

## WHAT IS AAC (AUTOCLAVED AERATED CONCRETE)?

**AAC** is a **high-quality light-weight, load-bearing and extremely well insulating building material** produced **as standard blocks, megablocks or panels.**

**AAC** has successfully been used **in Europe already since early last century** and is now among the mostly used wall building materials in Europe with rapidly growing market shares in many countries, especially in Asia and America.

**AAC** is a steam-cured mix of sand or pulverized fuel ash (PFA), cement, lime, and an aeration agent. The high-pressure steam-curing in autoclaves achieves a physically and chemically stable product with an average density being approx. **one fifth of normal concrete.** AAC comprises myriads of tiny non-connecting air bubbles which give AAC its incredibly diverse qualities and make it such a terrific insulator.

**AAC** is definitely one of the **major achievements of the past 80 years** in the field of wall construction. It is a revolutionary material that offers a unique combination of strength, low weight, thermal insulation, sound absorption, unsurpassed fire resistance and unprecedented buildability.

**AAC** for modern efficient buildings is **superior to conventional masonry** in virtually every way.

**AAC** in its chemical and physical properties has **durability characteristics** similar to normal concrete or stone with a **workability better than wood.**

**AAC** is a **natural and non-toxic construction material**, saves energy, and is friendly to your environment.

### TYPICAL SIZES

(other sizes possible)

#### Blocks

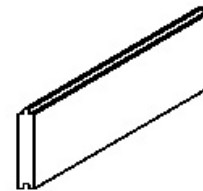
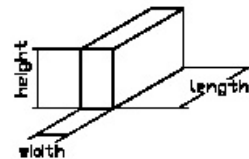
- length up to 625 mm (2 ft)
- height 200 - 400 mm (8" to 16")
- thickness 50 - 300 mm (2" to 12")

#### Megablocks

- length 625 to 1250 mm (2 to 4 ft)
- height 625 mm (2 ft)
- thickness 100 - 300 mm (4" to 12")

#### Panels

- length - 2.50 - 4.30 m (8 ft to 14 ft)  
as vertical wall panels  
- up to 6.00 m (20 ft) or 7.50 m (24 ft)  
as horizontal wall panels
- width 600 mm (2 ft)
- thickness 75 - 300 mm (3" to 12")



## EUROPE

Physical characteristics  
(DIN EN)

Strength class	*Density		*Average Compressive Strength		Thermal Conductivity	
	t/m <sup>3</sup>	lb/ft <sup>3</sup>	N/mm <sup>2</sup>	psi	W/mk	(BTU-in/ft <sup>2</sup> h°F)
PP2-035	0.35	22	2.5	350	< 0.11	< 0.76
PP2-040	0.40	25	2.5	350	0.11	0.76
PP2-050	0.50	30	2.5	350	0.14	0.97
PP4-050	0.50	30	5.0	700	0.14	0.97
PP4-060	0.60	35	5.0	700	0.16	1.11
PP8-070	0.70	40	7.5	1000	0.18	1.24

\*Ref. DIN 4165

Note: The compressive strength and density depend on the raw material quality and on the mix formula.

## USA

Physical characteristics  
(ASTM: C1386 - 98)

Strength Class	Nominal dry bulk density		Density Limits		Compr. Strength		Average Drying Shrinkage <sup>a</sup> (%)	Thermal Resistance (8 in. wall thickness)** R-value (hft <sup>2</sup> °F/BTU)
	lb/ft <sup>3</sup>	kg/m <sup>3</sup>	lb/ft <sup>3</sup>	kg/m <sup>3</sup>	psi	(MPa) min		
PAAC-2	25 (400)		22-28 (350)-(450)		360 (2.5)	290 (2.0)	)	) 11.5 - 9.2
	31 (500)		28-34 (450)-(550)					
PAAC-4	31 (500)		28-34 (450)-(550)		725 (5.0)	580 (4.0)	≤ 0.02	)
	37 (600)		34-41 (550)-(650)					
	44 (700)		41-47 (650)-(750)					
	50 (800)		47-53 (750)-(850)					
PAAC-8	37 (800)		35-41 (550)-(850)		1090 (7.5)	870 (6.0)		)
	44 (700)		41-47 (650)-(750)					
	50 (800)		47-53 (750)-(850)					

Ref. ASTM: C1386-98

\*\*including air film coefficients

Note: Permissible variations:

No overall unit dimension (width, height, and length) shall differ by more than 1/8 in. (3 mm) from the specified standard dimensions.

## Benefits

- **large size**, however **light weight**
- **light weight** = saves foundation cost, helps the mason
- high **load-bearing strength**
- high **durability** = long life, impervious to rot or pest
- dimensional **accuracy**
- high **economy**
- **easy handling, rapid construction**
- best **thermal insulation**, 6 - 10 times better than regular dense concrete
- unsurpassed **fire-resistance** = life, property and insurance cost saver
- excellent **sound absorption**, ideal for the hospitality industry
- good **workability, better than wood** (can be sawn, drilled, nailed, milled at site)
- **hurricane and earthquake resistance**
- complete **unsusceptibility to termites**
- **not rotting** (contrary to timber)

**Uses** Suitable for all kinds of building constructions such as residential, commercial, industrial and agricultural buildings, hotels, schools and hospitals, etc. in all climatic conditions.

For walls of all kinds such as external walls, internal walls, loadbearing or non loadbearing, infill walls to framed structures, party walls, fire break walls, cavity and single leaf walls as well as for renovation of old buildings (due to light weight).

**Laying** Laying with common mortar or thin-set glue mortar, plastered or unplastered as decoration.

Laying in 1 - 2 mm (approx. 1/16") thin-set glue mortar results in a dramatic reduction of bedding mortar and reduction of on-site handling and mixing.

**Stucco/Render** Normal 10 -12 mm (3/8 - 1/2") thick coat or special 1 - 3 mm (1/16 - 1/8") hard-set skim coat.

**Cutting at site** Blocks can easily and accurately be cut with a tungsten toothed handsaw. On large sites with many cuts an electric bandsaw is recommended.

### **Important to know**

If AAC is a new product to your country please note that separating walls or partition walls alone could already be a large market.

The partition walls can easily be installed into a building with existing external walls of concrete, brick or other material still taking full advantage of a solid wall with high fire rating, good sound absorption, easy and fast installation with hardly any mortar.

AAC walls easily compete with dry walls from plywood or plasterboard.

**Please note: Internal walls may count to be 2/3 of a building against 1/3 for external walls.**

### **Best insulation: heat and aircon saver**

AAC saves energy. The air bubbles trapped in AAC are giving the AAC 6 to 10 times better thermal insulation properties compared with conventional dense concrete or brick. Buildings constructed with AAC will be cooler in summer and warmer in winter. As a result the building's air condition or heating use will be lower.

### **Low density / high strength**

The cellular structure of AAC results in a dry density of approximately 0.4 to 0.6 kg/dm<sup>3</sup> (25 to 35 lb/ft<sup>3</sup>) for standard AAC being only **one fifth of normal dense concrete**. This means reduced construction times, smaller craneage on site, less worker fatigue and less load bearing structure.

One 90 mm (4") AAC block (90 x 600 x 300 mm) (4 x 24 x 12") with a weight of less than 8 kg (20 lb) is easily handled.

The weight-saving low density is of greatest advantage for high rise buildings. It saves piling, foundations, structural design.

AAC has a high strength to weight ratio with a characteristic compressive strength of 2.5 to 7.5 N/mm<sup>2</sup> (350 to 1000 psi).

**Fire-resistance** AAC is inorganic and totally incombustible, providing approximately twice the fire protection of normal concrete.

In fact, AAC is particularly suited for fire rated applications, such as ventilation shafts, elevator shafts, fire protection walls and for use with structural steel.

### **Unsurpassed fire-rating (HRS) (average)**

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<i>Block Thickness mm (")</i>	90 (3 ½)	100 (4)	150 (6)	180 (7)	200 (8)
<i>Non-Load Bearing</i>	3 hrs	4 hrs	4 hrs+	4 hrs+	4 hrs+
<i>Load Bearing</i>			2 hrs	3 hrs	4 hrs

## **OUTSTANDING CHARACTERISTICS OF AAC**

### **Excellent acoustic barrier**

AAC possesses an excellent sound reduction capacity and meets all Building Code requirements. This property results from the unique aerated structure which consists of tiny non-interconnected air cells giving a very low air porosity. Therefore the sound resistance achieved is better than anticipated for a material with low mass.

Sound insulation of masonry depends on both density and porosity. The air porosity of the material has a positive effect on the performance of the wall. It gives a high resistance to the passage of airborne sound relative to density.

AAC provides superior sound absorption better than normal concrete. This property reduces the echo effect (i.e: reflecting sound) in empty rooms.

**Easy workability - better than wood** - AAC can be cut, drilled and nailed better than wood by using normal hand tools. Power tools can be used for rapid routing for the embedment of services. AAC can be cut to virtually any shape or angle making it extremely adaptable.

### **Easy piping and cabling**

Installation of plumbing pipes in kitchens, bathrooms for water and sewage can easily and manually be cut into the AAC wall, faster than in any other blockwork. Wires will be installed in grooves easily cut with a manual chasing tool. Services, such as pipes and cables can be installed after walls are ready.

### **Dimensional accuracy**

The process of producing AAC ensures constant and consistent dimensions. Variation is minimized allowing accurate installation resulting in a plane background for the economical application of a variety of finishing systems.

Practically no plastering is required. A thin primer or skim coat will be sufficient for either painting or wall papering of internal walls.

### **Low shrinkage**

Dry AAC has low shrinkage characteristics compared with conventional concrete. However, "fresh" AAC changes its dimensions continuously over the whole interval from 'saturated with water' to 'completely dry'.

### **Seismic design**

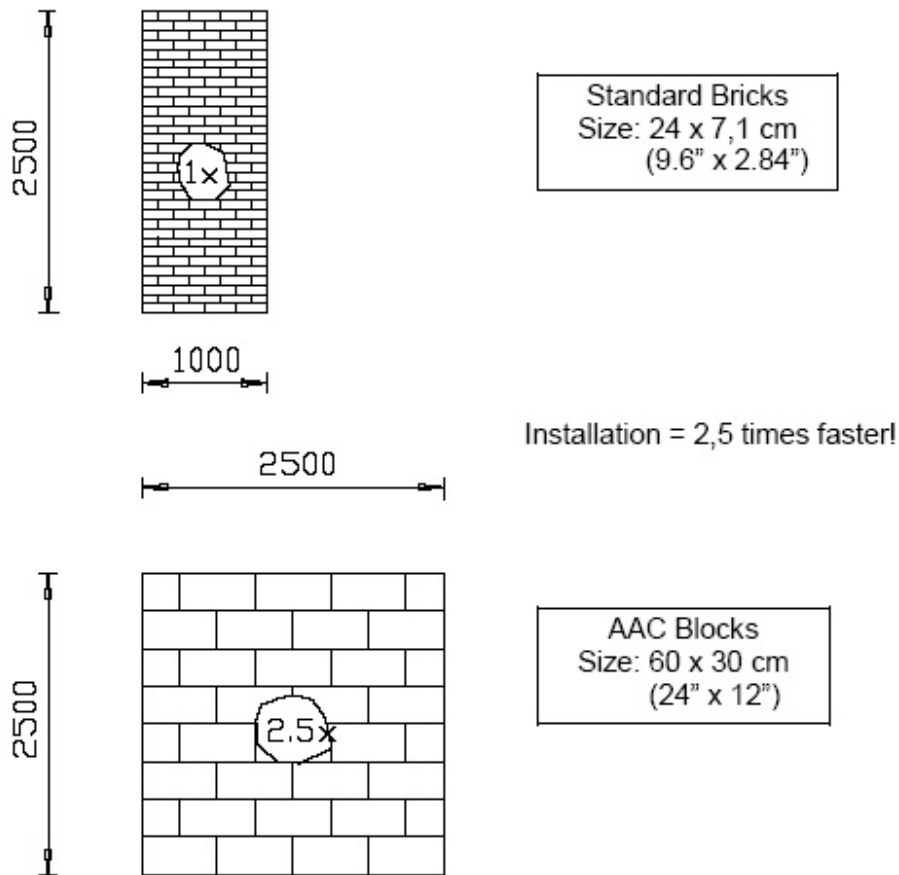
AAC has been used for many years in areas with high seismic action (like Japan). Buildings using fully or partly AAC have shown good resistance to earthquake forces. The light weight of AAC in relation to its strength reduces the forces. The non

combustible and fire-resistant characteristics provide further advantage against fires commonly associated with earthquakes.

### Rapid construction

One solid AAC Block of 60 x 30 cm (24 x 12") is equivalent in area to approx. 9 standard bricks of 7.1 x 24 cm (2.84 x 9.6") yet less than 1/5 the weight, leading to fast laying. Using thin-set mortar in 2 mm (1/16") joints avoids the time consuming handling and mixing of conventional mortar.

**Installation of AAC is 2.5 times faster than of bricks:**



### Ecological aspects of AAC (Environmentally friendly)

#### AAC Product:

No release of harmful substances.  
Recycling of demolished AAC in the process

#### AAC Production:

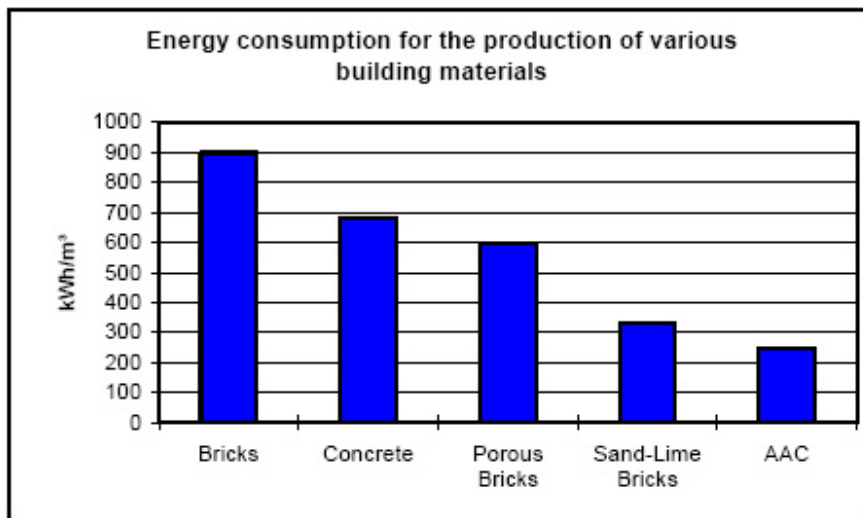
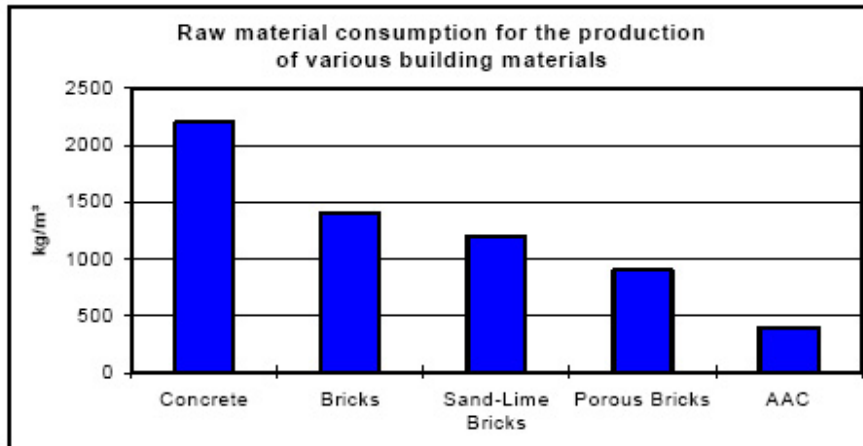
Production process without development of toxic gases  
No waste of raw materials (water, cut-offs, etc. are fully recycled into production)

Industrial byproducts like PFA (fly-ash) of coal fired power plants or mine tailings are turned into useful building materials.

Recycling of breakage, rejects, etc.

Lowest energy consumption in comparison to other wall building materials

Saves resources: 1 m<sup>3</sup> (1 ft<sup>3</sup>) of raw materials creates 4 m<sup>3</sup> (4 ft<sup>3</sup>) of AAC



*Ref. "Advances in AAC", page 272 pp., edited by Folker H. Wittmann 1992, published by Balkema*

## AAC INTRODUCTION TO THE MARKET

### AAC advantages compared to bricks or concrete blocks - A complete economic walling system

Do not directly compare the price of 1 m<sup>2</sup> (or 1 ft<sup>2</sup>) of AAC with 1 m<sup>2</sup> (or 1 ft<sup>2</sup>) of clay bricks, concrete blocks, CMU, etc. AAC is not just another block or brick in the wall, AAC

is a revolutionary walling material - in fact a complete walling system - with outstanding advantages against ordinary clay bricks or concrete blocks.

Therefore, **compare the ready-installed wall of AAC with a wall of clay bricks, concrete blocks, CMU, etc.** The ready AAC wall considers all benefits, such as:

- **Competitive price**
- **Dimensional accuracy** and the saving of thick rendering and plastering to compensate uneven block work.
- **Large in size**, equivalent to approx. 10 standard bricks and the rapid laying of AAC.
- **Low weight** and **considerable savings** of structural costs (loadbearing walls, foundation, piling etc.)
- Low weight **facilitates handling and laying** by the mason.
- The **thin-set mortar** of 1 - 2 mm (1/16") between each course, its easy mixing with water, its fast application with a notched trowel allows to build walls as high as required. The weight of the blocks on top will not squeeze out the mortar, as happens with the heavier clay bricks or hollow blocks.
- Further benefits which attract the quality builder to increase the value and comfort of his buildings:.. **better insulation .. heat and aircon saver.. good acoustic barrier .. high fire rating**

## Marketing

If the manufacturer already has his own market as a construction company the new product can easily be introduced to the market.

Installation of AAC is so easy and needs little investment. Therefore it is recommended to establish a number of subcontractors and sell completely-installed walls rather than the blocks alone.

Internal walls could be sold to be built into traditional buildings. This will be a good market as there are many more internal walls (2/3) than external walls (1/3). This would easily remove doubts and hesitations of architects and builders and help faster introduction.

The building of walls with subcontractors has various advantages, such as introduction of AAC and controlled workmanship and correct application.

Advertising, brochures, visits to architects and consultants help to quickly introduce AAC to the market place.

Cooperation with large builders, merchants etc.