ALC (Aerated Lightweight Concrete) Panel

Picture Taken At: PROJECT @ NATIONAL UNIVERSITY SINGAPORE
**INTRODUCTION**

**History**
VODAPRUF Pte Ltd was founded in Year 2013, focus in the manufacturing of Lightherm (Lightweight Concrete), and recent year branched into the manufacturing of vPanel (ALC Panel - Aerated Lightweight Concrete Panel).

**Our Factory**
Is located in Kulai, Johor Bahru (Malaysia) which is only 35km from Singapore, producing Lightherm & vPanel (ALC Panel). Our sales office is located in Singapore.

**Time Line**
**Year 2013**
Incorporated in Singapore by Managing Director Wang Wee Hwa, started operation as a trading company.

**Year 2014**
Rented first office in Singapore, set up packing machinery for Lightherm manufacturing.

**Year 2015**
Shifted production plant to Malaysia, started EPS (expanded polystyrene) manufacturing in Senai, Johor Bahru.

**Year 2016**
Set up second factory to produce vPanel (ALC Panel) in Kulai, Johor Bahru.

**Year 2017**
Expanded factory over a 2 acres land.

**Year 2018**
- Acquired more than 230 projects for Lightherm concrete project.
- Franchise - Manufacturing - Partner in Korea, China and Phillipines.

**Year 2019**
- Set up branch in Sarawak (Malaysia) producing vPanel - Block (ALC Block - Aerated Lightweight Concrete Block).
- Set up branch in Northern Island (UK) producing Lightherm (Lightweight Aggregate).

**LOCAL CAPACITY & INTERNATIONAL MARKET**

**Year 2020**
- vPanel production reaches an annual production capacity of 280,000m2.
- vPanel has been installed for more than 30 projects in both the private and government sectors. These include projects by HDB, MOH, JTC and other commercial and industrial projects, such as, data centres, food factory, manufacturing facilities, chemical plants and private residential projects.

- Cost Effective Semi Automated Production with a Productivity of 28,000M2 Per Month.
- In House Logistic for Just - In – Time Delivery.
- vPanel - Block (ALC Block - Aerated Lightweight Concrete Block).
- Branch in Northern Island (United Kingdom), Producing Lightherm Lightweight Aggregates.
- Franchisee in Phillipines (Local Production).
- Franchisee in Korea (Local Production).
ORGANIZATION STRUCTURE

CORPORATE VISION
To be a global leader in precast wall/block manufacturing through product customizer & chemical technology advancement.

CORE VALUE

INNOVATIVE
To come out with new creative ideas that have the potential to accelerate the building industry advancement.

HONESTY
To act with honesty and integrity towards our:
- Investor
- Supplier
- Customer
- Employee

PASSION
To serve the society and industry, and is driven by passion.
**PRODUCT INTRODUCTION**

vPanel is an Aerated Lightweight Concrete Panel (ALC Panel) made by VODAPRUFL PTE LTD, using a blend of cement and sieved sand. vPanel has acquired test certification in Singapore and Malaysia.

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th></th>
<th>vPanel 75</th>
<th>vPanel 100</th>
<th>vPanel 125</th>
<th>vPanel 150</th>
<th>vPanel 200</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dry Density kg/m³</td>
<td></td>
<td>650</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Wet Density kg/m³</td>
<td></td>
<td></td>
<td>750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Per m² Weight, KG</td>
<td>49kg</td>
<td>65kg</td>
<td>81kg</td>
<td>98kg</td>
<td>130kg</td>
</tr>
<tr>
<td>4. Thickness, mm</td>
<td>75mm</td>
<td>100mm</td>
<td>125mm</td>
<td>150mm</td>
<td>200mm</td>
</tr>
<tr>
<td>5. Panel Width, mm</td>
<td>600mm</td>
<td>600mm</td>
<td>600mm</td>
<td>600mm</td>
<td>600mm</td>
</tr>
<tr>
<td>6. Maximum Panel Length, mm</td>
<td>≤3000mm</td>
<td>≤4000mm</td>
<td>≤5000mm</td>
<td>≤6000mm</td>
<td>≤6000mm</td>
</tr>
<tr>
<td>7. Sound Transmission STC, ISO 140-3:1995</td>
<td>N/A</td>
<td>STC 39 (bare panel)</td>
<td>STC 50 (10mm plaster both face)</td>
<td>STC 56 (10mm plaster both face)</td>
<td></td>
</tr>
<tr>
<td>8. Thermal Conductivity, w/mk</td>
<td>0.125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Water Absorption (BS EN 772) Cw, s, 90min</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Strength &amp; Robustness (BS 5234 Part 2)</td>
<td>Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Fire rating (BS 476, Part 22:1987)</td>
<td>N/A</td>
<td>4 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Full Test Reports:**

1. Non Combustible Test Report, BS 476: Part 4
2. Compressive Strength Report, BS EN 12390-3:2009
3. Certificate of Conformity, COC Class 2
4. Certificate of Conformity, COC Class 1A
5. Fire Rating Report, BS 476: Part 22
8. Acoustic Test Report, ASTM E90
9. Robustness Test Report, BS 5234
10. PE Endorsement
11. Malaysia CIDB Certificate
12. Malaysia BOMBA Certificate
15. Singapore Environment Council, Green Label Certificate
17. TVOC and Formaldehyde Test, ASTM D5116-10

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**Can VODAPRUFL customise the length of vPanel?**

Yes, the maximum length of each thickness range is stated above. Customise length panel will takes a longer lead time but in some cases it can contribute in cost saving. Extra residual length of the panel can be cut and install using a staggered joint method, thus eliminating risk of wastage.
# vPANEL PROJECT REFERENCE

<table>
<thead>
<tr>
<th>Project Name / Location</th>
<th>Application</th>
<th>Profile</th>
<th>Developer / Owner</th>
<th>Architect</th>
<th>Structural Consultant</th>
<th>Main Contractor</th>
<th>Coverage</th>
<th>Date of completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG - Bungalow @ 42 Saraca Road</td>
<td>External &amp; Internal Wall</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>San Energy Pte Ltd</td>
<td>450m2</td>
<td>Jun 2017</td>
</tr>
<tr>
<td>SG - Childsree @ 93 Jurong West Street</td>
<td>Internal Wall</td>
<td>50mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>800m2</td>
<td>Mar 2017</td>
</tr>
<tr>
<td>SG - HDB @ 2888 Bukit Batok</td>
<td>Internal Wall</td>
<td>50mm</td>
<td>HDB</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6m2</td>
<td>Jan 2017</td>
</tr>
<tr>
<td>SG - Pet Farm @ S6 Sungai Tengah Road</td>
<td>External &amp; Internal Wall</td>
<td>100mm</td>
<td>JTC Corporation</td>
<td>WSP Consultancy</td>
<td>WSP Consultancy</td>
<td>Lim Ho Lee Construction Pte Ltd</td>
<td>25,000m2</td>
<td>Feb 2018</td>
</tr>
<tr>
<td>SG - Warehouse Project at Woodland</td>
<td>Internal Wall</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>300m2</td>
<td>April 2018</td>
</tr>
<tr>
<td>SG - Furnishing Contractor @ 14 Sungai Kudat Street 6</td>
<td>Internal Wall</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>240m2</td>
<td>May 2018</td>
</tr>
<tr>
<td>SG - Factory @ 25 Changi North Rise</td>
<td>External Wall, 8 metre height</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Architect Project Group LLP</td>
<td>600m2</td>
<td>Oct 2018</td>
</tr>
<tr>
<td>SG - Transformer room at 47 Julian Brough</td>
<td>External Wall</td>
<td>250mm</td>
<td>Radha Export Pte Ltd</td>
<td>Thymian Pte Ltd</td>
<td>Latitude Architects</td>
<td>Weirn Builders Pte Ltd</td>
<td>250</td>
<td>Oct 2018</td>
</tr>
<tr>
<td>Factory @ 11 Tuas Avenue 10</td>
<td>External Wall</td>
<td>100mm</td>
<td>JTC Corporation Pte Ltd</td>
<td>Pal Consultancy Pte Ltd</td>
<td>DAArcClub Architects</td>
<td>QFC Construction Pte Ltd</td>
<td>800m2</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Factory @ 103 Pioneer Road</td>
<td>External Wall</td>
<td>100mm</td>
<td>R.Glaze Singapore Pte Ltd</td>
<td>BK Consulting Engineers Pte Ltd</td>
<td>TWA Architecture</td>
<td>Media Construction Pte Ltd</td>
<td>2300m2</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Cheese Making Factory @</td>
<td>Internal Wall</td>
<td>100mm</td>
<td>Zebras Investments Ltd</td>
<td>-</td>
<td>GL Consulting and Services</td>
<td>Zebras Investments Ltd</td>
<td>450m2</td>
<td>Nov 2018</td>
</tr>
<tr>
<td>Industrial Building @ 60 Lorong 23 Keylong</td>
<td>External Wall</td>
<td>100mm</td>
<td>Koi Lim Builders Merchants Pte Ltd</td>
<td>CGM Engineering Consultant</td>
<td>D Arc Club Architects</td>
<td>Trust Build Pte Ltd</td>
<td>3500m2</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Keng Cheng Primary School @ 15 Lorong 3 Toa Payoh</td>
<td>External Wall</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Trust Build Pte Ltd</td>
<td>1800m2</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Factory @ Shipyards Crescent</td>
<td>External Wall</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Quadrion Builders Pte Ltd</td>
<td>3800m2</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Crai Nj Camp 3 - Extension</td>
<td>External &amp; Internal Wall</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Defence Science &amp; Technology Agency (DSTA)</td>
<td>2400m2</td>
<td>May 2018</td>
</tr>
<tr>
<td>Factory 4-Storey @ 23 Gul Awe</td>
<td>External &amp; Internal wall</td>
<td>100mm</td>
<td>JTC Corporation Pte Ltd</td>
<td>Pal Consultancy Pte Ltd</td>
<td>DAArcClub Architects</td>
<td>QFC Construction Pte Ltd</td>
<td>8000m2</td>
<td>Oct 2018</td>
</tr>
<tr>
<td>Factory 2-Storey @ [LINDE GAS] @ Jurong Island</td>
<td>Internal wall</td>
<td>100mm</td>
<td>R.Glaze Singapore Pte Ltd</td>
<td>BK Consulting Engineers Pte Ltd</td>
<td>TWA Architecture</td>
<td>Media Construction Pte Ltd</td>
<td>23000m2</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Industrial building at 60 Marsiling Road, 7-Storey</td>
<td>External &amp; Internal wall</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2500m2</td>
<td>Jan 2020</td>
</tr>
<tr>
<td>Sengkang N3 C29 Neighbourhood Centre</td>
<td>External &amp; Internal</td>
<td>100mm</td>
<td>HDB</td>
<td>-</td>
<td>-</td>
<td>HDB</td>
<td>4500m2</td>
<td>Q1 2020</td>
</tr>
<tr>
<td>Data Centre at Sunview Drive</td>
<td>Internal</td>
<td>150mm</td>
<td>Equinix SCS-1</td>
<td>AWP</td>
<td>-</td>
<td>AWP</td>
<td>3000m2</td>
<td>Q1 2020</td>
</tr>
<tr>
<td>Industrial Building At Ubi Road 4</td>
<td>External &amp; Internal</td>
<td>100mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Jurong Town Corporation</td>
<td>9300m2</td>
<td>Q1 2020</td>
</tr>
</tbody>
</table>

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**VODAPRUF**

05
Singapore
As external & internal wall - Profile thickness of 100mm – 4 - Storey Industrial Building @ 25 Tanjong Penjuru
WHY US?

Why VODAPRUF ALC Panel instead of other ALC panel supplier

01 Why VODAPRUF

02 Comparison with Hollow Core Panel

03 Comparison with Drywall System

04 Comparison Table

05 Labour Saving Index Comparison

LOW PRICE.
VODAPRUF is the only ALC Panel supplier in Singapore that in-house manufacture the panel. Without an intermediate 3rd party, this enable us to provide a better price offer to our customer.

ADVANCE MANUFACTURING.
Enable us to provide JIT (Just in Time) manufacturing for special urgent request.

CLOSE PROMIXTY.
Factory located in Kulai, which is only 35 kilometers from Singapore. Lead time of within 48 hours upon receive customer site instruction time deliver goods.

2 ACRE SPACE.
Enable us to stock up to 80,000m² of panels for our client.

High Level Of Available Stock.

Low Storage Fee.
IN HOUSE LORRY.
Ease on aliasing work, thus short lead time of within 48 hours upon receive site instructions.

QUALITY CONTROL.
Ensuring proper loading, proper transportation and proper unloading to eliminate defects due to transportation.

24 HOURS DELIVERY.
During crisis or urgent period, we are able to delivery anytime and any day in a week.

VODAPRUF vPanel (ALC Panel)

Full certificate available.

Lowest price guaranteed.

ON SITE TRAINING.
Provide on site installation guidance to installer.

TECHNICAL SUPPORT.
For the preparation of shopdrawing and drafting works.

AUTHORITY SUBMISSION.
Strong assistant in the submission of DOC (Declaration of Conformity) for fire rated wall.
## COMPARISON WITH HOLLOW CORE PANEL

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
<th>vPanel (900 Density 900kg/m³, custom made for specific areas)</th>
<th>vPanel 550 Standard Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sound Insulation (ASTM E 90)</td>
<td>STC 46</td>
<td>vSTC 46 without plaster or skim with skim both sides, STC 42 with plaster both sides, STC 50</td>
</tr>
<tr>
<td>2</td>
<td>Thermal Conductivity (K-value) (ASTM C 318)</td>
<td>0.74 W/m-K</td>
<td>0.385 W/m-K</td>
</tr>
<tr>
<td>3</td>
<td>Thermal Resistance (R-value) (ASTM C 318)</td>
<td>0.15 m²K/W</td>
<td>0.256m²K/W</td>
</tr>
<tr>
<td>4</td>
<td>Fire rating (BS476: Part 22)</td>
<td>Integrity: 2 hours</td>
<td>Integrity: 4 hours</td>
</tr>
<tr>
<td>5</td>
<td>Compressive strength - Cube Test (BS EN 772)</td>
<td>46 N/mm²</td>
<td>5 N/mm²</td>
</tr>
<tr>
<td>6</td>
<td>Compressive strength - Section (BS EN 772)</td>
<td>34 N/mm²</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>Bending strength (AAC2.5/BS EN 772 Part 6)</td>
<td>4.4 N/mm²</td>
<td>N/A</td>
</tr>
<tr>
<td>8</td>
<td>Water absorption (SS 271)</td>
<td>4.6%</td>
<td>N/A</td>
</tr>
<tr>
<td>9</td>
<td>Moisture Absorption-Drying Shrinkage (SS 271)</td>
<td>0.03%</td>
<td>N/A</td>
</tr>
<tr>
<td>10</td>
<td>Density (BS EN 772)</td>
<td>1450kg/m³</td>
<td>950kg/m³</td>
</tr>
</tbody>
</table>

## COMPARISON WITH DRYWALL SYSTEM PANEL

<table>
<thead>
<tr>
<th></th>
<th>vPanel – Lightweight insulation Panel, 100mm Drywall (120mm thick)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layers</td>
<td>1. Single product vPanel. Layer 1 - gypsum board</td>
</tr>
<tr>
<td></td>
<td>Layer 2 – C Channel Layer 3 – Rockwool Insulation Layer 4 – C Charlie Layer 5 – gypsum board</td>
</tr>
<tr>
<td>LSI (labour saving Index)</td>
<td>0.9</td>
</tr>
<tr>
<td>Hollowness (Non Solid Feeling)</td>
<td>No</td>
</tr>
<tr>
<td>Suitable for wet areas</td>
<td>Yes</td>
</tr>
<tr>
<td>Productivity</td>
<td>35m²/man/day</td>
</tr>
<tr>
<td>Fire Rating (BS 476 Pt 20)</td>
<td>240 minutes</td>
</tr>
<tr>
<td>On-Site Installation of Concealed Wiring, Ducting &amp; Pipework</td>
<td>After installation of wall, wall surface can be chased. Void within wall to be filled with packing material. By fitting services before closing up.</td>
</tr>
<tr>
<td>Surface Appearance</td>
<td>Smooth without skim coat</td>
</tr>
<tr>
<td>Joint Treatment</td>
<td>Acrylic based waterproofing and flexible tape is applied between abutting panel. Cementitious compound &amp; fibre tape is applied between abutting panel.</td>
</tr>
<tr>
<td>Waterproofing system between panels</td>
<td>Yes</td>
</tr>
<tr>
<td>Crack prevention system between panel joints</td>
<td>Yes</td>
</tr>
<tr>
<td>Crack prevention system between panel joints and ceiling and floor soffit</td>
<td>Yes</td>
</tr>
<tr>
<td>Fastener Types</td>
<td>Cavity Anchors</td>
</tr>
<tr>
<td>Weight (2.4 metre height)</td>
<td>180kg/m run</td>
</tr>
<tr>
<td>Sound Insulation</td>
<td>43.52 (depends on wall thickness)</td>
</tr>
<tr>
<td>External wall application</td>
<td>Yes</td>
</tr>
</tbody>
</table>

## STRENGTH AND ROBUSTNESS TEST SS492 OR BS5234 PART 2

<table>
<thead>
<tr>
<th>Item</th>
<th>Stiffness</th>
<th>SD (Severe Duty)</th>
<th>SD (Severe Duty)</th>
<th>SD (Severe Duty)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small Hard Body Impact: Surface Damage</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
</tr>
<tr>
<td>2</td>
<td>Small Hard Body Impact: Perforation</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
</tr>
<tr>
<td>3</td>
<td>Large Soft Body Impact: Damage</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
</tr>
<tr>
<td>4</td>
<td>Large Soft Body Impact: Structural Damage</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
</tr>
<tr>
<td>5</td>
<td>Door Slamming</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
</tr>
<tr>
<td>6</td>
<td>Crowd Pressure</td>
<td>3.0 kN/m</td>
<td>SD (Severe Duty)</td>
<td>SD (Severe Duty)</td>
</tr>
<tr>
<td>7</td>
<td>Lightweight Anchorage: Minimum Pull Out Force of 100N</td>
<td>Pass</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>8</td>
<td>Lightweight Anchorage: Minimum Pull Down Force of 250 N</td>
<td>Pass</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>9</td>
<td>Heavyweight Anchorage: Wash Basin</td>
<td>3500 N</td>
<td>3500 N</td>
<td>3500 N</td>
</tr>
<tr>
<td>10</td>
<td>Heavyweight Anchorage: Wall Cupboard</td>
<td>3500 N</td>
<td>4000 N</td>
<td>4000 N</td>
</tr>
</tbody>
</table>

### 4. KEY PRIMARY benefit of vPanel Lightweight Thermal Insulation Panel compared to drywall:

1. **INSULATION**
   - vPanel has good thermal insulation in a single product, while drywall will require the use of Rockwool for insulation feature.

2. **WATER RESISTANT**
   - Drywall’s gypsum board is moisture sensitive, thus not suitable to be used for wet areas unless with the usage of special water resistance type which is costly.

3. **SOLID AND NOT HOLLOW**
   - vPanel is non hollow, thus provided a “solid” feeling, while drywall is hollow.

4. **EXTERNAL WALL USE**
   - vPanel is suitable to be use for external wall as it passed the robustness test require and it is also water resistant.
## COMPARISON TABLE

### Thermal - Conductivity, Weight and Productivity

<table>
<thead>
<tr>
<th>Thermal Conductivity (W/mK)</th>
<th>WALL SYSTEM</th>
<th>DESCRIPTION</th>
<th>LABOUR SAVING INDEX Sw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traditional</td>
<td>Drywall (Mandatory Component) Dry partition wall for all internal dry areas (exclude party wall/toilet wall/kitchen wall) (applicable to residential non-landed projects only)</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Lightweight</td>
<td>Curtain wall/full height glass partition/dry partition wall/prefabricated railing</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>AAC</td>
<td>Prefabricated railing</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Brick</td>
<td>Dry partition wall</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Hollow Care</td>
<td>Dry Partition wall with tile/stone finishes</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>vPanel</td>
<td>Off-form precast concrete external walls and columns (4)</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precast concrete wall with skim coat 0.90 (1)</td>
<td>0.90 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precast concrete wall with plastering, tile/stone finishes</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Lightweight concrete panel with skim coat)</td>
<td>0.85 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light grey concrete panel</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cast In-situ RC Wall</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off-form cast in-situ RC external walls and columns (4)</td>
<td>0.80 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cast in-situ RC wall with plastering, tile/stone finishes</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precision blockwall</td>
<td>0.30 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precision blockwall with plastering, tile/stone finishes</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brickwall/Blockwall</td>
<td>Refer to Table 3 (5)</td>
</tr>
</tbody>
</table>

1. These indices also apply to the respective walls with no finishes or finishes done off-site.
2. Precast concrete walls refer to precast walls that are generally non-proprietary and manufactured to customise to a specific project.
3. Lightweight concrete panels include autoclaved lightweight concrete (ALC) panels, autoclaved aerated concrete (AAC) panels.
5. The use of brickwall/blockwall, once used, must be indicated and its wall length computed under the wall system.

Demerit points for the use of brickwall/blockwall will be computed under Table 3.

* Indicators for other systems not shown in this table shall be determined by BCA on a case-by-case basis.

## LABOUR SAVING INDEX COMPARISON

<table>
<thead>
<tr>
<th>WALL SYSTEM</th>
<th>DESCRIPTION</th>
<th>LABOUR SAVING INDEX Sw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drywall</td>
<td>Dry partition wall for all internal dry areas (exclude party wall/toilet wall/kitchen wall) (applicable to residential non-landed projects only)</td>
<td>1.00</td>
</tr>
<tr>
<td>Curtain wall/full height glass partition/dry partition wall/prefabricated railing</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Prefabricated railing</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Dry partition wall</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Dry Partition wall with tile/stone finishes</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Off-form precast concrete external walls and columns (4)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Precast concrete wall with skim coat</td>
<td>0.90 (1)</td>
<td></td>
</tr>
<tr>
<td>Precast concrete wall with plastering, tile/stone finishes</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>(Lightweight concrete panel with skim coat)</td>
<td>0.85 (1)</td>
<td></td>
</tr>
<tr>
<td>Light grey concrete panel</td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td>Cast In-situ RC Wall</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Off-form cast in-situ RC external walls and columns (4)</td>
<td>0.80 (1)</td>
<td></td>
</tr>
<tr>
<td>Cast in-situ RC wall with plastering, tile/stone finishes</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Precision blockwall</td>
<td>0.30 (1)</td>
<td></td>
</tr>
<tr>
<td>Precision blockwall with plastering, tile/stone finishes</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>Brickwall/Blockwall</td>
<td>Refer to Table 3 (5)</td>
<td></td>
</tr>
</tbody>
</table>

What is the minimum length of precast panel to achieve Labour Saving Index of 0.85? ✂

As per latest BCA circular, it would be 2.4 metre.
TECHNICAL DETAILS

1. 4 Type of Common Fixing Installation
2. Method of Statement
3. Test Report & Certificate
4. Detail Drawing

PART 1: 4 TYPES OF COMMON FIXING INSTALLATION

1. Light Duty
2. Medium Duty
3. Heavy Duty
4. Severe Duty
INSTALLATION
TOOLS YOU NEED

- Power Drill
- Hammer
- Screwdriver
- Drill Bit Set
- Angular Drill Bit
- Measuring Tape

Caution: De-activate the impact drilling mode when forming holes at the vPanel.

LIGHT
DUTY

PHOTO FRAME / MIRROR / WALL CLOCK / CLOTHING HOOK

Application: light-weight items.
Maximum Weight: up to 2kg per point

Concrete Nail Ø3mm x 40mm

STEP - BY - STEP

1. Place the Nail
2. Hammering
3. Place Attachment
**MEDIUM DUTY**

**CURTAIN RAIL SYSTEM / WALL FAN / FRAMED PAINTING / LARGE MIRROR / CLOTHING HOOK / LIGHT FITTINGS / SMALL BATHROOM FITTINGS / AIR - CONDITIONING INDOOR UNIT CCTV CAMERA**

Application: Medium weight items.

Maximum Weight: up to 10kg per point

**ACCESSORIES**

- Nylon / Plastic Wall Plug
- Wood Screw

**STEP - BY - STEP**

1. **Drill Hole**
2. **Insert Anchor**
3. **Place Attachment**
4. **Tighten Screw**

---

**HEAVY DUTY**

**WALL - HUNG CABINET / SHELF / WASH BASIN / URINAL FITTINGS / TOWEL RACKS / RESIDENTIAL DB BOX / AIR - CONDITIONING OUTDOOR UNITS / LARGE TV SCREEN**

Application: Heavy weight items.

Maximum Weight: up to 50kg per point

**ACCESSORIES**

- Nylon / Plastic Wall Plug

**STEP - BY - STEP**

1. **Drill Hole**
2. **Insert Wall Plug**
3. **Place Attachment**
4. **Tighten Screw**

---

**Wall Plug Size:**
- Up to 5kg: Ø 8mm x 40mm Hole Diameter x Min. depth: Ø 10mm x 30mm Screw Size: Ø 3 - 4mm x 30mm
- Up to 10kg: Ø 6mm x 30mm Hole Diameter x Min. depth: Ø 6mm x 40mm Screw Size: Ø 4 - 5mm x 30mm
- Up to 30kg: Ø 8mm x 50mm Hole Diameter x Min. depth: Ø 8mm x 50mm Screw Size: Ø 5 - 6mm x 50mm
- Up to 50kg: Ø 10mm x 50mm Hole Diameter x Min. depth: Ø 10mm x 60mm Screw Size: Ø 7 - 8mm x 50mm

---

**VODAPRUF**
ANCHORS NOT SUITABLE TO BE USED

Metal Anchor Bolt

Note:
1) The nylon plugs dimensions and information contained in the above table serves as a guide only.
2) Screw length should be selected ensuring full penetration into the anchor plug.
3) VODAPRUF does not supply these items.

INDUSTRIAL HEAVY ELECTRICAL DB / FIRE HOSE REEL / LARGE SIGNBOARD / NON - CANTILEVER AWNING

Application:
Heavy - weight items.

Maximum Weight:
up to 150kg per point

ACCESSORIES

Metal Sleeve Anchor
Coarse Threaded Screw

Wall Plug Size:
6mm x 30mm
Hole Diameter x Min depth:
6mm x 50mm
Screw Size:
6mm x 50mm

Wall Plug Size:
8mm x 50mm
Hole Diameter x Min depth:
8mm x 75mm
Screw Size:
8mm x 50mm

Threaded Rod

Threaded Rod Size:
8mm and 10mm diameter with a 50mm minimum embedment

STEP - BY - STEP

1. Drill Hole
2. Insert Anchor
3. Place Attachment
4. Tighten Screw

1. Drill Hole
2. Remove Dust
3. Insert Sleeve
4. Inject Chemical Mortar
5. Insert Bolt
6. Fix Bracket / Nut

VODAPRUF
PART 2: CONDUIT INSTALLATION

INSTALLATION TOOLS YOU NEED

Wall Chaser
Angle Grinder
Hammer
Chisel
Measuring Tape
Level Tool

CONDUIT

ELECTRICAL PIPING / WATER PIPING / AIR-CONDITIONING PIPING

1. Mark chase location
2. Cut chase lines
3. Remove waste pieces
4. Clean dust
5. Insert conduit
6. Mortar patch
7. Embed Fibreglass Tape & Top Up with Skim Coat Base / Render
8. Skim Coat / Render

This includes adding electrical wiring or plumbing works that necessitate formation of chases on vPanel.

Chase Width = Pipe Outer Dimension + 20mm
Chase Depth = Pipe Outer Dimension + 8mm min.
Before the vPanel installation, please refer to project design shopdrawing to identify the location and dimension of wall. Installation of stiffener and lintel are to be completed before the installing of vPanel.

For first storey, a minimum 100mm of RC kerb to be construct before vPanel installation.

Cutting of vPanel to necessary length and dimension. vPanel comes with standard dimension of 600mm (W) x 3000mm (L).

**What are the other accessories that is needed to purchase to install vPanel?**

1. vNail (one L-bracket with two 100mm v shaped nail) - fastening of panel to slab and hollow section.
2. AAC joint mortar - as a filler mortar to panels joints and gap.
   Both material is commonly available in Singapore construction material supplier shop. Customer can also choose to buy through VODAPRUF.

**Will the product warranty be voided when we are not using VODAPRUF accessories?**

No. Product comes with warranty of performance and there is no need to buy the commonly available accessories from VODAPRUF. VODAPRUF objective is to provide the most economical-yet-quality solution system to the industry.
METHOD OF STATEMENT

Lifting the vPanel to installation area. As vPanel is under lightweight, it can be lift up easily by 2-3 workers. For Height level of installation, a scissor lift / boom lift is required to lift up the vPanel.

For Height level of installation, a scissor lift / boom lift is required to lift up the vPanel.

Apply cement on the panel installation area.
METHOD OF STATEMENT

Transfer the vPanel to the installation position. Secure the panel with stiffener / column by using vNail on both sides of the vPanel.

Installation of L - Brackets on both side of vPanel to Stiffener / Column.

FB-40 frame Bracket with Double Pin Lock

<table>
<thead>
<tr>
<th>Code</th>
<th>(A)</th>
<th>(B)</th>
<th>(C)</th>
<th>Thickness</th>
<th>Packing</th>
</tr>
</thead>
<tbody>
<tr>
<td>FB - 40</td>
<td>40</td>
<td>50</td>
<td>150</td>
<td>3</td>
<td>20 pcs / box</td>
</tr>
</tbody>
</table>

*All Measurement in (MM)*

Pin Lock Length: 150mm

How is vPanel fastened to the slab soffit and r.c slab?

It can be done using traditional rebar method or using vNail as per picture.
Repeat the same method to continue the remaining vPanel installation.

Every joint of the panel-panel connection to be covered by fiberglass mesh and cement. Connection of panel to stiffener, to be covered by steel mesh and cement.

After that, proceed to skim coat application, before applying paint on the wall.

For external wall, waterproofing is required after the vPanel installation, with fiberglass mesh.

For external wall, Plastering layer to be applied after waterproofing.

Only then skimcoat and paint application.
ROBUSTNESS TEST REPORT, BS 5234

Performance Test of Partition Wall System Using VODAPRUF VPANEL Wall System of 100mm THK

Tested with Reference to BS 5234: Part 2: 1992 or SS 492: 2001

Tested for: VODAPRUF PTE LTD
63 Admiralty Street #02-12
Singapore 77445

Prepared by: Ng Kuang Xiong
Higher Associate Engineer

Approved by: Tan Boon Keong
Assistant Vice President, Building & Acoustics Group
Mechanical Centre

Summary of Test Results:
- Test for grade compliance: Passed
- Tests for load on partition walls:
  - Light weight anchorage - Full cut: 100% Achieved
  - Light weight anchorage - Full down: 250% Achieved
  - Honey weight anchorage - Punched: 100% Achieved
  - Honey weight anchorage - Pull out: 100% Achieved

Conclusion:
- All test results other than those for honey weight anchorage have met the BS 5234 grade category of 90% BS 8203 Part 2, 1992 or SS 492:2001.
- The results of load on partition walls have also met the requirements of 100% BS 8203.
- VODAPRUF VPANEL partition system of 100mm THK has also achieved the following performance:
  - Vertical load on partition walls: 2000 kg
  - Horizontal load on partition walls: 1000 kg

Signatures:
Ng Kuang Xiong
Higher Associate Engineer
Tan Boon Keong
Assistant Vice President, Building & Acoustics Group
Mechanical Centre
WATER ABSORPTION TEST

Table 1. Test result for test duration of 15 minutes.

<table>
<thead>
<tr>
<th>Specimen Ref.</th>
<th>Gross Area (m²)</th>
<th>Coefficient of water absorption due to Capillary Action (g/m²)</th>
<th>Average Coefficient of Water Absorption due to Capillary Action (g/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>1000</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
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<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>1000</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Remarks: Waterproofing: No

Table 2. Test result for test duration of 30 minutes.

<table>
<thead>
<tr>
<th>Specimen Ref.</th>
<th>Gross Area (m²)</th>
<th>Coefficient of water absorption due to Capillary Action (g/m²)</th>
<th>Average Coefficient of Water Absorption due to Capillary Action (g/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000</td>
<td>5</td>
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<tr>
<td>2</td>
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<td>5</td>
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</tr>
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<td>4</td>
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<td>5</td>
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<td>5</td>
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</tr>
<tr>
<td>6</td>
<td>1000</td>
<td>5</td>
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</tr>
</tbody>
</table>

COMPRESSION STRENGTH REPORT, BS EN 12390-3 : 2009

Test Report No. 7362319085-9GEG51701
Date: 15th June 2017

PROJECT:
Determination of Compressive Strength & Density of Three (3) In Situ Cube Samples Per Strand

TESTED FOR:
VODAPRUFS BY SUD
BD Accredited No. PD 112

DATE OF TEST:
15th June 2017

TEST SPECIFICATION:
The test was conducted in accordance with BS EN 12390-3:2009 "Compressive Strength of Thin-Slab Concrete and BS EN 12390-3:2009 "Testing of Hydraulic Cement".

TESTING LOCATION:
TÜV SÜD Pte Ltd (East), 10A Tong Ah Road, #05-01/02, Singapore 428472

TESTER:
Mr. Wang Zhi Teng

TEST RESULTS:

<table>
<thead>
<tr>
<th>Test Results</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample (No)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Compressive Strength (MPa)</td>
<td>51</td>
<td>52</td>
</tr>
<tr>
<td>Density (g/cm³)</td>
<td>2.96</td>
<td>2.94</td>
</tr>
<tr>
<td>Water Absorption (g/m²)</td>
<td>5.4</td>
<td>5.3</td>
</tr>
<tr>
<td>Compressive Strength at 28 Days (MPa)</td>
<td>5.8</td>
<td>5.9</td>
</tr>
</tbody>
</table>
SINGAPORE GREEN BUILDING PRODUCT CERTIFICATE

AWARDED TO
Vodaprub Pte Ltd
8B Admiralty Street #08-12
Singapore 757440
FOR THE PRODUCT
Block and Wall Panel

PRODUCT BRAND
VODAPRUF

PRODUCT MODEL
VPANEL

THE PRODUCT HAS BEEN ASSESSED ACCORDING TO THE ASSESSMENT CRITERIA OF SINGAPORE GREEN BUILDING PRODUCT CERTIFICATION SCHEME. IT HAS BEEN AWARDED THE RATING:

Director
SGBC Pte Ltd

Certificate Number | Original Issue Date | Revised Date | Valid Till
---|---|---|---
SGBP 3271 | 24 February 2020 | - | 23 February 2022

✔️ Good ✔️ Very Good ✔️✔️ Excellent ✔️✔️✔️ Leader

The use and reliance on this certificate is subject to the terms and conditions of the Singapore Green Building Product Certification Scheme. Revised certificates may also be issued at the discretion of the Council. The certification status may be verified at the Singapore Green Building Council website (www.sgbc.sg).
What is the maximum height of panel can goes before we need to a lintel?

What is the maximum height of wall if the panel is 100mm and with the combination with lintel and stiffener?

Refer above.
**DETAIL DRAWING**

**ALC Panel Wall with Steel Stiffener (w/o Steel Lintel)**

**NOTE:**
No Lintel to be provided if Wall Height is not exceeding 4.3m

**VODAPRUF**

80 Admiralty Street #06-12,
Singapore 757440

**PROJECT:** KHENG CHENG SCHOOL

**VPANEL CONNECTION-HORIZONTAL APPLICATION**

**DRAWING NUMBER:** VDP-VP-002

**DATE:** 22 NOV 2019

**SCALE:** 1:75

**CHECKED BY:** WANG

**AUL**

**broken image**
For industrial project, what if the wall is higher than question 2 above?

Install a transfer beam (RC or Steel beam) and repeat the installation method.
EXAMPLE OF PANEL ORIENTATION 2
**Step 1:**
Cut Groove using circular blade (use blade head for steel material to ensure max. groove depth 50mm

**Step 2:**
Insert pipes/M&E unit

**Step 3:**
Patch back with non shrunk grout

**Step 4:**
Plaster or Plaster-Skim Coat

**Embedded BRC mesh**

**vPanel - ALC Panel**