

Specifying the right construction categories

A Toowoomba waste management facility has become the first development project to be specified to one of the risk-based construction categories supporting the new National Structural Steelwork Compliance Scheme (NSSCS).

The project has been specified to Construction Category 2 (CC2) by structural engineering practice, Knight Consulting Engineers which read about the Scheme in a recent edition of this magazine.

“It was all too easy to adopt,” said Knight Consulting’s **Tyson Cowie**. “We worked through the new Code of Practice to determine the right execution class which should inject even more confidence into the built design.”

The ‘Construction Category’ concept is pivotal to the new AS/NZS 5131 ‘Structural steelwork – Fabrication and erection’ which is in the process of becoming a new Australian Standard.

Construction categories offer the industry a common approach to selecting the right level of quality and assurance controls to ensure the structure meets the engineer’s design assumptions and the level of risk mitigation inherent in the Workplace Health and Safety Act.

The selection of a Construction Category for a steel structure or its components is a risk-based approach intended to provide consistency with the reliability philosophy and principles on which the fundamental load assessment (AS/NZS 1170 series) and structural design (AS 4100) are based. The approach ensures fabrication and erection recognise the importance level of the structure, what maintenance and inspection measures will be in place, the consequences of failure and the complexity of the tasks.

Construction Categories

Determining a construction category is undertaken in the design phase. The construction specification should embody the specifics of these decisions and other information necessary to fully define the necessary requirements for the chosen construction category or categories.

The BCA (for Australia), or Section 3 of AS/NZS 1170.0 (for New Zealand or for structures in Australia that fall outside of the BCA) define the Importance Levels for different structure types. Importance levels are designated from 1 (representing the lowest risk to life) up to 4 (representing the highest risk to life and/or post-disaster recover functions). The BCA itself provides limited guidance on what building or structure types fall into which importance level. However, the ‘Guide to the BCA’ provides a more detailed rationale for categorisation into importance level.

Importance level		1		2		3		4	
Service categories		SC1	SC2	SC1	SC2	SC1	SC2	SC1	SC2
Fabrication categories	FC1	CC1	CC3	CC2	CC3	CC3	CC3	CC3	CC3
	FC2	CC2	CC3	CC2	CC3	CC3	CC3	CC3	CC4

Note: The determination of the Construction Category is the responsibility of the designer

The input factors to the Risk Matrix are:

- The ‘**Importance Level**’ which reflects the risk to life and consequences of failure.
- The ‘**Service Category**’ which reflects the actions to which the structure and its parts are likely to be exposed, such as earthquake or fatigue.
- The ‘**Fabrication Category**’ which reflects the complexity of the fabrication and its components.

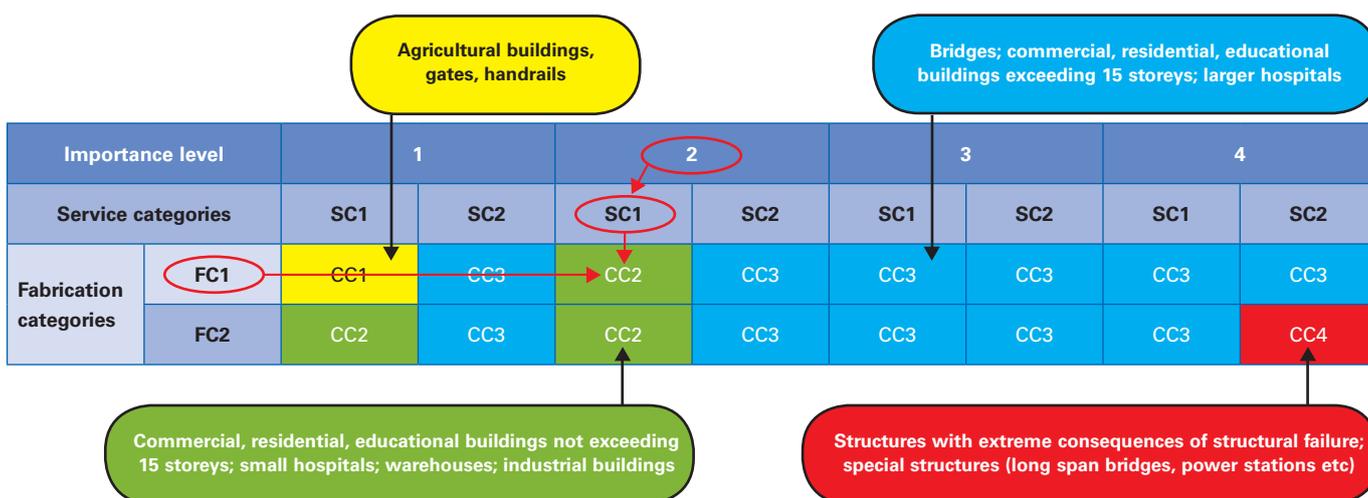
The selected **Service Category (SC1 or SC2)** reflects the uncertainty in the exposure of the structure to actions that may expose flaws during use. The structure or part of it can contain components or structural details that are categorised under different service categories. Most common structures for which design is not driven by fatigue or earthquake considerations would be classified as SC1.

Suggested criteria for service categories	
SC1	<ul style="list-style-type: none"> • Structures or components designed for predominantly quasi-static actions only. Examples include typical multi-level buildings, warehouses and storage facilities.
SC2	<ul style="list-style-type: none"> • Structures and components with members and connections designated for fatigue assessment according to Section 11 of AS 4100 or NZS 3404. Examples include road and railway bridges, cranes and immediate supporting structure (where supported off the building or structure) and structures susceptible to vibrations produced by wind, crowds or vibrating machinery. • Structures and connections designed for seismic actions in regions of medium or high seismic activity.

The selected **Fabrication Category (FC1 or FC2)** reflects the complexity of the fabrication inherent in the structure or parts of the structure. The structure can contain components or assemblies categorised under different fabrication categories. Most conventional construction with the usual grades of hot rolled sections or cold-formed structural hollow sections would be FC1.

Suggested criteria for service categories	
FC1	<ul style="list-style-type: none"> • Non-welded components manufactured from any steel grade products • Welded components manufactured from steel grade components less than or equal to Grade 450
FC2	<ul style="list-style-type: none"> • Welded components manufactured from steel above Grade 450 • Site welded components essential for structural integrity • Components receiving thermic treatment during manufacturing • Components of CHS trusses requiring end profile cuts

Typical Construction Categories



What the engineer must do

The determination of the construction category is the responsibility of the designer, taking national provisions, published guidance from industry associations and the relevant Work, Health and Safety regulations and Codes of Practice into account.

For the structural designer, the implementation at a project-specific level is straightforward:

- Determine the construction category for the building, structure or its parts
- Place notes on the project drawings
- Include necessary words in the project specifications
- If contracted, review project-specific documentation to ensure conformity to the NSSCS

Notes should be placed on all engineering drawings that specify the service category, fabrication category and construction category selected for the structure or its parts.

The form of note is straightforward and detailed in ASI Tech Note 11 'Structural Steelwork Fabrication and Erection Code of Practice – Implementation Guide for Design Engineers, available for free download from <http://steel.org.au/elibrary/asi-technical-notes/>.