Cyclone Yasi, Structural Reliability and the BCA

Editorial by Rod Johnston *

The *Financial Review* of 4 February 2011 featued an article headlined "Strong codes kept homes intact", and made a convincing case that changes to the "building code" since Cyclone Tracey (1974) have resulted in buildings that are more resistant to wind loads associated with cyclones, in particular Cyclones Larry (2006) and Yasi (2011).

This process of progressive improvement in both the BCA (Building Code of Australia) and the relevant structural Australian Standards referred to therein, will be augmented by a proposed amendment to the ABCB Protocol for Referenced Documents, requiring changes to structural standards to be accompanied by a statement regarding the structural reliability. [Structural reliability is a measure of the overall resistance of a structure to collapse under assumed loadings such as wind, earthquake and the like.]

Architects and engineers should ensure that all building products are capable of delivering the structural reliability implicit in the BCA. Where building products are within the scope of BCA-referenced Australian Standards, confirmation of strict adherence shoud be sought. Many building products standards make provision for a range of "grades" or similar, without specifiying the application. In these cases, the designer must determine and clearly specify the relevant grade and/or properties required for the application.

It is recommended that this principle of considering structural reliability should also be extended to Alternative Solutions and Codemark Certifications for other structural products and systems. In particular, check that design values derived from tests have been determined statistically in accordance with AS/NZS 1170.0:2002 Appendix B, accounting for the number of tests, the coefficient of variation and an implicit capacity reduction factor (ϕ). Alternate methods are also included in other standards, but these oftern yield numerically different design values.

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Why Do Building Product Suppliers Need CodeMark?

1. All building products must comply with the BCA (Building Code of Australia).

2. The first path to BCA compliance is via a relevant “deemed-to-satisfy” Acceptable Construction Practice or Acceptable Construction Manual, typically an Australian Standard.

3. If a DTS solution is not available, a second path to BCA compliance is via an “alternative solution”. This may be an “engineer designed” solution for each project, or may be via CodeMark.

4. Each state has regulations, ensuring that a CodeMark building solution cannot be rejected. For their own protection, local authorities are now insisting on either strict compliance with a relevant Australian Standard, or on CodeMark Certification.

5. The two principal requirements of CodeMark third-party certification are:

   - The manufacturer must have a properly functioning Management System (similar to ISO 9001), capable of delivering consistent product to predetermined specifications.
   - The nominated products must satisfy the nominated BCA clauses.

Why Must Ecolabels Be Benchmarked?

“…..there is a real danger that ecolabels may fail to provide enough precise data on the in-service performance for each product, under a range of applications and climates….. this could lead to poor decision-making and the selection of products, which appear to be environmentally friendly, but are, in fact, inappropriate for the actual application. ….“

“Benchmarking and Specification of Sustainable Building Products”,
Johnston, R, Gogstad, P, & Woolcock, J, UAE, 2009

1. Environmental benchmarking is done by predicting the life-cycle environmental impact of a benchmark form of construction, predicting the life-cycle environmental impact of the proposed alternative, and comparing the two. A suitable benchmark is “….. the most-common form of construction satisfying the building regulations”.

2. Environmental benchmarking enables designers and specifiers to determine, at the pre-design stage, the scale of the environmental effects of substituting one product for another.

3. Environmental benchmarking uses “Whole-of-building, whole-of-life, cradle-to-grave, Life Cycle Analysis”, including both embodied impacts (raw material, transport, manufacture, construction etc.) and in-service impacts.