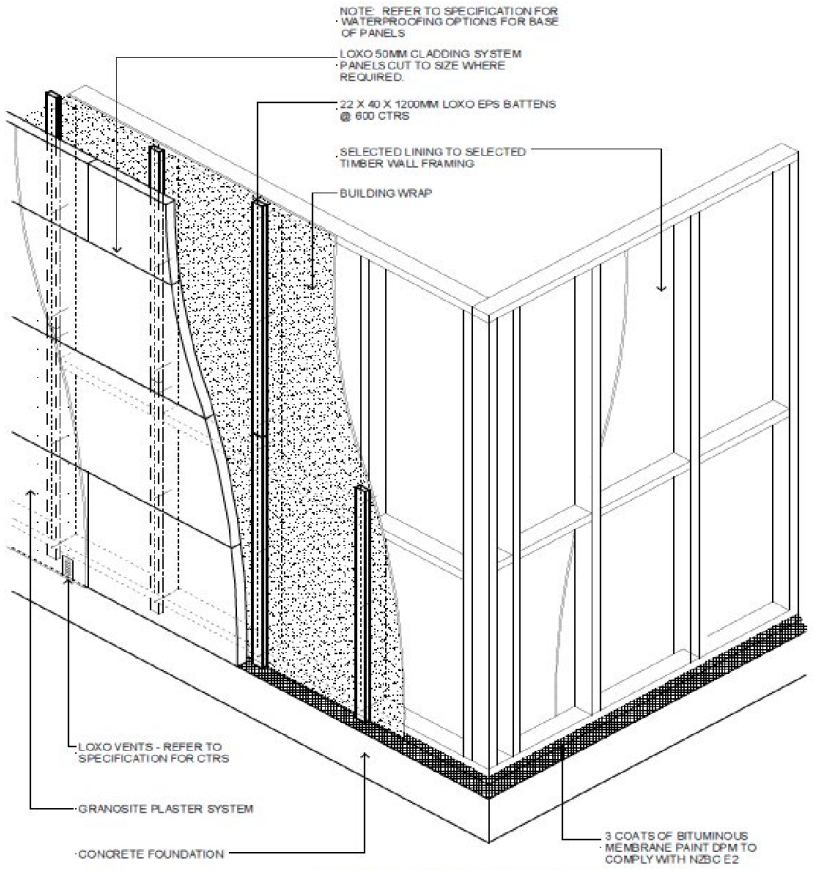
R-CALCULATION - 50MM LOXO PANEL WITH 22MM VENTILATED GAP & R2.0 INSULATION

(NZ application assuming 14% M.C. in LOXO PANEL & construction per below)

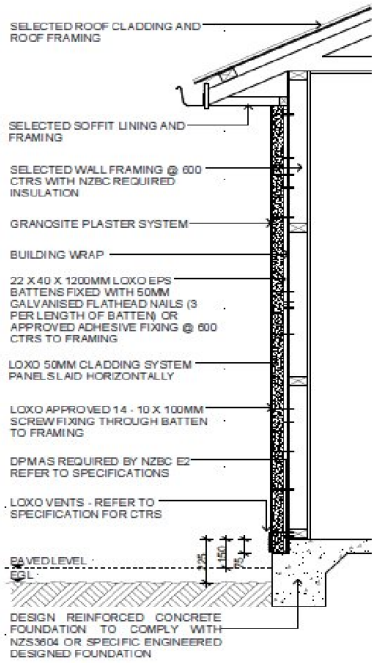
Granosite SPECIALIST ARCHITECTURAL COATINGS LOXO CLADDING SYSTEMS

GENERAL ARRANGEMENT 2.2



GENERAL ARRANGEMENT
Det. 2.2.1
Scale NTS
UPDATED AUGUST 2014

2.3 SINGLE STORY SECTION



SINGLE STOREY SECTION
22 x 40 x 1200mm CLASSIC BATTEN
Det. 2.3.1
Scale 1:20
UPDATED AUGUST 2014

THERMAL INSULATION EVALUATION BY CALCULATION

50MM LOXO PANEL WITH 22MM VENTILATED GAP & R2.0 INSULATION (a: insulation path)

Granosite Plaster System, 50mm Loxo Panel, 22mm vented air gap, unreflective building wrap, R2.0 batt insulation (e.g. 90mm 10kg/m3 glasswool), 10mm plasterboard

JMF Calc														
372w06aV	wall thermal element	m².K/W	°C out	°C in	°C avg	Δt	m².K/W	°C out	°C in	°C avg	Δt	e1	e2	mm
	Outside air film:	0.030	**6.00**	6.15	6.07	0.15	0.030	**30.00**	29.92	29.96	0.08	cavity		
	Granosite Plaster System (8mm, k=0.8) (55% derated)	0.005	6.15	6.17	6.16	0.02	0.005	29.92	29.91	29.92	0.01			8
	50mm Loxo Panel (k=0.198 @ 14% M.C.) (55% derated)	**0.114**	6.17	6.73	6.45	0.56	**0.114**	29.91	29.62	29.76	0.29			50
	22mm unreflective vented air gap (55% derated)	***0.093***	6.73	7.19	6.96	0.46	***0.076***	29.62	29.42	29.52	0.20	0.87	0.87	22
	unreflective building wrap	0.000	7.19	7.19	7.19	0.00	0.000	29.42	29.42	29.42	0.00			0
	R2.0 batt insulation (e.g. 90mm 10kg/m3 glasswool)	**2.036**	7.19	17.29	12.24	10.10	**1.949**	29.42	24.37	26.89	5.05			90
	10mm plasterboard	0.053	17.29	17.55	17.42	0.26	0.053	24.37	24.23	24.30	0.14			10
	Indoor air film (unreflective still air surface):	0.090	17.55	**18.00**	17.78	0.45	0.090	24.23	**24.00**	24.12	0.23			
	Total Thermal Resistance, R_{Ti} =	**2.42**	**winter**			12.00	**2.32**	**summer**			6.00			180
	Corresponding Total Conductance (U_{Ti}):	0.41	W/(m².K)				0.43	W/(m².K)						
	Surface Overall Total Thermal Resistance, R_T=	**2.20**	**winter**				**2.12**	**summer**	(when framing considered)					

NOTES: **Determinations based upon NZS 4214:2006 and AS/NZS 4859.1:2002/Amdt 1 2006.** Client Ref: 2015.1

(NZ bounding outdoor temperature conditions of 6°C winter, 30°C summer) Version 26/02/2015 08:48

The results are believed representative at the date of calculation, however the author reserves the right to update calculations.

50mm Loxo Panel (k=0.127, 0% M.C.) thermal resistance based on Boqianzhijian (WSW)ZI China, test No.0702074 of Feb 2007 at 30°C, 0% M.C.

Loxo Panel estimated to have k=0.198 @ 14% M.C. i.e. R0.253 for 50mm for above calculations. For 0% MC, add 0.07 to Overall Total R.

90x45mm wood frames @ 600mm centres and dwangs @ 800mm, equates to 86.8% of surface area for insulation.

Insulation R adjusted at 0.65%/K or 0.39%/K in line with AS/NZS 4859.1:2002/Amdt 1, Clause K3.1

Air space insulation values (shown in italics) were estimated using Reflect3 software.

The calculations incorporate the dust assumptions of AS/NZS 4859.1:2002/Amdt 1 2006 - Wall cavity, Clause K3.2 (e+0.0) (no dust on vertical surfaces)

Total R values include indoor and outdoor air films. Total Conductance (U) calculated by U=1/R

Calculated by James Fricker, F.AIRAH, M.IEAust, CPEng.

Signed: James Fricker

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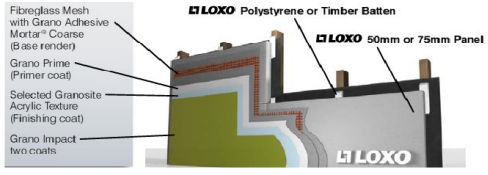
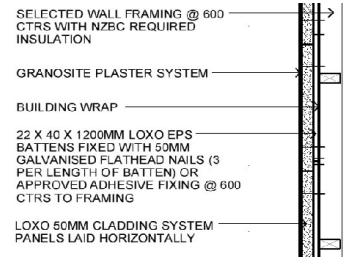
Membership No. 1179647





THERMAL INSULATION EVALUATION BY CALCULATION

50MM LOXO PANEL WITH 22MM VENTILATED GAP & R2.0 INSULATION (b: frame+EPS batten path)

Granosite Plaster System, 50mm Loxo Panel, 22mm SL Class EPS batten, unreflective building wrap, 90mm deep pine framing (12% MC, k =0.12 W/mK), 10mm plasterboard

JMF Calc													
372w06bV	wall thermal element	m².K/W	°C out	°C in	°C avg	Δt	m².K/W	°C out	°C in	°C avg	Δt	e1 e2	mm
	Outside air film:	0.030	**6.00**	6.21	6.10	0.21	0.030	**30.00**	29.90	29.95	0.10	cavity	
	Granosite Plaster System (8mm, k=0.8)	0.010	6.21	6.27	6.24	0.07	0.010	29.90	29.86	29.88	0.03		8
	50mm Loxo Panel (k=0.198 @ 14% M.C.)	**0.253**	6.27	8.00	7.14	1.73	**0.253**	29.86	28.98	29.42	0.88		50
	22mm SL Class EPS batten	**0.568**	8.00	11.89	9.95	3.89	**0.530**	28.98	27.12	28.05	1.85		22
	unreflective building wrap	0.000	11.89	11.89	11.89	0.00	0.000	27.12	27.12	27.12	0.00		0
	90mm deep pine framing (12% MC, k =0.12 W/mK)	0.750	11.89	17.02	14.46	5.13	0.750	27.12	24.50	25.81	2.62		90
	10mm plasterboard	0.053	17.02	17.38	17.20	0.36	0.053	24.50	24.31	24.41	0.19		10
	Indoor air film (unreflective still air surface):	0.090	17.38	**18.00**	17.69	0.62	0.090	24.31	**24.00**	24.16	0.31		
	Total Thermal Resistance, R_{Tf} =	**1.75**	**winter**			12.00	**1.72**	**summer**			6.00		180
	Corresponding Total Conductance (U_{Tf}):	0.57	W/(m².K)				0.58	W/(m².K)					

NOTES: **Determinations based upon NZS 4214:2006 and AS/NZS 4859.1:2002/Amdt 1 2006.** Client Ref: 2015.1

(NZ bounding outdoor temperature conditions of 6°C winter, 30°C summer) Version 26/02/2015 08:48

The results are believed representative at the date of calculation, however the author reserves the right to update calculations.

50mm Loxo Panel (k=0.198 @ 14% M.C.) thermal resistance based on Boqianzhijian (WSW)ZI China, test No.0702074 of Feb 2007 at 30°C, 0% M.C.

Loxo Panel estimated to have k=0.198 @ 14% M.C. i.e. R0.253 for 50mm for above calculations.

90x45mm wood frames @ 600mm centres and dwangs @ 800mm, equates to 6.7% of surface area for EPS insulated framing.

Insulation R adjusted at 0.65%/K or 0.39%/K in line with AS/NZS 4859.1:2002/Amdt 1, Clause K3.1

Total R values include indoor and outdoor air films. Total Conductance (U) calculated by U=1/R

Calculated by James Fricker, F.AIRAH, M.IEAust, CPEng.

Signed: James Fricker

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THERMAL INSULATION EVALUATION BY CALCULATION

50MM LOXO PANEL WITH 22MM VENTILATED GAP & R2.0 INSULATION (c: frame+air gap path)

Granosite Plaster System, 50mm Loxo Panel, 22mm SL Class EPS batten, unreflective building wrap, 90mm deep pine framing (12% MC, k =0.12 W/mK), 10mm plasterboard

JMF Calc														
372w06cV	wall thermal element	m².K/W	°C out	°C in	°C avg	Δt	m².K/W	°C out	°C in	°C avg	Δt	e1	e2	mm
	Outside air film:	0.030	**6.00**	6.32	6.16	0.32	0.030	**30.00**	29.84	29.92	0.16	cavity		
	Granosite Plaster System (8mm, k=0.8) (55% derated)	0.005	6.32	6.37	6.34	0.05	0.005	29.84	29.81	29.83	0.02			8
	50mm Loxo Panel (k=0.198 @ 14% M.C.) (55% derated)	**0.114**	6.37	7.57	6.97	1.20	**0.114**	29.81	29.20	29.51	0.61			50
	22mm unreflective vented air gap (55% derated)	***0.091***	7.57	8.54	8.05	0.97	***0.076***	29.20	28.80	29.00	0.41	0.87	0.87	22
	unreflective building wrap	0.000	8.54	8.54	8.54	0.00	0.000	28.80	28.80	28.80	0.00			0
	90mm deep pine framing (12% MC, k =0.12 W/mK)	0.750	8.54	16.48	12.51	7.95	0.750	28.80	24.77	26.78	4.03			90
	10mm plasterboard	0.053	16.48	17.05	16.77	0.56	0.053	24.77	24.48	24.63	0.28			10
	Indoor air film (unreflective still air surface):	0.090	17.05	**18.00**	17.52	0.95	0.090	24.48	**24.00**	24.24	0.48			
	Total Thermal Resistance, R_{Tf} =	**1.13**	winter			12.00	**1.12**	summer			6.00			180
	Corresponding Total Conductance (U_{Tf}):	0.88	W/(m².K)				0.90	W/(m².K)						

NOTES: **Determinations based upon NZS 4214:2006 and AS/NZS 4859.1:2002/Amdt 1 2006.** Client Ref: 2015.1

(NZ bounding outdoor temperature conditions of 6°C winter, 30°C summer) Version 26/02/2015 08:48

The results are believed representative at the date of calculation, however the author reserves the right to update calculations.

50mm Loxo Panel (k=0.198 @ 14% M.C.) (55% derated) thermal resistance based on Boqianzhijian (WSW)ZI China, test No.0702074 of Feb 2007 at 30°C

Loxo Panel estimated to have k=0.198 @ 14% M.C. i.e. R0.253 for 50mm for above calculations.

90x45mm wood frames @ 600mm centres and dwangs @ 800mm, equates to 6.5% of surface area for uninsulated framing.

Insulation R adjusted at 0.65%/K or 0.39%/K in line with AS/NZS 4859.1:2002/Amdt 1, Clause K3.1

Air space insulation values (shown in italics) were estimated using Reflect3 software.

The calculations incorporate the dust assumptions of AS/NZS 4859.1:2002/Amdt 1 2006 - Wall cavity, Clause K3.2 (e+0.0) (no dust on vertical surfaces)

Total R values include indoor and outdoor air films. Total Conductance (U) calculated by U=1/R

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