



SAKANN

شركة السكن الحديثة للصناعة
Modern Sakann Industrial Co.



A) Details

Rapidwall is a load bearing building panel with a multitude of uses for the construction industry.

It is ideal for just about any construction in which current building practices are used and is suitable for single, double or multi-storey housing and for commercial and industrial development.

Rapidwall eliminates the need for bricks, timber wall frames and plasterboard as it serves as both the internal and external load bearing wall.

Because of its low energy and environmental credentials, Rapidwall is particularly suitable in areas where traditional building materials, that have high energy usage, high carbon emissions or cause degradation to the environment, are no longer sustainable.

Rapidwall panels are manufactured, in moulding process, from high grade gypsum plaster and glass-fibre rovings to a size of 12 metres by 3 metres by 123 millimetres thick. The hollow sections, or voids, have 250 millimetre centres. The panels are cut in the factory to design specifications to a maximum tolerance of 5 millimetres.

After cutting, the panels are loaded onto collapsible frames called stillages ready for transport to the building site. Up to 500 m² of Rapidwall can be transported on one truck.

The panels are lowered into position using a small crane and supported by props until the structure is completed.

The formed cells can be filled with insulation for increased thermal performance or with concrete for increased load-bearing structural capacity.

Specifications	Unfilled	Filled with concrete
Weight (123mm) Rapidwall	44 kg/m ²	250 kg/m ²
Sound rating (Rw) 120mm Rapidwall	28	49
Fire Rating	1 hour	4 hours*
Ultimate Design Bending Capacity	Ø x 2.5 kNm/metre width	Ø x 22.7 kNm/metre width
Load Bearing Capacity	100kN/m - 2 Stories residential	870kN/M filled with 20Mpa concrete - 8 stories (Typically)
Void volume / M2	86 litres / m ²	N.A.
Horizontal shear strength	50kN/m	T.B.A.
Axial Load capacity / compressive strength	160kN/m	T.B.A.
Water Absorbtion	Less than 5% after 24 hours immersion	N.A.

* Building Code Australia 240/240/240

Thermal Insulation

Thermal resistance properties are from laboratory tests on 120mm thick panels.

Construction			U (W/m2K)
Main element of wall	Additional coat or lining	Total thickness (mm)	
Single leaf Rapidwall +50 mm Thermal Insulation Polystyrene (Density=35kg/m3)	NA	124+50	0.286
Single leaf Rapidwall filled with 20Mpa normal concrete	NA	124	0.326

Fire Resistance

The three figures in the right hand column refer to fire resistance periods for satisfying structural adequacy, integrity and insulation, respectively. Fire resistance levels marked with an asterisk are test results from previos 100mm Rapidwall panel tests. These results are deemed to be applicable to 123mm thick Rapidwall.

Copies of the fire resistance test certificates are available by request from Rapid Building

Systems : office@rapidwall.com.au

	Description	Fire Resistance Level
Non-load Bearing Walls	Single leaf unfilled Rapidwall panel	180/120/60*
	Single leaf panel filled with Rockwool batts	180/90/90*
Load Bearing Walls	Single leaf panel filled with 12mm scoria aggregate	30/30/30*
	Single leaf panel filled with no fines scoria	120/120/120*
	Single leaf panel filled with 32MPa concrete	240/240/240*
	Double leaf panel filled with cellulose fibre inside the cores	180/180/180*

Sound Transmission

RW values for various forms of Rapidwall construction:

Main Element	Additional Lining	Attachment Method	Total Thickness (mm)	RW
Single leaf Rapidwall, unfilled	-	-	123	28
Single leaf Rapidwall filled with 60kg/m ³ cellulose fibre insulation	-	-	123	31
Single leaf Rapidwall filled with 90kg/m ³ cellulose fibre insulation	-	-	123	33
Single leaf concrete filled Rapidwall	-	-	123	49
Single leaf Rapidwall filled with 90kg/m ³ cellulose fibre insulation	13mm Gyprock	Direct-fixed with screws and thin glue daubs	136	36
Single leaf concrete filled Rapidwall	13mm Gyprock and Tontine TSB3 polyester insulation	Standard 28mm Rondo 129 furring channels	164	45
Single leaf concrete filled Rapidwall	13mm Gyprock and Tontine TSB3 polyester insulation	Heavy gauge (1.2mm) Rondo 38mm top hat sections	174	54
Single leaf concrete filled Rapidwall	13mm Gyprock and Tontine TSB3 polyester insulation	Standard 28mm Rondo 129 furring channels and	177	55

CSR Gyprock
resilient
mounts

Single leaf concrete filled Rapidwall	13mm Gyprock and Tontine TSB3 polyester insulation	Separate row of 51mm steel studs spaced 10mm from Rapidwall	197	55
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Mechanical Properties

Specifications	Unfilled	Filled with concrete
Weight (123mm Rapidwall)	44 kg/m ²	250 kg/m ²
Sound rating (Rw)	48 dB	54 dB
Fire Rating	1 hour	4 hours*
Ultimate Design Bending Capacity	Ø x 2.5 kNm/metre width	Ø x 22.7 kNm/metre width
Load Bearing Capacity	100kN/m - 2 Stories residential	870kN/M filled with 20Mpa concrete - 8 stories (Typically)
Void volume / M2	86 litres / m ²	N.A.
Horizontal shear strength	50kN/m	T.B.A.
Axial Load capacity / compressive strength	160kN/m	T.B.A.
Water Absorbtion	Less than 5% after 24 hours immersion	N.A.

B) Features

Protection from all the elements - Fire, hurricanes and cyclones and temperature.

Produced from inert gypsum plaster, Rapidwall has a 1 hour fire rating when unfilled or a 4 hour fire rating when filled with concrete.

By using a simple tie down system, the roof is secured through the cavity of the wall to the foundation giving it significant protection against high winds.

Further, Rapidwall has a high thermal insulation and when the hollows are filled with insulation even greater thermal properties are achieved.



Saves energy and the environment

In his thesis, Ecologically Sustainable Development - Approaches in the Construction Industry, Robert Omahen, University of Regensburg concludes that:

"Rapidwall offers huge savings in embodied energy - 66% for domestic buildings 40% for commercial buildings."

He further states that, Rapidwall uses "fewer raw materials but doesn't compromise on load bearing capability and the total CO2 saving of Rapidwall, for residential dwellings in Australia would be about 63% or 3.91 million tonnes compared to brick."

High quality finish

The manner in which Rapidwall is manufactured means that both sides, the internal and external surfaces, are finished to a very high quality thereby dramatically reducing construction and finishing time.

Furthermore, the clean dry construction process eliminates the need for bricklaying and most plastering.

More cost effective than other building products

The following chart is based on the construction of a 130m² demonstration house in Mumbai, India.

Materials used	Rapidwall Building	Conventional Building	Saving in %
Cement	16 tonnes	32.55 tonnes	50.8
Steel	1800 kg	2779 kg	35.2
River sand	20 m ³	83.37 m ³	76
Granite metal	38 m ³	52.46 m ³	27.56
Bricks	-	57200	
Rapidwall	500m ²	-	
Water	50000lt	200000lt	75
Built Area	143m ²	154.45m ²	8
Labour	389 man days	1200 man days	67.59
Construction Time	21 days	120 days	82
Total Weight of superstructure	170 tonnes	490 tonnes	65
Construction Cost	\$US 26,800	\$US 36,980	27.5
Embodied energy in kWh	82921	215400	61.5

C) The Environment

The global warming debate rages and will continue to do so into the foreseeable future.

Roger A. Pielke, Jr., and Daniel Sarewitz, Columbia University say this:

“Climate impacts occur because society and environment are vulnerable. This vulnerability might take the form of urban development on a flood plain or on an unstable mountainside, or it might mean a species stressed through loss of its habitat.”

"Human-caused or not, these changes are likely to have impacts on society and the environment. Natural disasters, human health, biodiversity, endangered species, water resources, international trade, financial services, transportation networks, agriculture — virtually any area of human experience is in some way affected by climate. These impacts are occurring today, and they hold the prospect of increasing in the future. And for the most part, we are doing too little in response."

Regardless of which side of the debate you favor, most agree that if we humans are acting in ways that could adversely affect our environment we should act appropriately.

At Rapidwall we have taken these precautions.

- Rapidwall is produced from inert naturally occurring gypsum or from by-product chemical gypsums. Removing excess by-product chemical gypsum and turning it into Rapidwall panels and subsequently homes not only cleans up the environment but provides an opportunity to give disadvantaged people a place to call their own.
- Rapidwall reduces, if not eliminates environmental damage caused by the degradation of precious agricultural resources needed in traditional building materials. Clay for bricks, water, sands and metals for concrete.
- Compared to these traditional building products Rapidwall uses 50 percent of the energy.
- Rapidwall has such low CO2 emissions it will become eligible for Carbon Credits.
- Rapidwall is 100% recyclable.
- Its production and manufacturing has little impact on the environment.

Environmental Benefits

Gypsum is the primary raw material for the manufacture of Rapidwall.

Throughout the world, natural gypsum as well as synthetic gypsum is used for Rapidwall.

Natural gypsum is an inert, naturally occurring, material and available in vast quantities all over the world. In all countries gypsum is used as a clay breaker to enhance the yield of farming land.

Many millions of tonnes of flue gas gypsum and phospho gypsum are produced annually as



by-products of coal fired power stations and chemical fertilizer industries and in many cases this waste is itself becoming an environmental problem.

By utilising Rapid Building Systems' Rapidflow calcination equipment, phospho gypsum, flue gas gypsum and other industrial gypsums can be turned into plaster and subsequently into Rapidwall buildings that are environmentally friendly, non polluting, energy efficient and aesthetically pleasing; thereby cleaning up the environment.

In formulating Rapidwall building panels, the main ingredients are plaster and water supplemented with relatively small amounts of other materials to obtain excellent water resistant and strength properties.

The other raw materials consist of retarder, a water proofing agent, polymers, consistency modifiers, release agents and fibre glass rovings.

These ingredients are sourced through the petrochemical, mineral and vegetable oil industries and are all supplied with comprehensive Material Safety Data Sheets for safe and environmentally responsible use. There are no animal products required or used.

Rapidwall is continuing with research and development on raw materials and additives to obtain even better performances within strict ecological guidelines, whilst maintaining quality and recycling status as top priorities.

In a diverse range of countries and communities where Rapidwall is active, traditional customs, beliefs and religions are treated with the highest respect, before and during the life cycle of the respective projects.

Eliminating environmental damage

China outlawed the use of clay bricks in 2002 because of the damage caused by the mining of clay and because of the pollution caused by firing the many thousands of kilns. So important does China view this issue, they now operate in Beijing, a "Ministry of Walling" with the sole responsibility of finding and introducing new types of energy efficient and environmentally friendly walling products.

The Government of India has arrived at a similar conclusion in regard to the use of Rapidwall, and production started two years ago.

The single panel Rapidwall system serves as both the internal and external wall and eliminates the need for bricks, blocks, timber and steel wall frames and plasterboard linings.

The lowest energy embodied building product

"Rapidwall panels are the lowest embodied energy building material available on the world

market."

Quote from thesis by Robert Omahen Faculty of Economics, University of Regensburg, Germany © 2002.

Embodied energy is the energy consumed by all of the processes associated with the production of a building, from the acquisition of natural resources to product delivery, including mining, manufacturing of materials and equipment, transport and administrative functions.

Adding all the energy components together from gypsum mining, manufacturing panels, transporting to site and constructing a building, Rapidwall buildings are low energy consumers.

Even when concrete and insulation are used to fill cavities in the panels to provide insulation for single storeys, and strength for multi storeys, the embodied energy of Rapidwall buildings is substantially less than other buildings.

Studies have been carried out on a series of alternative building products and Rapidwall is less than 50% of these materials.

Eligible for Carbon Credits

Rapidwall has been acknowledged by the World Bank to be eligible for carbon credits, which we understand, to be the first building material to achieve such recognition.

Air drying

In many countries in the world Rapidwall building panels can be air dried in open air racks thereby alleviating the need for kiln drying process and saving on energy.

100% recyclable

- With Rapidwall, door and window openings are cut in the factory according to building design requirements.
- The partial off-cuts can be used in other parts of the building project, or returned to the plaster manufacturer for recycling.
- If not recycled, off-cuts and miscellaneous remnants of panels remaining after installation are biodegradable after pulverising.

CO2

- Carbon dioxide emissions are substantially less for Rapidwall than comparable building materials.
- One square metre of clay brickwork emits over 70kg of carbon dioxide compared with 7kg for the equivalent “Rapidwall” panel. The carbon dioxide emissions include production, transportation and installation of the respective products.
- When panels are air dried, natural water vapour is the only emission into the atmosphere, and there are no other emissions.

Environment Impacts

Environmental impact clearances have so far been obtained with each plant approval in Australia, China and India and completely comply with Environmental guidelines set by the local Environment Protection Boards.

Air Quality—exterior

- Where gypsum is calcined the emissions are kept well below any Countries legal limits.
- Plaster conveying is a minimal dust operation and any dust generated is encapsulated within the silos. Exhaust air from the dust collectors is filtered through bin vents mounted on the top of the silos and bins, and then recycled.
- Mobile equipment such as fork lift trucks operating outside the factory are equipped and fully maintained with exhausts and silencers as specified by the suppliers and local regulations.
- Access roads surrounding the factory are either made from concrete or asphalt, minimising airborne dust caused by traffic movement.

Air Quality—interior

- The factory is ventilated via natural air flows and there are no airborne emissions from the production process of producing Rapidwall.
- Efficient dust collection removes potential dust emissions at each stage of the processing.
- Mobile equipment operating within the factory site is fitted with approved exhaust systems.
- Operators are provided with masks when handling some raw materials as specified by the Supplier’s MSDS.

Water Supply, Underground Tanks and Rain Water Harvesting

- Potable water is used in the process for making Rapidwall building panels.
- Process water is sourced from local water services to the nominated industrial area.
- Additional water is sourced from recycling process water stored in underground tanks, and by harvesting rain water.

Recycled Plaster

- In the final stages of moulding and forming Rapidwall building panels, excess plaster slurry is screeded from the surface of the panels. This material is collected by the operators, placed in containers and recycled by the plaster manufacturer and/or supplier for reuse in the process
- The wet mixer is washed after each panel is mixed and formed, and the wash water is recycled and used again.

Environmentally Friendly Raw Materials

All raw materials are carefully selected to avoid toxic and hazardous substances in the process. Plaster ($\text{CaSO}_4, 0.5\text{H}_2\text{O}$) is the main raw material which is made from naturally occurring or industrial gypsum. It is a fully biodegradable material when pulverised finely and water is added, forming gypsum.

Sourcing Raw Materials All raw materials are derived from natural minerals and natural vegetable sources. There are no animal materials present throughout the process.

Plaster

Gypsum plaster is the main raw material used for making Rapidwall building panels and is produced by calcining natural gypsum rock or industrial waste gypsum with the chemical name of calcium sulphate dihydrate ($\text{CaSO}_4, 2\text{H}_2\text{O}$). Natural gypsum is mined, transported from a local source and converted into plaster by local manufacturers. The chemical name for plaster is calcium sulphate hemihydrate ($\text{CaSO}_4, 0.5\text{H}_2\text{O}$). Gypsum and plaster are both slightly soluble in water and are considered non hazardous substances.

Glass Fibre Rovings (E glass)

Glass Fibre rovings are used for reinforcing Rapidwall building panels. The rovings are cut into lengths during panel production and are wetted directly into the plaster slurry during moulding operations. Fibre glass handling and cutting are considered non hazardous activities. The fibreglass is non respirable.

Retarders are classed as food grade quality

Further information regarding raw materials used in the production and manufacture of Rapidwall or Rapidflow plasters and material safety data sheets (MSDS) are available on request from Rapid Building Systems.

Respect for Local Customs and Religious Beliefs

Rapidwall building panels are manufactured in a number of countries throughout the world and the respective customs and religions are high priorities for consideration before, during and after building new plants. In this regard great care has been taken to remain sensitive towards these important items.