

# Your Guide to Building with AAC



Figure 1: Finished AAC House, Paradise California

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# Your Guide to Building with AAC

## INTRODUCTION

Thank you for your interest in this building material, we hope that you find this guide helpful in understanding the benefits of Autoclaved Aerated Concrete and more!

Our goal is to provide a quality product and service to create a safe and lasting return on your most important investment for generations to come. We want to properly educate Americans when it comes to building commercial or residential AAC structures.

Understand that this is glomerate piece assembled by installers, engineers, architects, manufacturers, scientists, professors, and professionals inside and outside the industry.

## WHAT IS AUTOCLAVED AERATED CONCRETE “AAC”?

Autoclaved Aerated Concrete, more commonly referred to as AAC, is a closed cell masonry product that comes in blocks or panels. This “aerated” product was first developed in Germany in the 1880s then perfected and patented in the 1920s by a Swedish architect named Johan Axel Eriksson. Sweden and much of Europe were experiencing lumber shortages because of World War I, so an alternative construction method needed to be developed. Dr. Eriksson discovered that by curing the material with heat and pressure in an autoclave, the final product was much stronger and dimensionally accurate than the product when it was “air cured”.



Figure 2: 12x8x24 AAC Block

### WHY HAVE I NEVER HEARD OF AAC BEFORE?

AAC is relatively new in the US. There are over 3,000 AAC manufacturing plants worldwide but there are only three operating in North America and only one of those is in the United States. The US plant is in Haines City, FL. and the other two plants are in Monterrey and Mexico City, Mexico. AAC is widely used in the areas surrounding these plants but due to high shipping costs, the product is not well known outside of these regions.

### WHAT CAN I BUILD WITH AAC?

AAC can be used on almost any type of residential or commercial building. For hotels and dormitory type structures, you can use AAC panels to build the entire structure including the floors and roofs. For a residential project, you would see AAC block being used for the exterior (and possibly the interior) walls. If a fully fireproof home is your objective, AAC panels could also be used on the roof to protect your structure from the flying embers that typically start house fires.

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## WHAT ARE THE MAIN BENEFITS OF AAC?

AAC has many benefits.

- Porous structure gives superior fire resistance and has the highest UL (underwriters' laboratory) Fire Rating in the Industry
  - A few examples:
    - AAC 1600 Celsius (2912°F)
    - Steel 1400 Celsius (2552 °F)
    - Fire-Retardant Plywood or Lumber Celsius  $\leq 71$  ( $\leq 160^\circ\text{F}$ )
- Superior Thermal Insulation – it is nicknamed High Tech Adobe
- Excellent Acoustic properties
- Lighter weight than traditional masonry or cement products
- Easy to install with basic construction skills making it DIY friendly
- No off gassing of toxins when exposed to fire
- Will not support the growth of mold or mildew
- Termites will not eat it
- 100% recyclable-all waste material can easily be crushed back into sand
- Hurricane and Tornado resistant-can be engineered to 200+ mph
- Long life, is not affected by harsh climates or extreme weather conditions

## AAC WORLDWIDE USAGE

- Australia 60%
- China 50%
- England 50%
- Germany 65%
- Poland 80%
- United States <.01%



*Figure 3: Different Sized AAC Panels and Blocks*

## A DEEPER DIVE INTO THE BENEFITS OF AAC

### ECONOMIC BENEFITS

Building with AAC can shorten construction cycles. AAC weights from 25-40 lbs. per cubic foot as compared to 130 lbs. for standard masonry. This provides extensive savings in shipping (depending on the location of the project). In addition, the reduced energy requirements of a building constructed with AAC can save building owners and occupants a great deal of money over the lifetime of building. One can expect annual savings between 35-60% on the building's utility bills, and a national average savings of 65% on the building insurance premiums.

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## FIRE RESISTANT

Every year, hundreds of homes are lost and thousands more threatened by roaring wildfires that rip through the Pacific Northwest. Hundreds of tests, studies and real-life scenarios have proven the benefits of AAC as a fire-resistant material. With AAC being non-combustible and inorganic, it makes it one of the highest hourly fire-resistant materials per inch of building material in today's market, with the melting points of 2,912°F.

## PEST AND MOLD RESISTANCE

Unlike most building materials use today, AAC is 100% inorganic. In climates where termites and other insects flourish, AAC is the perfect application as pests cannot eat it. Its solid construction also alleviates voids where pests can live and colonize. AAC's inorganic properties leave no nutritional value for molds and fungi to thrive, leaving it the perfect materials of use in wet climate areas.

## SOUND TRANSMISSION

AAC has been proven to drastically reduce the impact of noise pollution, both inside and outside of the building. Its noise reduction coefficient is more than seven times that of ordinary concrete. The STC (Sound Transmission Class) rating of an 8" thick AAC wall ranges from 44-50 STC depending on the finishing material (stucco, plaster, drywall, etc.).



Figure 4: Moiser, Oregon

## STRENGTH AND STABILITY

AAC has an extremely high strength to weight ratio. When installed properly, the resulting wall function as a monolithic (one complete) structure. Depending upon the density, AAC provides compressive strength of 290 psi to more than 1000 psi. AAC has been used in seismically active and hurricane prone regions around the world. Buildings constructed of AAC can withstand wind forces exceeding 190 MPH. the strength and resiliency of AAC is best exemplified by the survival of all 5,578 homes during the Kobe, Japan earthquake in 1995, which damages or destroyed over 106,000 buildings.

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## IS AAC A “GREEN” MATERIAL? WHAT FOOTPRINT ARE WE LEAVING BY USING AAC?

AAC is made of a few simple ingredients; sand, cement, lime, and water. During the manufacturing process these naturally abundant materials are used to make a non-toxic, non-pollutant, 100% recyclable product. AAC covers 3 applications, 1) structure/framing 2) installation and 3) interior ready sub-straight “drywall”. AAC the product itself uses a third of the cement as a typical CMU (Concert Masonry Unit, also known as cinderblock). The facility uses a substantial amount of power which is a drawback but ultimately produces zero emissions from steam generation or wastewater, accompanied with solar farms. Adjoining future plants could potentially bring AAC products to net zero, or as close as humanly possible. As far as shipping goes, we have a low carbon footprint since we use the rail and rail facilities.

## AAC CERTIFICATIONS & TESTING

### ACI CERTIFICATIONS

American Concrete Institute “ACI” is a non-profit technical society and standards developing organization. <https://www.concrete.org/>

- TMS 402/602: Building Code Requirements and Specification for Masonry Structures (Formerly ACI 530)
- ACI PRC-526-19: Guide for Design and Construction with Autoclaved Aerated Concrete Panels

### ASTM CERTIFICAITONS

The American Society for Testing and Materials “ASTM” is a scientific and technical organization that is a developer of standards for testing different types of materials. For more information on testing and approval for the items listed below, please visit <https://www.astm.org/>

- ASTM C1452-00: Standard Specification for Reinforced Autoclaved Aerated Concrete Elements
- ASTM C1555-03: Standard Practice for Autoclaved Aerated Concrete Masonry
- ATSM C1660-10: Standard Specification for Thin-bed Mortar for Autoclaved Aerated Concrete (AAC) Masonry
  - (Thin-bed commonly known as “thin-set” mortar)
- ASTM C1686-09: Standard Practice for Installation & Testing of Reinforced Autoclaved Aerated Concrete (AAC) Units
- ASTM C1691-21: Standard Specification for Unreinforced Autoclaved Aerated Concrete (AAC) Masonry Units
- ASTM C1692-18: Standard Practice for Construction & Testing of Autoclaved Aerated Concrete (AAC) Masonry
- ASTM C1693-09e1: Standard Specification for Autoclaved Aerated Concrete (AAC)
- ASTM C1694-09 Standard Specification for Reinforced Autoclaved Aerated Concrete (AAC) Elements



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## LEED CERTIFICATION

Leadership in Energy and Environmental Design “LEED” is an internationally recognized green building certification system. Developed by the United States Green Building Council (USGBC), LEED provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations, and maintenance solutions. LEED promotes sustainable building and development practices through a rating system based on points, that recognizes projects that implement strategies for better environmental and health performances. USGBC certifies buildings, NOT the materials used to construct the buildings. Therefore, a vast majority of green building materials will contribute to LEED points. The following description of LEED credits, with the use of AAC, represents qualified LEED points, which can be considered for certification. <https://www.usgbc.org/>

## UL CERTIFICATIONS

The Underwriters Laboratory “UL” is a global safety science leader, UL helps companies to demonstrate safety, enhance sustainability, strengthen security, deliver quality, manage risk, and achieve regulatory compliance. <https://ul.org/>

Assemblies for AAC performed under the ASTM E-119 Fire Test of Building Construction and Materials Standards are as follows:

- UL K909: Restrained and Unrestrained Floor Panel Assembly
- UL P932: Restrained and Unrestrained Roof Panel Assembly
- UL U919: Bearing and Non-Bearing AAC Masonry Assemblies
- UL U920: Bearing and Non-Bearing AAC Panel Assemblies
- UL X901: Steel Column protection Assembly
- UL FF-D 0017, 0018, 0019, 0020: Joint Systems Floor to Floor
- UL FW-D 0012, 0013, 0014, 0015: Joint Systems Floor to Wall
- UL HW-D 0166, 0177: Joint Systems Head to Wall
- UL WW-d 0023, 0024: Joint Systems Wall to Wall
- UL C-BJ 1307, 8010: Through Penetration Systems Masonry Single or Multiple Commodities
- UL W-J 8009: Through Penetration Systems Panels Single or Multiple Commodities



Figure 5: Concrete Foundation w/AAC Block, Bentonville Arkansas

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## BUILDING & SHIPPING AAC

### WHO WILL INSTALL AND/OR BUILD MY AAC PROJECT FOR ME?

While AAC is a masonry product and is usually installed by a mason, most any skilled construction worker can be trained to install AAC. Even a journeyman mason will need a few days of hands-on training to learn the nuances of installing AAC vs CMU. Our sister company, AACPS (Autoclaved Aerated Concrete Professional Services), can provide this training for your workers either at your jobsite or at one of our training sites in Oregon. Upon completion of this training program, AACPS will issue your workers certification cards indicating they have passed the course. AACPS can also supply all the specialty tools required for AAC installation. Once you are certified, AACPS can/will sell you the equipment you need to operate a business as a certified installer.

AAC is a DIY friendly product, but that's said with some reservations. Building even a modest size house is a major undertaking regardless of what material you are using. AAC requires some specialty tools which are not readily available at your local box store, so the DIY approach is not for everyone. If you are an experienced DIY professional, AACPS is ready and willing to help you make your project a success. You can rent the specialty tools from AACPS, and a qualified installation instructor can provide you with onsite training. We will help you coordinate this training if you buy the AAC from us.

### HOW MUCH DOES AAC COST?

Historically, AAC has been considered a premium cost product that was only used for expensive custom homes. Today, AAC is very competitive with most other construction methods including residential wood construction. Because AAC eliminates many steps in the building process, the cost comparison to other construction methods is a bit complicated sometimes. The houses we are currently building in Oregon and California are selling for the same price as wood-built homes of a comparable design.



Figure 6: One Pallet Contains 60 Blocks of 12x8x24

### HOW ARE YOU OVERCOMING THE HIGH SHIPPING COSTS?

Our company has worked with the railroads to perfect boxcar shipping of AAC. Each boxcar contains almost 5 semi loads of block, so we can eliminate a lot of the freight cost to bring AAC into our distribution yards throughout the western US. We currently have distribution yards in Boise, ID., Cheyenne, WY., Fontana, CA., Phoenix, AZ., Prineville, OR., Sacramento, CA., Sparks, NV., and Springfield, MO. Additional yards in Albuquerque, NM., Oklahoma City, OK., Salt Lake City, UT., and Seattle, WA. will be opening soon.

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## HOW DO I CONVINCE MY BUILDER TO USE AAC?

It is not uncommon for established builders to be reluctant to change the way they operate. They have a significant investment in tools and equipment for the type of construction that they are building. They most likely also have long term relationships with subcontractors who they trust, and they like to work with. We understand and appreciate that mentality but...you would not be searching the Internet for a better building product if you were happy with the quality of the current construction products and methods. When thousands of homes each year are destroyed by wildfires, tornados, hurricanes and floods, the builder loses his ability to choose what the consumer buys. If you are committed to building with AAC, we will help you find a builder!

## HOW DO I GET STARTED?

Any successful construction project typically starts with a consultation at a local design professionals office. The complexity of the building codes combined with local restrictions implemented by municipalities usually means disaster for someone who is not familiar with these subjects. Your design professional could be an Architectural firm, or it could be a local home builder within house design capabilities. Your design professional may be reluctant to work with AAC due to their lack of knowledge about the product but don't let this stop you. We have experienced design professionals who are familiar with AAC that are ready to assist your design team. If you already have plans for your project, we can help you convert them to AAC. Please send them to one of the following companies below, based on your location.

## CONTACTS

Company/Website	Contact Information	Serving Areas
Carr General Construction	Phone: 541-728-8210 Email: <a href="mailto:phil.carrconstruction@gmail.com">phil.carrconstruction@gmail.com</a>	Idaho, Oregon, Washington
<b>DDV.LLC</b>	Phone: 307-996-6302 Email: <a href="mailto:dean@ddvllc.com">dean@ddvllc.com</a>	Colorado, Idaho, Kansas, Oklahoma, Utah, Wyoming
EcoTerra LLC Consulting	Phone: 479-531-5950 Email: <a href="mailto:mwallmosaic@gmail.com">mwallmosaic@gmail.com</a>	Arkansas, Missouri, Oklahoma
<b>Hammel Construction</b>	Phone: 541-914-4996 Email: <a href="mailto:hammelconstructionaac@gmail.com">hammelconstructionaac@gmail.com</a>	Oregon
Kingdom Block	Phone: 541-951-3712 Email: <a href="mailto:nickcook@kingdomblock.com">nickcook@kingdomblock.com</a>	Arizona
<b>Northwest AAC</b>	Phone: 541-948-3076 Email: <a href="mailto:bob@northwestaac.com">bob@northwestaac.com</a>	Idaho, Oregon, Washington
Old World Construction	Phone: 541-647-0200 Email: <a href="mailto:bnagy87@gmail.com">bnagy87@gmail.com</a>	California
<b>Slomax Masonry</b>	Phone: 970-576-5656 Email: <a href="mailto:slomax.sam@gmail.com">slomax.sam@gmail.com</a>	Colorado, New Mexico, Utah, and the Midwest