



STRUCTAply™ and CUSTOMply™

Plywood Specification Guide

Holding Capacity to Achieve Specific ‘N’ Values in all Applications

Compliant grabrail fixing is achieved through correct identification of the substrate, appropriate fastener selection, and sufficient thread embedment into structural framing. When these factors are addressed, the required performance can be confidently achieved.

The following information is supplied to make informed decisions regarding what fixings to use to attach grab rails and other appliances to STRUCTAply™ and CUSTOMply™ products.

The main reference for all timber fixings can be found in *AS1720.1 – 2010 Timber Structures Part 1: Design Methods*. This standard is referenced in the National Construction Code (NCC). The relevant section detailed below is *Section 4 Design Capacity of Joints in Timber Structures, Sub Section 4.3 – Screwed Joints*.

MINIMUM PERFORMANCE REQUIREMENT

All grabrail fixings must be capable of resisting a load of 1100 N applied in any direction without loosening, rotation, or deformation. This requirement is set out in *AS1428.1:2021* and applies to all compliant installations.

SUBSTRATE AND FRAMING CONSIDERATIONS

STRUCTAply™ and CUSTOMply™ have a joint group classification of JD4 (Refer *AS1720.1 – Timber Structures (Design Standard)*), which must be used when determining fixing capacity. The joint group of the supporting timber framing must also be identified and confirmed prior to design. Without this information, fastener selection cannot be verified or relied upon.

FIXINGS FOR TIMBER FRAMING

When fixing into timber framing, fasteners must be selected and designed in accordance with *AS 1720.1–2010*. The capacity of the fixing is determined by the screw gauge, the depth of thread penetration into the framing, and the joint group of the timber.

The tables below can be used to determine the thread length required to achieve a specific Newton (N) value. For example, as shown in the table below, an 8g screw with a shank diameter of 4.17 mm and a fully threaded length of 40 mm, when screwed into pine framing with a joint group of JD4, will achieve 2240 N. This is calculated as 40 mm (screw length) × 56 N/mm = 2240 N.

CHARACTERISTIC CAPACITY PER SCREW (N)

Table 4.5(B)

Laterally loaded in single shear – seasoned timber

Joint Group	Screw Size Number						
	4	6	8	10	12	14	18
	Shank Diameter (mm)						
	2.74	3.45	4.17	4.88	5.59	6.3	7.72
JD1	1719	2560	3570	4720	6000	7380	10550
JD2	1280	1950	2700	3570	4520	5560	7950
JD3	1010	1520	2120	2800	3570	4380	6270
JD4	710	1080	1520	2020	2530	3130	4480
JD5	510	780	1080	1420	1790	2220	3170
JD6	370	570	780	1010	1310	1620	2290

CHARACTERISTIC CAPACITY PER SCREW (N)

Table 4.6(B)

Laterally loaded in withdrawal – seasoned timber

Joint Group	Screw Size Number						
	4	6	8	10	12	14	18
	Shank Diameter (mm)						
	2.74	3.45	4.17	4.88	5.59	6.3	7.72
JD1	81	102	125	147	168	189	232
JD2	62	79	97	112	127	145	178
JD3	48	62	73	87	100	112	137
JD4	37	46	56	66	75	85	194
JD5	29	37	44	52	60	68	83
JD6	23	29	35	41	46	52	64

The below table is to determine the tensile capacity for different screw types.

MAXIMUM TENSILE CAPACITY FOR SCREWS

TABLE 4.7

Metal	Maximum Tensile Capacity (N)						
	Shank Diameter (mm)						
	4	6	8	10	12	14	18
Steel & 18/8 Stainless Steel	1410	2140	3180	4380	5710	7300	10810
Brass & Silicon Bronze	1080	1640	2450	3380	4400	5620	8320
Aluminium Alloy	830	1250	1870	2590	3360	4300	6370

FIXINGS FOR STEEL FRAMING

Where fixings are installed into steel framing, self-drilling screws compliant with AS 3566.1-2002 must be used. The appropriate screw size, gauge, and withdrawal capacity should be confirmed with the fastener supplier or referenced against the National Association of Steel Framed Housing Inc. (NASH) standard for steel-framed construction.

CAPACITY DETERMINATION

Design capacity must be verified using the relevant tables from AS 1720.1. Table 4.5(B) is used to determine shear (lateral) capacity, while Table 4.6(B) provides withdrawal capacity per millimetre of thread penetration. These tables, form the basis of all fixing calculations.

FASTENER MATERIAL SELECTION

The tensile capacity of fasteners varies depending on material type. Steel and stainless steel fasteners provide the highest capacity, while brass and bronze offer moderate performance. Aluminium fasteners provide the lowest tensile capacity and should be used with caution where high loads are expected.

COMPLIANCE REQUIREMENTS

All fasteners used in timber applications must comply with AS 1649-2001, which governs testing and characteristic strength. Where steel framing is involved, compliance with AS 3566.1-2002 is required. These standards ensure that fasteners perform as expected under load.

SPECIFICATION GUIDANCE

Designers should ensure that all fixings are specified to achieve a minimum capacity of 1100 N, with appropriate allowance for real-world conditions. Full thread engagement into the structural framing should be prioritised, and reliance on lining materials alone should be avoided. Site conditions must always be verified, and non-standard fixings should be confirmed with the supplier prior to specification.

KEY RISKS

Common causes of non-compliance include unknown or incorrect timber joint group assumptions, insufficient embedment depth, fixing into lining rather than structural framing, and unverified fixing performance in steel substrates. These risks should be addressed early in the design process.

REFERENCES & SOURCE INFORMATION

- National Construction Code 2022 (Building Code of Australia – Volume 2)
- AS/NZS 2269: 2012 Plywood - Structural
- AS 1720.1 – 2010 Timber structures Part 1: Design Methods.
- Livable Housing Design Standard (LHDS)
- Guidance for Builders and designers for NDIS Housing
- AS 1428.1:2021 Design for access and mobility – Part 1: General requirements for access – New building work
- AS 1649:2025 – Timber – Methods of test for mechanical fasteners and connectors – Basic working loads and characteristic strengths.
- AS 3566.1-2002, Self-drilling screws for the building and construction industries Part 1: General requirements and mechanical properties.

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