



## Autoclaved Aerated Concrete (AAC) – its Application and General Information

### 1. The building material

Autoclaved aerated concrete is a high-quality building material made of:

- silica sand
- lime
- cement
- water
- and aluminium as gas developing agent

The mixed raw materials will be filled into moulds and after raising up cut into blocks or reinforced elements. After that the cut cake will be cured in autoclaves under steam pressure of 13 bar with a temperature of about 200° C.

The advantages of AAC for the building industry are the multiplicity of sizes, the good load-bearing and low weight, the easy handling as well as the best thermal insulation.

AAC will be used worldwide for domestic as well as industrial buildings for the following application:

- Outside walls
- Inside – and separating walls
- Fire walls
- Load bearing – and non-bearing walls
- Wall elements for skeleton structures

The advantages of AAC compared to other building materials are as follows:

- Low weight
- High stability, therefore useable for load-bearing walls
- Big sizes of blocks with low weight
- Fast construction with high economic efficiency
- Small amount of mortar with the result of high cost reduction
- Good treatment by sawing, milling, drilling and nailing
- Easy handling
- Highest thermal isolation
- High fire resistant
- Low tolerance in sizes through our high quality machineries

Normal mortar or thin bed mortar can be used for AAC. The exact connection of a wall or roof is given by blocks or reinforced panels with tongue and groove. The fast construction of a wall is granted by the big sizes of blocks and panels.



## 1.1 General figures of area space and building space based on Hötten's experience

Capacity	100,000 m <sup>3</sup> /year	200,000 m <sup>3</sup> /year	300,000 m <sup>3</sup> /year
Stock yard area space	10,000 m <sup>2</sup>	15,000 m <sup>2</sup>	20,000 m <sup>2</sup>
Production building space	5,000 m <sup>2</sup>	8,000 m <sup>2</sup>	10,000 m <sup>2</sup>
Total area space	15,000 m <sup>2</sup>	23,000 m <sup>2</sup>	30,000 m <sup>2</sup>

## 2. Basic requirements on the quality of raw materials necessary for AAC production

**Sand** (Fine sand must be free from stone, clay, salty impurities and organic substances)

SiO <sub>2</sub>	at least	85%
	of this	75% as quartz
	better at least	80% as quartz
Loss on ignition	less than	5%
Al <sub>2</sub> O <sub>3</sub>	less than	7%
Na <sub>2</sub> O + K <sub>2</sub> O	less than	2%
Fe <sub>2</sub> O <sub>3</sub>	less than	3%
MgO	less than	2%
SO <sub>3</sub>	less than	3%
Silt	less than	2,5%
Chloride	less than	0,05%

### Lime

Ground calcium oxide		90% < 0,1mm
CaO total	preferably more than	90%
CaO aktiv	less than	85%
T60 value (60°C)		8-15 min
MgO	less than	2%
SiO <sub>2</sub>	less than	5%
Al <sub>2</sub> O <sub>3</sub> + Fe <sub>2</sub> O <sub>3</sub>	less than	2,5%
SO <sub>3</sub>	less than	0,3%
Na <sub>2</sub> O + K <sub>2</sub> O	less than	1,5%
residual	less than	3,0%

**Cement** (Standard Portland cement with no additions of fuel ash or slags)

free CaO	less than	1,5%
sulphate total	less than	3,0%
autoclave expansion		0,25-1,0%
spec. surface	approx.	3.000-4.000 cm <sup>2</sup> /g

### Gypsum

If required, preferably natural gypsum can be used (ANHYDRITE) or sometimes also synthetic anhydrite from desulphering plants.



**Aluminium** (some main values)

specific surface	at least	15.000 cm <sup>2</sup> /g
metal content	ca.	95% powder
	ca.	80% paste

Aluminium paste mostly approx. 80% aluminium powder. The type of aluminium will be determined after tests with available raw materials.

**Water**

Clean potable water of approx. 7 - 7,5 pH

After testing of all raw materials in our lab we are able to comment the quality of the products for the new AAC plant.

For testing the raw materials Hötten needs the following quantity of raw materials:

- 2 kg Silica sand
- 1 kg Lime
- 1 kg Zement
- 50 g Alumina

All mentioned figures are reference values. Raw materials with divergent figures can be quite used for the production of AAC.



### 3. Overview of the necessary raw materials and energy referred to 1 m<sup>3</sup> AAC

Recipe with a density of 0,5 kg/dm<sup>3</sup>

	lime active	cement active
Sand	355 kg	355 kg
Cement	30 kg	100 kg
Lime	90 kg	50 kg
Aluminium	0,4 kg	0,4 kg
Production water	260 kg	260 kg
Steam water	150 kg	150 kg
Fuel	10 kg	10 kg
electr. energy	20 kWh	20 kWh
Mould oil	0,15 l	0,15 l
Grinding balls	1,0 kg – 2 kg	1,0 – 2 kg

The above mentioned figures are only calculation figures and may have to be modified at site according to the quality of the existing raw materials.



#### 4. Premium quality products from our AAC-plant have following measurements:

Block sizes	Length	500-625 mm
	Height	200-300 mm
	Width	50-400 mm
Panel sizes	Length	up to 6.000 mm
	Height	600-625 mm
	Width	100-300 mm
Physical properties	Density	0,40-0,80 kg/dm <sup>3</sup>
	Strength	2,50-7,5 N/mm <sup>2</sup>
	Thermal conduction	0,14-0,27 W/mK
	Water absorption	4-8 kg/m <sup>2</sup> at density 0,5 g/dm <sup>3</sup>

#### 5. Production of AAC is highly capital- and sparsely wage-intensive

The enclosed prices of the plant are calculated on the basis of supply from Germany. Steel structures, silos, hoppers etc. will be supplied locally.

AAC plant with a capacity of 100,000 cbm/year    appr.                    € 8 – 10 Mio.

AAC plant with a capacity of 200,000 cbm/year    appr.                    € 10 – 12 Mio.

AAC plant with a capacity of 300,000 cbm/year    appr.                    € 12 – 14 Mio.

The delivery time will be appr. 10 – 14 months depending on the range of supply.

All key equipment will preferably be pre-installed and tested at Hötten premises. After that the equipment will be delivered and transported in structural components.

For the commissioning, start up of the production and training of the staff qualified specialists of Hötten are provided to the customer.

After start-up Hötten provides an after sales service for maintenance of the plant as well as for modifications and updating.