

## Checklist for Imported Structural Steelwork

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### Key Words

Structural steel, compliance, production control systems, Construction Reviewer

### Introduction

The globalisation of the structural steel supply chain has sparked concern over the quality of fabricated steelwork in New Zealand building projects when sourced from low-cost countries. Demonstrating compliance of imported material with the requirements of the New Zealand structural steel and welding standards can be very challenging: there are cultural, geographical and language barriers, and often a lack of independent quality assurance associated with offshore fabricator workshops. Guidance for ensuring compliance of structural steelwork is provided in the following article:

- Fussell, A., Cowie, K., Hicks, S., Karpenko, M., *Ensuring Compliance of Structural Steelwork – Regardless of Origin*, Steel Advisor QLT1001, Steel Construction New Zealand, 2016 (This article was first published in SESOC Journal Volume 29 No 1 April 2016)

In response to requests from Building Control Authorities a checklist has been developed as a guide to assess compliance of imported fabricated steelwork. The checklist is to be read in conjunction with the above referenced article. The checklist provides normative references to the corresponding sections of the NZS, AS/NZS standards and defines documentation required to claim compliance. Depending on the outcome of the assessment, the fabricated steelwork may be subject to additional NDT and (destructive) testing.

### Checklist to Assess Compliance of Fabricated Steelwork

#	Item	Normative Reference	Documentation required to claim compliance
<b>Materials</b>			
1	Do all construction materials comply with standards specified and records available?	NZS 3404.1:1997, Section 2.2	Material test certificates
	Is there evidence of conformity with the material supply standard?	Material supply standards	Third-party conformity assessment preferred, e.g. ACRS for AS/NZS material standards or independent testing

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			by an appropriately accredited test facility?
2	Are alternate material supplied to an internationally recognized standard?	NZS 3404.1:2009 clause 2.2.1	Material test certificates
3	Has a metallurgist or a materials engineer confirmed that the material supplied to an alternate internationally recognized standard is equivalent to a material standard referenced from NZS 3404?	NZS 3404.1:2009 clause 2.2.1	Record of approval by the design engineer
4	If an alternative material is approved as equivalent to one reference in NZS 3404 (clause 2.2.1), how do they demonstrate the tolerances and distribution of mechanical properties ( $COV \leq 10\%$ ) of the as supplied material meets the requirements of the material supply standard recognised in NZS 3404?	NZS 3404 (clause 2.2.1)	Record of approval by the design engineer  Dimensional inspection checklist reports
5	Has the material been supplied with test reports or test certificates prepared by a laboratory accredited by signatories to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA) on behalf of the manufacturer?	NZS 3404.1:2009 clause 2.2.2	Test certificates
6	Are construction materials traceable through the entire supply chain (mill, distributor, fabrication plant and site?)	NZS 3404.1:2009 clause 3.1.2	As-built fabrication drawings, traceability records
<b>Fabrication</b>			
7	Does the fabricator have procedures/records to ensure that the following operations complies with client's specification and/or requirements of NZS 3404.1:		
7a	Cutting	NZS 3404.1:2009, Section 3.2.2	Production Quality Plan
7b	Transition of thickness and width for seismic members	NZS 3404.1:2009, Section 3.2.4.2	Production Quality Plan
7c	Holing	NZS 3404.1:2009 section 3.2.5	Production Quality Plan
7d	Straightening, curving and cambering	NZS 3404.1:2009 section 3.2.1	Production Quality Plan

7e	Tolerances	NZS 3404.1:2009 section 3.3.3	Production Quality Plan
8	Have all stages of construction (including welding) been adequately reviewed by a person who is competent to undertake the review?	NZS 3404.1:1997, Section 1.6.3.1	Record of review by construction reviewer
9	Does the fabricator maintain procedures to ensure work is within fabrication tolerances? Does the fabricator maintain dimensional check lists and reports as identified in the Quality Plan?	NZS 3404.1:2009 section 3.3.3	Dimensional inspection checklist reports
<b>Welding</b>			
10	Has welding been specified in accordance with AS/NZS 1554 Part 1, 2 or 5 as applicable?	NZS 3404.1:1997, Section 14.3.4	Project documentation
11	Have matters for resolution been resolved/addressed prior to welding and evidence exist?	AS/NZS 1554.1: 2011, Appendix D, items (a) to (y)	Technical review check list(s)
12	Has fabricator qualified welding procedures prior to welding?	AS/NZS 1554.1: 2011, Section 4.1.1, NZS 3404:1997 Section 1.6.3.2	Approval records required or third-party inspection reports confirming this
13	Have welders been suitably qualified to carry out tasks according to welding procedures (e.g. to NZS 4711 or AS/NZS 2980)	AS/NZS 1554.1: 2011, Section 4.12, NZS 3404:1997 Section 1.6.3.2	Welder/welding operator qualification certificates
14	Do all construction materials to be welded comply with the AS/NZS grades listed in the AS/NZS 1554, Section 2.1, Item (C) and evidence exist?	AS/NZS 1554, Section 2.1, Item (C)?	Material test certificates Record design engineer's approval
15	If the answer to the above is "not", has the weldability of alternative steel grade been established and evidence exist?	AS/NZS 1554, Table 6.6.1(B) AS/NZS 1554, Section 7 AS/NZS 1554, Section 5.3.4	PQR/WPS Qualification test reports
16	Have welding consumables been selected in accordance with the (seismic requirements of) standard?	NZS 3404.1, Section 2.6.4.5.2 AS/NZS 1554.1, Section 6	Welding consumables test certificates showing Ships Classification Societies Grade 3 approval (as applicable)
17	Have welding consumables been used within the welding parameter ranges specified by the manufacturer and the standard.	NZS 3404.1, Section 2.6.4.5.2, Item (b)	Welding inspection reports confirming the suitability of WPS or

			records of review (see below)
18	Have welding procedures been approved <u>prior to welding</u> by the design Engineer and evidence exist?	NZS 3404.1:1997, Section 1.6.3.2, Item (4)	Records or review and approval <u>prior to welding</u> .
19	Has welding been carried out under the supervision of a welding supervisor qualified in accordance of the Clause 4.12.1 of AS/NZS 1554.1?	NZS 3404.1:1997, Section 1.6.3.2, Item (2) AS/NZS 1554.1:2011, Section 4.12.1	Welding coordination personnel qualification records
20	Is there evidence (e.g. inspection reports) that welding complied with all the appropriate requirements of AS/NZS 1554 such as workmanship, quality of welds and dimensional tolerances?	AS/NZS 1554.1:2011, Section 5 and 6	Signed inspection and quality plans
21	Is there evidence that fabricator complied with a quality management system such as ISO 3834? (NOTE)	AS/NZS 1554.1:2011, Section 1.7.1	Copy of ISO 3834 part 2 or 3 certificate issued by a Certifying Body, or fabricator's quality documentation reviewed by a third party welding engineer/inspector demonstrating compliance with ISO 3834
22	Does the fabricator ensure that the following items are addressed to contract specification and/or NZS 3404.1 and AS/NZS 1554: a) Welding consumables for earthquake resisting structures b) Weld access holes c) Welding of continuity stiffeners in earthquake resisting members	NZS 3404.1:2009, Section 3.2.3.2 NZS 3404.1:2009, Section 3.2.3.3 NZS 3404.1:2009, Section 3.2.3.4	Quality Plans
<b>Welding Inspection</b>			
23	Has the extent of non-destructive examination been nominated/approved by the design engineer?	NZS 3404:1997, Appendix D, Section D2	Project documentation
24	Has inspection been carried out in accordance with the AS/NZS 1554?	AS/NZS 1554.1:2011, Section 7	Inspection reports
25	Has welding inspection personnel been properly qualified and evidence exist?	AS/NZS 1554.1, Section 7.2	Welding inspection personnel qualification records

26	Has non-destructive examination personnel been properly qualified and evidence exist?	AS/NZS 1554.1, Section 7.4	NDT personnel qualification records
27	Do final inspection reports exist stating that inspected welds comply with the permissible level of imperfections of SP or FP weld as applicable?	AS/NZS 1554.1, Section 6 AS/NZS 1554.5, Section 6	Final inspection report(s)
<b>Coatings</b>			
28	Has steel surfaces been prepared in accordance with the requirements of AS/NZS 2312 for the coating system specified?	NZS 3404.1:2009, Section 5.1.4	Project documentation
29	Has the coating system been applied in accordance with the requirements of AS/NZS 2312 for the coating system specified?	NZS 3404.1:2009, Section 5.1.4	Project documentation
30	Has inspection of protective coatings been carried out in accordance with the recommendations of AS/NZS 2312?	NZS 3404.1:2009, Section 5.4	Inspection reports
31	Has structural steel members been adequately protected from coating damage during handling and transport?	NZS 3404.1:2009, Section 5.6	Project documentation
32	Has the coating system damage by welding, erection or other causes been adequately repaired?	NZS 3404.1:2009, Section 5.7	Project documentation

**NOTE:**

Welding is recognised in ISO 9001 as “special processes” as the quality of welded products cannot be fully verified by final inspection. Therefore, Section 1.7 of AS/NZS 1554.1:2011 requires the fabricator to demonstrate that all welding and related activities are conducted under a suitable quality management system. Such a system should comply with the requirements of AS/NZS ISO 3834

**References**

SAA/SNZ, Structural steel welding – Part 1: Welding of steel structures, AS/NZS 1554.1, Standards Australia/New Zealand, Sydney/Wellington, 2014 including amendment 1

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SNZ, Steel Structures Standard Part 1: Materials, fabrication, and construction, NZS3404 Part 1:2009, Standards New Zealand, Wellington, 2009