

### Concrete masonry units

Concrete blocks or masonry tend to use lower volumes of cement for a given density of concrete as they use a low-cement mix, relying on vibration to produce a well compacted block.

Manufacturing and curing is quality controlled to produce blocks of consistent size and shape.

Concrete masonry typically provides a permanent formwork, which is reinforced and grouted to meet structural performance requirements.

The thermal resistance of cement block is low and additional insulation is required.

Single-skin masonry requires the application and maintenance of a weatherproof coating to prevent moisture absorption.

Concrete masonry is able to provide good thermal mass when the insulation is provided to the external face of the construction. It is also widely used to provide a modular and proportioned construction element. A range of decorative surface finishes and block colours is available.

Concrete masonry is widely used to provide fire-resistant construction, retaining walls and robust utilitarian structures. In addition a wide range of paving and other landscaping units are also available.

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Extraction and manufacture	
<b>Impact of extraction</b>	<p>Quarrying for aggregate, removal of sand and cement manufacture have the potential to create dust, noise and visual impact. In New Zealand quarries, sand removal and cement manufacturing plants are generally required to comply with specific environmental conditions under their resource consents – refer <a href="http://www.aqa.org.nz/environment.asp">www.aqa.org.nz/environment.asp</a>.</p> <p>There is potential for damage to local ecosystems during raw material extraction.</p>
<b>Use of energy and other resources</b>	<p>Embodied energy for concrete block is quoted<sup>1</sup> as 0.90 MJ/kg.</p> <p>Manufacture of concrete masonry is a significant user of water (not to the same level as concrete) although most plants recycle wastewater.</p>
<b>By-products/emissions</b>	<p>Check that the specific supplier has a wastewater collection and recycling system to collect contaminated water, wash-down water and wastewater.</p> <p>New Zealand concrete masonry manufacturing plants are generally required to comply with specific controls on plant emissions, water use and water discharge under their resource consents.</p>
Sourcing	
<b>Material sources</b>	<p>Concrete masonry units are made from locally sourced aggregate and cement.</p> <p>Some imported paving units are available (check that they are manufactured to a recognised standard).</p>
<b>Availability</b>	<p>Concrete blocks are readily available throughout New Zealand</p>
<b>Transport to site</b>	<p>Concrete masonry is relatively bulky and heavy to transport.</p> <p>Truck access to site storage position is recommended to allow pallets to be delivered close to point of use.</p>
Construction/installation	
<b>Health and safety during construction/installation</b>	<p>Safety equipment is required when handling cement (gloves, overalls) or cutting/drilling concrete with a masonry saw or drill (ear muffs, safety glasses, dust mask and overalls) to eliminate risk of skin irritation and lung damage.</p>

<b>Ease of construction/ installation</b>	Requires skilled (registered) masons. Concrete masonry is classified as a heavyweight cladding material under NZS 3604.
<b>Adaptability</b>	Once installed, concrete masonry may be relatively difficult to modify/replace.
<b>Performance</b>	
<b>Health and safety during life of building</b>	Concrete blocks are inert, non-toxic, and not prone to off-gassing of volatile materials.
<b>Structural capability</b>	Concrete blocks provide both the structure and weatherskin (though they need weatherproof coating to keep moisture out).
<b>Expected durability</b> (assuming correct installation and maintenance)	80+ years – concrete masonry is robust and durable even if wetted and is immune to insect attack. Single skin concrete masonry construction requires the application of a paint coating for weathertightness under NZS 4229.
<b>Maintenance rating</b>	Low – when used as an unpainted veneer. Medium to high when used as a single skin external wall – the weatherskin requires regular repainting every 8 – 10 years.
<b>Moisture resistance</b>	Concrete blocks absorb moisture.
<b>Rot, mould and corrosion</b>	Reinforcing steel may corrode if the quality of the grout fill is poor. Lichens and mosses may grow on damp, weathered surfaces unless the surface is treated. This does not affect the integrity of the concrete masonry.
<b>Thermal performance</b>	Concrete masonry provides low levels of thermal insulation unless a specific insulating material such as polystyrene is incorporated into the element design. Concrete masonry provides high thermal mass when exposed to a building's interior and direct warming from the sun. Thermal mass is negated where insulation material is applied to the inside of the concrete masonry. Concrete masonry installed as a veneer to the structural element provides no thermal mass benefit.
<b>Sound insulation</b>	Concrete masonry's high mass provides good sound deadening, particularly at low frequencies.
<b>Fire performance</b>	Concrete blocks will not burn. They are readily incorporated into fire resistant rated construction.
<b>Waste disposal/recycling/re-use</b>	
<b>Re-use</b>	Not currently possible
<b>Recycling</b>	Concrete masonry can be crushed and reused as aggregate in new concrete or for paving/roading.
<b>Waste disposal</b>	Demolition material can be used as clean fill.

1. Embodied energy figures taken from work © J. Andrew Alcorn, 2010. (Alcorn, J. Andrew, *Global Sustainability and the New Zealand House*, a thesis submitted to Victoria University of Wellington in fulfilment of the requirements for the degree of Doctor of Philosophy in Architecture, Wellington, 2010.)