



e-crete AAC Technical Guide

Version 4.0 Rev.02 2026



The following documentation, information and instructions are provided as a courtesy of The E-Crete Company. The Customer and their assigns are responsible to ensure compliance with all local and Federal codes.

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Energy Efficient ☐ Acoustical Insulation ☐ Fire Resistant ☐ Pest Resistant ☐ Environmentally Friendly



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C	Engineering Calculations - Static, Shear, Seismic, reinforcement calculations	Old (2000)	
D	Sample Drawings / details - In PDF and currently Autocad 2000	Issued Beta	
E	Environmental / Green status	Started	Need confirmed certifications list
F	Finishing / Coatings - Interior / Exterior coatings and treatments	Started	3 Suppliers confirmed
G	Projects Portfolio	Issued	On-going Updates, and projects additions
I	Installation Techniques - Basic installation techniques, Future will include advanced.	Issued Beta	
P	Product Cut-sheet / Order sheet - E-Crete Product line order form SKU, Class, Size, Skid Weight, etc.	Started	
T	regional Thermal performance charts - Performance charts for various US geographic regions	Started	expand to help local engineer


e-crete[®] AAC

Introduction - Section 1.0

An introduction to e-crete[®] AAC Autoclaved Aerated Concrete

Your decision to open this Technical Design Manual says a lot. You are now in a select group of professional Engineers, Architects, Designers, and Builders around the world who have chosen an innovative, cost effective, and environmentally safe building material called Autoclaved Aerated Concrete (AAC). E-Crete is a company dedicated to satisfying your high building standards in the United States for energy efficient, sound suppressing, and fire and insect resistant structures. E-Crete's AAC offers many more benefits to you and your clients as described in the following chapters. This document was developed for only one purpose - to assist you.

Thank you for considering E-Crete's Autoclaved Aerated Concrete for your next project.

We look forward to working with you!

Sincerely,

The employees of,

The e-crete Company



Energy Efficient □ Acoustical Insulation □ Fire Resistant □ Pest Resistant □ Environmentally Friendly

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e-crete[®] AAC

Introduction - Section 1.0

Affiliations

E-Crete is currently
Affiliated with the following
Organizations



SCOTTSDALE



GREEN BUILDING
PROGRAM



About **e-crete[®]** AAC

E-Crete AAC meets architects', engineers' and contractors' concern for durability, quality of construction, building with energy-saving products, as well as the projected future value of structures. The construction industry has become more competitive, profit margins are shrinking and construction schedules are accelerating, making E-Crete blocks an increasingly attractive, cost effective building material.

E-Crete blocks are a solid, high-performance concrete block used for over 75 years in a variety of commercial, industrial and residential construction applications worldwide in a variety of climates. E-Crete is affordable, readily available, and can give perceptive designers an edge in a very competitive market. E-Crete is price competitive with other building materials and offers benefits that can reduce overall project costs. Lightweight E-Crete yields overall structural economies by reducing the mass that must be considered in seismic design and the dead load transmitted to foundations and superstructure members. E-Crete installs easily without special crews or equipment.

In addition to design and construction benefits, E-Crete provides significant advantages to commercial building occupants and homeowners over other building materials. Escalating cooling and heating costs make E-Crete's high thermal efficiency and improved insulation properties attractive to owners. E-Crete can also satisfy the more stringent construction standards promulgated in the aftermath of recent fires, hurricanes and earthquakes. E-Crete's proven durability and environmental benefits appeal to those who are becoming much more sensitive to the life-cycle economy of buildings.

**e-crete[®] AAC**

Introduction - Section 1.1

CONTACTING The e-crete Company



We hope that you find this manual and guide to be a comprehensive resource in assisting you in preparing for your project. Please review its content and we graciously accept any feedback you may have. The e-crete company staff would be happy to assist you in any way in successfully completing your project using e-crete AAC building products.

We also invite you to visit our web site where you will find additional resources including CAD drawings and specifications for direct insertion into your documentation.

If you have any questions or comments please feel free to contact us using the method of your choice;

1) by telephone at our toll free number (866) 508-5803

2) through the contact page on our web site www.e-crete.com

3) or by mail at
237 South Delsea Drive
Unit # 330
Vineland, New Jersey
08360





An examination of e-crete[®] AAC product - production, impact, and product lines.

Of all of the new building techniques and materials introduced during the last century, few have won such rapid acceptance worldwide. AAC is one of the lightest forms of concrete. It is the most technically advanced material used for the manufacture of mass-produced masonry blocks.

E-Crete AAC's micro cellular structure, featuring millions of tiny pockets of trapped air, gives the product its distinctive features. High compressive strength, thermal insulation, sound insulation and fire resistance are all provided in one lightweight product. In addition, **E-Crete AAC** provides high resistance to moisture and air penetration. It will not support mold growth and provides maximum protection against insect and pest damage to the building fabric.

Lightweight, easy to work with, and with impressive load bearing capabilities, the opportunity to achieve superior results in less time will be quickly recognized by the best contractors.



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PRODUCT DESCRIPTION

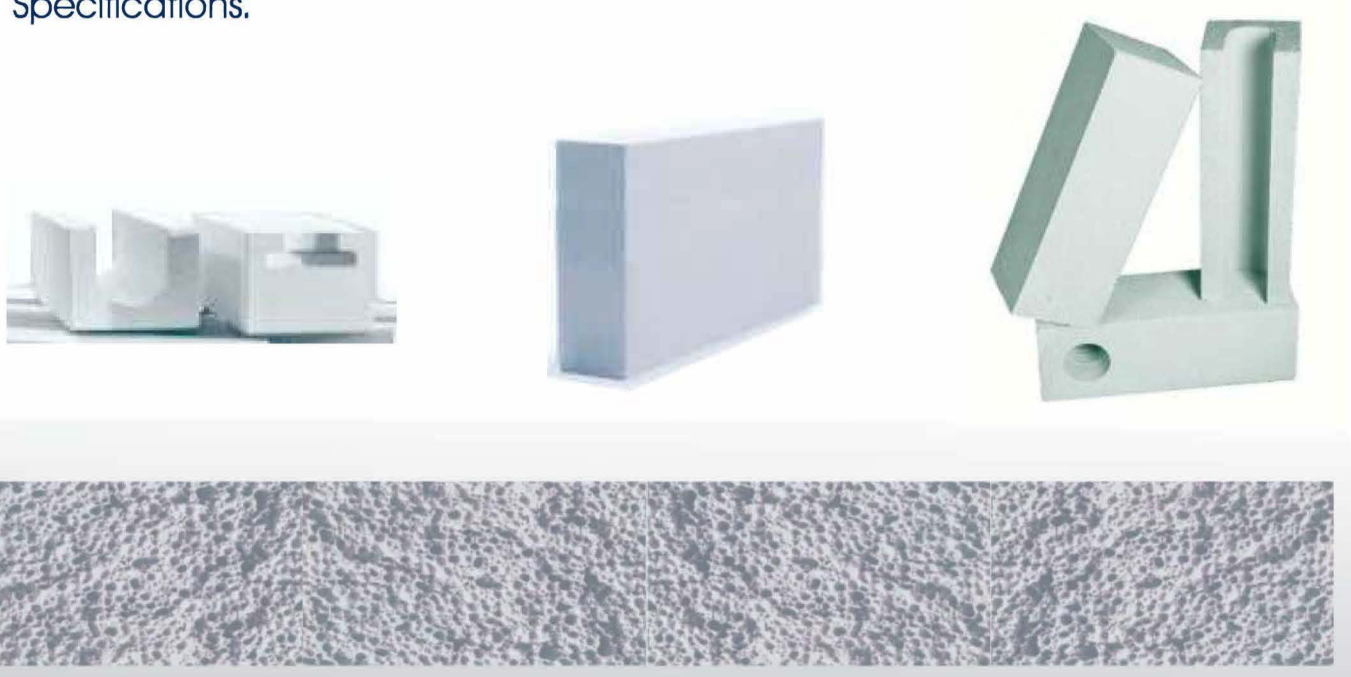
Autoclaved Aerated Concrete

Autoclaved Aerated Concrete (AAC) is a lightweight, high strength building material used in a variety of applications for commercial, industrial, and residential construction. AAC is manufactured from sand, cement, lime, gypsum, aeration agent and water to produce pre-cast blocks and panels. AAC has excellent thermal and acoustic insulation properties, is fire and pest resistant, and environmentally superior to more traditional building materials. AAC is a viable and economical alternative to conventional building materials such as wood, concrete, and steel.

AAC was originally invented by architect Johan Axel Ericksson and was patented in 1924. AAC has been used extensively throughout Europe, Far and Middle East, and Australia.

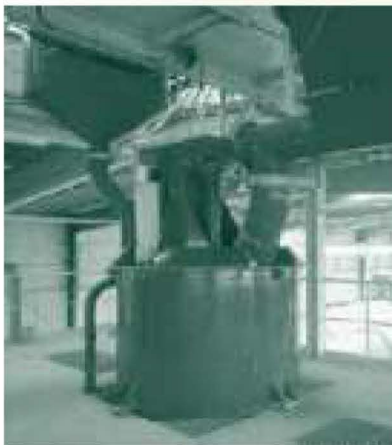
AAC was specifically designed for load-bearing applications such as wall and lintel construction. AAC is also a superior building material in non-load bearing applications such as sound and fire walls.

The following pages describe the manufacturing of AAC, the benefits of using it for masonry walls, the physical properties, construction details and guide Specifications.



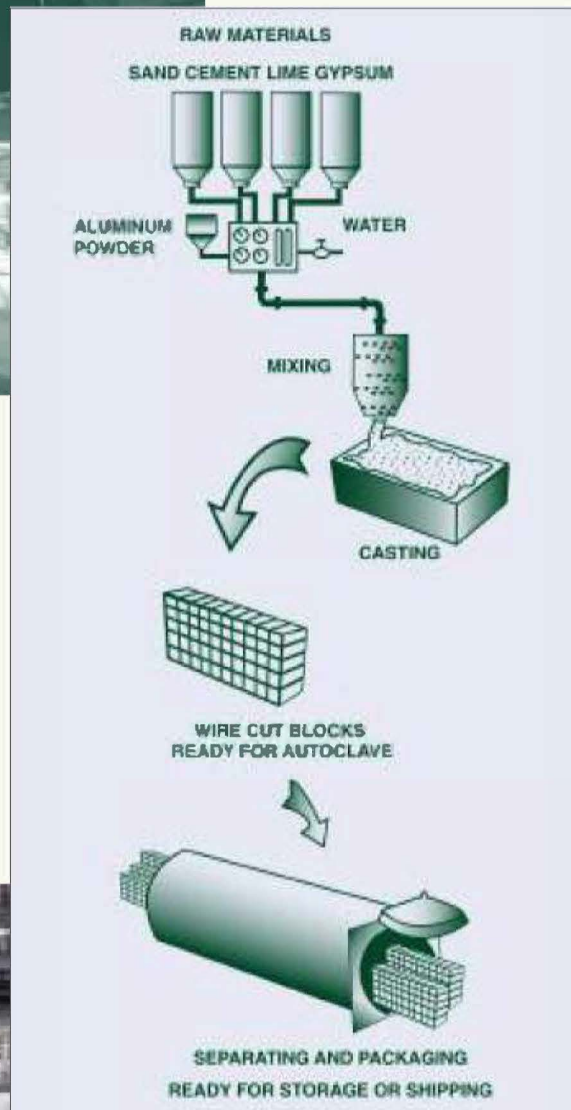
AAC PRODUCTION - PROCESS

Environmentally friendly and energy conserving, AAC meets all the requirements of a “green” building material. No pollutants or hazardous wastes are generated in the production process and there is no waste of raw Materials.



AAC Raw Ingredients

Sand
Water
Cement
Lime
Gypsum
Aerating Agent



The production method conserves energy because autoclaving is carried out at high pressures and thermal energy is recovered and reused for maximum efficiency. Production trimmings can also be fully recycled making E-Crete AAC a highly efficient and environmentally friendly building material.



**e-crete[®] AAC**

Products - Section 2.1

IDEAL USES OF e-crete[®] AAC

The many advantageous properties of E-Crete AAC make it an ideal building material for:

Fire Separation
Sound Walls
Shaft Walls
Fire Walls
Hotels Hospitals

Commercial
Multi-Family
Residential
Industrial
Schools

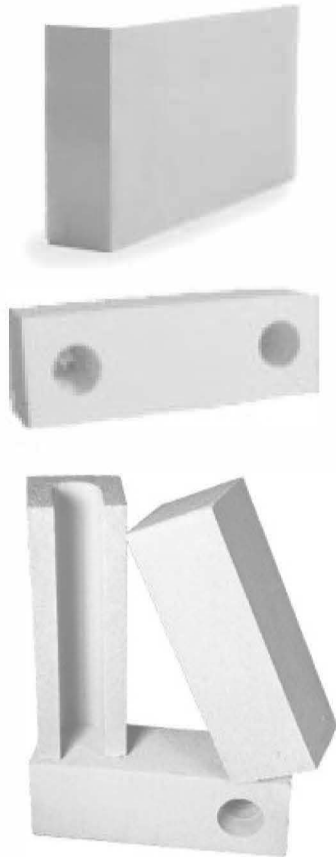


Eight Key Features

- Extremely Durable
- Thermal Insulation
- Fire Resistance (UL Listed)
- Acoustic Insulation
- Pest Resistant
- Environmentally Friendly
- Versatile and Easy to Use
- Lightweight



AAC BLOCK - PRODUCT LINE



AAC Block Dimensions (Inches)

Width (Thickness)	Height	Length
4	8	24
6	8	24
8	8	24
10	8	24
12	8	24
8	12	24

Jumbo Block

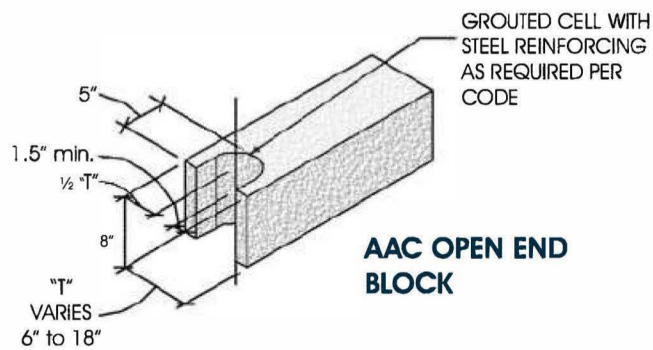
4	24	32-48
6	24	32-48
8	24	32-48
10	24	32-48
12	24	32-48
16	24	32-48
18	24	32-48

AAC Block Density

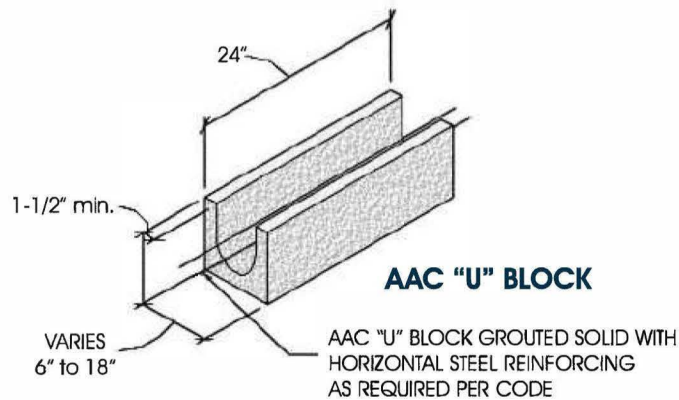
Class	DRY DENSITY lb/ft ³ (kg/m ³)
AAC 2	25 ± 1.6 (400)
AAC 3	31 ± 1.6 (500)
AAC 4	37 ± 1.6 (600)
AAC 6	44 ± 1.6 (700)



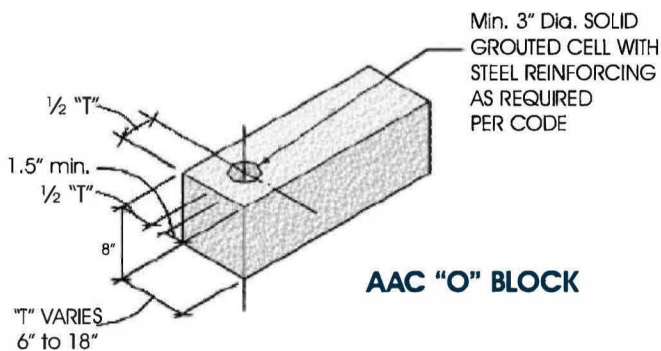
AAC BLOCK - PRODUCT LINE



AAC OPEN END BLOCK

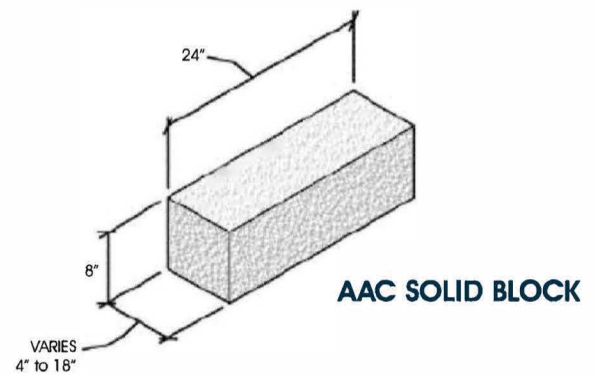


AAC "U" BLOCK

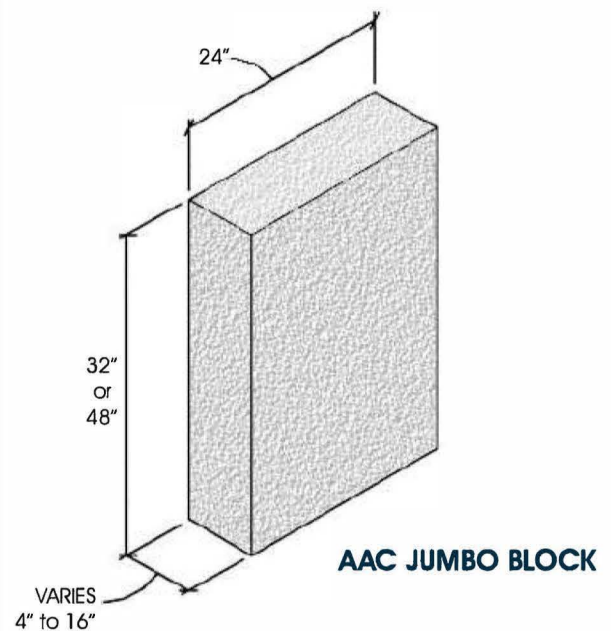


AAC "O" BLOCK

AAC STANDARD BLOCKS



AAC SOLID BLOCK



AAC JUMBO BLOCK

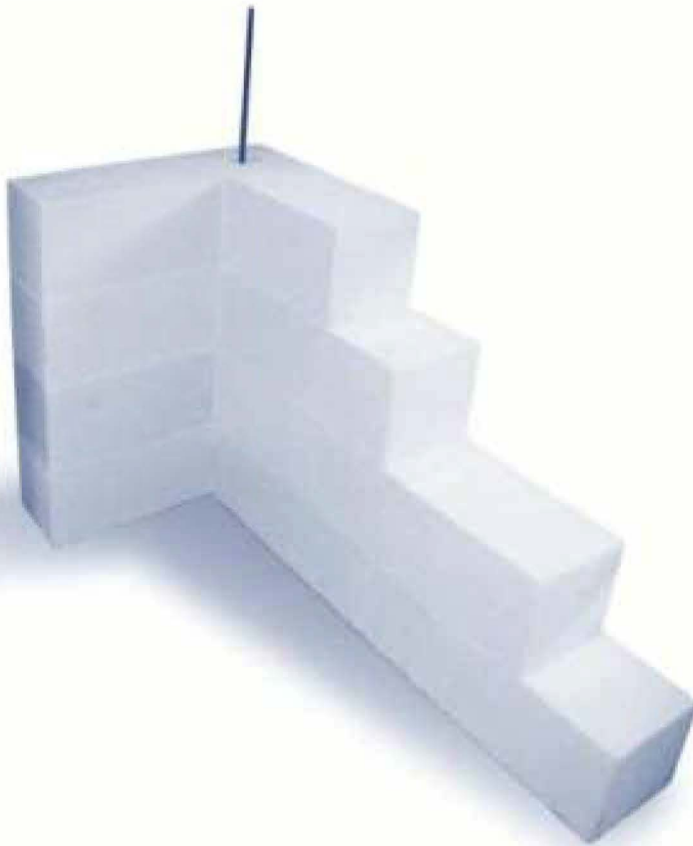


STANDARDS and APPROVALS

E-Crete is committed to compliance with all applicable Standards, Codes, and Classifications.

Autoclaved Aerated Concrete, through its more than 70 years of worldwide use has acceptance and confirmation from the required international standards, and local building codes in numerous countries worldwide.

The following pages contain a list of many of the US Standards and Approvals obtained by the AAC product in general. E-Crete product meets or exceeds every standard. For your project we suggest that you always involve a professional engineer and or Architect as the returns are historic. We believe in quality built facilities, that embrace the ages.





STANDARDS and APPROVALS

Test / Report / Publication	Description of procedure / project	Comments
AATCC / ICBO 127 1995	Water Penetration / Flow Rate	
ACI 523.5R	Guide for Using Autoclaved Aerated Concrete Panels - Structural Design	
ACI 530-05/ASCE 5-05/TMS 402-05	Building Code Requirements for Masonry Structures	
ASTM C 1012	Standard Test Method for Hydraulic Cement Exposed to a sulfate solution.	
ASTM C 1072 94	Masonry Flexural Bond Strength	
ASTM C 1148	Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar.	
ASTM C 185	Test Method for Air Content of Hydraulic Cement	
ASTM C 270	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars	
ASTM C 270	Standard Specifications for Mortar for Unit Masonry Standard Specification for Masonry Cement	
ASTM C 91	Std Spec for Masonry Cement	
ASTM C1262	Freeze Thaw Testing	
ASTM C1386	Standard Specification for AAC Wall construction units	Standard Covers Physical Requirements of Load-Bearing Compression and Non-Load-Bearing AAC Units
ASTM C 1452	Standard Specification for Reinforced Autoclaved Aerated Concrete Elements	Standard covers Load-Bearing and Non-Load-Bearing reinforced autoclaved aerated concrete (AAC) floor, roof, wall, and stair elements used as components for building construction.
ASTM C 1555-03	Standard Practices for AAC Masonry	Standard covers workmanship of AAC, thin bed mortars, and exterior and interior finishes.
ASTM C 266	Test method for time of setting of Hydraulic Cement Paste.	
ASTM C 518	Thermal Conductivity Test	
ASTM C 67	Freeze Thaw Testing	
ASTM E 119	Standard Test Methods for Fire Tests of Building Construction and Materials	Fire Test of Wall Assemblies (Load and Non-Load-Bearing) and Hose Stream Test. Fire Test of Floor and Roof Assembly



STANDARDS and APPROVALS

Test / Report / Publication	Description of procedure / project	Comments
ASTM E 136	Standard Test Method for Behavior of material in a Vertical Tube Furnace "Combustibility Test"	
ASTM E 90 & ASTM C 423	Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of building Partitions	Test method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room method
ASTM E 330	Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.	
ASTM E 331	Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference. Only one wall assembly with and without finishes.	
ASTM E 519	Diagonal Shear Testing of AAC Masonry Walls	
ASTM E 72	Methods of Construction Strength Tests of Panels for Building Construction Section 14: Racking Load Evaluation of Sheathing Materials on a Standard Wood Frame	
ICC ESR-1371	AAC Design Procedure for all Seismic Areas	
NER 531	Structural, Fire, Thermal and Sound Isolation for all AAC product lines	
NER Report 588	Structural and Thermal	
Oak Ridge National Laboratory - Thermal Performance Report	Thermal Evaluation of AAC2.5/32 including thermal mass benefit in residential construction in six major cities	
PA201 DADE COUNTY LARGE MISSILE TEST	AAC2.5/32(G 2) Missile Impact Performance	
PA202 DADE COUNTY	AAC2.5/32(G 2) Criteria for Testing Building Envelope Component Using Uniform Static Air Pressure	
U205	AAC, min 2 in. thick and max. 2 ft wide panel fastened to the steel studs on both sides of the studs with type S3 hex head type self drilling, self tapping screws. Min. 2 fasteners per panel at each stud.	Underwriters' Laboratories (UL) Design
U206	AAC, min. 2 in. thick and max 2 ft wide panel installed between a). Min. 6 AAC blocks, min. 8" AAC wall panel or concrete blocks or b). Any 1hr or 2hr rated stud wall assembly constructed of material and manner described in the individual U300 or U400 series Wall or Partition Design in the UL Fire Resistance Directory. Refer to UL Directory for additional detail.	Underwriters' Laboratories (UL) Design



STANDARDS and APPROVALS

Test / Report / Publication	Description of procedure / project	Comments
U207.	EXTERIOR CLADDING AND OTHER WALL ASSEMBLY. Refer to UL directory for additional detail	Underwriters' Laboratories (UL) Design
U208	POWER PANEL ASSEMBLY WITH STEEL OR WOOD STUDS. Typically specified for party wall construction. Refer to UL directory. Fire Rating depends on thickness. 2 hr for 2" thickness, 3 hr for 3" thickness, 4 hr for 4" thickness.	Underwriters' Laboratories (UL) Design
U358	MIN. 3 INCH PANELS WITH SPECIFIC CROSS SECTION	Underwriters' Laboratories (UL) Design
U916	8 INCH BLOCK see page 3.2.02	UL Fire test results
U917	6 INCH BLOCK see page 3.2.01	UL Fire test results
U918	8 IN WALL PANEL	UL Fire test results
U919	4 INCH BLOCK see page 3.2.01	UL Fire test results
U920	6 IN WALL PANEL	UL Fire test results
U921	6 INCH BLOCK see page 3.2.01	UL Fire test results
U924	AAC BLOCK see page 3.3.01	UL Sound Transmission Classification (STC) for AAC walls
U925	4 INCH BLOCK ASSEMBLY WITH STEEL OR WOOD STUDS	UL Fire test results
UL263 (ASTME119)	Fire classification for AAC 2" Power Panel	UL Fire test results
UL263 (ASTME119)	Fire classification for various AAC wall and floor systems	UL Fire test results
W J 8009	Wall assembly through penetration Fire Stop System for multiple penetrations.	Underwriters' Laboratories (UL) Design
X901	Min. 4 IN BLOCK or MIN. 8 IN PANEL Installed horizontally or vertically. Panels attached to the concrete floor and ceiling.	UL Fire test results

Acronym	Association / Publisher
ACI	American Concrete Institute
ASTM	American Society for Testing and Materials
ANSI	American National Standards Institute
ICC	International Code Council
ICBO	International Conference of Building Officials
NER	National Evaluation Report
PA	Product Approval
UL, Uxxx, Xxxx, ULxxx, W J xxxx	Underwriters Laboratory



ENVIRONMENTAL IMPACT

E-Crete Autoclaved Aerated Concrete is an innovation in ecologically friendly building materials. It is rare that the implementation of technology in the building construction materials world actually improves the environmental impact. Decades of

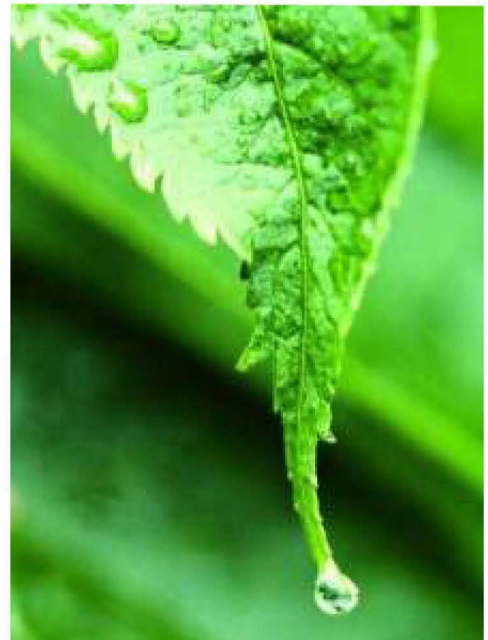


human abuse of and natural resources consumption for human benefit are paramount. We believe that with this product we can help to realize human consumption of resources that is easily sustainable by the planet we share.

The AAC process has proven over close to a century to be economic and environmentally sound. Core to its environmentally friendly basics are what you put into it. The raw materials required to produce AAC are the most abundant, inert materials on earth – we

only need to shape them. The fact that we only need to combine them in a different way, without changing the chemistry of the components, means that if we return them to the planet we return something that the planet knows, unlike the plastics and other modified products in normal North American building construction use today.

The E-Crete AAC process uses locally available completely renewable products. The raw materials, being locally available also reduce any impact on the environment due to shipping, trucking, and other effects like economic impact regarding global pricing, the price of sand will not change other than regionally. To create an AAC block, even with its superior performance in work-ability, fire resistance, heat transfer co-efficiency, sound transfer co-efficiency, is less than any of the individual components of a typical building wall material like concrete or wood. Other products with the same inert factors like standard concrete or CMU require many times the price of transport and manufacture, due to the mass required and the weight shipped, all of which consumes energy not required with E-Crete AAC.





ENVIRONMENTAL IMPACT

Raw Materials

Sand - Water - Cement - Lime - Gypsum - Aluminum powder

- Inert - Natural - Abundant
- Local availability - easily sourced
- No shortage of raw materials due to global abundance
- Low materials consumption, as the finished product is 4-5 times the volume of the raw materials used

Manufacturing Process

- No special measures are required for employee health protection
- No special measures are required for the protection of the environment
- Lower energy consumption relative to comparable products
 - i. 50% less than standard concrete
 - ii. 20% less than traditional CMU concrete block
- Trimmings and waste materials are 100% recyclable



Transport - Shipment weight

- With product unit weight for AAC at approx. 20% of concrete and 60% of 2 cell CMU block, the energy to transport equivalent volumes is substantially reduced

Building Energy Efficiency

- Due to AAC's excellent insulation properties, substantial energy reduction has been documented for decades in almost all climatic regions
- Because of the monolithic state of AAC when constructed, air infiltration is nearly eliminated as well as "cold" spots from thermal breaks due to traditional stud or headers



ENVIRONMENTAL IMPACT

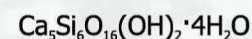
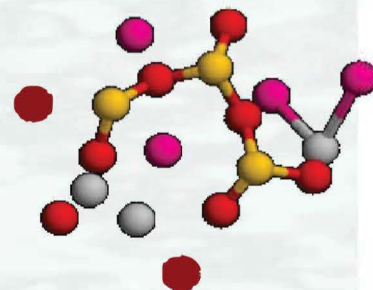
Indoor Air Quality

- ❑ AAC does not emit any contaminants such as Volatile Organic Compounds (VOCs)
- ❑ AAC does not contain toxic agents or carcinogens like other insulation such as fiberglass batt or spray foams
- ❑ AAC is virtually impervious to pests and does not promote bio-hazardous molds or rot
- ❑ As AAC is "non-flammable" no toxic gases or vapors are released if there is a fire
- ❑ Naturally ionizing emissions are extremely low and do not have any health impact unlike some aggregates in use today
- ❑ AAC will not change its composition once it leaves the autoclave
 - it remains perpetually stable



Disposal Recycle

- ❑ AAC outlasts the service life of the buildings it is used for, this means the AAC material can be re-used with no concern for its durability
- ❑ As the finished AAC material is actually Tobermorite 11 Å a naturally occurring mineral, it can be used as superior clean fill, or if it is disposed of in a landfill there are no adverse environmental impacts



During Construction

- ❑ Due to its reduced weight AAC can be assembled on site without heavy lift equipment further reducing energy requirements
- ❑ When the recommended methods of cutting, trimming and shaping are performed on AAC, its coarse dust does not have the adverse health effects on workers as many other materials





Properties - Section 3.0

An examination of e-crete[®] AAC physical properties.



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THERMAL PROPERTIES

Thermal Performance of AAC Block

Introduction

Building design and material properties influence thermal performance and energy consumption for residential and commercial buildings. AAC wall, floor and roof systems provide an innovative combination of excellent thermal conductivity, thermal mass and low air-infiltration. This practical combination of properties in one system provides an excellent thermal insulation material and permits peak energy usage in the building to be shifted to off-peak hours, thus reducing operation costs for building users and owners, improving comfort of living and reducing the demand on power generation facilities.

Definitions

Thermal performance of any building material is the result of several factors and may not be assumed either effective or ineffective on the basis of any one factor. In this section, there are definitions and examples of the various thermal properties that are used to determine the overall thermal efficiency of any building material. Thermal properties generally influence the design of the building envelope and specifically how the AAC thermal properties result in outstanding performance and energy savings. The values for the various AAC thermal properties are included in a later section of this chapter.

Thermal Conductivity "K" (Btu.in/h.Ft².F) is a measure of the material conductivity as tested in a laboratory procedure that measures the heat flow through building material under steady and constant climatic conditions. It is important to remember that these laboratory conditions do not reflect the normal climatic cycles. This issue is discussed in further detail in the thermal mass section. Based on the above definition, it is shown that the lower the "K" value the higher the insulating value. The following table gives the "K" value for different materials.

Designation	Thermal Conductivity, K (Btu.in/h.Ft ² .F)
AAC 32 pcf	0.96 (1)
Concrete 150 pcf	9.98 (2)
Insulation	0.2 (3)
Steel	329.0
Water	4.15

(1) Based on ASTM C518

(2) ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers)

(3) ASHRAE



THERMAL PROPERTIES

Thermal Resistance "R" (h.Ft².F/Btu) is the opposite of the thermal conductivity and it is *the resistance of material to conduct or allow heat flow. R-value*

$$R = (1 / K) \times \text{Wall Thickness (in.)}$$

Designation	Thermal Resistance "R" (h.Ft ² .F/Btu)
8" AAC 32 pcf Wall System	10.0
8" Concrete 150 pcf Wall System	1.0
3½" Batt Insulation	13
1" Steel Plate	0.003

Note: AAC Wall System and Concrete Wall System consist of Plaster on both sides of the wall.

Heat Transmission Coefficient, U-value (Btu/h. Ft².°F) is defined as *the amount of heat, expressed in BTU's transmitted in one hour through one square foot of a building envelope in 1°F temperature difference.*

$$U = 1 / R$$

Designation	U-value (Btu/h.Ft ² .F)
8" AAC 32 pcf Wall System	0.10
8" Concrete 150 pcf Wall System	1.0
3½" Batt Insulation	0.077
1" Steel Plate	329

Note: AAC Wall System and Concrete Wall System consist of Plaster on both sides of the wall.

In addition to the above basic material thermal properties, other thermal properties such as **specific heat** and **heat capacity** affect the performance of the building envelope.

Specific heat, S (Btu/lb.°F) is the amount of heat required to raise one pound of material one degree °F.

Designation	S - value (Btu/lb.°F)
8" AAC 32 pcf Wall System	0.25
8" Concrete 150 pcf Wall System	0.21
3½" Batt Insulation	0.085
1" Steel Plate	0.125



THERMAL PROPERTIES

Heat capacity, HC (Btu/Ft².°F) or as sometimes referred to “thermal mass”, is a measure of how much heat a building component can store or hold per unit of mass. It is essentially the specific heat taking into account the thickness of the material.

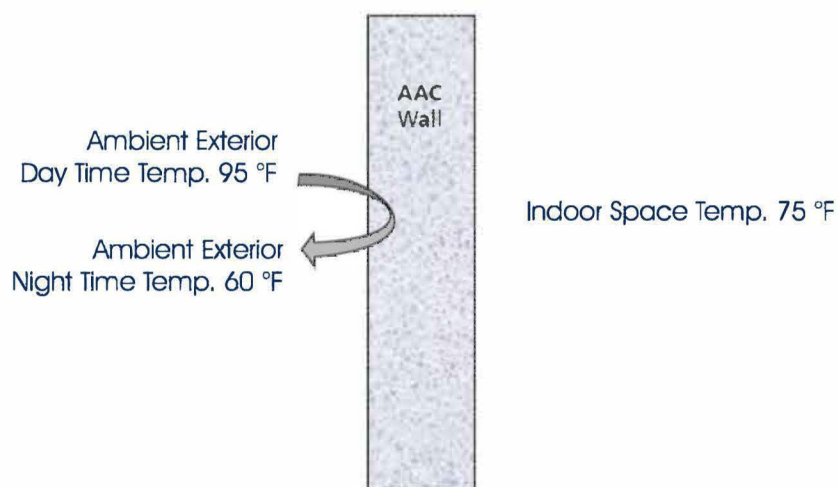
Designation	Heat Capacity - HC (Btu/Ft ² .°F)
8" AAC 32 pcf Wall System	6.07
8" Concrete 150 pcf Wall System	23.0
3½" Batt Insulation	0.007
1" Steel Plate	5.10

Note: AAC Wall System and Concrete Wall System consist of Plaster on both sides of the wall.

Understanding the Thermal Mass Benefit Concept

In the “steady state” thermal values obtained from laboratory testing, it is assumed that temperatures at both sides of a wall are constant and remain constant for a period of time, unlike what actually occurs in normal conditions. In actual conditions, the temperature levels on both sides of walls may change during a 24-hour period. In many cases, the exterior temperature may experience large temperature swings. These changes may cause a reversal in direction of the heat flow or at the least, “delay” the heat flow to the point where it substantially reduces the heat transfer to the inside of the building envelope. The following diagrams illustrate each of these conditions.

Reversed Heat Flow Example - Amarillo, Texas

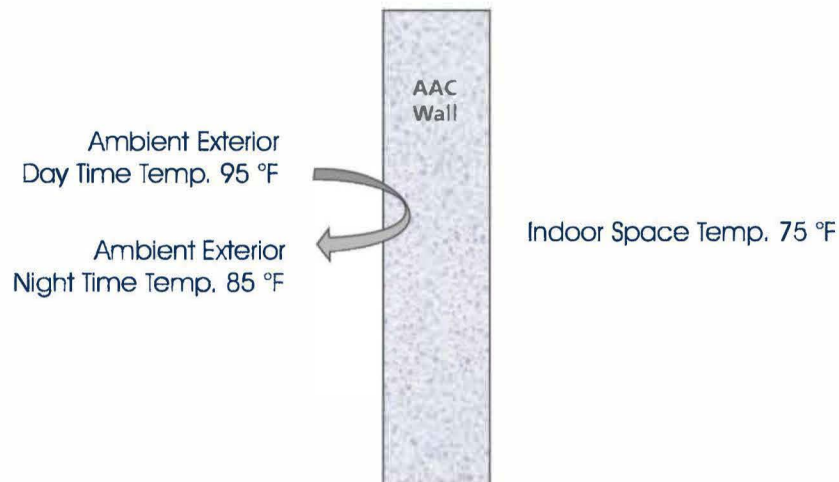




THERMAL PROPERTIES

In Amarillo, Texas, it is not unusual that the outside day temperature may fluctuate from 95 °F down to 60 °F in the same 24-hour period while the indoor temperature is maintained at 75 °F. This drop in temperature and the excellent heat capacity of AAC materials cause a reversal in the direction of heat transfer back to the outside within the 24 hours. Subsequently, the total heat gain through the AAC wall system is significantly less than a low thermal mass wall system such as framed wall. In this case, the combination of the heat capacity and the excellent thermal resistance exceeds the performance of a high “steady state” R-value. This dynamic process is known as the “thermal mass benefit” or “mass-enhanced” R-value.

Delayed Heat Flow Example – Orlando, Florida



In Orlando, it is not unusual that when the outside day temperature is 95 °F, the outside night temperature will only drop down to 85 °F. During the same time frame, the inside temperature could be at 75 °F. In this case, the drop in the outside temperature may not be enough to cause a reversal in the direction of heat transfer. However due to the wall thickness, its thermal conductivity and its heat capacity a time delay or “Time lag” results and shifts the peak temperature load to between 7 to 9 hours later. Since HVAC systems are required to be designed for peak loads, this shift in timing of the peak load can result in a significant reduction in the size of mechanical equipment with a subsequent reduction in energy consumption and cost. Table 1.0 shows “Time lag” values for different building materials.



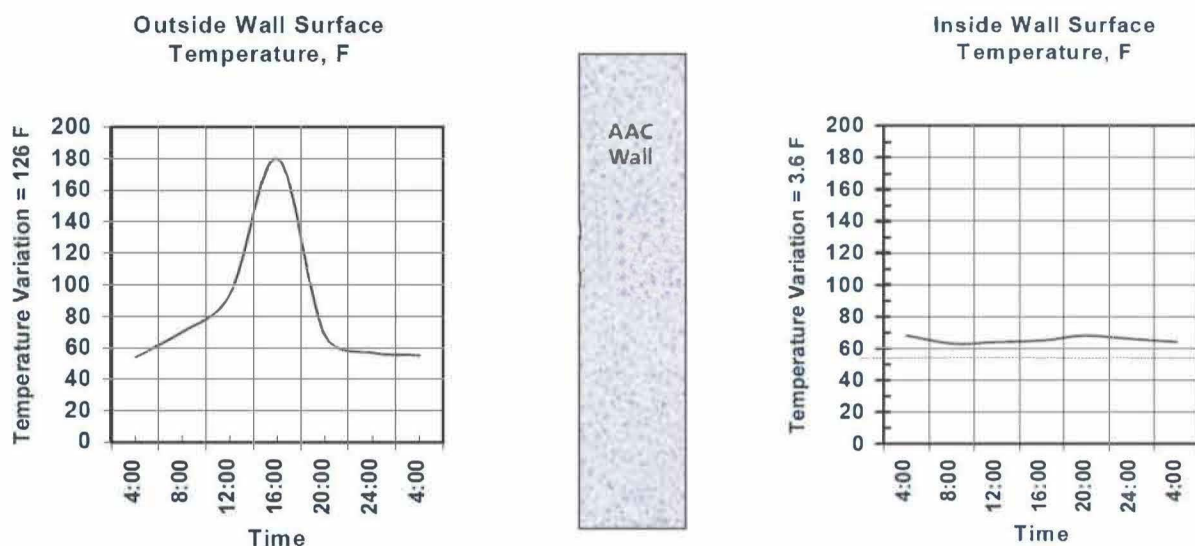
THERMAL PROPERTIES

Table 1.0

Material	Time Lag, hr.
8" AAC Wall	8
8" CMU Wall	6 ⁽¹⁾
2" x 4" Frame Wall	2 ⁽¹⁾

(1) NCMA Tek 6-3: Shifting Peak Energy Loads with Concrete Masonry Construction (1991)

In a previous test, AAC wall surface temperatures were measured over a 24 hour period on a west wall, which was painted black to increase surface temperature. The outside wall temperature fluctuated by as much as 126°F. The inside temperature remained at a pleasant 68°F without air conditioning with a mere 3.6°F variation. Additionally, the peak temperature was shifted to a later time of the day when energy is no longer required to mechanically adjust the indoor temperature.



This "time lag" combined with the heat capacity of AAC results in substantial reduction of peak energy consumption. This reduction is considerable in residential buildings and represents financial savings for homeowners in addition to the comfort of living and pleasant steady interior climate.

Dynamic Benefit Analysis

The effectiveness of AAC material in providing and controlling interior climatic conditions was illustrated by testing a wall in conditions that simulate actual climatic conditions in a comprehensive energy analysis performed by Oak Ridge National Laboratory (ORNL).

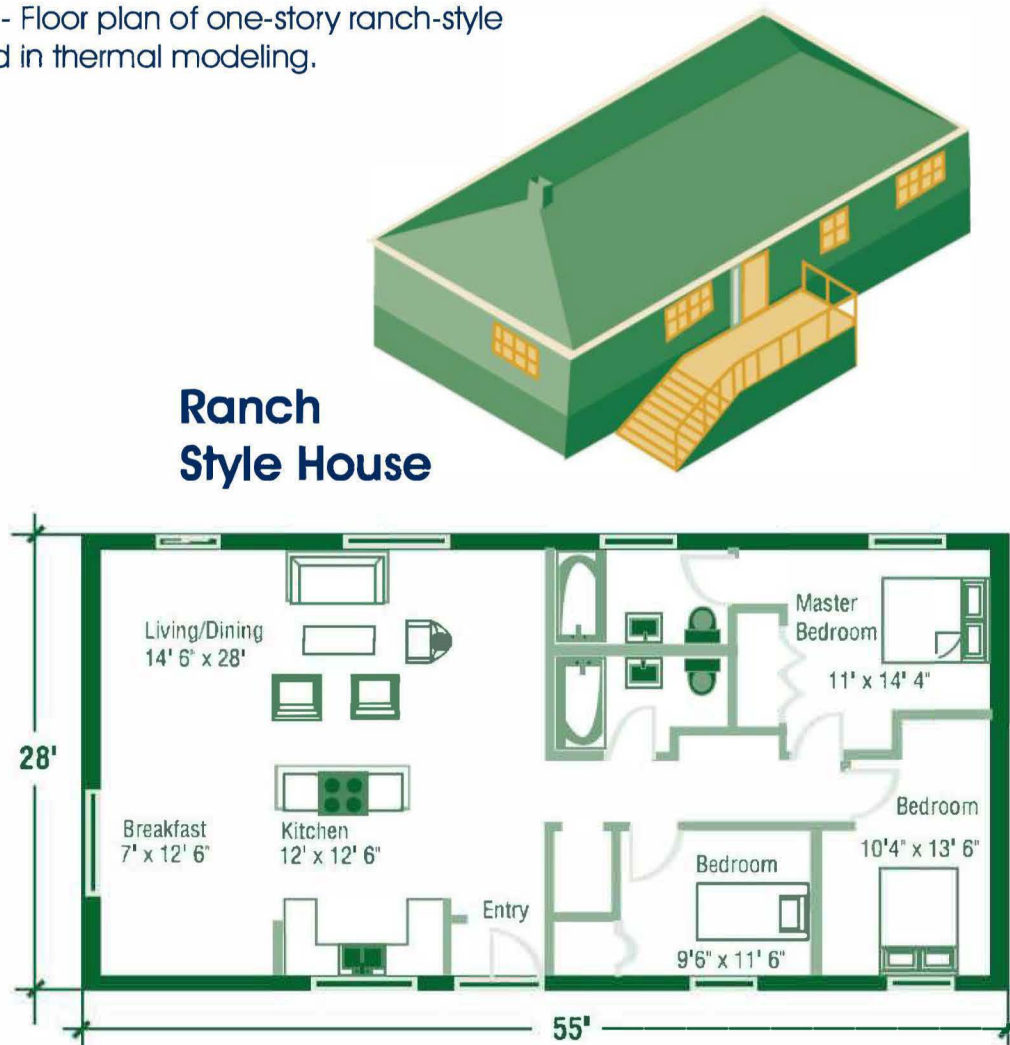


THERMAL PROPERTIES

In the study performed by ORNL, the steady state and the dynamic thermal performance of an AAC wall system were analyzed using an ORNL Building Technology Center Guarded Hot box. In the dynamic test of an 8-foot x 8-foot wall, the climatic boundary conditions were changed to simulate similar conditions to a normal climatic cycle.

The results of ORNL steady state and dynamic analysis were used to develop a model for AAC wall systems using Department of Energy 2.1E software. The computer software was used to simulate the heating and cooling loads for a single-family residence with AAC walls compared to an identical building simulated with lightweight stud framed wall and a Concrete Masonry Unit (CMU) wall. Figure 1.0 shows the house model and the floor plan used in the study performed by Oak Ridge National Laboratory for six representative U.S. climates.

Figure 1.0 - Floor plan of one-story ranch-style house used in thermal modeling.



THERMAL PROPERTIES

Location	Cooling Energy [Mbtu]	Heating Energy [Mbtu]	Total Energy [Mbtu].
Atlanta	7.4	25.1	32.5
Denver	1.21	48.32	49.5
Miami	37.36	0.65	38.01
Minneapolis	2.05	82.72	84.77
Phoenix	31.73	5.27	37.0
Washington, D.C.	4.33	42.56	46.89

Table 2.0: Simulated heating and cooling energy required for a ranch house built with AAC walls as shown in ORNL report "Whole Wall Rating / Label for AAC Wall Systems with Solid Autoclaved Cellular Concrete Blocks Part II - Dynamic Thermal Analysis" dated February 8, 1999.

Additionally, the cooling and heating energy required for a wood framed house at different levels of thermal insulation was calculated to identify the savings in energy as shown in Table 3.0. It is apparent that only increasing the R-value of a wall does not necessarily decrease the required energy, contrary to common perception. This can also be attributed to thermal mass benefit, control of air infiltration and construction details.

R-value	Atlanta	Denver	Miami	Minneapolis	Phoenix	Washington
Annual Cooling Loads [Mbtu]						
12.5	8.98	2.72	37.42	2.94	32.68	5.65
15	8.53	2.48	36.61	2.77	31.51	5.29
20	7.93	2.14	35.85	2.47	30.20	4.83
29	7.41	1.83	34.86	2.18	28.62	4.39
37	7.42	1.92	34.58	2.20	28.36	4.41
Annual Heating Loads [Mbtu]						
12.5	25.05	48.33	0.94	80.27	7.46	41.68
15	23.73	45.99	0.84	77.14	6.85	39.90
20	22.292	43.43	0.713	73.92	6.051	37.83
29	20.54	40.32	0.61	69.73	5.27	35.24
37	20.11	39.58	0.61	68.39	5.34	34.51

Table 3.0: Simulated heating and cooling energy required for a ranch house built with the wood framed walls as shown in ORNL report "Whole Wall Rating / Label for Wall Systems with Solid Autoclaved Cellular Concrete Blocks Part II - Dynamic Thermal Analysis dated February 8, 1999.

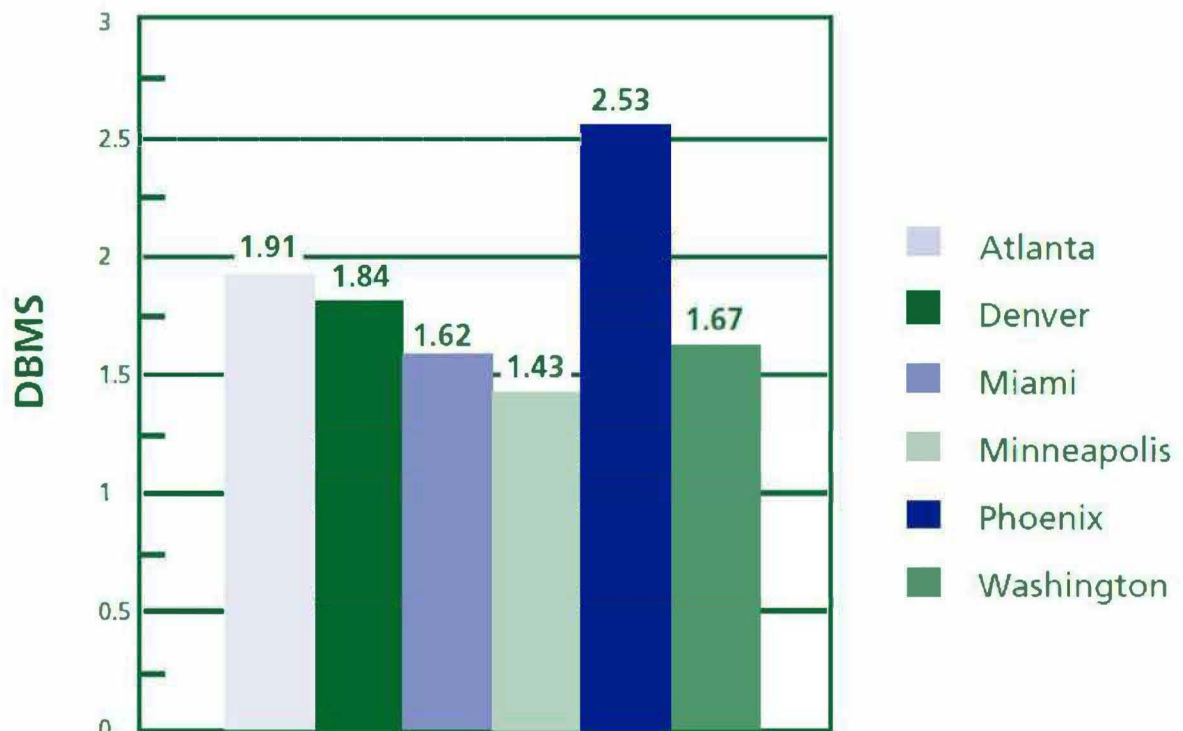
These loads were then used to estimate the effective R-value which would be needed in ordinary construction to result in the same total heating and sensible cooling loads as the AAC wall system in each of the six climates as shown in Table 2.0.



THERMAL PROPERTIES

The resulting R-value is a steady R-value for AAC walls multiplied by DBMS (Dynamic Benefit for Massive Systems). DBMS is a function of climate, building type and base envelope system (i.e., conventional 2x4 wood frame wall system). DBMS values for the AAC wall were obtained by comparison between total loads necessary for heating and cooling the light-weight wood-frame building and the AAC unit house for six U.S. climates and four building orientations. This factor accounts for not only the steady state R-value but also the inherent thermal mass benefit without considering air infiltration. Figure 2.0 and Table 4.0 show DBMS values and effective R-value for AAC walls when compared to other wall systems.

Figure 2.0:
DBMS values for AAC Walls





THERMAL PROPERTIES

City	AAC wall			Two-core CMU wall			2x4 wood stud wall		
	Steady-state R-value	DBMS	Effective R-value	Steady-state R-value	DBMS	Effective R-value	Steady-state R-value	DBMS	Effective R-value
Atlanta	8.34	1.91	15.93	2.29	0.89	2.04	12.5	1.0	12.5
Denver		1.84	15.34		0.91	2.08			
Miami		1.62	13.51		0.62	1.42			
Minneapolis		1.43	11.93		0.57	1.31			
Phoenix		2.53	21.10		1.46	3.34			
Washington		1.67	13.93		0.78	1.78			

Table 4.0: Dynamic thermal performance characteristics for AAC units, two-core CMU and wood frame walls.

In a review of the above charts, AAC walls outperformed the other wall systems for the energy consumption by using the lowest energy demands and showed the highest effective R-value.

Beyond the thermal properties already discussed thus far, tests of actual buildings have shown the air infiltration of a structure to be 63% less than a wood stud framed structure and 48% less than an un-insulated 8" CMU wall. The impact of this on thermal performance and the resulting whole building annual energy demands of a building constructed using either AAC walls, CMU, or framed walls were compared using different air-tightness values. Similar to earlier calculations, six climates were used for energy modeling and determination of the whole building energy demand, of buildings with these different wall systems. Figure 3.0 shows that the increased air-tightness in houses constructed with an AAC wall system significantly reduce the energy demand requirements.



THERMAL PROPERTIES

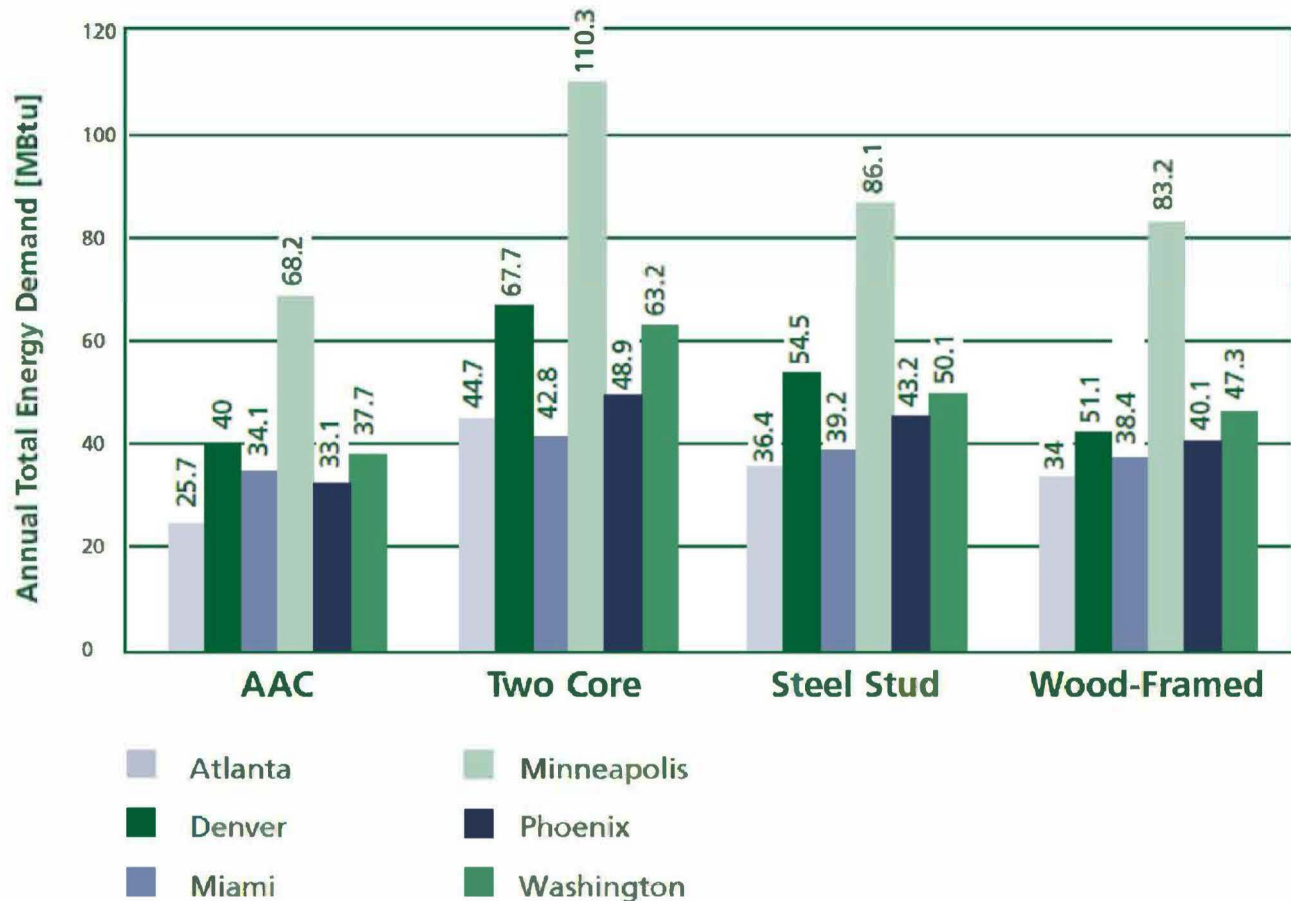


Figure 3.0: Comparison of annual demands for different wall systems considering different air-leakage rates as shown in ORNL report "Whole Wall Rating / Label for Wall Systems with Solid Autoclaved Cellular Concrete Blocks Part II - Dynamic Thermal Analysis" dated February 8, 1999.

According to the ORNL report, "the results of computer simulations for the six U.S. climates show that annual energy performance of the single family residence made of AAC walls is superior in comparison with a similar house built using either two-core CMU, steel studs, or conventional wood-framed walls. On average, energy demands of the AAC wall house are about **18%, 36%, and 23% lower** than similar houses constructed with **wood frame walls, two-core CMU, and steel studs walls**, respectively. Chart 1.0 shows that an AAC wall yielded the least operating energy cost when compared with other wall systems. In addition, as a result of lower demand on peak energy loads, the use of AAC walls reduces the size of mechanical equipment as shown in Chart 2.0.



THERMAL PROPERTIES

Chart 1.0: Annual energy cost comparison for different wall systems.

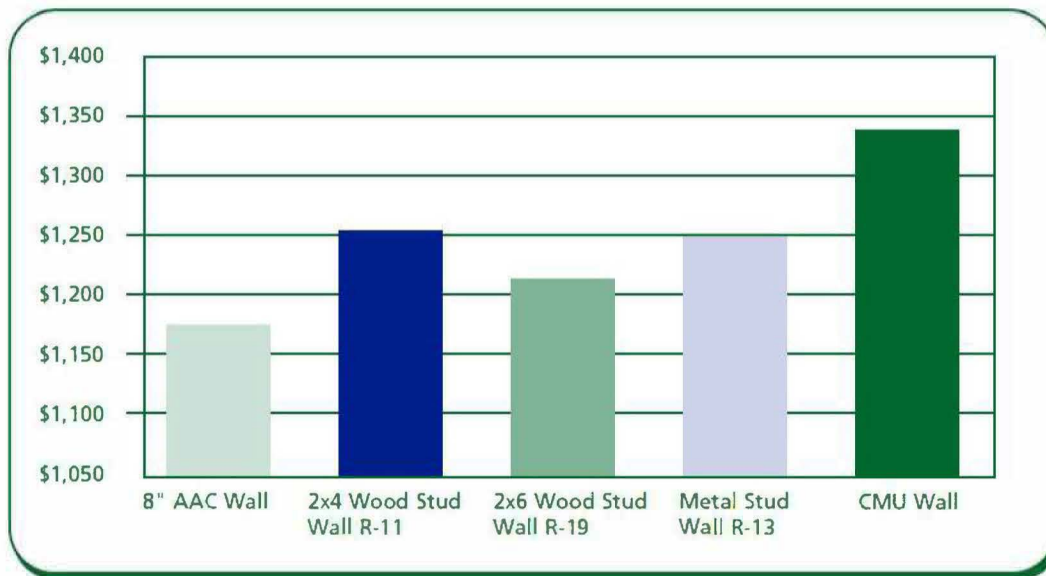
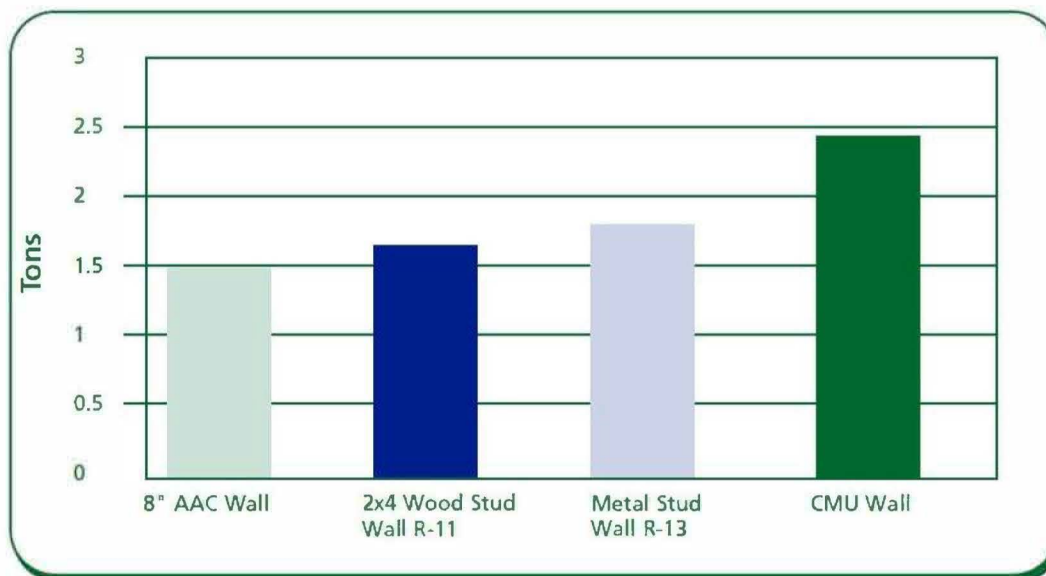


Chart 2.0: Size of mechanical equipment (A/C Unit Capacity) for different wall systems



The example cited makes the point that AAC products can offer the homeowner and the designer several important benefits if the material's thermal properties are used appropriately. This chapter of the Residential Application Manual provides the information needed by the design professional to understand and utilize the properties and design values that will result in the utmost thermal efficiency when using AAC.



Properties - Section 3.1

THERMAL PROPERTIES

For the mechanical engineer, included are simple design tools, tips and general directions to assist in the design of residential projects. All tables and designs aids were developed by a mechanical engineering consulting firm and are based on current energy codes such as ASHRAE, Model Energy Code and State mandated code such as the Florida Energy Code. Step by step procedures are available for energy code compliance, load calculation and equipment sizing such as Manual J.

Design Aids: Thermal Properties For Different AAC Material

Table 5.0: Thermal Conductivity (K-value), R-value and U-value for AAC, alone

AAC Type	Density pcf	Thermal Conductivity	R Value Thickness, inches.				U Value Thickness, inches			
			6	8	10	12	6	8	10	12
AAC 2	26	0.79	7.59	10.13	12.66	15.19	0.13	0.10	0.08	0.07
AAC 3	32	0.96	6.25	8.33	10.42	12.50	0.16	0.12	0.10	0.08
AAC 4	38	1.15	5.22	6.96	8.70	10.43	0.19	0.14	0.12	0.10
AAC 6	44	1.15	5.22	6.96	8.70	10.43	0.19	0.14	0.12	0.10

Table 6.0: Thermal Conductivity (K-value), R-value and U-Value for AAC, exterior and interior plaster

AAC Type	Density pcf	Thermal Conductivity	R Value Thickness, inches.				U Value Thickness, inches			
			6	8	10	12	6	8	10	12
AAC 2	26	0.79	8.91	11.45	13.98	16.51	0.11	0.09	0.07	0.06
AAC 3	32	0.96	7.57	9.65	11.74	13.82	0.13	0.10	0.09	0.07
AAC 4	38	1.15	6.54	8.28	10.02	11.75	0.15	0.12	0.10	0.09
AAC 6	44	1.15	6.54	8.28	10.02	11.75	0.15	0.12	0.10	0.09

R-value = R outside air (0.17) + R ext plaster (0.36)
+ R AAC + R int plaster(0.11) + R inside air (0.68)



THERMAL PROPERTIES

Table 7.0: Thermal Conductivity (K-value), R-value and U-value for AAC, brick veneer and interior plaster

AAC Type	Density pcf	Thermal Conductivity	R - Value Thickness, inches.				U - Value Thickness, inches			
			6	8	10	12	6	8	10	12
AAC 2	26	0.79	10.00	12.54	15.07	17.60	0.10	0.08	0.07	0.06
AAC 3	32	0.96	8.66	10.74	12.83	14.91	0.12	0.09	0.08	0.07
AAC 4	38	1.15	7.63	9.37	11.11	12.84	0.13	0.11	0.09	0.08
AAC 6	44	1.15	7.63	9.37	11.11	12.84	0.13	0.11	0.09	0.08

R-value = R outside air (0.17) + R 4" brick (0.44) + R Air space 1" (1.0) + R AAC + R int plaster(0.11) + R inside air (0.68)

Table 8.0: Thermal Conductivity (K-value), R-value and U-Value for AAC, exterior plaster and glued 1/2" gypsum board

AAC Type	Density pcf	Thermal Conductivity	R Value Thickness, inches.				U Value Thickness, inches			
			6	8	10	12	6	8	10	12
AAC 2	26	0.79	9.25	11.79	14.32	16.85	0.11	0.08	0.07	0.06
AAC 3	32	0.96	7.91	9.99	12.08	14.16	0.13	0.10	0.08	0.07
AAC 4	38	1.15	6.88	8.62	10.36	12.09	0.15	0.12	0.10	0.08
AAC 6	44	1.15	6.88	8.62	10.36	12.09	0.15	0.12	0.10	0.08

R-value R outside air (0.17) + R ext plaster (0.36) + R AAC + R drywall (0.45) + R inside air (0.68)

Table 9.0: Thermal Conductivity (K-value), R-value and U-Value for AAC, exterior plaster, furring, and 1/2" gypsum board

AAC Type	Density pcf	Thermal Conductivity	R Value Thickness, inches.				U Value Thickness, inches			
			6	8	10	12	6	8	10	12
AAC 2	26	0.79	10.20	12.74	15.27	17.80	0.10	0.08	0.07	0.06
AAC 3	32	0.96	8.86	10.94	13.03	15.11	0.11	0.09	0.08	0.07
AAC 4	38	1.15	7.83	9.57	11.31	13.04	0.13	0.10	0.09	0.08
AAC 6	44	1.15	7.83	9.57	11.31	13.04	0.13	0.10	0.09	0.08

R-value = R outside air (0.17) + R ext plaster (0.36) + R AAC + R drywall + furring (1.4) + R inside air (0.68)



THERMAL PROPERTIES

Table 10.0: Specific Heat (s) and Heat Capacity (HC) for AAC, exterior and interior plaster

AAC Type	Density pcf	Specific Heat	Heat Capacity Thickness, inches			
			6	8	10	12
AAC 2	26	0.25	4.00	5.08	6.17	7.25
AAC 3	32	0.25	4.75	6.08	7.42	8.75
AAC 4	38	0.25	5.50	7.08	8.67	10.25
AAC 6	44	0.25	6.25	8.08	9.92	11.75

Table 11.0: Specific Heat (s) and Heat Capacity (HC) for AAC, exterior plaster and 1/2" drywall

AAC Type	Density pcf	Specific Heat	Heat Capacity Thickness, inches			
			6	8	10	12
AAC 2	26	0.25	4.28	5.36	6.45	7.53
AAC 3	32	0.25	5.03	6.36	7.70	9.03
AAC 4	38	0.25	5.78	7.36	8.95	10.53
AAC 6	44	0.25	6.63	8.36	10.20	12.03

Table 12.0: Specific Heat (s) and Heat Capacity (HC) for AAC, brick veneer and interior plaster

AAC Type	Density pcf	Specific Heat	Heat Capacity Thickness, inches			
			6	8	10	12
AAC 2	26	0.25	12.51	13.59	14.68	15.76
AAC 3	32	0.25	13.26	14.59	15.93	17.26
AAC 4	38	0.25	14.01	15.59	17.18	18.76
AAC 6	44	0.25	14.76	16.59	18.43	20.26

THERMAL PROPERTIES

Table 13.0: Specific Heat (s) and Heat Capacity (HC) for **AAC, brick veneer and 1/2" glued drywall**

AAC Type	Density pcf	Specific Heat	Heat Capacity Thickness, inches			
			6	8	10	12
AAC 2	26	0.25	12.79	13.88	14.96	16.04
AAC 3	32	0.25	13.54	14.88	16.21	17.54
AAC 4	38	0.25	14.29	15.88	17.46	19.04
AAC 6	44	0.25	15.04	16.88	18.71	20.54

Brick 4" • Density = 135 pcf, • Specific heat = 0.20 Btu/lb.°F

(*) "Thermal Performance For AAC Block-Residential Application" was prepared by Hebel and is the property of Autoclaved Aerated Concrete Product Association (AACPA) and is only to be used by members of the AACPA.

Table 14.0: DBMS and Equivalent R Values

City	8 AAC			10 AAC			12 AAC		
	R	DBMS	R equiv	R	DBMS	R equiv	R	DBMS	R equiv
Phoenix	8.4	2.48	20.83	10.5	2.51	26.36	12.60	2.54	32.01
Flagstaff	8.4	1.99	16.72	10.5	1.99	20.90	12.60	1.99	25.07
Los Angeles	8.4	1.54	12.94	10.5	1.57	16.49	12.60	1.60	20.17
Sacramento	8.4	2.44	20.50	10.5	2.44	25.62	12.60	2.44	30.74
San Diego	8.4	1.42	11.93	10.5	1.44	15.12	12.60	1.46	18.40
San Francisco	8.4	1.78	14.95	10.5	1.79	18.80	12.60	1.80	22.68
Denver	8.4	1.9	15.96	10.5	1.92	20.16	12.60	1.94	24.45
Miami	8.4	1.73	14.53	10.5	1.76	18.48	12.60	1.79	22.56
Atlanta	8.4	1.93	16.21	10.5	1.94	20.37	12.60	1.95	24.57
Minneapolis	8.4	1.48	12.43	10.5	1.5	15.75	12.60	1.52	19.16
Albuquerque	8.4	2.06	17.30	10.5	2.09	21.95	12.60	2.12	26.72
Santa Fe	8.4	2.14	17.98	10.5	2.17	22.79	12.60	2.20	27.73
Las Vegas	8.4	2.14	20.66	10.5	2.49	26.15	12.60	2.52	31.76
Reno	8.4	2.05	17.22	10.5	2.06	21.63	12.60	2.07	26.08
Eugene	8.4	2.14	17.98	10.5	2.16	22.68	12.60	2.18	27.47
El Paso	8.4	2.31	19.40	10.5	2.34	24.57	12.60	2.37	29.87
Salt Lake City	8.4	2.11	17.72	10.5	2.11	22.16	12.60	2.11	26.59
Washington D.C.	8.4	1.7	14.28	10.5	1.72	18.06	12.60	1.74	21.93
Seattle	8.4	1.39	11.68	10.5	1.41	14.81	12.60	1.43	18.02
Spokane	8.4	1.85	15.54	10.5	1.86	19.53	12.60	1.87	23.56

(Source; "A Comparison of Innovative Exterior Wall Construction Techniques", Del E Webb School of Construction at Arizona State University) R = steady state R-Value DBMS=Dynamic Benefit of Massive Systems predicted by neural network Requiv=RxDBMS *Interpolated

**e-crete[®] AAC**

Properties - Section 3.2

FIRE RESISTANCE

E-Crete AAC is non-combustible and offers the greatest fire resistance of any building material currently on the market. No toxic gases or vapors are ever emitted from E-Crete products. In the event of a fire, E-Crete provides a level of protection against loss of life and property that conventional construction cannot approach.

Underwriters' Laboratories has shown a minimum 4" thick non-load-bearing, or a 6" thick load-bearing wall, without any finishing materials, provides a four-hour fire rating. This exceeds the requirements of the National Building Code and eliminates the need for applying costly fireproofing materials.



Precast Autoclaved
Aerated Concrete As
To Fire Resistance Only
See UL Fire Resistance
Directory 87DN





e-crete[®] AAC

Properties - Section 3.2

FIRE RESISTANCE Protection of Life and Property

Fire is one of the most terrifying and destructive forces in nature. Millions and Millions of dollars of property are damaged by fire every year, by human and natural causes, not to mention the risk to human life. Protection of life and property is a paramount concern at E-Crete, we understand that in constructing our buildings we use extremely flammable materials, sometimes out of necessity. Wood and plastics may be required to make a liveable dwelling, but we believe that E-Crete AAC is the wright product in the right place in every home. E-Crete AAC is the premier fire separation product on the market for almost all applications.



AAC house survivor surrounded by brush fire victim homes.



Precast Autoclaved
Aerated Concrete As
To Fire Resistance Only
See UL Fire Resistance
Directory 87DN



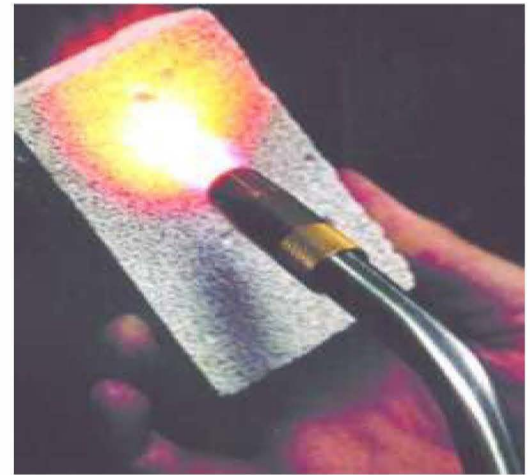
An Industrial building is destroyed in a multi-unit complex. The demising wall of AAC saves the neighbor and provides a vantage point for attack on the flames.

FIRE RESISTANCE Protection of Life and Property

E-crete AAC is the Premier Product for Fire Protection as demonstrated in ASTM, ANSI and UL testing. It is the defacto choice for ;

- ❑ Steel column wraps
- ❑ Steel beam wraps
- ❑ Shaft walls
- ❑ Fire walls
- ❑ Smoke walls
- ❑ Stairwells
- ❑ Corridors & egress

Precast Autoclaved
Aerated Concrete As
To Fire Resistance Only
See UL Fire Resistance
Directory 87DN



Some of the advantages of building with AAC for fire control are,

- ❑ Non combustible
- ❑ No toxic gasses or fumes are ever generated
- ❑ Demonstrated structural integrity during a fire (ASTM E 119)
- ❑ **UL** Rated with numerous standard configurations of wall assemblies
- ❑ NYC **MEA/OTCR** certified
- ❑ Lower insurance costs

Fire rating of common thickness' of AAC with no coatings

FIRE RATING - AAC 4 Thickness, inches (mm)					
Block / Wall thickness inches (mm)	3 ½ (90)	4 (102)	6 (152)	7 (178)	8 (203)
Non Load Bearing Wall	3 Hrs.	4 Hrs.	4 Hrs.+	4 Hrs.+	4 Hrs.+
Load Bearing Wall	-	-	2 Hrs.	3 Hrs.	4 Hrs.



Properties - Section 3.2

FIRE RESISTANCE Protection of Life and Property

ASTM E 119 - Single Specimen Fire Test

- Not only tests a products ability to resist heat and fire, but also its structural stability performance during a catastrophic event like fire. Demising walls, corridors, means of egress need to not only resist fire, but also remain structurally intact to protect **Life** and Property.



AAC Block wall **PASSES** Hose Stream Test



Gypsum Board Wall **FAILS** Hose Stream Test

Underwriters Laboratories has certified numerous AAC block wall assemblies and applications. Following is a partial list of approved configurations as well as a few design examples on the following pages.

Precast Autoclaved
Aerated Concrete As
To Fire Resistance Only
See UL Fire Resistance
Directory 87DN



UL FIRE RATING ANSI UL 263 AAC Block Walls		
6"	4-hour / Non Load Bearing Wall	U917
6"	4-hour / Load Bearing Wall	U917
4"	4-hour / Non Load Bearing Wall	U919
6"	4-hour / Load Bearing Wall	U919
6"	4-hour / Non Load Bearing Wall	U921
6"	4-hour / Load Bearing Wall	U921
4"	4-hour / Structural column wrap	X901



e-crete[®] AAC

Properties - Section 3.2

FIRE RESISTANCE TYPICAL FIRE - RATING

4" THICK AAC NON-BEARING WALL

UL DESIGN No. U919

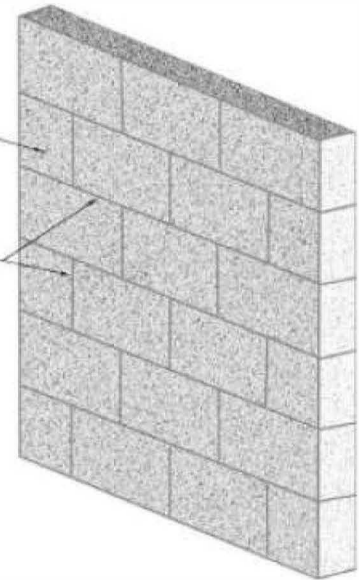
FIRE RATING - 4 Hrs.

Precast Autoclaved
Aerated Concrete As
To Fire Resistance Only
See UL Fire Resistance
Directory 87DN



4" x 8" x 24" or 4" x 24" x 32"
AAC BLOCK WALL

THIN BED MORTAR, BLOCKS
LAID IN an ANSI A118.4 LATEX /
PORTLAND CEMENT THIN BED
MORTAR INSTALLED WITH
VERTICAL JOINTS STAGGERED

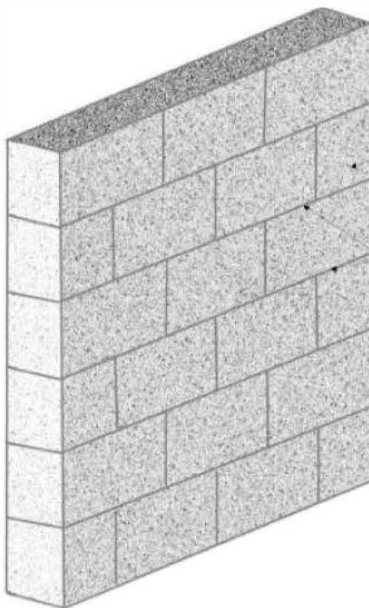


6" THICK AAC BEARING and NON-BEARING WALL

UL DESIGN No. U917 and U921

FIRE RATING (BEARING) - 4 Hrs.

FIRE RATING (NON BEARING) - 4 Hrs.



6" x 8" x 24" or 6" x 24" x 32"
AAC BLOCK WALL

THIN BED MORTAR, BLOCKS
LAID IN an ANSI A118.4 LATEX /
PORTLAND CEMENT THIN BED
MORTAR INSTALLED WITH
VERTICAL JOINTS STAGGERED



e-crete[®] AAC

Properties - Section 3.2

FIRE RESISTANCE TYPICAL FIRE - RATING

8" THICK AAC BEARING and NON-BEARING WALL

UL DESIGN No. U916

FIRE RATING (NON BEARING) - 4 Hrs.

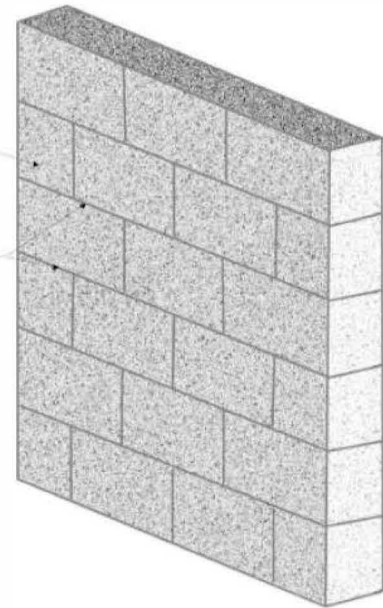
FIRE RATING (BEARING) - 4 Hrs.

Precast
Autoclaved
Aerated
Concrete As
To Fire Resistance Only
See UL Fire Resistance
Directory 87DN



8" x 8" x 24" or
8" x 24" x 32"
AAC BLOCK WALL

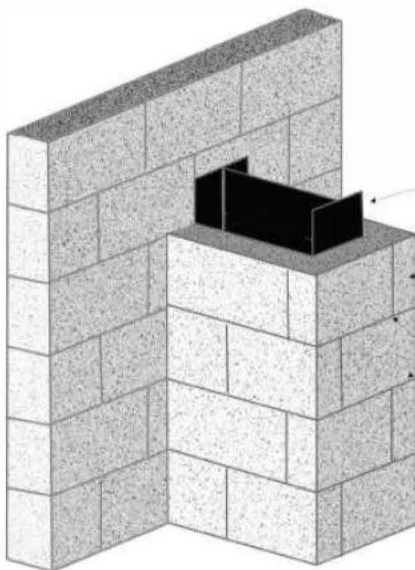
THIN BED MORTAR, BLOCKS
LAID IN an ANSI A118.4 LATEX /
PORTLAND CEMENT THIN BED
MORTAR INSTALLED WITH
VERTICAL JOINTS STAGGERED



4" THICK STEEL COLUMN WRAP

UL DESIGN No. X901

FIRE RATING - 4 Hrs.



STEEL COLUMN

4" THICK MIN.
AAC BLOCK WALL

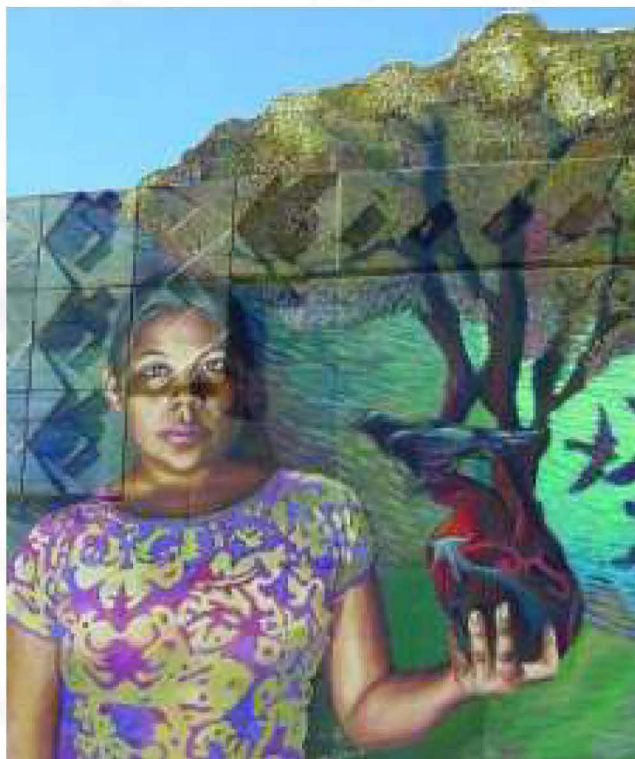
THIN BED MORTAR, BLOCKS
LAID IN an ANSIA 118.4 LATEX /
PORTLAND CEMENT THIN BED
MORTAR INSTALLED WITH
VERTICAL JOINTS STAGGERED



**e-crete[®] AAC**

Properties - Section 3.3

ACOUSTIC INSULATION

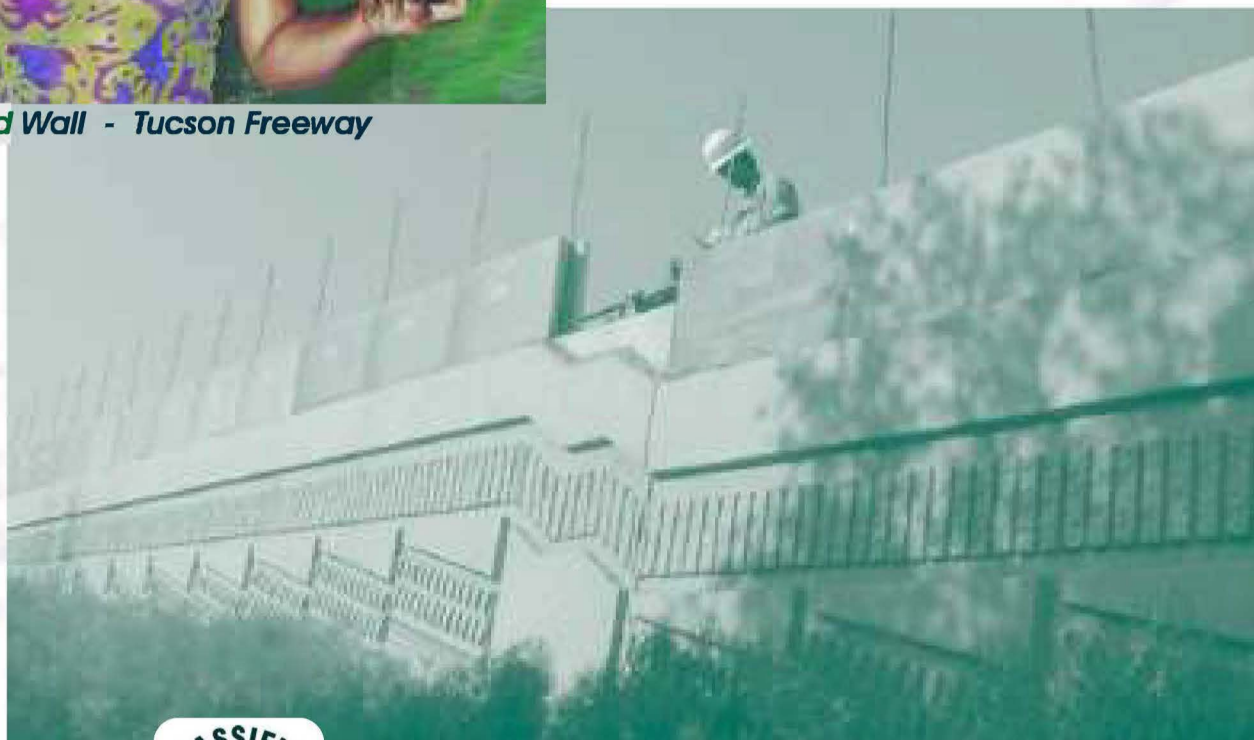


Sound Wall - Tucson Freeway

E-Crete AAC serves as an exceptional acoustic insulation material.

Its porous structure and high surface mass, coupled with its ability to dampen mechanical vibration energy, make for a building material that provides an outstanding defense against noise pollution. In addition to using a wall material with superior sound insulation properties, it is essential to design and construct a wall that prevents air leaks.

E-Crete's solid construction eliminates imperfections, which allow sound transmission through the walls, thus providing a final wall assembly that offers superior sound insulation characteristics.



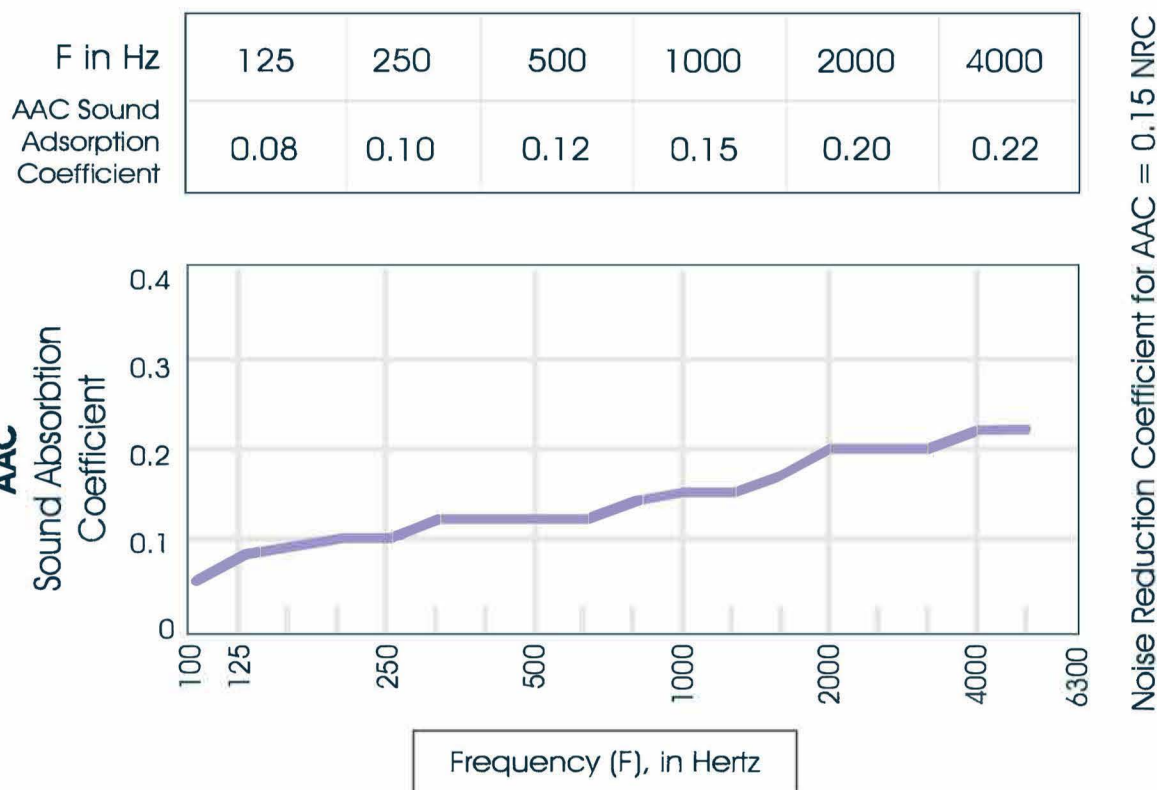
Precast Autoclaved Aerated Concrete
As To Sound Transmission Coefficient (STC) Only
See UL Design No. 924



ACOUSTIC PERFORMANCE

Noise Reduction Coefficient (NRC)

The Noise Reduction Coefficient (commonly abbreviated NRC) is a scalar representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption. NRC is a compilation of the materials Sound Adsorption Coefficient at different frequencies.



TYPICAL NRC RATINGS COMPARISONS:

Autoclaved Areated Concrete = 0.15

Concrete Block CMU = 0.07

Standard Poured Concrete = 0.02

**AAC IS MORE THAN 2 TIMES AS EFFECTIVE FOR SOUND INSULATION AS CMU
AND 7.5 TIMES AS EFFECTIVE AS POURED CONCRETE.**



ACOUSTIC PERFORMANCE

Sound Transmission Class Ratings (STC)

E-crete AAC has exceptional sound insulation properties that exceed all other solid materials of the same weight per surface area.

- Cellular structure
- High surface mass
- Mechanical vibration energy damping

Sound Transmission Class (STC) ratings range from 36 to greater than 65 with density (AAC 4,6), finishes, and assemblies.

TYPICAL STC RATINGS

AAC Wall Assembly with no Coatings



4"

AAC2=32
AAC4=34
AAC6=37



6"

AAC2=37
AAC4=39
AAC6=42



8"

AAC2=40
AAC4=42
AAC6=45



10"

AAC2=42
AAC4=44
AAC6=47



12"

AAC2=45
AAC4=47
AAC6=50

AAC Wall Assembly with 1/4" plaster each side



4"

AAC2=34
AAC4=36
AAC6=38



6"

AAC2=38
AAC4=40
AAC6=43



8"

AAC2=41
AAC4=43
AAC6=46



10"

AAC2=43
AAC4=45
AAC6=48



12"

AAC2=45
AAC4=48
AAC6=51

ACOUSTIC PERFORMANCE

Sound Transmission Class Ratings (STC)

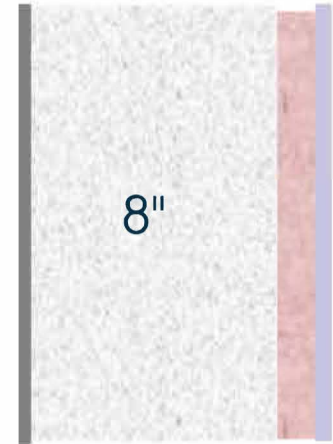
TYPICAL STC RATINGS OF COMMON AAC WALL SYSTEMS



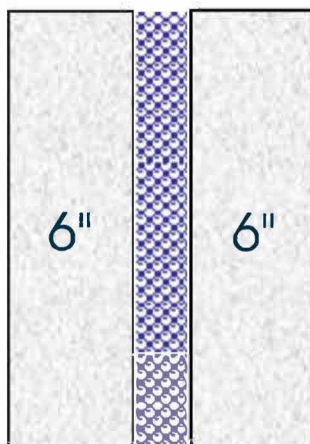
STC 47
 1/8" PC on 8" AAC4
 1-1/4" Furring
 Gyp. Board



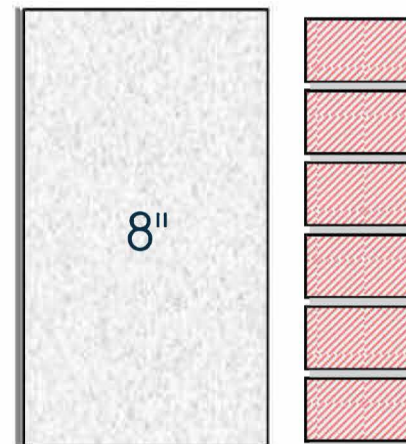
STC 51
 1/8" PC on 8" AAC4
 1-1/4" Furring
 Sound Insulation
 Gyp. Board



STC 55
 1/8" PC on 8" AAC4
 With Adhered
 Sound Insulation



STC 65
 2 x 6" AAC6
 1-1/2" Batt Insulation



STC 57
 3/8" PC on 8" AAC2
 1-1/2" Air Space
 with Brick Veneer

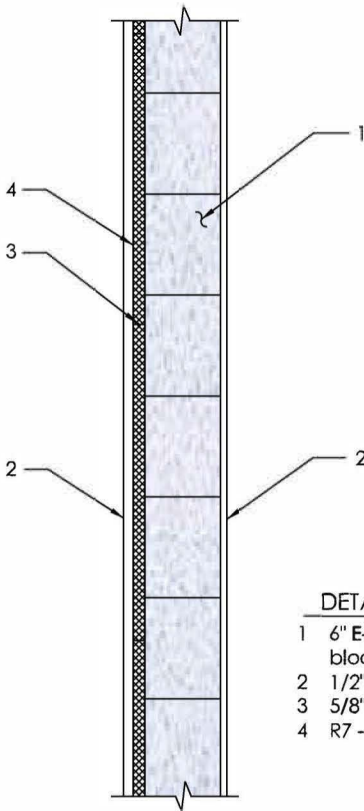
Values obtained from test or calculation - 4" AAC4 and 8" AAC2 - ASTM E 90



e-crete[®] AAC

Properties - Section 3.3

ACOUSTIC INSULATION Sample Sound Wall Configuration



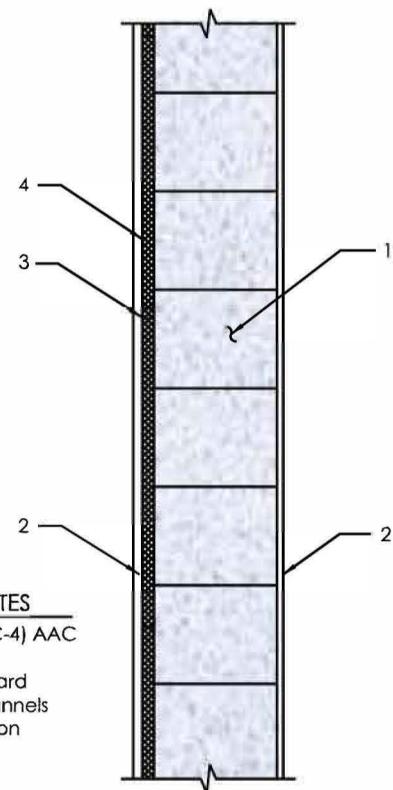
DETAIL KEY NOTES

- 1 6" E-Crete(AAC-4) AAC block wall
- 2 1/2" gypsum board
- 3 5/8" resilient channels
- 4 R7 - batt insulation

6" E-CRETE AAC SOUND WALL - STC = 50
19001



Precast Autoclaved Aerated Concrete
As To Sound Transmission Coefficient
(STC) Only See UL Design No. 924



DETAIL KEY NOTES

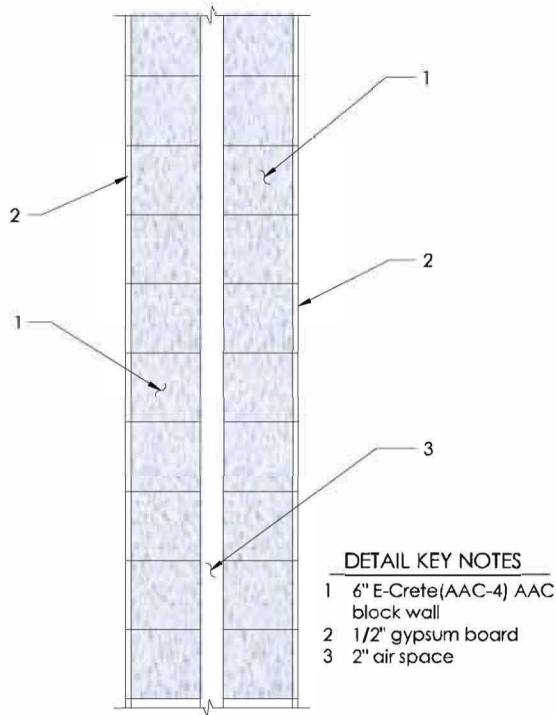
- 1 10" E-Crete(AAC-4) AAC block wall
- 2 1/2" gypsum board
- 3 5/8" resilient channels
- 4 R7 - batt insulation

10" E-CRETE AAC SOUND WALL - STC = 52
19003



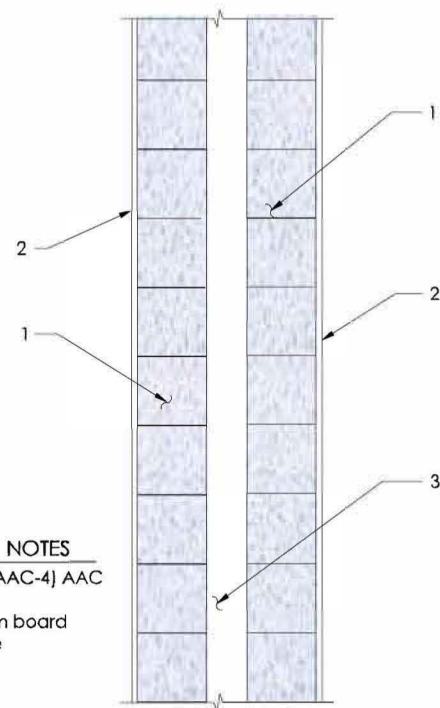
Properties - Section 3.3

ACOUSTIC INSULATION Sample Sound Wall Configuration



Precast Autoclaved Aerated Concrete
As To Sound Transmission Coefficient
(STC) Only See UL Design No. 924

DOUBLE 6" E-CRETE
AAC SOUND WALL WITH 2" AIR SPACE - STC = 57
19005



DOUBLE 6" E-CRETE
AAC SOUND WALL WITH 4" AIR SPACE - STC = 61
19006



e-crete[®] AAC

Installation - Section 4.0

Best Practise Guide for e-crete[®] AAC Design and Installation Procedures



Contents

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Fire Resistance

Acoustic Insulation

Moisture Absorption

4.0 Installation

Structural Design

Construction Details

Install Procedures

Tools / Fasteners

Wall Finishes

5.0 Projects



Energy Efficient □ Acoustical Insulation □ Fire Resistant □ Pest Resistant □ Environmentally Friendly



DESIGN INTRODUCTION

Autoclaved Aerated Concrete (AAC) masonry blocks have been used successfully around the world since 1923. In high seismic areas, like Japan



and Turkey, AAC masonry has shown superior resistance to earthquake forces, beyond other traditional materials. Its high strength-to-weight ratio makes AAC masonry structures less susceptible to absorbing earthquake-derived lateral loads. Its non-combustible and fire-resistant characteristics provide additional benefit against fires commonly associated with earthquakes. The current approved design method for AAC masonry block walls in all seismic zones (design categories) are very similar to the design of conventional masonry using ultimate strength design procedures as outlined in the ICC ESR-1371.

AAC masonry walls can be designed as reinforced or un-reinforced wall systems. AAC masonry blocks can be pre-drilled with one 4-inch diameter hole at a distance of $t/2$ to allow for vertical wall reinforcing as required by the designer. If vertical reinforcing is required it should be spaced in two-foot increments. Solid blocks can be drilled on site for special reinforcing requirements but should be avoided if possible. - Minimum vertical wall reinforcing requirements are one #4 rebar at wall corners, within 24 inches of each side of wall openings, and at the end of walls and control joints. Horizontal reinforcing requirements are two #4 rebars in solid grouted AAC masonry "U" block at floor and roof bearing and one #4 rebar at the top of the parapet walls. Horizontal reinforcing at AAC masonry lintels should extend 24 inches past wall openings.





DESIGN CONSIDERATIONS - STRUCTURAL DESIGN

Some of the differences between AAC masonry walls and conventional masonry are:

1. AAC masonry weighs approximately 30 lbs. per cu. ft. compared to 150 lbs. per cu. ft. and 50 lbs. per cu. ft. for concrete and conventional masonry, respectively.
2. AAC masonry is constructed using a thin-bed mortar, which has a greater compressive and tensile strength than the block. The bond strength of the thin-bed mortar will not allow failure at the joints. AAC masonry walls act like a beam with a neutral stress axis at the wall's center, thus reducing or eliminating the minimum reinforcement requirement that is currently necessary for conventional masonry.
3. AAC masonry blocks are solid blocks with drilled holes only where vertical wall reinforcing is required.
4. AAC masonry block lengths are typically 24" long versus 16" in conventional masonry.
5. AAC masonry blocks provide an economical balance between strength, thermal, and fire resistance properties. The Masonry Standard Joint Committee (MSJC) has approved the design procedures for AAC masonry and has been published in ACI 530-05.

The e-crete Company is a member of the Autoclaved Aerated Concrete Association (AACPA) and a leader in the technical review committee. The purpose of the Association, and the technical committee, in particular, is to further the research and technological development of AAC and to standardize its design and construction procedures.





DESIGN CONSIDERATIONS

STRUCTURAL DESIGN PROCEDURES

Structural design of AAC masonry walls and lintels are to be in accordance with section 4.0 of the ICC ESR-1371.

Items to consider when designing AAC masonry walls:

- AAC masonry blocks are available in a variety of grades with corresponding density and compressive strength. The most common grade produced by E-Crete is AAC 3 (32 pcf). Consult with your local distributor for availability of other grades.
- If vertical reinforcing is required it should be spaced in 2' increments (2', 4', 6', etc.). AAC masonry blocks can be drilled on site for additional reinforcement requirements. Caution should be taken to make sure that there is at least 2" of AAC remaining when notching or drilling the block to prevent possible splitting when grouting.
- Vertical reinforcing at each end of wall openings need to be within 2' of the opening which will allow the installer flexibility in maintaining a 2' module to minimize on site drilling.
- For long walls, crack control joints should be placed at 20' to 24' O.C. to prevent temperature and shrinkage cracking.
- AAC lintels can be designed in two different ways as illustrated in the AAC masonry lintel design examples. AAC "U" blocks tend to split when grouting if stirrups are spaced less than 8" O.C.
- Steel lintels can be used similar to conventional masonry.
- Power Steel Lintels are available to use with AAC masonry and the load tables are provided at the end of this chapter.
- If needed, concentrated loads can be spread out by using a bond beam in the same manner as conventional masonry.
- Allowable loads for anchor bolts are the same as conventional masonry provided that the AAC "U" block is notched 4" around the anchor bolt and grouted solid. See ledger detail in the construction detail section.
- Specific inspection is required for all AAC masonry walls. Inspections are to be performed in the same manner as conventional masonry. See section 4.4 of the ICC ESR-1371.



DESIGN CONSIDERATIONS

TYPICAL GENERAL NOTES

GENERAL

All construction shall conform to the 2000 International Building Code (IBC) and/or 1997 Uniform Building Code (UBC).

AAC block walls designed per ICC ESR 1371.

The contractor shall be responsible for and provide all measures necessary to protect the structure during construction. These measures shall include, but not be limited to bracing and/or shoring for loads due to wind. The contractor shall be responsible for the design implementation of all scaffolding, bracing and shoring.

Contractor shall verify all dimensions and coordinate the site conditions with the drawings prior to construction. Any discrepancies and omissions shall be resolved with the architect. Do not use scaled dimensions.

Where any discrepancies occur between plans, details, general notes and specifications, the greater requirement shall govern, where no specific detail is shown. All details shown shall be incorporated into the project at all appropriate locations, whether specifically indicated or not.

In general, like all other construction products, autoclaved aerated concrete (AAC) is susceptible to minor damage if mishandled. Less handling means lower potential for damage. In some instances, damage may occur from shipping. Damaged blocks should be trimmed and installed to reduce job waste.

FOR ALL AAC CONSTRUCTION PRODUCTS:

Deliver only an amount of material that can readily be installed. Unload pallets using pallet forks (either forklift or pallet fork on a crane cable). Consult your OSHA safety manual for "rigging" for other safety considerations. It is not advisable to use crane straps and slings. Storage areas should be accessible to delivery trucks and convenient to materials staging areas. If possible, drop-deliver the material right to the material staging areas. Storage materials should always be stored away from other construction activities on a flat-graded area that is not susceptible to standing water, erosion or settling. Keep material covered and banded until ready for installation.

LEVELING MORTAR BED (FIRST COURSE ONLY)

Mortar shall conform to ASTM C270, type S or M with 28-day compressive strength of 1800 PSI, tested per UBC standard 21-16 Masonry cement.

THIN BED MORTAR

Thin-bed mortar as provided by E-CRETE AAC manufacturer per ICC ESR 1371.

GROUT

Grout shall conform to ASTM C476, fine grout, 28-day compressive strength of 2000 PSI, tested per UBC standards. Grout shall be free of fly ash and /or chloride. See details and notes on drawings for size and spacing of reinforcing bars. Lap splices of reinforcing in AAC walls, unless noted otherwise, shall be 40 bar diameters for grade 40 and 48 bar diameter for grade 60 bars.



DESIGN CONSIDERATIONS

TYPICAL GENERAL NOTES (cont.)

Provide vertical dowels from footings continuous through stem walls into AAC walls above. All shall match size and spacing of vertical reinforcing above. Extend all horizontal bond beam reinforcing in AAC walls continuous around corners and intersections or provide bent corner bars to match and lap horizontal bond beam reinforcing at corners and intersections. All reinforcing in AAC walls shall be accurately located prior to grouting and the position maintained during grouting.

All cells and courses with reinforcing shall be filled solid with grout. Maximum grout lift 8'-0" with each grout pour stopping 1-1/2 inches below the top course of lift. Provide cleanouts if grout lift exceeds 4'-0". Place grout continuously. Do not interrupt grouting for more than one hour. Mechanically vibrate grout in vertical spaces immediately after pouring and again about 5 minutes later.

Unless noted otherwise on the drawings, provide vertical AAC wall control joints such that no straight run of wall exceeds 24'-0". Coordinate locations with architect.

REINFORCING

Reinforcing steel shall conform to ASTM A615, grade 40 (Fy=40 KSI) Deformed bars for all bars #5 and smaller.

Welding of reinforcing shall be in accordance to AWS D1.4. No tack welding of reinforcing bars allowed.

Extend all horizontal reinforcing continuous around corners and intersections or provide bent bars to match and lap with horizontal bars at corners and intersections of walls.

Provide vertical wall reinforcing at all corners, wall ends, and within 24" of all wall openings. See plans for size and additional requirements.

Provide two horizontal reinforcing bars in solid grouted AAC "U" blocks at roof and floor supports and one horizontal reinforcing at top of parapet. See plans for size and additional requirements.

SPECIAL INSPECTIONS: (REQUIRED FOR ALL AAC MASONRY BLOCK WALLS)

1. Special inspections shall be performed by a qualified inspector approved by the architect and the building official.
2. Special inspections for structural Autoclaved Aerated Concrete (AAC) walls shall be performed by a qualified inspector under the direct supervision of a state registered structural engineer who is familiar with the structural design of this project. The special inspection certificate shall be sealed by the supervising structural engineer. The contractor shall be responsible to providing a minimum of 24 hours notice to the special inspector to begin any work for which special inspection is required.
3. In accordance with UBC 1701.6.2 some inspections may be made on a periodic basis and satisfy the requirements of continuous inspection.
4. Special inspection is required during the following operations per UBC.
 - a. Structural AAC walls: During placement of reinforcing, inspection of grout space immediately prior to closing of cleanouts and during placement of all grout. Special inspection for placing of units may be performed on a periodic basis.
5. Duties and responsibilities of the special inspector:
 - a. The special inspector shall observe the work assigned for conformance with the approved design drawings and specifications.
 - b. The special inspector shall furnish inspection reports to the building official and the engineer or architect of record. All discrepancies shall be brought to the immediate attention of the contractor for correction, then, if uncorrected, to the engineer or architect of record and the building official. Upon completion of the assigned work, the special inspector shall complete and sign a final report certifying that to the best of the inspector's knowledge, the work is in conformance with the approved plans and specifications, and the applicable workmanship provisions of the code.



DESIGN CONSIDERATIONS

PHYSICAL PROPERTIES of AAC

The e-crete Company offers high quality Autoclaved Aerated Concrete (AAC) building products for structural and non-structural applications. Weighing about one-fifth the weight of conventional concrete, E-Crete AAC can improve thermal performance resulting in reduced cooling and heating equipment requirements and lower utility bills while providing the greatest fire resistance of any building material currently on the market. E-Crete AAC also serves as an excellent acoustic insulation material.

Physical Properties of AAC Block

AAC Grade	Dry Bulk Lbs/ft ³	Density Kg/m ³	Minimum Compressive Strength		Average Drying Shrinkage %
			Psi	Mpa	
AAC 2	25-31	400	290	2	< 0.02
AAC 3	31	500	435	3	< 0.02
AAC 4	31-50	500-800	580	4	< 0.02
AAC 6	37-50	600-800	870	6	< 0.02

See ICC ESR-1371 and ASTM C1386





e-crete[®] AAC

Installation - Section 4.1

ENGINEERING / SEISMIC CALCULATIONS and TYPICAL CONSTRUCTION DRAWINGS and DETAILS

"A"

SEE APPENDIX "A" for accessories and associates

"C"

SEE APPENDIX "C" for engineering calculations

"D"

SEE APPENDIX "D" for typical construction drawing details.

"I"

SEE APPENDIX "I" for basic installation techniques



TYPICAL CONSTRUCTION DRAWINGS and DETAILS

SEE APPENDIX "D"

The e-crete Company offers the following construction drawings and details for inclusion in your project documents. The drawings are available for download in AutoCAD format on our web site - www.e-crete.com

Structural / Foundation Details		
Section #	Section Description	Detail / Page No.
10000	AAC Wall at Exterior Monolithic Concrete Footing	10001-10003
10100	AAC Wall at Exterior Concrete Stem Wall and Footing	10101-10102
10200	AAC Wall at Exterior CMU Stem Wall and Footing	10201-10206
10300	AAC Wall at Interior Monolithic Concrete Footing	10301-10302
10400	AAC Wall at Interior CMU Stem Wall at Crawlspace	10401-10402
10500	AAC Column at Stem Wall or Footing	10501-10502
10600	AAC Wall Non-Bearing at Interior Concrete Slab	10601
11000	Typical Reinforcing at AAC Wall - Elevation	11001-11007
12000	Special Jamb Reinforcing at AAC Wall - Plan	12001-12002
12100	AAC Column - Plan	12101
Structural Framing Details		
Section #	Section Description	Detail No.
13000	Pref. Wood Truss at AAC Wall – Top Plate	13001-13008
13100	Pref. Wood Truss at AAC Wall – Wood Ledger	13101
13200	Wood "I" Joists at AAC Wall – Top Plate	13201-13202
13300	Wood "I" Joists at AAC Wall – Wood Ledger	13301-13303
13400	Wood Joists at AAC Wall – Top Plate	13401
13500	Wood Joists at AAC Wall – Wood Ledger	None at this time
13600	Wood framing at AAC and CMU Basement walls	13601
14000	Wood Ledger at AAC Wall	14001-14006
14100	Pref. Wood Trusses / Joists at non-bearing AAC wall	14101
14200	Plywood Sheathing at AAC Wall	14201-14204
15000	Wood Beam at AAC Wall- Wall Continues	15001-15003
15100	Wood Beam at AAC Wall- Flush with wall	15101-15105
15200	Wood Viga Beam at AAC Wall	15201
15300	Wood Beam at AAC Column	15301-15302
16000	Steel Ledger/Deck at AAC Wall	16001
18200	Stair Framing at AAC Wall	18201



 "D"

TYPICAL CONSTRUCTION DRAWINGS and DETAILS

SEE APPENDIX "D"

The e-crete Company offers the following construction drawings and details for inclusion in your project documents. The drawings are available for download in AutoCAD format on our web site - www.e-crete.com

Structural Lintel Details		
Section #	Section Description	Detail No.
18000	AAC Lintel	18001-18007
18100	Steel Lintel Beam at AAC Wall	18101-18103
18300	Power Steel Lintel at AAC Wall	18301
Sound Walls		
Section #	Section Description	Detail No.
19000	6" E-CRETE AAC SOUND WALL - STC = 50	19001
19000	8" E-CRETE AAC SOUND WALL - STC = 51	19002
19000	10" E-CRETE AAC SOUND WALL - STC = 52	19003
19000	10" E-CRETE AAC SOUND WALL - STC = 55	19004
19000	DOUBLE 6" E-CRETE AAC SOUND WALL with 2" AIR SPACE - STC = 57	19005
19000	DOUBLE 6" E-CRETE AAC SOUND WALL with 4" AIR SPACE - STC = 61	19006
19000	DOUBLE 2 x 4 WOOD STUD SOUND WALL - STC = 50	19007
19000	DOUBLE 2 X 4 WOOD STUD SOUND WALL - STC = 55	19008
19000	DOUBLE 2 X 6 WOOD STUD SOUND WALL - STC = 60	19009
Door and Window Jamb Details		
Section #	Section Description	Detail No.
19100	Wood Door Frame Anchorage to AAC Block Wall	19101
19100	Wood Door Frame Anchorage to AAC Block Wall	19102
19100	Steel Door Frame Anchorage to AAC Block Wall	19103
19100	Door Frame Opening Anchorage to AAC Block Wall	19104
19100	Window Jamb at AAC Wall	19105
19100	Window Jamb at AAC Wall	19106
19100	Window Jamb at AAC Wall	19107



ENGINEERING / SEISMIC CALCULATIONS and DETAILS

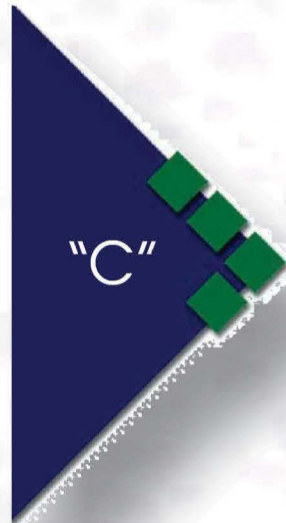
ENGINEERING DESIGN CALCULATION EXAMPLES

Un-reinforced AAC masonry wall design example

Reinforced AAC masonry wall design example

AAC masonry shear wall design example

AAC Lintel design example



SEE APPENDIX "C" for
engineering calculations



TOOLS / FASTENERS

STANDARD TOOLS and FASTENERS USED IN AAC INSTALLATION

The following companies specialize in tools and fasteners expressly designed for AAC applications.

Recommended Suppliers:

Hilti
(fasteners)
P.O. Box 21148
Tulsa, OK 74121
(800) 879-8000
www.hilti.com/us

Demand Products
(tools and fasteners)
1055 Nine North Drive
Alpharetta, GA 30004
(800) 325-7540
www.demandproducts.com

Windlock Select
(tools and accessories)
1055 Leisz's Bridge Road
Leesport, PA 19533
(877) 468-5643
www.windlockselect.com





WALL FINISHES

MANUFACTURERS of COATINGS and FINISHES



Exterior surfaces of AAC should be protected by water permeable and breathable coatings. A stucco finish used on AAC provides a low maintenance wall system and can be integrally colored with mineral pigments to eliminate the need for frequent painting. Numerous conventional coatings and finishing products are compatible with Autoclaved Aerated Concrete.

All coatings must comply with ASTM C 1555 section 9 ("Exterior Surface Treatment"). Interior plaster coatings applied directly to AAC provide a beautiful and solid interior wall that is easy to repair. Plastered walls can be painted in any assortment of interior colors and a veneered plaster left unpainted provides an exceptionally pleasing appearance.

Recommended Suppliers:

Elite Cement Products, Inc.

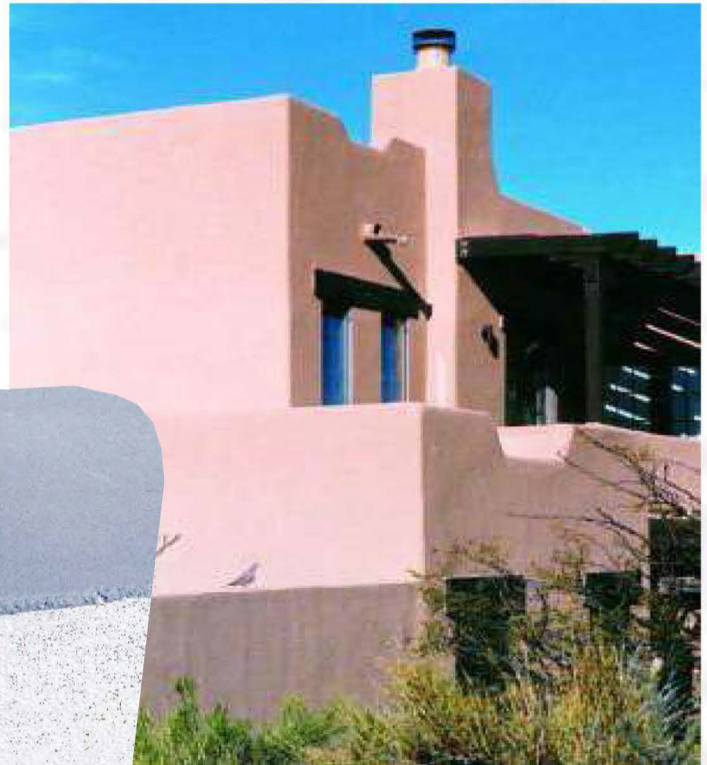
(mineral/acrylic finishes)
4235 Buford Highway
Duluth, GA 30096
(678) 206-0242
www.elitecement.com

Sider-Oxydro, Inc.

(mineral finishes)
10110 Regur Road
Hawkinsville, GA 31036
(478) 892-9800
www.sider-oxydro.com

Ultra Kote

(synthetic/acrylic finishes)
327 S. 27th Avenue Phoenix, AZ 85009 Ph (602) 272-5830
Fax (602) 272-6445 - www.ultrakoteproducts.com



**e-crete[®] AAC**

Projects - Section 5.0

PARTIAL PROJECT PORTFOLIO

e-crete AAC products have been used in numerous projects around North America. The e-crete AAC project list is continuously growing as AAC product acceptance and certification is achieved across the United States.

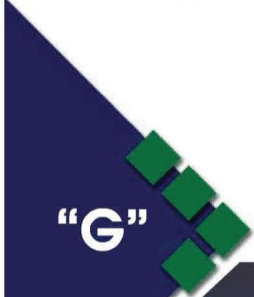
Designers and Contractors on individual projects have chosen AAC for a specific advantageous property or characteristic, such as AAC's incredible

Fire resistance in highly volatile manufacturing facilities, AAC's imperviousness to Pests in particularly prone regions, or AAC's flexibility and versatility in achieving a particular aesthetic such as "Adobe" or "Mission" architectural styles. For some inspirational graphical examples please see the latest version of Appendix "G" of this manual which is available for

download on our web site

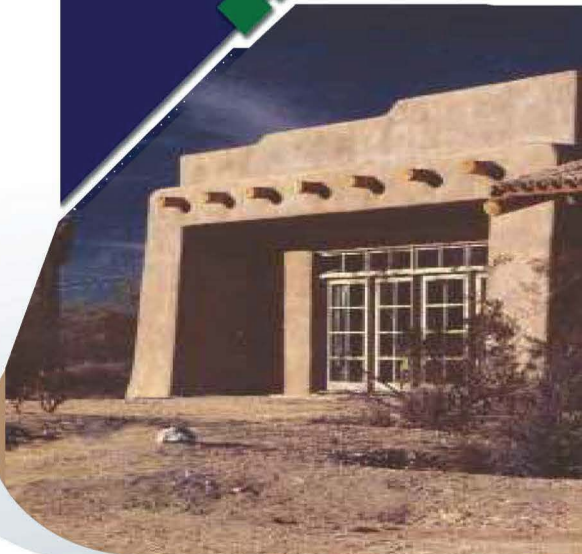
www.e-crete.com.

Check back often to see the latest innovative design examples.



"G"

See Appendix "G"

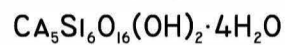
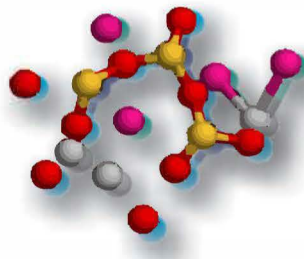


Energy Efficient ☐ Acoustical Insulation ☐ Fire Resistant ☐ Pest Resistant ☐ Environmentally Friendly



The **e-crete** Company

Autoclaved Aerated Concrete



The enclosed documentation, information and instructions are provided as a courtesy of
The E-Crete Company.

The Customer and their assigns are responsible to ensure compliance with all Local and Federal codes.

Energy Efficient □ Acoustical Insulation □ Fire Resistant □ Pest Resistant □ Environmentally Friendly