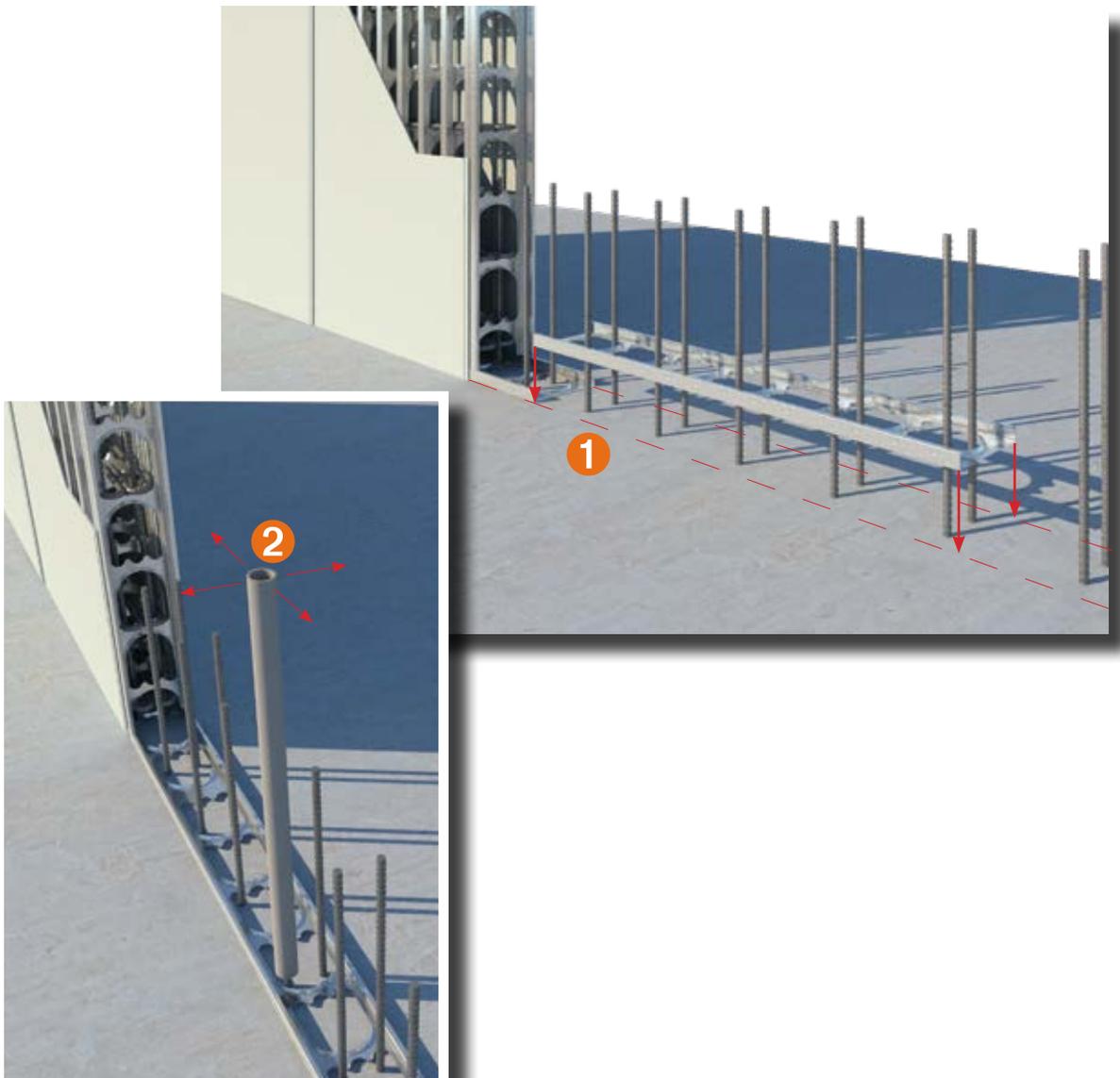
### Installation of Horizontal Hooked Bars and Ligatures in Logicwall® Panels

The following procedures outlines the installation of horizontal hooked bars, ligatures in AFS Logicwall® panels.

**1** Mark the location of the wall and carefully position the floor track over the starter bars and fix it to the floor.

**2** Confirm the location of all starter bars and adjust their vertical alignment so that the required ligature reinforcement can be placed easily over the starter bars.

A steel tube can be used to adjust the alignment of the starter bars where required.



## Reinforcement Installation (continued)

### Installation of Lowest Ligatures Over Starter Bars

Consult the project engineer drawings regarding the correct location of ligatures.

- 1** Carefully position and lower the ligatures around the starter bars.
- 2** Install the lowest ligatures over the starter bars and place them on the bar chairs. The lowest ligatures should be placed/chaired to a maximum of 50mm above the slab top surface.



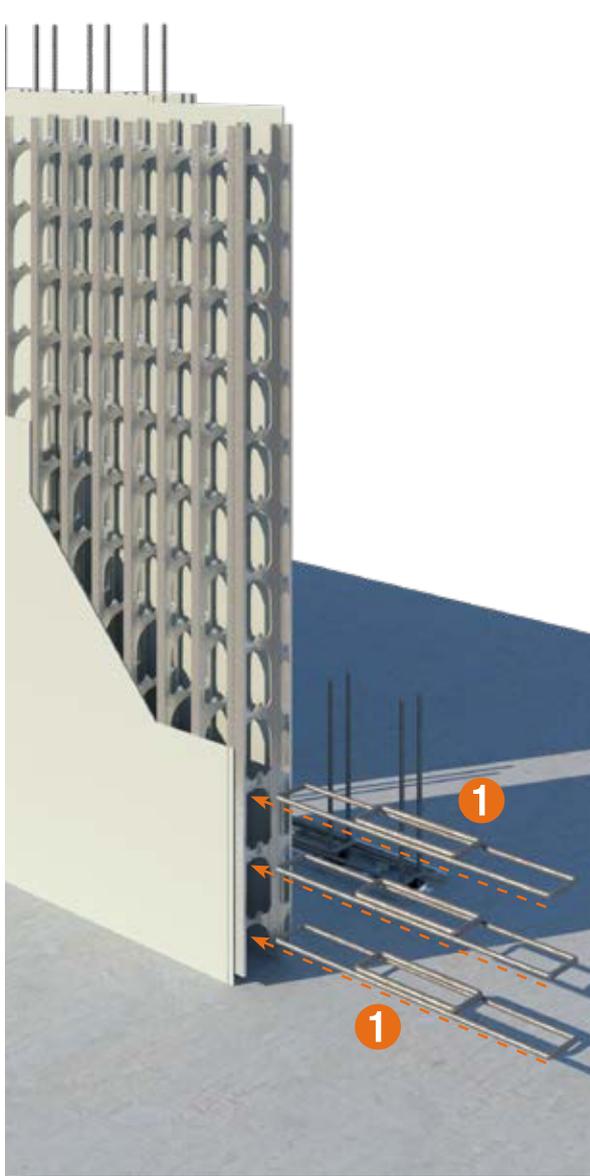
## Reinforcement Installation (continued)

### Installation of Subsequent Ligatures in the AFS Logicwall® Over Starter Bars

Consult with the project engineers drawings regarding the required locations of the reinforcement ligatures.

Ligatures required over starter bars are to be positioned into the AFS Logicwall® panels in their correct locations prior to the installation of panels over starter bars.

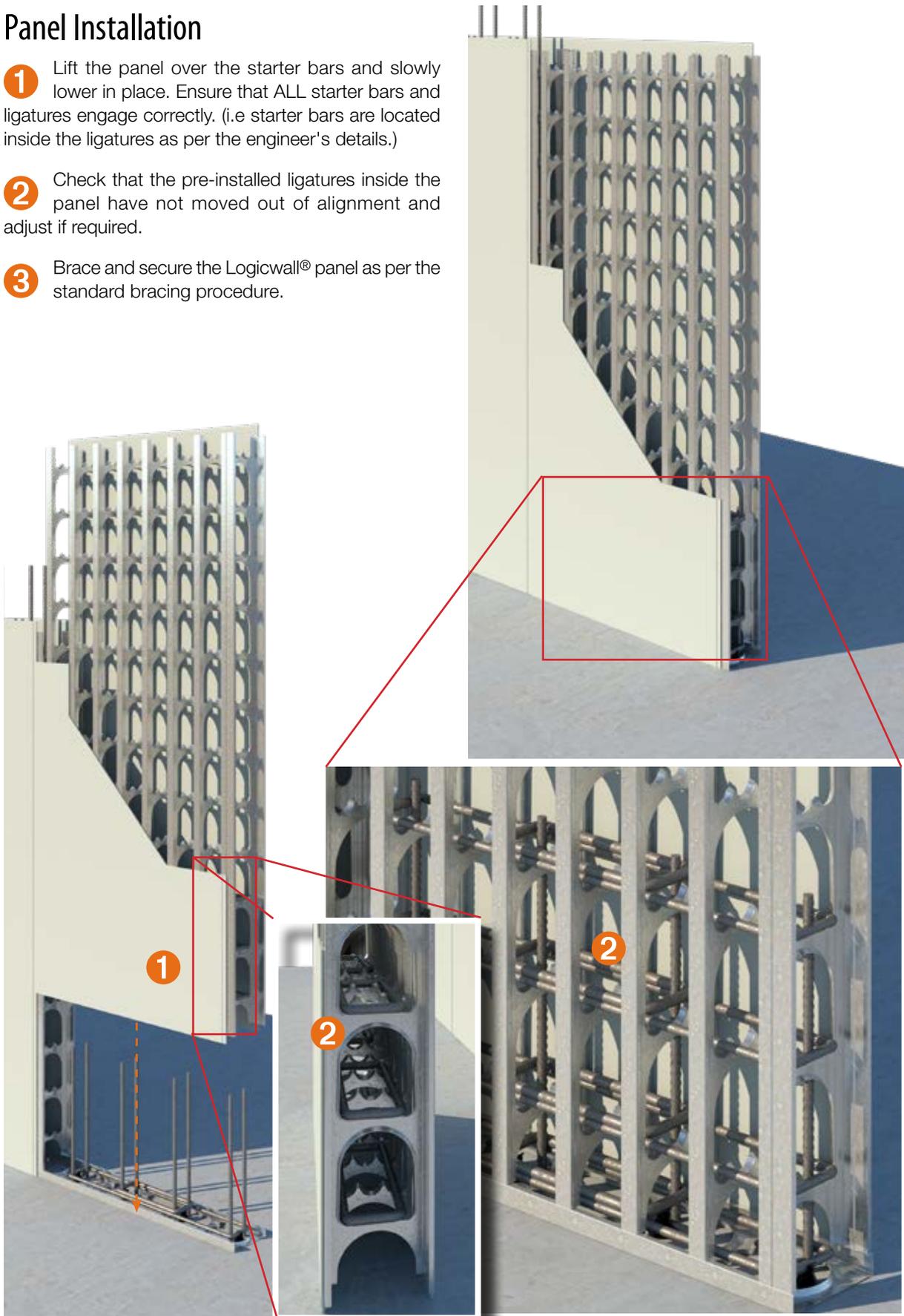
- 1 Ensure that the Logicwall® panel widths suit the ligature sizes. Where required, ligatures can be tied in groups to avoid reaching into the Logicwall® for installation. Shop drawn panel widths should be coordinated with ligature placement. Slide the ligature assembly into the panel to the correct location.



## Reinforcement Installation (continued)

### Panel Installation

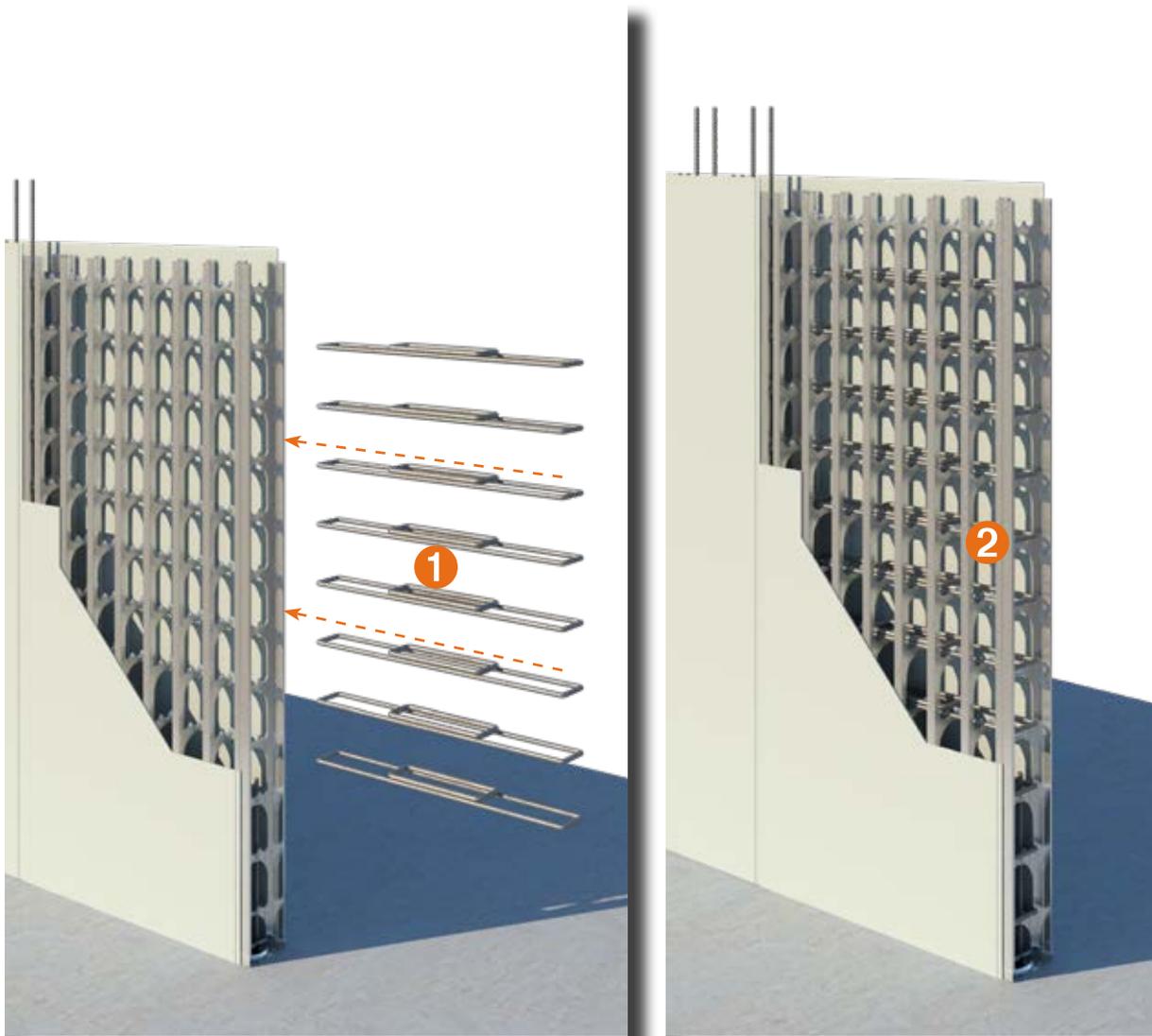
- 1** Lift the panel over the starter bars and slowly lower in place. Ensure that ALL starter bars and ligatures engage correctly. (i.e starter bars are located inside the ligatures as per the engineer's details.)
- 2** Check that the pre-installed ligatures inside the panel have not moved out of alignment and adjust if required.
- 3** Brace and secure the Logicwall® panel as per the standard bracing procedure.



## Reinforcement Installation (continued)

## Installation of Subsequent Ligatures in Panels Above Starter Bars

- 1 Install subsequent ligatures for the remainder of the panel as per the project engineering drawings.
- 2 Ensure that all ligatures are correctly located to allow vertical bars installation.



## Reinforcement Installation (continued)

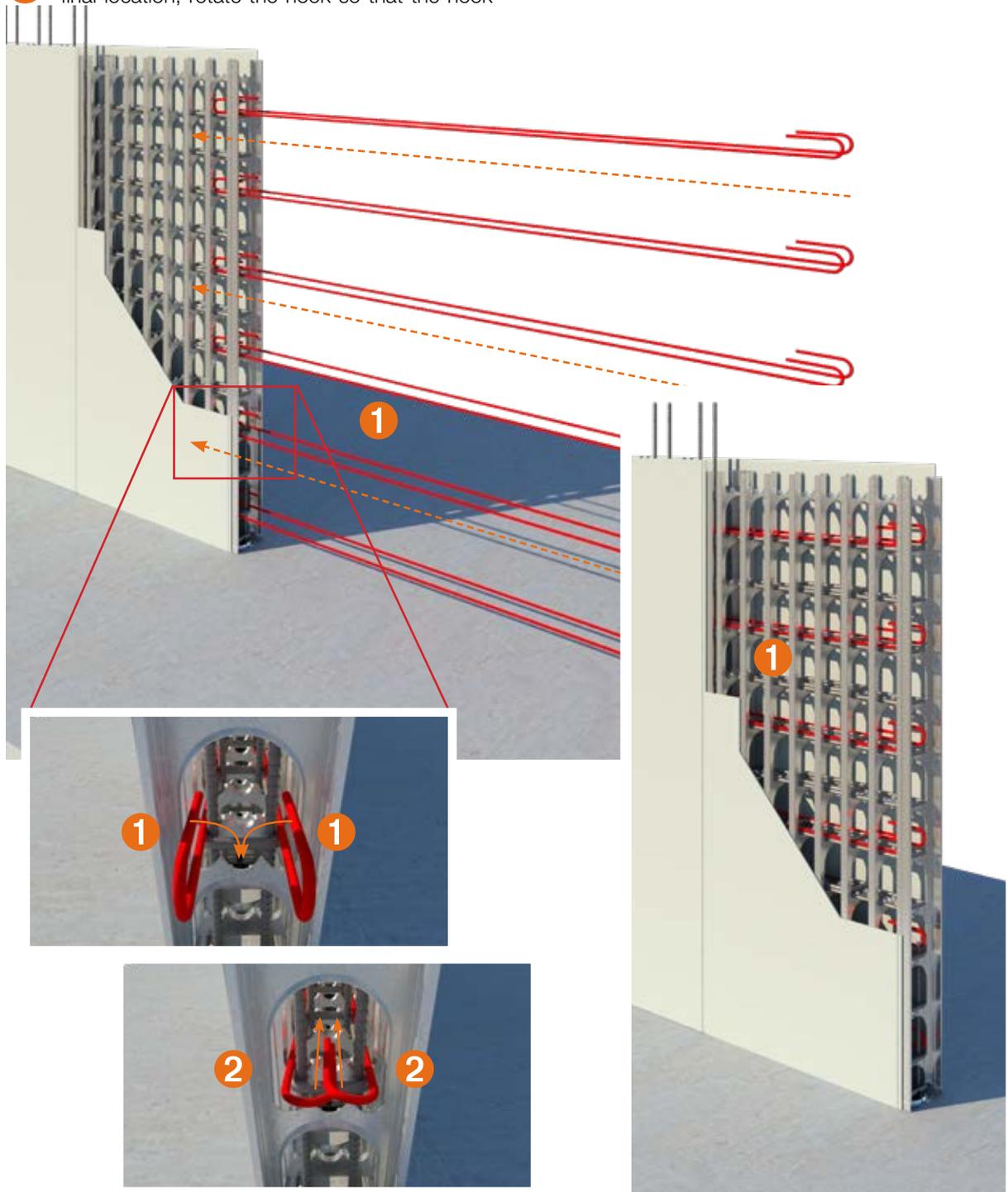
### Installation of Horizontal Reinforcement with Hooks

- 1** Slide the horizontal reinforcement bar into the Logicwall® panel ensuring that the hook bar face is in a vertical position and is placed on the outside of all the starter bars.
- 2** When the horizontal bars are slid in their correct final location, rotate the hook so that the hook

rests horizontally on the studs.

Repeat for both sides of the wall, turning the hook inwards and resting on the stud.

Install horizontal hook bars progressively above the starter bars as the wall is built. Note that horizontal hook bars shall be lapped as per the project engineer's details



## Reinforcement Installation (continued)

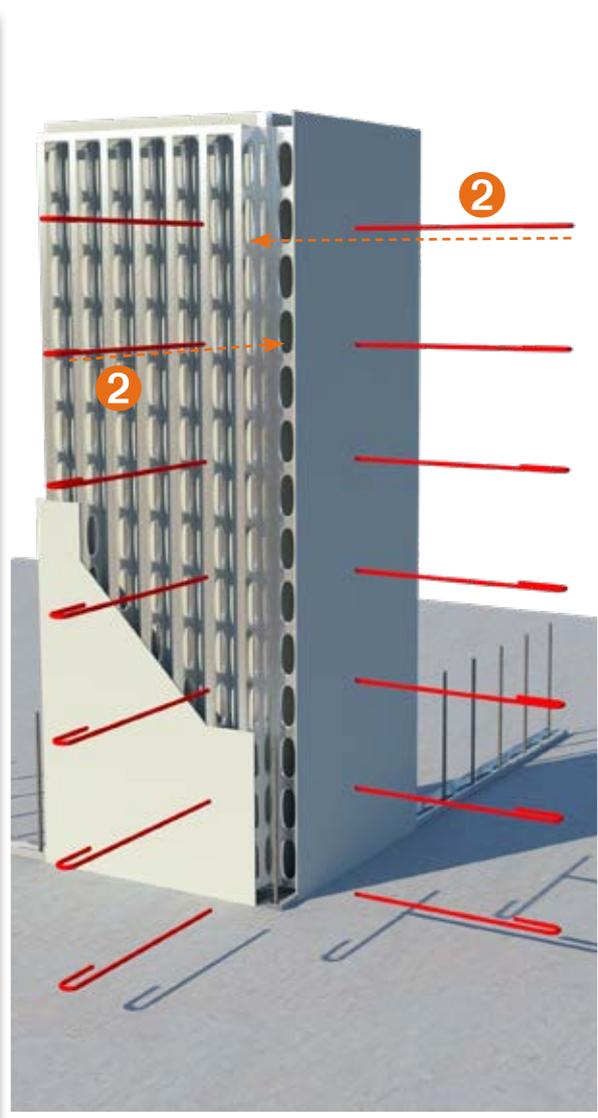
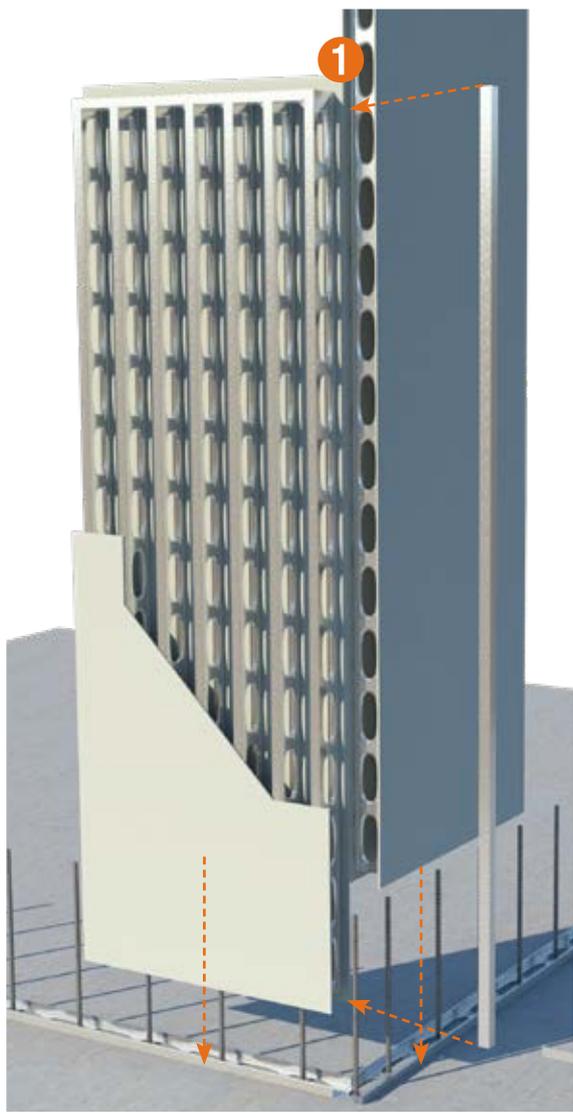
## Installation of Standard Hook Bars with Open Corner Capping

The installation procedure is as follows:

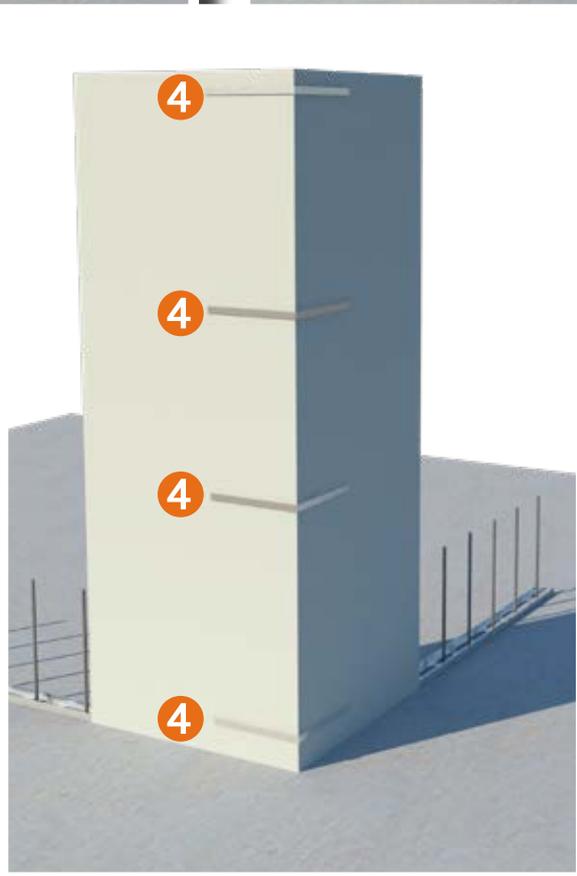
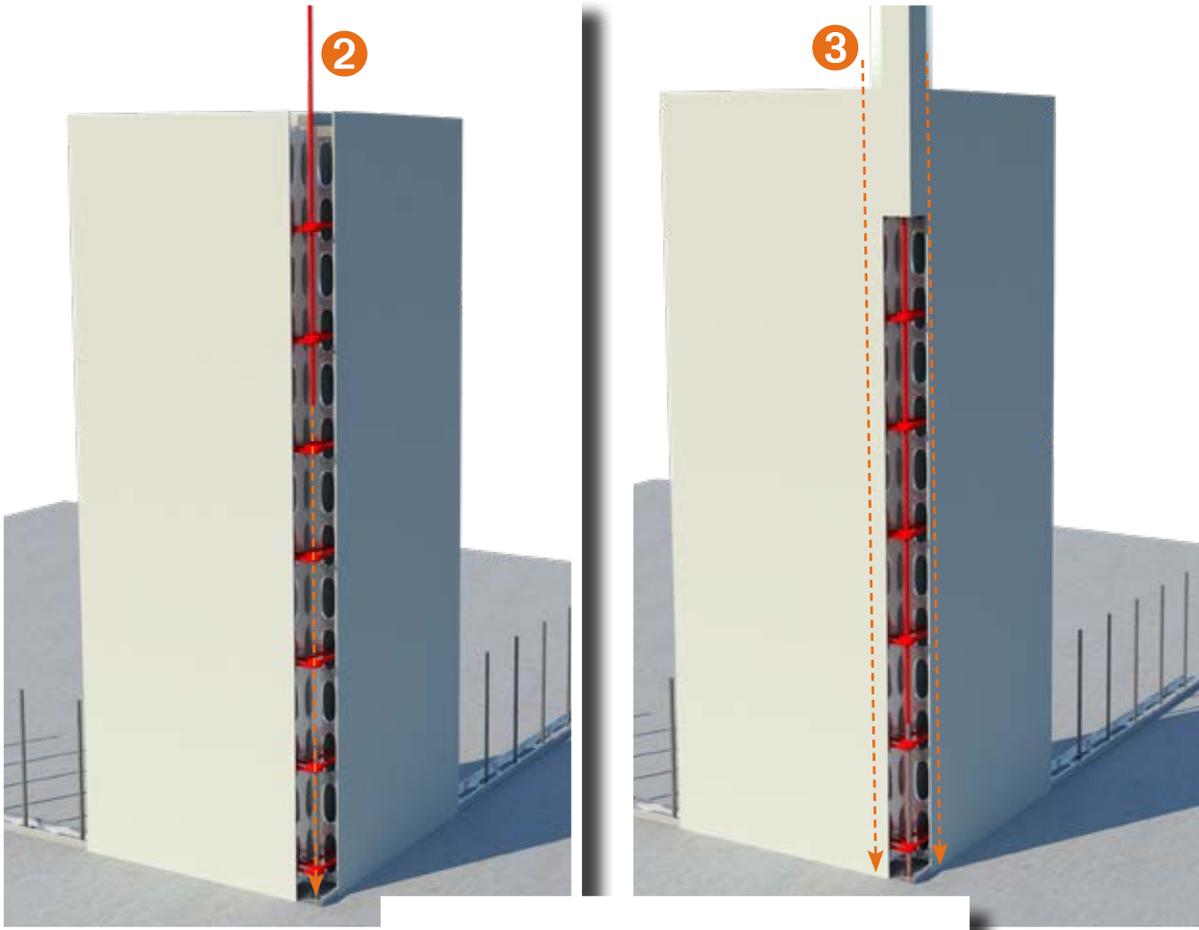
- 1** Install corner panel 1 to the internal edge of the corner panel 2. Glue and Screw fix (typically 300mm centres) internal corner angle to the FC sheet on the internal side of the wall corner.
- 2** Align the 'hook' on each hook bar in the corner and insert the vertical 'dropper bar' from the top of the corner panel and through the loops formed by the hook bars.

**NOTE:** Hook returns should be a minimum of 150mm to prevent the hook twisting in the cavity. (Panel bracing not shown for clarity)

- 3** Install steel corner cap by sliding the cap down from the top. Glue and screw fix in place typically at 300mm centres
- 4** Install steel corner brackets on the external side of the corner panels. The brackets are to be screw fixed with hex head screws. The brackets should be located typically at 1000mm centres along the wall height on the external side of wall corners.



Reinforcement Installation (continued)



## Reinforcement Installation (continued)

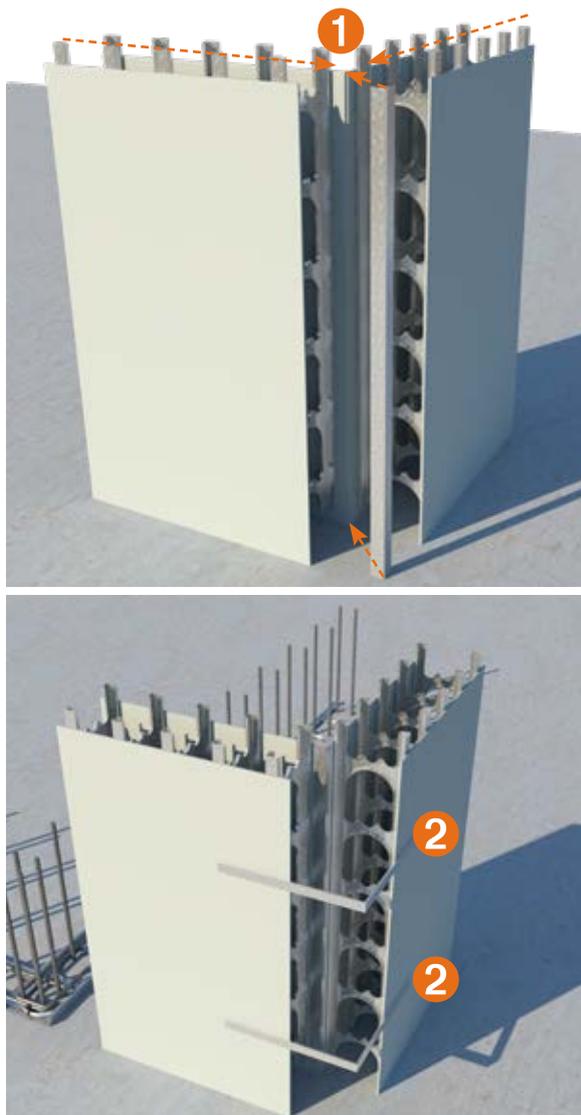
### Site Installation of closed Ligatures or Hooked U Bars in Logicwall® Panels with Open Corner Capping

Logicwall® panels with open corner capping shall be used where closed ligatures or U bars with hooks are required to be installed in the wall corners.

The corner panel shall be installed in two stages along the wall height as follows;

- 1 – Placement of lower corner panel assembly over the height of starter bars and
- 2 – Placement of upper corner panels on

The lower corner panels are 1200mm in height and will have steel stud frame extensions to facilitate installation, joining and alignment of upper corner panels.



The installation procedure is as follows:

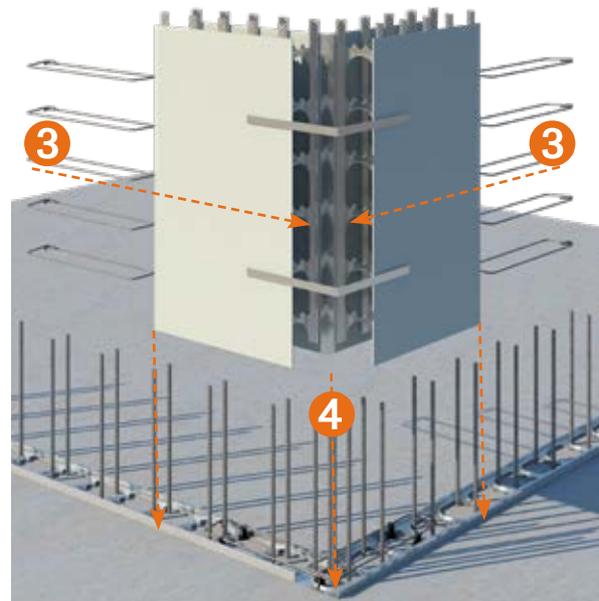
- 1 Stand lower corner panel 1 to the internal edge of the lower corner panel 2. Each panel is 1200mm in height.

Cut internal steel corner angle to the height of lower corner panels. Glue and Screw fix (typically 300mm centres) internal corner angle to the FC sheet on the internal side of the wall corner. Plumb panel 2, then glue and screw.

- 2 Install steel corner brackets on the internal and external side of the corner panels. The brackets are to be screw fixed with hex head screws. The brackets should be located at the top and typically 300mm below the top on the internal side and at top and bottom on the external side of wall corner assembly. Ensure that brackets are clear of the location of the ligatures or U bars.

- 3 Install closed ligatures or U bars with hooks in both corner panels over the height of starter bars. Follow the installation procedure described earlier in the section "Installation of Subsequent Ligatures in the AFS Logicwall® over starter bar".

- 4 Once corner steel reinforcement has been installed, lift the steel bracketed Logicwall® corner panel assembly by hand or crane. Lower it slowly and carefully over the starter bars ensuring that the starter bars are on the inside of closed ligatures or hooked U bars.



## Reinforcement Installation (continued)

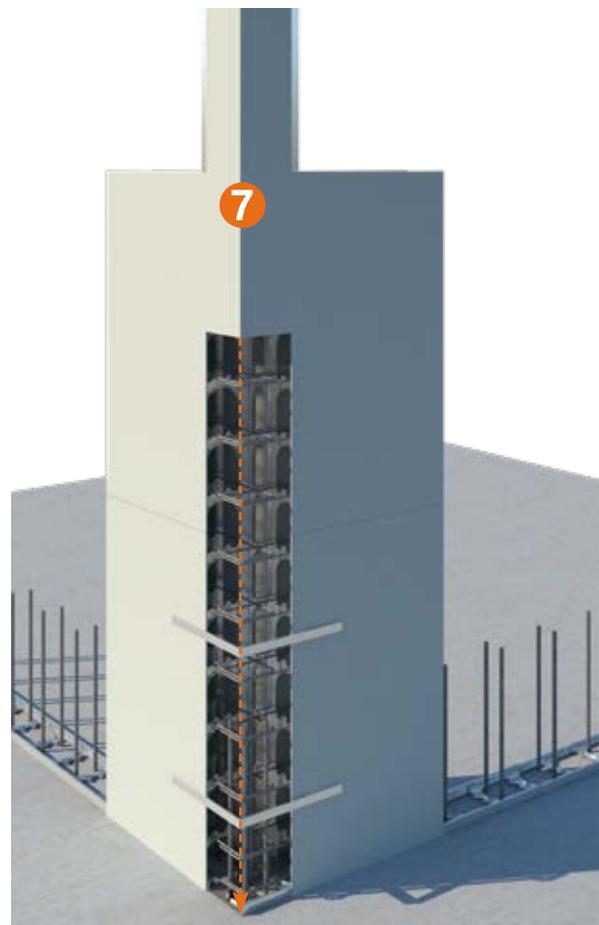
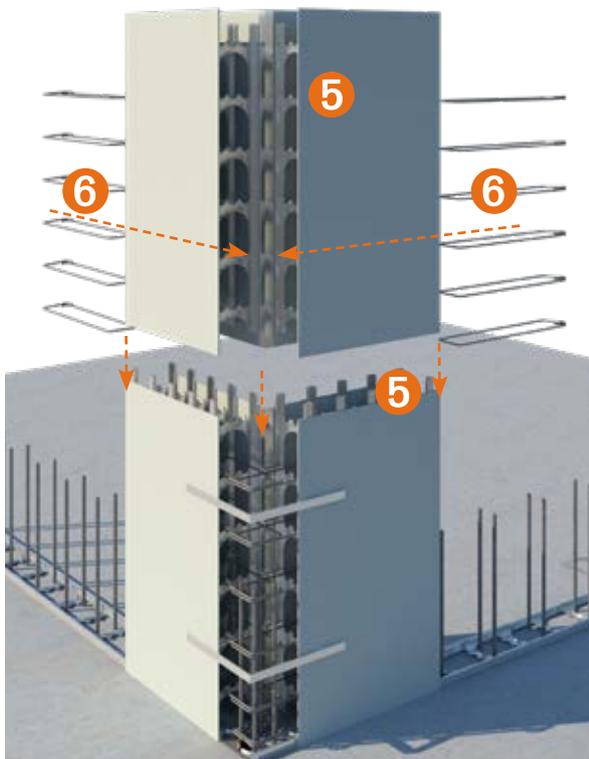
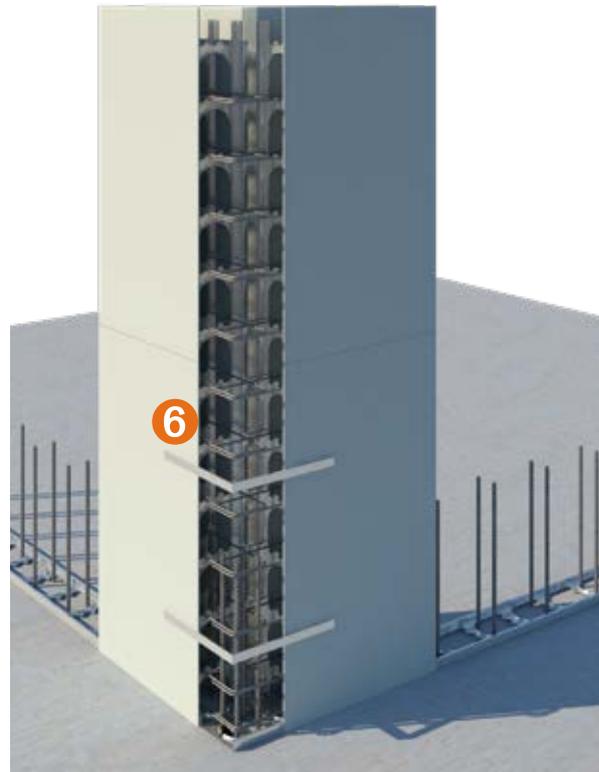
- 5** Install upper corner panels on top of lower corner panels. The panels can be installed manually or using crane depending on the panels size. Fix internal corner angle to the first upper panel to be installed as per step 2. Then plumb and brace lower panel 1 and upper panel 1 as per the standard procedure.

Fix the upper panel 2, glue and screw the internal corner angle. Then plumb and brace lower panel 2 and upper panel 2.

- 6** Install closed ligatures or U bars with hooks in the upper corner panels.

**Note:** Slide and install horizontal bars with hooks and install vertical reinforcement bar using guide horizontal locater bars as required before closing the corner.

- 7** Remove brackets and install steel corner cap by sliding the cap down from the top. Glue and screw fix in place typically at 300mm centres. Bracket and brace corner caps.



## Panel Erection

### Final check before concrete pour

Prior to filling AFS Logicwall® the Builder, Engineer and the installer should perform a check that all walls are straight, square, plumb and true, that all reinforcement, both horizontal and vertical has been placed according to the structural drawings/specification.

Make sure all the opening are the correct size and in the correct location and capped; that all electrical/data conduits and boxes are in and according to plan. This

procedure should be documented.

Power/data connection boxes need a "face plate" fitted to hold them square and prevent them from dislodging during concrete pour. Also, it is advisable to put a screw through the end of the conduit, inside the box to prevent the conduit "floating" out during pour.



## Core Filling of Walls

### Introduction

The contractor or installer is responsible for achieving compaction and dense and homogeneous coverage of the concrete mix in AFS Logicwall®.

AFS Logicwall® cannot be installed using traditional methods of compaction or vibration.

AFS has carried out tests which achieved desired compaction or dense and homogeneous coverage of AFS Logicwall®

This guide sets out the methods used by AFS to achieve compaction.

Use of this guide or an equivalent procedure to achieve compaction of AFS Logicwall® is entirely at the discretion of the contractor or installer.

AFS is not responsible for achieving compaction of the concrete in AFS Logicwall® or core filling of walls.

### Concrete Pour Limitations

When panel installation is complete with all appropriate checks ticked off, the walls can be filled with concrete.

Quantity of concrete that can be poured in a day must be assessed and determined in consideration of the following factors:

- Ease of access
- Number of passes that are required
- Concrete gelling time between passes
- Consideration of wet weather

For wet weather conditions, the panels need to be assessed and the concrete pour either be delayed or be undertaken with extreme caution, applying measures to suit the given conditions.

## Core Filling of Walls (continued)

### Additional equipment required for concrete pour

Prior to commencing a pour, ensure that a concrete vibrator (40mm diameter maximum), at least one wheelbarrow and multiple shovels, trowels, screw

guns and screws and some sheets of form-ply are readily available.

### Number of concrete passes required per panel

Walls up to 3 metres high can be filled in 2 passes with the first pass being to a maximum height of 1.5m. Walls from 3-4.2m should be filled in 3-4 passes with the 1st & 2nd pass being to a maximum height of 1m each. Allow at least 30 minutes or more between passes for concrete to gel.

Higher MPa mixes will gel faster than low strength mix designs. These guidelines will vary according to site conditions, with the requirement of extra passes and extra gelling time in wet/ cold weather. In cases of extreme weather the concrete pour should be postponed.

### Concrete pour

The concrete mix and concrete placement technique is critical to the successful outcome of filling AFS Logicwall®.



### Concrete mix design

The concrete supplier is responsible to provide a mix design that is suitable for filling AFS Logicwall®.

The concrete core fill mix must be designed with enhanced flow characteristics. Such concrete is available from Hanson Concrete and other concrete suppliers. Refer to Section J for concrete mix design guide.

## Core Filling of Walls (continued)

### Concrete delivery and placement

The concrete must be placed using a suitable boom pump via a 50mm delivery hose with continuous flow. Never fill AFS Logicwall® using a kibble. AFS Logicwall® cannot be core filled using traditional core filling and vibrating methods.

### Concrete 'Gel' Test

The concrete core filling in AFS Logic wall is undertaken in passes with concrete pours limited to 1500mm high per pass. A simple reinforcement test shall be undertaken to check that concrete in each pass has 'gelled' sufficiently before the subsequent pass (Typically 30 minutes or more). The test steps are as follows:

- a) After the first pass of the concrete pour, lower an N12 or N16 reinforcement bar into the Logicwall® cavity till the reinforcement contacts the wet concrete.
- b) Let the reinforcement bar fall under its own weight. If the reinforcement bar sinks 75 - 125 mm into concrete and stops, it indicates that the concrete has 'gelled' sufficiently for the 2nd pass of the concrete pour to commence.
- c) If the reinforcement bar does not stop and continues to go down into the wet concrete, the concrete is still too wet for commencement of the

second pass of the concrete pour. Allow suitable time for the concrete to 'gel'. Then, conduct the test again to check and ensure that it meets the bar sink criteria as noted in Step 'b' before proceeding to the next pass of the concrete pour.

- d) Depending on wall height, the gel test shall be carried out for all subsequent passes of the concrete pour.
  - Concrete is vibrated with a 40mm diameter needle vibrator by placing the vibrator in the upper 300mm of the wall panel and rattling the steel stud framework and reinforcement bars.

**Note:** Over vibrating can result in bulges and/or blowouts. Do not touch the fibre cement sheets with the vibrator. Keep vibration to a minimum.

The average pump rate for core filling AFS Logicwall® is 10m<sup>3</sup> per hour. It is important to advise the concrete supply company of the required delivery turn around time. (e.g. 1x5m<sup>3</sup> load every half hour).



## Core Filling of Walls (continued)

### Concrete pour procedure

Starting from an appropriate point commence filling the walls, holding the hose directly over each 'cell' (space between studs) move from cell to cell counting to 10 to 20 as required to achieve a maximum 1500mm high lift.

When moving around the walls filling them, remember that the shorter/thinner a section of wall the faster it will fill. Consequently vary the time the hose is held over

each cell to ensure that any given area is only filled approximately maximum 1500mm per pass.

There should be at least one person either side of the wall at the base of the wall, confirming by tapping with a hammer that the correct height lift is being achieved. Keep a keen eye on the panels for any sign of bulging or movement. Should this occur, immediately move the hose to another area and continue pumping.



### Securing of temporary patches/bracing if area bulges/blows out

If panel bulging or blow outs occur, call across other team members to screw form-ply over the affected area, ensuring that they get the screws into the studs within the panel.

Clean up any concrete that may have become

misplaced straight away.

Once form-ply has been securely screwed to the face of the panel and any other temporary propping or bracing thought necessary applied, bring the hose back and fill the area.

### Filling of sills

At openings such as windows or large mechanical penetrations, lower the hose and ensure all sills are adequately filled.

## Core Filling of Walls (continued)

### Filling of horizontal panels

Special attention needs to be given to the filling of “horizontal” panels (i.e. studs run horizontally) as the concrete can tend to ‘bridge’ on the stud leaving pockets empty below. If this is happening it is necessary to use a needle vibrator, 40mm diameter maximum, to



ensure that these panels are properly filled.

**Note:** Over vibrating could result in bulges and/or blow-outs.



### Use of the concrete vibrator in AFS Logicwall®

Concrete is to be vibrated with a 40mm diameter needle vibrator, by placing the vibrator within the upper 300mm of the wall panel and rattling the steel stud framework and reinforcement bars for 3 seconds at a time.

The vibrator must not be dropped or lowered to the bottom of the panel (as done traditionally) or held against the fibre cement board as this may result in panel failure.

### Finishing of sills/top of wall

When the sills and tops of walls have been filled, they should be neatly trowel finished. The top of the sill/wall is either:

- a) left set down slightly if a slab is to be poured over the top;

**OR**

- b) trowelled off smooth if it is the finished top of a wall or if it is to be the bearing edge for Delta-core or Ultra-floor to sit on.



## Core Filling of Walls (continued)

### Placing of 'L' bars at the top of the AFS Logicwall®

It is at this point that 'L' bars may be required to be placed in the wet concrete at the top of the AFS Logicwall® wall to tie the wall and slab over together.

This needs to be done by the responsible person / party. The bars need to have been ordered and be readily available.



### Concrete clean-up

During pour, it is inevitable that some concrete gets splattered onto the slab below and down the face of the AFS Logicwall® panels.

This must be cleaned on the pour day, straight after the pour.

During a large pour, persons should follow around, scrapping all splattered concrete off the slab and walls and where necessary, wipe the walls down. Otherwise the concrete will set hard creating extra work to scrape off.

## Removal of braces

### Early removal of braces

The braces are normally removed once the slab over is poured or the roof is attached. However if due to site conditions or for any other circumstance, it is desirable to remove the braces earlier, approval must be obtained from the project engineer, especially in

situations where the AFS Logicwall® is to become retaining wall and will be back-filled against, or is to be loaded with a pre-cast slab system.



## Routine QA Procedures

### Removal of temporary patches

The day after pour any temporary patches are to be removed. In the event of a bulge or blowout that had to be ply-ed up during the pour, that ply should be

removed and the area assessed. If the ply has pulled the board tight back against the studs within the panel, no further work is necessary.

### Repair of panels if concrete has bulged/panel blown out

If the board has come away from the studs and is distorted beyond the allowable tolerance, a cut through the board at a point where it is flat against the studs and that section of board be removed. If the concrete has bulged passed the stud, scrape it back to the face of the stud while the concrete is still

green. A new piece of board can now be glued onto the stud or the area can be patched using a suitable acrylic modified render (i.e. Macrender) and flushed over when the joints are set.



### Repair of voids in panels

After AFS Logicwall® walls have been corefilled the walls should be tapped using hammers on both sides to check compaction. should a hollow in the wall be identified, the location should be marked. a high strength grout should then be injected into the

panel to fill the hollow. This process should be done in conjunction with the specifications from the grout supplier and the methodology be approved by the project engineer.

### Cleaning and tidy up

When all necessary cleaning, tidy up and patching has been done, the installer should hand the completed area over to the builder until it is ready for the installer to come back in and tape and set the joints. Some areas will require extra work in preparation for joint setting.

The horizontal joint that occurs in stairwells (also the external horizontal joints, depending on the specified finish) will inevitably require some grinding back and/or patching to 'feather-out' any misalignment which has occurred during installation.



## Workplace Health Safety and the Environment

AFS logicwall® has been designed with workplace health safety and the environment in mind. Issues regarding installation have been considered so that the risk of harm to those who build, use and maintain the structure is minimised.

A vital consideration when planning installation, is to have appropriate safe systems of work to identify hazards, assess risks, control exposures and to ensure a process is in place to review control measures.

Assessing the hazards associated with the installation methods, equipment, tools, dust, noise, chemicals, other trades and work environment is the responsibility of both the builder and installer.

Appropriate assessment of risk, adequate resources, communication methods and training provided to workers is to be considered and documented for each site location.

### Personal Protective Equipment

The Personal Protective Equipment (PPE) required may vary from site to site and from time to time, and it is the responsibility of every individual to ensure that they use the appropriate equipment to safeguard themselves and those around them.

Logicwall® panels and concrete contain silicas that are harmful if inhaled. Appropriate protective clothing and breathing equipment must be worn when cutting logicwall®.

When cutting, drilling, screwing or grinding panels using power tools, an attached LEV and a M or H Class HEPA filter industrial vacuum must be used.

#### **Always ensure the work area is properly ventilated.**

An approved P2 half face mask and safety glasses must be worn. AFS recommends that hearing protection be worn if equipment used exceeds noise standards.

### Recommended Safe Working Practices

#### Cutting Outdoors

- Position cutting station so wind will blow dust away from the user or others in the working area.
- Use a dust reducing plunge saw equipped with a dust extract ion system . (LEV and a M or H Class HEPA filter)

#### Sanding/Drilling/Screwing/Other Machining

- When sanding, drilling, screwing or machining, you should always wear a P2 half face mask. **(provides 10 x protection from dust inhalation)**
- Fit check and fit test your respirators to get full protection.

- Replace your mask (or filter components) more often if heavy dust.
- Warn others in the immediate area to move away or wear suitable PPE.

### Important Reminders

**NEVER** use a power saw indoors without adequate ventilation and PPE.

**NEVER** use a saw blade that is not purpose-made for cutting fibre cement, concrete and steel products.

**AVOID** dust generation by either vacuuming or wet sweeping.

**AVOID** dry sweeping - only with adequate ventilation and PPE.

**ALWAYS** wear recommended PPE.

**ALWAYS** follow tool manufacturers' safety recommendations.

**ALWAYS** be aware of others in your working location.

These control measures are consistent with industry recommendations for safe work practices. Assessments have proven, this combination will reduce the airborne concentration of RCS to levels below the exposure standard for workers .

AFS has documented sample safe work methods that can be accessed upon request as REFERENCE MATERIAL ONLY. This can be provided as an aid to builders and installers when risk assessing the work, and when developing their own documentation.

Consultation and training of workers in agreed safe methods will always be the builders and installers responsibility.

Safety Data Sheets are available upon request at [www.afsformwork.com.au](http://www.afsformwork.com.au)

For further information please visit SafeWork Australia <https://www.safeworkaustralia.gov.au/risk>

## Tools and Accessories

### Hand Tools

To safely and efficiently complete any task, it is essential to have the necessary tools available and to use the right tool for the right task.

A typical range of hand tools would include, but not be limited to the following:

- A set of tin snips
- Cutting knife
- Chisels
- Hammers - 'claw' and 'gympie'
- Pencils, marking pens, chalk
- Variety of pliers
- A range of squares
- Tool bag/belts are essential
- String and chalk lines
- Tape Measures - eg. 8m and 3m
- Spirit levels - range of lengths eg. 600mm and 2000mm
- Plumb Bob



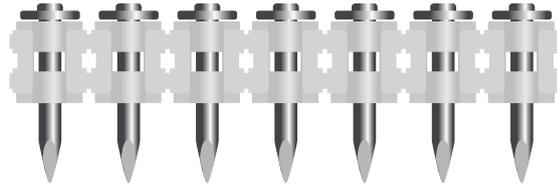
## Tools and Accessories (continued)

### Power Tools

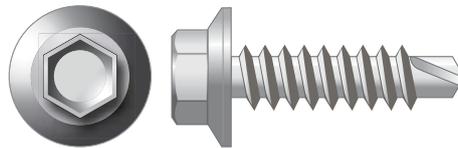
There are a range of power tools required during installation of AFS Logicwall®. Wherever possible preference should be given to cordless tools.

**Note:** The following images of power tools are only diagrammatic and do not represent the specific brand or model to be used. All power tools require tagging as per site requirements.

**Note:** Refer to the Personal Protective Equipment (PPE) part of this manual section for suitable PPE provisions for safe operations.



The floor track is shot down using 'charge' guns, with appropriate fixings.



The braces are fixed to the panel using tek-screws.

These are driven in using cordless impact driver with hexhead bit fitted.

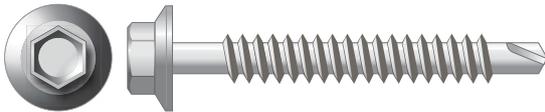
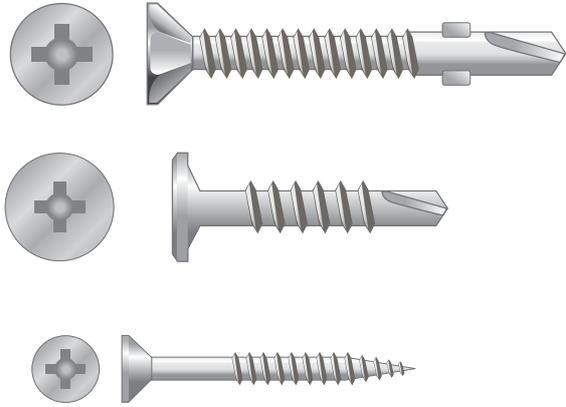


The braces are fixed to the concrete slab using 'Excalibur' style screw bolts. The screw bolts are driven into a hole that has been pre-drilled (using cordless rotary drill with appropriate sized masonry bit) using cordless impact wrench with appropriate sized impact socket.

## Tools and Accessories (continued)

The panels are screwed off to the floor track and at each joint and end caps are fitted using counter sink, self drilling screws - there are a range of these available with Philips Head or Square Drive, in a range of styles.

These **must** be minimum Class 3 Galvanised. On some projects architects/ builders have specified stainless steel in external areas. These screws are driven in using cordless impact driver fitted with the appropriate driver bits.



A range of other screws can/are used in varying applications eg. the fitting of temporary patches.



The trimming of the panels and fitting of power boxes involves the use of 100mm, 125mm and 225mm grinders and circular saws with an appropriate range of cutting discs eg. metal cutting and diamond dry cutting discs.



## Tools and Accessories (continued)

### Adhesive/Sealant

The floor track at external walls and between wet areas, requires 2 beads of sealant (one each side of the track). End caps must be fitted using adhesive and screws. In some situations it is prudent to use adhesive and screws on the panel joints.

The sealants/adhesives that are normally used are polyurethane based products such as Sikaflex or Bostik Seal'n'Flex. These products are supplied in sausages and applied using appropriate sausage guns. The sealant/adhesives must be used strictly in accordance with manufacturers recommendations.



### Access tools

All scaffolding and safe access provisions are the responsibility of the builder and installers and are governed by the individual site conditions. It is essential that safe work practices and all associated standards are met/complied with. Installers would normally provide a range of ladders and/or platforms for personal access to the top of wall

### Concrete pour tools

In addition to all the normal equipment including screwguns and an assortment of screws and formply, the following is an indicative guide to the extra equipment required during concrete pours.

- At least one wheelbarrow, multiple shovels and a range of trowels.
- Concrete vibrator: 40mm diameter maximum.

