

ACNL Engineers P/L - Design Criteria.

k1 and j2 factors for timber frame elements only.

Residential floor elements are assumed to support "normal" claddings and coverings.

Refer AS1170.1 Appendix C for criteria based on different coverings.

j2 assumes seasoned timber. Add 1 for unseasoned timber when $j2 > 1$.

All Industrial & Shed members are assumed as STEEL.

Residential

Member	Load Case	k1	j2	Service limits		Comments
				Span /	Absolute max (mm)	
Roof Batten	1.35G	0.57				
	1.2G+1.5Q1	0.94				Q1 = UDL
	1.2G+1.5Q2	0.97				Q2 = Concentrated
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	300		4mm for eaves overhang
	Q		1.00	200		
	Ws (Up or down)		1.00	150		
Rafters	1.35G	0.57				
	1.2G+1.5Q1	0.94				Q1 = UDL
	1.2G+1.5Q2	0.97				Q2 = Concentrated
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	300	20	Overhang = 10mm max
	Q1		1.00	300	12	Overhang = 10mm max
	Q2		1.00	300	12	Overhang = 10mm max
	G + ψ Q		2.00 / 3.00	360	12	Overhang = 10mm max
	Ws (Up or down)		1.00	150	20	Overhang = 20mm max
Roof Beams	1.35G	0.57				
	1.2G+1.5Q1	0.94				Q1 = UDL
	1.2G+1.5Q2	0.97				Q2 = Concentrated
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	300	10	
	Q1		1.00	300	10	
	Q2		1.00	300	10	
	G + ψ Q		2.00 / 3.00	360	12	
	Ws (Up)		1.00	150	30	
Underpurlins	1.35G	0.57				
	1.2G+1.5Q1	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	300		
	Q1		1.00	250		
	G + ψ Q		2.00 / 3.00	360	12	
	Ws (Up)		1.00			No check required

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Residential

Member	Load Case	k1	j2	Service limits		Comments
				Span /	Absolute max (mm)	
Strutting Beams	1.35G	0.57				
	1.2G+1.5Q1	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	300	20	
	Q1		1.00	250	20	
	Q2		1.00	300	10	
	G + ψ Q		2.00 / 3.00	360	12	
	Ws (Up)					No check required
Counter Strutting Beam	1.35G	0.57				
	1.2G+1.5Q1	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	300	12	Assumes 25mm gap to ceiling
	Q1		1.00	250	12	Assumes 25mm gap to ceiling
	Q1		1.00	250		
	G + ψ Q		2.00 / 3.00	360	12	
	Ws (Up)					No check required
Hanging - Strutting Beam	1.35G	0.57				
	1.2G+1.5Q	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	300	12	
	Q		1.00	300	12	
	G + ψ Q		2.00 / 3.00	360	12	
	Ws (Up)					No check required
Ceiling Battens	1.35G	0.57				
	0.9G+Wu	0.94				
	1.2G+Wu	0.94				
	G		2.00 / 3.00	600		
	Q					No check required
	Ws (Up)					No check required
Ceiling Joists	1.35G	0.57				
	1.2G+1.5Q	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	400	12	

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Residential

Member	Load Case	k1	j2	Service limits		Comments
				Span /	Absolute max (mm)	
Hanging Beam	1.35G	0.57				
	1.2G+1.5Q1	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00	300	12	
	Q		1.00	270		
Counter Beam	1.35G	0.57				
	1.2G+1.5Q1	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00	300	15	
	Q		1.00	270	15	
Verandah Beams	1.35G	0.57				
	1.2G+1.5Q1	0.97				
	0.9G+Wu	1.00				
	1.2G+Wu	1.00				
	G		2.00 / 3.00	400	10	
	Q		1.00	250	12	
Posts	Ws		1.00	200		
	1.35G	0.57				
	1.2G+1.5Q1	0.80				Q - Floor only
	1.2G+1.5Q2	0.94				Q - Roof only
	1.2G+Wu+Q1	1.00				Wind down
	0.9G+Wu	1.00				Uplift
Common Studs						No serviceability checks required
	1.35G	0.57				
	1.2G+1.5Q	0.57				Q - Permanent Floor ($\psi = 0.4$)
	1.2G+1.5Q	0.80				Q - Transient floor
	1.2G+1.5Q	0.94				Q - Roof
	1.2G+Wu	1.00				Vertical wind
	0.9G+Wu	1.00				Vertical wind
	Wu	1.00				Lateral wind
	Ws		1.00	200	20	Lateral wind service load. AS1720.3 Gives Span/150

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Residential

Member	Load Case	k1	j2	Service limits		Comments
				Span /	Absolute max (mm)	
Wall Plates	1.35G	0.57				
	1.2G+1.5Q	0.80				Q - Floor
	1.2G+1.5Q	0.94				Q - Roof
	1.2G+Wu	1.00				
	0.9G+Wu	1.00				
	G+Q		2.00 / 3.00	200	3	Q - Floor
	Q		1.00	200	3	Q - Roof
	Ws					No serviceability checks required
Lintels	1.35G	0.57				
	1.2G+1.5Q1	0.57				Q1 - Permanent Floor ; (0.5 kPa)
	1.2G+1.5Q2	0.80				Q2 - Transient floor ; (1.5 kPa)
	1.2G+1.5Q3	0.94				Q3 - Roof ; (0.25 kPa)
	0.9G+Wu	1.00				Wind down
	G+Q1		2.00 / 3.00	300	10	Q1 - Permanent Floor
	Q2		1.00	360	10	Q2 - Transient Floor
	Q3		1.00	250	10	Q3 - Roof
	G + ψQ		2.00 / 3.00	360	10	
	Ws (Up or down)		1.00	200	10	
Wind Beams	Wu	1.00				
	Ws		1.00	200	15	
Floor Joists	1.2G+1.5Q1	0.57				Q - Permanent Floor
	1.2G+1.5Q2	0.80				Q - Transient floor
	1.2G+1.5Q3	0.94				Q - Transient concentrated LL
	G+Q1		2.00 / 3.00	300	15	Q - Permanent Floor
	Q2		1.00	360	10	
	G + ψQ		2.00 / 3.00	360	12	
	Vibration		1.00		2	1 kN mid span
Bearers	1.2G+1.5Q1	0.57				Q1 - Permanent Floor ; (0.5 kPa)
	1.2G+1.5Q2	0.80				Q2 - Transient floor ; (1.5 kPa)
	1.2G+1.5Q3	0.94				Q3 - Transient concentrated LL (1.8 kN)
	G+Q1		2.00 / 3.00	300	12	Q1 - Permanent Floor
	Q2		1.00	360	10	
	G + ψQ		2.00 / 3.00	360	12	
	Vibration		1.00		2	1 kN mid span
Wind Portal (Steel)	Wu	N/A				
	Ws		N/A	250	18	When acting alone
			N/A	300	15	When acting with other bracing

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Industrial and Sheds (Assumes no ceiling)	Member	Load Case	Importance Level 1		Importance Level 2		Comments
			Span /	Max (mm)	Span /	Max (mm)	
Purlins (Steel)	G		250		300		Roof pitch > 5 degrees
	G		300		300		Roof pitch < 5 degrees
	Q		150		180	20	General LL
	G+Q				250	30	Roof pitch > 5 degrees
	Ws		100		150		
Rafters (Steel)	G		250		300		Roof pitch > 5 degrees
	G		300		360		Roof pitch < 5 degrees
	Q1		200		300		General LL
	Ws		100		150		
Portal Frames (Steel)	Ws		Bay spacing / 200		Bay spacing / 200		Differential between bays at top
Columns (Steel)	Ws		100		150		Side sway - Deflection at top
Lintels (Steel)	G		200	20	300	15	Doors
	Q		200	25	300	15	Doors
	G+Q		250	10	360	10	Window openings
	Ws		150	20	240	12	
Floor Beams (Steel)	G				300	15	
	Q				300	15	
	G+Q (long term)				360	15	
	Vibration					2	1 kN mid span