

NZS 3603 Considerations When Using SPAX Design Guide & Software

Joint design using the SPAX Design Guide and software is based on the Eurocode (EC5) and SPAX European Technical Assessment (ETA). When designing joints with New Zealand timbers, the basis of the SPAX Design Guide and software may be used but the information below should be taken into consideration.

	<u>NZS 3603</u>	<u>Design Guide Strength Class and Software</u>
Equivalent Material ("members" tab on software)		
Timber	J5 Joint group	C16
	J4 Joint group	C35
	J1 Joint group	D60
Glulam	GL12	GL24c
	GL13	GL24h/GL28c
	GL17	GL32h/GL36c
LVL	Hyspan (CHH)	Use C35 timber
	Hyone	Use C35 timber
	Hychord	Use C35 timber
	Hy90	Use C35 timber
	LVL11	C35 in shear / C16 in withdrawal
	LVL13	C35 in shear / C16 in withdrawal
	LVL15	Use C35 timber

Modification Factors

Modification factors for both NZS 3603 and SPAX ETA are similar in most cases so the SPAX Design Guide and software can generally be used in conjunction with NZS 3603 design. In individual cases, the differences in factors in the examples shown below may need to be considered. Except for γ_m and k_{mod} , all other factors are calculated automatically in the SPAX software as a result of input variables.

Capacity Factor	$\phi = \times 0.7$	$\gamma_m = \div 1.3 (= \times 0.77)$
Load Duration	$k = 0.8$	$k_{mod} = 0.8$
Capacity x Load Duration	$\phi \times k = 0.7 \times 0.8$ $= 0.56$	$k_{mod} \div \gamma_m = 0.8 \div 1.3$ $= 0.615$
Grain Direction	Shear	
	= 1.0 in side grain	$k_{ax} = 1.0$ in side grain
	= 0.67 in end grain	= 0.632 in end grain
	Withdrawal	
	= 1.0 in side grain	$k_{ax} = 1.0$ in side grain
	= 0.67 in end grain	N/A in end grain (min angle 15°)

Edge/End Distances and Spacing

If requirements of NZS 3603 wish to be met, the distances below may need to be checked as they may vary to the SPAX design distances.

Spacing	Minimum distance
End distance	$10d_a$
Edge distance	$5d_a$
Between screws	
- along grain	$10d_a$
- across grain	$3d_a$

d_a = shank diameter

NZS 3603 vs SPAX Eurocode Design Guide

NZS 3603

- Joint strength groups based on design densities
(radiata pine = 550 kg/m³)
- Considers shank diameter
- Shear – tables specify characteristic capacities
- Withdrawal – considers 2 failure modes. Head pull-through not considered due to large washers.
- Simplified minimum edge, end and spacing distances
- All values applied to pre-drilled holes only
- No design criteria for inclined screws

EC 5

- Based on characteristic densities
(radiata pine = 400 kg/m³)
- Considers thread diameter
- Shear – based on Johansen's Yield Theory with 6 possible failure modes plus rope effect
- Withdrawal – considers 3 failure modes, including head pull-through.
- Complicated minimum distances but more logical
- Pre-drilling not necessary. Values calculated for both non pre-drilled and pre-drilled holes
- Design methods for larger no. of configurations