

HANDY HINTS in specifying concrete buildings

Concrete is ideally placed to be the sustainable material of choice by virtue of its economics, thermal mass, durability, fire resistance, acoustic performance, adaptability, versatility and recyclability^{1,2}.

There is an increasing focus on constructing sustainable buildings under the Green Building Council of Australia Green Star certification process³.

The Green Star rating system allows concrete materials up to 3 credit points by replacing Portland cement with supplementary cementitious materials (SCMs) (fly ash, slag and amorphous silica), using reclaimed water and by replacing quarried aggregate with crushed slag aggregates or manufactured sand⁴.

The following issues should be considered when specifying concrete for Green Star rated buildings:

- **DO** account for reducing Portland cement over the total project, not a standard reduction for each concrete element.
- **DO** understand that generally the greater the amount of Portland cement that is replaced by SCM's, the more time it takes for concrete to achieve the same strength and durability.
- **DO** consider the time taken to achieve the required concrete strength in the design and construction of the building.
- **DON'T** remove form work or prestress the concrete element before it has obtained the required strength as this may lead to structural failure of those elements – see the table below.
- **DO** consider reducing the Portland cement content more on non structural elements such as external paths, ground slab blindings, basement, ground slab and footings rather than structural elements such as prestressed floors, columns, beams and walls.
- **DON'T** place an over emphasis on concrete material credits. Only up to 3 points are available for concrete material of out a total of 100 points that are available for the Green Star rating system.
- **DO** remember to keep the potential building cost savings due to reduce floor building cycle times, structural efficiencies and reduce concrete volumes from using precast or prestressed concrete. These may in fact provide additional Green Star environmental credits.
- **DO** download the CCAA *Green Star – Life Cycle Impacts – Concrete Credit 19B.1 User Guide* from www.ccaa.com.au, click on Resources > Green Star.
- **DO** download the CCAA Briefing 19, *Sustainable Use of Aggregates*, from www.ccaa.com.au, click on Publications > Technical Publications > Briefings, for more details on the use of crushed slag aggregates or manufactured sand.
- **DO** download the CCAA *Guide to the Specification and use of Manufactured Sand in Concrete*, from www.ccaa.com.au, for more detail on the impact of manufactured sand on concrete properties.

	Mix A	Mix B	Mix C	Mix D	Mix E	Mix F
Typical Concrete Strength	32MPa	32 MPa	32 MPa	50 MPa	50 MPa	50 MPa
Portland Cement	100%	70%	60%	100%	70%	60%
SCM	0%	30%	40%	0%	30%	40%
Typical Application	Floor slabs			Columns		
Average time take to achieve required early strength of 22 MPa in days*	4	5	6	2	3	4

* Note that the time estimated is general and can be impacted by local weather conditions and other variables.

¹ Sustainable Concrete Buildings, Cement Concrete & Aggregates Australia, Briefing 13, 2010

² Concrete the Responsible Choice, Cement Concrete & Aggregates Australia, 2010

³ <http://new.gbca.org.au/green-star/certification-process/>

⁴ Green Star – Life Cycle Impacts – Concrete Credit 19B.1 User Guide, Cement Concrete & Aggregates Australia, Aug 2017