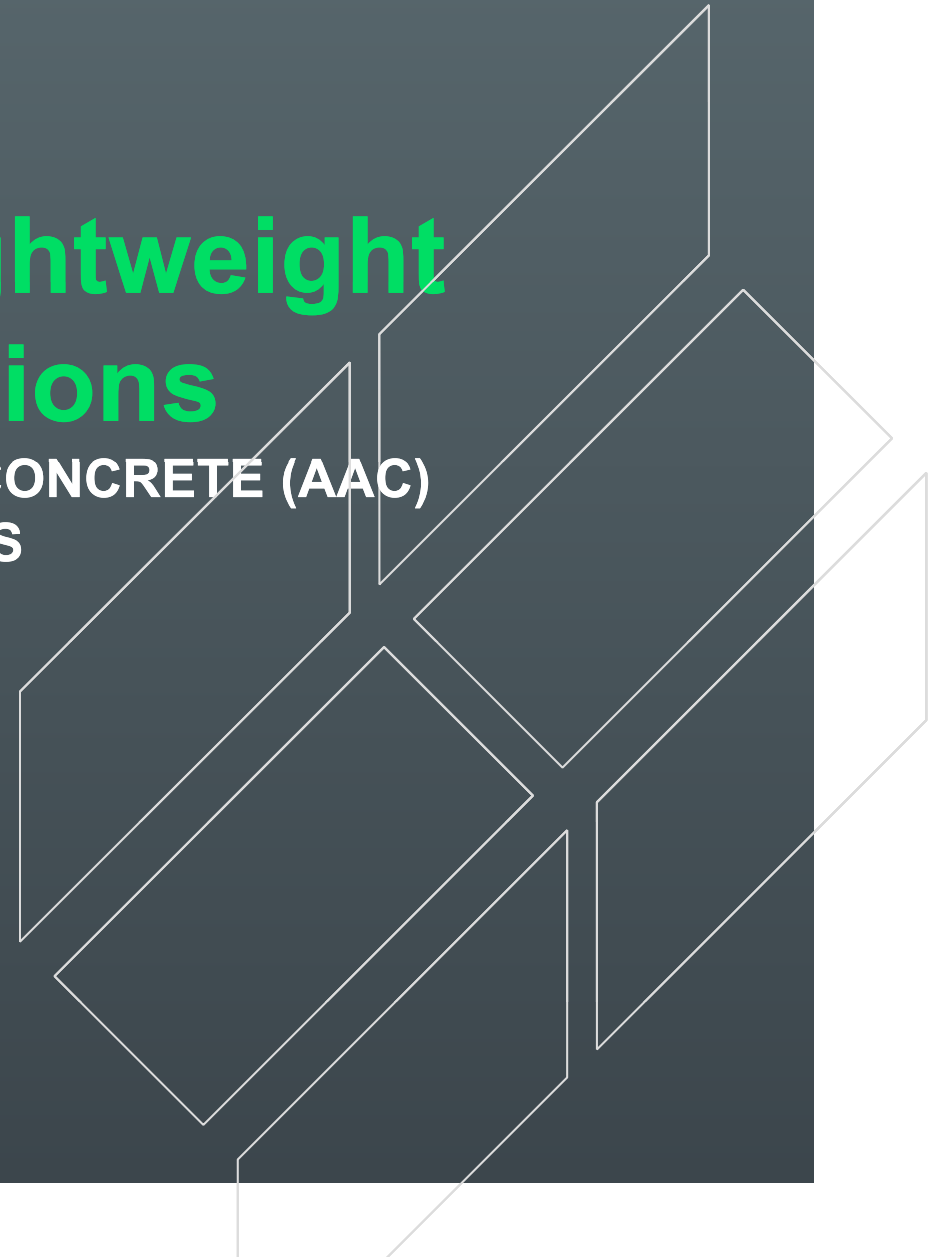




Delivering Lightweight IBS Solutions

AUTOCLAVED AERATED CONCRETE (AAC)
PRODUCTS



COMPANY OVERVIEW



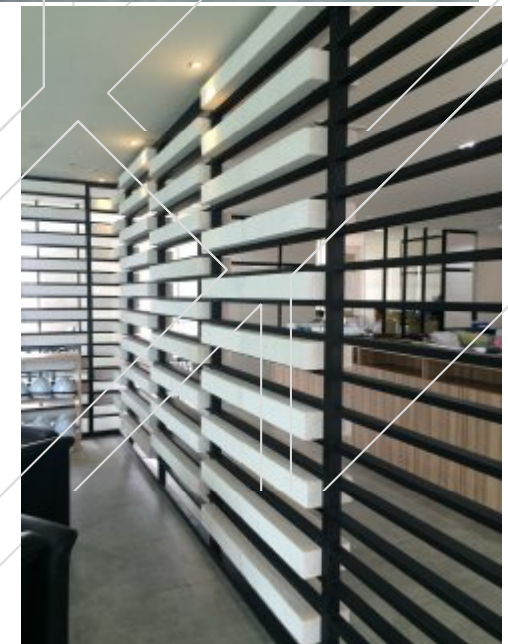
- ❖ Established in 2012. Head Office in Jln Kuchai Lama, KL, Malaysia.
- ❖ Factory situated at Serendah, Rawang.
- ❖ Leading Manufacturer of AAC (Autoclaved Aerated Concrete) in Malaysia
- ❖ Product Range inclusive of blocks, panels, lintels with dry density 450 – 650 kg /m³ and essential installation components such thin bed adhesive, render, skim coats, ties and tools
- ❖ Investment : RM100 million
- ❖ Annual capacity – 600,000 m³
- ❖ 150 employees nationwide
- ❖ State of the art technology from Germany – Wehrhahn

OUR FACTORY



STARKEN SERENDAH

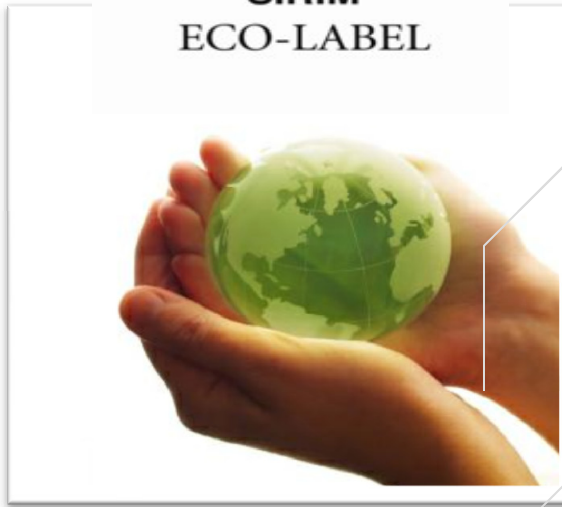
Investment :RM100 millions
Capacity :600,000 m³ annually
Land area :93,000m²



SUSTAINABILITY

- ✓ Uses Sustainable Materials & Contains up to 20% of Recycled Materials - Certified By Green Label Singapore & SIRIM Eco Label

STARKEN SUPPORTS THE MALAYSIAN GOVERNMENT GREEN INITIATIVES





The Singapore Green Labelling Scheme Secretariat hereby grant

Starken AAC Sdn Bhd

No. A-1-3A, Pusat Perdagangan Kuchai,
No. 2 Jalan 1/127, Off Jalan Kuchai lama, Kuala Lumpur 58200, Malaysia
the right to use the Singapore Green Label for

STARKEN S5 BLOCKS

023-008-2182

"Eco-Friendly Building Material"

Validity: 24 October 2014 to 23 October 2015



JOSE RAYMOND
Chief Executive Officer
Singapore Environment Council



WHAT IS AAC ?

Cement + Sand + Lime + Aerating agent

Autoclave

Autoclaved Aerated Concrete (AAC)

Benefits of AAC



Lightweight



Fire Resistance



Thermal Insulation



Precise Dimension



Sound Insulation



Good Workability

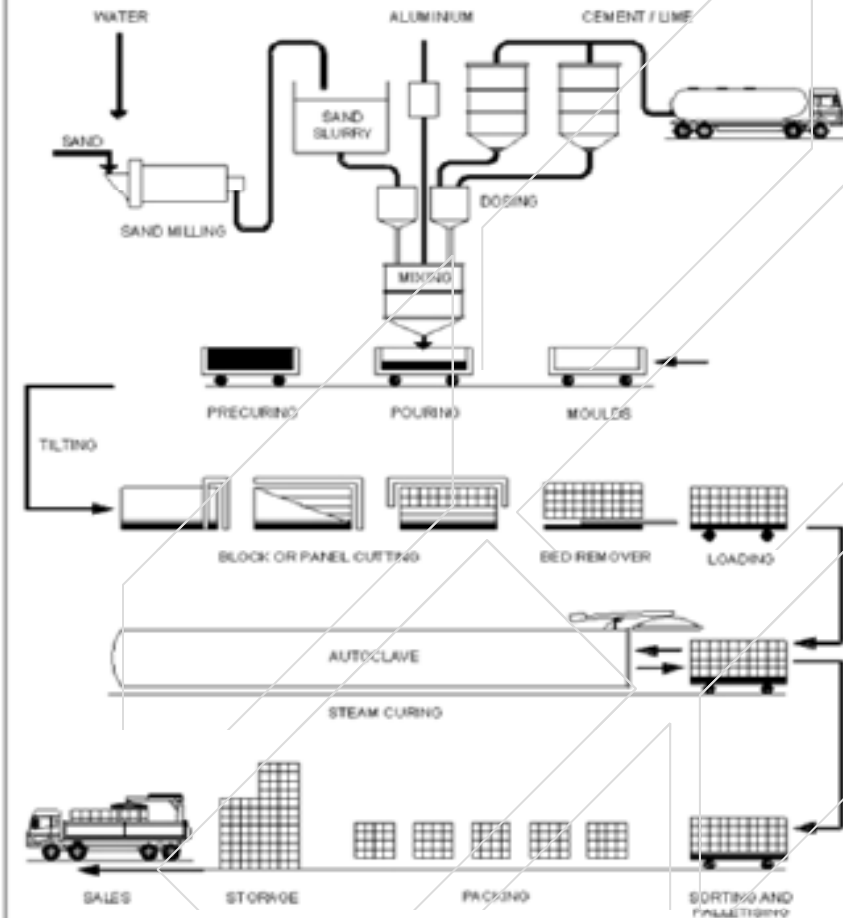


Durable



Cost Saving

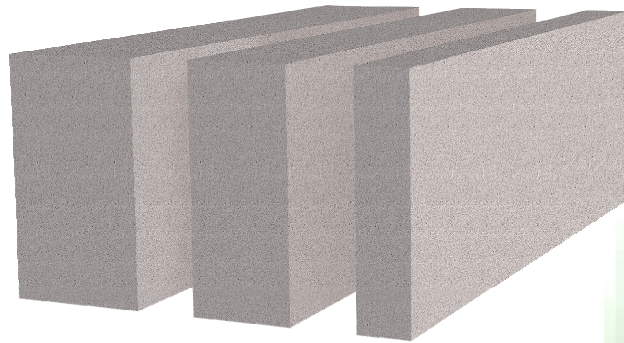
AAC MANUFACTURING PROCESS



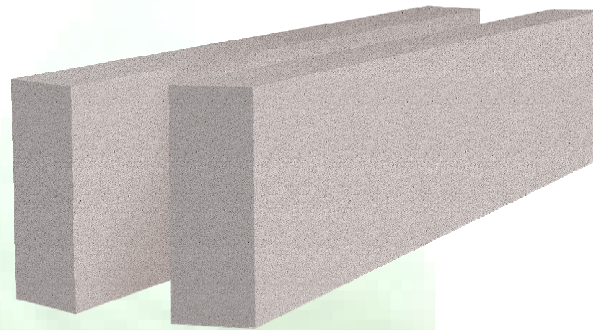
STÄRKEN TM

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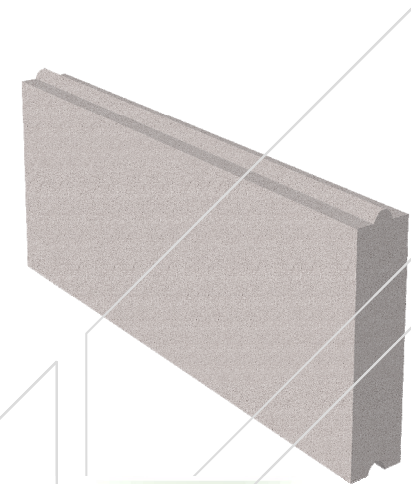
PRODUCT RANGE



Starken Block



Starken Lintel



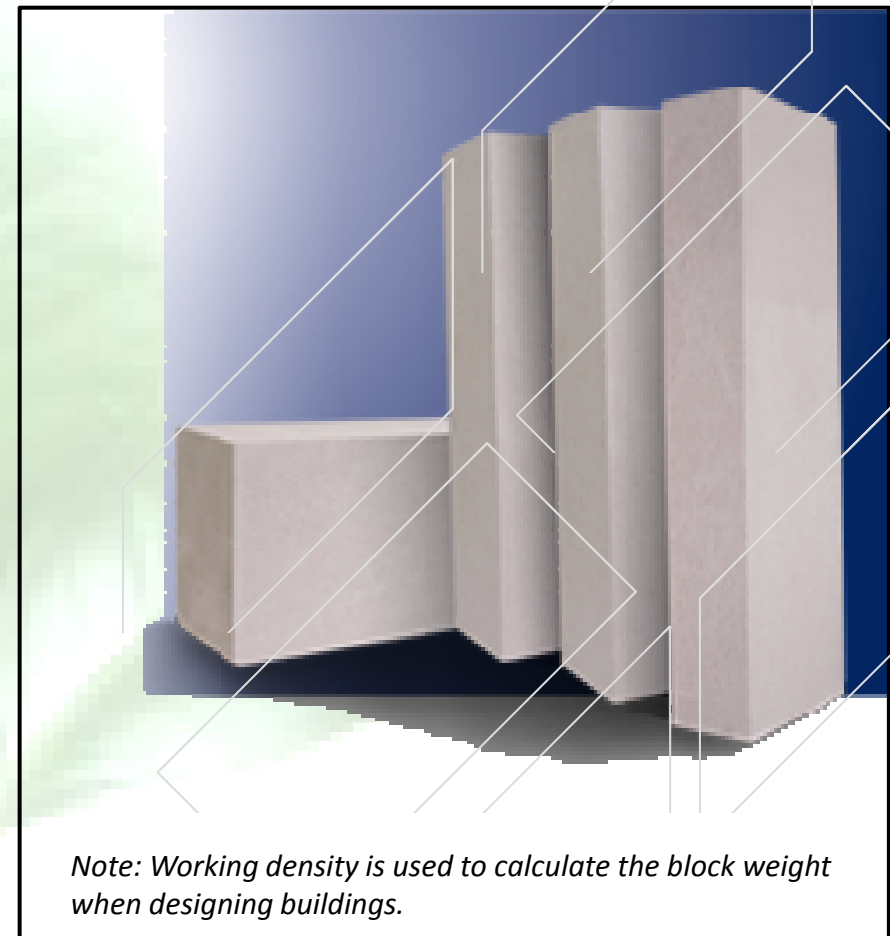
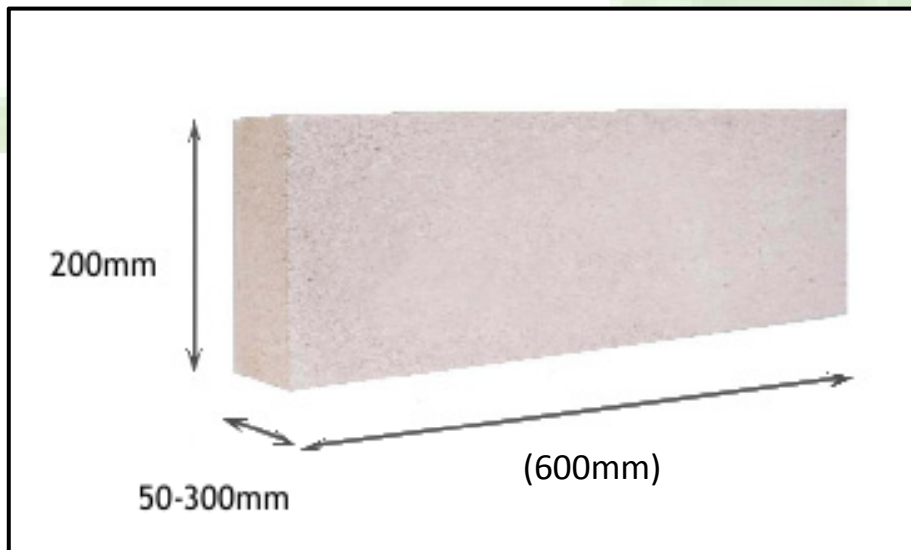
Starken Wall/ Floor Panel

Autoclaved aerated concrete (AAC) is a lightweight, precast building products used around the world. Available in blocks and panels of various sizes, AAC is an ideal material for internal & external walls, firewalls, acoustic walls and floors

STARKEN BLOCKS



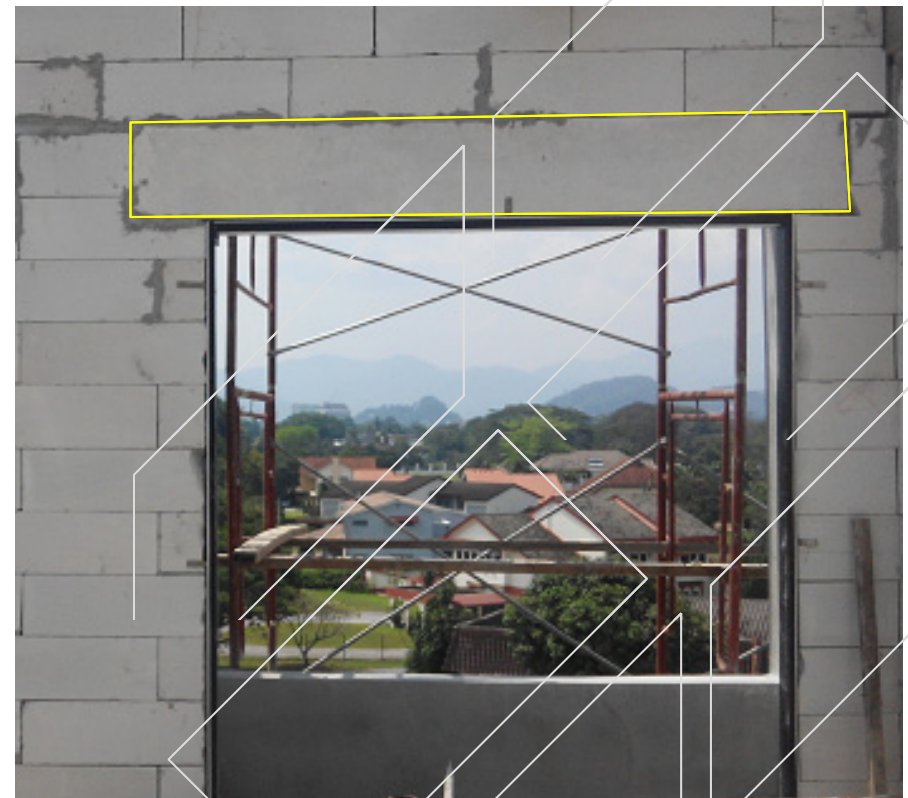
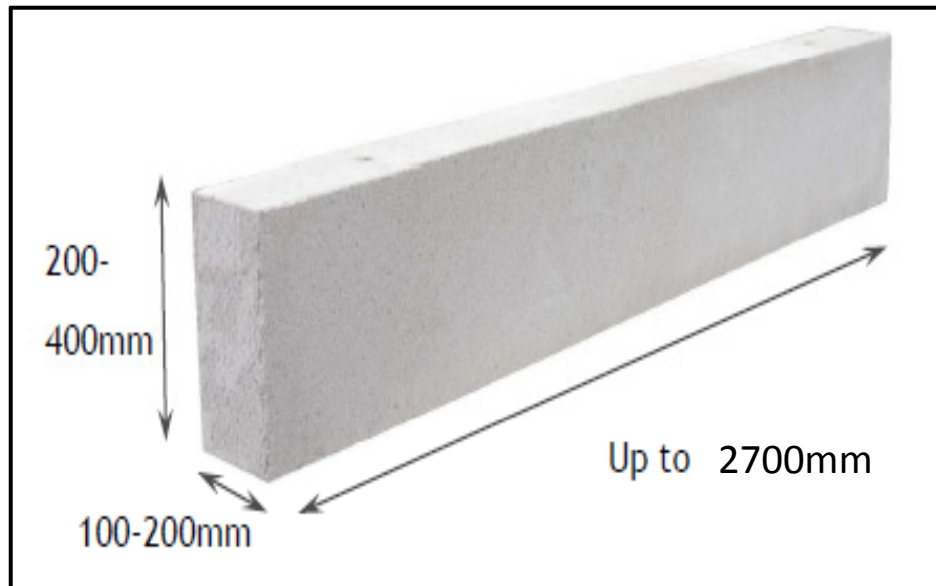
- Internal & External Walls
- Infill & Load-bearing walls
- Working Density (kg/m^3) : 700, 840 & 910
- Compressive Strength (average)
 - S3 blocks 3.5MPa
 - S5 blocks 5.5MPa
 - S7 blocks 7.0MPa
- **IBS Factor 0.5 (10 points on wall)**



STARKEN LINTEL



- Pre-cast Reinforced AAC Lintels
- For standard door and window openings of 900mm to 2,100mm clear span.

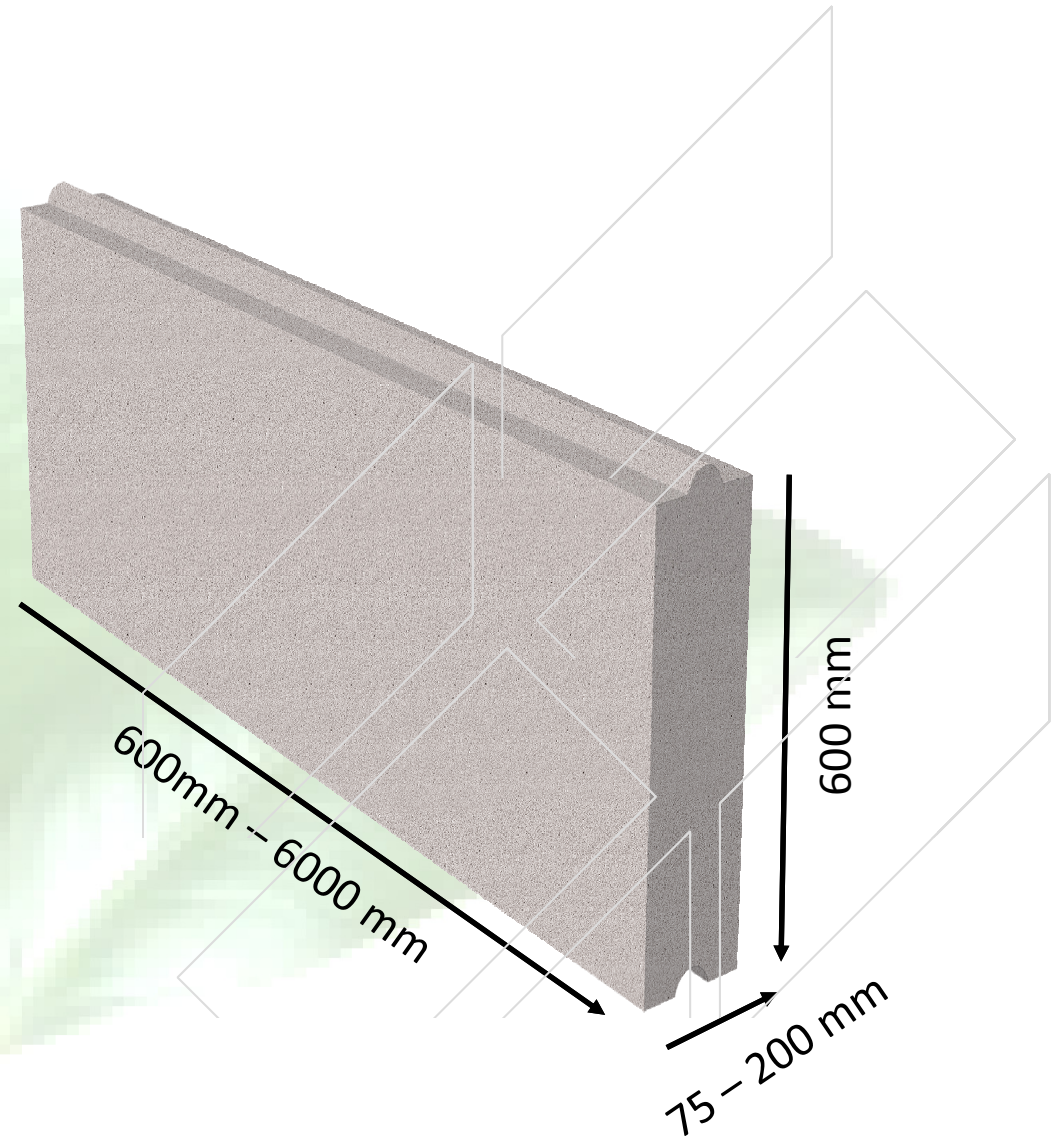


STARKEN WALL PANEL

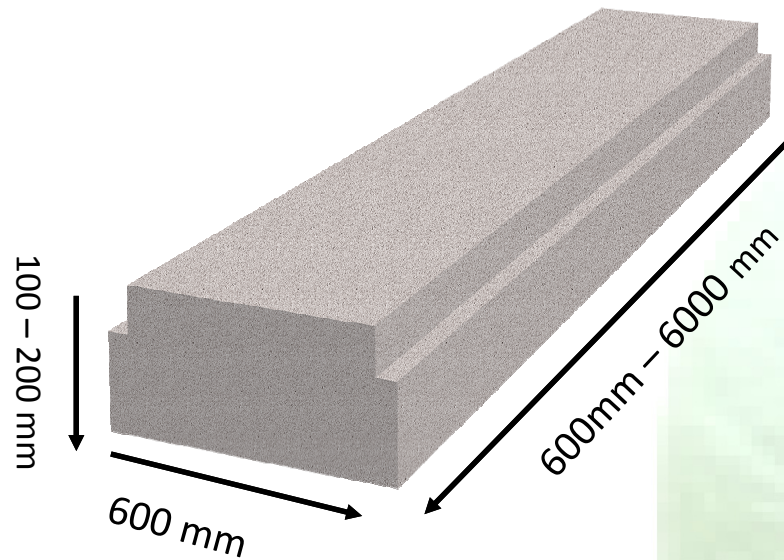


- Reinforced panels
- Horizontal or vertical orientation
- Steel & concrete frames
- Nominal Dry Density : 550 kg/m^3
- Working Density : $780 - 820 \text{ kg/m}^3$
- Compressive Strength : 3.5 MPa
- **IBS Factor 1.0 (20 points on wall)**
- 30 % lighter than conventional hollow core panel

* Based on 100 mm thickness



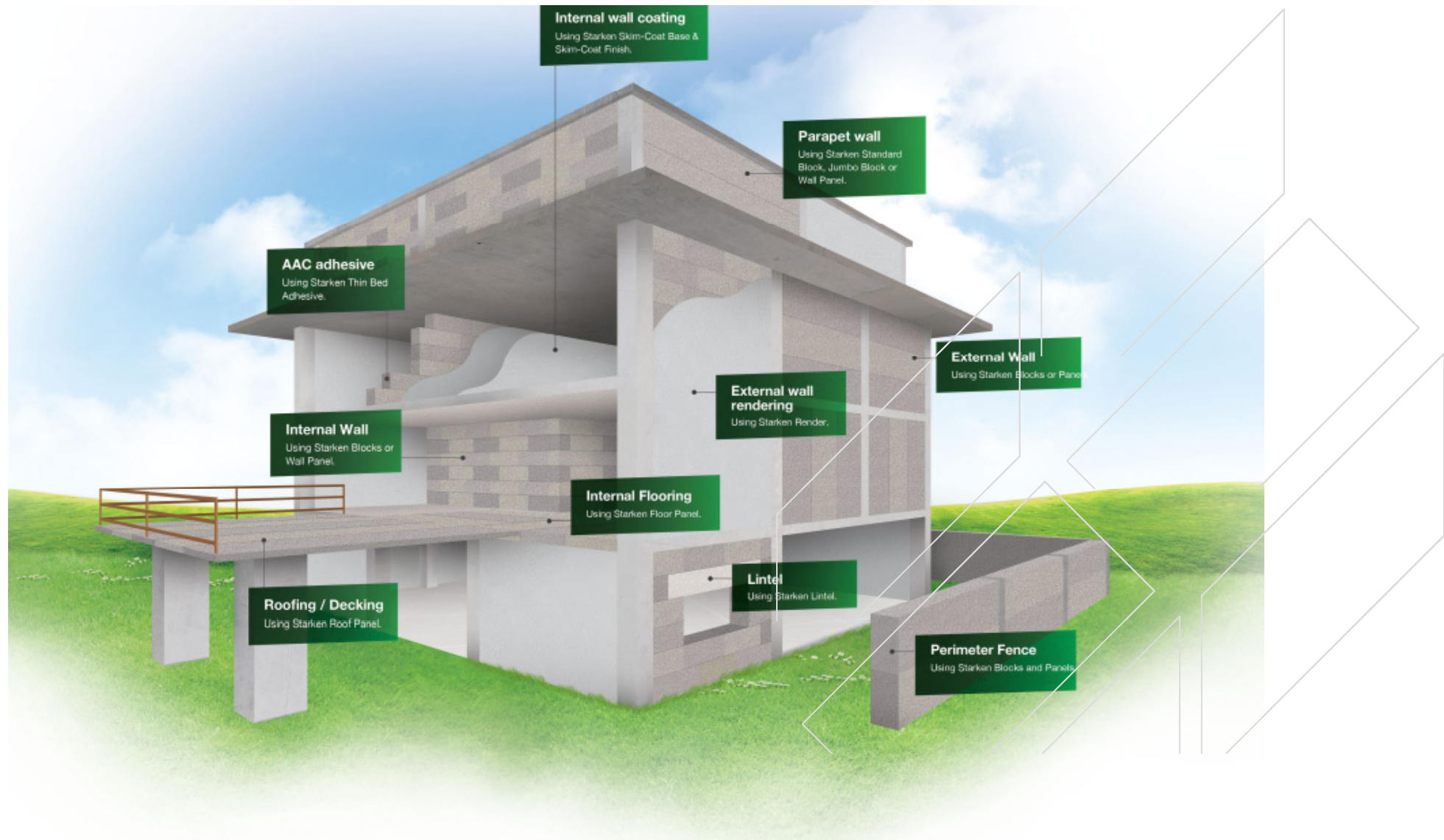
STARKEN FLOOR PANEL



- Reinforced AAC Floor Panels
- Nominal Dry Density : 550 kg/m^3
- Working Density : $780 - 820 \text{ kg/m}^3$
- Compressive Strength : 3.5 MPa



APPLICATION DIAGRAM



WHERE TO USE ?



Residential: Landed/ High rise



- Outstanding thermal insulation
- Versatile
- Saving foundation cost up to 25%
- Non-toxic products

Commercial: Offices/ Shopping malls



- Improve building operating cost
- Good sound insulation
- Solid & strong

Educational: Schools & Universities



- IBS certified components
- Improve building operating cost
- Superior fire rating – up to 4 hours
- Good sound insulation

Leisure: Hotels/ Resorts



- Speedy construction
- Outstanding thermal insulation
- Good sound insulation
- Saving foundation cost up to 25%

Healthcare: Hospitals/Clinics



- IBS certified components
- Superior fire rating – up to 4 hours
- Non-toxic products
- Outstanding thermal insulation

Industrial: Factories / Warehouse



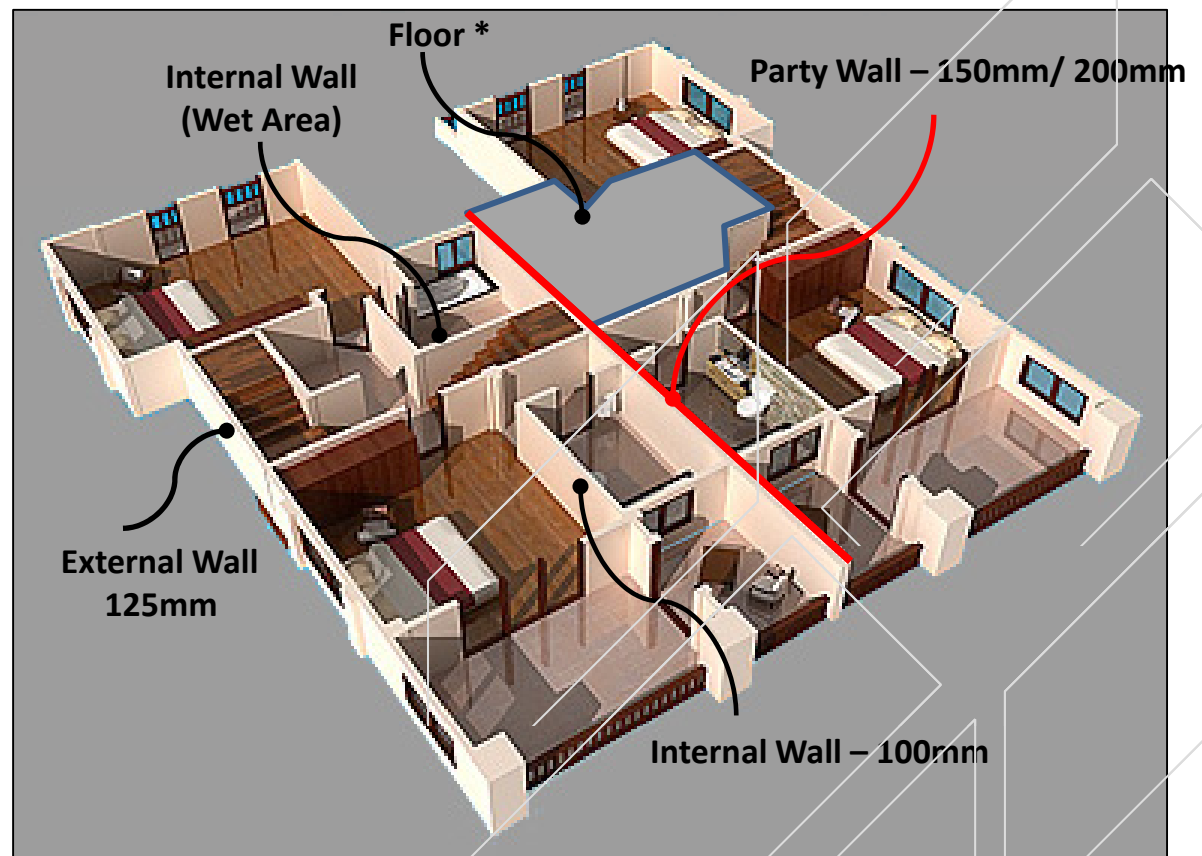
- Superior fire rating – up to 4 hours
- Can be used as compartment wall
- Outstanding thermal insulation
- Solid & strong

BLOCK & PANEL APPLICATIONS



Residential

- Terraced houses
- Semi-D & bungalows
- Flats/ Apartments & Condos



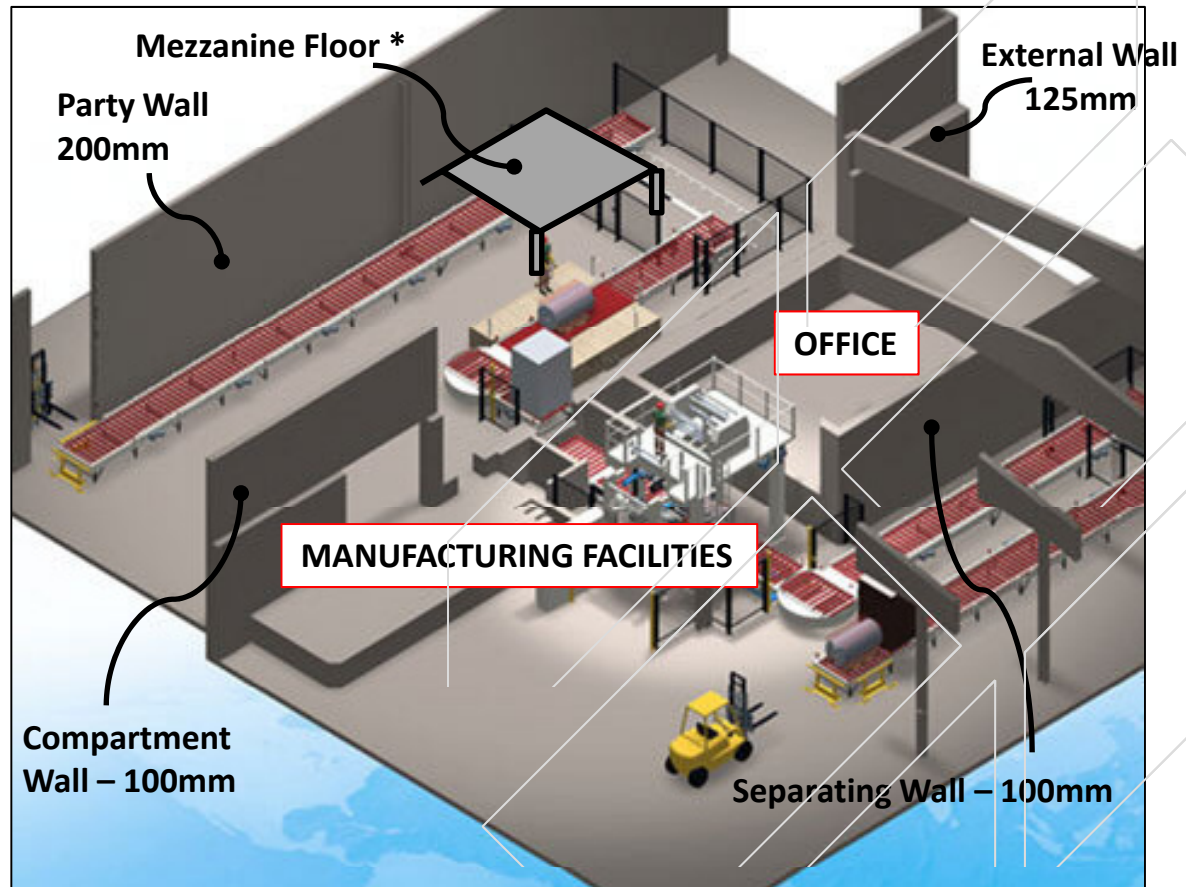
** Applies to panels only*

BLOCK & PANEL APPLICATIONS



Non-residential

- Leisure (Hotels/ chalets)
- Factories/ warehouses
- Offices
- Commercial buildings



** Applies to panels only*

COST ESTIMATION FOR REFERENCE

(Non-load bearing wall)

No	APPLICATION	STARKEN AAC Block			Clay Brick			Cement Sand Brick	
		INTERNAL WALL	EXTERNAL WALL	PARTY WALL	INTERNAL WALL	EXTERNAL WALL	PARTY WALL	INTERNAL WALL	EXTERNAL WALL
1	TYPE								
	Material Thickness	100 mm	125 mm	200	100 mm	100 mm	200 mm	100 mm	100 mm
	Finished Wall Thickness	110 mm	140 mm	210	150 mm	150 mm	250 mm	150 mm	150 mm
	Finishes - Internal Face	3-5 mm skimcoat	3-5 mm skimcoat	3-5 mm skimcoat	25mm Plaster	25mm Plaster	25mm Plaster	25mm Plaster	25mm Plaster
	Finishes - External Face	-	10-12 mm Render	-	-	25mm Plaster	-	-	25mm Plaster
2	COST	RM /m ²	RM /m ²	RM /m ²	RM /m ²	RM /m ²	RM /m ²	RM /m ²	RM /m ²
	Material	25.42	31.78	50.84	22.20	22.20	44.40	14.40	14.40
	Labour + installation tools	13.20	14.81	16.98	12.80	12.80	25.60	12.80	12.80
	Skim Coat (Material + Labour + Mesh)	13.00	6.50	13.00	-	-	-	-	-
	External Render (Material + Labour)	-	14.00	-	-	-	-	-	-
	Plastering (Material + Labour)	-	-	-	33.00	40.00	33.00	33.00	40.00
	Wastage (3% AAC, 5% Brick)	0.76	0.95	1.53	1.11	1.11	2.22	0.72	0.72
	TOTAL COST	52.38	68.04	82.35	69.41	76.41	105.52	61.22	68.22
	SUPPLY & INSTALL RATE (INCLUSIVE OF PROFIT MARGIN 15%)	60.24	78.24	94.70	79.82	87.87	121.35	70.40	78.45
					133%	112%	128%	117%	100%

Updated : 7th July 2014

Note :

1. Price may vary depending on location and project site. The prices shown above are based on Klang Valley only.

2. The price for claybrick is based on RM 0.37/pc, RM0.24/pc ofr cement sand brick (assumed 60pcs/m2).

3.AAC Block is priced at RM3.05/pc for 600 x 200 x 100mm.

4. The comparison table is based on estimation. Actual supply& install rate is subject to actual site measurement & to be quoted by applicators.

10 REASONS WHY CHOOSE AAC?



1. Lightweight
2. Fire Resistant
3. Thermal Insulation
4. Precise Dimension
5. Sound Insulation
6. Good Workability
7. Environment Friendly
8. Speedy Construction
9. Durable
10. IBS Certified



ADVANTAGES OF AAC



REASON NO 1 Lightweight

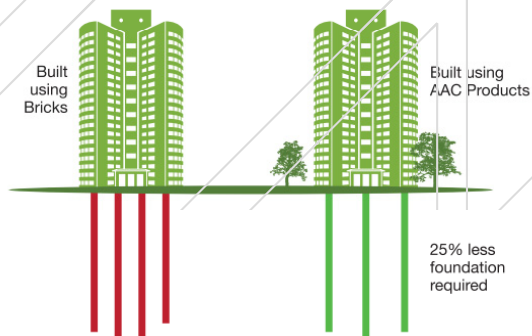


- Working Density of 700, 840 & 910kg / m³
- Up to **3 times lighter** than conventional concrete
- Easy to handle

Study on 18-storey Serviced Apartment (Based on S5 Blocks)

- 12% Saving on Foundation Cost
- 17% Saving on Super Structure Reinforcement

Save up to 25% Foundation Cost Brick vs AAC



SUBSTANTIAL REDUCTION OF BUILDING DEAD LOAD



Application	AAC Block Wall	Brick Wall	Significance
Internal Wall	Thickness - 110mm Weight - 98kg/m ² <i>Component:</i> - AAC blocks 100mm - Skim coat (5mm both sides)	Thickness - 150mm 288kg/m ² <i>Component:</i> - Bricks 114mm - Plaster (18mm both sides)	65% reduction in dead load of internal wall
External Wall	Thickness - 140mm Weight - 128kg/m ² <i>Component:</i> - AAC blocks 125mm - Skim coat 5mm - Render 10mm	Thickness - 150mm Weight - 288kg/m ² <i>Component:</i> - Bricks 114mm - Plaster (18mm both sides)	56% reduction in dead load of external wall
Party Wall	Thickness - 210mm Weight - 182kg/m ² <i>Component:</i> - AAC blocks 200mm - Skim coat (5mm both sides)	Thickness - 250mm Weight - 480kg/m ² <i>Component:</i> - Bricks 225mm - Plaster (12.5mm both sides)	62% reduction in dead load of party wall

Notes:

1. AAC weight is estimated based on working density of 840/m³
2. Brick wall density is assumed at 1920kg/m³ (UBBL Malaysia)

ADVANTAGES OF AAC

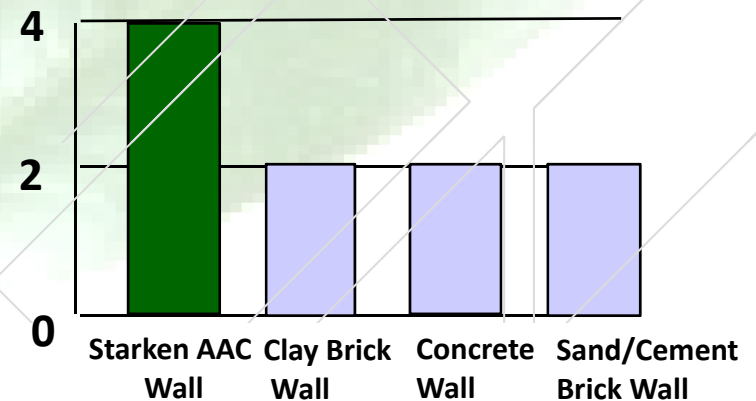


REASON NO 2 Excellent Fire Rating



- Fire rating to BS 476 Part 22
 - 50 mm up to 2 hours
 - 100 mm **up to 4 hours**
- Best in its class

High Fire Resistance Period (FRP)*

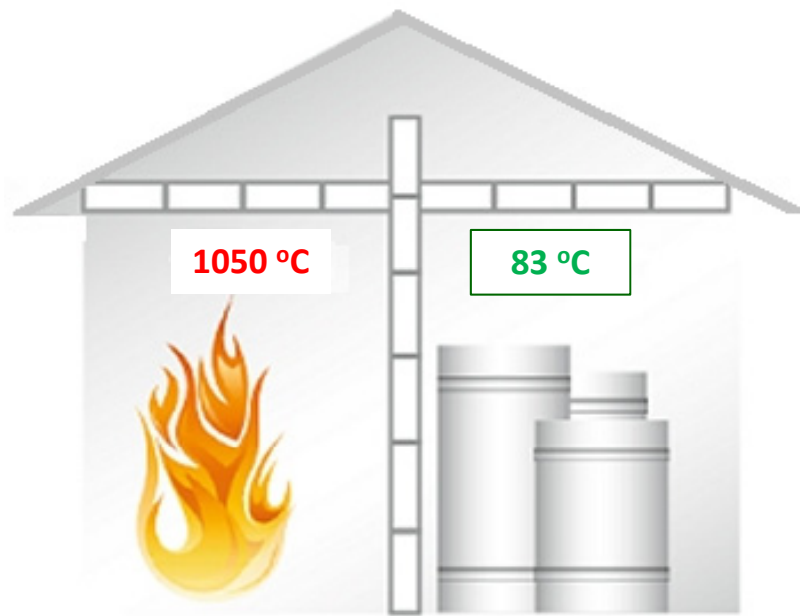


* Based on 100mm thick wall, excluding skim coat/render.

FIRE RESISTANT WALL SYSTEM TEST



System : 100mm thick AAC Block Wall
Standard: BS 476 Part 22 – Non-load Bearing
Fire Resistance Period (FRP) – 4 hours



After 2 hours of fire outbreak

Note:

1. Initial mean temperature is 30°C
2. Max. individual temp. rise - 180°C
3. Max. mean temp. rise - 140°C

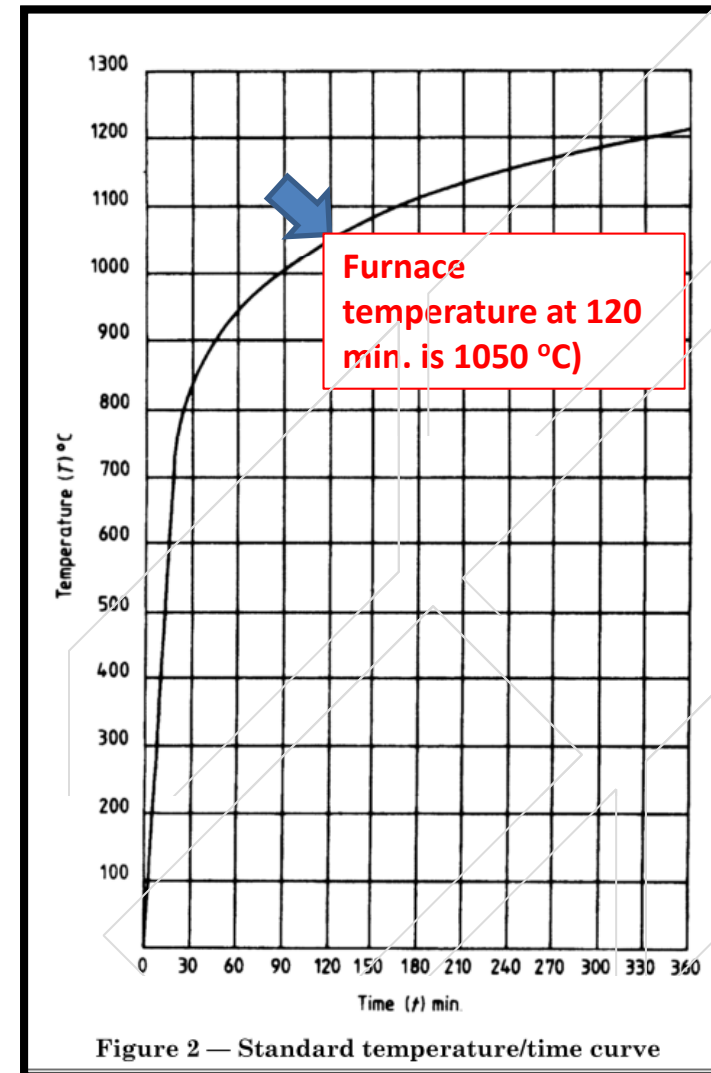


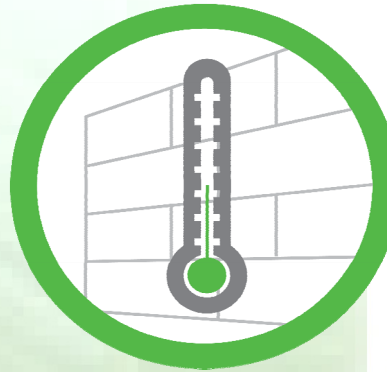
Figure 2 — Standard temperature/time curve

Extract from BS 476 Part 20

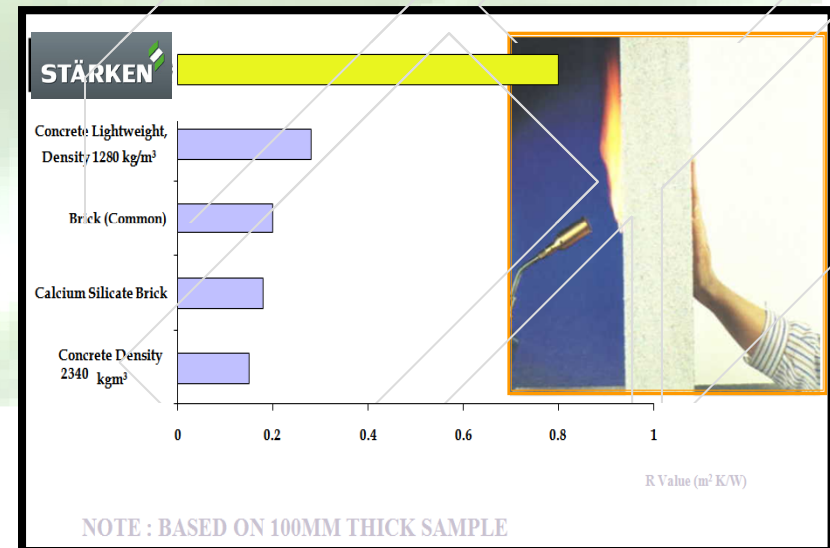
ADVANTAGES OF AAC



REASON NO 3 Superior Thermal Insulation



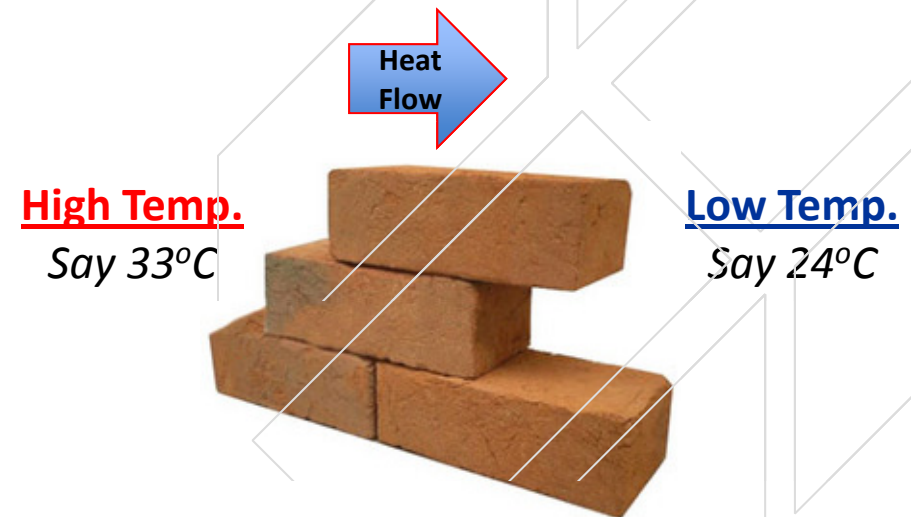
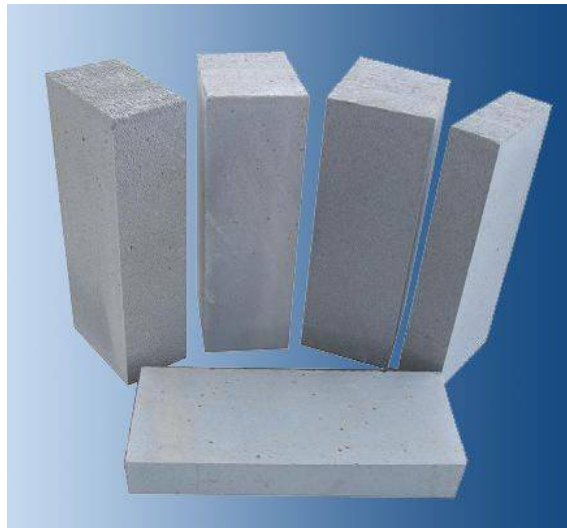
- Improve building operating cost
- Reduce cooling / heating cost by 30%



HEAT INSULATION PROPERTIES



System	Nominal Thickness	Thermal Insulation	Thermal Transmittance
AAC Block Wall	140mm	1.056 m ² K/W	0.947 W/m ² K
Brick Wall (Clay)	150mm	0.325 m ² K/W	3.080 W/m ² K
AAC Block Wall is > 3 times more effective in reducing heat inflow			

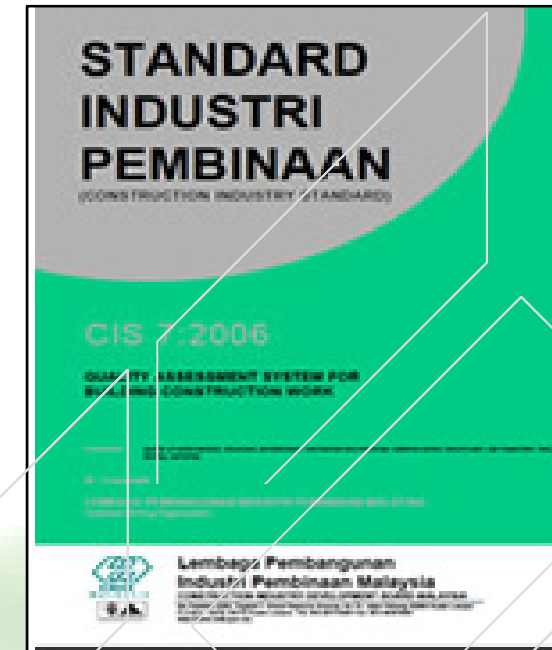


Estimated daily electricity saving for 175m² single Storey unit (8 hours) – 11.5kWh

ADVANTAGES OF AAC



REASON NO 4 PRECISE DIMENSION



Quality Assessment System
For Building
Construction Work

- Thickness tolerance ± 2.0 mm
- Facilitate Compliance to QCLASSIC Performance Criteria

QLASSIC – WALL SURFACE QUALITY



Evenness of Surface

Tolerance - 3mm max. per 1200mm



Right Angle

Tolerance - 4mm max.
per 300mm

ADVANTAGES OF AAC



REASON NO 5 Good Sound Insulation



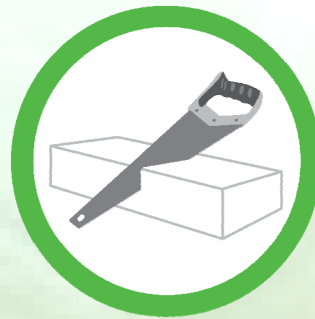
AAC HAS GOOD ACOUSTIC PERFORMANCE

AAC Block Thickness (mm)	100 NOTE 1	125 NOTE 1	150 NOTE 1	200
STC / Rw	41dB	43dB NOTE 1 44dB NOTE 3	45dB	48dB NOTE 1 49dB NOTE 2

Notes:

- 1. AAC block wall systems were tested in conjunction with 3mm to 5mm thick skim coat on each side*
- 2. AAC block wall systems were tested in conjunction with 6mm to 8mm thick skim coat on each side*
- 3. AAC block wall was tested in conjunction with 10mm thick AAC render on each side.*
- 4. Estimated sound insulation value if tested in conjunction with 3mm to 5mm thick skim coat on each side.*
- 5. 150mm thick brick wall sound insulation approximately 39dB to 43dB.*

REASON NO 6 Excellent Workability



- Can be sawn, drilled, just like wood
- It facilitates fitting of plumbing, electrical and also wall fittings

ADVANTAGES OF AAC



REASON NO 7 Environment Friendly



- Made from non-toxic materials
- Green Building Material – Low VOC, No Formaldehyde
- Uses 100% biomass energy for autoclave
- Contribute to GBI Rating



Sirim Eco Label



Green Label
Singapore



ISO 14001

ADVANTAGES OF AAC



REASON NO 8 Speedy Construction



- More than 2 times faster compared to conventional wall

	Starken	Brick
Wall Installation Rate	20 – 22m ² /man day (1 Starken Block)	10m ² /man day (= 7 Bricks)
Thinner coatings on Starken block wall means faster application rates	50 – 75 m ² /man day (3 -5 mm skim coat internally)	20m ² /man day (25mm plaster)
	40 m ² /man day (12 mm render externally)	20m ² /man day (25mm plaster)

REASON NO 9 Strong & Durable



- Rated as “Severe Duty” grade to BS 5234
- Proven durability under extreme different climatic conditions
 - Europe > 80 years
 - Middle East > 40 years
 - Australia / South Africa > 20 years
 - USA > 20 years
 - Asia > 20 years

WALL GRADING BASED ON BS 5234



Grade		Description	Acceptable Usage
LD	Light Duty	Minimal Stiffness. Is suitable for use in areas where there is a small chance of impact loads.	Domestic accommodation
MD	Medium Duty	Moderate Stiffness. Is suitable for use in areas where there is some chance of accident occurring	Office accommodation
HD	Heavy Duty	High Stiffness. Is suitable for use in areas where there is chance of impact loads.	Public circulation areas; Industrial areas
SD	Severe Duty	Is suitable for use in areas prone to vandalism and rough use.	Major circulation areas; Heavy industrial areas

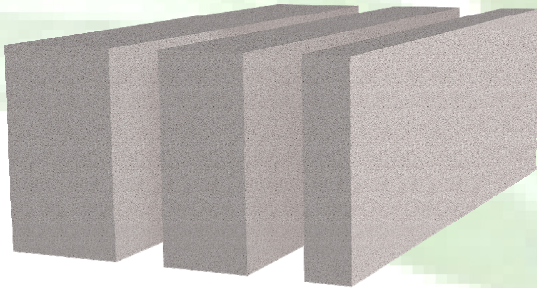
ADVANTAGES OF AAC



REASON NO 10 IBS Certified

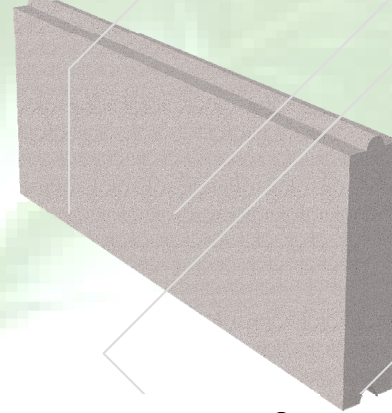


Starken Blocks



IBS score factor : **0.5**

Starken Wall Panels

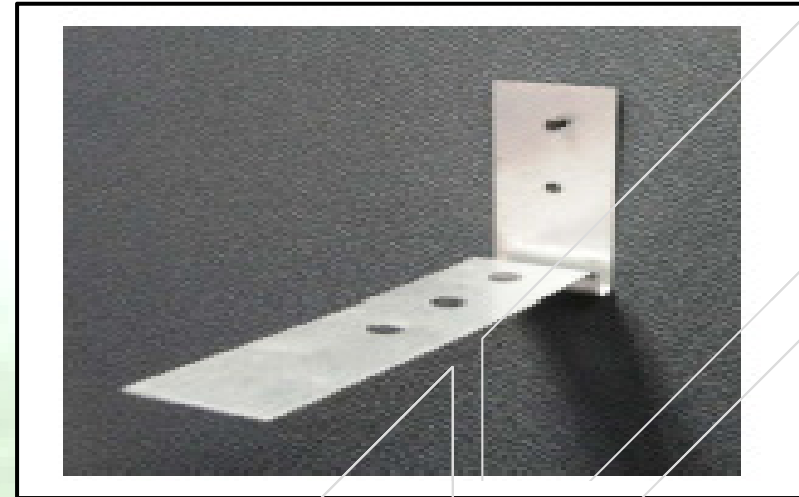


IBS score factor : **1.0**

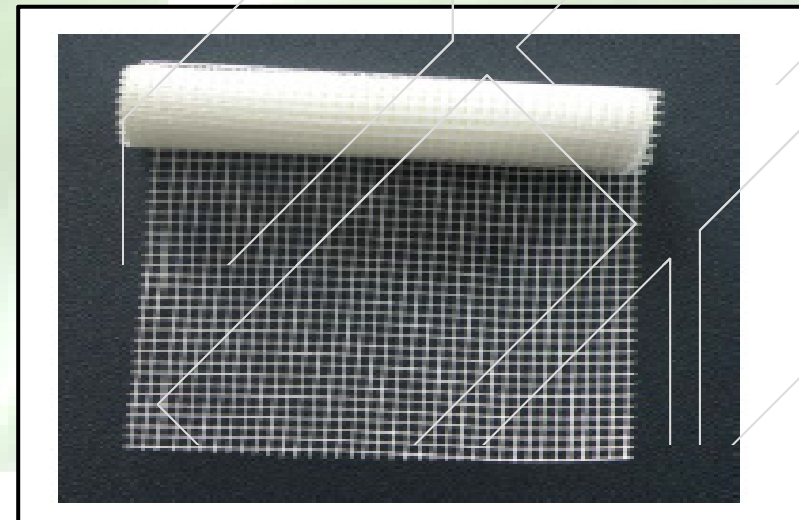
ACCESSORIES



Adhesive & Mortar



Bracket Tie



Fiber mesh

ACCESSORIES - TOOLS



Applying thin bed mortals :
with notched trowel (width
corresponds to block thickness)



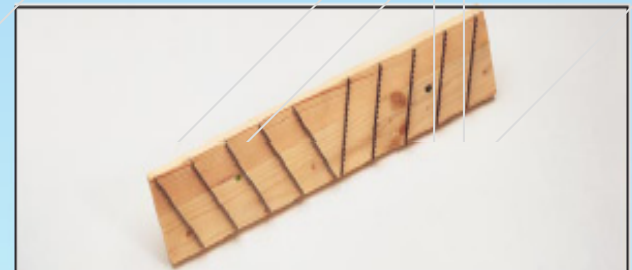
Aligning blocks :
with rubber mallet and spirit
level



Cutting pieces to fit :
With marking triangle and
hand saw

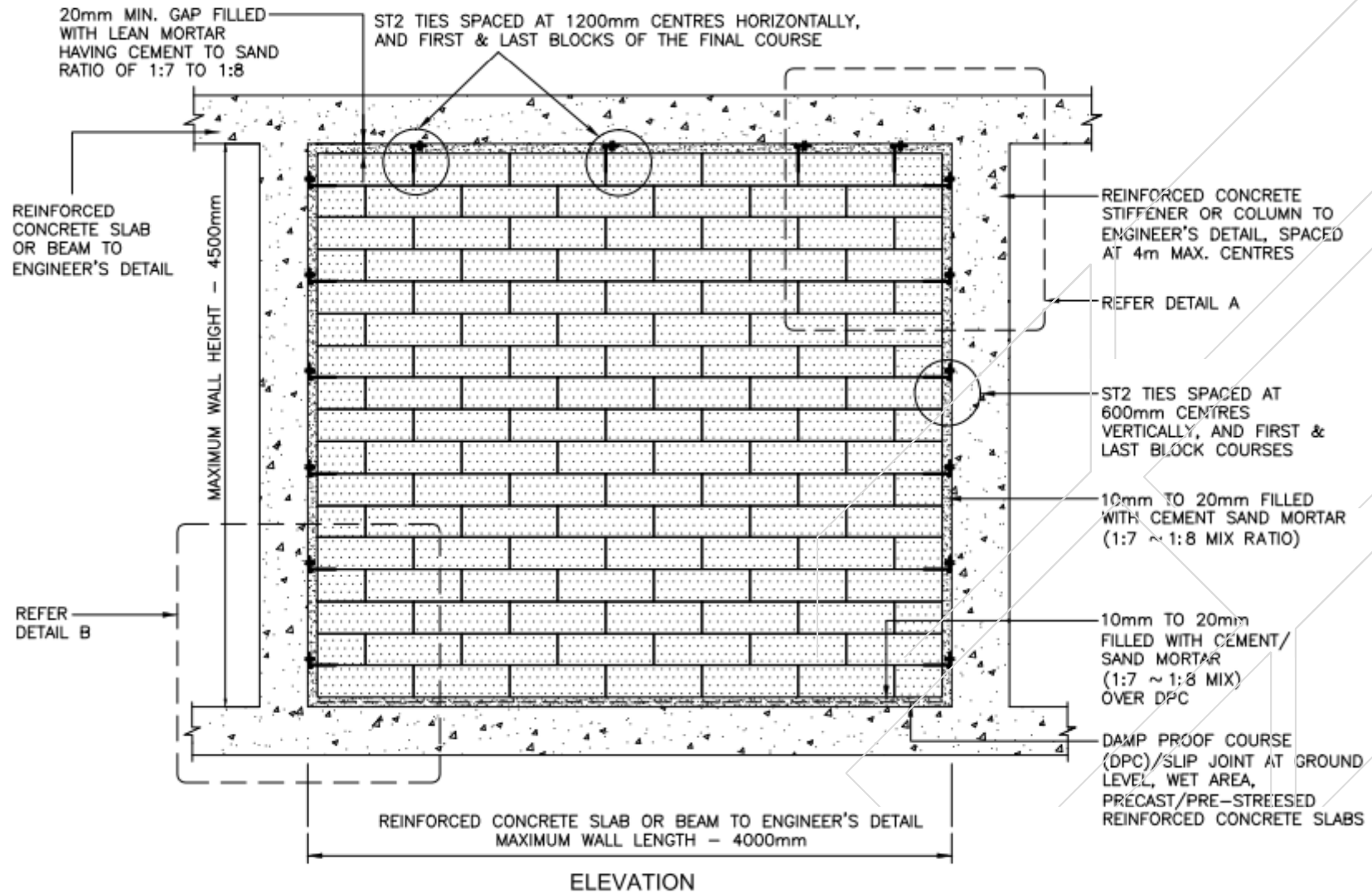


Correcting unevenness :
With sanding board and
plane

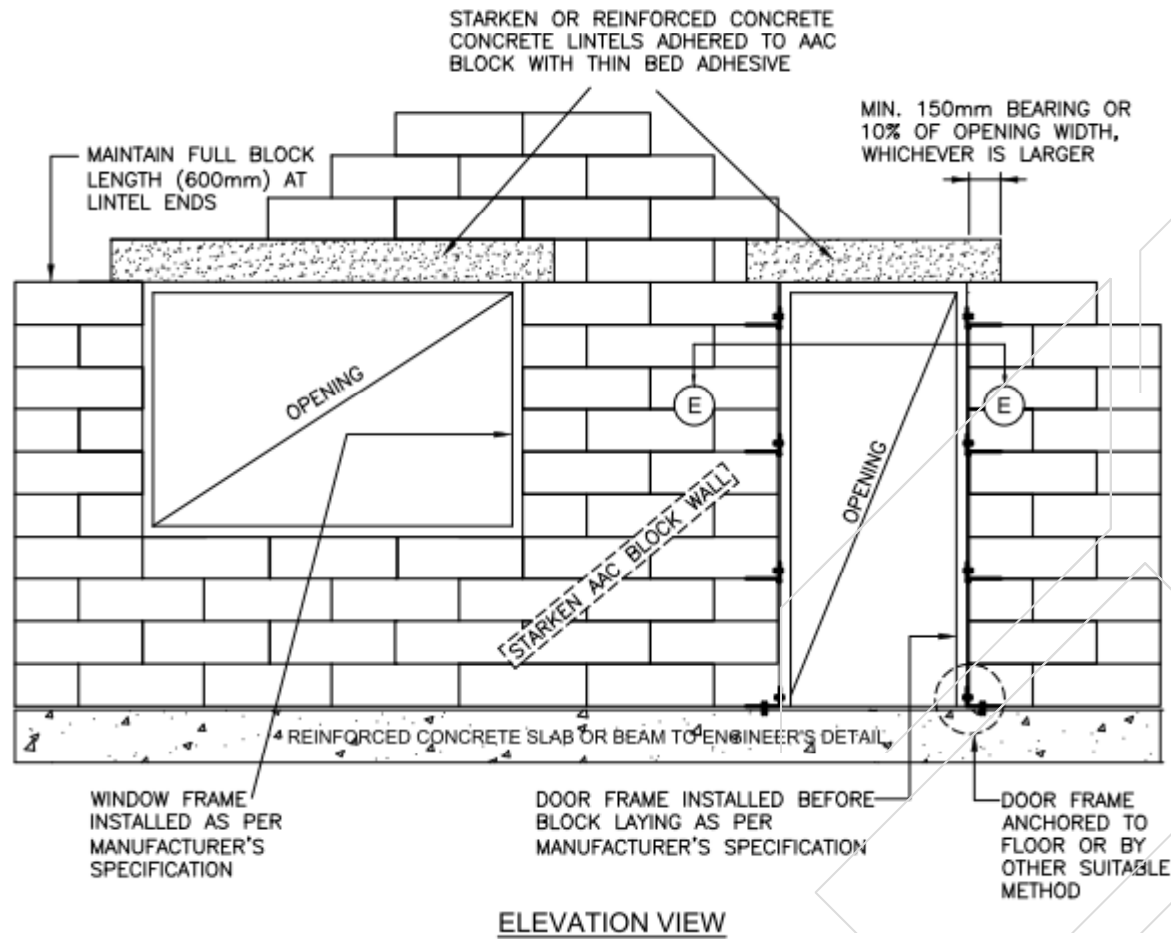


INSTALLATION METHODS – AAC BLOCK

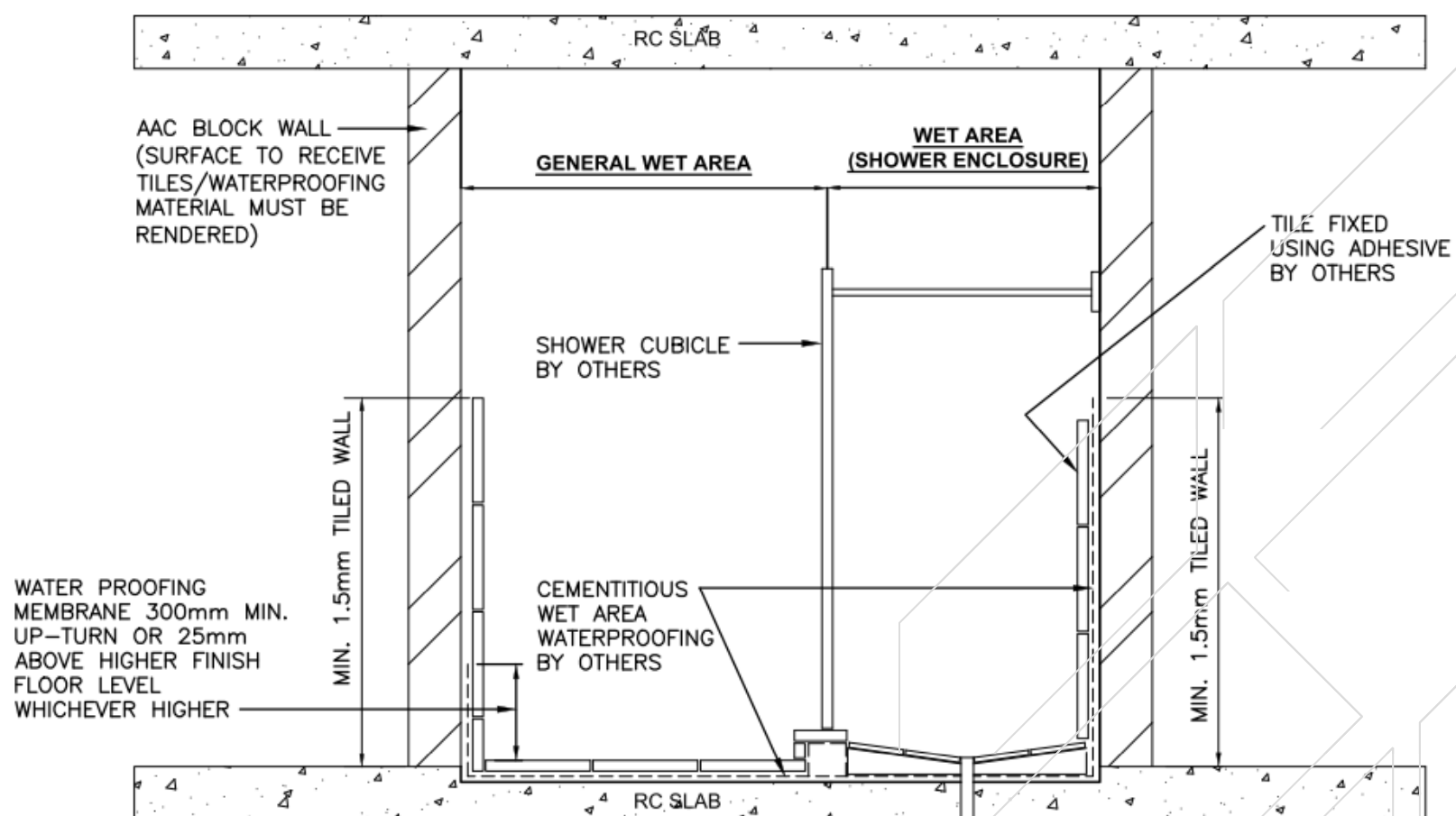
FIGURE 1 : NON LOADBEARING STARKEN BLOCK WALL INSTALLATION



INSTALLATION METHODS – AAC BLOCK



WET AREA WATERPROOFING



TYPICAL MATERIAL ARRANGEMENT:

1. AAC BLOCK WALL
2. 10mm RENDER
3. WATERPROOFING MATERIAL – CEMENTITIOUS
4. TILE ADHESIVE & TILE

WHY US ?



❑ Latest German manufacturing technology & machineries

- ✓ *Quality products to MS & BS EN*
- ✓ *Better dimensional tolerance*

❑ Largest AAC producer in Malaysia

- ✓ *Stock availability*
- ✓ *Warehousing facility (20-acre land)*
- ✓ *Timely delivery*

❑ Experience & well-structured HR

- ✓ *Sales team (Contractors & Distributors)*
- ✓ *Marketing team (Developers & Specifiers)*
- ✓ *Technical team*
- ✓ *Logistic team*

❑ Technical Support

- ✓ *Customized design solutions*
- ✓ *On-site training*
- ✓ *On-site demo*

