JOE Green Presentation – English

The Future of Green Concrete Revolution

JOE™ just one earth

Gramata™
Lightweight Green Aggregates

LiGrA™
Lightweight Green Aggregates

The Art of Lightweight Technology

GREEN MANUFACTURER

ZERO WASTE MANUFACTURER

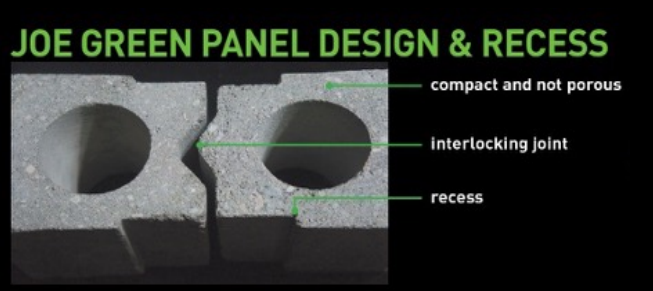
RECYCLED GREEN CONCRETE

QUALITY

SUPER LIGHT WEIGHT

SUPER FLAT SKIM COAT ONLY

8M CUSTOMIZED DESIGN & SIZES EASY HOUSEKEEPING



Pull-off test (Per Point Load):

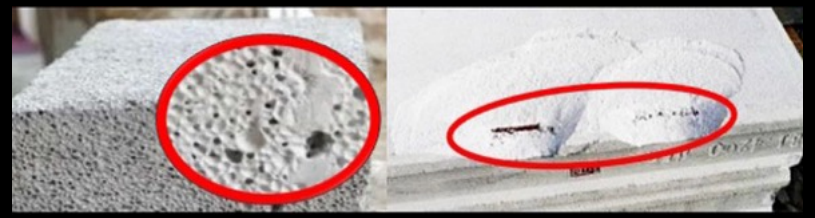
- Hollow 400 kg
- Solid 1.2 tones

Other types of wall panels

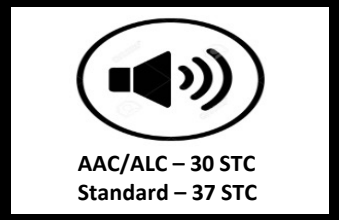
Porous and wavy, design without recess

Susceptible to Cracking (Vibration)

AAC Block



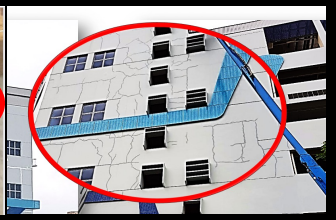
Porous, Corrodes BRC inside, Bending and No Strength



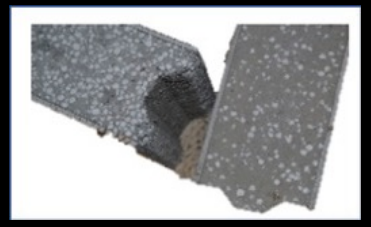
Inconsistent Sound Level

Water Mark

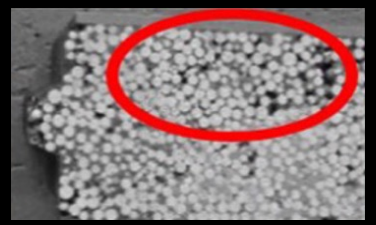
Moldy/fungus wall



External Cracking



Sandwich Panel/EPS Beads



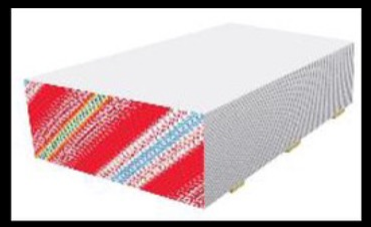
Inconsistent Quality

Low Strength

Joint Crack and Peel Off

Debonding

Flammable and Toxic Fumes

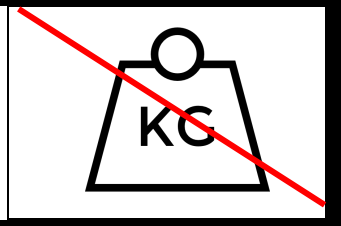


Gypsum Board

Water Seepage

Mold and Fungus

Low Strength



Low Sound Insulation

The risk of wall panels with materials shown above:

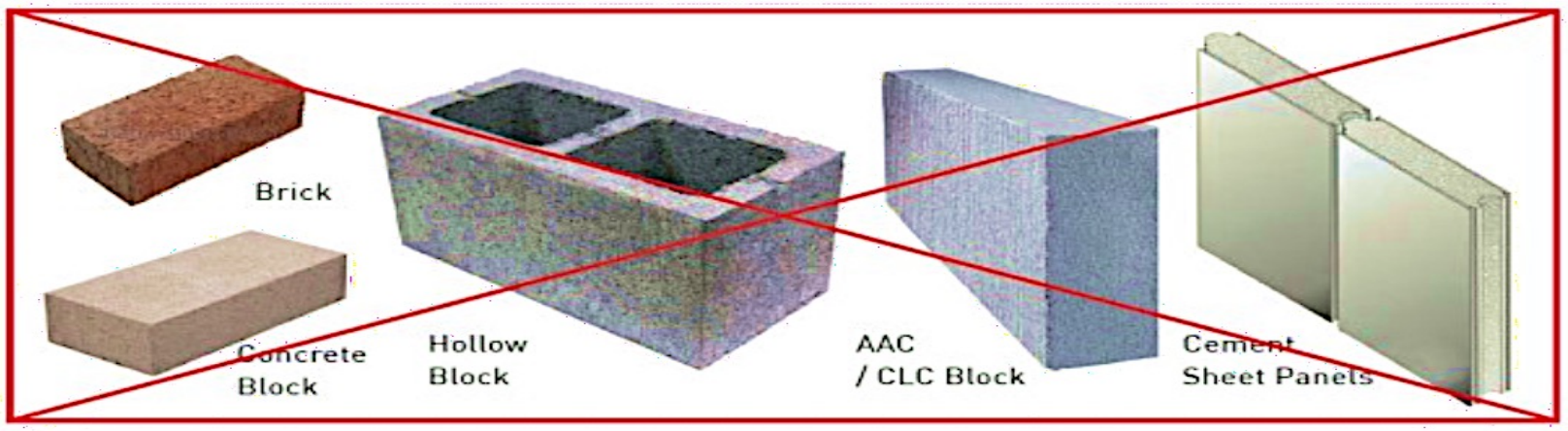
1. Spider & Joint Cracks
2. Water Absorption/Seepage
3. Fungus & Mold
4. High Risk of Flammable Materials
5. Low Heat & Sound Insulation
6. Toxic Fumes
7. Corrosive Materials
8. Debonding
9. Deflection/ Uneven Surface
10. Airborne Diseases

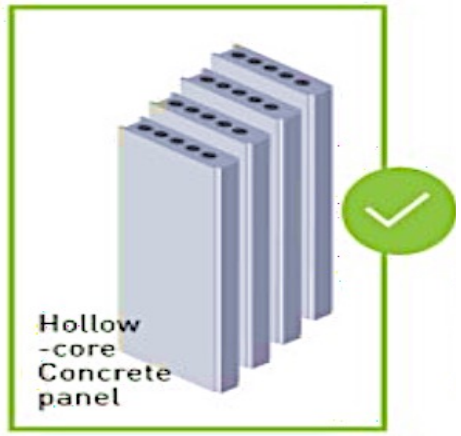
There are 2 Fire Resistance Requirements:

1. Integrity
   - Still Intact
   - Not Collapsed
   - Not Burned
2. Insulation
   - Time for heat to penetrate the wall

Comparison : Concrete Hollow Core Wall Panels v/s ACC Blocks

green concrete panel

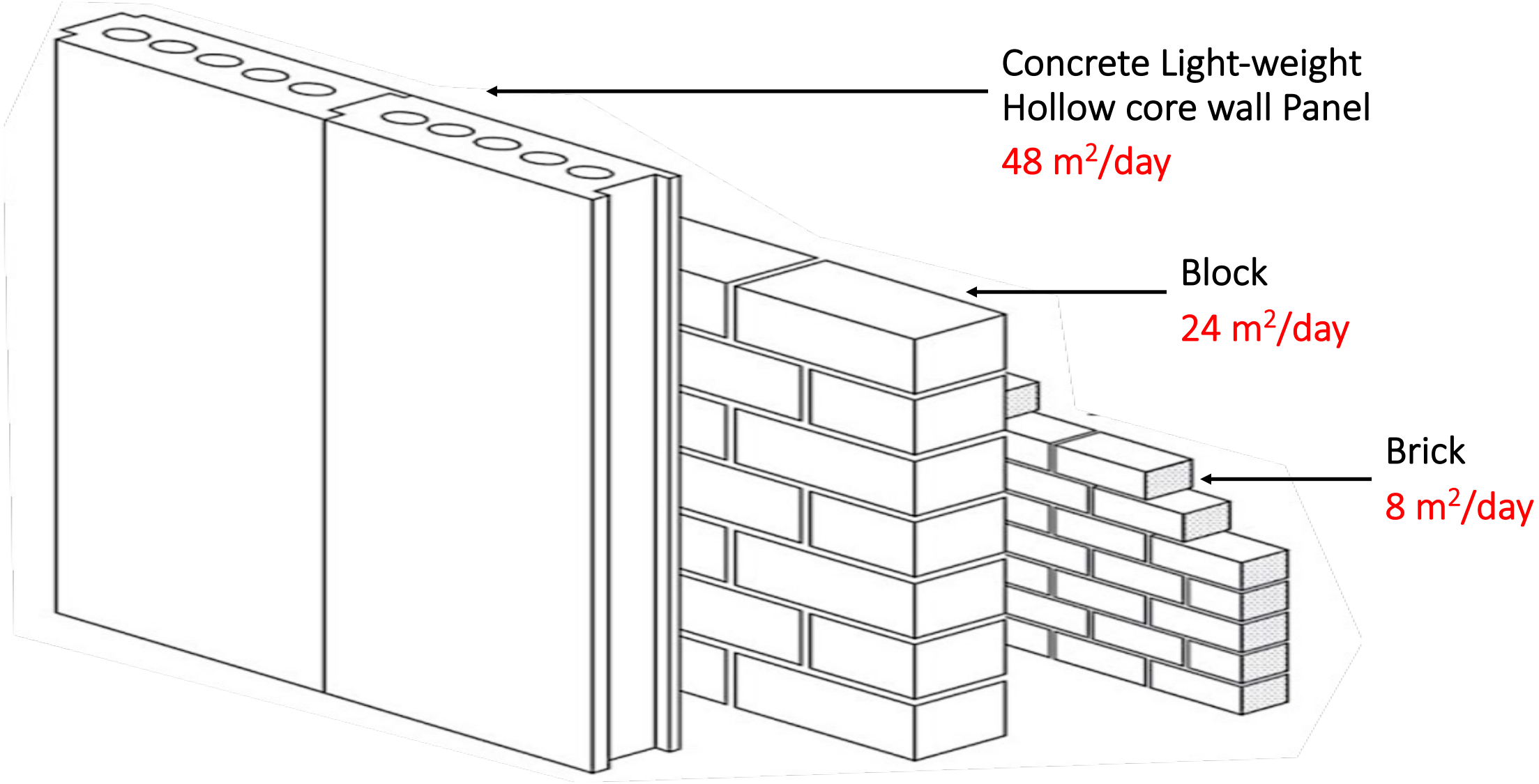




- **Very Quick & Easy to Install, Save Time ad minimize the need of skilled labor.**
- **3-4 person's team can install 48-50 m^2 per day. (5 times faster than Traditional method)**
- **Wall Panels are made of High Strength Concrete with flatness, hence no need of cement mortar plastering. Just thin skim coating of 1-3mm only.**
- **Excellence Resistance to wet condition, most ideal for kitchen, bathroom, external and internal walls.**
- **Complete Wall System very competitive with Other Conventional material like AAC / Solid Concrete Blocks & Bricks.**
- **For super large-scale project, panel production can be at Site, saving on transportation, import tax and custom charges.**
- **Increase Floor Area in comparison to traditional material, saving from plaster thickness.**
- **Easy for M&E Installation with just coring and insertion of flexible conduits, saving times, cost and debris clearing.**
- **Minimum Lintel and Stiffeners and no RC Kerb required.**
- **Less number of joints and mortar adhesive usage as compared to traditional masonry.**
- **Lighter Weight compared to Masonry with plaster, saving in Structural cost.**
- **Very High Compressive Cube Strength of 40-50 Mpa.**
- **Very High Sound Barrier Insulation of 46-49 STC.**
- **Clean and Neat Construction Site with less wastage and debris.**
- **Saving in transportation of bricks/ Cement, water, scaffolding, etc..**
- **Being Hollow core, less blockage and interference to Wifi, internet networks.**
- **Better Performance is Strength and robustness performance under seismic situation.**

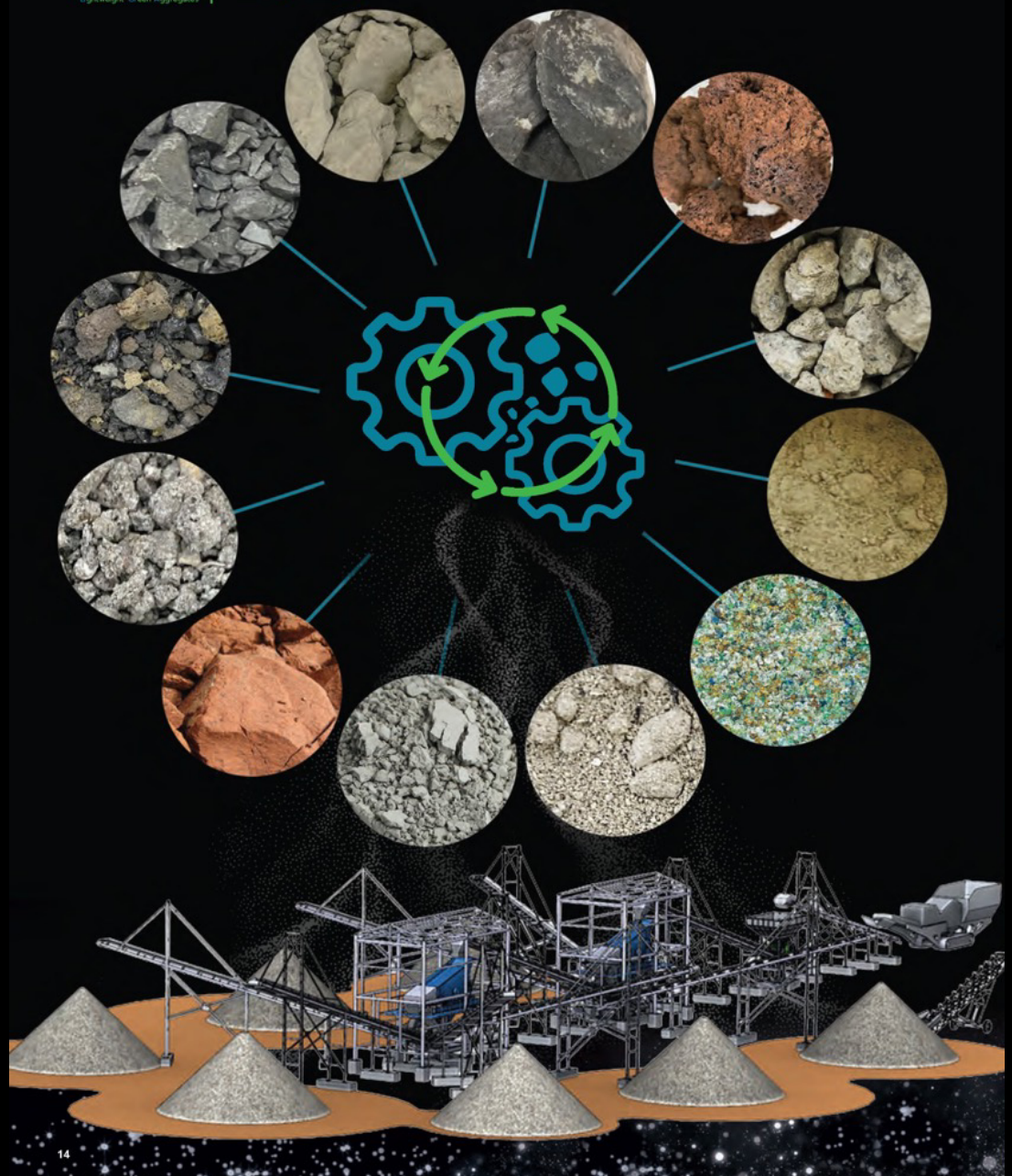
Comparison : Concrete Hollow Core Wall Panels v/s ACC Blocks

Installation Speed



JOE™ | Various Industrial Wastes

LiGrA™ Lightweight Green Aggregates | Recycling

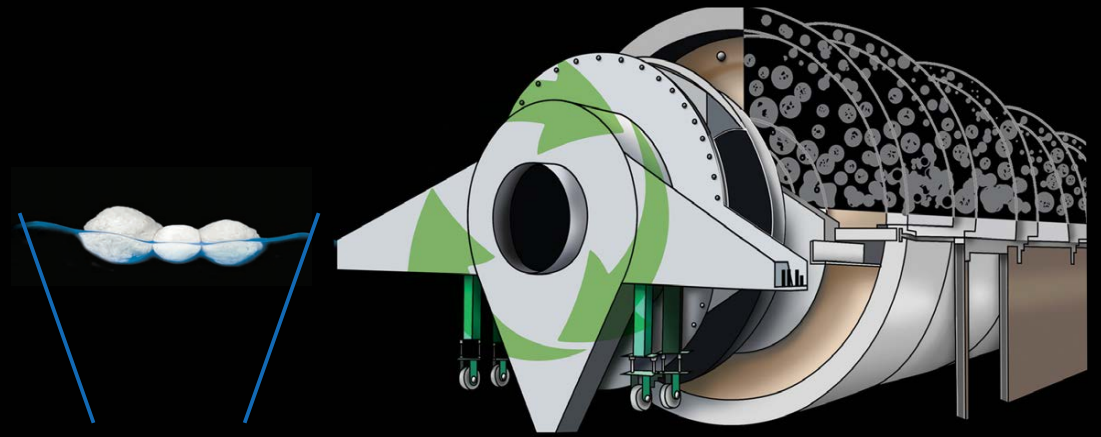


The Engineering of Lightweight Green Aggregates

JOE™ | Processing

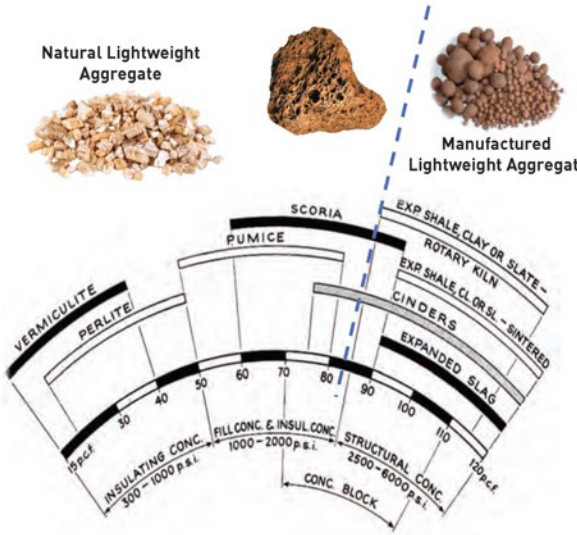
LiGrA™ Lightweight Green Aggregates

We acquired state of the art technology from overseas experts and higher learning institutions to identify, calibrate and formulate lightweight green aggregates from various types of inorganic wastes. The equipment has also been tailor-made for these specific purposes.

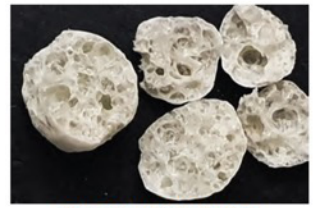


What is Lightweight Green Aggregates ?

Lightweight Aggregates are granules or pellets of lightweight materials that have many applications. They can either be mined from natural sources or manufactured using minerals. **Lightweight Green Aggregates (LiGrA),** on the other hand, is manufactured from waste materials.



Structural LiGrA
Densely packed finer pores



Non-Structural LiGrA
Loosely packed coarser pores

What is Lightweight Green Concrete ?

Lightweight Green Concrete is produced by replacing the heavy aggregates with lightweight aggregates.

1 m³ of Normal Weight Concrete

Cement	Fine Aggregate (Sand)
Water	Coarse Aggregate (Granite)

Density 2400 kg/m³

Partially or fully replaced

1 m³ of Lightweight Concrete

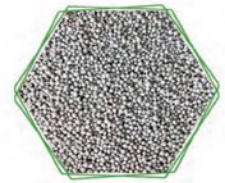
Cement	Fine Aggregate (LWA)
Water	Coarse Aggregate (LWA)

Density 800 to 2000 kg/m³ for structural application
&
Density below 800 kg/m³ for non-structural application

JOE Size LiGrA™ Lightweight Green Aggregates

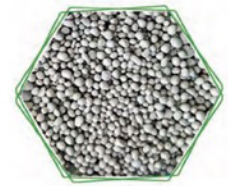
0.1 - 0.3 mm

0.25 - 0.5 mm



0.5 - 1 mm

Avaliable Sizes Lightweight Geen Aggregates (LiGrA)



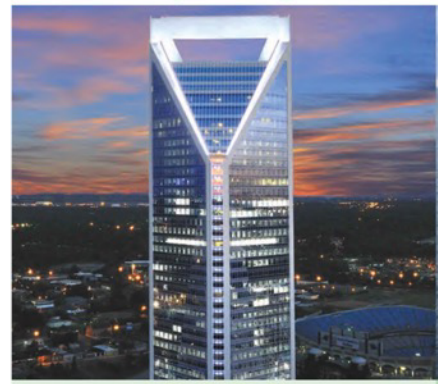
1 - 2 mm

2 - 4 mm

4 - 8 mm

8 - 16 mm

Lightweight Structures Built with Lightweight Concrete



Duke Energy Centre (USA)

Heidrun Platform (Norway)

Wellington Stadium (New Zealand)

The Nordhordland Floating Bridge

What is the solution?

LiGrA
Lightweight Green Aggregates

LiGrA has the technology to convert **Waste** to produce **Lightweight Green Aggregates** for used in **Lightweight Green Concrete**

- Provide Avenues to Recycle Waste
- Reduce Landfill & Waste Disposal Problem
- Reduce Exploitation of Natural Resources
- Manufacture Product Superior to its Original Form

LIGHTWEIGHT GREEN CONCRETE

LIGHTWEIGHT GREEN AGGREGATES

The Benefits

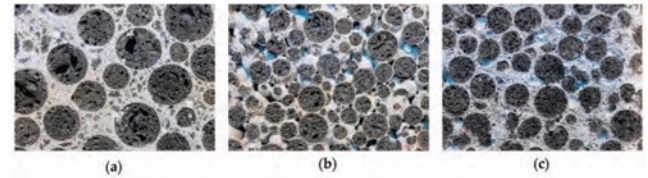
- Saving in Construction Cost and Time
- Saving in Handling & Transportation Cost
- Saving in Foundation Cost
- More Durable Structures
- Higher Earthquake Resistance
- Longer Building Service Life
- Bigger Space Savings between Columns
- Lintel & Stiffener Joint Cost Savings
- Lower Crane Capacity
- Energy Savings Benefit
- Built Sustainable Environments

The Benefits

- Extra Lightweight and Strong
- 100% Biodegradable and Recyclable
- Environmentally Friendly
- Lower Carbon Footprint
- Economic & Competitive
- No Hazards to Health
- Non Combustible
- High Resistance to Fire
- Good Thermal Insulation
- High Acoustic Insulation
- Low Water Absorption

Recycled Lightweight Concrete Advantages Over Normal Weight Concrete

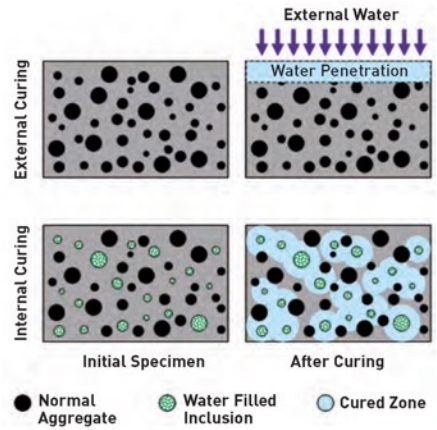
INTERNAL & EXTERNAL CURING	**CONTINUOUS STRENGTH GAIN**
STRONG INTERFACE BETWEEN AGGREGATE & CEMENT	**LIFELONG DURABILITY**
MODULUS COMPATIBILITY OF AGGREGATE & CEMENT	**UNIFORM STRESS DISTRIBUTION**



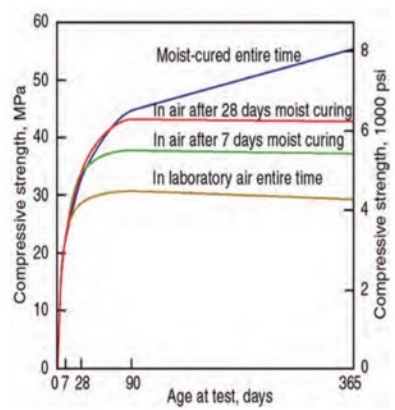
(a) Image of structural lightweight concrete with a dense matrix structure;
(b) Image of lightweight aggregate concrete with open pore structure;
(c) Image of lightweight aggregate concrete with a porous matrix filling the open pore structure

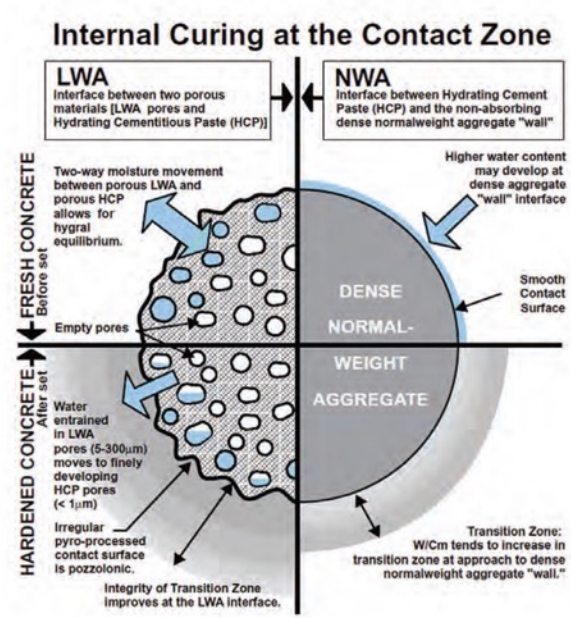
Launching of Lightweight Concrete Ship U.S.S. SELMA in 1919

Year 1919 : 26.7 MPa
Year 1980 : 55.2 MPa



LIGHTWEIGHT CONCRETE EXCEPTIONAL PERFORMANCE





JOE LiGrA R&D

We Are The Innovator

The technology of LiGrA are in consistent collaboration with the Institute of Higher Learnings from some reputable universities, professionals and industrial players into advance building material for the construction industry. Our new formulations and customisation yield many new products that offers cost-effective, high-quality solutions and to keep abreast of the technology and break new frontiers. Our advance R&D lab and dedicated professional scientists and engineers continuously keep developing new sustainable green products for the future. In line with the world GO GREEN PLAN.

Lightweight Green Aggregates

JOE Application LiGrA

Thermal Insulation (Roofs, Floors, Fire Doors)

Heat Resistant Plaster & Dry Mortar

Heat Resistant Paints & Wallpapers

PPVC & PBU Precast

Lightweight Building Materials

Lightweight Ready-Mix, Concrete & Industrialised Building System (IBS)

Floating Concrete & Structure

Insulation of Pipeline in Oilfield

Lightweight Fillers for Ceramic and Polymeric Products

Geotechnical Applications (Retaining Wall, Soil Stability & Foundation)

Wastewater Treatment

Automotive Body Composite

Hydroponic Media

Filtration Media

Decorative Materials

JOE Revolution

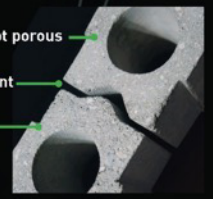
LiCrA Specialist and Benchmark

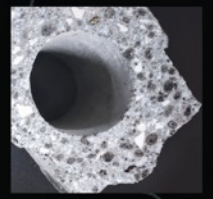
Gramata Concrete Industry Revolution LiCrA


Waste Materials


Minimum 30% RCAs

JOE GREEN PANEL DESIGN & RECESS





XS / X5

Thickness : 75 - 200mm
Nominal Weight : 128 - 281 kg/m^2
Fire rating : 1 - 4 Hours
Sound Insulation : STC 47 - 58
Nominal Density : 2,200 kg/m^3
Water Absorption : 6%
Compressive Strength : >40 MPa

X3

Thickness : 75 - 200mm
Nominal Weight : 93 - 204 kg/m^2
Fire rating : 2 - 4 Hours
Sound Insulation : STC 45 - 54
Nominal Density : 1,600 kg/m^3
Water Absorption : 11%
Compressive Strength : >25 MPa

X2

Thickness : 75 - 200mm
Nominal Weight : 84 - 166 kg/m^2
Fire rating : 2 - 4 Hours
Sound Insulation : STC 41 - 50
Nominal Density : 1,300 kg/m^3
Water Absorption : 14%
Compressive Strength : >15 MPa

X1

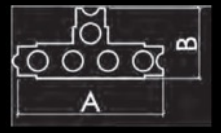
Thickness : 75 - 200mm
Nominal Weight : 58 - 115 kg/m^2
Fire rating : 2 - 4 Hours
Sound Insulation : STC 39 - 48
Nominal Density : 900 kg/m^3
Water Absorption : 15%
Compressive Strength : >5 MPa

Content : Lightweight Green Aggregates
Characteristic : Xtra Light, Solid, Strong
Performance : Lighter Than Other Hollow-Core Wall Panels
High Fire Resistance
Low Water Absorption
High Sound Insulation
Better Compressive Strength
Green & Environmentally Friendly
Economic & Competitive
Skim Coat Finishing Only

JOE LiGrA Revolution

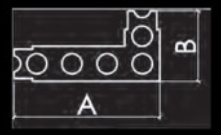
Specialist and Benchmark

T-Joint



Thickness available		Dimension
75mm, Ø 40mm	:	A=290mm : B= 143mm
90mm, Ø 58mm	:	A=290mm : B= 185mm
100mm, Ø 64mm	:	A=290mm : B= 195mm
150mm, Ø 40mm	:	A=290mm : B= 270mm
200mm, Ø 64mm	:	A=290mm : B= 350mm

L-Joint



Thickness available		Dimension
75mm, Ø 40mm	:	A=290mm : B= 143mm
90mm, Ø 58mm	:	A=290mm : B= 185mm
100mm, Ø 64mm	:	A=290mm : B= 195mm
150mm, Ø 40mm	:	A=290mm : B= 270mm
200mm, Ø 64mm	:	A=290mm : B= 350mm

Other Special Customization Available

Width: 100mm, 200mm, and 300mm
Numbers of Tensile Wire : 8 - 12 nos
Solid Panels
M&E Recess
Groove Lines
Noise Barrier Panel
Anti Blast Design with Rebar and Grouting
Stiffener Panel with Rebar and Grouting

Customized

Width	:	600mm, 300mm, 200mm, 100mm
Thickness available	:	200mm, Ø 64mm 150mm, Ø 40mm 100mm, Ø 64mm 100mm, Ø 40mm 90mm, Ø 58mm 75mm, Ø 40mm

Note: Solid Panels Available (Except 75mm)Customized Panels Available

Standard (XS / X5)		Max Panel Height
200mm Solid	:	max 6.0m (with wire)
150mm Solid	:	max 6.0m (with wire)
100mm Solid	:	max 6.0m (with wire)
200mm, Ø 64mm	:	max 6.0m (with wire)
150mm, Ø 40mm	:	max 6.0m (with wire)
100mm, Ø 64mm	:	max 5.2m (with wire)
100mm, Ø 40mm	:	max 6.0m (with wire)
90mm, Ø 58mm	:	max 4.5m (with wire)
75mm, Ø 40mm	:	max 3.3m

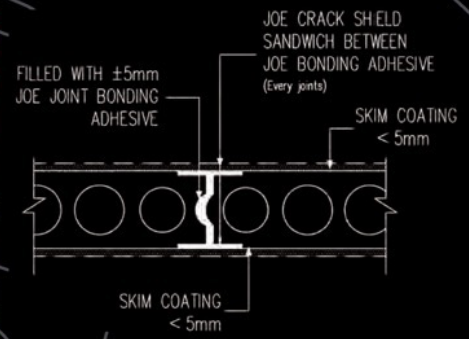
Note: Panel above 3.3m will be wired for safety & impact strength

X1 & X2 & X3		Max Panel Height
X1 100mm, Ø 64mm	:	max 5.2m (with wire)
X1 100mm, Ø 40mm	:	max 6.0m (with wire)
X2 100mm, Ø 64mm	:	max 5.2m (with wire)
X2 100mm, Ø 40mm	:	max 6.0m (with wire)
X3 100mm, Ø 64mm	:	max 5.2m (with wire)
X3 100mm, Ø 40mm		max 6.0m (with wire)

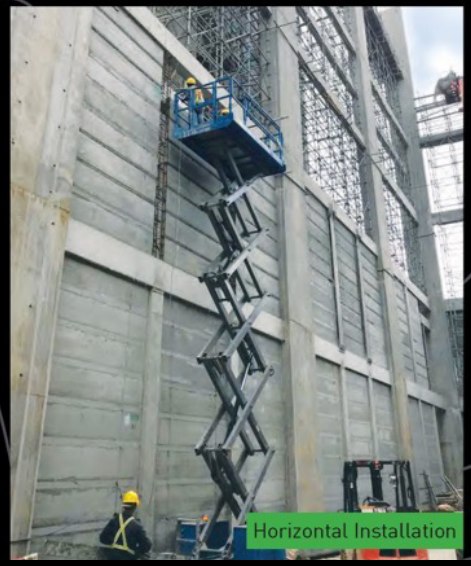
Reinforcement Tensile Wire	:	Tensile Strength min. 600 MPa (Ø3, Ø4.5, Ø5)
Recess Design	:	depth 6mm width 40mm


Vertical Installation

JOE LiGrA Specification




Reinforced with High Tensile Wire for Long Panel


Horizontal Installation


Customized with Rebar & Grout

JOE LiGrA Customization

Land Transport Authority
We Keep Your World Moving

JOE Proven LiGrA

Customized Design & Specification

To fit each unique project requirement and specification such as sound insulation for sound barrier and cinema, fire resistant, blasting walls as well as groove line pattern. We are able to modify number of hollows, different embedded tensile wire from 8 to 12 wires as well as solid panel. We also provide different kind of thickness, L and T Joint as well as accessories to prevent crack issues and ease of installation.

Noise Barrier Wall with Groove Line Design

Pattern Walls Design





Block Size for Special Order – All Thickness and Models


JOE Beyond LiGrA Test Reports

*Skim Coat on Both Sides ** Thin Plasters on Both Sides *** Plaster on Both Sides
With M&E ^Without Wire ^^With Wire { } Acoustic Assessment

tested by: TUV SUD PSB Singapore, SETSCO, Admaterials Technologies, SIRIM QAS International, CPG, fischer innovative solutions, HILTI MULTIFIX™

Functional Requirements	JOE Green Standard Concrete Panel					
	75mm (Ø40mm)	90mm (Ø58mm)	100mm (Ø40mm)	100mm (Ø64mm)	150mm (Ø40mm)	200mm (Ø64mm)
ASTM - E90						
Sound Insulation (STC)	STC 47*	STC 48*	STC 52*	STC 49* (STC 50-51**)	(STC 55)	(STC 56-58)
ASTM C 518						
Thermal Conductivity (W/m^{o}K) K-value	0.675	0.6796	1.194	0.665	N/A	N/A
Thermal Resistance (m^{2} ^{o}K/W) R-value	0.111	0.132	0.0832	0.1484		
BS 476: Part 22: 1987						
Fire Resistance						
Integrity	132Mins*	68Mins*	132Mins#*	132Mins*	N/A	N/A
Insulation	125Mins*	68Mins*	132Mins#*	131Mins*		
Deflection Test (mm)	33mm	65mm	42mm	25mm		
Difference of Area Under Curve with Standard (%)	0.1	0.1	0.0	0.2		
Fire Resistance (4 Hours, Single Wall)						
Integrity	N/A	N/A	N/A	N/A	260Mins*	260Mins*
Insulation					260Mins*	260Mins*
Deflection Test (mm)					35mm	19mm
Difference of Area Under Curve with Standard (%)					-0.1	0.1
BS EN 772						
Compressive Strength - Cube	57.90 N/mm^{2}					
Compressive Strength - Section	42.8 N/mm^{2}	31.6 N/mm^{2}	48.2 N/mm^{2}	37.0 N/mm^{2}	50.8 N/mm^{2}	34.8 N/mm^{2}
SS 271: 1983						
Water Absorption (24 hrs Immersion) - Setsco Labs (Should Not Exceed 23.5%)	7.15 %	7.16 %	7.81 %	6.63 %	6.37 %	5.89 %
Drying Shrinkage - Setsco Labs (Should Not Exceed 0.09%)	0.05 %					
SS 492: 2001 / BS 5234 (Impact Tests)						
Determination of Partition Wall Stiffness	SD	SD	N/A	SD	N/A	N/A
Surface Damaged by Small Hard Body Impact	SD	SD		SD		
Perforation by Small Hard Body Impact	SD	SD		SD		
Damaged by Large Soft Body Impact	SD	SD		SD		
Structural Damaged by Large Soft Body Impact	SD	SD		SD		
Door Slamming	SD	SD		SD		
Lightweight Anchorage Pull-Out	Pass	Pass		Pass		
Lightweight Anchorage Pull-Down	Pass	Pass		Pass		
Heavyweight Anchorage Wash Basin (N)	1500	1500		1500		
Heavyweight Anchorage Wall Cupboard (N)	4000	4000		4000		
Horizontal Load/Crowd Pressure (3.0 kN/m)	Up to 3.0 kN/m	Up to 3.0 kN/m		Up to 3.0 kN/m		
1. Deflection (mm)	-0.04	-0.06		-1.2		
2. Residual Deflection (mm)	0	0		-0.1		
Bending Strength (N/mm^{2})	10.80 N/mm^{2}					

Functional Requirements	JOE Green Standard Concrete Panel		JOE Green Light Panel				
	100mm Solid	150mm Solid	100mm (Ø64mm) X1	100mm X1 SOLID	100mm (Ø64mm) X2	100mm X2 SOLID	100mm (Ø64mm) X3
ASTM - E90							
Sound Insulation (STC)	(STC 54-55)	(STC 57-58)	STC 41*	N/A	STC 43*	(STC 45)	STC 47*
ASTM C 518							
Thermal Conductivity (W/m^{o}K) K-value	0.9012	N/A	0.2306	N/A	0.535	N/A	0.4393
Thermal Resistance (m^{2} ^{o}K/W) R-value	0.111		0.434		0.189		0.2276
BS 476: Part 22: 1987							
Fire Resistance							
Integrity	N/A	N/A	196Mins*	N/A	132Mins*	N/A	N/A
Insulation			169Mins*		120Mins*		
Deflection Test (mm)			-3mm		12mm		
Difference of Area Under Curve with Standard (%)			0.0		0.1		
Fire Resistance (4 Hours, Single Wall)							
Integrity	260Mins*	260Mins*	N/A	240Mins*	N/A	240Mins*	120Mins*
Insulation	260Mins*	260Mins*		240Mins*		240Mins*	120Mins*
Deflection Test (mm)	5mm	23mm		8mm		32mm	25mm
Difference of Area Under Curve with Standard (%)	0.0	0.0		0.0		0.0	0.0
BS EN 772							
Compressive Strength - Cube	57.90 N/mm^{2}		-	-	-	-	-
Compressive Strength - Section	40.9 N/mm^{2}	-	3.7 N/mm^{2}	7.1 N/mm^{2}	11.3 N/mm^{2}	17.5 N/mm^{2}	19.6 N/mm^{2}
SS 271: 1983							
Water Absorption (24 hrs Immersion) - Setsco Labs (Should Not Exceed 23.5%)	5.57%	N/A	14.94 %	20.16 %	14.60 %	12.58 %	11.31 %
Drying Shrinkage - Setsco Labs (Should Not Exceed 0.09%)	0.05 %		0.09 %		0.08 %		0.07 %
SS 492: 2001 / BS 5234 (Impact Tests)							
Determination of Partition Wall Stiffness	N/A	N/A	SD	N/A	SD	N/A	SD
Surface Damaged by Small Hard Body Impact			SD		SD		SD
Perforation by Small Hard Body Impact			SD		SD		SD
Damaged by Large Soft Body Impact			SD		SD		SD
Structural Damaged by Large Soft Body Impact			SD		SD		SD
Door Slamming			SD		SD		SD
Lightweight Anchorage Pull-Out			Pass		Pass		Pass
Lightweight Anchorage Pull-Down			Pass		Pass		Pass
Heavyweight Anchorage Wash Basin (N)			1500		1500		1500
Heavyweight Anchorage Wall Cupboard (N)			4000		4000		4000
Horizontal Load/Crowd Pressure (3.0 kN/m)			Up to 3.0 kN/m		Up to 3.0 kN/m		Up to 3.0 kN/m
1. Deflection (mm)			-0.745		-2.334		-0.4
2. Residual Deflection (mm)			-0.2		-0.2		-0.1
Bending Strength (N/mm^{2})	10.80 N/mm^{2}		0.8 N/mm^{2}		3.5 N/mm^{2}		4.45 N/mm^{2}

JOE Quality

LiGrA We Are The Best

FOOTNOTE :
* - Varies as per thickness
# - Skimcoat Finishing
NA - Not Available

REFERENCES :
(1) Quoted the report by Lightweight Concrete Journal, that the moisture of AAC wall lab test at 45% moisture content when the wall is just built. In time to come, the moisture will drop to 3.5%. The ratio of 45% and 3.5% will result in what I said 11dB drop of sound insulation.
(2) Panels and other materials which show a water absorption test should directly be connected to the length of time the test sample was submersed under water.
The relationship between these two factors are important and directly related until maximum value is reached.
(3) Requires Plastering to achieve thickness to comply Code for electrical installation - 50mm cover to Electrical Conduits , without damaging the Steel Reinforcement of ALC Panel.

	PROPERTIES	COMPARISON FOR 100MM THICK WALL MATERIALS									
		JOE X5 (XS)	Other Panel	Red Brick	JOE X3	AAC Block Bata Ringan	ALC/GIP Panel Bata Ringan	SANDWICH PANEL (EPS)	JOE X2	Dry Wall / Gypsum Board	JOE X1
TEST REPORTS	Nominal Density (kg/m3)	2200	2200	1760	1600	550	800	720	1300	10	900
	Weight (kg/m2)- 100mm thickness	135	145	160	96	80	80	72	85	100 (Frame & Insulation)	65
	Maximum Height without lintel (mm)	8000*	3300	3000	6000*	3000	6000	3000	6000*	2400	6000*
	Compressive Strength (MPa) Cube	49	25	2 - 4	-	4.5	4.5	-	-	NA	-
	Compressive Strength (MPa) Section	42-59	15	2.5	20	2.5 - 5	5 - 7	4	11 - 17	NA	3 - 7
	Water Absorption (Percentage)	6% (24-hr immersed)	5% (30-min immersed)[2]	15 - 25%	11% (24-hr immersed)	35 - 60%	35 - 60%	20%	13% (24-hr immersed)	Not Usable (Dry Areas Only)	15% (24 -hr immersed)
	Water Absorption (Capillary) $g/m^2s^{0.5}$	24	NA	NA	NA	130	190	45	11 (WP-SPEC)	Not Usable (Dry Areas Only)	NA
	Air Tightness Certified	Yes	No	No	No	No	No	No	No	No	No
	Thermal Coductivity (W/K.m) - 100mm (Lower is Better)	0.74	NA	1.15	0.44	0.15 - 0.25	0.15 - 0.25	0.26	0.54	0.17	0.23
	Fire Rating (Hours)	1 - 4	1 - 2 (needs infill)	1 - 2	2 - 4	3 - 4	2 - 4	1 - 4	2 - 4	1 - 2 (needs infill)	2 - 4
	Sound Transmission Class (STC)	49 - 58	37 - 41	37 - 42	45 - 54	35 - 40 (11dB Drop after 3-6 Mos)[1]	40 - 46 (11dB Drop after 3-6 Mos.)[1]	41	41 -50	35 - 52 (Rock Wool) (Requires Insulation)	39 - 48
PERFORMANCES	Buildability (Labour Saving Index))	0.85#	0.85#	Demerits	0.85#	0.10	0.85#	0.85#	0.85#	1.00	0.85#
	Productivity (m^2/manday)	20	18	6	22	12	18	18	24	23	25
	Use of Green Recycled Material	Yes	No	No	Yes	No	No	No	Yes	No	Yes
	Use of Flammable Material	No	No	No	No	No	No	Yes	No	No	No
	Heavyweight Anchorage (4000N) Strength & Robustness	Severe Duty (Highest)	Severe Duty (Highest)	Pass (chemical & mechanical fixing)	Severe Duty (Highest)	Pass (chemical fixing)	Pass (chemical fixing)	Medium - Severe Duty	Severe Duty (Highest)	Pass (mechanical fixing- special bolt)	Severe Duty (Highest)
	Customised Height Available	Yes (8M)	No	No	Yes (6M)	No	Yes (3M or 6M only)	No	Yes (6M)	No	Yes (6M)
	Customised Thickness Available	75 - 200	75 - 200	100 - 230	75 - 200	100-200	75-200	100-200	75 - 200	75-150	75- 200
	Wire Reinforcement (safety & strength) (Earthquake, Vibration, Movement, Impact)	High tensile wire (600 Mpa) 3-5mm dia	No	No	High tensile wire (600 Mpa) 3-5mm dia	No	BRC Mesh	BRC Mesh	High tensile wire (600 Mpa) 3-5mm dia	Metal Stud	High tensile wire (600 Mpa) 3-5mm dia
	Crack Resistance Accessories	1. JOE UV Crackshield 2. JOE Bond Adhesive	Wire or Fiber Mesh	-	1. JOE Crackshield 2. JOE Bond Adhesive	Wire or Fiber Mesh	Wire or Fiber Mesh	Fiber Mesh	1. JOE Crackshield 2. JOE Bond Adhesive	-	1. JOE Crackshield 2. JOE Bond Adhesive
	Stopper Cap for Hollow Insert	Yes	No	No	Yes	No	No	No	Yes	No	Yes
	Joint Recess for Stronger Joints	Yes	No	No	Yes	No	No	No	Yes	No	Yes
	Product Structure	Strong & Compact	Low Strength, More Sand, Less Cement	Compact, Low Strength	Strong & Compact & Lightweight	Porous, Full of Capillary, Low Strength, Potential Fungus/Molding Growth	Porous, Full of Capillary, Low Strength, Potential Fungus/Molding Growth	Porous, Low Strength, Easy to Debond, Weak Glue Adhesive	Strong & Compact & Lightweight	Fragile, Easy to Break, Lowest Strength	Strong & Compact & Lightweight
	Production Process	Extrusion Flat Surface, Compact, Special Customised Machine	Extrusion on Conveyor, Potential Uneven Wavy Surface	Moulding, Potential Uneven Wavy Plate Surface	Extrusion Flat Surface, Compact, Special Customised Machine	Moulding, Potential Uneven Wavy Plate Surface	Moulding, Potential Uneven Wavy Plate Surface	Moulding, Potential Uneven Wavy Surface	Extrusion Flat Surface, Compact, Special Customised Machine	Extrusion on Metal Roller, Potential Uneven Surface, Thin & Brittle	Extrusion Flat Surface, Compact, Special Customised Machine
	Finishing Application (mm)	Thin Skimcoat	Plaster + Skimcoat	Plaster + Skimcoat	Thin Skimcoat	Plaster + Skimcoat	Plaster + Skimcoat	Plaster + Skimcoat	Thin Skimcoat	Putty	Thin Skimcoat
COST SAVINGS	Plaster Material & Labor Savings	-	15-25 mm (3 Layers)	15-25 mm (3 Layers)	-	15-25 mm (3 Layers)	-	15-25 mm (3 Layers)	-	-	-
	Skimcoat Material & Labor Savings (Due to Flatness & Waving)	1 - 5mm (1 Layer)	5 - 15mm (1 Layer)	5 - 20mm (1 - 2 Layer)	1 - 5mm (1 Layer)	5 - 10mm (1 -2 Layer)	5 - 10mm (1 - 2 Layer)	10 mm (2 - 3 Layers)	1 - 5mm (1 Layer)	Rockwool & Putty	1 - 5mm (1 Layer)
	Total Weight (kg/m2) (After Finishing)	155	185	260	115	140	140	122	105	105	85
	Lintel Savings	Up to 8M	Every 3M	Every 3M	Up to 6M	Every 3M	Every 3M	Every 3M	Up to 6M	Every 3M	Up to 6M
	Stiffener Savings	Up to 8M	Every 3M	Every 3M	Up to 6M	Every 3M	Every 3M	Every 3M	Up to 6M	Every 3M	Up to 6M
	M&E Services Savings (MEP - Indonesia)	Services can be run through hollow core with minimum opening	Services can be run through hollow core with minimum opening	Require surface hacking & trimming for recess	Services can be run through hollow core with minimum opening	Require surface hacking & trimming for recess	Require surface Cutting and Trimming for recess (Max. 30mm) No cutting to BRC reinforcement	Require surface Cutting and Trimming for recess (Max. 30mm) No cutting to BRC reinforcement	Services can be run through hollow core with minimum opening	By fitting services before closing up	Services can be run through hollow core with minimum opening
	Wall Fixing	L-bracket + Sleeve Anchor / H10 Dowel Bar	Bracket / H10 Dowel Bar	Wall Tie	L-bracket + Sleeve Anchor / H10 Dowel Bar	Wall Tie	Wall Panel Bracket	Wall Panel Bracket	L-bracket + Sleeve Anchor / H10 Dowel Bar	Metal Stud & Drive Pins	L-bracket + Sleeve Anchor / H10 Dowel Bar
	Site Houskeeeping & Wastage	Min. Wastage & Cutting due to Custom Length	More Wastage Higher Breakage	More Wet Works & High Wastage	Min. Wastage & Cutting due to Custom Length	More Wastage Higher Breakage	More patching material to M&E Works / More Debris to handle	More patching material to M&E Works / More Debris to handle	Min. Wastage & Cutting due to Custom Length	More Wastage (12 - 15%)	Min. Wastage & Cutting due to Custom Length
	External Waterproofing	Joints Only	Full Surface Waterproofing	Full Surface Waterproofing	Joints Only	Full Surface Waterproofing	Full Surface Waterproofing	Joints Only	Joints Only	Not Recommended (Indoor Only)	Joints Only
	Additional Scaffolding / Work Platform Savings Based on Single Tier @ 3.3M	-	-	Needs Scaffolding / Work Platform	-	Needs Scaffolding / Work Platform	Needs Scaffolding / Work Platform	-	-	Needs Scaffolding / Work Platform	-

HOLDING STRENGTH TEST

SS 492:2001/BS 5234

6m JOE Green Lightweight Concrete Panels Featuring Plant Boxes Weighing Approx. 200kg Each

5.4m JOE Green Concrete Panel With Skim Coat Loaded With 650kg on a Single Gravity Anchorage

Cert. No.:022-015
Eco-Friendly Building Material/Low Emission Concrete/Cement/ 30% Recycled Content
















Singapore Green Mark

			Requirements	Higher Scoring X1	X2	X3	XS/X5
1	ENERGY EFFICIENCY		Reduced Heat Gain [ETTV]	✓	✓	✓	✓
2	HEALTH & WELLBEING	HW 1.2	HW 1.2 Material Emissions	✓	✓	✓	✓
		HW 2.3	Sound			✓	✓
3	RESILIENCE	RE 1.1 b	Resources	✓	✓	✓	✓
		RE 1.2b	Urban Heat Island Mitigation				
4	WHOLE LIFE CARBON	CN 1.1	Whole Life Carbon Calculation	✓	✓	✓	✓
		CN 1.2	Embodied Carbon	✓	✓	✓	✓
		CN 1.3	2030 Transition Plan	✓	✓	✓	✓
		CN 2.1	Sustainable Construction	✓	✓	✓	✓
		CN 2.2	Sustainable Products & Finishes	✓	✓	✓	✓
		CN 3.2	Fit out Products	✓	✓	✓	✓
5	MAINTAINABILITY	General	BIM model	✓	✓	✓	✓
		1.5	Design Factor - Masonry & Lightweight Concrete Panel	✓	✓	✓	✓
		1.5.1	Reduce risk of Water ingress and Efflorescence formation	✓	✓	✓	✓
		1.5.2	Reduce risk of façade flaking/peeling/cracking /blistering	✓	✓	✓	✓
		2.5	Basement and Car Park				

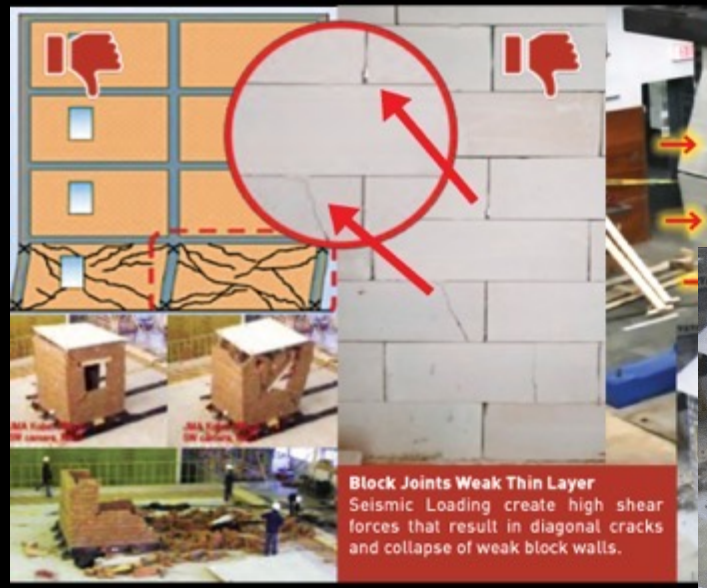
malaysia greenbuildingindex

	Applicable GBI Credits	Criteria	Higher Scoring X1	X2	X3	XS/X5
1	**Energy Efficiency**	EE	✓	✓	✓	✓
	Mininum Energy Efficiency Performance					
2	**Indoor Environmental Quality**	EQ	✓	✓	✓	✓
	Indoor Air Pollutants		✓	✓	✓	✓
	Mould Prevention		✓	✓	✓	✓
	Internal Noise Levels / Sound Insulation		✓	✓	✓	✓
	IQA Before & During Occupancy					
3	**Sustainable Planning & Management**	SM				
	Sustainable Construction		✓	✓	✓	✓
	Qlassic - Quality Assessment System for Building		✓	✓	✓	✓
	IBS - Industrialised Building System		✓	✓	✓	✓
4	**Materials & Resources**	MR				
	Material Reuse & Selection		✓	✓	✓	✓
	Recycled Content Materials		✓	✓	✓	✓
	Regional Materials		✓	✓	✓	✓
	Material Manufacture & Ingredients		✓	✓	✓	✓
	Storage & Collection of Recyclables		✓	✓	✓	✓
	Construction Waste Management		✓	✓	✓	✓

JOE LiGrA Impact & Safety

Seismic Activity

AAC Block/Brick VS Panels



Block Joints Weak Thin Layer
Seismic Loading create high shear forces that result in diagonal cracks and collapse of weak block walls.

PRODUCT:
JOE Green Wire-Reinforced Panel

INCIDENT:
Hit & Damaged by Forklift

LOCATION:
Tampines Warehouse L3

SOLUTION:
Easily Repaired by Patch & Grout

Damaged Accidentally Hit by Forklift

Heavy-Load Mounting Capability
Normal Sleeve Anchor M8 Per Point up to 400KG (Hollow Section) & 1.2 Ton (Solid Section)

Other Functionable Applications Use as Fire Rated Strong Ceiling at Double Volume Area

Air Tightness Test for Hospital (NCID)

Water Tightness Test for External Wall

Panel Systems & Wire Reinforcement for Security

Wall Panel Systems with Wire
High shear strength coupled with strong end connections help to resist the high shear force of Seismic Loading

Wire Reinforced Panel Joints
Solid, Strong, Full Contact
Minimize Seismic Impact

Earthquake Proof Building Design - Chile

Wire Reinforcement for Strength & Safety

AIR TIGHTNESS TEST
Air Transmission = 0% TUV Certified

WATER TIGHTNESS TEST = 0% SEEPAGE

JOE green concrete panel
LiGrA Lightweight Green Aggregates
Superiority

Superior, Strong, Flat, & Wire Customization

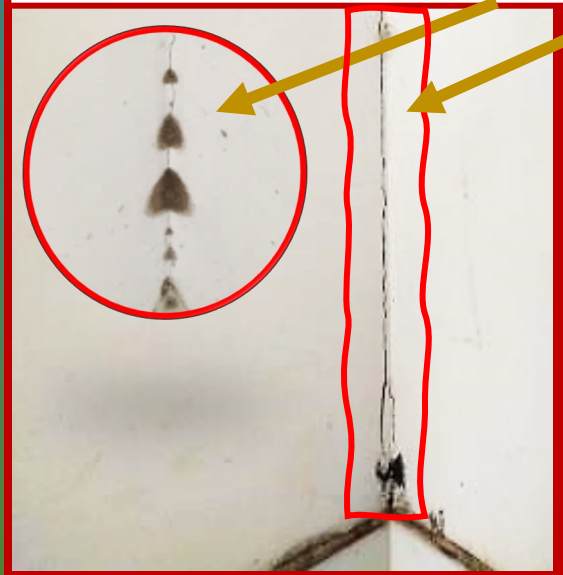
Tensile Wire 600 Mpa

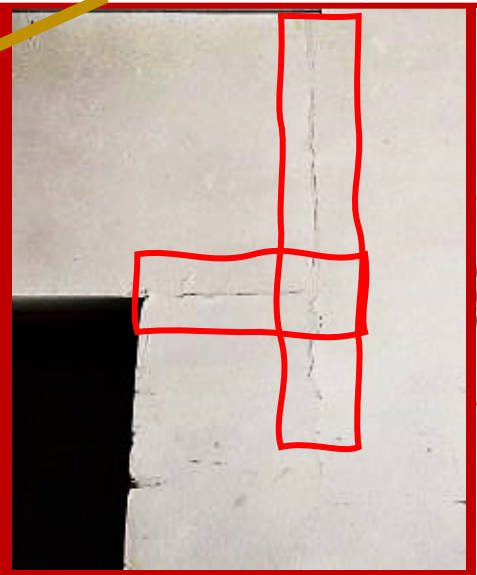
For Better Bending Strength & Safety

Minimize Lintel, Stiffener, & Column Usage

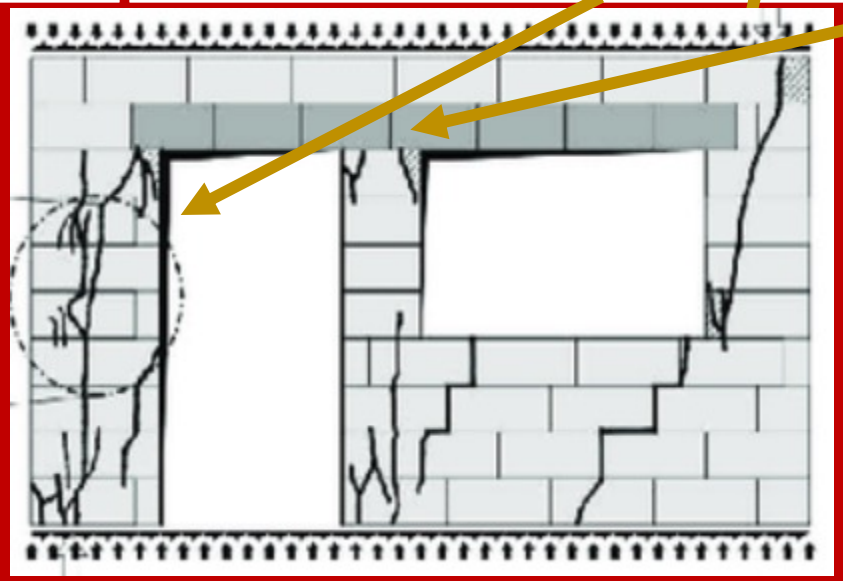
VS

Others : Corner Fungus & Cracking During Construction





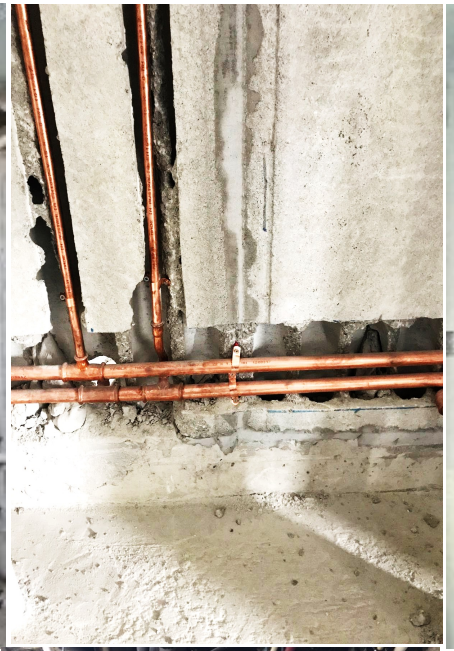
Others: Crack Due to Door-Slamming, Need Stiffener/Lintel Reinforcement



MECHANICAL & ELECTRICAL APPLICATIONS (M&E)

Fast & efficient wall chasing or hacking for flexible M&E workmanship

M&E conduit can slot into hollow-core without trimming recess to embed piping



Easy & Fast M&E wiring,
Best for Time & Cost Saving on metal conduits

Recessed cut for K.O. boxes

Hollow Core Design for Easy M&E

Direct Cut for Larger Piping

JOE GREEN – PPVC & IBS APPROVED

1 50 Cycle – Heat & Rain Test

2 Water Capillary Test

3 Fire Rating & Wall Integrity Test

PPVC, PBU , Bedroom, Toilet, & Service Duct Applications

PPVC Transport Issues:

- ✖ Heavy Load (30 Ton+)
- ✖ Rain affects water absorption
- ✖ Need lightweight technology to avoid cracking/damage

LIGA's Benefits for PPVC & IBS

- 👍 Savings in Foundation
- 👍 Reduce & Save on Super Crane Heavy Lifting
- 👍 Lower Carbon Footprint & Less Material Usage
- 👍 Cost & Time Saving Benefits

JOE Green Wall Panel for PPVC

Installation of Hollow Core Wall Panel at PPVC Finishing Yard in Singapore

JOE Green Precast Concrete Hollow Core Wall Panel to Kitchen & Bed-room.

JOE Green Precast Concrete Hollow Core Wall Panel to Kitchen & Bed-room & Balcony Ducting.

JOE Green Wall Panel for PPVC

Mock-up Installation of JOE Green Hollow Core Wall Panel at PPVC Precast Yard in Senai, Johor Malaysia

Bedroom Toilet and Service Duct application.

JOE Green Wall Panel for PPVC

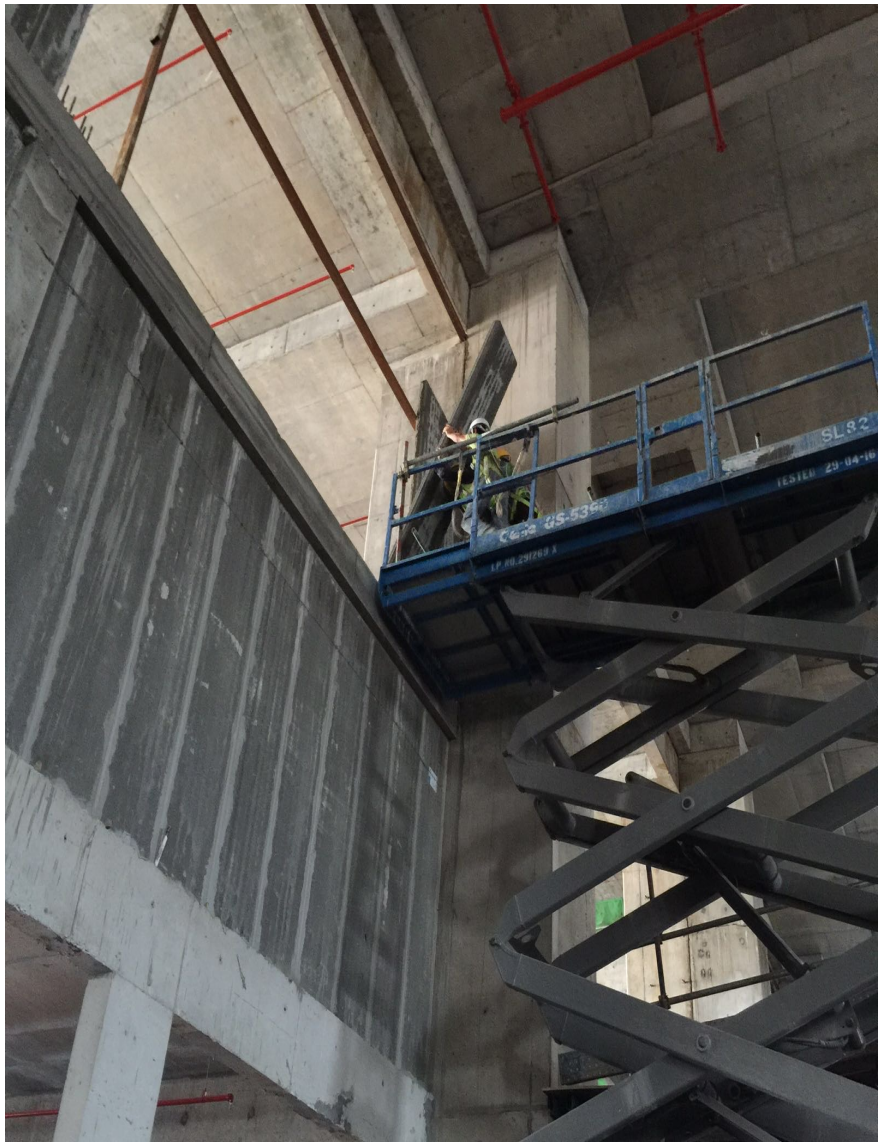
PPVC – In Build Bathroom (IBB) Wet Area Applications - Toilet / Bathroom / Bedroom and Kitchen

MALAYSIA CIDB – TRAINING CENTRE FOR HOLLOW CORE WALL INSTALLATION

JOE Green Wall Panel Installation

Using Electric Stacker for Lifting and Installation

JOE Green Wall Panel Installation



Using Forklift and Scissor Lift for Lifting and Installation

JOE Green Wall Panel Installation

Using Forklift and Lorry Crane for Lifting and Installation

DOWEL BAR (EXTERNAL) METHOD

Use Trolley to Move Panel

Alignment & Adjustment

- Bottom Gap (± 25mm)
- Top Gap (± 25mm)
- Using Wooden Wedges

INSERTION T10 DOWEL BAR ON THE BEAM & SLAB

Easily cut by Makita to make any opening for M&E, etc.

Apply JOE JOINT BONDING Adhesive

JOE L-BRACKET (INTERNAL) METHOD

- Full contact Grouting @ Top Joint
- Protect against seepage during construction

L-BRACKET (TOP)

L-BRACKET (BOTTOM)

2 Brackets per panel
1 top & 1 bottom

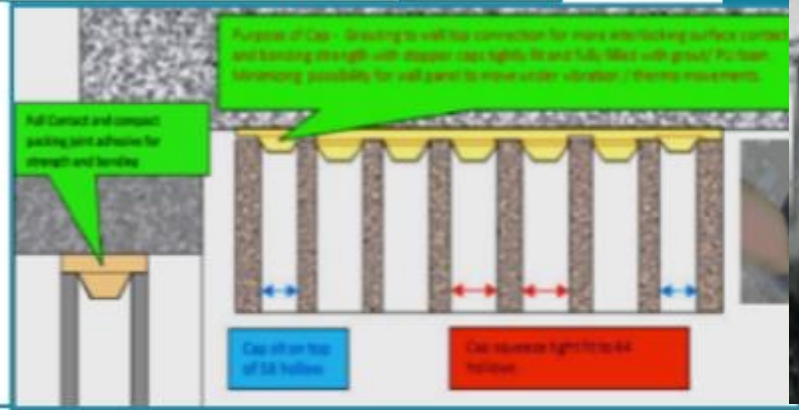
Very strong, No Cutting

Less Wastage & Manhour Labor

Cheaper Construction Cost

Grout/Adhesive Cost Savings

Safe, Consistent & Efficient



EASE OF INSTALLATION

JOE™ LiGrA™ Lightweight Green Aggregates

Manual Installation

2.8M High Wall

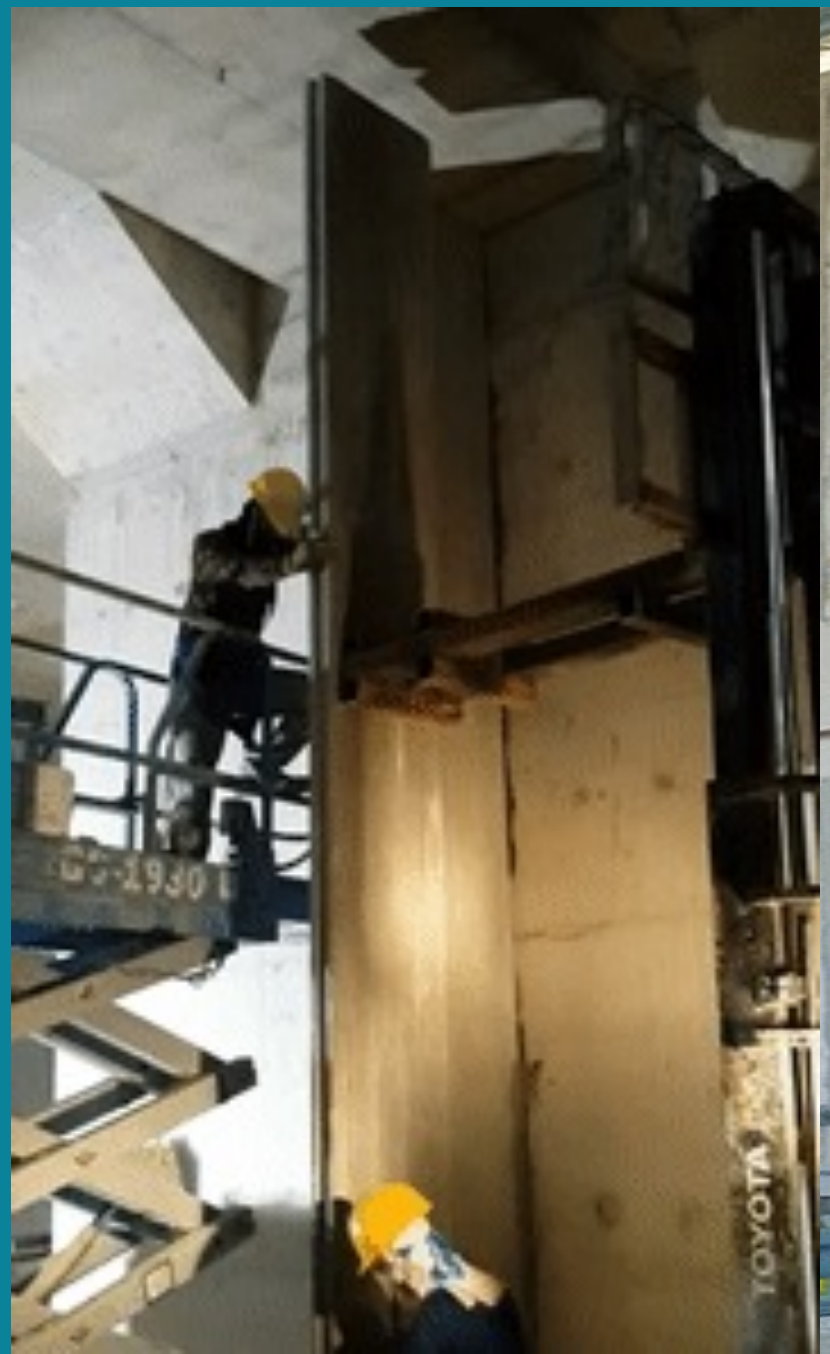
2-3 Man Installation

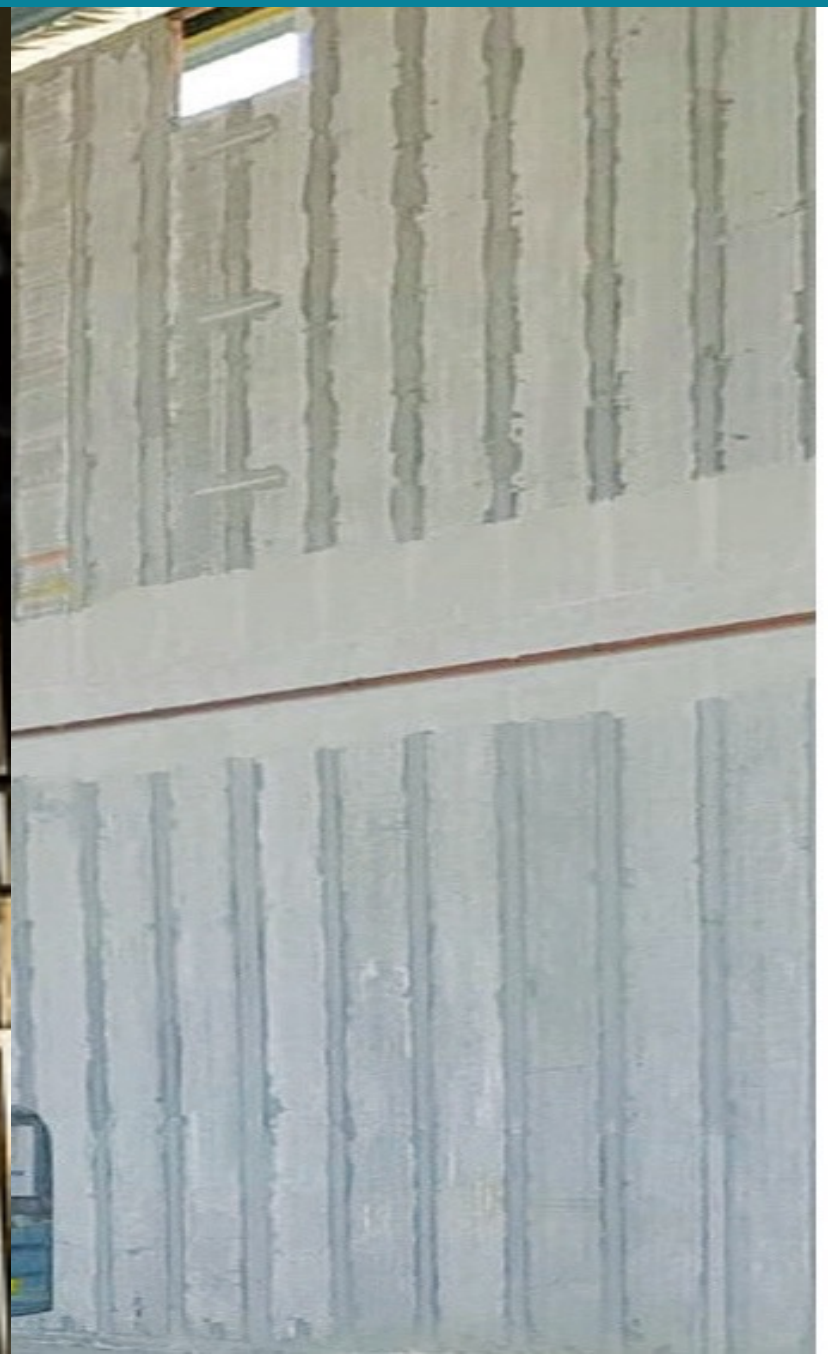
5 Min/Panel

Hand Trolley for

Easy to Maneuver

EASE OF INSTALLATION





- ✓ 5.2M High Wall
- ✓ Forklift + 1 Pt. Load
- ✓ 3 Man Installation
- ✓ 5 Min / Panel
- ✓ Stacker/Forklift
- ✓ with Extender Arm

JOE Accessories
LiGrA JOINT BONDING ADHESIVE

JOE Joint Bonding Adhesive

Is a pre-blend high polymer cement, specially sized inert aggregates and approved chemical additives. It is a cement based adhesive, specially designed for fixing panel and blocks. The formula has excellent workability to help minimize crack and shrinkage. By just adding in the required amount of water and mixing, it is ready for application.

Technical data (typical) :

Weight	: 40 kg/bag	Setting Time	: Initial - 5 hours
Density	: 1.4 gm/cm^3	Consumption (approximate)	:
Open Time	: 30 minutes	1 bag = 6 m^2 - 8 m^2	

Instructions for use :

1. Surface of application for the adhesive must be free from dust, oil and or any contamination. Moist surface with water spray before application.
2. Mix 26% to 28%, 10 - 11 litre of water by volume.
3. Adhesive must be added into water during mixing.
4. Must use an electric mixer to mix the adhesive for around 5 minutes. The mix must be homogenious.
5. The mix must be used within 30 minutes after mixing.
6. Application to big gap by handheld pump to ensure proper and sufficient infill and bonding contact.

JOE Accessories
LiGrA CRACKSHIELD

Lightweight Concrete Wall Panel Joint Tape

APPLICATION

- Internal & External Wall joints
- Inner and Outer Corner Beads
- Structural to Wall Connections.

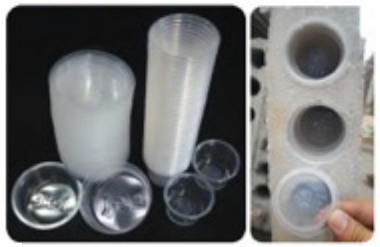
TYPE	WIDTH/THICKNESS	LENGTH	UNIT/CARTON
ROLL	50 mm/0.5 mm	40 M	10 Rolls

DESCRIPTION

JOE Crackshield is manufactured from special formulated UPVC as a joint reinforcement tape with high tensile strength to resist tearing, stretching and distortion. It is a flexible-centered joint to allow for movements and designed for usage with JOE Joint Bonding Adhesive for :

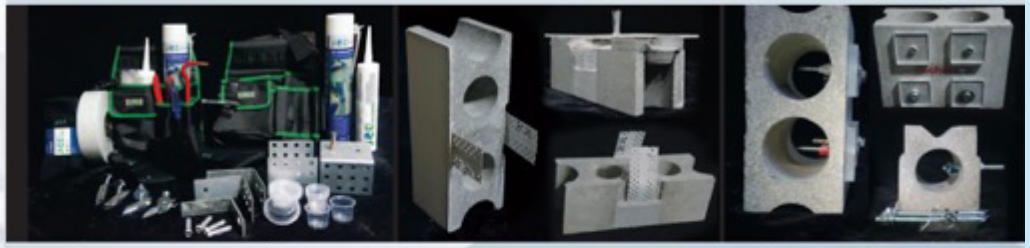
1. Reinforcing joints at inner corner, outer corner, structural joints between column, beam and ceiling.
2. Better performance in resisting crack due to thermal, stretching and other distortions compared to other fibre & wire meshes.
3. Improving water resistant and minimize water seepage through the joint when used at external and wet area.
4. Designed with perforations to provide a superior key grip for bonding between substrate.
5. Designed with flexible center creasing and uniform winding promote accurate and easy application to angles (corner treatment) and angle beading as well as flat joints with length of 40 metre per roll.

JOE Accessories
LiGrA STOPPERCAP



- Specially designed for capping off to fit to hollow core opening at top of JOE Green Concrete Wall Panels for size 40mm and 58/64mm diameter hollows.
- Easy handling and application compared to using backer rod, sponge and other infill material as stopper.
- Prevent water ingress and logging within hollow cores at external wall during in process work.
- Help prevent wastage of bonding adhesive dropping into hollows and ensure compactness of grouting.
- Improve panel grid at top joints as stopper form a key profile, enhance contact surface thus minimizing any potential movements due to insufficient grip and bonding contact surfaces.

TYPE	DEPTH	DIAMETER	UNIT/CARTON	APPLICATION
Capping	30mm	40mm	500 Pieces	To all TOP hollow cores of wall when installing vertically or to both sides of wall when installing horizontally
(PP)	20mm	58/64mm	500 Pieces	



JOE BOND
JOINT BONDING ADHESIVE

JOE ACCESSORIES
GAP PUMP

JOE ACCESSORIES
CRACKSHIELD

JOE PIM
PANEL INSTALLATION MACHINE

JOE ACCESSORIES
STOPPERCAP

JOE SAFETY EQUIPMENT
SAFETY SHOES

JOE SAFETY EQUIPMENT
TOOLS BAG

JOE ACCESSORIES
ACRYSHIELD

JOE ACCESSORIES
SLEEVE ANCHOR

JOE SAFETY EQUIPMENT
SOCKS

JOE ACCESSORIES
GRAVITY ANCHOR

JOE ACCESSORIES
L BRACKET

JOE SAFETY EQUIPMENT
MASKER

JOE LiGrA Honourable Partners

10 YEARS ++
More Than 1,000 Projects

PUBLIC DEVELOPERS

Building and Construction Authority
HOUSING & DEVELOPMENT BOARD
Land Transport Authority — We Keep Your World Moving
People's Association
Ministry of Education Singapore
MINISTRY OF HEALTH SINGAPORE
NUS National University of Singapore
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
TEMASEK HOLDINGS
PSA The World's Port of Call
sembcorp
NUH National University Hospital
MINDEF SINGAPORE
MINISTRY OF HOME AFFAIRS
jtc
ntuc
CIDB MALAYSIA
CHANGI airport singapore
URBAN REDEVELOPMENT AUTHORITY
RafflesMedicalGroup
mapletree
SAFRA
sentosa
JKR

DEVELOPERS

ascendas Reit
Aurum
Far East Organization — Inspiring Better Lives
SGM SOKA GAKKAI MALAYSIA
长春产业 ALLGREEN PROPERTIES
City Developments Limited
CHIU TENG GROUP
CapitaLand
FRASERS CENTREPOINT
FOREST CITY
GSH
LIPPO GROUP
ROXY-PACIFIC HOLDINGS LIMITED
CAMPHOMES
PERENNIAL
OKH
IHG
TASEK MAJU
GuocoLand
MCL Land
Oxley
OUE
Keppel Land
Setia
MahSing
PROPERTI
COUNTRY GARDEN
POLLUX PROPERTIES
UOL Group Limited 华业集团有限公司

ARCHITECTS

architects61
ADDP ARCHITECTS LLP
aesler
ARUP
DP ARCHITECTS
ONG&ONG
CPG
AKIPRO Chartered Architect
RSP
kyoob
KAJIMA DESIGN
swan & maclaren
WOHA
SURBANA JURONG

MAIN CONTRACTORS

新建工程私人有限公司 BHCC CONSTRUCTION PTE LTD
BOUSTEAD
DAEWOO E&C
Dragages Singapore
HPC BUILDERS PTE LTD
Greatearth
長龍峰建築工程有限公司 CHAN RONG FEN BUILDING CONSTRUCTION PTE LTD
DMC DUA MEDAN CONSTRUCTION SDN BHD
Gammon
中国建筑(南洋)发展有限公司 China Construction (South Pacific) Development Co Pte Ltd
CHIP ENG SENG CORPORATION LTD
CNOC 青建国际
LIAN HO LEE CONSTRUCTION
GIANT LEAP
GENNAL
HYUNDAI
LAUBROS
NEONG HONG CONSTRUCTION PTE LTD
LUM CHANG
Sembawang
SoilBuild
SGA Builders Sdn Bhd
SKS
KAJIMA OVERSEAS ASIA
KIMLY CONSTRUCTION
PRECISE
SSANGYONG
SHIMZ
Straits Construction
LIAN BENG GROUP LTD
NCB NEWCON BUILDERS PTE LTD
PM
MCC SHANGHAI BAOYE GROUP CORP., LTD.
Lian Soon Construction Pte Ltd
TEAMBUILD
PSPCON SDN BHD
PULAUINTAN
So Keh
SUMITOMO MITSUI CONSTRUCTION CO.,LTD.
SATO KOGYO
TAY HUP BROTHERS CONSTRUCTION SDN BHD
SAMSUNG
WOH HUP
TIONG AIK CONSTRUCTION PTE LTD
TiongSeng GROUP
TAKENAKA
SAMSUNG C&T

AIRPORT & LTA PROJECTS — JOE LiGrA

Land Transport Authority | CHANGI airport singapore | JEWEL CHANGI AIRPORT

Efficient & Cost Effective Noise Barrier Walls

Project MRT - T205 - Woodlands South Station

JOE Singapore

LiGrA Mixed Development

Lightweight Green Aggregates

STARS OF KOVAN

ROYAL SQUARE

Hillion

MARINA ONE

Residences | Offices | Retail

Northpoint City

NORTH PARK

THE WOODLEIGH RESIDENCES

THE WOODLEIGH MALL

SOUTH BEACH

EON SHENTON

V ON SHENTON

DUO

Paya Lebar Quarter Mall

Paya Lebar Quarter

King Albert Park (KAP)

Le Quest @ Bukit Batok West Avenue 6

SENGKANG GRAND RESIDENCES

FUNAN, comprises a retail component, two office blocks and lyf Funan Singapore serviced residence

ONE KM

JOE Singapore Residential

LiGrA Lightweight Green Aggregates

JOE Singapore Residential

LiGrA Lightweight Green Aggregates

Coco Palms Condominium


Seven Palms Sentosa Cove


Ripple Bay Condominium at 2 Pasir Ris Link


The Greenwich Residential


Forest Woods Residences


The Amore EC at Edgedale Plains


THE TOPIARY Executive Condominium


THE LAKEFRONT RESIDENCES Condominium


Ecopolitan EC at Punggol Walk


The Tapestry Condominium


Sky Park Residences Executive Condominium


Thomson Impressions Condominium


Bartley Ridge Condominium


Sea Esta Condominium


KOVAN REGENCY Condominium


Waterfront Gold Condo at Bedok Reservoir Rd


THE INFLORA Condominium


euHabitat Condominium


SKY GREEN Condominium


WILSHIRE RESIDENCES


SIGNATURE AT YISHUN
Executive Condominium


PARC Life Condominium


ROYALGREEN Condominium @ Bukit Timah


15 Holland Hill


Grandeur Park Residences Condominium


Seventy St Patrick's Condominium

JOE Singapore
LiGrA Residential

HOUSING & DEVELOPMENT BOARD


JOE Singapore
LiGrA Residential
HOUSING & DEVELOPMENT BOARD
Park Colonial Condo
18 Woodsville Condo
HDB Bidadari (Alkaff Courtview)
Upp Serangoon Rd
HDB Bidadari (Alkaff Lakeview)
PIE
Sant Ritz Condominium
The Woodleigh Residences
Sennett Residence
HDB Bidadari (Alkaff Oasis)
Alkaff OASIS
BIDADARI ESTATE
Alkaff LAKEVIEW
Alkaff COURTVIEW

JOE Singapore Residential

LiGrA Lightweight Green Aggregates

HOUSING & DEVELOPMENT BOARD

JOE Singapore LiGrA Institutions

Integrated Care Hub (ICH)

CENTRE FOR HEALTHCARE INNOVATION

National Centre for Infectious Diseases

RafflesHospital

Sengkang General Hospital SingHealth

NUH National University Hospital

MINISTRY OF HEALTH SINGAPORE

HOMETEAMNS KHATIB

NTUC Health Nursing Home (Chai Chee)

St. Andrew's Nursing Home at Jalan Penjara

Ren Ci @ Ang Mo Kio (Nursing Home)

National Cancer Centre Singapore

NATIONAL SKIN CENTRE (NSC) Singapore

JOE Singapore Institution

LiGrA Lightweight Green Aggregates

BCA ACADEMY
of the built environment

MINISTRY OF EDUCATION SINGAPORE

LEE KONG CHIAN SCHOOL OF MEDICINE

NTU Yunnan Garden Campus

SUTD SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

NUS National University of Singapore

YaleNUSCollege

NUS National University of Singapore

More Than Hundred Schools Projects in Singapore

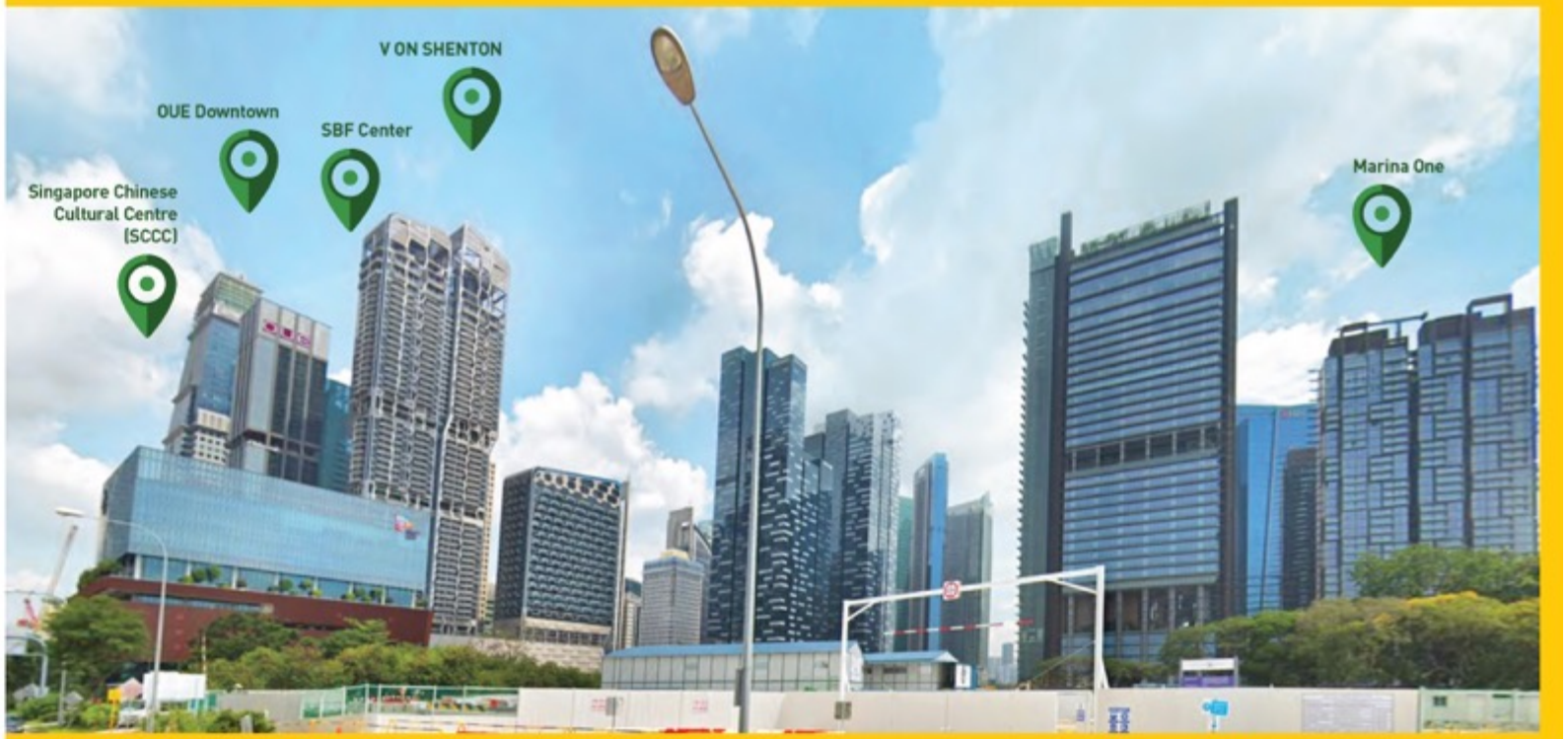
Temasek POLYTECHNIC

Overseas Family School

JOE Singapore Commercial

LiGrA Lightweight Green Aggregates

Professional Choice



Singapore Chinese Cultural Centre (SCCC)

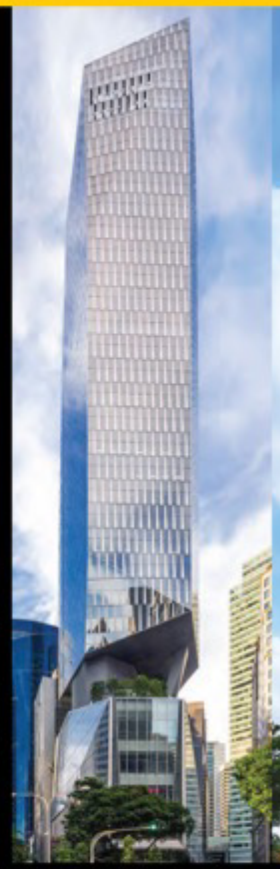
OUE Downtown

SBF Center

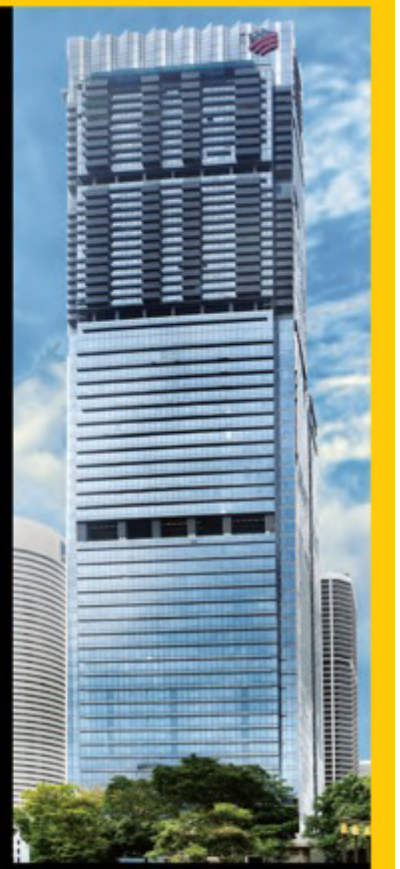
JOE Singapore
LiGrA Commercial

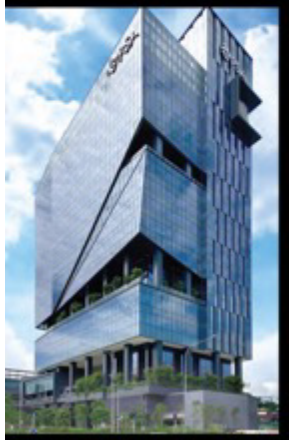
Hotel Boss


AXA Tower at 8 Shenton Way


Robinson Tower Redevelopment


CapitaSpring at 88 Market St


Guoco Tower at Tanjong Pagar Centre


New PSA Corporate HQ


InterContinental Singapore Robertson Quay


Orchard Hotel Singapore

JOE Singapore Industrial

LiGrA Lightweight Green Aggregates

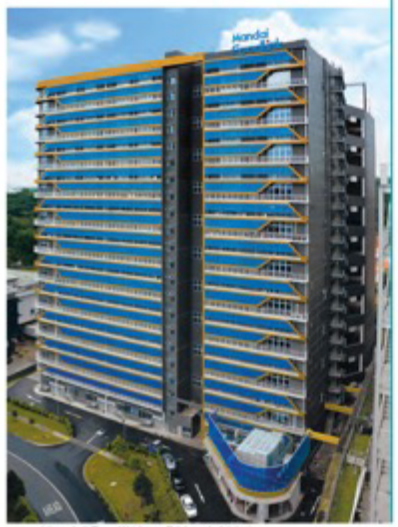
High-Tech Industrial Buildings

Industrial Development at Ang Mo Kio Street 65 for ST Electronics

JTC MedTech Hub @ MedTech Park

JTC Furniture Hub @ Sungei Kadut

THE WESTCOM at 1 Tuas South Avenue 6



Mandai Foodlink at 5 Mandai Link

Micron 300mm NAND Facility at 1 North Coast Drive

NORDCOM I

NORDCOM II

proxima

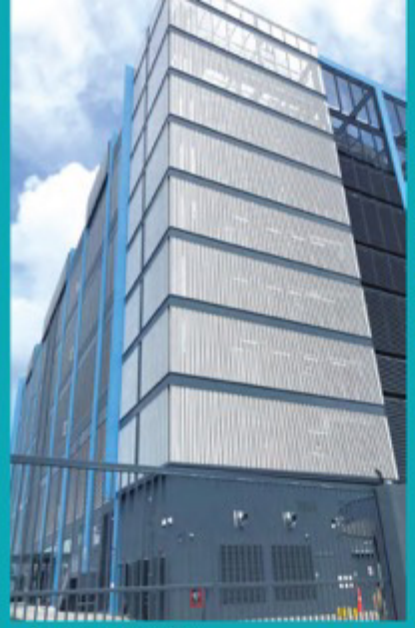
T-SPACE

JTC Business Aviation Complex at Seletar

Tagore 8 at 421 Tagore Industrial Avenue

JTC Chemicals Hub @ Tuas South

The InDex @ Tuas South Ave 3


Data Center at Loyang Drive


6 Storey Warehouse at 47 Jln Buroh

COSL (Singapore) at 3 Benoi Rd

Industrial Building With Ancillary Office at Tuas South Link


Mandai Link Logistics' Warehouses-Cold Storage at Mandai Link


STTelemedia Global Data Centres at 51 Defu Lane 10


Jurong Shipyard Office at Tuas South Boulevard / Tuas View Extension


Using panel 5.2m height for external wall and window opening

JOE International
LiGrA Malaysia
Lightweight Green Aggregates

FOREST CITY
COUNTRY GARDEN PACIFICVIEW

EATON RESIDENCES at Kuala Lumpur, Malaysia

MERIDIN EAST

FOREST CITY Projects [Plot 4 - Phase 1, Plot 26 - Phase 2, Plot 26 - Phase 4],

THE AMERALD Resort Hotel at Pengerang, Johor, Malaysia

Taman Pelangi Indah Sales Gallery by SP Setia

Holiday Inn Johor Bahru City Centre

Sky Habitat @ Meldrum Hills, Johor Bahru, Malaysia

Warehouse, Chemical and Paint Store for Malaysia Marine and Heavy Engineering Sdn Bhd, Johor, Malaysia

GRANDVIEW 360° Condominium, Johor Bahru, Malaysia

JOE International

LiGrA Malaysia

Lightweight Green Aggregates

BRDB

Permas Jaya - Johor Bahru

Sierra Perdana - Johor Bahru

Brickfields - Kuala Lumpur

PIJ HOLDINGS

Larkin - Johor Bahru

Medini - Johor Bahru

Ecoworld Business Park - Johor Bahru

JOE International
LiGrA Lightweight Green Aggregates
Malaysia

Nilai District Police Headquarters, Malaysia

Additional Buildings In Johor State CIDB Complex at Jalan Tampoi, Johor Bahru, Malaysia

ISKANDAR Residences Medini @ Nusajaya, Johor Bahru

PS Jalan Reko Kajang for Petronas

Marlborough College Malaysia, Johor

SIHANOUKVILLE, CAMBODIA
D'Seaview
CAMHOMES

International
JOE
LiGrA Lightweight Green Aggregates
Cambodia

JOE International
LiGrA Lightweight Green Aggregates
Indonesia

Meisterstadt BATAM

POLLUX HABIBIE INTERNATIONAL

AGUNG SEDAYU GROUP

Tokyo RIVERSIDE APARTMENT at PIK 2

Gereja Reformed Injili Indonesia (GRII) Batam, Indonesia

HS Hotel Santika

Hotel santika Batam, Indonesia

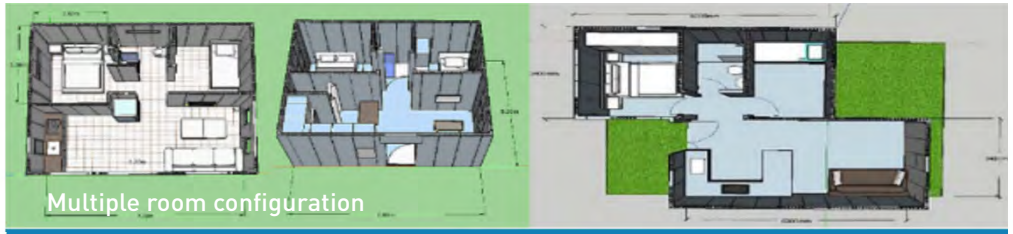
JOE Green Wall Panel System for Affordable housing / Worker Dormitory / Etc.

Affordable Housing Using JOE Green Wall Panel System

✓ **No In-Situ Structural Columns**

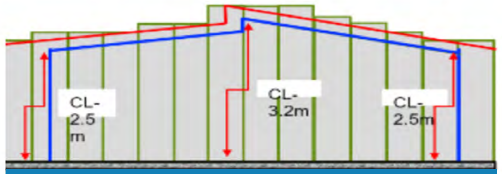
✓ **Fast & Simple Construction**

✓ **High Quality**

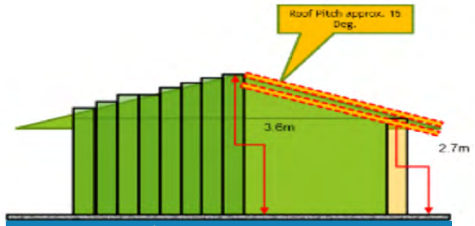


Semi-D : Low-cost Housing w/ Piched Roof / Flat False Ceiling
Partition Wall Between Unit to use JOE Panel & Duplicate for Terrace Layout

Tyipical Terrace Facade can duplicate the front entrace design



Concept Roofing Design as photo with stagger roof profile for Modern Look



Gable end / corner Unit can have similar treatment.

Using JOE Green Wall Panel System for Concrete Drainage and Irrigation

Using JOE Green Wall Panel System for Concrete Flooring Slab.

Other Functionable applications

Planter Box

Walkway Slab at Podium

Perimeter Fence

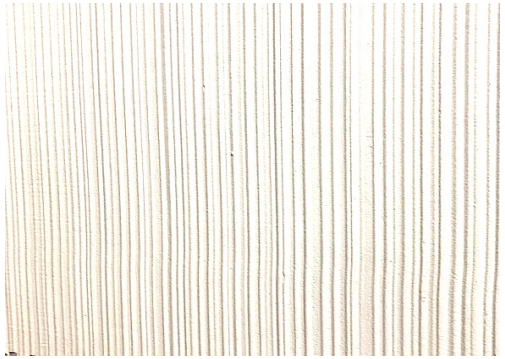
Walkway Slab at Podium

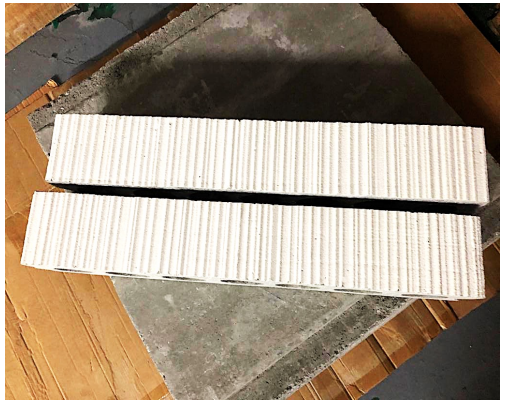
Equipment Plinth

External Facade Pattern Walls Design - Customization

Precast Facade using Form-liner molding – Wavy & occupy cranage hours

Customer's request to propose replacement of Facade wall to our Hollow core wall for a more economic alternative and faster construction option to minimize reliance of tower crane lifting as a critical activity.





JOE Green's Customized Pattern Panel as non-critical activity erection – less reliance on tower crane.

JOE Green Lightweight Concrete Panel has received an Excellent rating certification mark from SGBC and TÜV SÜD PSB at SGBC-BCA Sustainable Leadership Awards Gala Dinner 2016. Today, JOE Green Concrete Panel has been awarded the rating Leader under SGBC product certification scheme

Managing Director of JOE Green, Mr. Boediman Widjaja, received a trophy as one of the winner Asia Green Business Awards 2015/16 in BEI Asia Awards 2015/16 for JOE Green Lightweight Concrete Wall Panel product

Director of Joe Green, Ms. Cindy Lim, received a trophy in Singapore Brands 2012 Gala Dinner Night, 28 April 2012

Ms. Charlina Lim from JOE Green was receiving a trophy as one of the winner of Asia Green Business Awards 2017 in BEI Asia Awards 2017 for JOE Green Lightweight Concrete Wall Panel product

Mr. Boediman Widjaja and Ms. Charlina Lim represented JOE Green to receive a trophy as one of the winner of Enterprise 50 Awards. E50 recognises the enterprises whose journey to innovation is helping to shape a sustainable future.

JOE™ LiGrA™ Lightweight Green Aggregates

Seeing Is Believing

We had honorary guests visiting JOE's plant, HQ and project sites to observe our usage of recycle concrete aggregates and waste materials for eco-friendly green products, to make our earth more sustainable.

An honour to have the Ambassador of the Republic of Indonesia H.E. Suryo Pratomo visit JOE Green HQ and Lab at Amazana Building Singapore

Petronas and Dua Medan Construction Sdn Bhd Team

Construction Industry Development Board Malaysia (CIDB) with 40 PKMM (Persatuan Kontraktor Melayu Malaysia)

China Communications Construction

Sunway Construction Sdn Bhd visited Tiong Woon Corporation's Warehouse project site

Country Garden Pacificview Sdn Bhd for Forest City, Gelang Patah

SKS Group and Atria Architects visit JOE Green's project site Holiday Inn JBCC

An honour to have the Ambassador of the Republic of Indonesia H.E. I Gede Ngurah Swajaya visit JOE Green HQ at Amazana Building Singapore

Ministry of Manpower (MOM) Singapore visited The MKZ Condominium project site

CEO of Housing and Development Board (HDB), Dr Cheong Koon Hean, visit HDB project site at Sengkang East Road

JOE Green's prestigious project Pollux Habibie Meisterstadt Batam residential towers topping-out ceremony on April 2019

BCA's Super Low Energy Buildings Department Environmental Sustainability Group visit JOE Green Lab

ECOWORLD Development Group

MCL Land Ltd, Lum Chang Building Contractors Pte Ltd, P&T Architects & Engineers Ltd

Lum Chang Building Contractors Pte Ltd

AESLER Architects Indonesia (PT. Aesler Grup Internasional)

PT PP Tbk visit JOE Green HQ in Singapore for their Indonesia construction projects

Nan Shan Group, Bintan - Indonesia & China

Woh Hup, construction and civil engineering specialist company

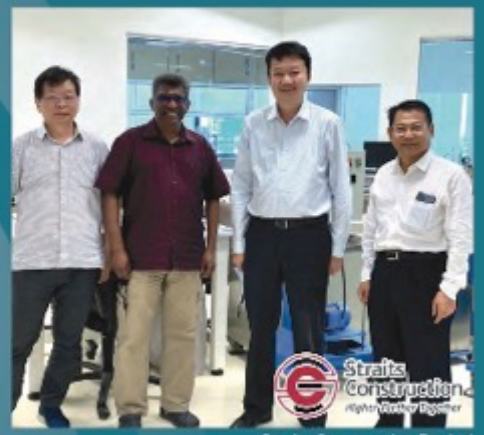
Pulau Intan

Shimizu Corporation and ExxonMobil Asia Pacific Pte Ltd

Honorary Guests

Hearing is Believing

Teambuild Singapore



Straits Construction Pte Ltd

JOE Green visits HLH Group HQ in Cambodia to see the projects and potential set up new factory

Obayashi Corporation visited Ripple Bay Condominium Singapore project site

Mr. Richard Koh, MD of Nawarat Group - Thailand

Chiu Teng Enterprise

Daewoo Engineering & Construction Co. Ltd.

Nippon Paint Singapore

Globally Recognized

Patent, Registered Design & Trademark

Singapore

Malaysia

Malaysia

Indonesia

India

China

Hong Kong

Hong Kong

Australia

New Zealand

USA

Cambodia

European Union

USA

JOE Testimonials

LiGrA Hearing is Believing

Professional Verdicts :

"The Right Wall Panel for Every Construction"


CERTIFICATE OF APPRECIATION

JOE Green Pte Ltd

For being part of our project to supply Building Materials with Good Quality, Good Quantity and On Time Delivery Goods as project :

"Pollux Meisterstadt Batam"


Meisterstadt

Certification of Appreciation

AWARDED TO

JOE Green Pte Ltd

For Good Quality, Good Quantity and On Time Delivery Goods at Meisterstadt Batam project.

Batam 7th July 2020

Richie Laseduw

General Manager


Meisterstadt | aesler

Certification of Appreciation

AWARDED TO

JOE Green Pte Ltd

For Good Quality and Excellent Product at Meisterstadt Batam


PETRONAS

JOE Green Precast Sdn. Bhd.

&

Dua Medan Construction Sdn. Bhd.

are proud to be

the IBS Solutions Provider &

Participant of Projects for PETRONAS

JOE DMC

www.joegreenpanel.com

8th Dec 2020

"Our project hotel Santika Batam had completed in December 2019. We would like to thank JOE Green Team for the full support. We have been satisfied using your products, in terms of cost savings, time and quality of products. We have other projects that may need your support again. We will contact you soon. Thank you very much."

Frans Bambang
Manager
CV. MEGA CONTRACTOR INDONESIA

"Compare to other precast wall panels, we definitely can see the quality and precission of JOE Green panel far more better for INOAC Project."

Tipluk Jati
Director
PT. AGNI SATYA PERSADA INDONESIA

"JOE Green products e.g. panels, brackets and accessories are found to be in high quality standard. JOE Green wall panel system is easy to install & hence can improve productivity. JOE Green's technical support i.e. submission of shopdrawings & details is also excellent. The technical personnel is found to be knowledgeable, responsive. JOE Green panel can be further improved if the panel use in the residential dwelling unit can be lighter in weight, currently need 3 - 4 workers to erect 1 panel"

Lim Jit Heng
Project Manager
長龍峰建築工程有限公司 CHAN RONG FEN BUILDING CONSTRUCTION PTE LTD

"Good material. It would be important to brief customers every construction details shown in the catalogue, especially to the worker of the erector on the dos and don'ts"

Mdm Eng Y H
Project Manager
三達利建設私人有限公司 SANTARLI CONSTRUCTION PTE LTD

"We have been with JOE Green for many years. Their product quality is good & have a broad product range."

Ivy Toh
Contract Manager
WOH HUP

"We are the 1st time work with JOE Green and very satisfy with JOE Green product quality."

Tan Teck Chong
Senior Project Manager
PSYCON SDN BHD

"Installing Joe Green product is very easy. All the material accessories were designed to make it easy. Joe Green product also can be cut to size required, so it can speed up the installation time. We experience those things in one of our project in PIK 2."

Setyowati K
Director
PT. BARA BINTANG SEMESTA

"JOE Green offers wide range of solid and reliable products that not only improve work productivity. It also stands out in term of value proposition that we can offer to our clients"

Wayne Fu Cheng
Director
FU CHENG BUILDING CONSTRUCTION PTE LTD

"Overall service is excellent"

Marvin Laxamana
Quantity Surveyor
建築私人有限公司 YES Construction Pte Ltd

"JOE Green's service is good"

Jackson Tiong
Contract Manager
LIAN BENG GROUP LTD

"Dear JOE Green, we are very impressed with the strong technical knowledge and fast support of the team. Overall we are very satisfied with your commitment and service"

Soh Lip Hong
Project Manager
新建工程私人有限公司 BHCC CONSTRUCTION PTE LTD

"Quality products, prompt delivery and great support !"

Johnny Xu
Director
CHIAN TECK

"Service and product quality from JOE Green is good"

May Beh
Purchaser

"The product is good. However the product delivery process need to be improved. Moving forward the contractor's installer need to familiarize with JOE product and take advantage of the speed and quality of JOE product offering for elevating construction industry standard."

Ar. Selamat
Director, JYP Architects Sdn Bhd
Principal, Arkitek Selamat Sdn Bhd

"Joe Green products are strong and good quality. The sizes are cut precisely according to our requirement so the waste of material are limited. We do Tokyo Riverside Project."

Harjoto H
Director
PT. TIRTA CITRA BARA PERSADA

JOE™ just one earth
green concrete panel

LiGrA™
Lightweight Green Aggregates

Worldwide, Buildings Account for 40% of Global Energy Consumption and 33% of Greenhouse Gas Emission

JOE Green has a Plan to Decarbonise the Industry, With a focus of Sustainability

Lightweight Green Aggregate (LiGrA) is Made from Recycled Waste, Help to reduce CO2 Emissions, Resource use and Construction costs.

JOE Green is Continuously Developing other products, with the aim of **Reducing Emissions, Manpower, Resource use and Energy Inefficiency.**

JOE™ just one earth

Gramata™
Lightweight Green Aggregates

LiGrA™
Lightweight Green Aggregates

The Art of Lightweight Technology

Contact Us :

E-Catalogue :

Thank You

www.joegreenpanel.com

+65 9760 5272