ICC-ES Evaluation Report

ESR-5457

Issued February 2025

Subject to renewal February 2026

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DIVISION: 06 00 00 – WOOD, PLASTICS AND COMPOSITES Section: 06 12 00 – Structural Panels	REPORT HOLDER: KPS BUILDING CONTRACTING, LLC	EVALUATION SUBJECT: OFF-SITE TIMBER BUILDING SYSTEM	

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2024, 2021, 2018 and 2015 *International Building Code*® (IBC)
- 2024, 2021, 2018 and 2015 *International Residential Code*® (IRC)

Properties evaluated:

- Material properties
- Surface-burning characteristics (insulation)

2.0 USES

Off-Site Timber Building System, consist of wall panels, floor panels and roof/ceiling panels, to be used in load- and nonload-bearing exterior and interior wall, floor and roof/ceiling assemblies for Type V construction under the IBC and any construction permitted under the IRC. When Off-Site Timber Building System is installed under the IRC, an engineered design is required in accordance with IRC Section R301.1.3.

This report evaluates components used with Off-Site Timber Building System panels for structural performance only.

3.0 DESCRIPTION

3.1 General:

Off-Site Timber Building System panels are factory-assembled structural panels consisting of sheathings which are fastened to wood framing members, with insulation placed inside cavities. Refer to Figures 1, 2, 3 and 4 for illustrations of installed Off-Site Timber Building System panels.

3.2 Panels:

3.2.1 Exterior and Interior Wall Panels: The exterior and interior wall panels are identified and available in sizes indicated in Table 1. Panels with openings are configured with wood headers or with a top plate configuration, according to Figures 4A, 4B and 4C. Studs, headers and plates are connected using nails per fastening schedule on IBC Table 2304.10.2.

The exterior panels are manufactured with sheathings, which are nailed or stapled to 45 mm x195 mm (dimension planed, measured according EN 1309-1) [1.77 inches x 7.67 inches] wood studs spaced at 23.6 inches (600 mm) max.

The nails and spacings used for the sheathings of exterior panels are as follows:

Exterior Wall sheathing	8d common spaced 2 through 6 in. edge on center and 3 through 6 in. field on center., as determined in approved construction documents

The staples and spacings used for the sheathings of exterior panels are as follows:

Exterior Wall sheathing	1¾ or 2-inch 16 Gauge at 2 through 6 in. edge on center and 2 through 6 in. field on center, as determined in approved construction documents

For **SI**: 1 in = 25.4 mm

The exterior panels are filled with insulation (mineral wool) in the wall cavities. When applicable, doors and windows will be screwed to the panels with corresponding trims and caulking. Installation of exterior windows and doors is outside scope of this report and must comply with applicable code.

The exterior panels must be connected at the jobsite to a wood sill plate complying with IBC Section 2304.12 or 2024 IRC Section R304 (2021, 2018 and 2015 IRC Section R317) attached to a concrete foundation. The sill plate on the concrete foundation must be fastened in accordance with the applicable provisions of IBC Chapter 23. The connection of the bottom plate of the wall panels to the sill plate is outside scope of this report and must comply with the IBC. The exterior panels top plate can alternatively be designed with a vertical top plate/header configuration. The 45 mm x 195 mm studs are notched to fit a 45 mm x 220 mm vertical plate/header which is nailed to the studs, according to Figure 4B Detail No.2.

The loadbearing interior panels as shown in Figure 1C are manufactured with wood structural sheathing, which are nailed or stapled to 45 mm x 95 mm or 45 mm x 195 mm (1.77 inches x 3.74 inches or 1.77 inches x 7.68-inches) wood studs spaced at maximum 600 mm (23.6 inches) on center and to 45 mm x 95 mm to 45 mm x195 mm (1.77 inches x 3.74 inches to 1.77 inches x 7.68-inches) top and bottom plate or also to 45 mm x 220mm (1.77 inches x 8.66-inches) top plate, according to Figure 4B Detail No. 2.

The nails and spacings used for the sheathings of interior wall panels are 8d common spaced 2 through 6 in. (51 mm -152 mm) on center at the perimeter and 8d common spaced 2 through 6 in. (51 mm -152 mm) on center in the field, as indicated in the approved construction documents.

The staples and spacings used for the sheathings of interior wall panels are 16 Gauge by 1¾ or 2 inch-long (44 or 51 mm) staples spaced 2 through 6-in. (51 mm -152 mm) on center at the perimeter and spaced 2 through 6 in. (51 mm -152 mm) on center in the field, as indicated in the approved construction documents.

The load bearing interior panels are filled with insulation (mineral wool) in the cavities.

The load bearing interior panels are manufactured with a 45 mm x 95 mm or 45 mm x 195mm (1.77 inches x 3.74 inches or 1.77 inches x 7.68-inches) bottom plate and two (2) 45 mm x 95 mm or 45 mm x 195mm (2 - 1.77inch x 3.74 inches or 1.77 inches x 7.68-inch) top plates or a top plate configuration shown in Figure 4B. Bottom and top plate are nailed to the studs in accordance with the IBC Chapter 23. See Figures 1B and 1C.

3.2.2 Roof/Ceiling Panels: The roof/ceiling panels are available in the sizes indicated in Table 1. The roof/ceiling panels are manufactured from 45 mm x 220 mm (1.77 inches x 8.66-inches) wood framing with joists spaced at maximum of 600 mm (23.6 inches). A 45 x 220 wood framing member is fastened to both sides of the panels as indicated in the approved construction documents. Roof/ceiling Panels with wide span (Roof/Ceiling Panel 2) are manufactured with LVL frame and wood joists according to the approved construction documentation for the specific structure. Wood-based sheathing is nailed or stapled to the top of the panel. Roof/ceiling panels cavities are filled with mineral wool insulation. The roof/ceiling panel can be either blocked or unblocked. See Figure 2 for typical roof/ceiling panel construction.

The nails and spacing used for the sheathing of the roof/ceiling panels are as follows:

Roof sheathing	8d common at 2 through 6 in. edge on center and 2 through 6 in. field on center, as indicated in the approved construction documents

The staples and spacing used for the sheathing of the roof/ceiling panels are as follows:

Roof sheathing	2-inch 16 Gauge at 2 through 6 in. edge on center and 2 through6 in. field on center as indicated in the approved construction documents

For **SI**: 1 in = 25.4 mm

3.2.3 Floor Panels: The typical floor panel is available in the size indicated in Table 1. The floor panels are manufactured with a 45 mm x 220 mm (1.77 inches x 8.66-inches) frame and nailed to wood joists 45 mm x 220 mm (1.77 inches x 8.66-inches) spaced at maximum of 600 mm on center (23.6 inches). A 45 mm x 220 mm (1.77 inches x 8.66-inches) wood framing member is connected to each end of the joist as indicated in the approved construction documents. Floor Panels with wide span (Floor Panel 2) are manufactured with LVL frame and joists according to the approved construction documentation for the specific structure. Sheathing will be nailed or stapled to the top of the panel framework. The floor panel cavities are filled with mineral wool insulation. The floor panel can be either blocked or unblocked. See Figure 3 for typical floor panel construction.

The nails and spacing used for the sheathing of the roof/ceiling panels are as follows:

Floor sheathing	8d common at 2 through 6 in. edge on center / 2 through 6 in. field on center, as indicated in the approved construction documents

The staples and spacing used for the sheathing of the roof/ceiling panels are as follows:

Floor sheathing	1¾ or 2-inch 16 Gauge at 2 through 6 in. edge on center and 2 through 6 in. field on center, as indicated in the approved construction documents

For **SI**: 1 in = 25.4 mm

3.3 Materials:

3.3.1 Wood Framing:

3.3.1.1 Solid Sawn Lumber: The wood framing members are equivalent to Norway Spruce, Selected Structural sawn lumber, having a minimum specific gravity of 0.42 and the reference design values complying with American Wood Council *National Design Specification*® (NDS) for Wood Construction.

3.3.1.2 Laminated Veneer Lumber: The laminated veneer lumber (LVL) complies with ESR-3633.

3.3.2 Sheathing:

3.3.2.1 Exterior Wall Panels: The exterior and interior sheathing consist of 11 mm (7/16-inch) thick OSB board complies with US DOC PS2 for OSB, span rating 24/16.

3.3.2.2 Interior Wall Panels, loadbearing: The sheathing for both panel faces, consists of 11 mm (7/16-inch) thick OSB board complies with US DOC PS2 for OSB, span rating 24/16.

3.3.2.3 Roof/Ceiling Panels: The sheathing consists of 18 mm (23/32-inch) thick sheathing complying with US DOC PS2 for OSB, span rating 24 on center.

3.3.2.4 Floor Panels: The sheathing consists of 18mm (23/32-inch) thick sheathing complying with US DOC PS2 for OSB, span rating 24 on center.

3.3.3 Fasteners: The fasteners used with Off-Site Timber Building System panels are of bright finish, vinyl coated, zinc plated, galvanized or stainless-steel nails according to the moisture condition requirements.

3.3.3.1 Nails: Nails described in this report comply with ESR-1539.

3.3.4 Insulation: The insulation placed in the cavities of the Off-Site Timber Building System panels is mineral wool insulation and has flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 and is available in the following thicknesses:

3.3.4.1 Exterior Wall Panels: Mineral Wool, thermal insulation for buildings, thicknesses ranging from 45 mm to 195 mm (1.77 inches to 7.68 inches).

3.3.4.2 Interior Wall Panels: Mineral Wool, thermal insulation for buildings, thicknesses ranging from 95 mm to 195mm (3.74 inches to 7.68-inches) for loadbearing walls.

3.3.4.3 Roof/Ceiling Panels: Mineral Wool, thermal insulation for buildings, thicknesses up to 220 mm (8.66 inches) or in accordance with approved construction documents.

3.3.4.4 Floor/Ceiling Panels: Mineral Wool, thermal insulation for buildings, thicknesses up to 220 mm (8.66 inches) or in accordance with approved construction documents.

4.0 DESIGN AND INSTALLATION

4.1 General:

Design and installation of Off-Site Timber Building System panels must be in accordance with this evaluation report the report holder's published Off-Site Timber Building System panels' installation instructions and the

construction documents approved by the code official. The design of the building system must be in accordance with the applicable code provisions.

4.2 Design: The capacity demand of the exterior and interior wall panels and the floor and roof/ceiling panels must be determined for each structure in accordance with the applicable requirements of IBC Chapter 23. For compliance with the IRC, the Off-site Timber Building System panels must comply with IRC Section R301.1.3.

The design process for the shearwall panels and roof and floor diaphragms must comply with the design requirements in IBC Section 2305 and the AWC SDPWS.

When used as shear walls to resist wind and seismic loads under the IBC, the Off-Site Timber Building System panels must be designed in accordance with the IBC and the design coefficient and factors in ASCE/SEI 7-16 Table 12.2-1 for light-frame (wood) walls sheathed with wood structural panels rated for shear resistance, must be used for structures assigned in Seismic Design Categories A through F.

4.3 Installation: The report holder's installation instructions must be available at the jobsite at all times during installation. Jobsite installation of panels must be in accordance with the approved construction documents prepared by the registered design professional. Panel-to-panel connections and Panel-to-structural element connections are outside the scope of the evaluation report and must be designed by registered design professional.

4.3.1 Wall Panels: Wall panels must be continuously supported on top of the concrete foundation or of the floor panels. The entire thickness of axially loaded wall panels must be supported by supporting structural elements.

4.3.1.1 Exterior Wall Panels: Panels bottom plate connecting to the sill plate must be installed in accordance with approved construction documents. Wall panels bottom plate connecting to the concrete foundation must also be installed with connections according to the approved construction documents.

4.3.1.2 Interior Wall Panels: Panels bottom plate must be connected to the concrete foundation in accordance with approved construction documents. Panels bottom plate must be connected to floor panels in accordance with approved construction documents.

4.3.2 Roof/Ceiling Panels: Roof/ceiling panels connections to the wall panels must be connected in accordance with approved construction documents.

4.3.3 Floor Panels: Floor panels connections to the wall panels are installed in accordance with approved construction documents.

4.3.4 Exterior Wall Covering: An exterior wall covering complying with IBC Chapter 14 or IRC Chapter 7 must be installed over the exterior wall panels at the jobsite.

4.3.5 Roof Covering: The exterior (top) face of the roof panels must be protected by an approved roof covering complying with Chapter 15 of the IBC or Chapter 9 of the IRC, as applicable.

4.3.6 Interior Finishes: Interior finishes for walls, ceiling and floor must be provided and comply with Chapters 8 and 25 of the IBC or Chapters 3 and 7 of the IRC, as applicable.

4.4 Special Inspection:

Special inspection for installation at the jobsite must comply with applicable sections in IBC Chapter 17.

5.0 CONDITIONS OF USE:

The Off-Site Timber Building System panels described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Off-Site Timber Building System panels are fabricated, identified and erected in accordance with this report and the manufacturer's published installation instructions. If there are any conflicts between the manufacturer's published installation instructions and this report, the more restrictive governs.

5.2 Design loads to be resisted by the panels must be determined in accordance with the applicable code and must not exceed the design loads established in the approved construction documents.

5.3 Construction documents, including engineering calculations and drawings providing floor plans, wall details, including window and door details, and connection details, must be submitted to the code official when application is made for a permit, verifying compliance with this report and the applicable code. The design calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.4 Structures built with the Off-Site Timber Building System must be protected by an approved exterior wall covering, roof covering and interior finishes. Evaluation of the exterior wall covering, roof covering and interior finishes are outside the scope of this report and shall comply with Sections 4.3.4, 4.3.5 and 4.3.6, respectively.

5.5 The panels and their attachments at the jobsite must be subject to inspection by the code official prior to exterior/interior covering, as applicable. Special inspection shall be as required in Section 4.4.

5.6 Use of the panels is limited to Type V residential occupancies under the IBC and one and two-family dwellings under the IRC.

5.7 The panels must be protected against decay and termites in accordance with IBC Sections 2304.12 or 2024 IRC Section R304 (2021, 2018 and 2015 IRC Section R317), as applicable.

5.8 For use of the panels under the IRC, the panels are limited to an engineered design under IRC Section R301.1.3, engineered in accordance with the provisions in this evaluation report.

5.9 The foundation supporting the building's floor panels is outside the scope of this report and must be designed by a registered design professional.

5.10 On-site inspection of components of the building not evaluated under this acceptance criteria shall be conducted in accordance with Section 104.3 of ICC/MBI 1200 and ICC/MBI 1205.

5.11 Manufacturing of the Off-Site Timber Building System panels are under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Construction documents in accordance with applicable sections of 2023 ICC-G6 Guideline on Advance Panelization for Buildings.

6.2 Data in accordance with ASTM E84 for mineral wool insulation.

6.3 Quality documentation in accordance with the ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated May 2022.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-5457) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.

7.2 In addition, Off-Site Timber Building System panels shall be identified with a label that includes Production site, Project name, Project ID and Panel ID (Type and serial number).

7.3 The report holder's contact information is the following:

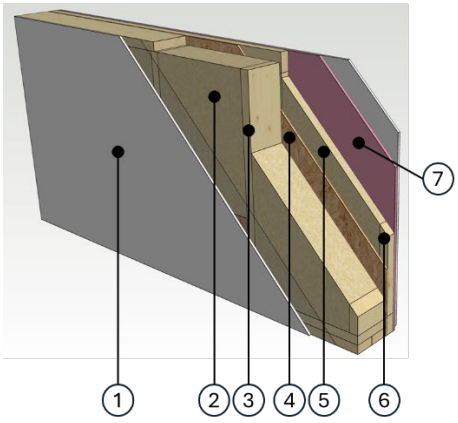
KPS BUILDING CONTRACTING LLC
12A DAMAC BUSINESS TOWER, BUSINESS BAY
DUBAI, DUBAI 111727
UNITED ARAB EMIRATES
www.kpsworld.com
971 50 6252681

TABLE 1—PANEL IDs AND DIMENSIONS[1,2]

PANEL ID	WALL PANELS						
	WIDTH OR LENGTH (in.)		HEIGHT (in.)		THICKNESS RANGE (in.)		OPENINGS width (in) x ht. (in)
	Min.	Max.	Min.	Max.	Min.	Max.	
Exterior Wall – EW	16	453	16	130	8.1	9.4	varies
Interior Wall 1 - IW	16	453	16	130	4.6	9.4	varies
PANEL ID	**ROOF PANEL**						
	SPAN (in.)		**LENGTH (in.)**		**THICKNESS (in.)**		**PITCH**
	Min.	Max.	Min.	Max.	Min.	Max.	
Roof/ceiling panel - RP	20	453	20	453	9.4	25	min 2% (min 1/4:12 roof slope)
PANEL ID	**FLOOR PANEL**						
	SPAN (in.)		**LENGTH (in.)**		**THICKNESS (in.)**		**Not applicable**
	Min.	Max.	Min.	Max.	Min.	Max.	
Floor panel - FP	20	453	20	453	9,4	25	Not applicable

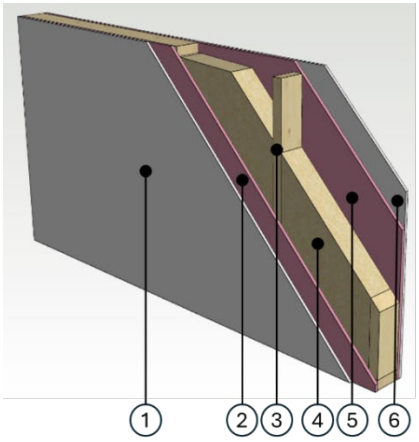
For **SI:** 1 inch = 25.4 mm, 1 foot = 304.8 mm.

[1] Wall, roof and floor panels must comply with approved construction documents.
[2] Wall panels with openings must be framed with headers as details in the approved construction documents.



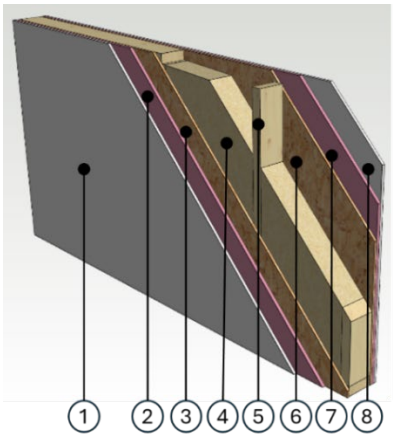
Material
1. Facade material *(Not included in this report)*
2. Thermal insulation, Mineral wool 195mm
3. Wall studs 45x195mm
4. OSB 7/16 (11mm), 24/16
5. Thermal insulation, Mineral wool 45mm
6. Furring strip 45x45mm
7. Gypsum Board *(Not included in this report)*

FIGURE 1A—ILLUSTRATION OF TYPICAL EXTERIOR WALL PANEL



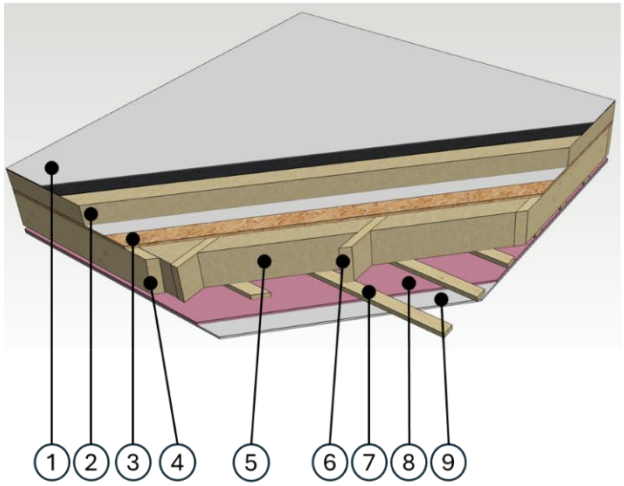
Material
1. Gypsum Board *(Not included in this report)*
2. Gypsum Board Type X *(Not included in this report)*
3. Thermal insulation, Mineral wool 95-195mm
4. Wall studs 45x95-195mm
5. Gypsum Board Type X *(Not included in this report)*
6. Gypsum Board *(Not included in this report)*

FIGURE 1B—ILLUSTRATION OF TYPICAL INTERIOR WALL (LOAD BEARING, VERTICAL LOADS



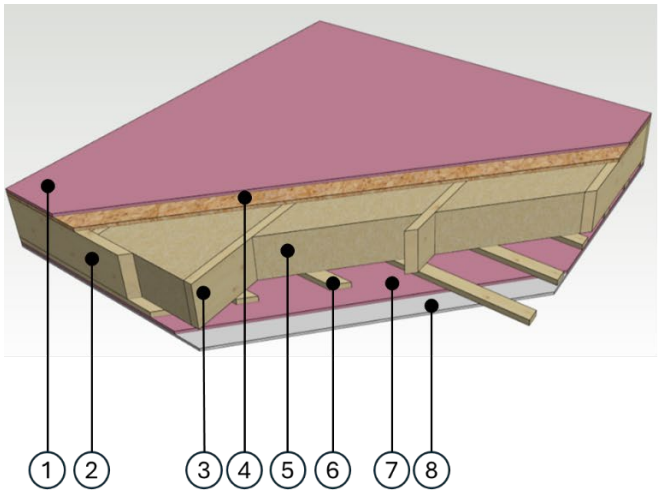
Material
1. Gypsum Board *(Not included in this report)*
2. Gypsum Board Type X *(Not included in this report)*
3. OSB 7/16 (11mm), 24/16
4. Thermal insulation, Mineral wool 95-195mm
5. Wall studs 45x95-195mm
6. OSB 7/16 (11mm), 24/16
7. Gypsum Board Type X *(Not included in this report)*
8. Gypsum Board *(Not included in this report)*

FIGURE 1C—ILLUSTRATION OF TYPICAL INTERIOR WALL (LOAD BEARING, SHEAR WALL)



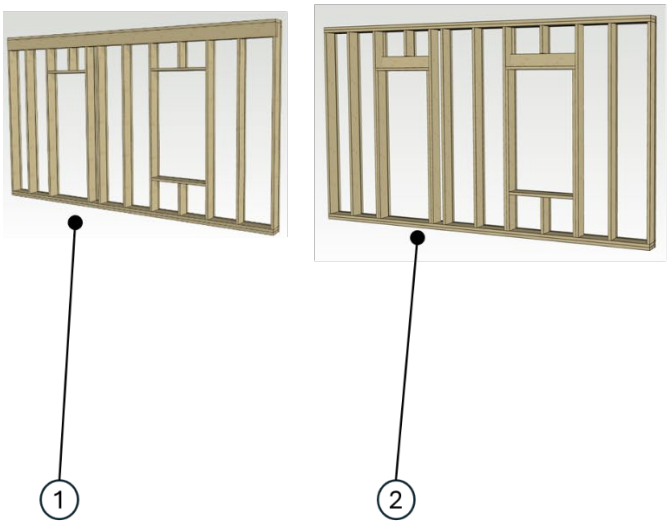
Material
1. Roof surface material *(Not included in this report)*
2. Thermal insulation, Mineral wool *(Not included in this report)*
3. OSB 23/32 (18mm), 24oc
4. Rim Board/joist 45x220mm
5. Thermal insulation, Mineral wool 220mm
6. Roof joists 45x220mm
7. Spaced boarding 28-34x45-70mm *(Not included in this report)*
8. Gypsum Board Type X *(Not included in this report)*
9. Gypsum Board *(Not included in this report)*

FIGURE 2— ILLUSTRATION OF TYPICAL ROOF/CEILING PANEL



Material
1. Floor surface material *(Not included in this report)*
2. Rim Board/joist 45x220mm
3. Floor joists 45x220mm
4. OSB 23/32 (18mm), 24oc
5. Thermal insulation, Mineral wool 220mm
6. Spaced boarding 28-34x45-70mm *(Not included in this report)*
7. Gypsum Board Type X *(Not included in this report)*
8. Gypsum Board *(Not included in this report)*

FIGURE 3— ILLUSTRATION OF TYPICAL FLOOR PANEL

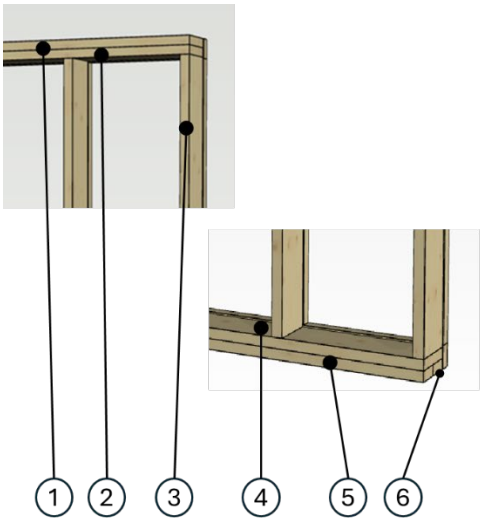


Type
1. Top Plate 45x195mm, Top Plate vertical 45x220mm
2. Double Top Plate 45x195mm

FIGURE 4A— ILLUSTRATION OF TYPICAL EXTERIOR WALL PANEL FRAMEWORK

Material
1. Wall Top Plate 45x195mm
2. Wall Top Plate 45x220mm
3. Wall Stud 45x195mm
4. Wall Bottom Plate 45x195mm
5. Sill Plate 45x95mm (on wall)
6. Sill Plate 45x95mm (on foundation)

FIGURE 4B— ILLUSTRATION OF TYPICAL WALL PANEL VERTICAL TOP PLATE



Material
1. Wall Top Plate 45x195mm
2. Wall Top Plate 45x195mm
3. Wall Stud 45x195mm
4. Wall Bottom Plate 45x195mm
5. Sill Plate 45x95mm (on wall)
6. Sill Plate 45x95mm (on foundation)

FIGURE 4C— ILLUSTRATION OF TYPICAL WALL PANEL DOUBLE TOP PLATE