STRUCTURAL DESIGN CERTIFICATE

Date: **24/01/18**
Client: **StructNail®**

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The structural items described and certified are:

- **0.250" x 0.100" x 1"-2 ½" (25mm – 65mm) Super Sharp Gripshank™ Fasteners**

Pullout Capacity[1]

BMT	0.55mm (G550 min)	0.75mm (G550 min)	0.95mm (G550 min)	1.2mm (G500 min)	1.5mm (G500 min)
Super Sharp Gripshank™	**0.55kN**	**0.85kN**	**1.04kN**	**1.42kN**	**1.69kN**

Screw Comparison*

BMT	0.55mm (G550 min)	0.75mm (G550 min)	0.95mm (G550 min)	1.2mm (G450 min)	1.5mm (G350 min)
10g Tek Screw	NA	0.85 kN	1.03 kN	1.20 kN	1.10 kN
12g Tek Screw	NA	0.98 kN	1.18 kN	1.37 kN	1.26 kN

*Above capacities are calculated from AS4600, Section 5 for generic screws. Before substituting nails in place of screws ensure previously specified screws are not designed to manufacturer specific capacities based on testing. Tested values are often higher than values calculated from AS4600.

Shear Capacity[2]

BMT	0.55mm (G550 min)	0.75mm (G550 min)	0.95mm (G550 min)
Super Sharp Gripshank™	**1.00kN**	**1.85kN**	**2.75kN**

Screw Comparison*

BMT	0.55mm (G550 min)	0.75mm (G550 min)	0.95mm (G550 min)
10g Tek Screw	1.04 kN	1.65 kN	2.18 kN
12g Tek Screw	1.11 kN	1.78 kN	2.33 kN

*Above capacities are calculated from AS4600, Section 5 for generic screws. Before substituting nails in place of screws ensure previously specified screws are not designed to manufacturer specific capacities based on testing. Tested values are often higher than values calculated from AS4600.

Fixing Applications[3]

Fixing Application	Suitable Substrate Thickness	Notes
Timber Flooring	0.75mm to 1.6mm BMT	Not suitable for CFC flooring
Lightweight Cladding	0.55mm to 1.6mm BMT (Shear) 0.75mm to 1.6mm BMT (Pull-out)	Ensure overal capacity equivalent to substituted screws. Refer to manufacturer for approval of nail as substitute to regular fixing. Pull-through testing not carried out.
Steel Lintel Plate	0.55mm to 1.6mm BMT (Shear) 0.75mm to 1.6mm BMT (Pull-out)	Ensure overal capacity equivalent to substituted screws
Strap Bracing	0.55mm to 1.6mm BMT (Shear)	Ensure overal capacity equivalent to substituted screws
Ceiling + Roof Battens	0.75mm to 1.6mm BMT (Pull-out)	Battens into 0.75mm Min Truss Chord Ensure overal capacity equivalent to substituted screws
Connector Brackets	0.55mm to 1.6mm BMT (Shear) 0.75mm to 1.6mm BMT (Pull-out)	Ensure overal capacity equivalent to substituted screws
Timber (direct fixed)	0.55mm to 1.6mm BMT (Shear) 0.75mm to 1.6mm BMT (Pull-out)	Ensure overal capacity equivalent to substituted screws

Notes:

[1] Pull out testing has been carried out on 20 nail samples installed on two different Cee sections of each BMT material noted in table (10 test on each section) as per section 8 of AS4600:2016 draft standard which is in line with Nash standard part 1 (and technical note 4). A coefficient of variation of 20% has been selected which conservatively allows for variation in nails, substrate or installation. Kt values of 1.29 for minimum results and 1.7 for average results have been applied to arrive at design capacities.

Where Supersharp Gripshank™ nails are used in accordance with above capacities and meet manufacturers specifications, the nails are capable of providing a resistance suitable for above applications. It is important for specifier to ensure the number of nails used provides an equivalent capacity to the screws noted in each products manual. Please note that no pull-through testing has been carried out in relation to external cladding systems at this time and it is important to refer manufacturer for advice in relation to use with such systems to ensure compliance.

[2] Shear testing has been carried out on 10 nail samples of each 0.55, 0.75 & 0.95mm BMT material (G55) as per the Cross-Tension Test specifed in section F4 of AS4600: 2005 (also F4 in AS4600:2016 draft standard which is in line with Nash standard part 1 (and technical note 4)). A coefficient of variation of 20% has been selected which conservatively allows for variation in nails, substrate or installation. Kt values of 1.49 for minimum results and 1.77 for average results have been applied to arrive at design capacities.

Where Supersharp Gripshank™ nails are used in accordance with above capacities and meet manufacturers specifications, the nails are capable of providing a resistance suitable for above applications. It is important for specifier to ensure the number of nails used provides an equivalent capacity to the screws noted in each products manual. Please note that no testing of tilting or hole bearing has been carried out in relation to external cladding systems at this time and it is important to refer manufacturer for advice in relation to use with such systems to ensure compliance.

[3] STA has also carried out testing through 19mm yellow tongue flooring into various substrates ranging from 0.75mm to 1.9mm BMT Cee sections and 1.6mm BMT RHS to determine whether suitable penetration can be achieved. It was found that suitable penetration could be achieved in all samples and thus we have concluded a range of substrate thickness should be 0.55mm to 1.6mm BMT for pull-out and 0.55mm to 1.6mm BMT for shear connections[3]. It is important to ensure equipment approved by manufacturer is used for installation to ensure correct installation.

Reference Documents

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Walther, T., 2006. *Impact Steel Frames Nail Pull-out Test,* Porirua City, NZ: BRANZ Limited.

If you require any further information regarding above please contact the undersigned.

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