CERTIFICATION AND INTRODUCTION OF AS/NZS 5131

ESSENTIAL CHANGES

Standard AS/NZS 5131 Structural Steelwork – Fabrication and Erection has now been released and will replace the Code of Practice (CoP) for the purposes of Certification under the ASI National Structural Steelwork Certification Scheme (NSSCS).

The ASI, as the peak body for the steel industry, established the Scheme in response to government, industry, fabricator and stakeholder complaints in regard to non-compliant product in the construction sector. In particular, imported materials and products.

The Scheme provides a platform to ensure that fabricators compete on a level quality basis, both internationally and domestically.

The Code of Practice was used as the basis for the new standard, AS/NZS 5131. It reflects well on the structure of the original Code of Practice that the new standard has relatively few changes from the Code of Practice.

As a consequence, all fabricators currently certified to the Code of Practice will be issued with new certificates reflecting compliance to AS/NZS 5131 and to their existing Construction Categories.

There will be no change to the dates associated with the certification process and the timing requirements for future Surveillance Audits and Re-certification Audits.

The fabricator is required to review the new standard AS/NZS 5131 and this document to ensure essential differences are incorporated into the fabricators business processes and procedures. This will be reviewed at the fabricators next surveillance or re-certification audit.

The following items are seen as some of the more significant changes between AS/NZS 5131 and the Code of Practice. In the commentary below, the initial clause reference applies to AS/NZS 5131.

1 Clause 4.1.3. Treatment Grades.

This has been included under Section 4, Design, Specification, Documentation and Traceability, to highlight the importance of the definition of Treatment Grades relating to the clean-up and dressing of structural steel before corrosion protection.

Clause 9.8.4 of AS/NZS 5131 provides definition around the 3 Treatment Grades (P1, P2, P3) and this has not changed from the CoP (Clause 9.9.4).

2 Clause 4.1.4 Geometrical Tolerances

Required geometrical tolerances are set down in Appendix F. This is a more comprehensive suite of tolerances than provided under the CoP and the tolerances are also treated and defined differently.

There remains 3 sets of tolerances:

- Manufacturing tolerances (as apply to Mills and manufacturers of the source product)
- Fabrication tolerances
- Erection tolerances

Under the CoP the 'fundamental tolerances' (one class only) were shown in the Appendix as 'Permitted Deviations' and in some cases were further categorised as 'Fundamental Tolerances' required to satisfy the design assumptions for the structural element in terms of design capacity.

AS/NZS 5131 now defines Functional Tolerances and Essential Tolerances.

Functional tolerances are defined as Class 1 and Class 2 (requirement strictness increases from Class 1 to Class 2).

AS/NZS 5131 indicates that Class 2 should be considered for CC3 defined activities.

Essential tolerances are defined as required for the mechanical resistance and stability of the completed structure.

Where not clarified or defined in the Construction Specification (i.e. via the customers Contract or Purchase Order on the fabricator), Class 1 Functional Tolerances shall apply.

Comment: It is important that the fabricator provides definition around tolerances to shop floor and site personnel and it is important that the documentation used to issue packages of work to the shop floor and site erection crews is able to clearly define the tolerances applicable to each package of work.

3 Coating Quality Level

AS/NZS 5131 now defines 2 levels of Coating Quality, PC1 and PC2.

These are referenced in Clauses 4.5.1 and 4.5.2 and defined in Clause 9.2.1.

PC1 applies to coatings applied in atmospheric corrosivity category C1 and C2 and where surface preparation is by hand or power tool cleaning or abrasive blast cleaning to Sa1.

PC2 applies to all other atmospheric corrosivity categories and where abrasive blasting to greater than Sa1 is required.

Refer Attachment A of this document for indicative details of corrosivity categories.

Where PC2 is specified, a higher level of documentation is required and includes:

- QMS as per Clause 4.5.1
- Quality Plan as per Clause 4.5.2
- Inspection and Test Plan as per Clauses 13.8.1

Comment: Where the fabricator self performs surface preparation and painting to PC2, the above documentation needs to be in place.

Where the fabricator subcontracts the corrosion protection (including surface preparation and painting and galvanising), it is the fabricators responsibility as part of the purchasing and subcontracting processes to ensure the corrosion control subcontractor complies with the above.

4 Clause 4.5.3 Safety of the Works

This clause, which replaces CoP Clause 4.4.3, now covers all aspects of the works including fabrication, welding, coating, mechanical fastening and erection.

There is a more uniform and consistent approach to safety and is supported by further definition in each section of the Standard.

Comment: The current audit processes have effectively taken into account safety requirements throughout the various phases of construction.

5 Clause 4.6 Purchasing – Components and Subcontracted Services

This is an important process that was not specifically referenced in the CoP.

Comment: The existing audit process reviewed purchasing arrangements due to the importance of this activity and due to the recognition of this activity in both ISO9001 and ISO3834 which is heavily referenced in both the CoP and AS/NZS 5131.

6 Clause 5.5.7 Foundation bolts

Section 5.5 Mechanical Fasteners, has generally been re-formatted.

Clause 5.5.7 relates to Foundation Bolts and provides better definition than existed in the CoP.

7 Clause 7.4.3 Welding Coordination

This replaces CoP Clause 7.5.2 Welding Supervision.

Comment: AS/NZS 5131 introduces 'welding coordination personnel' which allows for broader definition of personnel involved at the various stages of welding activities.

However, there is no real change in arrangements in this regard and the role of welding supervisor remains relevant in both AS/NZS 5131 and AS/NZS 1554 Clause 4.12.1.

It perhaps supports the reality that the Welding Supervisor may not be in attendance at the work face 100% of the time and that some of those activities can be accommodated by other suitably competent personnel within the business. See also Note 2 of AS/NZS 1554 Clause 4.12.1.

AS/NZS 1554 Clause 4.12.1 (e) allows for the qualification of the welding supervisor to include '3 years' experience in the fabrication of welded structures' and 'have other qualifications or experience acceptable to the principal conforming to the requirements of ISO14731 with specific technical knowledge and experience in the fabrication of welded steel structures'.

We would point out the Principal is the purchaser or owner of the structure being fabricated or erected or a nominated (suitably qualified) representative.

The fabricator therefore needs to ensure that where the welding supervisor is not formally qualified, the arrangements under the contract accommodate qualifications as per AS/NZS 1554 Clause 4.12.1(e).

SCA takes the view for all Construction Categories that all weld procedure qualifications and welder qualifications should be supervised, witnessed and approved by a formally qualified welding supervisor (can be a subcontractor for these purposes).

The fabricator needs to demonstrate the structure of welding related personnel is suitable and that welding related personnel involved in the business to cover weld procedure qualifications, welder qualifications and control of welding are competent and available when required. Where the business does not directly employ a formally qualified welding supervisor the fabricator needs to be able to demonstrate the arrangements that would be/are put in place to introduce a formally qualified welding supervisor for whatever duration deemed and agreed necessary.

8 Clause 7.5.7 Tack Welds

This replaces Clause 7.9.4 of the CoP and introduces better definition around requirements for tack welding.

9 Clause 7.6.2 Seismic requirements

New requirement under Clause 7.6, Acceptance Criteria requirements.

10 Clause 7.6.3 Fatigue Requirements

New requirement under Clause 7.6, Acceptance Criteria requirements.

11 Clause 7.6.4 Welding dissimilar steels

New requirement under Clause 7.6, Acceptance Criteria requirements.

12 Clause 9.4.4 Surface Finish

Requirements for the minimum angular profile of abrasive blasted surfaces has been increased from 25µm to 40µm.

Comment: Refer comments in item 3 above.

This needs to be reflected in all related documentation including work instructions, ITPs, purchase orders, subcontracts etc.

13 Section 10 Architecturally Exposed Structural Steelwork (AESS)

This is new section in AS/NZS 5131 that is substantially the same as Clause 9.16 of the CoP.

Tables 10.2 has been introduced to provide better definition around the definitions for the various categories of AESS.

14 Section 11 Erection

14.1 A number of changes have been made to this section.

14.2 Clause 11.4 Erection Design has been added and this references stability and protection against progressive collapse of the structure during construction.

14.3 Clause 11.5 Erection Process introduces the concepts of the Erection Sequence Methodology (ESM) as per 11.5.1.

14.4 Clause 11.5.5 Inspection and removal of temporary supports. This new clause requires actions to be taken around the safe removal of braces, props, frames and other items introduced to provide temporary support.

14.5 Clause 11.8 Erection Work at Site. This now includes the requirements for erection to be undertaken in accordance with the ESM described in 14.3 above.

Comment: Where the fabricator self performs site erection, documentation to reflect the above needs to be in place.

Where the fabricator subcontracts the site erection, it is the fabricators responsibility as part of their purchasing and subcontracting processes to ensure the site erection subcontractor complies with the above.

Reference is also made to Attachment B which includes:

- ASI Practical Guide to Erection of Structural Steelwork v3.2
- Building 1 – Member Erection Sequence Schedule
- Example Erection Sequence Diagrams

15 Clause 13.6.1.2 Inspection and test plan for welding

Clause 12.6.2 of the CoP required an ITP for welding for CC3 or when required under the Construction Specification.

AS/NZS 5131 now requires an ITP for welding for CC1 and CC2 to be prepared:

- When required by the construction specification;
- Where welding is subcontracted;
- When the work is required to be inspected by an inspection authority or the principal

Comment: This can be covered in detail in each related ITP or can be covered by a standard specification, work instruction (covering inspection arrangements) or the like, prepared and used by the fabricator, which sets down the requirements included in 13.6.1.2.

Where welding is subcontracted, the requirements of Clause 13.6.1.2 needs to form part of the subcontractors obligations as part of the fabricators purchasing or subcontract documentation.

Attachment A

Atmospheric corrosivity categories and examples of typical environments

Corrosivity category and risk	Low-carbon steel Thickness loss (µm)[a]	Examples of typical environments in a temperate climate (informative only)	
		Exterior	Interior

C1 very low	≤ 1.3	-	Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels
C2 low	> 1.3 to 25	Atmospheres with low level of pollution Mostly rural areas	Unheated buildings where condensation may occur, e.g. depots, sports halls
C3 medium	> 25 to 50	Urban and industrial atmospheres, moderate sulphur dioxide pollution Coastal area with low salinity	Production rooms with high humidity and some air pollution e.g. food-processing plants, laundries, breweries, dairies
C4 high	> 50 to 80	Industrial areas and coastal areas with moderate salinity	Chemical plants, swimming pools, coastal, ship and boatyards
C5-I very high (industrial)	> 80 to 200	Industrial areas with high humidity and aggressive atmosphere	Buildings or areas with almost permanent condensation and high pollution
C5-M very high (marine)	> 80 to 200	Coastal and offshore areas with high salinity	Buildings or areas with almost permanent condensation and high pollution

Atmospheric corrosivity categories and examples of typical environments (BS EN ISO 12944-2[1])

Notes:

- 1µm (1 micron) = 0.001mm
- [a] The thickness loss values are after the first year of exposure. Losses may reduce over subsequent years.
- The loss values used for the corrosivity categories are identical to those given in BS EN ISO 9223[2].
- In coastal areas in hot, humid zones, the mass or thickness losses can exceed the limits of category C5-M. Special precautions must therefore be taken when selecting protective paint systems for structures in such areas.