

Practice Note on the Sourcing of Compliant High Strength Structural Bolts

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Introduction

The New Zealand *Steel Structures Standard* states that high strength structural bolts shall be supplied to AS/NZS 1252. This standard underwent a major revision and was published on 23rd December 2016. The major technical changes incorporated in the new edition relate to updated testing and conformity requirements, the inclusion of the nominated European standard EN 14399-3 8.8 HR bolt as a “Deemed to satisfy” alternative and an additional European EN 14399-3 high tensile grade 10.9 HR.

A significant change to AS/NZS 1252 has been the creation of a new Part 2, title ‘Verification testing for bolt assemblies’. This represents a restricted form of third party conformity assessment, to provide confidence in products manufactured to AS/NZS 1252.1.

Feedback received from the New Zealand bolt distributors advised complying with the increased product conformity requirements in the 2016 version of AS/NZS 1252 will take some time to implement. Supplying high strength structural bolts to the European standard is currently being considered by the industry as a better option. Time will be required to transition to the European structural bolt Standard.

This practice note sets out the recommended practice for sourcing compliant high strength structural bolts for the New Zealand construction industry.

High Strength Structural Bolts Supplied to the Previous Version of AS/NZS 1252

High strength structural bolts in the short term (1-2 years) will continue to be supplied to the mechanical requirements of AS/NZS 1252:1996 and the dimensional requirements of AS/NZS 1252:1983.

Verification testing shall be carried out by the bolt distributor to provide confidence in the high strength structural bolt’s conformity with the requirements of AS/NZS 1252. Verification testing shall be carried out in accordance with appendix A of this practice note. The requirements are a modification of the verification testing for bolt assemblies described in AS/NZS 1252.2:2016.

High Strength Structural Bolts Supplied to AS/NZS 1252:2016

High strength structural bolts supplied to AS/NZS 1252.1:2016 shall be verified in accordance with AS/NZS 1252.2:2016.

In the 2016 version of AS/NZS 1252, product conformity has been made mandatory. This requires the manufacturer to carry out a program to meet the initial type testing (ITT) and factory production control (FPC) requirements of the Standard. Currently no bolt manufacturers are third party certified for ITT and FPC in accordance with AS/NZS 1252.1:2016. ITT and FPC is a prerequisite for verification testing to AS/NZS 1252.2:2016. Verification testing is only designed to confirm significant product characteristics for product from a stochastically controlled production process. Therefore, verification testing cannot be used to confirm product characteristics without documentation confirming ITT and FPC. Third party certification of ITT and FPC to another high strength bolt standard (EN14399) is not acceptable documentation alone.

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High Strength Structural Bolts Supplied to EN 14399

In the future, high strength structural bolts may be supplied in New Zealand to EN 14399. Under the Construction Products Regulation (CPR; EU, 2011), operable throughout member countries of the European Union, construction products under scope of a Harmonised European Standard (hEN) must be CE Marked. Marketing a product covered by a hEN in member countries of the EU without a valid CE mark is a criminal offence.

A CE Mark is placed on a product after a Notified Body (NB; NANDO, 2017) has assessed the manufacturers design and fabrication process and certified the manufacturer to be acceptable. The context for that assessment is defined in Annex ZA of the hEN covering that product.

CE marked high strength structural bolts are considered acceptable in lieu of verification testing to Part 2 of AS/NZS 1252, provided an auditing process is undertaken to check the veracity of the CE Marking can be properly ascertained. Such an audit process is described in Australian Steel Institute Technical Note 1 (Key, 2017)

References

EU (European Union) Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC. Official Journal of the European Union L88/5, 2011

Key, P., High strength structural bolt assemblies to AS/NZS 1252:2016, ASI Technical Note TN001 V4, Australian Steel Institute, 2017

NANDO (New Approach Notified and Designated Organisations) Information System. European Commission, Belgium, Brussels. See <http://ec.europa.eu/growth/tools-databases/nando/index.cfm> (accessed 07/11/2017)

SNZ, Steel Structures Standard (Incorporating Amendments 1 and 2), NZS 3404:1997 Part 1 and 2, Standards New Zealand, Wellington, 2007

SA/SNZ, High-strength steel fastener assemblies for structural engineering – Bolts, nuts and washers Part 1: Technical requirements, AS/NZS 1252.1:2016, Standards Australia / Standards New Zealand, Sydney /Wellington, 2016

SA/SNZ, High-strength steel fastener assemblies for structural engineering – Bolts, nuts and washers Part 2: Verification testing for bolt assemblies, AS/NZS 1252.2:2016, Standards Australia / Standards New Zealand, Sydney /Wellington, 2016

Appendix A

Verification testing for bolt assemblies to the mechanical requirements of AS/NZS 1252:1996 and dimensional requirements of AS/NZS 1252:1983

1.0 Scope

This section specifies the requirements for the verification testing that is used to provide confidence in the product's conformity with the mechanical requirements of AS/NZS 1252:1996 and dimensional requirements of AS/NZS 1252:1983.

2.0 Prerequisites for the verification testing program

The manufacturer shall have a factory production control (FPC) with a scope that complies with the requirements of ISO 9001: 2008 or 2015 (note that ISO 9001: 2015 will be the only permitted system from September 2018) and is certified by a conformity assessment body accredited by a signatory of the International Accreditation Forum Multilateral Recognition Agreement (IAF MLA).

An original or a copy of the inspection documents provided by the manufacturer or its approved representative, without any alteration, shall be provided. This documentation shall be accompanied by suitable means of identification of the product, in order to ensure the traceability between the manufacturing lot and the corresponding test certificate.

Copying of the original document is permitted, provided that

- a) Traceability of product is maintained
- b) The original document is available on request.

The supplier shall review the inspection or test certification for the bolt batch purchased. Checks shall include:

- a) The lot or batch identification number is consistent with that indicated on the packaging for the bolts purchased
- b) All tests are passed
- c) The testing is within the scope of the laboratory accreditation and their accreditation is still valid.
- d) The FPC is certified by a conformity assessment body accredited by an IAF MLA signatory and their accreditation is still valid.

3.0 Definition of Manufacturing lot or manufacturing batch

Quantity of fasteners of a single designation, including product grade, property class and size (one thread diameter and one length), manufactured from bar, wire, rod or flat product from a single cast, processed through the same or similar steps at the same time or over a continuous time period from a process with factory production control, including the same heat treatment and/or coating process, if any.

4.0 Minimum sampling and testing plan for verification testing

The minimum sampling and testing plan for verification testing is indicated in Table 1 for dimensional characteristics and Table 2 for mechanical characteristics.

Table 1: Minimum sampling and testing plan for Verification Testing - Dimensional Characteristics

Dimensional characteristic	Sample Size	Acceptance no. (Ac)
Bolts:		
Width across flats	1	0
Width across corners	Not required	-
GO thread gauge	1	0
NO GO thread gauge	1	0
Geometric tolerances	Not required	-
Nuts:		
Width across flats	1	0
Width across corners	Not required	-
Nut height	1	0

Socket NO GO	1	0
Geometric tolerances	Not required	
Washers:		
Hole diameter	1	0
Outside diameter	1	0
Thickness/chamfer	1	0

Table 2: Plan for Verification testing - Mechanical Characteristics

Dimensional characteristic	Sample Size	Acceptance no. (Ac)
Bolts:		
Ultimate tensile strength	1	0
Proof load test	1	0
Surface integrity – non-destructive	1	0
Surface integrity - destructive	Not required	-
Chemical composition	Not required	-
Metallurgical characteristics	Not required	-
Coating	1	0
Nuts:		
Proof load test	1	0
Hardness	1	0
Washers:		
Hardness	1	0
Assembly:		
Assembly test (Appendix C of AS/NS 1252:1996)	1	0
Free turn of Nut test (As required by AS/NZS 5131:2016)	1	0

5.0 Traceability of components

The identification number of the manufacturing lots, including the number of units, of the assembly lot to which the verification testing applies, shall be identified both on the test report and on all packaging for the entire assembly lot for the purpose of traceability of components.

6.0 Sampling, testing and assessment

Sampling, testing and assessment shall be undertaken in the following steps:

- (a) Select samples at random from the assembly lot
- (b) For each characteristic listed in table 1 and 2, carry out the inspection or test on the number of samples required.
- (c) Record the number of nonconforming characteristics and accept the assembly lot if this number is less than or equal to the acceptance number (Ac).
- (d) For any characteristic, if the number of nonconforming test results is greater than the acceptance number (Ac), then reject the assembly lot.

7.0 Re-testing in case of non-conforming product

Where a test indicates that an assembly lot is nonconforming, a sample of additional items, of the sample size specified in Table 3, for the number of non-conformances, shall be taken from the assembly lot and tested for the particular nonconforming parameter(s).

If the additional test result demonstrate conformance, then the assembly lot shall be deemed to comply, and all of the additional results included in the records.

If any of the additional test results demonstrate nonconformance, then the assembly lot shall be rejected as nonconforming and the supplier shall take steps to ensure the manufacturer is informed and the nonconforming assembly lot is not put into the market. The supplier shall have written procedures specifying the processing of nonconforming product.

Table 3: Minimum sampling and testing plan for verification testing - re-testing after initial tests indicate lot is non-conforming

Initial test sample size = 1	
Sample size	Acceptance No. (Ac)
1 (initial sample)	0
10	1
25	2
Lot to be rejected	3

8.0 Testing laboratory

Testing shall be performed in New Zealand by a laboratory that has a quality management system with a suitable scope that complies with the requirements of ISO 9001:2008 or 2015 and is certified by a certification body accredited by JAS-NZ, IANZ or an equivalent approved body. Testing shall be carried out by competent personnel for the tests specified.

9.0 Verification test report

The following minimum information shall be included on all supplied test reports:

- a) Date of testing
- b) Printed name, position and signature of the person authorizing the report, with date of issue
- c) Identification number of the manufacturing lot sufficient to allow traceability
- d) Number of items tested
- e) Designation of bolts, nuts and washers
- f) Coating or surface finish
- g) Test results in accordance with AS/NZS 1252:1983/1996 and this specification

10.0 Supplier Declaration of Conformity

A Supplier's declaration of conformity (SDoC) shall be provided. The issued SDoC shall include the following:

- a) Statement from the supplier that the bolt assembly type(s) covered by the SDoC complies with the mechanical requirements of AS/NZS 1252:1996, dimensional requirements of AS/NZS 1252:1983 and this specification.
- b) Test report numbers for the verification testing carried out under the responsibility of the supplier