Technical Supplement

Australia June 2021

Thermal Performance System Guide

Important Notes

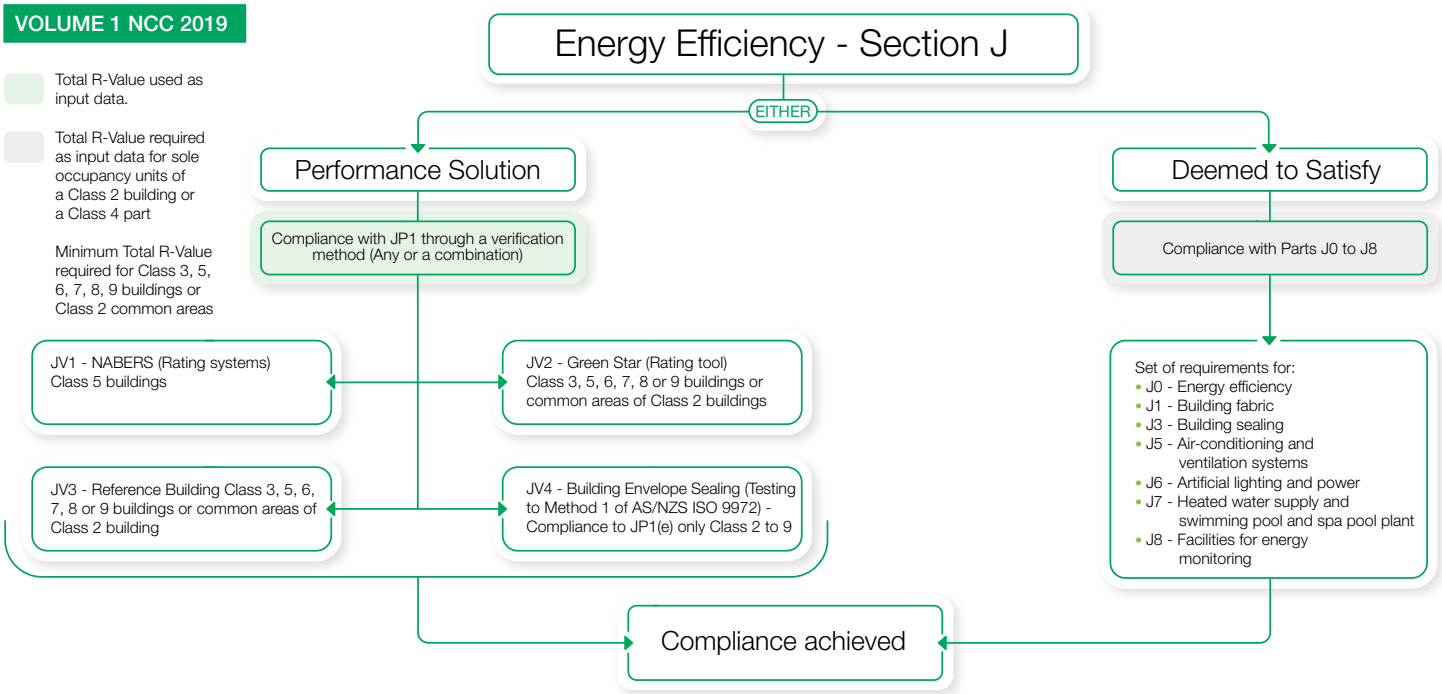
1. This supplement must be read in conjunction with the respective current James Hardie™ installation guide and any other relevant literature. This is not a standalone document for the installation of James Hardie™ products.
2. For specification, installation and warranty terms of James Hardie™ products, ensure that you have the current technical information and guides. If in doubt, or you need more information, visit www.jameshardie.com.au or Ask James Hardie™ on 13 11 03.

James Hardie's cladding products and wall systems contribute to the overall performance of the building envelope by providing thermal resistance, and can be used to meet both Deemed-to-Satisfy (DTS) provisions or Performance Solutions under the new NCC 2019.

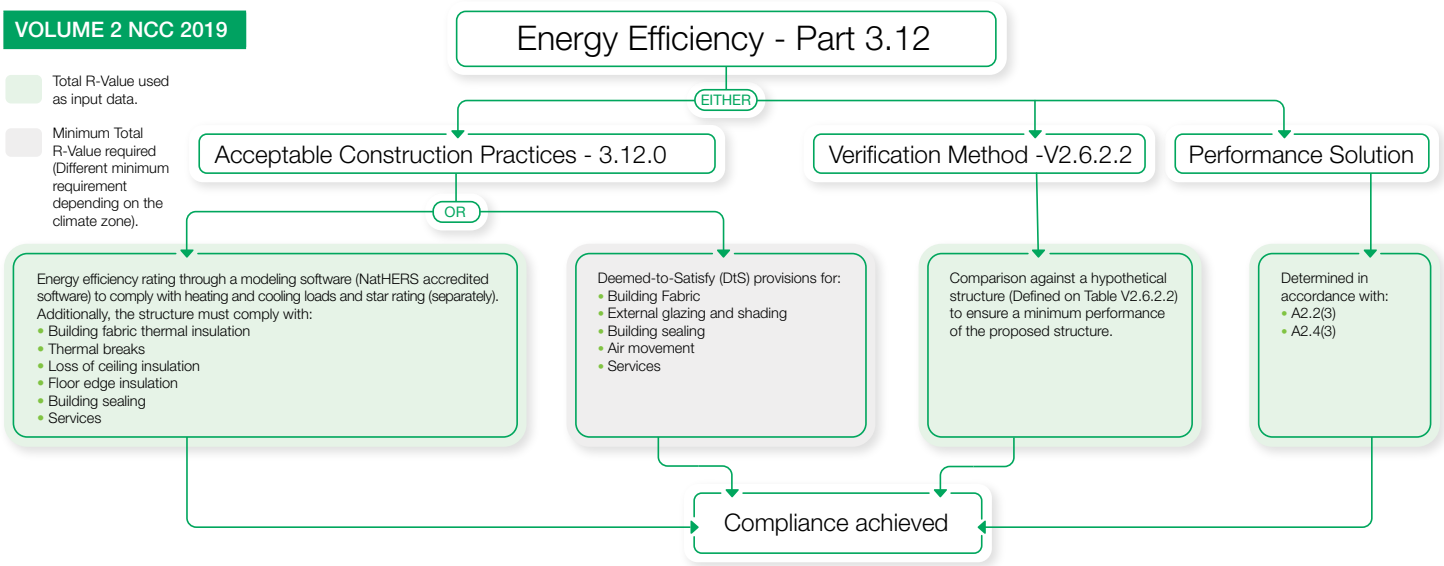
The NCC 2019 (Vol 1 and 2) adopted the updated AS/NZS 4859.1-2018 calculation method for thermal resistance which includes the effect of thermal bridging. Thermal bridging can be a major source of energy loss in homes and buildings, leading to higher utility bills. The new methodology considers the heat flow through the insulation path and through the frame, which means that the frame configuration such as stud and nogging spacing can impact the overall R-value achieved.

This guide outlines a range of third-party verified total R-values and U-values for James Hardie™ external cladding products in accordance with the new methodology. R-Values must be used as part of the compliance with the energy efficiency provisions from Volume 1 and 2 of the NCC and used in accordance to the preferred compliance pathway.

For Volume 1, multi-residential and non-residential buildings, the energy efficiency is assessed based on the requirements of Section J. In this section, R-Values are used as part of the input data required when achieving compliance through a performance solution. When demonstrating compliance to this section of the construction code through a DtS solution, the R-Values will be used as input data or will have to meet a minimum requirement depending on the building class. Diagram below outlines compliance pathways as per NCC 2019.

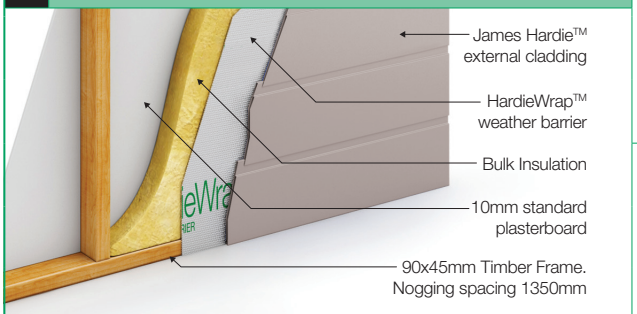
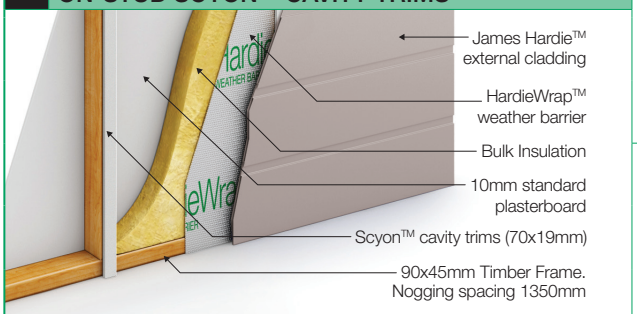
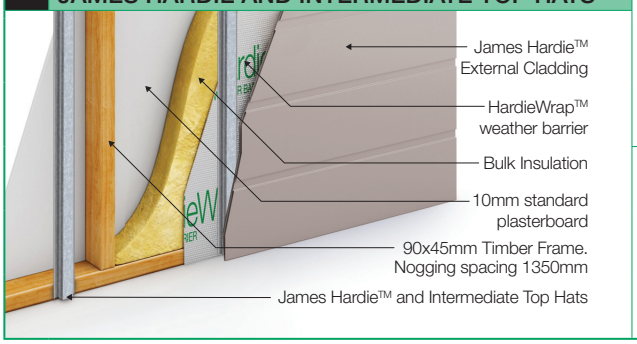


For Volume 2, the energy efficiency of the structure is measured based on the requirements of Section 3.12. R-Values will be used as part of the input data required when performing an energy efficiency assessment (using a NatHERS accredited software) in order to achieve the minimum star rating of as part of a performance solution as required in A2.2(3) and A2.4(3). When using a DtS solution, a minimum R-Value will be required, which will depend on the construction and climate zone as described in section 3.12.1.4. Please refer to the Notes Table for key design considerations.



The below presented R-Values and U-values are determined in accordance with AS/NZS 4859:2018 “Thermal Insulation Materials for Buildings. Part 1: General Criteria and Technical Provision, and Part 2: Design”.

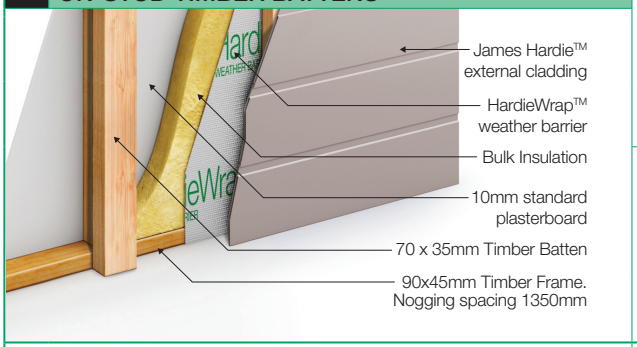
WALL SYSTEM THERMAL PERFORMANCE TOTAL R VALUES

External Cladding on Timber Frame	Stud Centers (mm)	Insulation	R-Value		U-Value	
			Summer	Winter	Summer	Winter
T1 EXTERNAL CLADDING DIRECT FIXED TO FRAME						
	600	R2.0	1.93	2.04	0.52	0.49
		R2.5	2.26	2.37	0.44	0.42
		R2.7	2.39	2.50	0.42	0.40
	450	R2.0	1.89	2.00	0.53	0.50
		R2.5	2.20	2.30	0.46	0.44
		R2.7	2.31	2.41	0.43	0.42
T2 EXTERNAL CLADDING FIXED TO ON-STUD SCYON™ CAVITY TRIMS						
	600	R2.0	2.26	2.40	0.44	0.42
		R2.5	2.59	2.73	0.39	0.37
		R2.7	2.71	2.85	0.37	0.35
	450	R2.0	2.20	2.33	0.45	0.43
		R2.5	2.50	2.63	0.40	0.38
		R2.7	2.62	2.74	0.38	0.37
T3 EXTERNAL CLADDING FIXED TO OFF-STUD JAMES HARDIE AND INTERMEDIATE TOP HATS						
	600	R2.0	2.30	2.46	0.43	0.41
		R2.5	2.66	2.82	0.38	0.36
		R2.7	2.79	2.95	0.36	0.34
	450	R2.0	2.26	2.40	0.44	0.42
		R2.5	2.59	2.74	0.39	0.37
		R2.7	2.72	2.87	0.37	0.35

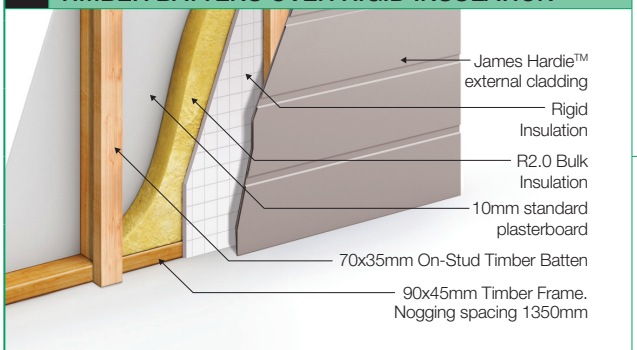
WALL SYSTEM THERMAL PERFORMANCE TOTAL R VALUES

External Cladding on Timber Frame

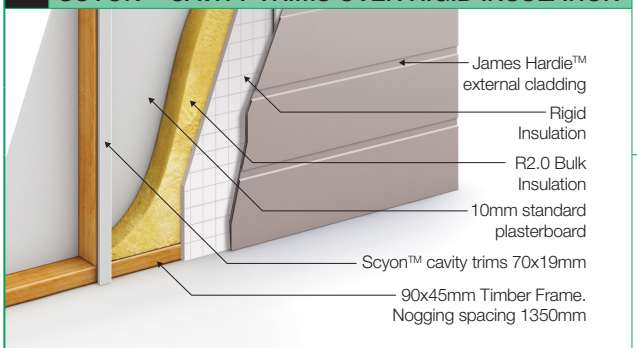
	Stud Centers (mm)	Insulation	R-Value		U-Value	
			Summer	Winter	Summer	Winter
T4 EXTERNAL CLADDING FIXED TO ON-STUD TIMBER BATTENS	600	R2.0	2.34	2.48	0.43	0.40
		R2.5	2.69	2.84	0.37	0.35
		R2.7	2.83	2.97	0.35	0.34
	450	R2.0	2.30	2.44	0.44	0.41
		R2.5	2.63	2.77	0.38	0.36
		R2.7	2.75	2.89	0.36	0.35



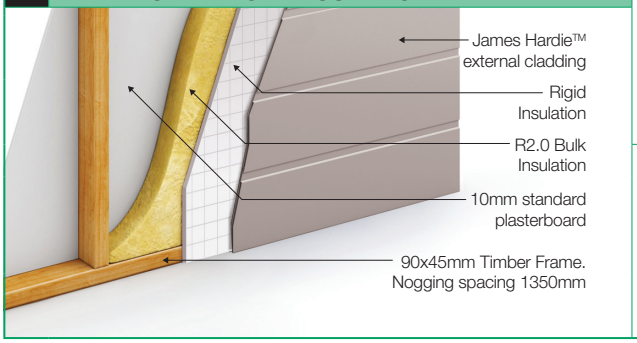
	Stud Centers (mm)	Rigid Insulation	R-Value		U-Value	
			Summer	Winter	Summer	Winter
T5 EXTERNAL CLADDING FIXED TO ON-STUD TIMBER BATTENS OVER RIGID INSULATION	600	R0.5	2.70	2.84	0.37	0.35
		R1.0	3.03	3.16	0.33	0.32
		R1.5	3.37	3.46	0.30	0.29
	450	R0.5	2.64	2.76	0.38	0.36
		R1.0	2.95	3.06	0.34	0.33
		R1.5	3.25	3.34	0.31	0.30



T6 EXTERNAL CLADDING FIXED TO ON-STUD SCYON™ CAVITY TRIMS OVER RIGID INSULATION	600	R0.5	2.60	2.72	0.39	0.37
		R1.0	2.91	3.02	0.34	0.33
		R1.5	3.21	3.29	0.32	0.30
	450	R0.5	2.51	2.63	0.40	0.38
		R1.0	2.79	2.89	0.36	0.35
		R1.5	3.06	3.13	0.33	0.32



T7 EXTERNAL CLADDING DIRECT FIXED TO FRAME OVER RIGID INSULATION	600	R0.5	2.27	2.37	0.44	0.42
			2.57*	2.67*	0.39*	0.37*
		R1.0	2.58	2.66	0.39	0.38
		R1.5	2.87	2.93	0.35	0.34
	450	R0.5	2.21	2.30	0.45	0.44
			2.48*	2.57*	0.40*	0.39*
		R1.0	2.49	2.56	0.40	0.39
		R1.5	2.75	2.80	0.36	0.36

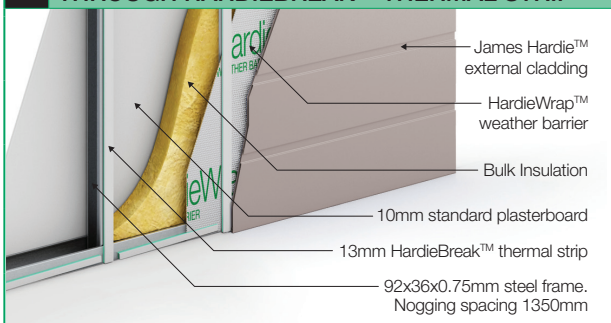


*These R and U-Values consider R2.5 bulk insulation instead of R.20 as described in the system's diagram.

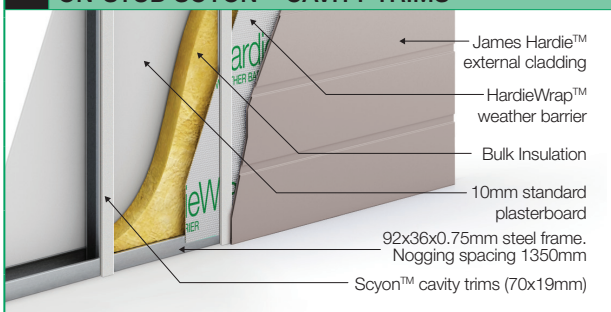
WALL SYSTEM THERMAL PERFORMANCE TOTAL R VALUES

External Cladding on Steel Frame

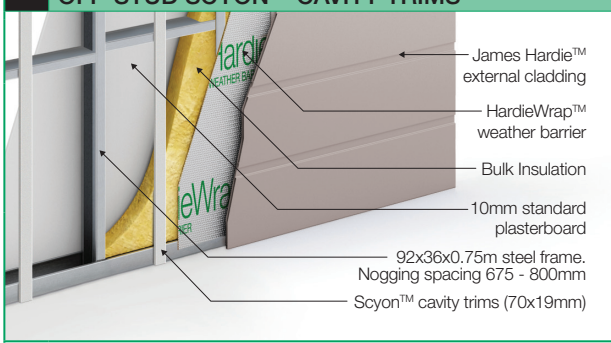
S1 EXTERNAL CLADDING DIRECT FIXED TO FRAME THROUGH HARDIEBREAK™ THERMAL STRIP



S2 EXTERNAL CLADDING FIXED TO ON-STUD SCYON™ CAVITY TRIMS

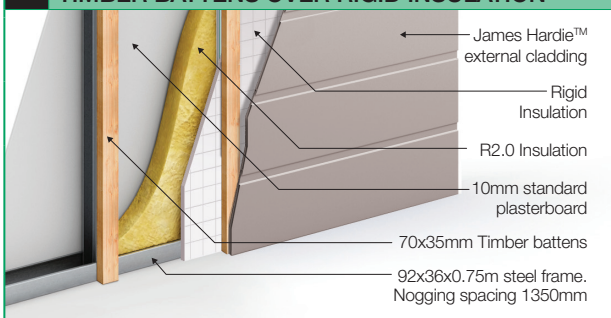


S3 EXTERNAL CLADDING FIXED TO OFF-STUD SCYON™ CAVITY TRIMS

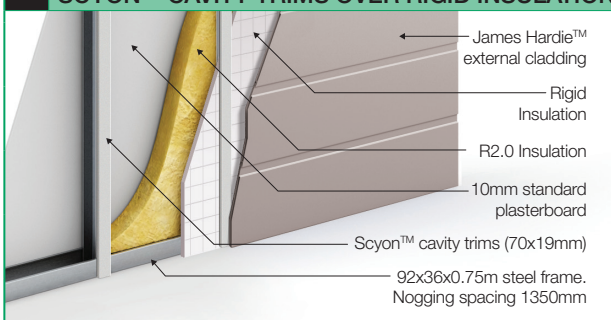


	Stud Centers (mm)	Insulation	R-Value		U-Value	
			Summer	Winter	Summer	Winter
S1	600	R2.0	1.77	1.85	0.57	0.54
		R2.5	1.97	2.06	0.51	0.49
		R2.7	2.05	2.13	0.49	0.47
	450	R2.0	1.67	1.74	0.60	0.57
		R2.5	1.85	1.92	0.54	0.52
		R2.7	1.91	1.98	0.52	0.51
S2	600	R2.0	1.64	1.72	0.61	0.58
		R2.5	1.80	1.88	0.55	0.53
		R2.7	1.86	1.93	0.54	0.52
	450	R2.0	1.51	1.57	0.66	0.64
		R2.5	1.64	1.70	0.61	0.59
		R2.7	1.68	1.74	0.59	0.58
S3	600	R2.0	1.69	1.80	0.59	0.56
		R2.5	1.86	1.97	0.54	0.51
		R2.7	1.92	2.03	0.52	0.49
	450	R2.0	1.61	1.71	0.62	0.59
		R2.5	1.75	1.85	0.57	0.54
		R2.7	1.80	1.91	0.56	0.53

S4 EXTERNAL CLADDING FIXED TO ON-STUD TIMBER BATTENS OVER RIGID INSULATION



S5 EXTERNAL CLADDING FIXED TO ON-STUD SCYON™ CAVITY TRIMS OVER RIGID INSULATION

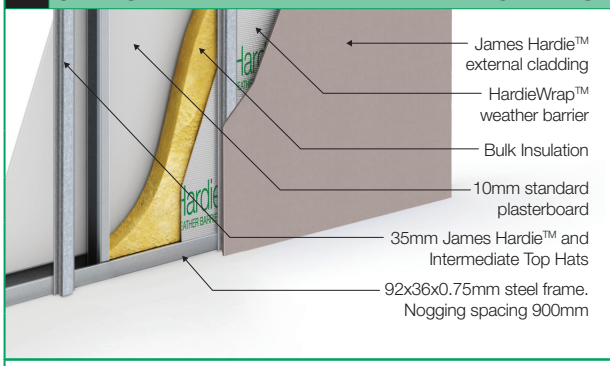


	Stud Centers (mm)	Insulation	R-Value		U-Value	
			Summer	Winter	Summer	Winter
S4	600	R0.5	2.21	2.32	0.45	0.43
		R1.0	2.43	2.54	0.41	0.39
		R1.5	2.64	2.73	0.38	0.37
	450	R0.5	2.10	2.20	0.48	0.46
		R1.0	2.29	2.38	0.44	0.42
		R1.5	2.47	2.54	0.41	0.39
S5	600	R0.5	1.81	1.87	0.55	0.53
		R1.0	1.95	2.01	0.51	0.50
		R1.5	2.07	2.12	0.48	0.47
	450	R0.5	1.64	1.69	0.61	0.59
		R1.0	1.75	1.80	0.57	0.56
		R1.5	1.85	1.88	0.54	0.53

WALL SYSTEM THERMAL PERFORMANCE TOTAL R VALUES

ExoTec™ on Steel Frame

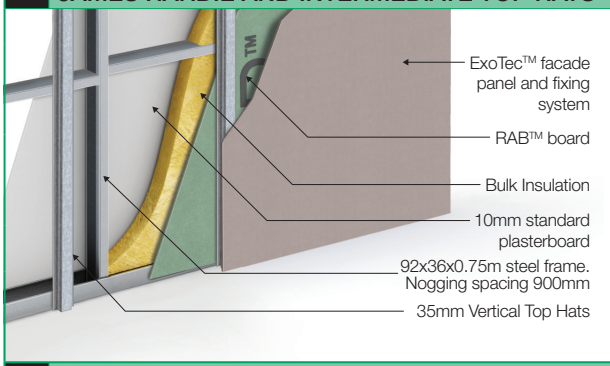
S6 EXTERNAL CLADDING FIXED TO OFF-STUD JAMES HARDIE AND INTERMEDIATE TOP HATS



Stud Centers (mm)	Insulation	R-Value		U-Value	
		Summer	Winter	Summer	Winter
600	R2.0	1.76	1.88	0.57	0.53
	R2.5	1.95	2.08	0.52	0.48
	R2.7	2.02	2.15	0.50	0.47
450	R2.0	1.64	1.75	0.61	0.57
	R2.5	1.80	1.92	0.56	0.52
	R2.7	1.86	1.98	0.54	0.51
300	R2.0	1.45	1.54	0.69	0.65
	R2.5	1.56	1.66	0.64	0.60
	R2.7	1.60	1.70	0.62	0.59

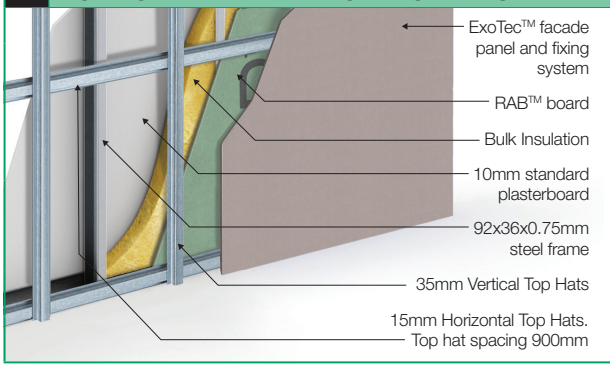
ExoTec™ systems with RAB™ board

S7 EXTERNAL CLADDING FIXED TO OFF-STUD JAMES HARDIE AND INTERMEDIATE TOP HATS



Stud Centers (mm)	Insulation	R-Value		U-Value	
		Summer	Winter	Summer	Winter
600	R1.50	1.33	1.43	0.75	0.70
	R2.50	1.74	1.86	0.57	0.54
	R2.50	1.85	1.97	0.54	0.51
450	R1.50	1.27	1.36	0.79	0.74
	R2.50	1.64	1.74	0.61	0.57
	R2.50	1.75	1.86	0.57	0.54
300	R1.50	1.17	1.25	0.86	0.80
	R2.50	1.46	1.55	0.68	0.64
	R2.50	1.58	1.68	0.63	0.60

S8 EXTERNAL CLADDING FIXED TO OFF-STUD HORIZONTAL AND VERTICAL TOP HATS



Stud Centers (mm)	Insulation	R-Value		U-Value	
		Summer	Winter	Summer	Winter
600	R1.50	1.54	1.65	0.65	0.61
	R2.50	2.12	2.27	0.47	0.44
	R2.50	2.19	2.36	0.46	0.42
450	R1.50	1.46	1.56	0.69	0.64
	R2.50	1.96	2.09	0.51	0.48
	R2.50	2.05	2.20	0.49	0.46
300	R1.50	1.32	1.41	0.76	0.71
	R2.50	1.71	1.82	0.59	0.55
	R2.50	1.81	1.94	0.55	0.52

JAMES HARDIE PRODUCT R VALUES (m^2 .k/w)	
Scyon™ Matrix™ cladding fixed to 19mm Scyon™ cavity trim	
James Hardie Product	**R-Value (m2 .k/w)**
HardieFlex™ 4.5mm	0.010
Villaboard™ / Versilux™ 6mm	0.013
HardieTex™, EasyLap™, Hardie™ Fine Texture Cladding and Matrix™ panel	0.016
ExoTec™ facade panel	0.017
HardiePlank™ weatherboard	0.018
Scyon™ Axon™	0.023
ComTex™ facade panel	0.039
PrimeLine™ weatherboard, Scyon™ Stria™ cladding & Scyon™ Linea™ weatherboard	0.04

NOTES

1. The above published Total R-Values for the above building system configurations were independently assessed in accordance with AS4859.2:2018 Thermal insulation materials for buildings. Part 2: Design', by certified engineers and industry organizations.
2. The above estimates the resulting (overall) Total R for the whole wall surface (excluding glazing) from the parallel heat paths. Insulation R adjusted for its mean temperatures for 18°C indoor and 12 °C outdoor winter, or 24 °C indoor and 36 °C outdoor summer, Australia. Indoor and outdoor air temperatures per AS/NZS4859.2:2018 Clause 5.1. For full report access, please contact James Hardie.
3. The R-values set out in the table above are calculated strictly based on the information/criteria/specifications set out in the adjacent system description and the assumptions set out in these Notes 1-9 inclusive. Any change to the information/criteria/specifications and assumptions upon which the R-values have been calculated for the described systems may result in a different R-value. Any variation from the above specifications and assumptions requires independent assessment to establish an R-Value for your system. Contact James Hardie for more information.
4. Steel frame systems have been estimated with a nominal Base Metal Thickness (BMT) of 0.75mm. For frames with BMT of 0.55mm or lower the overall Total R-Value may be increased by 0.1.
5. When Total Transmittance (U-Value) is required, this is calculated by U=1/R. Total R & U values include indoor and outdoor air film.
6. If 9mm Axon™ cladding (R0.023) is replaced by 9mm ExoTec™ (R0.015) cladding, all Total R results will reduce by 0.08.
7. If 12mm ExoTec™ cladding (R0.020) is used instead of 9mm ExoTec™ cladding (R0.015), all Total R results will increase by 0.005
8. If Villaboard™ is used instead of 10mm Plasterboard as internal lining, subtract 0.046 from the total R-Values.
9. Bulk insulation and membranes must be suitable for intended use and be installed as per manufacturer's recommendations.