AS/NZS 5131 & AS 4100
2020 UPDATE: SUMMARY OF CHANGES AND IMPLICATIONS

AUSTRALIAN STEEL INSTITUTE

OVERVIEW

On 14th August 2020, Standards Australia published an amendment to AS/NZS 5131:2016 *Structural steelwork – Fabrication and erection*. Following this, on 21st August 2020, Standards Australia published a revision to AS 4100 *Steel structures*.

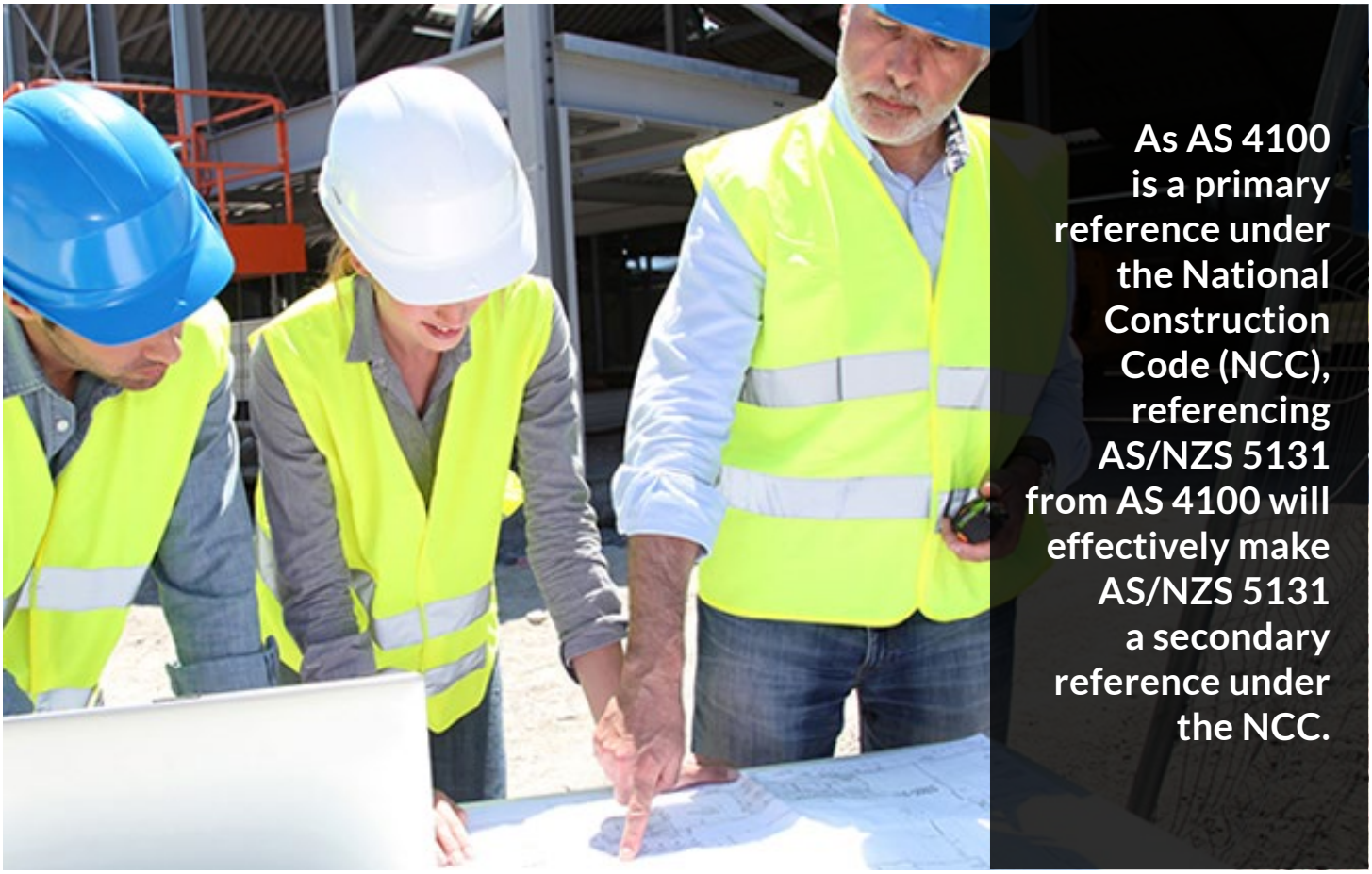
AS 4100 and AS/NZS 5131 work together to ensure risk-minimised, fit-for-purpose design and construction outcomes for steel structures. They are therefore significant for all members of the steel supply chain, including steel manufacturers, distributors, steel detailers, fabricators, erectors, designers, constructors and certifiers. **All members of the steel supply chain should be aware of the 2020 changes to these Standards,** the implications for their business and business relationships, and their duty of care under both Workplace Health and Safety (WHS) and National Construction Code (NCC) regulations.

HISTORICAL CONTEXT

Fabrication and erection of structural steel was previously addressed in two chapters of AS 4100. This was in sharp contrast to the situation in America, Canada, Europe and the UK. In each of these first-world countries, fabrication of structural steel is referenced to a self-standing separate Standard or specification, usually of a few hundred pages in length.

To ensure Australia maintained a baseline of internationally accepted 'good practice' and clearly defined quality standards, the Australian Steel Institute (ASI) developed a fabrication and erection Code of Practice, with agreement from Standards Australia that it would be submitted to become the first Standard for fabrication and erection of structural steel in Australia and New Zealand. The new Standard, AS/NZS 5131 *Structural steelwork - Fabrication and erection*, was published in 2016.

Following the publication of AS/NZS 5131, the next step was to revise AS 4100 to reference AS/NZS 5131 and remove the existing requirements for fabrication and erection from AS 4100. Significantly, as AS 4100 is a primary reference under the National Construction Code (NCC), referencing AS/NZS 5131 from AS 4100 **will effectively make AS/NZS 5131 a secondary reference under the NCC**.



AMENDMENTS TO AS/NZS 5131

The amendments of significance that have been made to AS/NZS 5131 include:

Traceability
Modifications to the definitions (Section 4) and application (Section 5) of traceability have been made to better align with international practice.

There are now three *types* of traceability, **lot**, **piece-mark** and **piece**, as further explained in Table 1 (below). The type of traceability is applied over an extent of components on the project, where the extent is defined in relation to the Construction Category, as further defined in Table 2 (below). In effect, the requirements for traceability have been 'unpacked' to allow more responsive application.

A baseline of lot traceability is required for Construction Categories CC2, CC3 and CC4, with no specified traceability for CC1. Optional piece-mark or piece traceability may be selected by the specifier if, and only if, required for CC3 and CC4. The baseline requirement for each Construction Category is indicated in Table 2. The baseline requirements are better aligned with international practice in this area.

TABLE 1: TYPES OF TRACEABILITY

TYPE	DEFINITION
Lot	For lot traceability, the material for a lot of identically fabricated components (main members, purlin cleats, etc.) shall be traceable back to a set of parent material test certificates, but an individual test certificate cannot be assigned to an individual piece of material within that lot of components. Material identification shall be transferred when part material is returned to stock and before further being allocated to other jobs.
Piece-mark	For piece-mark traceability, the raw material or fabricated component shall be traceable to the parent material test certificates at all stages through fabrication to incorporation into the works on-site, for each piece-mark, of which there may be many individual pieces. Raw material including all plate and section bought or allocated from stock for the work shall be correlated to the test certificates and incoming inspection records. Material identification shall be transferred when part material is returned to stock and before further being allocated to other jobs.
Piece	For piece traceability, the raw material or fabricated component shall be traceable to the parent material test certificates at all stages through fabrication to incorporation into the works on-site, for each piece of steel. Raw material including all plate and section bought or allocated from stock for the work shall be correlated to the test certificates and incoming inspection records. Material identification shall be transferred when part material is returned to stock and before further being allocated to other jobs.

TABLE 2: BASELINE REQUIREMENT FOR EACH CONSTRUCTION CATEGORY (CC)

CONSTRUCTION CATEGORY	BASELINE REQUIREMENT
Construction Category 1 (CC1)	Test certificates shall be available for all steel material. The grade of steel shall remain identifiable for all steel material. Individual plate and section components shall be marked or otherwise designated to ensure the grade can be correlated directly with the fabrication drawing or data.
Construction Category 2 (CC2)	Test certificates shall be provided for all steel material. Lot traceability for main structural members, connections between main structural members and major plate components (for fabricated plate web girders and the like).
Construction Categories 3 (CC3) and 4 (CC4)	Test certificates shall be provided for all steel material. Lot traceability for all items (including cleats, brackets and the like). Piece or piece-mark traceability is required if so designated in the construction specification.

Apart from 'unpacking' traceability to make it more flexible in its application, the significant difference with the 2020 amendment to AS/NZS 5131 is that lot traceability is the baseline for the CC2, CC3 and CC4 construction categories. The extent of application from main members to all members and components varies between the construction categories. For CC3 and CC4, the specifier may choose to require increased type traceability, either piece-mark or piece traceability. The previous version of AS/NZS 5131 required, in effect, piece traceability for all components for the higher construction categories.

The application of traceability has been one of the significant functional requirements for fabricators. ASI believes that this amendment makes traceability better aligned with industry expectations and international good practice.

AS/NZS ISO 3834

In AS/NZS 5131:2020 there is now normative reference to AS/NZS ISO 3834 *Quality requirements for fusion welding of metallic materials*, which was previously an informative reference. The good news is that the processes in AS/NZS 5131 were already aligned with the requirements of AS/NZS ISO 3834, a specific decision made by the Standards committee at the time of first publishing AS/NZS 5131. Therefore, the now normative reference to AS/NZS ISO 3834 does not actually introduce much by way of new requirements. ASI will shortly publish a new Technical Note discussing certification and comparing the scope of AS/NZS 5131:2016 and AS/NZS ISO 3834.

ABCB ALIGNMENT

With the publication of the revision to AS 4100, which now directly references AS/NZS 5131, there were necessary wording revisions throughout the document to reflect Australian Building Codes Board (ABCB) requirements for documents referenced under the National Construction Code (NCC). These changes are generally not 'mission critical'. In many cases "shall" has been changed to "should", which effectively makes the requirement non-mandatory. However, these changes were often to do with referencing, for example, normative referencing of manufacturers specifications or installation instructions. Normative referencing of third-party material is not supported by the ABCB, as it effectively makes manufacturers' specifications or installation instructions part of regulation, yet the ABCB has no control over this documentation.

RISK MATRIX

There has been a small but important change to the risk matrix used to assess the Construction Categories. For structures which are Importance Level 3 under the NCC, and with simple construction, the recommendation has changed from "CC3" to "CC2/CC3" with a note to allow engineers to specify CC2 where the construction is simple, as indicated in Figure 1. This small but important change will have significant impact on increasing the range of structures that CC2 fabricators can rightly work with.

IMPORTANCE LEVEL		1		2		3		4	
SERVICE CATEGORY		SC1	SC2	SC1	SC2	SC1	SC2	SC1	SC2
FABRICATION CATEGORY	FC1	CC1	CC3	CC2	CC3	CC2/ CC3(1)	CC3	CC3	CC3
	FC2	CC2	CC3	CC2	CC3	CC3	CC3	CC3	CC4

Note 1: The assessment of CC2 or CC3 for this designation marked should be based on engineering judgement and the relative simplicity of fabrication and erection of the structure.

Figure 1 Risk matrix for assessment of the Construction Category (CC)

These changes have been in response to industry feedback and ASI engagement with Standards to ensure AS/NZS 5131 continues to be responsive to industry needs and supports our fabricators and related industries. It is, in fact, pleasing that with the first major amendment to the new Standard AS/NZS 5131, the changes required were limited and responsive to industry concerns. It is an indication that the new Standard is working and has been accepted by industry.

It is now more important than ever that fabricators step up to the mark and ensure that their processes comply with the requirements of AS/NZS 5131.

REVISION OF AS 4100

The primary reason for revising AS 4100:1998 was to reference AS/NZS 5131 'Structural steelwork – Fabrication and erection'. The Standards committee BD-01 took the opportunity to also include a number of further updates consistent with updates to a number of other steel-related Standards that had occurred since the 2012 amendment to AS 4100.

The major changes to AS 4100:1998 include:

- **Fabrication and erection**: Sections 14 and 15 on fabrication and erection respectively have been reduced considerably in extent, retaining only the critical elements where engineering input is required and referencing AS/NZS 5131 for the majority of fabrication and erection requirements
- **Construction Category**: Selection of the Construction Category (previously only in AS/NZS 5131) has been made an engineering requirement, together with a new Appendix L providing guidance on selection of the Construction Category, including the same risk matrix as shown in Figure 1
- **Architecturally exposed structural steel**: Definition and description of 'architecturally exposed structural steel' (AESS) allows engineers to ensure their specifications accurately convey architectural intent and that intent ties into the requirements for AESS in AS/NZS 5131
- **Lamellar tearing**: definition and description of lamellar tearing. Addressing the likelihood of lamellar tearing in particular welded connections is a responsibility shared between engineers and fabricators
- **High strength bolts**: Introduction of a new "alternative bolt assembly type" to EN 14399-3 Type HR for grade 8.8 bolts and an "additional bolt assembly type" to EN 14399-3 Type HR for grade 10.9 bolts, together with specific design requirements for grade 10.9 bolts
- **Geometric tolerances**: New specification of geometrical tolerances for fabrication and erection aligned with AS/NZS 5131
- **Construction specification**: Reference to the "construction specification" (as the document containing the particular design data and details to be provided) as one deliverable from the design process

The nett effect of these changes is to more effectively tie fabrication and erection into the project process and ensure engineers clearly articulate engineering intent for risk-minimised fit-for-purpose fabrication outcomes.

It is important that engineers adequately convey design intent. The usual mechanism is via the construction specification prepared by the engineer for the project. ASI has created (and recently updated) the 'National Structural Steelwork Specification' (NSSS) and associated 'Standard Drawing Notes', specifically intended for engineers to utilise. These documents are a free download in Word and PDF format from: https://www.steel.org.au/focus-areas/quality-and-compliance/national-structural-steelwork-specification/

Download the NSSS as a PDF

Download the NSSS in Word

Download Drawing Notes as a PDF

Download Drawing Notes in Word

A complete and correct specification helps to manage risk for the project and engineer's duty of care under the Workplace Health and Safety Act and the 'Safe Design of Structures' Code of Practice. ASI has prepared tools for achieving compliant steel and steelwork outcomes for many members of the supply chain under the 'Responsible steelwork procurement' initiative – see https://www.steel.org.au/focus-areas/responsible-steelwork-procurement/

FURTHER INFORMATION

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