AIA CONTINUING EDUCATION | HSW

1.0 LU|HSW Credit • Lunch & Learn Format

AAC

BUILDING
BETTER
WORLDS

AUTOCLAVED AERATED CONCRETE

AAC *The Superior Building Material for Fire Safety, Sustainability & Energy Efficiency*

Presented by: **Michael Hofmann** | Registered AAC Specialist | 40+ Years Experience
CEO of MHE Group • International AAC Expert • 3,000+ AAC Projects Worldwide

AIA LEARNING OBJECTIVES

1.0 LU|HSW

01 Understand the production process, material composition, and structural properties of Autoclaved Aerated Concrete (AAC)

02 Evaluate AAC product lines — blocks, panels, floor/roof systems, cladding — and their application in diverse building typologies

03 Analyze the fire, thermal, acoustic, moisture resistance, and sustainability performance of AAC relative to alternative materials

04 Apply AAC system knowledge for energy code compliance, evaluate opportunities for fire sprinkler protection scope reduction, and reduced lifecycle costs

This program qualifies for AIA Continuing Education credit under Health, Safety & Welfare (HSW)

WHAT IS AUTOCLAVED AERATED CONCRETE?

DEFINITION

AAC is a lightweight, precast cellular concrete building material — composed of sand or fly ash, cement, lime, water, and aluminum powder — that is cured under high-pressure steam in an autoclave.

The chemical reaction creates millions of microscopic air cells, giving AAC its unique combination of low density and high performance.

Typical AAC density: 25–50 lb/ft³ (ASTM C1693 classes approx. 22–53 lb/ft³; normal concrete ~145 lb/ft³)

Approx. 80% Air by Volume

Complies with ASTM C1693 / C1691 / C1694 / C1660 / C1692 / EN 771-4

HISTORY & GLOBAL ADOPTION

1924	Invented in Sweden by Dr. Johan Axel Eriksson
1929	First industrial production — Ytong brand, Sweden
1943–80s	Rapid expansion across Europe; standard in Germany, Poland, UK
1990s	Introduced to North America; U.S. production begins (YTONG, Hebel, ACCO)
1996	AAC introduced to Florida market; MHE Group begins U.S. projects
2000s–now	Dominant in Middle East, Europe, SE Asia, India; ICC code-recognized in USA

MANUFACTURING PROCESS

STEP 1 · RAW MATERIALS

Silica sand or fly ash (waste by-product) + Portland cement + lime + water + aluminum powder as expansion agent

STEP 2 · MIXING & CASTING

Ingredients mixed to slurry and poured into steel molds. Aluminum reacts with calcium hydroxide, generating hydrogen gas — forming air bubbles

STEP 3 · PRE-CURING

Mixture rises like bread dough, expanding to ~2× original volume. Pre-cured at 104–158°F for several hours until semi-rigid green cake forms

STEP 4 · WIRE CUTTING

Green cake cut to precise dimensions using high-tension wire cutting machines, creating blocks, panels, or specialty shapes to ±1/16 in. tolerance

STEP 5 · AUTOCLAVE CURING

Products are steam-cured in autoclaves under heat and pressure; typical cycles are about 356–392°F for 8–12 hours. Steam curing crystallizes tobermorite mineral, creating final strength

STEP 6 · QA & PACKAGING

Products tested for density, compressive strength, moisture content per ASTM C1693. Packaged on pallets, ready for immediate use on site

AAC PRODUCT RANGE — COMPLETE BUILDING SYSTEM

MASONRY BLOCKS

SPECS: 4–20 in. thick
24×8 / 24×10 in. face
Density: 25–50 lb/ft³
Compressive: 290–1,090 psi

USES: Load-bearing & non-load-bearing walls, partitions, infill for steel/RC frames, AAC load-bearing system

REINFORCED WALL PANELS

SPECS: 6–12 in. thick
Up to 20 ft. height vertical or 20 ft. horizontal between structural Bay spans (Column to column)
Factory-set rebar cages
Pre-engineered openings

USES: Exterior walls, shear walls, tilt-up replacement, fast erection with crane installation

FLOOR & ROOF PANELS

SPECS: 6–12 in. thick
Spans up to 20 ft.
Factory-set rebar cages
Live load to 105 psf

USES: Horizontal diaphragms, flat roofs, floor systems — eliminates formwork, fast install

LINTEL / STAIRS

SPECS: Custom section sizes
Integrated rebar
Prescriptive spans to 8 ft; longer spans by engineered design.
Lintels match wall thickness, Stairs as per Design

USES: Window/door lintels — full AAC structural system possible

CLADDING & FACADE PANELS

SPECS: 2–8 in. thick
Factory-finished options
Painted or bare surface
Front-face aesthetic

USES: Non-structural exterior cladding, rain-screen systems, curtain wall infill, retrofits

SPECIALTY SHAPES

SPECS: U-blocks (bond beams)
O-Blocks
Acoustic partitions

USES: Bond beam courses, cored Blocks sections, specialty architectural features

FIRE RESISTANCE — AAC'S STANDOUT ADVANTAGE

4 HRS
Fire Rating
4-in. AAC Wall
ASTM E119 / UL U919 / UL U920 / K909

0
Combustible
Materials
100% Inorganic

2,200°F
Melting Point
AAC Panel
vs 1,000°F steel failure

Class A
Flame Spread
Index
ASTM E84 — Best Rating

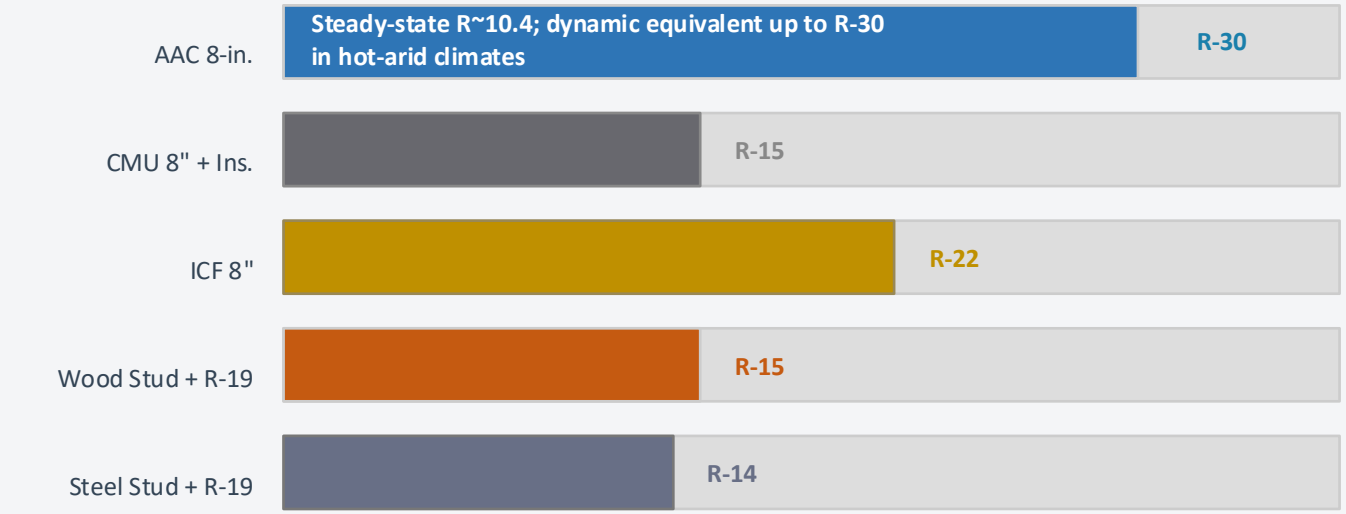
★ SPRINKLER SCOPE ALTERNATIVES

AAC's fire-rated assemblies may support sprinkler-scope alternatives only where permitted by IBC/NFPA, AHJ approval, and project-specific fire-protection engineering.

- AAC will not burn, melt, drip, or spread flame — even in direct flame contact
- Noncombustible/inorganic material with low smoke contribution; verify assembly and finish requirements under applicable IBC fire and interior-finish provisions.
- 4-in. AAC wall: tested 4-hour fire rating per UL U919/U920/K909 (non-loadbearing). For 4-hour loadbearing walls, use 6-in. AAC wall assemblies tested per UL/ASTM E119 designs and applicable IBC Chapter 7 provisions; verify assembly-specific ratings subject to project-specific engineering and AHJ approval.
- Fire resistance by tested UL designs and applicable IBC Chapter 7 provisions; verify assembly-specific ratings.
- Party walls, egress corridors, and stairwells may achieve required ratings with properly tested/designed AAC assemblies.
- Insurance underwriters recognize AAC as superior fire-resistant construction — premium reductions possible

THERMAL PERFORMANCE & ENERGY EFFICIENCY

R-VALUE COMPARISON — 8" (8-in.) WALL ASSEMBLY



**Steady-state R~10.4 for 8-in. AAC; dynamic equivalent varies by climate and modeling.*

** Up to R-30 applies to hot-arid climates with high diurnal swings using whole-building simulation.*

★ AAC walls may contribute to LEED documentation through energy performance, durability, and materials strategies.

THERMAL MASS EFFECT

- AAC absorbs & releases heat slowly — peak load shifting
- Reduces HVAC sizing 15–30%
- Florida & hot climates: massive energy savings
- Can support ASHRAE 90.1 / IECC compliance through project-specific energy modeling
- May contribute to ENERGY STAR performance when whole-building results qualify
- May reduce cooling loads depending on climate, orientation, and modeled assembly performance

ACOUSTIC PERFORMANCE — STC & IIC RATINGS

SOUND TRANSMISSION CLASS (STC)

IBC minimum STC 50 for party walls in multifamily

★ **AAC party-wall assemblies may support LEED acoustic-performance documentation when tested ratings meet project criteria.**

KEY ACOUSTIC FACTS

- AAC 8-in. assemblies can meet IBC STC 50 requirements when supported by ASTM E90-tested assembly data.
- Mass & porosity of AAC provides natural sound absorption
- Floor/ceiling AAC systems can achieve IIC 50+ with tested assemblies and proper floating finish.
- Hotels, hospitals, condos achieve superior privacy with AAC
- May reduce need for double-stud or resilient-channel framing depending on assembly design.

MOISTURE RESISTANCE & MOLD PREVENTION

★ **Florida Impact: AAC can help reduce mold-risk drivers in wood-frame alternatives when assemblies are properly detailed.**

INORGANIC MATERIAL

AAC contains no organic matter — no cellulose, no food source for mold or bacteria. AAC is inorganic and not a food source for mold; mold risk still depends on moisture control, coatings, and assembly detailing.

CONTROLLED POROSITY

Uniform micro-pores allow vapor diffusion while resisting liquid water penetration. Can reduce condensation risk when vapor control and wall assemblies are properly designed.

FLORIDA CLIMATE PERFORMANCE

Proven in hot-humid Climate Zone 1–2. Vapor control should be determined by climate zone, assembly design, and hygrothermal analysis. Exceeds Florida Building Code moisture requirements.

WATERPROOFING COMPATIBILITY

Accepts all standard exterior finishes: acrylic stucco, elastomeric paint, EIFS systems, thin brick. Interior: direct tile, plaster, or paint. Vapor permeable coating recommended

ASTM TEST DATA

ASTM E96 water vapor transmission: ~30–50 perms. Controlled permeability prevents moisture trapping — critical for wall durability.

IAQ BENEFIT

Mold-resistant assemblies can support improved IAQ when moisture is properly controlled. Critical for schools, hospitals, affordable housing. May support IAQ/durability goals; verify applicable LEED credits.

STRUCTURAL PROPERTIES & SEISMIC PERFORMANCE

MECHANICAL PROPERTIES — AAC GRADES

Property	AAC 2	AAC 4	AAC 6
Density (lb/ft³)	22–34	28–53	35–53
Comp. Strength (psi)	290–360 psi	435–580 psi	725–1,090 psi
Tensile Strength (psi)	81 psi	100 psi	129 psi
Flexural Strength (psi)	246 psi	370 psi	616 psi
E-Modulus (ksi)	195 ksi	249 ksi	338 ksi
Poisson's Ratio	0.15	0.15	0.20
Shear Strength (psi, verify)	13 psi	16 psi	20 psi

Per ASTM C1693 / C1691 / C1694 / EN 771-4. MHE AAC Load-Bearing System: Indonesian patent; U.S. patent application pending.

STRUCTURAL HIGHLIGHTS

- AAC Load-Bearing System: up to 4-story without RC frame (subject to project-specific structural engineering per TMS 402 and ASCE 7)
- Lightweight (typical 25–50 lb/ft³; ASTM C1693 classes ~22–53) can reduce foundation loads vs CMU
- AAC SFRS: SDC B = NL; SDC C = 35-ft cap per ASCE 7-22 Table 12.2-1. SDC D/E/F require separate lateral system unless approved.
- Product approvals/ESRs are product-specific; detail per TMS 402-22.
- Reduces structural steel/RC requirements — direct cost savings
- Engineered out-of-plane wind resistance for hurricane regions.
- Designed for ASCE 7 wind loads; Florida Product Approval/HVHZ testing may require TAS 201/202/203 as applicable.
- Panel-to-panel grouted/keyed connections can transfer diaphragm forces when engineered and detailed for the project.

AAC vs. ALTERNATIVE BUILDING SYSTEMS- Full wall assemblies-

PROPERTY	AAC	CMU	ICF	WOOD FRAME	RENCO
Fire Rating (8")	**Up to 4 HR ★ (tested assemblies)**	1–2 HR	1–2 HR	0–1 HR	Verify by tested assembly
Thermal (R-value 8")	**R~10 steady-state; dynamic up to R-30***	R-12	R-22	R-19	R-20
STC (8" wall)	**STC 52 ★**	STC 52	STC 45	STC 35	STC ~40
Weight (psf)	**18–22 psf ★**	45–57 psf	19 psf	6–8 psf	~12 psf
Mold Resistance	**Excellent ★**	Good	Excellent	Poor	Good
Precision / Tolerance	**±1/16 in. ★**	±1/8–3/16 in.	±3/16 in.	±3/16–3/8 in.	±1/16 in.
Construction Speed	**Fast ★**	Medium	Medium	Medium	Fast
LEED Contribution	**High ★**	Medium	Medium	Low	Medium
Cost (material/m^2)	Low	High	High	Moderate	High
ICC Code Recognized	**Yes ★**	Yes	Yes	Yes	No

*★ = AAC Advantage | *Dynamic R-value requires climate-specific energy modeling. Data: tested assemblies, manufacturer data, project assumptions; verify each assembly.*

CONSTRUCTION SPEED & TOTAL COST OF OWNERSHIP

SPEED ADVANTAGES

Large Block Size
AAC blocks: 24×8×(4–20 in.). 1 AAC block = 3–6 CMU units. Dramatically faster laying.

Lightweight Handling
~33–55 lb/block (AAC) vs 77+ lb (CMU). No specialty lifts for blocks. Single mason productivity +40%.

Panel Systems
Reinforced AAC wall panels erected by crane: 1 crew = 1,600 SFT/day (200–300 m²/day).

No Formwork
AAC floor/roof panels eliminate forming, shoring, casting — weeks saved on concrete frames.

Thin-Joint Mortar
3/32–1/8 in. polymer mortar joints vs 3/8 in. traditional. Less material, faster set, stronger wall.

Single-Trade Wall System
No furring, no insulation sub, no drywall — 17 days vs 29 days (CMU) per 1,800 SFT wall.

TOTAL COST OF OWNERSHIP — 2026 DATA

Total Wall Cost vs CMU	**–26.6%**	$22.29 vs $30.35/SFT paint-to-paint (FL 2026)
Material Cost (block only)	**+$2.16/SFT**	AAC $5.66 vs CMU $3.50 offset by trade elimination
Labor Savings	**20–35%**	155 vs 122 SFT/day; fewer block placements
Foundation Savings	**5–15%**	60% lighter than CMU reduces structural loads
HVAC Downsizing	**10–25%**	Thermal mass + modeled modeled assembly perf. reduces equip. sizing
Sprinkler Scope Alternatives	**$2–8/SF**	May support alternatives with code/AHJ/fire review.
Energy Savings (LCC)	**20–40%**	Over 30-year life cyde vs frame construction
Maintenance Reduction	**Significant**	No rot, rust, mold, termites, paint cycle

APPLICATION TYPOLOGIES — WHERE AAC EXCELS

MULTIFAMILY / CONDOS

STC 50+ party walls; fire-rated separations; reduced sound between units; mold-resistant construction. Ideal for 1–6 story Type III / V-A / IBC Type I-II.

HOTELS & HOSPITALITY

Superior acoustic privacy between rooms; fire separation; thermal mass for HVAC savings; fast erection on concrete frame or AAC load-bearing.

DATA CENTERS / BESS

4-hour fire-rated enclosures without additional protection; no off-gassing; non-combustible; thermal stability; can support code-compliant BESS separation when designed to NFPA 855/IBC and AHJ requirements.

HEALTHCARE / EDUCATION

Mold-resistant; low/no VOC contribution from AAC material; excellent IAQ; acoustic privacy; fire resistance; IBC compliant for occupancy types A/E/I. Supports WELL building certification.

INDUSTRIAL / WAREHOUSES

Non-combustible cladding and panel walls; tilt-up alternative; fire separation walls; lightweight on steel frames; fast installation with large panels.

SINGLE FAMILY / LUXURY

Quiet, comfortable, energy-efficient homes. Hurricane resistance; termite-resistant; fire-resistant; mold-resistant when moisture is controlled. Premium finish with thin plaster or direct tile.

IBC / CODE COMPLIANCE & APPROVALS

STANDARD	TITLE	RELEVANCE TO AAC
IBC 2021	Masonry Chapter 21	AAC masonry referenced in IBC Chapter 21 / Section 2103; structural design through TMS 402.
ASTM C1693	Precast AAC Specification	Material specification for precast autoclaved aerated concrete. Density classes, compressive strength classes, moisture content limits.
ASTM C1692	AAC Field Practice Standard	Standard practice for AAC masonry — mortar, installation, anchors, connections, surface treatment requirements.
TMS 402-22 / 602-22	Masonry Structural Code	AAC strength-design provisions in TMS 402-22 Chapter 11; seismic provisions in Chapter 7; construction/specification in TMS 602-22.
ICC-ES ESR	Evaluation Service Reports	ESRs are product-specific and often used by AHJs as part of code-compliance review.
NFPA 101 / IBC Ch.7	Fire Resistance	Fire resistance through tested UL/ASTM E119 assemblies and applicable IBC Chapter 7 provisions; verify assembly-specific rating.
ASCE 7-22	Wind & Seismic Loads	AAC wall systems are designed for ASCE 7-22 loads; Florida Product Approval / HVHZ pathway may require TAS 201/202/203 testing as applicable.
ASHRAE 90.1	Energy Compliance	AAC thermal mass may support compliance under ASHRAE 90.1 / IECC performance paths; verify exact mass-wall criteria and COMcheck modeling.

INSTALLATION BEST PRACTICES & KEY DETAILING

FOUNDATION & BASE COURSE

- Level, clean substrate — tolerance ±1/8 in. per 10 ft.
- First course: standard mortar (3/8–5/8 in.) for leveling
- Subsequent courses: thin-joint polymer mortar (3/32–1/8 in.)
- Damp-proof course membrane under base if required

WALL CONSTRUCTION

- Stagger block joints minimum 4-in. overlap
- Thin-joint mortar full bed — no furrowing
- Cut AAC with hand saw, circular saw, or router — no special tools
- Services (conduit, plumbing) chased directly into AAC — standard

REINFORCEMENT & BOND BEAMS

- Bond beams/reinforcement spacing per TMS 402, product ESR, and project engineering.
- Vertical rebar in grouted cores at corners, openings, and intervals
- Vertical reinforced grouted cores / boundary elements as required
- MHE AAC Load-Bearing System: engineered reinforcement scheme

OPENINGS & LINTELS

- AAC lintels: match wall thickness; prescriptive spans to 8 ft; longer spans by engineered design.
- Prefab lintels delivered with wall materials
- Temporary support during install — remove when mortar cures (24h)
- Lintel bearing: minimum 6-in. each side

FLOOR & ROOF PANELS

- Crane placement; panels seated on bearing wall or beam
- Bearing length per panel design and manufacturer requirements; 4–6 in. common.
- Grouted/keyed panel joints as engineered for diaphragm/load transfer.
- Screed or topping as required for finish floor level

FINISHING & SURFACE TREATMENT

- Interior: direct acrylic paint, tile adhesive, gypsum skim
- Exterior: acrylic base coat + finish coat (mesh/reinforcement per finish system and substrate).
- Interior vapor/moisture control per climate, assembly, and finish requirements.
- Window/door frames: anchor bolts or frame anchors direct into AAC

PROJECT CASE STUDIES & PROVEN PERFORMANCE

MULTIFAMILY — FLORIDA

5-Story Condominiums | 28 Units

- AAC VE replacing CMU + gypsum assembly
- Achieved STC 52 party walls — no added drywall
- 4-hour fire separation without spray fireproofing
- Structural savings: reduced foundation loads
- Schedule: 3 weeks faster than original CMU scope
- Budget: neutral on material; labor savings significant

HOTELS — GEORGIA AND FLORIDA

25+ Structures | Hillside / Coastal

- AAC panels for load-bearing walls in high impact zone
- Thermal performance critical — lower sized AC in structures
- Humidity resistance essential in tropical climate
- Panel system: fast erection
- MHE AAC Load-Bearing System applied
- 3,000+ AAC projects across the globe

DATA CENTER / BESS

Battery Energy Storage | USA

- 4-hour fire-rated AAC enclosures per NFPA 855
- IBC/NFPA sprinkler or protection alternatives evaluated with AHJ and fire-protection engineer
- No off-gassing — critical in electrical environments
- Thermal mass reduces interior temperature swing
- AAC-2 panels selected for low weight/fire balance
- AHJ review supported by product-specific ESR/test documentation where available

QUESTIONS & DISCUSSION

Thank you for attending this AIA Continuing Education Session

PRESENTER CONTACT

Michael Hofmann | MHE Group
CEO | Registered AAC Specialist
www.mhe.group | 40+ Years | 3,000+ AAC Projects Worldwide

AIA CREDIT INFORMATION

Program Title:
Autoclaved Aerated Concrete (AAC):
Fire Safety, Sustainability & Performance

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1.0 LU | HSW

Learning Format:

Lecture / Lunch & Learn

AIA Provider:

MHE Group (CES# 10149078)

Topic Area:

Building Systems / Sustainable Design

REFERENCES

· ASTM C1660, C1686, C1691, C1692, C1693, C1694, E84, E90, E119, E492

· TMS 402-22 / TMS 602-22 Masonry Building Code

· IBC 2021 Ch.7 & 21 | ASCE 7-22 | ASHRAE 90.1

· ICC-ES ESRs for product-specific AAC assemblies and code compliance.

· USGBC LEED v4 Reference Guide — BD+C

· NFPA 101, 855 | Florida Building Code 8th Ed.