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# LIMIT STATES DESIGN WITH HYSpan

Pictured, 40 m span Hyspan portal frame building.

NOW AVAILABLE H2-S TREATED  
TO PROTECT AGAINST TERMITES†



# Limit States Design with Hyspan

The following information is provided in order to enable limit states design to be performed with Hyspan in accordance with the requirements of AS 1720.1-1997, Timber structures, Part 1: Design methods.

Hyspan is a structural material with defined and reliable strength and stiffness properties and is therefore suited for a wide range of structural applications including critical elements, such as large span portal frames and highway bridge structures.

The design information given here is specific for Hyspan and should not be assumed to apply for any other material.

## Product Standards, Quality Control and Product Certification

Hyspan is manufactured and has its structural properties determined in accordance with AS/NZS 4357 Structural Laminated Veneer Lumber. Hyspan therefore complies with the requirements for structural design in accordance with AS 1720.

Conformance with AS/NZS 4357 is certified under the Plywood Association of Australia (PAA) Product Certification Scheme based upon manufacture in accordance with the PAA process based Quality Control Program.

The PAA Product Certification Scheme is accredited by the government established Joint Accreditation System of Australia and New Zealand (JAS-ANZ). Certification given by JAS-ANZ accredited bodies is recognised as “Evidence of Suitability” in the Building Code of Australia.



## Identification and Specification

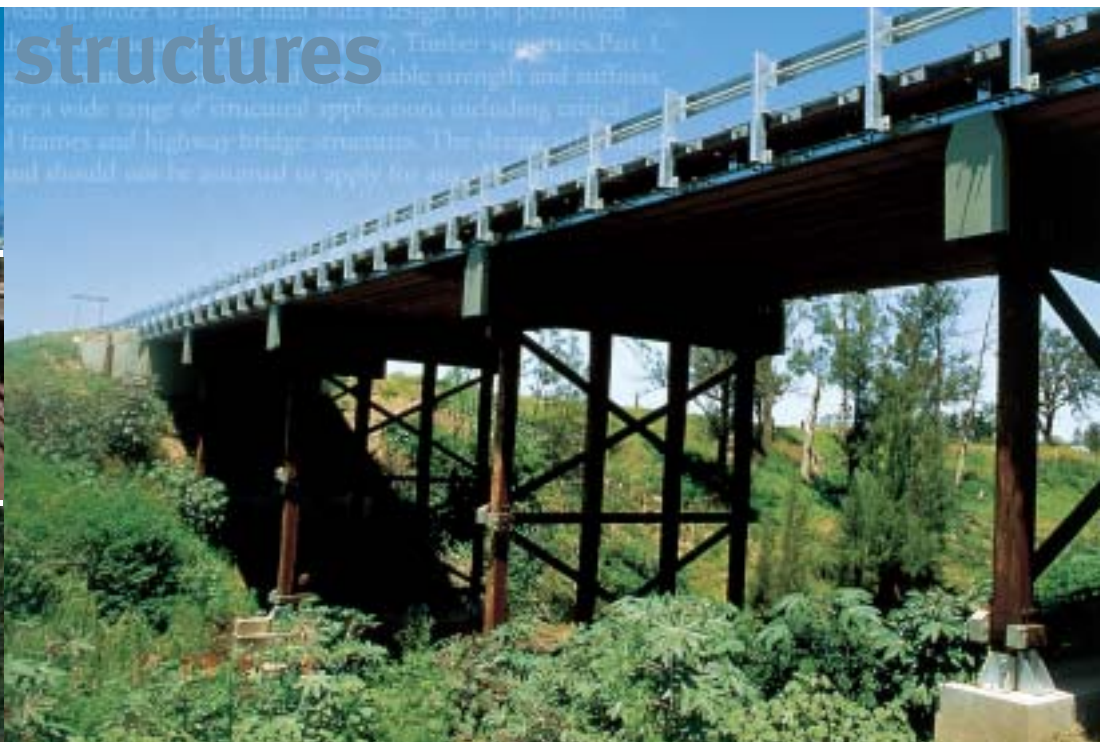
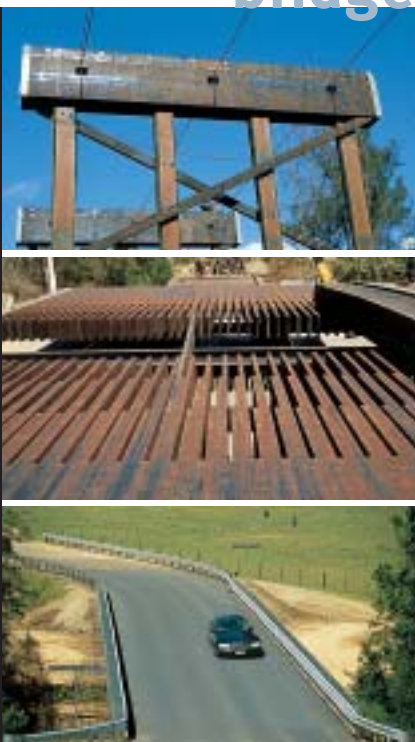
The name Hyspan is used as a stress-grade identifier in accordance with the identification requirements of AS 1720 and AS/NZS 4357.

Designers using the Hyspan properties for design should specify ‘Hyspan’ in the design documentation. Correct specification will ensure the correct material is supplied and used. Hyspan may ordinarily be readily identified by brand however, in some cases other methods (e.g. documentation) may also be used.

Please note that F grade properties or F grade identifiers do not apply for Hyspan - their use in specification in connection with Hyspan may mislead and result in the substitution of alternative but inferior materials.

**In order to protect the integrity of any design performed using Hyspan properties, do not accept the substitution of any unauthorised, look-alike materials.**

# bridge structures



\*H2-S treated Hyspan is manufactured to provide termite resistance equivalent to AS 1604 Hazard Level 2 for areas of Australia south of the Tropic of Capricorn.

# Design Data

The following design data is specific for Hyspan and is additional to design information given in Section 8 of AS 1720.

## Characteristic Strengths and Elastic Moduli

The properties given in Table 1 have been determined on the basis of testing at CSIRO and evaluation of test results in accordance with AS/NZS 4063, Timber – Stress-graded – In-grade strength and stiffness evaluation.

**Table 1 Characteristic Strengths and Elastic Moduli for Hyspan**

Bending (1)	$f'_b$	48 MPa	Shear in beams (1)	$f'_s$	5.3 MPa
Tension parallel to grain	$f'_t$	33 MPa	Shear at joint details (1)	$f'_{sj}$	5.3 MPa
Compression parallel to grain	$f'_c$	45 MPa	Modulus of Elasticity (2)	E	13,200 MPa
Compression perpendicular to grain	$f'_p$	12 MPa	Modulus of Rigidity	G	660 MPa
Joint Group (nails, bolts, screws)		JD4			

1. Properties apply whether used on flat or on edge.

2. Modulus of Elasticity is an average value which includes an allowance for shear deformation. Where required, the lower fifth percentile Modulus of Elasticity may be taken as 11,200 MPa.

## Capacity Factors

The capacity factors for use with the Hyspan strength properties given in Table 1 are given in Table 2. These values correspond to the highest level material property requirements detailed in Appendix I of AS 1720.

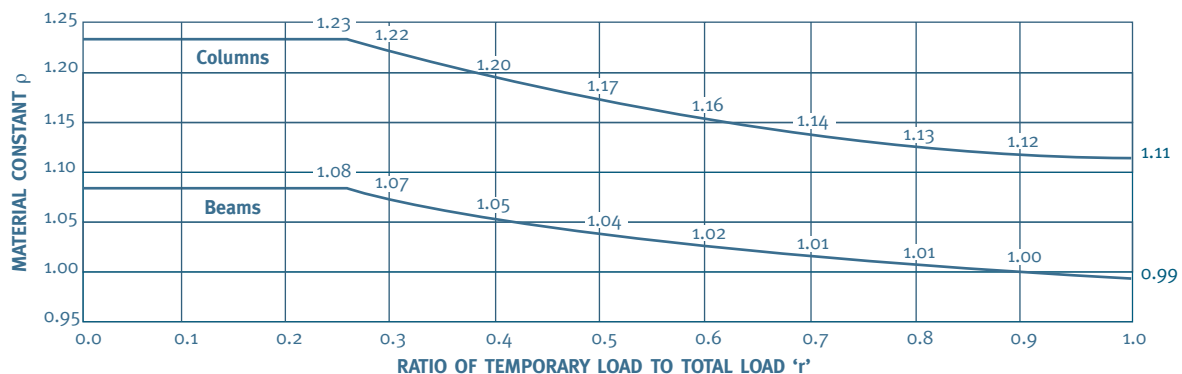
**Table 2 Capacity Factors,  $\phi$  for use with Hyspan**

DESIGN PROPERTY	APPLICATION OF STRUCTURAL MEMBER		
	All structural elements in houses and secondary structural elements in structures other than houses.	Primary structural elements in structures other than houses.	Primary structural elements in structures intended to fulfil an essential services or post disaster function.
	CAPACITY FACTOR, $\phi$		
$f'_b, f'_c, f'_t, f'_s, f'_p$ & $f'_{sj}$	0.90	0.85	0.80

For further explanation, definitions etc refer to Table 2.5, AS 1720.1

## Material Constant

The material constants for use in determining  $k_{12}$  for Hyspan beams and columns are given in Figure 1. The values given have been determined in accordance with equations E2(1) and E2(3) given in AS 1720.



1. Load should be interpreted as load effect; that is, the bending moment or axial compression in the member.
2. Temporary load refers to the load effect resulting from a load that acts for a duration of less than 12 months. Ordinarily, all loads except dead loads are regarded as temporary loads.
3. For a member normally subjected to axial tension, but which is required to support axial compression due to some temporary reversal of load, the material constant 'rho' may be taken as 0.99 (as for beams).

**FIGURE 1 MATERIAL CONSTANT 'rho' FOR USE WITH HYPAN BEAMS AND COLUMNS**

**Table 3 Standard Hyspan Sections & Section Properties**

HYSpan SECTION SIZE D X B mm	MASS PER UNIT LENGTH kg/m	CROSS SECTIONAL AREA A mm <sup>2</sup>	MAJOR AXIS		MINOR AXIS		TORSIONAL CONSTANT J x10 <sup>6</sup> mm <sup>4</sup>
			SECOND MOMENT OF AREA I <sub>xx</sub> x10 <sup>6</sup> mm <sup>4</sup>	FIRST MOMENT OF AREA Z <sub>xx</sub> x10 <sup>3</sup> mm <sup>3</sup>	SECOND MOMENT OF AREA I <sub>yy</sub> x10 <sup>6</sup> mm <sup>4</sup>	FIRST MOMENT OF AREA Z <sub>yy</sub> x10 <sup>3</sup> mm <sup>3</sup>	
			95 x 36	2.1	3420	2.6	
95 x 45	2.7	4275	3.2	67.7	0.7	32.1	2.0
95 x 63	3.7	5985	4.5	94.8	2.0	62.8	4.6
130 x 36	2.9	4680	6.6	101.4	0.5	28.1	1.7
130 x 45	3.6	5850	8.2	126.8	1.0	43.9	3.1
130 x 63	5.1	8190	11.5	177.5	2.7	86.0	7.5
150 x 36	3.3	5400	10.1	135.0	0.6	32.4	2.0
150 x 45	4.2	6750	12.7	168.8	1.1	50.6	3.7
150 x 63	5.9	9450	17.7	236.3	3.1	99.2	9.2
150 x 75	7.0	11250	21.1	281.3	5.3	140.6	14.4
170 x 36	3.8	6120	14.7	173.4	0.7	36.7	2.3
170 x 45	4.7	7650	18.4	216.8	1.3	57.4	4.3
170 x 63	6.6	10710	25.8	303.5	3.5	112.5	10.9
200 x 36	4.5	7200	24.0	240.0	0.8	43.2	2.8
200 x 45	5.6	9000	30.0	300.0	1.5	67.5	5.2
200 x 63	7.8	12600	42.0	420.0	4.2	132.3	13.4
240 x 36	5.4	8640	41.5	345.6	0.9	51.8	3.4
240 x 45	6.7	10800	51.8	432.0	1.8	81.0	6.4
240 x 63	9.4	15120	72.6	604.8	5.0	158.8	16.7
300 x 45	8.4	13500	101.3	675.0	2.3	101.3	8.3
300 x 63	11.7	18900	141.8	945.0	6.3	198.5	21.7
300 x 75	14.0	22500	168.8	1125.0	10.5	281.3	35.5
360 x 45	10.0	16200	175.0	972.0	2.7	121.5	10.1
360 x 63	14.1	22680	244.9	1360.8	7.5	238.1	26.7
400 x 45	11.2	18000	240.0	1200.0	3.0	135.0	11.3
400 x 63	15.6	25200	336.0	1680.0	8.3	264.6	30.0
400 x 75	18.6	30000	400.0	2000.0	14.1	375.0	49.6
450 x 63	17.6	28350	478.4	2126.3	9.4	297.7	34.2
525 x 75	24.4	39375	904.4	3445.3	18.5	492.2	67.2
600 x 63	23.4	37800	1134.0	3780.0	12.5	396.9	46.7
600 x 75	27.9	45000	1350.0	4500.0	21.1	562.5	77.7

All sections readily available to 12.0m length. Longer lengths available subject to transport considerations. For other sections and longer lengths enquiry is recommended.

**Available From:**

22 Prospect Street  
PO Box 425  
Box Hill Victoria 3128  
Australia

**General Enquiries**  
Freecall 1800 284 792  
Facsimile (08) 8739 7313

**Technical Enquiries**  
Freecall 1800 808 131  
Facsimile (03) 9793 9727