

3.3 STAINLESS STEEL FASTENERS

3.3.1 Composition

Unless shown otherwise on the Drawings, stainless steel fasteners must be of austenitic AISI 316L to ASTM A240M or ASTM A666 (or equivalent) steel, with maximum carbon content of 0.03 % and minimum molybdenum content of 2%.

3.3.2 Ultimate Tensile Strength

High strength stainless steel fasteners must have a minimum ultimate tensile strength of 800 MPa.

3.3.3 Dimensions and Associated Tolerances

The dimensions and associated tolerances of stainless steel fasteners must conform to the standards stated in Table B240.4.

TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION B240

STEEL FASTENERS

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REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 5/Rev 0	Global	Clauses rearranged and reworded.	GM, IC	25.06.12
	Guide Notes	Rewritten to provide technical background on ordering fasteners and on completing project specific requirements.		
	1.1	Scope expanded to include studs, threaded rods, and stainless steel fasteners. Note added on testing and traceability of fasteners.		
	1.3	Additional definitions inserted.		
	2	Hold Point moved to clause 6.		
	3.1	Previous clause 3.1 expanded and divided into clauses 3.1 "Structural Bolts, Nuts and Washers", 3.2 "Other Fasteners", 3.3 "Stainless Steel Fasteners" and 3.4 "Locking Devices". Packaging requirements moved to clause 7.		
	4	New clause on product conformity.		
	5	Previously clause 3.3.		
	6	New clause on documentation requirements and incorporating the Hold Point moved from clause 2.		
	7	New clause combining packaging requirements in previous clause 3.1 and storage requirements in previous clause 3.5.		
	Annex A	New annexure for inserting project specific requirements, including additional testing requirements.		
	Annex C	Schedule of Hold Points and Identified Records updated.		
	Annex E	New annexure on details of Preloading Suitability Test.		

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 5/Rev 0 (cont'd)	Annex L	New annexure on test methods and sampling frequency. Previous clause 3.2 moved to Annex L2 "Test Certificate".		
	Annex M	Referenced documents updated.		
Ed 5/Rev 1	3.2.5	Reference to Clause 8.1 of B201 (which prohibits welding of bolts for bridge steelwork) inserted. Reference to B241 for other welding requirements replaced by B201.	DCS	27.10.17
	Annex M	Referenced documents updated.		
Ed 6/Rev 0	Global	Clauses rearranged and reworded to improve clarity. Spec title changed. Term "stud" changed to "studbolt" to be consistent with terminology used in AS 2528.	DCS	08.04.19
	Guide Notes	Guide notes rearranged to align with order in main body of spec. Previous guide note G1 deleted.		
	G1	Previously 1 st paragraph of guide note G4.		
	G2	Previously 2 nd paragraph of guide note G4. Titles of withdrawn standards amended.		
	G3	Previously guide note G5.		
	G4	Previously guide note G10.		
	G5	New guide note on bolts for use with weathering steel.		
	G7	Previously guide note G11. Table G2 moved here from main body of spec.		
	G8	New guide note on heat treatment of structural bolts.		
	G9	Previously guide note G7.		
	G10	New guide note on bolt assembly testing, incorporating parts of previous guide note G8.		
	G11	New guide note on use of bolt assembly which have been verification tested.		
	G12	Previously guide note G9.		
	G13	Previously guide note G2.		
	G14	Previously guide note G3.		
1.3.1	Definitions amended. New term "purchase lot size" introduced, for determining frequency of testing.			

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 6/Rev 0 (cont'd)	1.3.2	New acronyms added.		
	1.4	New clause on initial assessment of fasteners.		
	3	Statement added that all fasteners, etc under B240 must have coarse pitch thread.		
	3.1.1	Incorporating part of previous clause 3.1.		
	3.1.2	Fasteners PC 8.8, etc to EN 14399-3 acceptable as "Alternative Assembly Type" in accordance with AS/NZS 1252:2016.		
	3.1.3	Fasteners PC 10.9, etc to EN 14399-3 acceptable as "Additional Assembly Type" in accordance with AS/NZS 1252:2016.		
	3.2.1, 3.2.2	Tables 1 and 3: typical protective treatment for bolts and screws previously in tables moved to front Guide Notes.		
	3.2.1	Table 2: "screw" removed from table.		
	3.2.3	Previously clause 3.2.6.		
	3.2.4	Previously clause 3.2.3. Referenced standards for hardened washers changed. Previous Table 4 on required hardness of washers deleted. Subsequent tables renumbered accordingly.		
	3.2.5	Previously clause 3.2.4 on studbolts.		
	3.2.6	Previously clause 3.2.5 on threaded rods, etc.		
	3.3	Headings added to form new sub-clauses 3.3.1 to 3.3.3.		
	3.5	Headings added to form new sub-clauses 3.5.1 to 3.5.2. Table 5: - "reference clause" column added to table; - high strength structural bolts PC 10.9 added; - AS 3566.2 noted as withdrawn; - table note (4) added, stating that HDG structural bolts may be used only if various tests first carried out on bolts.		
	4	New clause on testing, replacing previous clause titled "Conformity".		
	4.1	Incorporating parts of previous clause 4.		
	4.2	New clause on testing laboratories incorporating previous 1 st paragraph of clause L1.		
	4.3	New clause on test specimens incorporating 3 rd paragraph of previous clause 4, and last paragraph of previous clause L1.		

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 6/Rev 0 (cont'd)	4.4	Incorporating parts of previous clause L1 on mechanical properties testing.		
	4.5	Previously clause L2 on chemical composition testing.		
	4.5.1	Statement added that chemical composition testing to be in accordance with relevant standard.		
	4.6	Previously clause L3 on test certificates.		
	4.7	New clause on independent testing by the Principal.		
	4.8	Previously clause 4.1 on nonconforming purchase lot.		
		Statement added that new purchase lot to replace rejected lot must not be from the same source as rejected lot.		
	6	New clause on delivery and storage incorporating previous clauses 6 and 7.		
	6.1.1	Lead time for submission increased to 10 working days.		
	Annex A1	Annex changed, to be completed only for direct supply of bolts to Principal.		
	Annex A3.2	New annex specifying additional fasteners to be supplied for independent testing.		
	Annex E	Previous Annex E on preloading suitability test deleted.		
	Annex L	Table L.1 reformatted.		
Clause references to AS 4291.1 and AS 4291.2 updated. Preloading suitability test replaced by assembly test in AS/NZS 1252:2016.				
Annex M	Referenced documents updated.			
Ed 6/Rev 1	3.1.3	“PC 9” corrected to “PC 10” for high strength nuts.	MCQ	30.07.19
	3.2.4	Washers conforming to EN 14399-5 no longer acceptable.		
	3.5.1	Table 5, Note (3) – reference standard for electroplating changed from “AS 1789” to “AS 1897”.		
	Annex M	Referenced documents updated.		
Ed 6/Rev 2	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20

GUIDE NOTES
(Not Part of Contract Document)

G1 International Standards

TfNSW B240 specifies the Australian Standards and the most common international standards which are applicable to fasteners. However, fasteners to other international standards may exist in the Australian market. Advice may be sought from Bridge and Structural Engineering on whether other standards are equivalent to those listed in this Specification and make appropriate project specific changes to TfNSW B240.

G2 Withdrawn DIN Standards

Some withdrawn DIN standards may be called up in the contract documents. These Standards, and their equivalent ISO Standards, are listed in Table B240.G1 below:

Table B240.G1 – Withdrawn DIN Standards

Withdrawn DIN Standard	Equivalent ISO Standard
DIN 933 "M 1,6 to M 52 hexagon head screws threaded up to the head"	ISO 4017
DIN 934 "Hexagon nuts with metric coarse and fine pitch thread"	ISO 4032
DIN 912 "Hexagon socket head cap screws"	ISO 4762
DIN 975 "Threaded rods"	ISO 965

Obtain first the Principal's approval before using bolts manufactured to these Standards.

G3 Rolled vs. Cut Threads

Threads of fasteners may be produced as rolled or cut. Bolts with nominal diameter larger than 40 mm are typically produced with rolled threads.

Rolled threads are generally stronger than cut threads. Fasteners with rolled threads should be used for cyclic loading applications.

G4 High Strength Structural Bolts PC 8.8 to AS/NZS 1252 vs. Bolts PC 8.8 to AS 1110.1

High strength structural bolt assemblies to AS/NZS 1252 are commonly used for structural applications including preloaded bolted connections, e.g. TF and TB installation categories.

High strength bolts to AS 1110.1 assembled with nuts to AS 1112 may be specified in some structural applications instead of bolt assemblies, due to their wider range of sizes and material grades.

It should be noted here that although high strength bolts to AS 1110.1 assembled with nuts to AS 1112 can be preloaded, they may not be capable of sustaining the full preload of high strength structural bolt assemblies to AS/NZS 1252. The larger height of the high strength structural nuts (to AS/NZS 1252) provides safer margin against failure by thread stripping (brittle failure) than nuts to AS 1112.

The differences between both bolt types are as follows:

- (a) The shank lengths of high strength structural bolts to AS/NZS 1252 are longer than the shank lengths of high strength bolts to AS 1110.1 which may increase the bolt shear capacity for structural applications.

- (b) The dimensions of bolt heads and associated nuts of both systems are slightly different, e.g. larger width across flats for bolts to AS/NZS 1252 than to AS 1110.1, which may require different wrenches and/or sockets for tightening.
- (c) The thread tolerance of high strength structural bolts to AS/NZS 1252 suits hot-dip galvanizing (HDG), unlike high strength bolts to AS 1110.1.

AS/NZS 1252 covers both bolts and associated nuts and washers, unlike AS 1110.1 which covers only bolts and does not cross reference any suitable standards for washers.

G5 Bolts for Use with Weathering Steel

Bolt assemblies for use with weathering steel must be Type 3 Grade A325 conforming to ASTM F3125 rather than high strength structural bolt assemblies to AS/NZS 1252.

G6 Stainless Steel Bolts and Screws (refer Clause 3.3)

Grade 316 stainless steel fasteners are commonly produced to property class 50, 70 and 80 (i.e. minimum tensile strength of 500, 700 and 800 MPa respectively), and with chemical composition A4. Common designations are A4-50, A4-70 or A4-80. However, Grade 316 fasteners can be produced to achieve higher strengths.

G7 Protective Treatment of Fasteners (refer Clause 3.5)

Hot-dip galvanized fasteners with tensile strength of 1,000 MPa or greater are generally susceptible to hydrogen embrittlement.

Hence, hot-dip galvanized high strength structural bolts PC 10.9 to EN14399-3 and associated nuts PC 10 and washers are only permitted where the assembly test to AS/NZS 1252 or the preloading suitability test to EN 14399-2 is found to be conforming to the relevant standard, to isolate the risks of hydrogen embrittlement.

Electroplating of fasteners with tensile strength of 1,000 MPa or greater, or fasteners that are severely cold worked, requires suitable heat treatment to avoid hydrogen embrittlement. Hydrogen embrittlement does not occur in mechanically plated fasteners.

Table B240.G2 below shows typical protective treatment/finish of fasteners. Clause 3.5 of B240 specifies default protective treatment of fasteners supplied for TfNSW projects unless indicated otherwise on the Drawings.

Table B240.G2 - Typical Protective Treatment/Finish of Fasteners

	Fastener Type	Manufacturing Standard	Typical Protective Treatment
High Strength	ISO metric hexagon head bolts PC 8.8	AS 1110.1	Zinc plated or uncoated
	ISO metric hexagon head bolts PC 10.9	AS 1110.1	Zinc plated or uncoated
	ISO metric hexagon head screws PC 8.8	AS 1110.2	Zinc plated or uncoated
	ISO metric hexagon head screws PC 10.9 ⁽¹⁾	AS 1110.2	Zinc plated or uncoated
	ISO metric hexagon socket head cap screws PC 10.9	AS 1420	Zinc plated or uncoated
	ISO metric hexagon socket head cap screws PC 12.9	AS 1420	Zinc plated or uncoated
	ISO metric countersunk socket head screws PC 10.9	ISO 10642	Zinc plated or uncoated
	ISO metric hexagon nuts PC 8	AS 1112.1	Zinc plated or uncoated
	ISO metric hexagon nuts PC 10	AS 1112.1	Zinc plated or uncoated

	Fastener Type	Manufacturing Standard	Typical Protective Treatment
Low Strength	ISO metric hexagon head bolts PC 4.6	AS 1111.1	Hot-dip galvanized or uncoated
	ISO metric hexagon nuts PC 5	AS 1112.3	Zinc plated or uncoated or hot-dip galvanized
	ISO metric cup head bolts PC 4.6	AS/NZS 1390	Zinc plated or uncoated or hot-dip galvanized
	ISO metric hexagon head screws PC 4.6	AS 1111.2	Zinc plated or uncoated
	ISO metric thin hexagon nuts PC 04 or PC 05 ⁽²⁾	AS 1112.4	Hot-dip galvanized or Zinc plated or uncoated

Thermal diffusion galvanizing (TDG) may be used as an alternative to HDG. TDG is relatively new to Australia. The following advantages can be achieved where TDG is used for protective treatment of fasteners:

- (a) Similar coating thickness to HDG, without being susceptible to hydrogen embrittlement;
- (b) More consistent coating thickness compared with HDG, resulting in more reliable bolt preloads when tensioned using torque wrenches.

The thickness of the TDG must not be less than that of the HDG.

Where bolts are supplied uncoated for subsequent TDG, suppliers must confirm that product grades and thread dimension tolerances of the bolt assemblies allow for the coating thickness. Tapping of nuts following TDG is not usually done because of the hardness of the coating. Nut thread should be gauged using GO/NO GO thread gauge following TDG.

G8 Heat Treatment of High Strength Structural Bolts

Special considerations must be given during heat treatment of the fasteners to avoid decarburisation (reduction of carbon during heat treatment which causes strength reduction) of the threads and heads. Where there is evidence of such a problem, the decarburisation test in accordance with Clause 9.10 of AS/NZS 4291.1 must be carried out.

G9 Mechanical Properties Testing (refer Clause 4.4 and Annexure L)

Mechanical properties of high strength bolts of the same type and diameter but of different lengths may vary. The formation of the bolt head, particularly by cold forging, results in differing strengths for bolts of different lengths, unless subsequent normalising is carried out.

Typical fastener mechanical tests are listed in Table B240/L.1. However, where high risk is identified in using fasteners under specific project conditions, the designer may specify additional tests in Annexure B240/A3, e.g. impact testing should be specified for high strength fasteners used in applications where temperature may drop below 0°C.

Note that screws and bolts with reduced shank or head, e.g. socket head cap screws, may have reduced loadability despite meeting the material requirements for the property class. Therefore, some mechanical tests do not apply to these fasteners, e.g. wedge test does not apply to socket head cap screws.

G10 Bolt Assembly Testing

High strength structural bolt assemblies to AS/NZS 1252:2016 are now classified as k-class K0, K1 or K2, based on the bolt assembly test conducted. The higher the k-class, the smaller the variability between bolt assemblies.

The target preload can be achieved with higher precision by using bolt assembly k-class K2.

AS/NZS 1252:2016 provides two types of bolt assembly tests:

- (a) Basic assembly test for bolt installation where no torque controlled tensioning methods are to be used, e.g. part-turn method. This test is the minimum requirement for bolts manufactured to AS 1252. The bolt assemblies are then classified as k-class K0.
- (b) Extended assembly test for bolt installation where torque controlled methods are to be used for tensioning bolts fully or partially, i.e. where defined torque-tension relationship is required. The bolt assemblies are then classified as k-class K1 or K2.

Where a torque controlled method is specified on the Drawings or in other Contract Documents for bolt installation, bolt assemblies k-class K1 or K2 are required.

It should be noted that the assembly test in AS 1252 and the preloading suitability test in EN 14399-2 are equivalent and can be used interchangeability.

Annexure B240/E in the previous revision of B240, i.e. Ed 5/Rev 1, included an assembly test, named as "Preloading Suitability Test". That test is similar to but a simplified version of the basic assembly test in AS/NZS 1252. The "Preloading Suitability Test" was introduced to B240 following premature failure incidents during tightening of bolt assemblies.

Although the assembly test applies to high strength structural bolt assemblies only, the test or its simplified version, i.e. the Preloading Suitability Test, is recommended for high tensile bolt assemblies intended to be tensioned during installation, i.e. TF and TB installation categories. A copy of the Preloading Suitability Test can be obtained from Bridge and Structural Engineering.

G11 High Strength Structural Bolt Assemblies Verification Tested to AS/NZS 1252.2

High strength structural bolts assemblies supplied should preferably have been verification tested to AS/NZS 1252.2, to eliminate the risks of supply of faulty fasteners.

However, such verification of bolt assemblies is not mandated in B240, due to the lack of suitable testing facilities in Australia.

G12 Use of Black Bolts in Tensioned Bolted Connections

The variability in tension achieved in plain black bolts is less than that in hot-dip galvanized bolts. In some instances, the use of black bolts can be justified where a torque controlled method is to be used in preloaded connections.

G13 Traceability (refer Clause 5)

The integrity of a bolted structure relies upon the strength and durability of the materials used in the manufacture of its bolts, nuts and washers. The material properties of these components rely in turn upon the use of appropriate materials and manufacturing processes.

To ensure that these conditions have been met, TfNSW requires that fasteners be fully traceable throughout all manufacturing processes to the original batch of molten steel.

G14 Ordering/Specifying Fasteners (refer Annexure A)

AS/NZS 1252 sets out the requirements for high strength structural bolts and associated nuts and washers. An example for specifying property class (PC) 8.8, M20 - 150 mm long high strength structural bolts with plain finish is given below.

High strength structural bolts to AS/NZS 1252 - M20 × 150 - PC 8.8.

Although both HDG and plain finish are specified in AS/NZS 1252, plain bolts with no protective treatment are not commonly available in the Australian market.

AS 1110, AS 1111 and AS 1112 mainly specify the dimensional requirements for fasteners. When specifying fasteners to one of these standards, specify the material grade (i.e. property class) required.

Hexagon head bolts to AS 1110.1 - M20 × 150 - PC8.8 to AS 4291.1.

(optional addition) *thread tolerance class 6g to AS 1275.*

Fasteners available in the Australian market may have thread tolerance different than the ones specified in AS 1110, AS 1111 and AS 1112. It is preferable that the thread tolerance class be also specified as above.

Bolts to AS 1110, product grades A and B, were formerly known as precision bolts.

Bolts to AS 1111, product grade C, were formerly known as commercial bolts.

Washers with hardness as specified in AS 1237.1 are not suitable for use with bolts or threaded rods PC 8.8 or higher, particularly where fasteners are to be tensioned. Washer hardness must be higher than the hardness of associated steel components to avoid scouring the washers.

Some fasteners are not readily available in the Australian market. The designer should check the availability of products in the Australian market prior to specifying bolts for use under this Specification.

Steel fasteners PC 4.8 may be accepted as replacement for steel fasteners PC 4.6.

Steel fasteners PC 4.6 or PC 4.8 from free-cutting steel must not be used where welding is required for fabrication, due to the presence of high percentages of phosphorus and sulphur in these fasteners.

Thin (half) nuts are usually supplied as PC 04 or PC 05 nuts. Thin nuts made of high strength steel are not acceptable for use as lock nuts. Designers should specify mild steel thin nuts, preferably PC 04, for this application.



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QA SPECIFICATION B240

STEEL FASTENERS

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VERSION FOR: DATE:

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FOREWORD

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REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW B240 Edition 6 Revision 1.

All revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

PROJECT SPECIFIC CHANGES

Any project specific changes are indicated in the following manner:

- (a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. *Additional Text*.
- (b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

TfNSW QA SPECIFICATION B240

STEEL FASTENERS

1 GENERAL

1.1 SCOPE

This Specification sets out the requirements for the supply of steel (including stainless steel) fasteners, such as bolts, nuts, screws, washers, studbolts and threaded rods for steelwork.

It requires suppliers to carry out testing and implement traceability procedures to provide the Principal with assurance of fastener quality.

This Specification details the default protective treatment of the fasteners. Additional paint treatment may be specified on the Drawings or in other Contract Documents.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 Project Specific Requirements

Project specific details of work are shown in Annexure B240/A.

1.2.2 (Not Used)

1.2.3 Schedules of HOLD POINTS and Identified Records

The schedules in Annexure B240/C list the **HOLD POINTS** that must be observed. Refer to Specification TfNSW Q for definitions of **HOLD POINTS**.

The records listed in Annexure B240/C are **Identified Records** for the purposes of TfNSW Q Annexure Q/E.

1.2.4 (Not Used)

1.2.5 Frequency of Testing

The Inspection and Test Plan must nominate the proposed frequency of testing to verify conformity of the item, which must not be less than the frequency specified in Annexure B240/L. Where a minimum frequency is not specified, nominate an appropriate frequency. Frequency of testing must conform to the requirements of TfNSW Q.

You may propose to the Principal a reduced minimum frequency of testing. The proposal must be supported by a statistical analysis verifying consistent process capability and product characteristics. The Principal may vary or restore the specified minimum frequency of testing, either provisionally or permanently, at any time.

1.2.6 Referenced Documents

Unless otherwise specified, the applicable issue of a referenced document, other than a TfNSW Specification, is the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 1234). For convenience, the full titles are given in Annexure B240/M.

1.3 DEFINITIONS AND ABBREVIATIONS

1.3.1 Definitions

The terms “you” and “your” mean “the Contractor” and “the Contractor’s” respectively.

The following definitions apply to this Specification:

Fasteners	Steel items used to secure or join together individual items of steelwork, e.g. bolts, studbolts, threaded rods, holding down bolts, screws, nuts and washers.
High strength fasteners	Bolts, studbolts, threaded rods, and screws of property class 8.8 or higher, and nuts of property class 8 or higher, made from heat treated carbon steel.
Manufacturing lot	Fasteners of the same designation, including product grade, property class and size (one thread diameter and one length), manufactured from wire, rod or flat product from the same heat, 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.
Purchase lot size	The number of fastener items to be purchased from a single manufacturing lot. This size is used to determine the frequency of testing in Table B240/L.2.
Lot identification number	Unique number assigned by the manufacturer to a manufacturing lot, allowing full traceability from the finished product item back through all previous manufacturing operations to a given heat number or cast number of the raw material of manufacture.
Low strength fasteners	Bolts, studbolts, threaded rods and screws of property class 4.6 or 4.8, and nuts with property class 5, made from carbon steel not subjected to heat treatment during manufacturing.
Manufacturer	Entity providing the total, substantive or final production/assembly process of fasteners.
Mild steel washers	Washers not subjected to heat treatment during manufacturing.
Product grade	The precision of manufacture of the fastener, based on the applicable dimensional tolerances. Grade A is the most precise and grade C is the least precise.

Property class	Numeric code, stamped on the fastener to indicate its mechanical properties. Bolts, screws and studbolts have a two-digit number with a decimal point in between, the first digit being 0.01 times the nominal tensile strength in MPa and the second digit being 10 times the ratio of the lower yield strength (or stress at 0.2% permanent set) to the nominal tensile strength in MPa. Nuts have a single digit number representing 0.01 times the proof load stress in MPa, except for thin nuts which have a zero in front of the single digit.
Threaded rods	Rods that are threaded along its entire length, and used in conjunction with nuts.
High strength structural bolt assembly	Assembly of bolts, nuts and washers conforming to AS/NZS 1252 commonly used in structural engineering applications.
Studbolts	Short rods which are either threaded at both ends or along its entire length, and used in conjunction with nuts.
Supplier	Australian business entity, which can be a local representative of an overseas manufacturer, wholesaler, importer or contractor, and is responsible for ensuring conformity of the supplied fasteners to this Specification.
Trace lot number	Unique alphanumeric code assigned by a fastener manufacturer or distributor, to a consignment of fasteners which identifies the original manufacturing lot number in an unequivocal manner.

1.3.2 Acronyms

The following acronyms apply to this Specification:

AISI	American Iron and Steel Institute
HDG	Hot-dip galvanizing
HRC	Rockwell Hardness measured on the C scale
HV	Vickers Hardness
JAS-ANZ	Joint Accreditation System for Australia and New Zealand
NATA	National Association of Testing Authorities, Australia
PC	Property class
TB	Bearing-type tensioned bolt conforming to AS/NZS 5100.6
TDG	Thermal diffusion galvanizing
TF	Friction-type tensioned bolt conforming to AS/NZS 5100.6

1.4 INITIAL ASSESSMENT OF FASTENERS

1.4.1 Required Information

At least 6 weeks prior to the commencement of supply of fasteners, submit to the Principal the following information for each type of fasteners that you propose to use for the Works:

- (a) name and address of proposed Supplier(s);
- (b) evidence of conformity to the requirements of Clause 2;
- (c) product designation, description and proposed purchase lot size;
- (d) list of required tests in accordance with Clauses 3 and 4;
- (e) number of specimens to be tested in accordance with Annexure B240/L;
- (f) initial evidence of conformity to the requirements of Clause 5;
- (g) sample test certificates of similar type(s) of fasteners, showing conformity to Clause 3 and Annexure B240/L.

Documents submitted on previous projects may be accepted as evidence for Items (f) and (g). The documents must clearly show the lot identification number of the fastener on the test certificates.

1.4.2 Hold Point

HOLD POINT

Process Held:	Commencement of supply of fasteners.
Submission Details:	At least 6 weeks prior, submit the information stated in Clause 1.4.1.
Release of Hold Point:	The Principal will consider the submitted documents and may request further information, prior to authorising the release of the Hold Point.

2 QUALITY MANAGEMENT SYSTEM

The manufacturer(s) and the supplier(s) of the fasteners under this Specification must have in place quality management systems independently certified as fully complying with AS/NZS ISO 9001 by an organisation accredited by JAS-ANZ or an affiliated international certification organisation.

Provide evidence of the certification with each consignment of fasteners supplied (refer to Clause 6).

The Principal may conduct audits and inspections of the supplier's procedures and processes during the course of the Contract.

3 MATERIALS AND MANUFACTURE

All fasteners and associated components under this Specification must have coarse pitch thread.

3.1 HIGH STRENGTH STRUCTURAL BOLT ASSEMBLIES

3.1.1 Assemblies Conforming to AS/NZS 1252

Assemblies comprising bolts PC 8.8 (sizes M12 to M36), nuts PC 8 (sizes M12 to M36) and hardened washers conforming to AS/NZS 1252 are acceptable as high strength fastener assembly types under this Specification.

3.1.2 Alternative Assembly Type (to EN 14399-3)

In accordance with AS/NZS 1252.1 Clause 1.5 “Alternative Assembly Type”, only assemblies comprising bolts PC 8.8, nuts PC 8 and hardened washers manufactured in accordance with EN14399-3, System HR, are acceptable under this Specification.

3.1.3 Additional Assembly Type (to EN 14399-3)

In accordance with AS/NZS 1252.1 Clause 1.6 “Additional Assembly Type”, only assemblies comprising high strength bolts PC 10.9, high strength nuts PC 10 and associated hardened washers manufactured in accordance with EN14399-3, System HR, are acceptable under this Specification where shown on the Drawings.

3.2 OTHER FASTENERS

This Clause sets out the requirements for fasteners, other than those specified in Clause 3.1, which are acceptable under this Specification.

Unless stated otherwise, all references to fasteners are to ISO metric fasteners.

3.2.1 Bolts and Nuts

The dimensions and associated tolerances (“product grade”), and material properties (“property class”), of bolts and nuts must conform to the standards stated in Table B240.1.

Table B240.1 – Manufacturing and Material Standards for ISO Metric Bolts and Nuts

	Common Name	Product Grade/ Manufacturing Standard		Property Class/ Material Standard	
High Strength	ISO metric hexagon head bolts PC 8.8	A or B	AS 1110.1	8.8	AS 4291.1
	ISO metric hexagon head bolts PC 10.9	A or B	AS 1110.1	10.9	AS 4291.1
	ISO metric hexagon nuts PC 8	A or B	AS 1112.1	8	AS/NZS 4291.2
	ISO metric hexagon nuts PC 10	A or B	AS 1112.1	10	AS/NZS 4291.2
	ISO metric cup head bolts PC 8.8 ⁽¹⁾	–	AS/NZS 1390 (for dimensions only)	8.8	AS/NZS 4291.1
Low Strength	ISO metric hexagon head bolts PC 4.6	C	AS 1111.1	4.6	AS 4291.1
	ISO metric hexagon nuts PC 5	C	AS 1112.3	5	AS/NZS 4291.2
	ISO metric cup head bolts PC 4.6	–	AS/NZS 1390	4.6	AS/NZS 4291.1
	ISO metric thin hexagon nuts PC 04 or PC 05 ⁽²⁾	A or B	AS 1112.4	05	AS/NZS 4291.2

Notes:

⁽¹⁾ AS/NZS 1390 covers cup head bolts to PC 4.6 only; however the bolts can be manufactured to a higher property class (i.e. PC 8.8) as specified on the Drawings for some applications.

(2) Low strength thin nuts PC 04 or PC 05 are typically used as lock nuts with high or low tensile fasteners.

For ISO metric bolts or other threaded components of a particular property class, use only steel nuts of the corresponding property class shown in Table B240.2.

Table B240.2 – Corresponding Property Class of ISO Metric Nuts to Bolts

Component	Property Class				
	Bolts, U-bolts, threaded rods, etc	4.6	4.8	5.6	8.8
Nuts	5	5	5	8	10

3.2.2 Screws

The dimensions and associated tolerances, and material properties, of steel screws must conform to the standards stated in Table B240.3.

Table B240.3 – Manufacturing and Material Standards for ISO Metric Screws

	Common Name	Product Grade/ Manufacturing Standard		Property Class/ Material Standard	
High Strength	ISO metric hexagon head screws PC 8.8	A or B	AS 1110.2	8.8	AS 4291.1
	ISO metric hexagon head screws PC 10.9 ⁽¹⁾	A or B	AS 1110.2	10.9	AS 4291.1
	ISO metric hexagon socket head cap screws PC 10.9	A	AS 1420 or DIN 912	10.9	AS 4291.1
	ISO metric countersunk socket head screws PC 10.9	–	ISO 10642 or BS 4168	10.9	AS 4291.1 or ISO 898-1
	ISO metric hexagon socket head cap screws PC 12.9	A	AS 1420 or DIN 912	12.9	AS 4291.1
	ISO metric countersunk socket head screws PC 12.9 ⁽¹⁾	–	ISO 10642 or BS 4168	12.9	AS 4291.1 or ISO 898-1
Low Strength	ISO metric hexagon head screws PC 4.6	C	AS 1111.2	4.6	AS 4291.1

Note:

(1) Item may not be readily available in the Australian market.

Self-drilling steel screws for fixing to steel must conform to AS 3566, with Class 4 protective coating.

3.2.3 Fasteners In Imperial Units

Fasteners in Imperial units comprising hexagon bolts, screws and nuts must conform to relevant standards, e.g. AS/NZS 2465.

3.2.4 Washers

Unless shown otherwise on the Drawings, all washers must be flat, round and normal size.

Hardened steel washers for use with fasteners PC 8.8 or higher must conform to AS/NZS 1252.1. Washers conforming to EN 14399-6 are acceptable.

Steel washers for use with bolts PC 4.6, PC 4.8 or PC 5.6 must conform to AS 1237.1 and AS 1237.2.

Oversize and square washers must be manufactured to the dimensions and material properties specified on the Drawings.

3.2.5 Studbolts

ISO metric high strength steel studbolts must be PC 8.8 to AS 2528 or ASTM A193M. Associated nuts must be PC 8 to AS 2528 or ASTM A194M.

ISO metric low strength steel studbolts must be PC 4.6 to AS 2528. Associated nuts must be PC 5 to AS 2528.

High strength steel studbolts in Imperial units must be Grade B7 to AS 2528 or ASTM A193M. Associated nuts must be Grade 2H to AS 2528 or ASTM A194M.

Low strength steel studbolts in Imperial units must be Grade B8 to AS 2528. Associated nuts must be Grade 8 to AS 2528.

3.2.6 Threaded Rods, Holding Down Bolts and Other Non-standard Fasteners

The pitch and dimensional tolerances of threaded rods and associated nuts must conform to AS 1275 or ISO 965. Their material property class must conform to AS 4291.1 and AS/NZS 4291.2, or ISO 898-1 and ISO 898-2, as specified on the Drawings.

U-bolts, L-bolts and other non-standard fasteners must conform to the dimensions, material properties and protective treatment shown on the Drawings. Any departures from the specified dimensions, material properties and protective treatment must be approved by the Principal before manufacture.

Low strength fasteners (e.g. bolts and rods PC 4.6 and nuts PC 4) may be welded. Welding must conform to Specification TfNSW B201. Such fasteners must not be manufactured from free-cutting steels as specified in AS 1443.

3.3 STAINLESS STEEL FASTENERS

3.3.1 Composition

Unless shown otherwise on the Drawings, stainless steel fasteners must be of austenitic AISI 316L to ASTM A240M or ASTM A666 (or equivalent) steel, with maximum carbon content of 0.03 % and minimum molybdenum content of 2%.

3.3.2 Ultimate Tensile Strength

High strength stainless steel fasteners must have a minimum ultimate tensile strength of 800 MPa.

3.3.3 Dimensions and Associated Tolerances

The dimensions and associated tolerances of stainless steel fasteners must conform to the standards stated in Table B240.4.

Table B240.4 – Manufacturing Requirements for Stainless Steel Fasteners

Fastener	Manufacturing Standard
ISO metric hexagon head bolts	ISO 4014 or AS 1110.1 or DIN 931
ISO metric hexagon head screws	ISO 4017 or AS 1110.2
ISO metric hexagon socket head cap screws	ISO 4762 or AS 1420
ISO metric hexagon nuts	ISO 4032 or AS 1112.1
Washers	ISO 7089 or ISO 7090 for chamfered washers or DIN 125A (withdrawn)
ISO metric threaded rods	ISO 965 or AS 1275

3.4 LOCKING DEVICES

Use only locking devices approved by the Principal.

3.5 PROTECTIVE TREATMENT FOR FASTENERS

3.5.1 General

Unless specified otherwise, protective treatment of fasteners must conform to Table B240.5.

Table B240.5 – Protective Treatment of Fasteners

Fastener Type	Reference Clause	Protective Treatment
High strength structural bolts PC 8.8, and associated nuts and washers	3.1.1, 3.1.2	Hot-dip galvanizing (HDG) ⁽¹⁾
Low strength hexagon head bolts and screws PC 4.6, and associated nuts and washers	3.2.1	
Threaded rods PC 4.6 or PC 8.8, and associated nuts and washers	3.2.6, 3.2.1	
Holding down bolts and associated nuts and washers	3.2.6, 3.2.1	
Cup head bolts	3.2.1	
High strength structural bolts PC 10.9, and associated nuts and washers	3.1.3	Mechanical plating with zinc ⁽²⁾ , or HDG ^(1, 4)
High strength hexagon head bolts and screws PC 8.8 or PC 10.9 product grade A or B, and associated nuts and washers	3.2.1	PC 8.8: Mechanical plating with zinc ⁽²⁾ , or electroplating with zinc ⁽³⁾ . PC 10.9: Mechanical plating with zinc ⁽²⁾
High strength hexagon socket head cap screws PC 10.9 or PC 12.9	3.2.2	Residual coating of light oil
High strength countersunk socket head screws PC 10.9 or PC 12.9	3.2.2	
Self-drilling screws	3.2.2	Class 4 to AS 3566.2 (withdrawn)
Stainless steel fasteners	3.3	No additional protective treatment
Locking devices	3.4	As approved by the Principal

Note:

⁽¹⁾ HDG must be in accordance with AS/NZS 1214 or equivalent.

- (2) Mechanical plating with zinc must be in accordance with ASTM B695-04 or equivalent.
- (3) Electroplating with zinc must be in accordance with AS 1897 or equivalent.
- (4) Hot-dip galvanized high strength structural bolts PC 10.9 may be used only if the assembly test to AS/NZS 1252 or the preloading suitability test to EN 14399-2 has been carried out and found to be conforming to the relevant standard, to avoid the risk of hydrogen embrittlement associated with galvanizing process.

3.5.2 Thermal Diffusion Galvanizing

Where specified in Annexure B240/A1, use thermal diffusion galvanizing (TDG) instead of HDG or zinc plating. Ensure that the specified TDG layer thickness can be achieved for the bolt assembly product grades and the thread dimension tolerances.

Carry out trial assembly of fastener components with the specified coatings, to verify that the components will fit properly.

During the trial assembly, the nuts must be able to run up and down the threaded length of the bolt using only force applied by fingers.

4 TESTING

Testing of fasteners must conform to Clause 4.

4.1 GENERAL

4.1.1 Fasteners in Imperial Units

Testing of fasteners in Imperial units must conform to the relevant material and manufacturing standard(s), e.g. AS/NZS 2465.

4.1.2 Waiver of Testing

Where items in small quantities, i.e. less than 50, are used in low risk environment, the testing requirements may be waived if so specified in Annexure B240/A2.

4.1.3 Additional Testing

Carry out additional testing where so specified in Annexure B240/A3.

4.2 TESTING LABORATORIES

Tests must be carried out in laboratories accredited by NATA for the test, or in laboratories accredited for that test by an organisation with Mutual Recognition Agreement with NATA, unless approved otherwise by the Principal.

4.3 TEST SPECIMENS

Test only finished fasteners as supplied.

The proof load test (refer Clause 4.4) is a destructive test. Discard all proof load tested specimens.

4.4 MECHANICAL PROPERTIES

4.4.1 Test Methods

Carry out testing for mechanical properties as specified in Table B240/L.1.

Carry out tensile tests rather than wedge tensile test for bolts with nominal diameters larger than 39 mm.

Unless directed otherwise by the Principal, the hardness tests may be carried out using either the Vickers or Rockwell scale. Do not provide test results that have been converted from one scale to the other.

4.4.2 Testing Frequency

The minimum number of specimens to be tested from each purchase lot for each of the specified tests must be in accordance with Annexure B240/L.

4.5 CHEMICAL COMPOSITION

4.5.1 Test Methods

Carry out chemical composition testing in accordance with the relevant standard, e.g. AS 4291.1.

4.5.2 Frequency

Carry out one chemical composition test for each purchase lot.

4.6 TEST CERTIFICATES

Provide test certificates showing that fasteners tested conform to the requirements of this Specification.

The test certificate for each purchase lot must include the following:

- (a) test certificate number and test date;
- (b) test description and applicable standard;
- (c) identification of test specimen and purchase lot;
- (d) description of test specimen and stage of manufacture at the time of testing;
- (e) protective treatment (if applicable) and lubrication condition
- (f) test result and acceptance criteria;
- (g) description of type and location of failure and the fracture surfaces, where applicable;
- (h) chemical composition of purchase lot;
- (i) name of and position of the person authorised the test report and dated signature;
- (j) laboratory accreditation details;

4.7 TESTING BY PRINCIPAL

In addition to the quantity specified on the Drawings or in Annexure B240/A1, supply additional fasteners as specified in Annexure B240/A3 from each purchase lot for testing by the Principal.

The Principal may carry out testing on the additional fasteners to verify the test results submitted in accordance with Clause 4.6.

The testing is carried out at no additional costs to you, and at laboratories conforming to Clause 4.2.

4.8 NONCONFORMING PURCHASE LOTS

Where any test fails to meet the acceptance criteria, discard the purchase lot from which the sample specimen was taken and replace it with a new purchase lot.

Do not source the replacement purchase lot from the same manufacturing Lot from which the rejected Lot was sourced.

5 TRACEABILITY

Each supplied fastener item must be traceable. Provide documentations and identification of fastener items and their packaging to enable traceability of each item.

Control and record the lot identification number, and trace lot number if any, for each item within each purchase lot, to enable identification of the source of each item and each production process used for its manufacture.

6 DELIVERY AND STORAGE

6.1 DELIVERY

6.1.1 Hold Point

HOLD POINT

Process Held: Delivery of each consignment of fasteners to Site.

Submission Details: At least 10 working days prior, submit the following information:

- (a) Documents specified in Clause 2.
- (b) Details of supplier(s), the relevant lot identification number and trace lot number if any, and the fastener description/designation.
- (c) Test certificates for the purchase lot(s) in accordance with Clause 4.6.
- (d) Statement of conformity of the purchase lot(s) to the standards specified in this Specification.

Release of Hold Point: The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

6.1.2 Assemblies

Deliver bolts, nuts and washers as assemblies. Do not interchange components of assemblies.

6.1.3 Containers

Supply fasteners in sealed containers.

Deliver fasteners of the same purchase lot in the same container or in containers with identical labels for large quantities.

6.2 STORAGE

Store fasteners in a waterproof enclosure, clear of the ground and protected from damage.

ANNEXURE B240/A – PROJECT SPECIFIC REQUIREMENTS

Refer to Clause 1.2.1.

A1 SUPPLY OF FASTENERS

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure B240/A)

Complete section A1 only where this specification is used in a contract for supply of steel fasteners directly to the Principal. If this is not the case, delete this section in its entirety and replace the heading title with “Not Used”.

In Table B240/A1.1 below, fill in the required details for each fastener group. Examples of the minimum description when specifying fasteners are as follows:

High strength structural bolts to AS/NZS 1252 - M20 × 150 - PC 8.8;

Hexagon head bolts to AS 1110.1 - M20 × 150 - PC8.8 to AS 4291.1

(optional addition) thread tolerance class 6g to AS 1275.

Insert additional rows in Table B240/A1.1 as required.

For “Delivery location”, attach a map showing the location for delivery if appropriate.

Table B240/A1.1

Description	Details	Protective Treatment ⁽¹⁾	Qty Req'd
Fastener details			
Other requirements ⁽²⁾			
Delivery location ⁽³⁾			

Notes: Qty Req'd = Quantity Required

⁽¹⁾ Refer Clause 3.5.1.

⁽²⁾ State any other requirements (e.g. thread length of bolts).

⁽³⁾ Refer to attached map if provided.

A2 WAIVER OF TESTING

Refer to Clause 4.1.2.

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure B240/A)

List here any tests to be waived, where applicable.

A3 ADDITIONAL TESTING AND ADDITIONAL SPECIMENS

A3.1 Additional Testing

Refer to Clause 4.1.3.

Table B240/A1.2

Description of Additional Testing	Testing Frequency

A3.2 Additional Specimens

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure B240/A)

Insert in Table B240/A1.3 below the quantity of additional fasteners required for each fastener group. The default quantity is 5. Where different quantities are required for different fastener groups, show the quantity required against each fastener group.

Table B240/A1.3

Description	Qty Req'd ⁽¹⁾
Additional fasteners as specimens for independent testing ⁽²⁾	5

Notes: Qty Req'd = Quantity Required

⁽¹⁾ For each fastener group, unless shown otherwise.

⁽²⁾ Refer Clause 4.7.

ANNEXURE B240/B – (NOT USED)

ANNEXURE B240/C – SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS

Refer to Clause 1.2.3.

C1 SCHEDULE OF HOLD POINTS

Clause	Description
1.4.2	Commencement of supply of fasteners
6.1.1	Delivery of each consignment of fasteners to Site

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are Identified Records for the purposes of TfNSW Q Annexure Q/E.

Clause	Description of Identified Record
2	Certification of manufacturer/supplier quality management system
4.6	Test certificates for each purchase lot
5	Traceability documentation
6.1.1	Fastener delivery documentation

ANNEXURE B240/D TO B240/K – (NOT USED)

ANNEXURE B240/L – FREQUENCY OF TESTING – MECHANICAL PROPERTIES

Refer to Clause 1.2.5 and Clause 4.4.

L1 REQUIRED TESTS**Table B240/L.1 – Mechanical Testing Requirements**

Fastener Type	B240 Reference Clause	Tensile Strength ⁽¹⁾		Proof Load ⁽¹⁾		Other Tests ⁽¹⁾	
		Test Method	Test Plan	Test Method	Test Plan	Test Method	Test Plan
High strength structural bolts	3.1	Wedge test to AS/NZS 1252.1, Clause 6.6	B	AS/NZS 1252.1, Clause 6.6	B	Assembly test to AS/NZS 1252.1	
						Hardness test to AS/NZS 1252.1, Clause 2.4	
High strength structural nuts	3.1	NA		AS/NZS 1252.1, Clause 6.6	B	Hardness test to AS/NZS 1252.1, Clause 3.4	
Structural washers (hardened)	3.1	NA		NA		Hardness test to AS/NZS 1252.1, Clause 6.6	
High strength bolts	3.2	Wedge test to AS 4291.1, Clause 9.1	A	AS 4291.1, Clause 9.6	A	Hardness test to AS 4291.1, Clause 9.9	
High strength nuts	3.2	NA		AS/NZS 4291.2, Clause 9.1	A	Hardness test to AS/NZS 4291.2, Clause 9.2	
High strength screws other than socket head cap screws	3.2	Wedge test to AS 4291.1, Clause 9.1	A	AS 4291.1, Clause 9.6	A	Hardness test to AS 4291.1, Clause 9.9	
High strength socket head cap screws	3.2	AS 4291.1, Clause 9.4	A	AS 4291.1, Clause 9.6	A	Hardness test to AS 4291.1, Clause 9.9	
High strength studbolts or threaded rods	3.2	Wedge test to AS 2528, Clause 2.3.6.3	A	AS 2528, Clause 2.3.6.2	A	Hardness test to AS 2528, Clause 2.3.6.6	
Hardened washers	3.2	NA		NA		Vickers hardness test to AS 1817 or Rockwell hardness test to AS 1815	
Low strength bolts	3.2	AS 4291.1, Clause 9.2 (or wedge test to Clause 9.1)	B	AS 4291.1, Clause 9.6	B	NA	
Low strength screws	3.2	AS 4291.1, Clause 9.2 (or wedge test to Clause 9.1)	B	AS 4291.1, Clause 9.6	B	NA	

Steel Fasteners

B240

Fastener Type	B240 Reference Clause	Tensile Strength ⁽¹⁾		Proof Load ⁽¹⁾		Other Tests ⁽¹⁾	
		Test Method	Test Plan	Test Method	Test Plan	Test Method	Test Plan
Low strength nuts	3.2	NA		AS/NZS 4291.2, Clause 9.1	B	NA	
Low strength studbolts or threaded rods	3.2	AS 4291.1, Clause 9.2	B	AS 2528, Clause 2.3.6.2	B	NA	
Mild steel washers	3.2	NA		NA		Hardness test to AS 1237.1	B
Stainless steel bolts	3.3	ISO 3506-1, Clause 7	B	ISO 3506-1, Clause 7	B	NA	
Stainless steel screws	3.3	ISO 3506-1, Clause 7	B	ISO 3506-1, Clause 7	B	NA	
Stainless steel nuts	3.3	NA		ISO 3506-2, Clause 7	B	NA	
Stainless steel studbolts or threaded rods	3.3	ISO 3506-1, Clause 7	B	ISO 3506-1, Clause 7	B	NA	
Stainless steel washers	3.3	NA		NA		Vickers hardness test to AS 1817 or Rockwell hardness test to AS 1815	B
Self-drilling screws	3.2	AS 3566.1, Clause 1.11		NA		NA	

Notes: NA = Not applicable

⁽¹⁾ Refer to Table B240/L.2 for details of minimum testing frequency for the respective Test Plans.

L2 TESTING FREQUENCY

Determine the minimum number of specimens to be tested as follows:

- (a) Identify the type of tests required and the associated Test Plan from Table B240/L.1.
- (b) Determine minimum number of specimens for each test from Table B240/L.2, for the purchase lot size according to the specified Test Plan.

The frequency of testing of fasteners in Imperial units must conform to Annexure B240/L for the equivalent ISO metric fastener grade.

Table B240/L.2 –Testing Frequency for Test Plans

Purchase Lot Size ⁽¹⁾	Minimum Number of Specimens		
	Test Plan A	Test Plan B	Test Plan C
≤ 50	2	1	1
> 50 and ≤ 200	3	1	1
> 200 and ≤ 1,000	5	2	1
> 1,000 and ≤ 5,000	8	3	2
> 5,000 and ≤ 10,000	12	3	2
> 10,000	16	4	2

Note:

- ⁽¹⁾ Refer to Clause 1.3 for "purchase lot size" definition. Table B240/L.2 overrides the requirements of the manufacturing standards including AS/NZS 1252.

ANNEXURE B240/M – REFERENCED DOCUMENTS

Refer to Clause 1.2.6.

TfNSW Specifications

TfNSW Q	Quality Management System
TfNSW B201	Steelwork for Bridges

Australian Standards

AS 1110	ISO metric hexagon bolts and screws - Product grades A and B
AS 1110.1	Bolts
AS 1110.2	Screws
AS 1111	ISO metric hexagon bolts and screws - Product grade C
AS 1111.1	Bolts
AS 1111.2	Screws
AS 1112	ISO metric hexagon nuts
AS 1112.1	Style 1 - Product grades A and B
AS 1112.2	Style 2 - Product grades A and B
AS 1112.3	Product grade C
AS 1112.4	Chamfered thin nuts - Product grades A and B
AS/NZS 1214	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series)
AS 1237.1	Plain washers for metric bolts, screws and nuts for general purposes - General plan
AS 1237.2	Tolerances for fasteners - Washers for bolts, screws and nuts - Product grades A, C and F
AS/NZS 1252.1	High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers - Technical requirements
AS 1275	Metric screw threads for fasteners
AS/NZS 1390	Cup head bolts with ISO metric coarse threads
AS 1420	ISO metric hexagon socket head cap screws
AS 1443	Carbon and carbon-manganese steel - Cold finished bars
AS 1815	Metallic materials - Rockwell hardness test
AS 1817	Metallic materials - Vickers hardness test
AS 1897	Fasteners – Electroplated coatings
AS/NZS 2465	Unified hexagon bolts, screws and nuts (UNC and UNF threads)

AS 2528	Bolts, studbolts and nuts for flanges and other high and low temperature applications
AS 3566	Self-drilling screws for the building and construction industries
AS 3566.1	General requirements and mechanical properties
AS 3566.2	Corrosion resistance requirements
AS 4291	Mechanical properties of fasteners made of carbon steel and alloy steel
AS 4291.1	Bolts, screws and studs
AS/NZS 4291.2	Nuts with specified property classes - Coarse thread and fine pitch thread
AS/NZS 5100.6	Bridge design - Steel and composite construction
AS/NZS ISO 9001	Quality management systems - Requirements

ISO Standards

ISO 898	Mechanical properties of fasteners made of carbon steel and alloy steel
ISO 898-1	Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread
ISO 898-2	Nuts with specified property classes - Coarse thread and fine pitch thread
ISO 965	ISO general-purpose metric screw threads
ISO 3506	Mechanical properties of corrosion-resistant stainless steel fasteners
ISO 3506-1	Bolts, screws and studs
ISO 3506-2	Nuts
ISO 4014	Hexagon head bolts - Product grades A and B
ISO 4017	Fasteners – Hexagon head screws - Product grades A and B
ISO 4032	Hexagon regular nuts (Style 1) - Product grades A and B
ISO 4762	Hexagon socket head cap screws
ISO 7089	Plain washers - Normal series - Product grade A
ISO 7090	Plain washers, chamfered - Normal series - Product grade A
ISO 10642	Hexagon socket countersunk head screws

ASTM Standards

ASTM A193M	Standard Specification for alloy-steel and stainless steel bolting for high temperature or high pressure service and other special purpose applications
ASTM A194M	Standard specification for carbon steel, alloy steel, and stainless steel nuts for bolts for high pressure or high temperature service, or both
ASTM A240M	Standard specification for chromium and chromium-nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications
ASTM A666	Standard specification for annealed or cold-worked austenitic stainless steel sheet, strip, and flat bar
ASTM B695-04	Standard specification for coatings of zinc mechanically deposited on iron and steel

European Standards

BS 4168	Hexagon socket screws and wrench keys
DIN 125A	Product grade A washers (Withdrawn)
DIN 912	Socket head cap screws
DIN 931	Hexagon head bolts with shank
EN 14399	High strength Structural Bolting Assemblies for Preloading
EN 14399-2	Suitability Test for Preloading
EN 14399-3	System HR - Hexagon Bolt and Nut Assemblies
EN 14399-6	Plain Chamfered Washers