ENDUROFRAME® Fastener Requirements Specification

This lists the information that needs to be provided to licensees by fastener suppliers to ensure that fasteners meet the requirements for the ENDUROFRAME® system.

Introduction

All connections in the ENDUROFRAME® system utilise mechanical fasteners which are either screwed into pre-punched holes, or are self-drilling fasteners. As the design values for connections have been based on testing of fasteners into ENDUROFRAME® sections made from TRUECORE® steel, it is essential that fasteners provide correct and consistent properties to ensure that the ENDUROFRAME® system will perform structurally as it has been tested and designed. Fabricators and installers can source fasteners from any supplier however for the self-certification of the ENDUROFRAME® system to be valid, compliant fasteners are required to be used in assembly and installation.

Fasteners must meet the following general requirements to ensure structural integrity of the ENDUROFRAME® system and meet the requirements of the self-certification:-

- Fasteners must meet the dimensional requirements specified in Table 1. Minor differences in thread pitch and length shall be allowed, however the minimum gauge of fastener must be complied with. Contact the ENDUROFRAME® team where the dimensions of the fastener are different to those specified.
- Fasteners must meet or exceed the minimum tensile, shear, and torsional mechanical properties, where specified.
- Fasteners must provide a tight connection when fastening 2 pieces of 0.75mm TRUECORE® steel sections together, and meet the required design connection requirements. Fasteners should not strip or be loose once it has been inserted. Where a pre-punched hole size is specified, the fastener must provide a tight fit when inserted into the pre-punched hole of that size. Smaller hole sizes shall not be allowed.
- To ensure there is easy installation and the risk of screws stripping, there should be a reasonable gap between the torque required to insert the fastener, and the torque at which the fastener strips.
- Fasteners should comply with the corrosion requirements for TRUECORE® steel.

Important

BlueScope Steel does not specify or endorse any manufacturer of fasteners, nor do any checks to ensure that fasteners meet suppliers' claims. It is the responsibility of fastener suppliers to ensure that fasteners meet these requirements, and suitable quality control procedures are put in place to ensure these requirements are consistently met.

Requirements

A/ Corrosion Protection

All fasteners shall meet the requirements for TRUECORE® steel which are contained in Technical Bulletin TB 34 - Steel House Frames which is contained at this link. They must have a similar durability to TRUECORE® steel which, in residential applications, is 50 years.

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B/ Dimensional, Mechanical and Torque Properties

All fasteners shall have values which are the minimum gauge as the fasteners indicated below, and similar length and thread properties. Mechanical properties of fasteners should meet and be capable of creating tight connections between 2 pieces of 2 x 0.75mm BMT TRUECORE® steel without stripping the screw.

These values shall be carried out by testing, and the assessement of test results is required in accordance with NASH Standard Part 1, Section 7 with a coefficient of variation (k_{sc}) of 10%. Testing assessment is also contained in NASH Technical Note 4: Establishing Design Values by Testing. 5 tests should be carried out with the **average** value divided by 1.34 to come up with the characteristic value. These values shall meet the requirements contained in Table 1.

Table 1 - Required Fastener Properties

The values indicated in Table 1 are design values ie., appropriate safety factor have already been applied to the average tested values.

		Fastener Mechanical Properties			**Clamping and strip torque properties into 2 x 0.75mm BMT pieces of TRUECORE® steel**		
Fastener End Use	**Dimensional properties**	**Shear Strength**	**Tensile Strength**	**Torsional Strength**	**Pre-punched hole diameter[1]**	**Clamping torque**	**Strip torque[2]**
Trilobular thread truss locating fastener	17-13x18 Trilobular thread OR 5/16-12x17 Hex head	Not less than 13.4kN	Not less than 23.5kN	Not less than 20Nm	6.5mm	11.2Nm max	17.5Nm min
Truss stiffening fastener	12-14x20 hex head self-drilling fastener	Not less than 6.56kN	Not less than 11.41kN	Not less than 9.85Nm	None	The fastener should connect the 2 pieces of 0.75mm BMT TRUECORE® steel without stripping with 7.5Nm min. strip torque.	
Smooth Top Locating Wall fastener	M6 x 15 Smooth Top Locating Wall fastener[3]	Not less than 9.25kN	Not less than 14.55kN	Not less than 11.94Nm	5mm	3.73Nm max	7.46Nm min
Smooth Top Self-drilling Reinforcing fastener	M6 x 18 Self drilling smooth Top Self-drilling Reinforcing fastener[3]						

[1] Pre-punched holes may have a tolerance of +/- 0.05mm.
[2] Any fasteners that strip should be replaced with a fastener of similar gauge that does not strip. If a Trilobular thread truss locating fastener strips, it shall be replaced with two 12-14x20 hex head self-drilling fasteners.
[3]Thread pitch is not stated for these fasteners.

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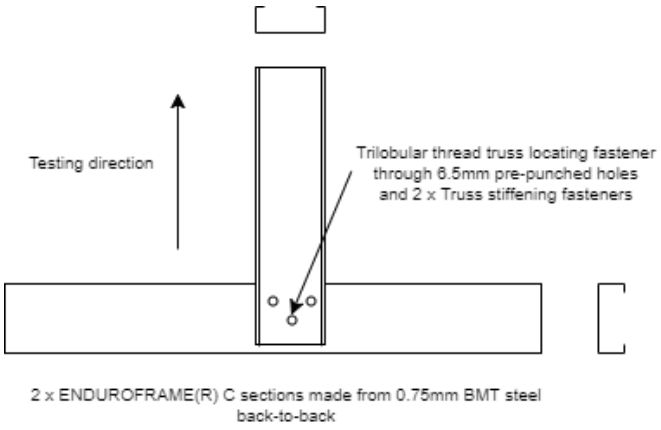
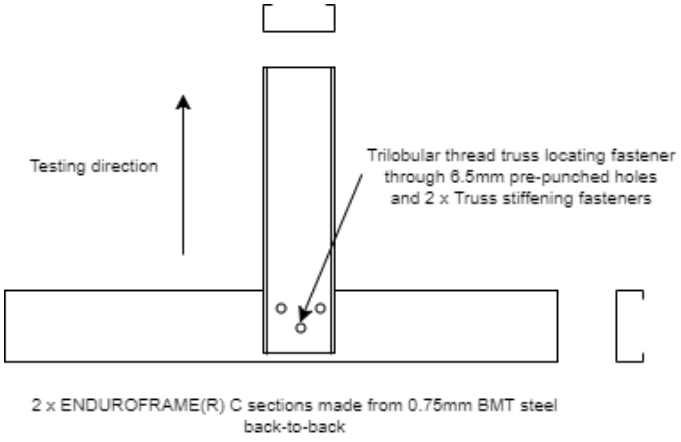
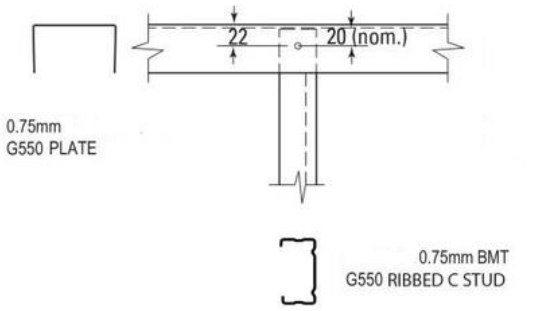
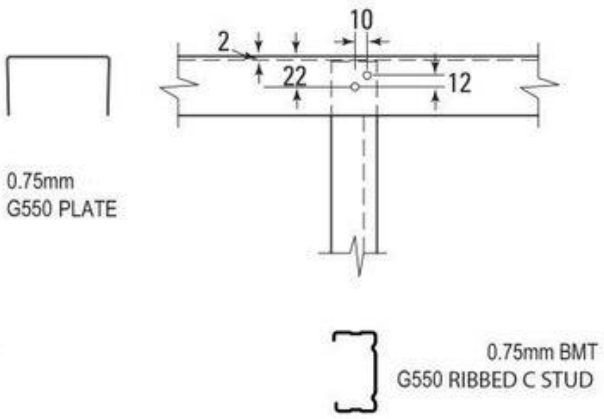
C/ Connection Design Requirements

Tests shall be carried out to determine the the capacity of connections with fasteners in tension between 2 pieces of 0.75mm BMT TRUECORE® steel. 5 connection samples shall be tested and the results assessed in accordance with NASH Technical Note 4: Establishing Design Values by Testing. The average value of the 5 test results shall be divided by 1.34 to determine the design value. The connection assemblies typically to be tested are in Table 2.

Table 2 - Required Connection Values

Fastener	Testing assembly	Minimum required design limit state capacity (kN)
Trilobular thread truss locating fastener		4.24kN
Truss stiffening fastener		8.67kN for 3 screws
Smooth Top Locating Wall fastener		6.25kN with 1 screw per side (2 screws per joint)

Fastener	Testing assembly	Minimum required design limit state capacity (kN)
Smooth Top Self-drilling Reinforcing fastener (tested together with Smooth Top Locating Wall fastener)		9.84kN with 2 screws per side (4 screws per joint) • 1 x Smooth top Locating Wall fastener per side • 1 x Smooth top self-drilling reinforcing fastener per side

Documentation Required to be Provided by Supplier

A compliance certificate is required to be provided by suppliers containing the following information:-

- Name, address, website and phone numbers of manufacturer
- Details of the fastener dimensions
- Shear, tensile, torsional mechanical properties calculated in accordance with this document meeting the requirements of Table 1
- Clamping and strip torque values calculated in accordance with this document meeting the requirements of Table 1
- Connection values calculated in accordance with this document meeting the requirements of Table 2
- A 50 year warranty against corrosion in accordance with Technical Bulleting TB 34 - Steel House Frames
- A statement of compliance with ISO 9001:2015 Quality management systems — Requirements
- Name and signature of tester
- Testing date

References

NASH Standard: Residential and Low-rise Steel Framing Part 1: Design Criteria 2005
NASH Technical Note 4: Establishing Design Values by Testing
Technical Bulleting TB 34 - Steel House Frames
AS3566-1988 Screws - Self -drilling
ISO 9001:2015 Quality management systems — Requirements
ENDUROFRAME Design Manuals