PAN PACIFIC ENGINEERING PTY LTD

LITEBUILT

HANDBOOK

AERATED CONCRETE PRODUCTS

METRIC AND U.S. VERSION

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1. LITEBUILT® Lightweight Aerated & Composite Concretes

LITEBUILT® Aerated Concrete is created by inclusion of a multitude of micro air bubbles in a cement based mixture. This is achieved by mixing the concentrated **LITEBUILT®** Foaming Chemical with water and generating foam therefrom, generally by using compressed air. To achieve the optimum results, an Aerator is required. The foam is then mixed with the sand / cement / water slurry using conventional ready mix or permanent concrete mixing facilities. **LITEBUILT®** Aerated Concrete behaves like ordinary dense weight concrete in most aspects, such as curing.

LITEBUILT® FOAM GENERATOR

2. Characteristics & Properties of LITEBUILT® Aerated Concrete

LITEBUILT® Aerated Concrete has good mechanical strength, together with a high insulation value over a wide range of densities.

Some of the benefits from using **LITEBUILT®** Lightweight Concrete include:

- Rapid and relatively simple construction.
- Low cost of **LITEBUILT®** Aerated Concrete, in comparison to other methods producing lightweight concretes.
- Good Thermal insulation properties give energy conservation advantages, which reduce operating costs (heating/air-conditioning).
- With **LITEBUILT®** Aerated & Lightweight Composite Concretes the result is lower building costs, more efficient building designs.
- Handling & cartage costs greatly reduced.
- Weight reductions from 10% to 87% over standard dense weight concrete depending on mix proportions and materials.
- Significant reduction of overall weight results in savings in structural frames, footings or piles. Such savings are often the multiple of the actual cost of the material itself.
- Economical in transportation, lower crane capacity required and reduction in manpower.
- The use of **LITEBUILT®** Aerated Concrete in pre-cast or tilt-up construction enables a reduction in crane size, it requires minimum labour for erection.
- **LITEBUILT®** Aerated Concrete can be sawn by hand, sculptured and penetrated by nails and screws.
- **LITEBUILT®** Aerated Concrete is extremely easy to screed, and may be placed on site at thicknesses down to 40 mm (1.5 ins).

A combination of the other materials can also be included in the mix, depending on the application and requirements, such as:

- Expanded Clay
- Polystyrene
- Cork
- Polypropylene
- Vermiculite
- Flyash
- Volcanic Ash

LITEBUILT® AERATED CONCRETE

3. Applications for LITEBUILT® Aerated & Composite Concretes

The use of lightweight concrete in building is becoming increasingly extensive. The following are some of the typical applications principally in use at present.

Density 300-600 kg/m³ (19 - 38 lbs/ft³) Made with Cement & Foam Only

This material is used in roof and floor as insulation against heat and sound and is applied on rigid floors (i.e. in itself it is not a structural material).

It is used for tennis courts and interspace filling between brickwork leaves in underground walls, insulation in hollow blocks and any other filling situation where high insulating properties are required.

Density 600-900 kg/m³ (38 - 56 lbs/ft³) Made with Sand, Cement & Foam

Used for the manufacture of precast blocks and panels for curtain and partition walls, slabs for false ceilings, thermal insulation and soundproofing screeds in multi-level residential and commercial buildings. **LITEBUILT®** Aerated Concrete of this density range is also ideal for bulkfill application.

LITEBUILT® LIGHTWEIGHT MASONRY COLUMNS

Density 900-1200 kg/m³ (56 - 75 lbs/ft³) Made with Sand, Cement & Foam

This material is used in concrete blocks and panels for outer leaves of buildings as well as partition walls, concrete slabs for roofing and floor screeds.

Density 1200-1600 kg/m³ (75 - 100 lbs/ft³) Made with Sand, Cement & Foam

This material is used in precast panels of any dimension for commercial and industrial use, insitu casting of walls, garden ornaments and other uses where structural concrete of lighter weight is an advantage.

4. Sundry Applications

Rigid Pavement Floor Screeds

A layer of foam concrete under ceramic tiles, marble paving, cement tiles etc. Generally a 500 kg/m³ (31 lbs/ft³) density is used, made form cement and foam only, in order to gain thermal and acoustic insulating properties and at the same time, to load the structure as little as possible.

The minimum recommended thickness for such a screed is 40 mm (1.5 ins).

Before pouring the material onto an existing floor, the surface should be made wet, however care should be taken to avoid large areas of water, which will effect the moisture content of the foam concrete.

Elastic Pavement Floor Screeds

This application is for floors covered with carpet, timber parquetry, vinyl tiles etc. As the paving material is directly glued onto the floor screed in many instances, the most suitable density is 1100 kg/m³ (69 lbs/ft³), using 2:1 sand cement ratio. The pavement is laid as described for rigid pavements, excepting that particular care is taken to trowel off the surface by hand or by mechanical trowel 24 hours after pouring.

Heat Insulation for Roofs

The ideal density for this purpose is 500 kg/m³ (31 lbs/ft³) made only with cement and foam. The value of K for heat transmission under these circumstances can be obtained from Table 3. The minimum thickness must never be less than 40 mm (1.5 ins).

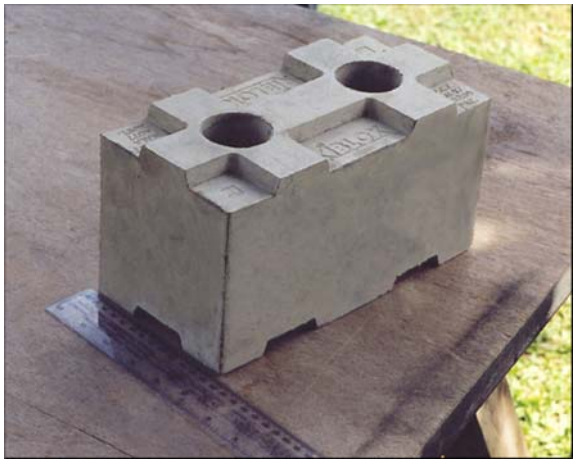
It is recommended that the surface be wet before pouring without undue water lying on the surface.

Inter-Space Filling

For such use, the normal density is about 400 kg/m³ (25 lbs/ft³) made from cement and foam only. The cavities should be filled in successive stages, doing no more than 600-700 mm (2 ft) at a time, allowing at least 12 hours between each pour.

Lightweight Masonry Blocks

LITEBUILT® Aerated Concrete is an ideal material for producing lightweight masonry blocks, reducing or eliminating the need for autoclave curing. The density which is used usually varies between 600 kg/m^3 and 1100 kg/m^3 (38 lbs/ft^3 and 69 lbs/ft^3) depending on the mechanical strength that is required, or alternatively, the desirable amount of thermal insulation.



LITEBUILT® FOAMED CONCRETE LITEBLOK™

Precast Panels

LITEBUILT® AERATED LIGHTWEIGHT PANEL CASTING

The normal density adopted for this type of usage varies between 1200 kg/m^3 and 1600 kg/m^3 (75 lbs/ft^3 and 100 lbs/ft^3). The density chosen is usually dependent upon the strength required, the dimensions (ie thickness etc).

Where sandwich panels are used, employing dense weight concrete as well as **LITEBUILT®** Aerated Concrete, it is advisable to cast the normal concrete into the mould first and follow immediately with the foam concrete, so that the bond between the two materials is homogenous.

5. Mixing of LITEBUILT® Aerated Concrete

There are two principle mixtures which constitute the majority of Aerated Concrete construction.

Cement + LITEBUILT® Foaming Agent

While the cement mixer or premix concrete truck is in motion, the water and cement are introduced and allowed to mix until a thoroughly consistent mixture is achieved. When this has taken place, the required amount of foam can be injected into the mixer and the mixing continued until the foam is completely enveloped into the total mix. The mixture is then ready for discharging into the moulds or wherever it is to be placed. The proportion of cement, water and foam for mixtures of various weights can be obtained from Table 1.

Note: Although it is possible to have neat cement mixes, the addition of some sand (about 25%) is recommended in order to prevent the formation of lumps.

Cement + Sand + LITEBUILT® Foam

In this situation the water, sand, cement are added to the mixer in that order and thoroughly mixed into a homogenous mortar before adding the foam. The components of the mix are outlined in Table 1.

Cement + Lightweight Aggregate + LITEBUILT® Foam

Because of the lightweight matrix formed by the mixture of cement, water and foam, lightweight aggregates can be used without the tendency to float when the mix is vibrated. Typical aggregates which are used are:- expanded shale or clay, scoria, pumice, vermiculite or flyash. The inclusion of such material is only recommended if it is locally available as its procurement from afar often results in a higher cost of the final product. Moreover, it is often increasing the overall density for a given strength, since simply a higher foam content can achieve better results.

LITEBUILT® FOAM BEING INJECTED INTO CONCRETE TRUCK

Table 1 (Metric): Mix Proportions – Sand, Cement and LITEBUILT® Foam

Quantity of Sand & Cement Kgs Per Cubic Meter							
Density Kg/m³	3:1		2:1		1:1		Cement only
	Sand Kg	Cement Kg	Sand Kg	Cement Kg	Sand Kg	Cement Kg	
1600	1148	383	–	–	–	–	–
1400	1005	335	–	–	–	–	–
1200	861	287	756	378	–	–	–
1100	790	263	693	347	–	–	–
1000	–	–	630	315	–	–	–
900	–	–	567	284	412	412	–
800	–	–	–	–	366	366	–
700	–	–	–	–	320	320	581
600	–	–	–	–	275	275	498
500	–	–	–	–	–	–	415
400	–	–	–	–	–	–	332
300	–	–	–	–	–	–	249

Note: Water Content = 0.4 to 0.5 litre per Kg cement

Table 1 (US Measures): Mix Proportions – Sand, Cement and LITEBUILT® Foam

Quantity of Sand & Cement Lbs Per Cubic Yard							
Density lbs/ft^3	3:1		2:1		1:1		Cement only lbs
	Sand lbs	Cement lbs	Sand lbs	Cement lbs	Sand lbs	Cement lbs	
100	1938	646	–	–	–	–	–
87	1686	562	–	–	–	–	–
75	1453	484	1276	638	–	–	–
69	1337	446	1174	587	–	–	–
62	–	–	1055	527	–	–	–
56	–	–	953	476	692	692	–
50	–	–	–	–	618	618	–
44	–	–	–	–	544	544	986
38	–	–	–	–	469	469	852
31	–	–	–	–	–	–	695
25	–	–	–	–	–	–	560
19	–	–	–	–	–	–	426

Note: Water Content = 0.4 to 0.5 pints per lbs cement

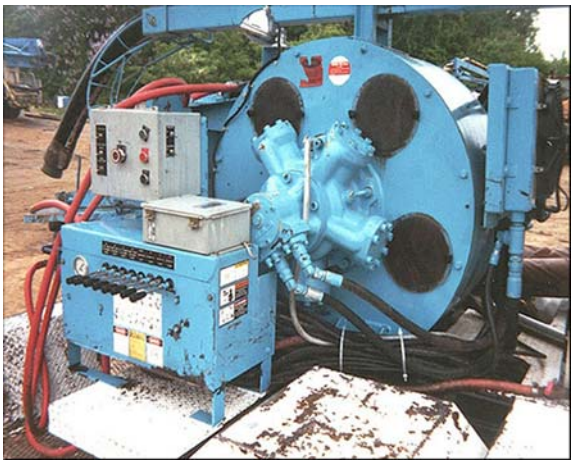
Dense Weight Concrete + LITEBUILT® Foam

The addition of up to 10% **LITEBUILT®** Foam into a normal dense-weight concrete mix has the effect of

(a) Reducing the density.
(b) Increasing the slump so that the water: cement ratio can be reduced.
(c) Eliminates “bleed water”.
(d) Allows early trowelling of the surface.
(e) Difficulties in pumping are eliminated even in hot weather.
(f) Improving the resistance to freeze-thaw attrition.

Even though the reduction in water: cement ratio produces an increase in strength, it is usually necessary to slightly increase the cement content of the mix to maintain the specified compressive strength.

Pumping LITEBUILT® Aerated Concrete



SQUEEZE TYPE PUMP FOR LITEBUILT® AERATED CONCRETE

LITEBUILT® Foam has an extremely strong bubble structure and can stand pumping to unusual heights without loss of entrained air.

The most suitable pump for this purpose is a “squeeze” type pump. In some situations a screw feed pump is also satisfactory.

Water Absorption

The water absorption of **LITEBUILT®** Aerated Concrete is low, due to its closed cellular structure.

6. Water : Cement Ratio

The amount of water to be added to the mix depends upon the moisture content of the sand, but as an average figure, 40-45 litres (40-45 pints) of water is used for every 100 kilograms (100 lbs) of cement. Additional water is added as a content of the foam, thereby bringing the total water: cement ratio up to the order to 0.6. In general, when the amount of foam is increased, as for lighter densities, the amount of water can therefore be decreased. The water: cement ratio should be kept as low as possible in order to avoid unnecessary shrinkage in the moulds, however, it should be remembered that, if the amount of water added to cement and sand in the first instance it too low, the necessary moisture to make a workable mix will be extracted from the foam when it is added, thereby destroying some of the foam which is naturally an expensive way of adding water to the mix.

Tests should be carried out on any particular mix which is required so that the resulting cellular concrete will have a flowable, creamy consistency.

7. Curing of LITEBUILT® Aerated Concrete

Since many of the properties of Aerated Concrete depend upon the successful process of curing, outlined below are some of the methods whereby its strength can be increased.

Air Curing

This is probably the easiest and most popular method of curing. It is a slow, but acceptable system which enables a turn around of moulds every 24 hours on average, depending on the ambient temperature.

LITEBUILT® LIGHTWEIGHT AERATED CONCRETE TILT UP PANELS

Steam Curing

When precast Aerated Concrete panels and slabs are made under factory conditions in order to obtain a relatively fast turn-around of moulds, it may be economic to induce an early strength into the concrete by applying heat from steam to the underside of the moulds. This causes a rise in temperature in the concrete and a resulting increase in strength.

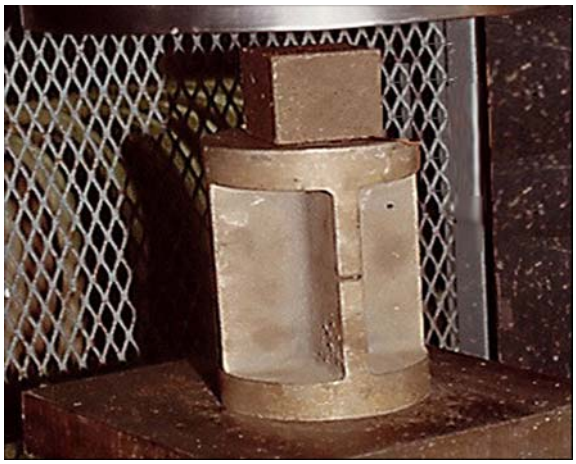
The reason for steaming from the underside is to avoid the increase in temperature creating small cells of compressed air with sufficient pressure to fracture the cement shell around the cell. Due to the weight of concrete above the lower layers this does not take place and by the time the temperature increases on the upper face, the cement has already acquired sufficient strength to resist the cells exploding off and giving a rough surface to the slab or panel.

Depending upon the type of cement used in the mix, steam curing is not begun until at least five hours after casting, and even then the increase in temperature is well controlled and should not exceed 70°C (167°F). The extent of steam curing depends upon the climate but as a general rule it can be subdivided into 2 hours required for raising the temperature, 4 hours maintaining the temperature and 2 hours lowering the temperature slowly to avoid thermal shock.

8. Strength

Compressive Strength

The compressive strengths of **LITEBUILT®** Aerated & Lightweight Composite Concrete is influenced by many factors, such as density, age, moisture content, the physical and chemical characteristics of component materials and mix proportions. Hence it is desirable to keep the mix proportions, type of cement and sand or other fillers as well as the method of production constant. A relationship exists between the density and the strength. Any change to the factors mentioned above could vary that relationship quite markedly.



COMPRESSIVE STRENGTH TESTING MACHINE

Table 2 (Metric): Compressive Strengths for LITEBUILT® Aerated Concrete

Density Kg/m³	300	400	500	600		700	800	900		1000	1100		1200	1400	1600
Sand Cement Ratio	0:1	0:1	0:1	0:1	1:1	1:1	1:1	1:1	2:1	2:1	2:1	3:1	3:1	3:1	3:1
7 Days Mpa	0.3	0.8	2.0	3.5	0.8	1.4	2.5	3.0	1.4	2.2	3.8	3.0	4.0	8.0	10.0
28 Days Mpa	0.7	2.0	3.5	4.0	2.0	3.5	4.5	5.0	3.2	5.2	8.5	7.0	10.0	12.0	18.0

Table 2 (US Measures): Compressive Strengths for LITEBUILT® Aerated Concrete

Density lbs/ft³	12	25	31	38		44	50	56		62	69		75	87	100
Sand Cement Ratio	0:1	0:1	0:1	0:1	1:1	1:1	1:1	1:1	2:1	2:1	2:1	3:1	3:1	3:1	3:1
7 Days psi	43	116	290	507	116	203	362	435	203	319	551	435	580	1160	1450
28 Days psi	101	290	507	580	290	507	652	725	464	754	1232	1015	1450	1740	2610

LITEBUILT® LIGHTWEIGHT ARCHITECTURAL ORNAMENTS

The compressive strength can be significantly increased through effective and special curing methods. Moist curing has a profound effect on increasing compressive strength. For products such as foamed concrete building blocks, it is advisable to cling- or stretch-wrap the pallets, thus assisting in the moisture retention for longer. Steam curing is another option, if curing time is crucial.

LITEBUILT® Aerated Concrete has a virtually linear increase in compressive strength over the first 12 month, unlike dense weight concrete, which levels out much earlier.

Compressive strength will continue to increase indefinitely due to the reaction with CO_2 present in the surrounding air. Again, the significant difference is that **LITEBUILT®** Aerated Concrete has a higher rate of curing than dense weight concrete. Where the level of compressive strength is critical, methods of accelerating the natural CO_2 curing process are available as part of our **LITEBUILT®** range of products. There are various methods and it can be applied in particular with factory produced building elements such as blocks and panels.

Tensile Strength

Depending on the method of curing, the tensile strength of foamed concrete can be as high as 0.25 of its compressive strength with a strain of around 0.1% at the time of rupture.

Shear Strength

Generally the shear strength varies between 6% and 10% of the compressive strength. Shear reinforcement is seldom required in flooring and roofing units.

9. Shrinkage

LITEBUILT® Aerated Concrete, like all cement materials has a shrinkage phenomena during the setting stage. The amount of shrinkage is dependant upon various factors e.g. type of cement, type of curing, size, and quality of sand, amount of cement in the mix, density of foamed concrete, as well as the water: cement ratio.

The greater extent of shrinkage occurs during the first 28 days, after which time it is negligible.

During the first 28 days, if the conditions of manufacture of the foamed concrete are well controlled, shrinkage can be kept under 0.1%.

This fact is of particular importance since cracks in walls – often caused by foundation movements – are regularly blamed on concrete shrinkage. If a crack occurs beyond the initial 28 days after the concrete was poured, it is virtually impossible that this is due to shrinkage.

10. Expansion

The coefficient of linear expansion for **LITEBUILT®** Aerated Concrete is of the same order as that of normal concrete, i.e. 0.000009 per degree Centigrade (0.000005 per degree F). This factor becomes important when using **LITEBUILT®** Aerated Concrete on large areas of roof slabs, which are exposed to heat and cold.

11. Acoustic Insulation

LITEBUILT® Aerated Concrete has a high sound absorption capacity. In general, dense weight concrete tends to deflect sound whereas **LITEBUILT®** Aerated Concrete absorbs sound. Sound transmission, however, on conventional walls, over most of the audible frequency range may be higher by 2-3% when compared to dense weight concrete. This slight disadvantage is in most cases academic, since most walls are either rendered, painted or both. This in turn will make a wall deflect the sound as does dense weight concrete.

Low frequency noise on the other hand is being greatly absorbed by **LITEBUILT®** Aerated Concrete, thus it is often used as an insulating layer on structural concrete slabs to restrict noise transmission from floor to floor in multi level residential or office buildings.

12. Thermal Insulation

Thermal insulation is one of the outstanding characteristics of **LITEBUILT®** Aerated Concrete Lightweight Concrete.

Due to its cellular structure, **LITEBUILT®** Aerated Concrete offers a very low transmission of heat. This means that in most cases the use of supplementary insulation in floors and walls is unnecessary.

FLOORSCREED APPLICATION

The high insulating value of the material becomes important as energy is saved by cutting both heating and air conditioning requirements, giving greater comfort in a wide range of climatic conditions.

Table 3 shows the relationship between the thermal conductivity and various densities.

LITEBUILT® Aerated Concrete's thermal performance greatly reduced the occurrence of condensation from atmospheric humidity, arising as the result of changes in ambient temperature.

LITEBUILT® Aerated Concrete is completely non-toxic.

Table 3 (Metric): Thermal Insulation with LITEBUILT® Aerated Concrete

Concrete Density kg/m³	λ	R Value 100mm	K at Selected Concrete Thickness			
			50mm	100mm	150mm	200mm
300	0.065	1.54	1.03	0.58	0.40	0.30
400	0.080	1.25	1.21	0.69	0.48	0.37
500	0.095	1.05	1.38	0.80	0.56	0.43
600	0.115	0.87	1.57	0.93	0.67	0.47
700	0.130	0.76	1.23	0.89	0.63	0.52
800	0.150	0.66	1.37	1.00	0.71	0.54
900	0.175	0.57	1.52	1.13	0.81	0.61
1000	0.205	0.48	1.69	1.27	0.94	0.70
1100	0.230	0.43	1.82	1.39	1.02	0.78
1200	0.270	0.37	2.02	1.55	1.15	0.98
1400	0.346	0.43	2.31	1.83	1.39	1.08
1600	0.436	0.28	2.06	2.10	1.63	1.29

λ = Thermal Conductivity Coefficient
K = Thermal Transmission Coefficient
Note: Densities 300-600 are cement/foam mixes
Densities 700 and over are cement/sand/foam mixes

Table 3 (US Measures): Thermal Insulation with LITEBUILT® Aerated Concrete

Concrete Density pcf	λ	R Value per inch	K at Selected Concrete Thickness			
			2"	4"	6"	8"
19	0.429	2.54	6.80	3.83	2.64	1.98
25	0.528	2.06	7.99	4.55	3.17	2.44
31	0.627	1.73	9.11	5.28	3.70	2.84
38	0.759	1.44	10.36	6.14	4.42	3.10
44	0.858	1.25	8.12	5.87	4.16	3.43
50	0.990	1.09	9.04	6.60	4.69	3.56
56	1.155	0.94	10.03	7.46	5.35	4.03
63	1.353	0.79	11.15	8.38	6.20	4.62
69	1.518	0.71	12.01	9.17	6.73	5.15
75	1.782	0.61	13.33	10.23	7.59	6.47
88	2.284	0.71	15.25	12.08	9.17	7.13
100	2.878	0.46	13.60	13.86	10.76	8.51

λ = Thermal Conductivity Coefficient
K = Thermal Transmission Coefficient
Note: Densities 19-38 are cement/foam mixes
Densities 44 and over are cement/sand/foam mixes

In many parts of the world, new homes are required to have insulated walls and ceilings in order to conserve energy. Table 4 indicates the superior economics of using cellular foamed concrete over other insulating materials commonly used.

Table 4: Comparative Table of the Most Commonly Used Building & Insulating Materials

Material	Density Kg/m³	Kcal/m²h°C	Relative cost Per m³ Placed	Required Thickness (meters) to Achieve K=0.70	Cost comparison at equivalent K value 0.70 Kcal/m²h°C
Marble	2700	2.9	–	3.5	–
Concrete	2400	1.3	2.92	1.58	40
Hollow Clay Brick	2000	0.8	3.4	0.97	34
Litebuilt® Foam Concrete	1600	0.5	2.52	0.61	15.7
Litebuilt® Foam Concrete	400	0.08	1	0.097	1
Expanded Cork	100	0.03	8.72	0.036	3.2
Rock Wool	100	0.032	5.8	0.040	2.37
Expanded Polystyrene	25	0.030	3.56	0.036	1.31
Expanded Polyurethane	35	0.022	11.72	0.026	3.1

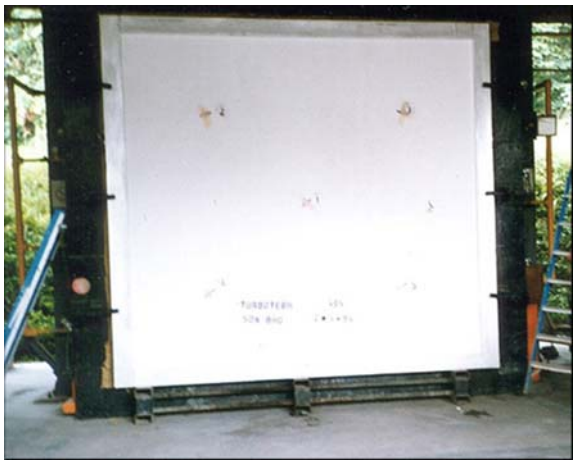
13. Fire Resistance

LITEBUILT® Aerated Concrete is extremely fire resistant and thus well suited to fire rated applications. Furthermore, the application of intense heat, such as an oxy torch held close to the surface, does not cause the concrete to spall or explode as is the case with normal dense weight concrete.

The result of this is that the reinforcing steel remains cool and protected for a much longer period. Tests and certificates from various authorities indicate that 150 mm (6 ins) of **LITEBUILT®** Aerated Concrete achieves in excess of a four hour fire rating.

In tests undertaken in Australia, a **LITEBUILT®** Aerated Concrete wall panel, 150 mm (6 ins) in thickness was exposed to temperatures in the vicinity of 1200°C (2192°F), with the unexposed surface only increasing by 46°C (115°F) after 5 hours.

Notes: Tests undertaken at BHP Research & New Technology.



LITEBUILT® PANEL BEING PREPARED FOR FIRE TESTING

The requirements for some specific authorities for 4 hour rating indicate: –
Italy 133 mm (5.3 ins), New Zealand 133 mm (5.3 ins), Australia (EBRS-Ryde) 105 mm (4 ins)

All tests, both in Australia and internationally, indicate that **LITEBUILT®** Aerated Concrete is greatly superior to normal concrete. Even at reduced thicknesses **LITEBUILT®** Aerated Concrete will not burn, spall or give off toxic gases, fumes or smoke.

14. Fastener Selection and Installation

The cellular structure of **LITEBUILT®** Aerated Concrete requires specialised fasteners for the attachment of both structural framing members and non-structural fittings.

Metal sleeved expanding anchors are not recommended as they may become loose due to their design characteristics.

Detailed in this section are recommended fasteners for a variety of applications. The choice of fastener is dependent on the nature and the requirement of the application, and the desired finish.

The following information has been supplied by the various approved manufacturers and may be purchased through their authorised outlets.

Frame – Fixings and Plastic Plugs

"Frame – Fixings" normally refers to a range of fasteners comprising various lengths and diameters of plastic plugs with matching length/diameter screws. These fasteners rely on expansion and friction grip within **LITEBUILT®** Aerated Concrete to provide holding power.

The majority of frame fixings are designed as "through fixings" where the plastic plug is installed through the fixture. Capacities will differ with relation to gripping profile, rate of expansion and diameter. Increased embedment, greater than the recommended manufacturers minimums do not generally improve performance. Approved suitable plastic plugs are not normally used as a "through fixing", appropriate screws are normally supplied separately and the plug is normally installed prior to locating and securing the fixture. Selection criteria is important and the following notes should be considered: –

PLASTIC WALL PLUGS

- Determine live and dead load requirements.
- Select fastener diameter and required embedment appropriate to capacity required.
- Fastener lengths are determined by fixing thickness and manufacturers recommended embedment into **LITEBUILT®** Aerated Concrete (Plasterboard would be considered as a component of the fixing thickness).
- All drilled holes in **LITEBUILT®** Aerated Concrete should be made using high speed twist drills suitable for steel or wood, (masonry drill bits should not be used). When using hammer-drills the hammer mode should be turned OFF.
- Edge distances and fastener spacings should conform to the manufacturers recommendations, care should be taken with regard to the orientation and direction of expansion. Hole depth should be considered taking into account the manufacturers recommended embedment with an additional allowance for debris accumulation.
- Fastener head styles should be selected to provide the desired appearance, normally a countersunk head style for fixing timber fixtures and a hex head style for metal sections.

Mechanical Fasteners

This category includes fasteners that do not rely on expansion for a friction based gripping action. Where the anchor possesses some “undercut” properties they may be classified as “mechanical” fasteners. Selection would depend the nature of the application and reference should be made to your fastener supplier.

Fastener Application Guide for Litebuilt® Aerated Concrete

Timber Door Frames – Pre Assembled

Position door frames plumb and square at desired locations, assemble **LITEBUILT®** Aerated Concrete block walls securing the rear of the jambs with approved block ties.

Timber Door Frames – Unassembled

Fix timber jambs to **LITEBUILT®** Aerated Concrete block work using approved frame – fixings as per manufacturers instructions. To ensure a stable fixing it is recommended that full width packers, to suit the width of the jambs, are used. Attention should be given to the direction of expansion when fixing into 100mm or 150mm (4 ins or 6 ins) **LITEBUILT®** Aerated Concrete internal walls. Fixings should be located above door hinges for additional support.

Timber Window Frames

Pack window frames as required and fix with appropriate fasteners. Gaps between the frame and the blocks should be filled with expanding foam to provide draught, noise and heat resistance.

Aluminium Window Frames

Subject to design, aluminium window frames may be available in different profiles. Should the windows have an attached timber reveal, use the same methods as timber windows. Some residential window frames have an attached “fin” that may be inserted into pre-cut slots made in the **LITEBUILT®** Aerated Concrete block opening, some manufacturers have a special block tie that attaches to the “fin” which is placed between block courses.

Commercial aluminium window frames may be fixed through the glazing recess providing that the fixing head size is suitable. It is also recommended that a paintable silicone caulk be used to seal between the **LITEBUILT®** Aerated Concrete blocks and the aluminium window frames.

Kitchen / Bathroom Cupboards and Shelving

Fastener selection depends on the required load capacity. A general guide would call for the fastener selection to be based on the load requirements, the manufacturers recommended embedment, the cupboard or shelf fixing thickness, with an allowance made for plasterboard or other wall finishes, and the desired head style. Appearances may benefit by selecting a fixing with optional snap-on plastic cover caps.

Hand Rails, Towel Rails and Grab Handles

Due to the large number of variations in design, it is recommended that fastener selection information be sought from your supplier.