

The New Zealand Structural Steelwork Specification in Compliance with AS/NZS 5131: Key Elements to Managing the Compliance of Fabricated Structural Steelwork

Author: Alistair Fussell¹, Kevin Cowie¹, Michail Karpenko²
Affiliation: ¹Steel Construction New Zealand Inc., ²NZ Heavy Engineering Research Association
Date: 11/02/19
Ref: FAB 2001

Keywords

Conformity, conformity assessment bodies, structural steelwork, structural steel contractor, factory production control, production inspections, AS/NZS 5131

Introduction

The Structural Steelwork – Fabrication and Erection standard AS/NZS 5131 (SA/SNZ, 2016c), is cited as an acceptable standard for demonstrating compliance with the Building Code. This standard published in 2016, was developed in response to the increased compliance risk posed by global sourcing of fabricated structural steelwork. AS/NZS 5131 defines what competent structural steel contractors must do to control and demonstrate the quality of their work.

The following challenges apply to implementing this standard:

1. no methodology for establishing that structural steel contractors meet the requirements of the standard
2. no assignment of tasks, particularly for inspections
3. no mandatory competency requirements for all key production and inspection personnel

To address these challenges, Steel Construction New Zealand developed the “New Zealand Structural Steelwork Specification in Compliance with AS/NZS 5131” (NZSSS; SCNZ, 2018c). This specification was intended to help implement the recently cited structural steelwork fabrication and erection standard for New Zealand building and infrastructure projects. It also includes requirements for managing the compliance of structural steel products and fabricated structural steelwork.

This article discusses the compliance management strategy that underpins the specification for both New Zealand and offshore fabricated structural steelwork.

Overview of AS/NZS 5131

AS/NZS 5131 specifies minimum requirements for the fabrication and erection of structural steelwork, including technical and conformity requirements. The technical requirements cover minimum standards of workmanship and any fabrication process limitations to avoid detrimentally altering the mechanical properties of the steel or introducing imperfections that could lead to brittle behaviour. The conformity requirements comprise tasks to be undertaken by the structural steelwork contractor to control and demonstrate the quality of their work. These conformity requirements are discussed in the *Qualifying Structural Steel Contractor* section and Appendix A.

A feature of AS/NZS 5131 is that there is risk differentiation of the technical and conformity requirements, designated by the four construction categories: CC1 to CC4. A CC1 designation is applicable to steelwork for a project with the least risk, whilst a CC3 or CC4 designation represents the projects with the highest risk. The design engineer must categorise their steelwork into one or more of these construction categories. Figure 1 provides examples of construction categories for various types of steel structures.

For more information about AS/NZS 5131, refer to SCNZ Fact Sheet FS3 (SCNZ, 2018a).

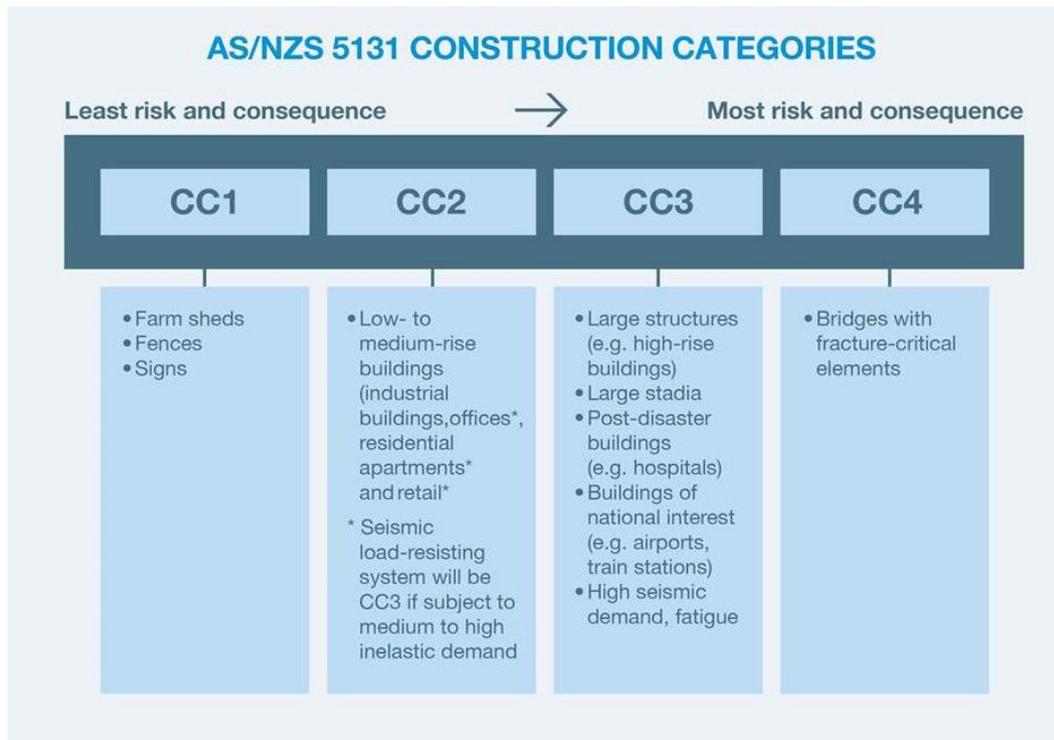


Figure 1 Examples of construction categories for various types of steel structures

Elements of NZSSS Dedicated to Quality Management

The key elements utilised in the specification for managing compliance are:

- Qualifying requirements for structural steel contractors
- Documentation review
- Independence of inspections
- Good sourcing practices for structural steel products

Each of these elements will be discussed in the following sections.

Qualifying Structural Steel Contractors

AS/NZS 5131 Requirements

AS/NZS 5131 does not address how structural steel contractors are qualified for structural steelwork contracts. The key conformity requirements in AS/NZS 5131 to control and demonstrate the quality of a structural steel contractor's work are:

1. Competent personnel
2. Fit for purpose, regularly maintained, and calibrated equipment
3. Procedures for controlling key manufacturing processes. Control of the welding process is an important element of the standard. It is recommended weld quality management is accordance with the requirements of AS/NZS ISO 3834 – Quality requirements for fusion welding of metallic materials (SA/SNZ, 2008)
4. Inspection and test plans to demonstrate conformity of workmanship with the technical requirements of the standard
5. A quality management system (QMS) under which all fabrication and erection processes operate

Items 1-4 equate to a factory production control (FPC) system whereas item 5 is a QMS. Both FPC and QMS are discussed in Appendix A.

AS/NZS 5131 does not address how compliance with the conformity requirements of the standard are assessed. This deficiency means that it can be challenging for builders and tender evaluation teams to identify structural steel contractors who comply with the requirements of the standard.

The standard does, however, provide a basis for establishing a third-party structural steel contractor certification scheme to identify companies who do meet the requirements of the standard such as the HERA Certifications Ltd Steel Fabrication Certification (SFC) Scheme. This provides the simplest and most reliable approach to qualifying structural steel contractors for structural steelwork contracts. For more information about the SFC scheme, refer www.steelfabcert.co.nz.

NZSSS Requirements

The NZSSS specifies structural steel contractors are qualified for structural steelwork contracts by:

- Certification under the HERA Certifications Ltd Steel Fabrication Certification (SFC) Scheme or
- Desktop review of a compliance document submitted at tender time demonstrating how the structural steel contractor will meet the requirements of AS/NZS 5131. Qualification by the desktop route is subject to Engineer and Principal approval and additional requirements apply. The additional requirements are discussed in the following paragraphs.

Two recommendations are also given in the informative notes in the Fabricator Qualification section of the NZSSS:

1. The tender evaluation team engage specialist expertise to review the compliance document submitted (if structural steel contractor qualification is by the desktop review route.) The rationale for this is that tender evaluation teams typically do not have the specialist knowledge to assess the compliance or otherwise of a structural steel contractor from the documentation provided
2. For construction category 3 and 4 projects (high risk projects), the use of non SFC certified structural steel contractors should only be limited to those who have some form of independent assessment and certification of their capability. Less robust alternatives to SFC certification are:
 - a. ISO 3834 - Quality requirements for fusion welding of metallic metals (ISO, 2005) and ISO 9001 – Quality Management Systems – Requirements (ISO, 2015)
 - b. Certification under an international certification scheme

A compliance document must still be submitted for structural steel contractors with alternative certifications in order to demonstrate how they will comply with the requirements of AS/NZS 5131 outside the scope of their certification. Alternative structural steel contractor certifications to SFC certification are discussed in Appendix A.

If a structural steel contractor is qualified by the desktop route, additional requirements apply. There is an increased requirement for documentation review and independent inspections. The additional documentation review and independent inspections are discussed in the following sections. The rationale for these additional requirements is that desktop review of a compliance document is a less robust approach to establishing structural contractor compliance with the requirements of AS/NZS 5131 than factory audit and certification under the SFC scheme.

An additional consideration for a desktop review qualified structural steel contractor is that the compliance document may have been prepared solely for the purpose of the tender bid and does not represent standard operating practice for the company. It is therefore important that the construction reviewer ensures the structural steel contractor adheres to the conformity procedures submitted in the compliance document during fabrication and erection of the contract works.

Documentation Review

AS/NZS 5131 Requirements

AS/NZS 5131 requires the structural steel contractor to have the following documentation:

1. Quality documentation
2. Quality management system
3. Quality plan (only mandatory for CC3 and CC4 projects unless specified in contract documents)
4. Inspection and test plans
5. Shop drawings
6. Manufacturer data records (checklists, inspection documentation, test reports etc)

Items 1 and 2 represent the structural steel contractor's written standard operating procedures for controlling quality while items 3,4,5 and 6 are specific to a particular contract. Items 1 and 2 are discussed in Appendix A.

NZSSS Requirements

The NZSSS differentiates between the documentation requested from the structural steel contractor for review, depending on the qualification route taken. The documentation review requirements are as follows:

SFC Qualified Structural Steel Contractor

1. Inspection and test plan
2. Shop drawings
3. Manufacturer data

Desk-top Review Qualified Structural Steel Contractor

1. Quality documentation
2. Quality plan (if required)
3. Personnel list (supervisors/inspectors)
4. Inspection and test plan
5. Shop drawings
6. Manufacturer data report

Item 1, and possibly 2 and 3 in the second list may be addressed at the tender stage as part of the desktop review of the structural steel contractor's compliance document. Items 4 and 5 will be reviewed at the post tender stage, prior to fabrication beginning. Item 6 will generally be reviewed at the end of the project as evidence that the structural steel contractor has operated its factory production and quality management systems. The only exception to this timeframe is that the inspection documentation for the structural steel should be reviewed prior to any fabrication beginning. This recommendation is applicable to SFC and desktop qualified structural steel contractors.

The reason there is less documentation required to be submitted and reviewed by the project engineer/ construction reviewer for SFC certified structural steel contractors, is that the quality documentation and quality plan requirements are addressed as part of their SFC audit and certification process.

The manufacturer's data report (6) will contain an extensive amount of information. The required manufacturer data to be supplied for review by the construction reviewer is construction category dependent, this is specified in the NZSSS.

It is recommended that appropriate expertise is contracted to assist the construction reviewer review the documentation submitted by non-SFC certified structural steel contractors.

Independent Inspection

AS/NZS 5131 Requirements

Documented inspection and test plans are required for structural steelwork fabricated and erected to the construction category 2, 3 and 4 requirements of AS/NZS 5131. Inspections are to be undertaken by competent personnel. Inspection and test plans are required to cover all key processes including:

1. Material and components
2. Preparation and assembly
3. Welding
4. Mechanical fastenings
5. Surface treatment
6. Paint coatings
7. Galvanized coatings
8. Erection

There are, however, limitations with the inspection provisions of the standard in terms of the definition of competency and independence of inspections. With respect to competency, AS/NZS 5131 provides only limited guidance on the minimum qualifications and relevant experience of inspectors. Qualifications are mandated for welding inspectors while those given for coatings inspectors are guidelines only. Informative guidance is also provided in AS/NZS 5131 for the minimum relevant experience required for inspectors.

AS/NZS 5131 does not address the matter of independence of inspection because it does not specify who should be undertaking inspections and testing. They could be first party (structural steel contractor), second party (independent party engaged by the structural steel contractor) or third party (independent party engaged by the builder or the principal) inspectors.

Historically, items 1, 2, 4, and 8 have been undertaken in-house by the structural steel contractor. The visual inspection of item 3 (welding) has traditionally been undertaken in-house, provided that the structural steel contractor has appropriately qualified personnel. Non-visual examination (ultrasonic, radiographic), however, has usually been contracted to an independent weld inspection company and paid for by the structural steel contractor. Guidance on the independence of surface treatment (item 5) and paint coatings (item 6) inspections has been provided in AS/NZS 2312.1 (SA/SNZ, 2014a). In this document, the independence of inspections is governed by the performance demand of the system, either the service environment or the extent of surface preparation required for the system. AS/NZS 5131 recognises the performance demand of coating systems by way of coating quality levels, PC1 and PC2. The NZSSS independence of inspection requirements for surface treatment and coatings inspections are based on the AS/NZS 5131 coating quality levels.

NZSSS Requirements

The NZSSS inspection requirements include independence of inspections not addressed in AS/NZS 5131 and mandatory qualifications for welding, surface preparation and coatings inspectors. This contrasts with AS/NZS 5131, which only provides guidelines on the surface preparation and coatings inspector qualification requirements.

The extent of independent inspections is dependent on whether the structural contractor is SFC certified or not. These requirements, taken from Appendix C of the NZSSS, are as follows:

SFC Certified Structural Steel Contractor

Independent Inspection Area	Required	
	CC2	CC3/CC4
Materials and Components		
Preparation, Assembly and Fabrication		
Welding (visual*)		
Welding (non visual – radiographic/ ultrasonic)	✓	✓
Fastening		
Surface Treatment (PC2 only)	✓	✓
Paint Coatings (PC2 only))	✓	✓
Galvanised Coatings (if required)	✓	✓
Erection		

NB Independent inspectors may cover more than one area

*Contingent on the structural steel contractor having suitably qualified in-house weld inspection personnel

Non SFC Certified Structural Steel Contractor

Independent Inspection Area	Required	
	CC2	CC3/CC4
Materials and Components	✓	✓
Preparation, Assembly and Fabrication		✓
Welding (visual and non-visual)	✓	✓
Fastening		✓
Surface Treatment (PC2 only)	✓	✓
Paint Coatings (PC2 only)	✓	✓
Galvanised Coatings (if required)	✓	✓
Erection		✓

NB Independent inspectors may cover more than one area

The philosophy underpinning the specification inspection requirements is that when using non-certified structural steel contractors, increased independent inspections are required to help manage the increased quality risk associated with such structural steelwork contractors. Consistent with a risk-based approach, the extent of items requiring independent inspection in the NZSSS increases with the project risk (construction category) and structural steel contractor risk.

One point to note is that the specification recommends that independent inspection be paid for by the builder not the principal as the builder is the party responsible for constructing the structure in accordance with the contract documents. An important requirement for independent inspection personnel is that they must have suitable training and experience with New Zealand standards and steelwork of similar scale and complexity of the contract. The requirement for inspection personnel to have relevant training and experience in New Zealand fabrication and welding standards is important for offshore fabrication. The appointment of independent inspectors by the builder is subject to the approval of the construction reviewer.

Good Practice Sourcing of Structural Steel Products

Introduction

SCNZ has recently published a series of good practice documents for sourcing compliant structural steels, structural fasteners, and anchor bolts to address deficiencies in the current compliance regime in New Zealand for construction products. Under this compliance regime, there is no requirement for the independent assessment of the capability of a manufacturer or the quality of their products.

The following good practice documents are available from the SCNZ website (www.scnz.org):

1. New Zealand Guide to the Sourcing of Compliant Structural Steels (Fussell, Cowie, Hicks, & Karpenko, 2018)
2. Practice Note on the Sourcing of Compliant High Strength Structural Bolts (Cowie, Hicks, & El Sarraf, 2018)
3. Practice Note on the Sourcing of Threaded Rod for Foundation Bolts (Cowie & Fussell, 2018)

The principle underpinning all three publications is that third parties must be involved in verifying the competency of manufacturers and/or conformity of their steel products.

AS/NZS 5131 Requirements

There is a requirement in AS/NZS 5131 for steel products and components to be supplied to structural steel contractors with inspection documentation (test certificates or reports). The purpose of this documentation is to allow them to check that the supplied products meet the requirements of the contract specification.

A weakness of AS/NZS 5131 is that this standard does not prescribe what inspection documentation constitutes adequate evidence of compliance with a given supply standard. The inspection documentation can be first (manufacturer), second (purchaser) or third (independent) party declarations of conformity. Unless requested otherwise, inspection documentation will typically be first party statement of conformity by the manufacturer. First party (manufacturer) assessment and declaration of conformity is deemed inadequate evidence of conformity in a global sourcing market.

NZSSS Requirements

Structural Steels

The NZSSS requires structural steels to be sourced in accordance with the New Zealand Guide to Sourcing Compliant Structural Steels, including the documented evidence of compliance which must accompany the supplied structural steel.

For details of the Guide to Sourcing Compliant Structural Steels, refer to the SCNZ fact sheet FS4 (SCNZ, 2018b)

Structural Fasteners

NZSSS specifies two options for sourcing high strength structural fasteners to the AS/NZS 1252 supply standard. High strength structural fasteners can be supplied to the 1996 and the 2016 revisions of AS/NZS 1252. The majority of fasteners to the New Zealand market are supplied to the 1996 revision. Regardless of which AS/NZS 1252 standard structural fasteners are supplied to, the NZSSS requires the importer to verify product quality through independent testing and inspection in accordance with:

1. Steel Advisor article Mat 1010 entitled "Practice Note on the Sourcing of Compliant High Strength Structural Bolts" (Cowie et al., 2018) or
2. AS/NZS 1252.2 – High Strength Steel Fasteners for Bolt Assemblies – Part 2: Verification testing for bolt assemblies (SA/SNZ, 2016b)

Option 1 applies to bolts sourced to the 1996 revision of AS/NZS 1252 while option 2 is applicable to the 2016 revision.

Unfortunately, the 1996 revision of AS/NZS 1252 contains no mandatory conformity requirements, including inspection and test requirements or the operation of factory production control. Compounding this issue, high

strength structural fasteners are typically of Chinese origin. (The lack of mandatory product conformity requirements was addressed in AS/NZS 1252.1:2016 (SA/SNZ, 2016a) and AS/NZS 1252.2:2016 (SA/SNZ, 2016b).) The latter specifies requirements for verification testing and inspections to be undertaken by the fastener importer to provide additional assurance of bolt quality.

To manage the transition from AS/NZS 1252:1996 supply to AS/NZS 1252.1:2016, an industry fastener supply working group comprising bolt importers, structural steel contractors, and structural engineers was convened in 2017. An outcome of this working group was a Steel Advisor article MAT 1010. This article features a sampling and test plan for third-party testing and inspections to be undertaken on behalf of the importer to provide additional assurance of bolt quality when supplying fasteners to the 1996 revision of AS/NZS 1252. This inspection and testing is a limited form of verification testing to that specified in AS/NZS 1252.2.

Anchor Bolts

The NZSSS anchor bolt sourcing requirement is that the quality of threaded rods used to connect structural steelwork to their foundations must be established by testing in accordance with Steel Advisor MAT 1011 (Cowie & Fussell, 2018). Furthermore, product shall be supplied with inspection documentation as per MAT 1011.

In New Zealand, threaded rod for anchor bolts is typically supplied to the DIN 976.1 standard (GIS, 2016) because there is no AS/NZS supply standard that meets the anchor bolt performance requirements of AS/NZS 5131.

The supply of anchor bolts has a similar compliance risk profile to that of structural fasteners supplied to AS/NZS 1252.1996. This risk requires managing as the DIN 976-1 standard contains no mandatory conformity requirements for anchor bolts and, furthermore, these are usually manufactured in China.

The industry fasteners supply working group also addressed the anchor bolt compliance risk in the form of a Steel Advisor article MAT 1011, entitled "Practice Note on the Sourcing of Threaded Rod Used for Foundation Bolts". This article establishes the equivalency of the DIN 976.1 standard with the mechanical and chemical requirements of AS/NZS 5131 and presents verification tests to be undertaken by the importer in order to provide additional confidence in the quality of supplied threaded rods.

Use of Non-Prequalified Structural Steels

The Steels Structures Standard NZS 3404.1 permits the use of three types of steels:

Prequalified Steels

These are structural steels manufactured to a prescribed selection of AS/NZS, EN, and JIS material standards. Such steels may be used without any further assessment or approval to justify their use with NZS 3404.

Alternative Steels (non-Prequalified Steels)

Structural steels manufactured to an international steel supply standard approved by an appropriate expert as compatible for use with the steel structures and welding standards (NZS 3404 and AS/NZS 1554.1) This approval process is outside the scope of NZS 3404 as a Verification Method for the NZ Building Code

Unidentified Steels

These are steels for which the grade is no longer identifiable. Such steels may be used subject to the following requirements:

- Establish design parameters f_y , f_u based on test data using an appropriate statistical method. Such a method is presented in appendix E of (Fussell, Cowie, Hcks & Karpenko , 2018), or
- Assume conservative design parameters f_y and f_u , 170 MPa and 300 MPa respectively and limit their use to elastic applications.

Principles for justifying the use of alternative steels are discussed in (Chung, Chiew, & Lee, 2015; BCA, 2013) but it must be noted that the significant issue of structural reliability is not addressed in these publications. Structural reliability is the process of calibrating the design rules in limit state design standards to ensure a low probability of failure during the life of the structure. Strength reduction factors (ϕ) produced by this calibration process are applied to the design rules in NZS 3404. To determine these strength reduction factors, assumptions have been made concerning the geometric and mechanical properties of structural steels that will be used in conjunction with this design standard. The process of justifying the use of alternative structural steels must consider whether

the use of such steels will render the strength reduction factors in NZS 3404 invalid. This matter of structural reliability is the topic of a current SCNZ/ HERA research project.

Implementation of AS/NZS 5131 – NZ Steelwork Specification in Compliance with AS/NZS 5131 Approach

As noted previously, a weakness of AS/NZS 5131 is that it does not address how the requirements of the standard are implemented. In particular it does not address who is responsible for the various tasks and at what stage of the structural steelwork process they should be undertaken. Furthermore, it is not clear what structural steel contractor documentation is required to be reviewed by the project engineer/ construction reviewer. The NZSSS is intended to address these problems. In addition, the NZSSS provides a risk-based approach to manage the compliance of structural steelwork. To illustrate how the NZSSS requirements are implemented, a diagram overviewing the key stages of the structural steelwork procurement process has been prepared, see Appendix B. This diagram should be read in conjunction with Appendices A, B, and C of the NZSSS.

Conclusion

The recently published structural steelwork fabrication and erection standard AS/NZS 5131 was developed to address the increased compliance risk posed by the global sourcing of structural steelwork. Whilst this document contains tools to assist in managing the compliance of structural steelwork manufactured to this standard, the standard does not specifically address how they should be used. The recently published New Zealand Structural Steelwork Specification in Compliance with AS/NZS 5131 is intended to address this deficiency. The key elements utilised in the NZSSS to manage the quality of structural steelwork have been discussed in this article, including requirements for qualifying structural steelwork contractors via a certification or desktop review routes, documentation review, the use of independent inspectors, and good practice sourcing of structural steel products. Each of these elements involves the use of third-party conformity assessment bodies, which are an essential element of the risk-based approach presented in the NZSSS document. The roles of third-party conformance bodies will be discussed in future practice notes.

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Appendix A Factory Control and Quality Management Systems

The primary technique for managing the quality of structural steelwork is factory production control which can be implemented in isolation or as part of an overall quality management system operated by a structural steel contractor. Factory production control and quality management systems are discussed in the following sections.

Factory Production Control

The ISO 9000 series of quality management standards include the concept of a special process for any work where the final quality of the product cannot be verified only by inspection, such as steel making and welding (Karpenko, 2016). In such situations, a documented quality system is required for controlling the variables that could affect the quality of manufactured products. Documented quality systems are known as a factory production control system (BSI, n.d.).

Factory production control is defined as operational techniques and all measures necessary to regulate and maintain the conformity of a product to the required standard (SCNZ, 2018a). The key elements of factory production control include procedures, competent personnel, and inspection and testing supported by fit for purpose equipment.

Local (AS/NZS 5131) and international (EN 1090.2; CEN, 2008) fabrication and erection standards include factory production control requirements. Conformity with these requirements is best established by third party expert audit and certification. In Europe, FPC certification is mandated by construction product regulations. Outside of Europe, factory production control certification is achieved under voluntary structural steel contractor certification schemes, such as the SFC (New Zealand), National Structural Steelwork Compliance Scheme (Australia), and the AISC Certification Programme (United States of America).

Welding is an important fabrication process. The fabrication and erections standard (AS/NZS 5131) and the welding standard, AS/NZS 1554.1 (SA/SNZ, 2014b) recommend weld quality management to the requirements of AS/NZS ISO 3834 – “Quality Requirements for Fusion Welding of Metallic Materials” (AS/NZS, 2008). This standard provides three levels of quality requirements for welding (Elementary, Standard and Comprehensive).

AS/NZS ISO 3834 and ISO 3834 (ISO, 2005) provide factory production control requirements for welding. A key element of this standard is the requirement for a responsible welding co-ordinator. The responsible welding co-ordinator has overall responsibility for all welding operations and has the authority to halt all welding operations should this be required (Karpenko, 2016). As for structural steel contractor FPC, conformity with the requirements of AS/NZS ISO 3834 is best established by third party audit and certification.

One point of note is that ISO 3834 certification includes endorsement to a welding standard. New Zealand companies will be endorsed to the relevant parts of the AS/NZS 1554 welding standard series. Therefore, offshore structural steel contractors with endorsement to international welding standards will need to demonstrate how they plan to address the AS/NZS specific requirements outside the scope of their ISO 3834 certification.

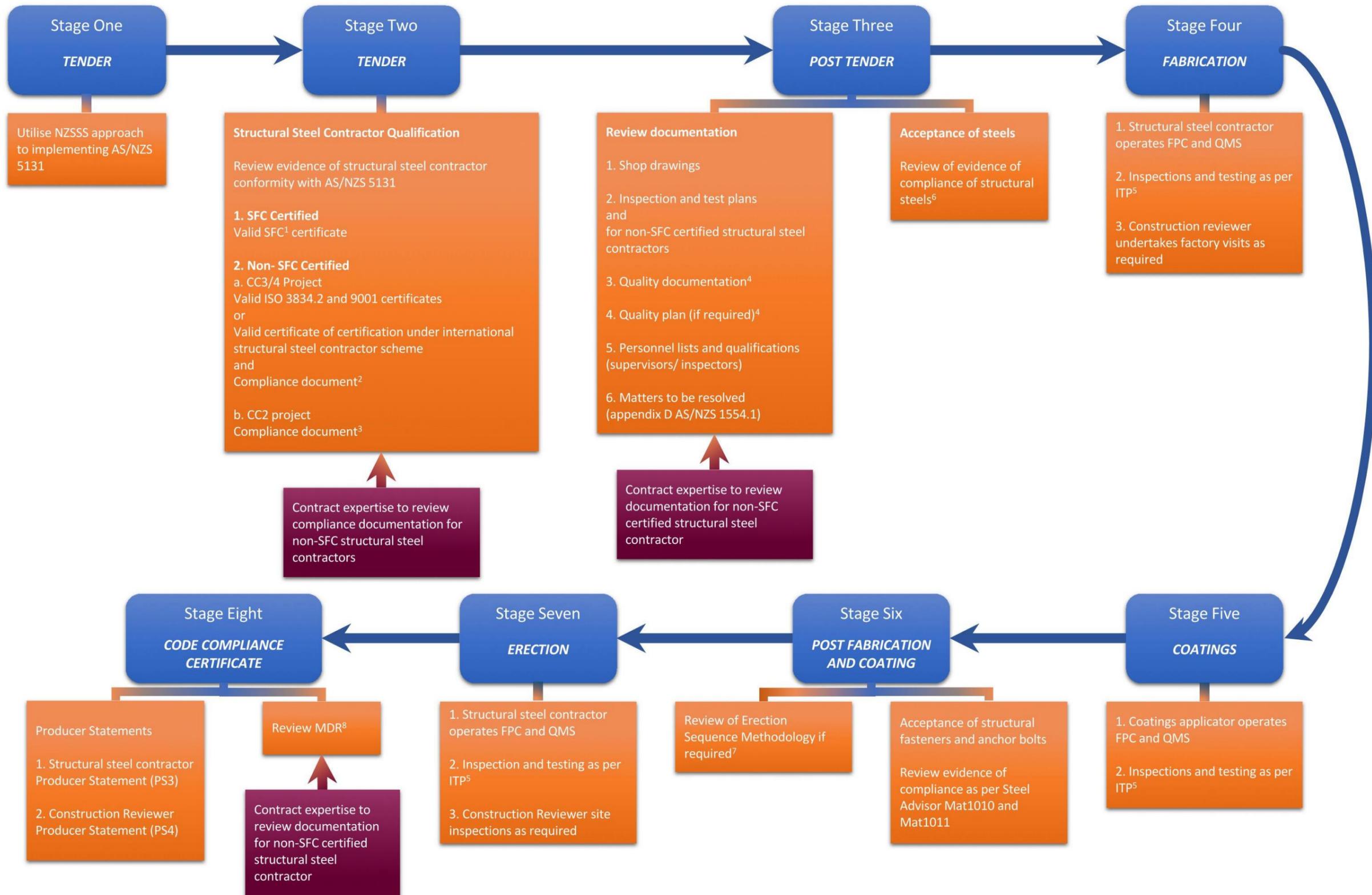
Quality Management Systems

A QMS is a formalised system to document processes, procedures and responsibilities for achieving quality policies and objectives. A QMS helps co-ordinate and direct an organisation’s activities to meet customer and regulatory requirements and improve its effectiveness and efficiency on a continuous basis (ASQ, n.d.).

ISO 9001 (ISO, 2015) is the most recognised and implemented quality management system in the world. Certification by an appropriately accredited conformance assessment body provides independent verification that a company’s QMS is based on the principles of ISO 9001.

A key point to note is that quality management systems such as ISO 9001 do not include specific requirements for products (Smallbone, 2007). A documented factory production control system for fabrication or welding processes is required to control the key factors affecting quality. If a structural steel contractor has their quality management system certified, but no factory production control system certification to a recognised steel contractor programme or weld quality standard, it is important to establish that the scope of their QMS procedures cover the factory production control requirements of AS/NZS 5131.

Appendix B Implementation of AS/NZS 5131 – NZSSS Approach



Notes to Implementation of New Zealand Structural Steelwork Specification in Compliance with AS/NZS 5131 (NZSSS) Flowchart:

1. SFC: Hera Certifications Ltd Steel Fabrication Certification Scheme
2. Compliance document to demonstrate how structural steel contractor plans to comply with AS/NZS 5131 requirements outside scope of their certification
3. Compliance document to demonstrate how structural steel contractor plans to comply with AS/NZS 5131 requirements
4. A review of these documents will not be required at this stage if already reviewed as part of tender evaluation process
5. ITP: Inspection and test plan
6. The roles and responsibilities for various parties in the structural steel procurement process are outlined in the Guide to the Sourcing of Compliant Structural Steels (report SCNZ 111:2018)
7. The roles and responsibilities of the various parties in reviewing and approving the erection sequence methodology (ESM) are specified in clause 4.8.5.4 of the New Zealand Steelwork Specification in compliance with AS/NZS 5131
8. The content for the manufacturer data records by construction category to be submitted is defined in clause 4.8.8 of the New Zealand Structural Steelwork Specification in Compliance with AS/NZS 5131 (SCNZ: report 112:2018)