

PlyBrace™ Plywood Technical Note

Version 1 July 2022

Endless possibilities.



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GIB HandiBrac[®] is a registered trademark of Winstone Wallboards

AraucoPly[®] is a registered trademark of Maderas Arauco S.A.

Please check our website www.bbi.net.nz for any updates to this document.



bbi[®] PlyBrace[™] Plywood Wall Bracing Specifications

Product	Min Wall Length	PlyBrace™ Thickness	Max Stud Spacing	Wind*	Earthquake**
	mm	mm	mm	BU/m	BU/m
bbi® AraucoPly®® DD F8	200	7	600	41	49
bbi® AraucoPly® DD F8	400	7	600	56	58
bbi® AraucoPly® DD F8	600	7	600	72	80
bbi® AraucoPly® DD F8	1200	7	600	93	100
bbi® Redline® Poplar Core	1200	9	600	109	111
bbi® Redline® Poplar Core	1200	12	600	101	108
bbi [®] Redline [®] Premium Hardwood Core	1200	12	600	134	157
bbi® Blondeline® Birch Poplar Core	1200	9	600	102	114
bbi® Blondeline® Birch Poplar Core	1200	12	600	106	106

As limited by the serviceability load capacity.* As limited by the ultimate load capacity.** Maximum hold down rating for NZS 3604:2011 timber floors is 120BU's/m. Maximum hold down rating for NZS 3604:2011 concrete floors is 150BU's/m.

bbi[®] PlyBrace[™] Plywood Wall Bracing Systems

bbi[®] has a range of wall bracing systems in 7 mm, 9 mm, and 12 mm thicknesses used to resist earthquake and wind loads on timber framed buildings.

These products have been manufactured and tested in accordance with NZS3604:2011.

Wall Framing

Wall framing must comply with the New Zealand building code requirements. Nogs are not required to achieve the above bracing unit loadings.

Sheet Fastenings

50 x 2.8 flat head galvanised nails at 150mm centres around the perimeter of the sheet with fixings at 300 centres on internal stud.



Frame Connections

GIB Handibrac[®] with M12 hold down bolts, except 7mm DD F8 200mm wall which uses 1 M12 hold down bolt with 50 x 50 x 3 square washer centered in the frame.

Installation Requirements

bbi® AraucoPly® DD F8 can be installed prior to the building being fully enclosed if H3.2 treated. The building must be fully enclosed within 60 days of installation.

bbi[®] **Redline**[®] and **Blondeline**[®] must only be installed once the building has been fully enclosed and the moisture content of the supporting timber framing does not exceed 18%.

Finishing System

All visible surfaces, including edges must be finished with three coats of polyurethane or a paint system comprising of a primer/sealer, and two topcoats*. * Excludes bbl® AraucoPly® DD F8

Durability

bbi[®] PlyBrace™ Wall Bracing Systems have a serviceable life of at least 50 years providing they remain dry.

Design Considerations

bbi® PlyBrace™ Wall Bracing Systems are for use in dry, internal, protected locations of thermally insulated buildings which are heated, intermittently heated and predominantly unheated in accordance with NZS 3602 Section 110, Table 1E and Section 205. The internal environment must be such that the moisture content of the supporting timber framing does not exceed 18%.

bbi® PlyBrace™ Wall Bracing Systems must be located within the building thermal envelope and must either be exposed to view or be in locations easily accessible for inspection. **bbi® PlyBrace™** Wall Bracing Systems must not be located in any high moisture environment or in areas subject to water splash. They must not be used in areas such as bathrooms, toilets, laundries or kitchens.

bbi[®] PlyBrace[™] sheets must not be used in saunas or steam rooms. **bbi[®] PlyBrace[™]** Wall Bracing Systems must not be exposed to temperatures of 50°C or greater for prolonged periods. Refer to appliance and fitting manufacturers for installation details.

Prevention of Fire Occurring

Separation or protection must be provided to **bbi® PlyBrace™** Wall Bracing Systems from heat sources such as stoves, heaters, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 to C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.





bbi® PlyBrace™ Wall Bracing Systems are designed to meet the requirements of the New Zealand Building Code and have been tested using the P21 method by Scion Research New Zealand as referenced in NZS3604:2011







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bbi® AraucoPly®

DD F8 Structural Pine Plywood 7mm 200mm Wall, Brackets

Endless possibilities.



Results

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi AraucoPly DD F8 Structural Pine Plywood 7mm 200mm Wall, Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 200mm x 2.4m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side Walls with Brackets.

- 1. BU wind = 8 (41 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 10 (49 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side, 90x45 H1.2 SG8 framing, studs at 200mm centres, no nogs Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, No brackets used One M12 hold down bolt with 50x50x3mm washer to centre of bottom plate P21 Supplementary restraints used.

RISK AND LIMITATION OF LIABILITY: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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No obvious signs of failure to framing or plywood



Figure 2: Wall 289146



Figure 3: Wall 289147

D21-2010 DDA CINC		KING TEST						
Wall Construction			RESULT EVF	LUATION				
200mm bbi Arous	DIV	DD E9 Struct	ural Dina Di	wood 7mm	ono oido			
20011111, DDI Alauc	oriy	DD Fo Struct	Omm contro		one side			
Plywood fixed 50r	nmv'	9, sidus al 20 2 8mm Galv 9	Stool Naile a	s, 110 11095 at 150mm co	ntree	Summary		
to plates and exte	rnal	ctude			intes	Farthquako	49 (11)	BII/m
7mm min odgo di	rtano	siuus	4			Wind	49 (0)	BU/III BU/m
One M12 hold dow	stant	es all alound	ı. Iv?mm wash	or to contro	of bottom pl	ato	41 (3)	B0/III
P21 Supplementa		strainte usod	A SIIIII Wasii	er to centre	or bottom pra	ale		
Date of test:	ly ie.	25-May-22	Shin No	3251		Tested by	lohn Lee	
Date of calc's:-		30-May-22	Job No.	TE21-068		Analysed by	Doug Ga	unt
Calculated to BRANZ	7 P21	2010 AS/NZS	1170 285 NZS	3604.2011	Scion Private	Bag 3020 Rote	Doug Ou	
Culculated to Diving		Serviceability	Cycles	Ultimate Cvc		Dag 0020 Note		
		Cycle to H/300 c		Cycle to Dis	placement		Wall dim	ensions
		8.0	Xmm	v=(mm)	placement		L (mm)	H(mm)
Lab Number	<u> </u>	Loads	Residual	Maximum			200	2410
Labramber	ctio		Dofin C	Lood	dof @ D		d at P/2	Ath D
	lire	(F8)	Delin, C	Luau			u al F/Z	401, K
		KN	mm	P(KN)	y (mm)	P/2 (KN)	a mm	KIN
280445	-	0.24	3 20	0.50	36.0	0.25	0.0	0.46
209145	-	0.24	3.20	0.50	30.0	0.25	9.0	0.40
290446	-	0.24	2.50	0.51	30.0	0.25	0.0	0.40
203140		0.25	3.00	0.50	30.0	0.25	0.0	0.40
2901/7	+	0.20	2.00	0.57	30.0	0.23	0.5	0.52
203147	-	0.20	1.10	0.40	30.0	0.23	9.5	0.44
	-	0.20	1.10	0.59	30.0			0.57
			(0)		()		(1)	
		(P ₈)	(C)	(P)	(y)	P/2 (KN)	(D)	(Ry)
Averages		0.24	2.70	0.52	36.00	0.24	8.83	0.49
Coefficient of Variat	ion %	9.97	29.32	8.50	0.00	3.97	7.06	8.56
y = average failure c	deflec	tion or peak d	eflection of the	e three tests.				
d= average first cyc	le dis	placement at	half peak, (the	e very first cy	cle wall reache	es the load)		
R = Residual load, I	P = P	eak Load, S =	Serviceabilit	y load				
Displacement Reco	very I	-actor (K1), (0	.8 <= K1 <=	1.0)	System	is factor K2 =	1.2	
Average Structural I	Displa	acement Ducti	lity factor			u = y/d	4.08	
Ductility Modificatio	n faci	or				K4 =	1.00	
DLW = Selected de	flection	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	quake for	ces
D04-0040 DD 0-1-			50 10 1					
P21:2010 BR Calc	S	K1	EQ ultimate	EQ service	Wind Ultimate	Wind Service		
Lab Number	(DL)	(= 1.4 - C/X)	BUS	BUS	BUS	BUS		
289145	(BU)	1.00	9.5	10.4	10.1	8.1		
290146		1.00	47	52 11.1	10.7	40		
203140	(BU) BLI/m)	1.00	50	56	54	43		
289147	(BLI)	1.00	10.1	10.5	10.5	81		
(BU/m)	1.00	51	52	53	41		
``````````````````````````````````````	Í	289145	-6% Ok result	-4% Ok result	-5% Ok result	-4% Ok result		
<20% Result Check		289146	2% Ok result	6% Ok result	4% Ok result	6% Ok result		
		289147	4% Ok result	-3% Ok result	1% Ok result	-3% Ok result		
Note: Where the va	lue of	BR Wind or BR I	EQ for anv spec	imen is more th	an 20% areater t	han		
either of the other tw	o spe	cimens, assian i	t a value of 1.2 t	imes the lower v	value before aver	raging.		
	,							
Average Earthqua	ke B	R	Ultimate			Serviceabili	tv	
EQ (BU's)		20 x K4 x Rv =	10	(P8 x K1)	x (K2/0.55) =	11	-	
		49	BU/m	()	Limited by	Ultimate lim	it state	
Average Wind BR			Ultimate		,	Serviceabili	ty	
Wind (BU's)		20 * P =	10	(P8 x K1	1) x (K2/0.71) =	8		
(= 50)		41	BU/m		l imited by	Serviceabili	tv limit st	ate

Figure 4: P21:2010 calculations for 200mm x 2.40m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side wall

Please feel free to contact me to discuss this information.

aunt Doug Gaunt te

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### bbi® AraucoPly®

DD F8 Structural Pine Plywood 7mm 400mm Wall, Brackets

Endless possibilities.



### Results

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi AraucoPly DD F8 Structural Pine Plywood 7mm 400mm Wall, Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 400mm x 2.4m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side Walls with Brackets.

- 1. BU wind = 22 (56 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 23 (58 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side, 90x45 H1.2 SG8 framing, studs at 400mm centres, no nogs

Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates,

GIB Handibracs brackets used

M12 hold down bolts to bottom plate and brackets

P21 Supplementary restraints used.

**RISK AND LIMITATION OF LIABILITY**: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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No obvious signs of failure to framing or plywood



Figure 2: Wall 289143



Figure 3: Wall 289144

D24-2040 DDA OING		CKING TEST						
P21:2010 BRACING	3 RAI	CRING TEST	RESULTEVA	LUATION				
400mm bbi Arous	e Div		ural Dina Dh	uvood 7mm	ono oido			
400mm, DDI Arauc	OPIY	DD F8 Struct			one side			
90X43 HI.2 SGO IR		g, sluds at 40		s, no nogs	ntroo	Cum m o m /		
Plywood lixed 50		2.0000 Galv			nires	Summary	50 (11)	DI I/m
to plates and exte	rnai	stuas				Eartnquake	58 (U)	BU/m
/mm min eage as	stanc	es all around		ibracs used (	each end	wind	56 (5)	BU/m
N12 noid down bo	DITS TO	o bottom plat	e & Drackets					
P21 Supplemental	ry re:	Stramts used	Chin No.	2051		Tested by	John Loo	
Date of test		25-1Vlay-22	Ship No.	3231		A polygood by	John Lee	unt
Date of calcs	7 004	30-141 a y-22	JUD NU.		Seien Drivete	Analysed by	Doug Ga	uni
Calculated to BRANZ	<u> </u>	Soniosopility	Cuelee	Ultimate Cue	Scion, Privale	Day 3020 Roll	Jiua.	
		Serviceability		Cycle to Dis			Wall dim	anaiona
					Jiacement			
Lob Number	c	0.8	A mm Decidual	y=(mm)			L(mm)	H(mm)
Lab Number	stio	Loads	Residual				400	2410
	irec	(P ₈ )	Defin, C	Load	def @ P		d at P/2	4th, R
		kN	mm	P(kN)	y (mm)	P/2 (kN)	d mm	kN
	-							
289142	+	0.58	2.70	1.55	36.0	0.78	11.6	1.44
	-	0.73	1.80	1.53	36.0			1.45
289143	+	0.67	2.40	1.50	36.0	0.75	9.7	1.40
	-	0.73	2.00	1.72	36.0			1.65
289144	+	0.52	3.20	1.60	36.0	0.80	13.3	1.47
	-	0.72	1.60	1.35	36.0			1.27
		(P ₈ )	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry)
Averages		0.66	2.28	1.54	36.00	0.78	11.53	1.45
<b>Coefficient of Variat</b>	ion %	12.32	24.04	7.20	0.00	2.63	12.75	7.75
y = average failure o	deflec	tion or peak d	eflection of the	e three tests.				
d= average first cyc	le dis	placement at	half peak, (the	e very first cy	cle wall reache	es the load)		
R = Residual load, I	P = P	eak Load, S =	<ul> <li>Serviceabilit</li> </ul>	y load				
Displacement Reco	very F	-actor (K1), (0	.8 <= K1 <=	1.0)	System	is factor K2 =	1.2	
Average Structural [	Displa	acement Ducti	lity factor			u = y/d	3.12	
Ductility Modificatio	n fact	tor				K4 =	0.80	
DLW = Selected de	flection	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	quake for	es
P21:2010 BR Calc	's	K1	EQ ultimate	EQ service	Wind Ultimate	Wind Service		
Lab Number		(= 1.4 - C/X)	BU's	BU's	BU's	BU's		
289142	(BU)	1.00	23.1	28.6	30.8	22.1		
(	BU/m)		58	71	77	55		
289143	(BU)	1.00	24.4	30.5	32.2	23.7		
(	BU/m)	1.00	61	/6	81	59		
289144	(BU)	1.00	21.9	27.1	29.5	21.0		
(	БU/III)	280142		10/ 0// 10/				
<20% Peoult Check		209142	0% OK result	-1% OK result	0% Ok result	-1% OK result		
~20 /0 Result Check		209143	0% OK result	9% OK result	7% Ok result	9% OK result		
Note: Where the ve	lue of	BR Wind or PP I	=0 /0 OK Tesult	imen is more the	-1/0 OK result	han		
either of the other the		cimens assign i	t a value of 1 2 f	imes the lower	an 20 /o greater t	raina		
	is spec	assigni				ayiriy.	l	
	ke R	R	Illtimate			Serviceabili	tv	
FO (RUIe)		20 x K4 v Rv -	23	(P8 v K1)	x (K2/0 55) =	29	<u>.y</u>	
		50 ATT + ATT - 50	BU/m		l imited by	Lilitimate lim	it state	
Average Wind RP			Illtimate		Linited by	Serviceabili	tv	
Wind (RLI'e)		20 * P =	31		) x (K2/0 71) =	22	<u>.,</u>	
		56	BII/m		Limited by	 Sorvicoabili	tv limit ef	ato

*Figure 4:* P21:2010 calculations for 400mm x 2.40m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side wall

Please feel free to contact me to discuss this information.

aunt Doug Gaunt te

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### bbi® AraucoPly®

DD F8 Structural Pine Plywood 7mm 600mm Wall, Brackets

Endless possibilities.



### **Results**

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi AraucoPly DD F8 Structural Pine Plywood 7mm 600mm Wall, Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 600mm x 2.4m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side Walls with Brackets.

- 1. BU wind = 43 (72 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 48 (80 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

#### Wall Construction

bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side, 90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, GIB Handibracs brackets used M12 hold down bolts to bottom plate and brackets P21 Supplementary restraints used.

**RISK AND LIMITATION OF LIABILITY**: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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Figure 1: Wall 289139

No obvious signs of failure to framing or plywood



Figure 2: Wall 289140



Figure 3: Wall 289141

P21:2010 BRACING	G RA	CKING TEST	RESULT EVA	LUATION				
Wall Construction								
600mm, bbi Arauc	oPly	DD F8 Struct	ural Pine Pl	ywood 7mm	one side			
90x45 H1.2 SG8 fra	amin	g, studs at 60	0mm centre	s, no nogs				
Plywood fixed 50r	nmx	2.8mm Galv S	Steel Nails a	at 150mm ce	ntres	Summary		
to plates and exte	rnal	studs				Earthquake	80 (U)	BU/m
7mm min edge dis	stanc	es all around	I. GIB Hand	ibracs used o	each end	Wind	72 (S)	BU/m
M12 hold down bo	olts to	bottom plat	e & brackets			-		
P21 Supplementa	rv re	straints used						
Date of test:-	Ĺ	25-Mav-22	Ship No.	3251		Tested by	John Lee	
Date of calc's:-		30-May-22	Job No.	TE21-068		Analysed by	Doug Ga	unt
Calculated to BRANZ	Z P21.	2010. AS/NZS	1170.2&5. NZS	53604:2011	Scion. Private	Bag 3020 Roto	orua.	
		Serviceability	Cycles	Ultimate Cyc	les			
		Cvcle to H/300 c	or DLQ or DLW	Cvcle to Dis	placement		Wall dim	ensions
		8.0	Xmm	v=(mm)			L(mm)	H(mm
Lab Number	Ľ	Loads	Residual	Maximum			600	2410
	ctio	(P _a )	Defin C	Load	def @ P		d at P/2	4th F
	Dire						d mm	
		KIN	11111	P(KIN)	у (ппп)	P/2 (KIN)	u mm	KIN
289139	+	1.03	2.80	2.73	36.0	1.37	11 7	2 55
200100	-	1.28	2.00	2.93	36.0	1.07		2.69
289140	+	1.34	2.80	3.05	36.0	1.53	94	2.83
2001-10	-	1 44	2.60	2.93	36.0	1.00	0.1	2 73
289141	+	1 20	3.00	2.00	36.0	1 40	9.6	2.69
2001-11	_	1.20	2 20	3.00	36.0	1.10	0.0	2.00
		1.07	2.20	0.00	00.0			2.70
		(Pa)	(C)	(P)	()()	P/2 (kN)	(d)	(Rv)
		1 29	2.57	(1)	26.00	1 /2 (((1))	10.22	(IV) 2 71
Averages	on 9/	10.42	2.07	2.91	0.00	1.43	10.23	2.71
		10.42	IJ.01	J.19	0.00	4.00	10.17	3.12
y - average failure c		nlocomont of		e lillee lesis.	alo wall roach	a the lead)		
u- average inst cyc			- Soniooshilit					
R - Residual Idau, r		Feak Ludu, S -		y 10au 1 0)	Svotor	a factor K2 -	1.0	
	Veryi	-actor (KT), (U		1.0)	Systen		1.2	
Average Structural L	Jispia						0.02	
	n iaci flootiu	lOI on limit for win	d foraça		tod dofloation	K4 =	U.88	
DLVV = Selected de	necu			DLQ = Select				es
P21:2010 BR Calc	's	К1	EQ ultimate	EQ service	Wind Ultimate	Wind Service		
Lab Number	-	(= 1.4 - C/X)	BU's	BU's	BU's	BU's		
289139	(BU)	1.00	46.2	50.4	56.6	39.0		
(	BU/m)		77	84	94	65		
289140	(BU)	1.00	49.0	60.7	59.8	47.0		
()	BU/m)		82	101	100	78		
289141	(BU)	1.00	48.0	56.1	58.0	43.4		
()	BU/m)		80	93	97	72		
		289139	-5% Ok result	-16% Ok result	-4% Ok result	-16% Ok result		
<20% Result Check		289140	4% Ok result	12% Ok result	4% Ok result	12% Ok result		
		289141	1% Ok result	1% Ok result	0% Ok result	1% Ok result		
Note: Where the val	lue of	BR Wind or BR B	EQ for any spec	imen is more the	an 20% greater t	han		
either of the other tw	o spe	cimens, assign i	t a value of 1.2 t	imes the lower v	alue before ave	raging.		
• <del>-</del>								
Average Earthqua	ke B	R	<u>Ultimate</u>			<u>Serviceabili</u>	t <u>y</u>	
EQ (BU's)		20 x K4 x Ry =	48	(P8 x K1)	x (K2/0.55) =	56		
		80	BU/m		Limited by	Ultimate lim	it state	
Average Wind BR			<u>Ultimate</u>			<u>Serviceabili</u>	t <u>y</u>	
Wind (BU's)		20 * P =	58	(P8 x K1	) x (K2/0.71) =	43		
		72	BU/m		Limited by	Serviceabili	ty limit sl	ate

Figure 4: P21:2010 calculations for 600mm x 2.40m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side wall

Please feel free to contact me to discuss this information.

Cant-Doug Gaunt



____

### bbi[®] AraucoPly[®]

DD F8 Structural Pine Plywood 7mm 1200mm Wall, Brackets



### **Results**

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi AraucoPly DD F8 Structural Pine Plywood 7mm 1200mm Wall, Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 1200mm x 2.4m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side Walls with Brackets.

- 1. BU wind = 112 (93 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 120 (100 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side,

90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs

Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, 300mm centres on internal stud

GIB Handibracs brackets used

M12 hold down bolts to bottom plate and brackets

P21 Supplementary restraints used.

**RISK AND LIMITATION OF LIABILITY**: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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Figure 1: Wall 289133

No obvious signs of failure to framing or plywood Plywood pulling on bottom plate nails.



Figure 2: Wall 289134



Figure 3: Wall 289135

P21:2010 BRACIN	G RA	CKING TEST	RESULT EVA	LUATION				
Wall Construction	<u> </u>			· · -				
1200mm, bbi Arau	ICOPI	y DD F8 Struc	ctural Pine P	Plywood 7mn	n one side			
90x45 H1.2 SG8 fr	amin	g, studs at 60	0mm centre	s, no nogs	_			
Plywood fixed 50	mmx	2.8mm Galv S		at 150mm ce	ntres	Summary	400 (11)	
to plates and exte	ernal	studs, 300mm	to internal	studs,	· .	Earthquake	100 (U)	BU/m
/mm min edge di	stand	es all around	I. GIB Hand	ibracs used (	each end	Wind	93 (S)	BU/m
M12 hold down b	olts to	b bottom plat	e & brackets					
P21 Supplementa	iry re	straints used	Chin No.	0054		Tested by		
Date of test:-		25-Way-22	Ship No.	3231 TE01.069		A polygod by	John Lee	unt
Date of calcs:-	7 0 0 4	25-Way-22	JOD NO.	1E21-068	Seien Drivete	Analysed by	Doug Ga	unt
Calculated to BRAN	2 1 2 1	Sonicophility	Cyclos	Liltimato Cur	Scion, Private	Bag 3020 Roll	orua.	
				Cycle to Dis			Wall dim	onsions
		8 0	Xmm	v=(mm)	placement		L (mm)	H(mm
Lah Number		0.0	Residual	Maximum			1200	2410
Lab Number	ctio		Dofin C	Lood	dof @ D		d at D/2	2410 4th E
	ire		Delin, C	Luau				401, F
		KN	mm	P(KN)	y (mm)	P/2 (KN)	a mm	KN
289133	+	3 55	2 10	7.87	36.0	3 94	95	6.80
203133	-	3.58	3 10	7.80	36.0	0.04	5.5	6 95
289134	+	3.12	1 70	7.30	36.0	3.65	97	6 22
200104	-	3.04	3.10	6.96	36.0	0.00	0.1	6.18
289135	+	3.62	1.60	7.55	36.0	3.78	9.0	6.50
	-	2.93	3.60	6.19	36.0	0.10		5.35
<u> </u>		(P ₈ )	(C)	(P)	(y)	P/2 (kN)	(d)	(Rv)
Averages		3.31	2 53	7.28	36.00	3 79	9 40	6.33
Coefficient of Varia	tion %	8.55	30.29	7.90	0.00	3.08	3 13	8 23
v = average failure		tion or neak d	eflection of th	o three tests	0.00	0.00	0.10	0.20
d= average first cv	ne dis	nlacement at	half neak (th	e verv first cv	le wall reach	es the load)		
R = Residual load	P = F	Peak Load S =	Serviceabilit	v load				
Displacement Reco	verv	Factor (K1) (0	8 <= K1 <=	1 0)	System	ns factor K2 =	12	
Average Structural	Displa	acement Ducti	lity factor		Cysten	$\mu = v/d$	3.83	
Ductility Modification	on fac	tor				K4 =	0.95	
DLW = Selected de	eflecti	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	auake for	es
P21:2010 BR Calo	c's	K1	EQ ultimate	EQ service	Wind Ultimate	Wind Service		
Lab Number		(= 1.4 - C/X)	BU's	BU's	BU's	BU's		
289133	(BU)	1.00	130.1	155.6	156.7	120.5		
	(BU/m)		108	130	131	100		
289134	(BU)	1.00	117.3	134.4	142.6	104.1		
	(BU/m)		98	112	119	87		
289135	(BU)	1.00	112.1	142.9	137.4	110.7		
	(BO/m)	000400	93	119	115	92		
<200/ Deput Obs - Is		289733	12% Ok result	11% Ok result	11% Ok result	11% Ok result		
<20% Result Check		289134	-3% OK result	-11% OK result	-3% Ok result	-11% OK result		
Note: Where the ut		209133 BR Wind or PP I	= 10% OK result	imen is more th	-970 UK result	- 1 70 OK result		
either of the other to		cimens assion i	ta value of 1.2 f	imen is more the	an 20% yrealer l /alue before ave	radina		
	no spe	simono, assigit f				aynny.	1	
Average Earthoua	ake B	R	Ultimate			<u>Serviceabili</u>	ity	
EQ (BU's)	)	20 x K4 x Rv =	120	(P8 x K1)	x (K2/0.55) =	144		
	·	100	BU/m	(	Limited by	Ultimate lim	it state	
Average Wind BF	2		Ultimate		<b>_</b>	Serviceabili	ity	
Wind (BU's)	)	20 * P =	146	(P8 x K1	1) x (K2/0.71) =	112		

Figure 4: P21:2010 calculations for 1200mm x 2.40m bbi AraucoPly DD F8 Structural Pine Plywood 7mm one side wall

Please feel free to contact me to discuss this information.

Cant-Doug Gaunt



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### bbi[®] Redline[®] Poplar Core Plywood 9mm 1200mm Wall, Brackets



### Results

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi RedLine Poplar Core Plywood 9mm 1200mm Wall Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 1200mm x 2.4mm bbi RedLine Poplar Core Plywood 9mm one side Walls with Brackets.

- 1. BU wind = 130 (109 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 133 (111 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi RedLine Poplar Core Plywood 9mm one side,

90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs

Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, 300mm centres on internal stud

GIB Handibracs brackets used

M12 hold down bolts to bottom plate and brackets

P21 Supplementary restraints used.

**RISK AND LIMITATION OF LIABILITY**: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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Figure 1: Wall 289136

No obvious signs of failure to framing or plywood Plywood pulling on bottom plate nails.



Figure 2: Wall 289137



Figure 3: Wall 289138

P21:2010 BRACING	RA	CKING TEST						
Wall Construction								-
1200mm, bbi Bedl	ine	Poplar Core I	Plywood 9m	m one side				
90x45 H1.2 SG8 fra	amin	a. studs at 60	0mm centre	s. no noas				
Plywood fixed 50r	nmx	2.8mm Galv S	Steel Nails a	at 150mm ce	ntres	Summarv		
to plates and exte	rnal	studs. 300mm	n to internal	studs.		Earthquake	111 (U)	BU/m
7mm min edae di	stand	es all around	d. GIB Hand	ibracs used	each end	Wind	109 (S)	BU/m
M12 hold down bo	olts to	bottom plat	e & brackets					
P21 Supplementa	rv re	straints used						
Date of test:-		25-May-22	Ship No.	3251		Tested by	John Lee	
Date of calc's:-		26-May-22	Job No.	TE21-068		Analysed by	Doug Ga	unt
Calculated to BRANZ	Z P21	:2010, AS/NZS	1170.2&5, NZS	53604:2011	Scion, Private	Bag 3020 Rote	orua.	
		Serviceability	Cycles	Ultimate Cyc	cles			
		Cycle to H/300 c	or DLQ or DLW	Cycle to Dis	placement		Wall dim	ensions
		8.0	Xmm	y=(mm)			L(mm)	H(mm
Lab Number	uo	Loads	Residual	Maximum			1200	2410
	ecti	(P ₈ )	Defln, C	Load	def @ P		d at P/2	4th, R
	Dir	kN	mm	P(kN)	v (mm)	P/2 (kN)	d mm	kN
						, , , , , , , , , , , , , , , , , , ,		1
289136	+	3.83	3.30	8.10	36.0	4.05	9.1	6.97
	-	4.07	3.20	7.80	36.0			7.00
289137	+	3.85	2.90	8.22	36.0	4.11	9.5	7.20
	-	4.08	2.50	7.41	36.0			6.60
289138	+	3.65	2.80	7.45	36.0	3.73	8.5	6.62
	-	3.67	3.10	7.40	36.0			6.45
		(P ₈ )	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry)
Averages		3.86	2.97	7.73	36.00	3.96	9.03	6.81
Coefficient of Variat	ion %	4.41	9.06	4.33	0.00	4.27	4.55	3.90
y = average failure of	leflec	tion or peak d	eflection of the	e three tests.				
d= average first cyc	le dis	placement at	half peak, (the	e very first cy	cle wall reach	es the load)		
R = Residual load, I	P = F	Peak Load, S =	Serviceabilit	y load				
Displacement Reco	very l	Factor (K1), (0	.8 <= K1 <=	1.0)	System	ns factor K2 =	1.2	
Average Structural I	Displa	acement Ducti	lity factor			u = y/d	3.99	
Ductility Modificatio	n fac	tor				K4 =	0.98	
DLW = Selected de	flecti	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	quake for	es
P21:2010 BR Calc	's	K1	EQ ultimate	EQ service	Wind Ultimate	Wind Service		
Lab Number		(= 1.4 - C/X)	BU's	BU's	BU's	BU's		
289136	(BU)	1.00	136.7	171.6	159.0	132.9		
(	BU/m)	_	114	143	133	111		
289137	(BU)	1.00	135.0	173.0	156.3	134.0		
(	BU/m)	1.00	113	144	130	112		
289138	(BU)	1.00	127.9	159.7	148.5	123.7		
(	вu/m)	220126	10/	133	124	103		
<200/ Deput Chart		209130	4% OK result	3% OK result	4% OK result	3% OK result		
~20% Result Check		209131	2% OK result	4% OK result	2% OK result	4% OK result		
Note: Whore the ve		203130 RD Wind or PD 1	=0% OK result	imen is more th	-0% OK result	-0% OK result		
either of the other tw	ide of 10 spe	cimens, assign i	t a value of 1.2 t	imen is more the imes the lower w	value before ave	raging.		
Average Earthque	ke P	R	Illtimato			Sanviceabili	tv.	
	NG D		133		x (K2/0 55) -	168		
		20 x rt4 x rty =	BII/m		I imited by	Illtimate lim	it state	
Average Wind PD		111	Illtimato		Linned by	Sanviceabili	tv	
Wind (RII's)		20 * P -	155	(P8 v K*	 1) x (K2/0 71) -	130	<u>.y</u>	
wind (DOS)		100	BU/m	7.01)	limited by	Serviceabili	tv limit a	ate
		109	50/III		mineu by	Gerviceaulli	Ly IIIIIL S	

Figure 4: P21:2010 calculations for 1200mm x 2.40m bbi RedLine Poplar Core Plywood 9mm one side wall

Please feel free to contact me to discuss this information.

Cant Doug Gaunt



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### bbi[®] Redline[®] Poplar Core Plywood 12mm 1200mm Wall, Brackets



### Results

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi RedLine Poplar Core
Location:	Hastings	Date:	30 May 2022
Tel No.:	06 8715539	Pages:	5

Martin

Please find below the P21 bracing results for your three 1200mm x 2.4m bbi RedLine Poplar Core Plywood 12mm one side Walls with Brackets.

- 1. BU wind = 121 (101 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 130 (108 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi RedLine Poplar Core Plywood 12mm one side,

90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs

Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, 300mm centres on internal stud

GIB Handibracs brackets used

M12 hold down bolts to bottom plate and brackets

P21 Supplementary restraints used.

**RISK AND LIMITATION OF LIABILITY**: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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Figure 1: Wall 289136

No obvious signs of failure to framing or plywood Plywood pulling on bottom plate nails.



Figure 2: Wall 289137



Figure 3: Wall 289138

P21:2010 BRACING	R A	CKING TEST						
Wall Construction								
1200mm, bbi Bedl	ine	Poplar Core I	Plywood 9m	m one side				
90x45 H1.2 SG8 fra	amin	a. studs at 60	0mm centre	s. no noas				
Plywood fixed 50r	nmx	2.8mm Galv S	Steel Nails a	at 150mm ce	ntres	Summarv		
to plates and exte	rnal	studs. 300mm	to internal	studs.		Earthquake	111 (U)	BU/m
7mm min edge dis	stand	es all around	. GIB Hand	ibracs used	each end	Wind	109 (S)	BU/m
M12 hold down bo	olts to	bottom plat	e & brackets					
P21 Supplementa	ry re	straints used						
Date of test:-		25-May-22	Ship No.	3251		Tested by	John Lee	
Date of calc's:-		26-May-22	Job No.	TE21-068		Analysed by	Doug Ga	unt
Calculated to BRANZ	Z P21.	:2010, AS/NZS	1170.2&5, NZS	53604:2011	Scion, Private	Bag 3020 Rote	orua.	
		Serviceability	Cycles	Ultimate Cyc	cles			
		Cycle to H/300 c	or DLQ or DLW	Cycle to Dis	placement		Wall dim	ensions
		8.0	Xmm	y=(mm)			L(mm)	H(mm
Lab Number	uo	Loads	Residual	Maximum			1200	2410
	ecti	(P ₈ )	Defln, C	Load	def @ P		d at P/2	4th, R
	Dir	kN	mm	P(kN)	v (mm)	P/2 (kN)	d mm	kN
						, , , , , , , , , , , , , , , , , , ,		1
289136	+	3.83	3.30	8.10	36.0	4.05	9.1	6.97
	-	4.07	3.20	7.80	36.0			7.00
289137	+	3.85	2.90	8.22	36.0	4.11	9.5	7.20
	-	4.08	2.50	7.41	36.0			6.60
289138	+	3.65	2.80	7.45	36.0	3.73	8.5	6.62
	-	3.67	3.10	7.40	36.0			6.45
		(P ₈ )	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry)
Averages		3.86	2.97	7.73	36.00	3.96	9.03	6.81
Coefficient of Variat	ion %	4.41	9.06	4.33	0.00	4.27	4.55	3.90
y = average failure c	leflec	tion or peak d	eflection of th	e three tests.				
d= average first cyc	le dis	placement at	half peak, (th	e very first cy	cle wall reach	es the load)		
R = Residual load, I	P = F	Peak Load, S =	Serviceabilit	y load				
Displacement Reco	very l	Factor (K1), (0	.8 <= K1 <=	1.0)	System	ns factor K2 =	1.2	
Average Structural [	Displa	acement Ducti	lity factor			u = y/d	3.99	
Ductility Modificatio	n fact	tor				K4 =	0.98	
DLW = Selected de	flecti	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	quake for	es
P21:2010 BR Calc	's	K1	EQ ultimate	EQ service	Wind Ultimate	Wind Service		
Lab Number		(= 1.4 - C/X)	BU's	BU's	BU's	BU's		
289136	(BU)	1.00	136.7	171.6	159.0	132.9		
()	BU/m)	_	114	143	133	111		
289137	(BU)	1.00	135.0	173.0	156.3	134.0		
()	BU/m)	1.00	113	144	130	112		
289138	(BU)	1.00	127.9	159.7	148.5	123.7		
(	вu/m)	220426	107	133	124	103		
<200/ Deput Obert		209130	4% OK result	3% OK result	4% OK result	3% OK result		
~20% Result Check		209131	2% OK result	4% OK result	2% OK result	4% OK result		
Note: Whore the ve		203130 RD Wind or PD 1	-0% OK result	imen is more th	-0% OK result	-0% OK result		
either of the other tw	ine of lo spe	cimens, assign i	<u>t a value of 1.2</u> t	imen is more the imes the lower v	an 20% greater t value before ave	raging.		
Average Fortheres	ko P	D	Illtimete			Comiccokili	<b></b>	
	ке В		122		V (K2/0 EE) -	Jerviceabili	<u>ty</u>	
EQ (BUS)		20 X K4 X KY=	IJJ BII/m	(rð x kí)	$\times (n 2/0.55) =$	100	it state	
Average Wind PD		111	DU/III		Linned by	Sonviocabili	nt state	
Wind (PLIC)		20 * 🖸 –	155	(D0 v 1/2	1) v (K2/0 71) -	130	<u>Ly</u>	
		20 P =	BII/m	(FOXK	limitad by	Sonviceabili	ty limit of	ato
		109	50/11		Linned by	Serviceabili	Ly mill S	ale

Figure 4: P21:2010 calculations for 1200mm x 2.40m bbi RedLine Poplar Core Plywood 9mm one side wall

Please feel free to contact me to discuss this information.

Cant Doug Gaunt



### bbi[®] Redline[®]

Premium Hardwood Core Plywood 12mm 1200mm Wall, Brackets



### **Results**

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi RedLine Premium Hardwood Core Plywood 12mm1200mm Wall, Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 1200mm x 2.4m bbi RedLine Premium Hardwood Core Plywood 12mm one side Walls with Brackets.

- 1. BU wind =134 (112 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 157 (131 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi RedLine Premium Hardwood Core Plywood 12mm one side, 90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, 300mm centres on internal stud GIB Handibracs brackets used M12 hold down bolts to bottom plate and brackets P21 Supplementary restraints used.

RISK AND LIMITATION OF LIABILITY: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. USE OF NAME: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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Figure 1: Wall 289124

No obvious signs of failure to framing or plywood Plywood pulling on bottom plate nails.



Figure 2: Wall 289125



Figure 3: Wall 289126

P21:2010 BRACING	G RA	CKING TEST	RESULT EVA	LUATION				
Wall Construction								
1200mm, bbi Redl	ine	Premium Haı	dwood Core	Plywood 12	2mm one side	9		
90x45 H1.2 SG8 fra	amin	g, studs at 60	0mm centre	s, no nogs				
Plywood fixed 50	nmx	2.8mm Galv S	Steel Nails a	at 150mm ce	ntres	Summary		
to plates and exte	rnal	studs, 300mn	n to internal	studs,		Earthquake	131 (U)	BU/m
7mm min edge di	stanc	es all around	d. GIB Hand	ibracs used o	each end	Wind	112 (S)	BU/m
M12 hold down bo	olts to	bottom plat	e & brackets					
P21 Supplementa	ry re	straints used						
Date of test:-		24-May-22	Ship No.	3251		Tested by	John Lee	<u> </u>
Date of calc's:-		24-May-22	Job No.	TE21-068		Analysed by	Doug Ga	unt
Calculated to BRANA	2 P21	2010, AS/NZS	1170.2&5, NZS	S3604:2011	Scion, Private	Bag 3020 Rote	orua.	
		Serviceability	Cycles	Oitimate Cyc			Mall dim	
		Cycle to H/300 c	or DLQ or DLW		placement		vvali dim	
Lab Number		0.0	Desidual	y=(mm)			L(IIIII)	2410
	ctio	Loads	Residual	Maximum			1200	2410
	ireo	(P ₈ )	Defin, C	Load	der @ P		d at P/2	4th, F
		kN	mm	P(kN)	y (mm)	P/2 (kN)	d mm	kN
289124	+	4 45	3 10	9.80	36.0	<u> 1</u> 90	74	8 50
203124	-	4.43	2 50	9.96	36.0	4.50		9.00
289125	+	3.75	2.50	8,60	36.0	4 30	9.5	7.18
200120	-	3.86	3.10	8.48	36.0	1.00	0.0	7.80
289126	+	3.68	3.40	8.25	36.0	4.13	7.4	7.20
	-	3.80	3.30	8.15	36.0			7.48
		(P ₈ )	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry)
Averages		4.09	2.98	8.87	36.00	4.44	8.10	7.86
Coefficient of Variat	ion %	11.50	11.99	8.21	0.00	7.47	12.22	8.62
y = average failure o	deflec	tion or peak d	eflection of th	e three tests.				
d= average first cyc	le dis	placement at	half peak, (the	e very first cy	cle wall reach	es the load)		
R = Residual load,	P = F	eak Load, S =	<ul> <li>Serviceabilit</li> </ul>	y load				
Displacement Reco	very	Factor (K1), (0	0.8 <= K1 <=	1.0)	System	ns factor K2 =	1.2	
Average Structural I	Displa	acement Ducti	lity factor			u = y/d	4.44	
Ductility Modificatio	n fac	tor				K4 =	1.00	
DLW = Selected de	flecti	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	quake for	es
P21.2010 BR Calc	's	К1	FO ultimate	FO service	Wind Ultimate	Wind Service	-	
Lab Number		(= 1.4 - C/X)	BII's	BU's	BII's	BLI's		
289124	(BLI)	1.00	175.0	205.5	197.6	159.2		
(	BU/m)		146	171	165	133		
289125	(BU)	1.00	149.8	166.0	170.8	128.6		
(	BU/m)		125	138	142	107		
289126	(BU)	0.98	146.8	160.4	164.0	124.3		
(	BU/m)		122	134	137	104		
		289124	15% Ok result	192.5	15% Ok result	149.1		
<20% Result Check		289125	-7% Ok result	-10% Ok result	-6% Ok result	-10% Ok result		
		289126	-11% Ok result	-16% Ok result	-12% Ok result	-16% Ok result		
Note: Where the va	lue of	BR Wind or BR I	EQ for any spec	imen is more the	an 20% greater t alue boforo ora	than raoing		
enner of the other tw	io spe	umens, assign i	a value of 1.2 t	nnes the lower v	aiue peiore ave	ayıny.		
Average Earthoua	ke B	R	Ultimate			Serviceabili	ty	
EQ (BU's)	_	20 x K4 x Rv =	157	(P8 x K1)	x (K2/0.55) =	173		
		131	BU/m	(	Limited by	Ultimate lim	it state	
Average Wind BR			Ultimate			<u>Serviceabili</u>	ty	
Wind (BU's)		20 * P =	177	(P8 x K1	l) x (K2/0.71) =	134		
		112	BU/m		Limited by	Serviceabili	ty limit s	ate

*Figure 4:* P21:2010 calculations for 1200mm x 2.40m bbi RedLine Premium Hardwood Core Plywood 12mm one side wall

Please feel free to contact me to discuss this information.

Launt Doug Gaunt



### bbi[®] Blondeline[®]

Birch Poplar Core Plywood 9mm 1200mm Wall, Brackets



### Results

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi BlondeLine Birch Poplar Core Plywood 9mm 1200mm Wall, Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 1200mm x 2.4m bbi BlondeLine Birch Poplar Core Plywood 9mm one side Walls with Brackets.

- 1. BU wind = 123 (102 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 137 (114 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi BlondeLine Birch Poplar Core Plywood 9mm one side,

90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs

Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, 300mm centres on internal stud

GIB Handibracs brackets used

M12 hold down bolts to bottom plate and brackets

P21 Supplementary restraints used.

**RISK AND LIMITATION OF LIABILITY**: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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Figure 1: Wall 289130

No obvious signs of failure to framing or plywood Plywood pulling on bottom plate nails.



Figure 2: Wall 289131



Figure 3: Wall 289132

90x45 H1.2 SG8 fra	aming	g, studs at 60	0mm centre	s, no nogs	-			
Plywood fixed 50r	nmx2	2.8mm Galv	Steel Nails a	at 150mm ce	ntres	Summary		
to plates and exte	rnal	studs, 300mn	n to internal	studs,		Earthquake	114 (U)	BU/m
7mm min edge die	stanc	es all around	d. GIB Hand	ibracs used	each end	Wind	102 (S)	BU/m
M12 hold down bo	olts to	bottom plat	e & brackets					
P21 Supplementa	ry res	straints used						
Date of test:-		25-May-22	Ship No.	3251		Tested by	John Lee	
Date of calc's:-		25-May-22	Job No.	TE21-068		Analysed by	Doug Ga	unt
Calculated to BRANZ	Z P21:	2010, AS/NZS	1170.2&5, NZS	53604:2011	Scion, Private	Bag 3020 Rote	orua.	
		Serviceability	Cycles	Ultimate Cyc	les			
		Cycle to H/300 c	or DLQ or DLW	Cycle to Dis	placement		Wall dim	ension
		8.0	X mm	y=(mm)			L(mm)	H(mr
Lab Number	ion	Loads	Residual	Maximum			1200	2410
	ect	(P ₈ )	Defln, C	Load	def @ P		d at P/2	4th,
	Dir	kN	mm	P(kN)	y (mm)	P/2 (kN)	d mm	kN
289130	+	3.70	2.60	8.17	36.0	4.09	7.4	7.00
	-	3.70	3.20	7.61	36.0			6.75
289131	+	3.50	3.00	8.00	36.0	4.00	9.6	6.80
	-	3.55	2.30	7.72	36.0			6.80
289132	+	3.85	2.30	8.33	36.0	4.17	9.1	7.20
	-	3.52	3.20	7.53	36.0			6.58
		(P ₈ )	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry
Averages		3 64	2 77	7 89	36.00	4.08	8 70	6.86
Coofficient of Variati	on %	3 /3	13.05	3 73	0.00	1.65	10.82	2.87
R = Residual load, I Displacement Reco	P = P very F	eak Load, S = Factor (K1), (0	= Serviceabilit ).8 <= K1 <=	y load 1.0)	System	is factor K2 =	1.2	
Average Structural [	Displa	acement Ducti	lity factor			u = y/d	4.14	
Ductility Modificatio	n fact	or				K4 =	1.00	
DLW = Selected de	flection	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	quake for	es
		124	<b>FO</b> 10 10 10	50		W/: 10		
P21:2010 BR Calc	S		EQ ultimate	EQ Service		Wind Service		
		(= 1.4 - C/X)	BU S	БU S	<b>BUS</b>	BUS		
203130	(BU)	1.00	137.5	125	157.8 122	125.1		
289131	(BII)	1.00	136.0	153.8	157.2	110.2		
(	(150) BU/m)	1.00	113	128	131	99		
289132	(BU)	1 00	137.8	160.8	158.6	124.6		
(	(190) BU/m)		115	134	132	104		
(1	,	289130	0% Ok result	3% Ok result	0% Ok result	3% Ok result		
<20% Result Check		289131	-1% Ok result	-5% Ok result	-1% Ok result	-5% Ok result		
		289132	1% Ok result	2% Ok result	1% Ok result	2% Ok result		
Note: Where the val	lue of	BR Wind or BR I	EQ for anv spec	imen is more th	an 20% areater t	han		
either of the other tw	o spec	cimens, assign i	t a value of 1.2 t	imes the lower	alue before aver	raging.		
Average Earthqua	ke B	R	<u>Ultimate</u>			<u>Serviceabili</u>	<u>ty</u>	
EQ (BU's)		20 x K4 x Ry =	137	(P8 x K1)	x (K2/0.55) =	159		
		114	BU/m		Limited by	Ultimate lim	it state	
Average Wind BR			<u>Ultimate</u>			<u>Serviceabili</u>	<u>ty</u>	
Wind (BU's)		20 * P =	158	(P8 x K	1) x (K2/0.71) =	123		
					, , ,			

*Figure 4:* P21:2010 calculations for 1200mm x 2.40m bbi BlondeLine Birch Poplar Core Plywood 9mm one side wall

Please feel free to contact me to discuss this information.

(Aun! Doug Gaunt



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### bbi[®] Blondeline[®]

Birch Poplar Core Plywood 12mm 1200mm Wall, Brackets



### Results

To: Organisation:	Martin Wallace bbi Wood Products	From: Subject:	Doug Gaunt P21:2010 bbi BlondeLine Birch Poplar Core Plywood 12mm 1200mm Wall, Brackets
Location:	Hastings	Date:	30 May 2022
Fax No.:	021 745783	No. of	5
Tel No.:	06 8715539	Pages:	

Martin

Please find below the P21 bracing results for your three 1200mm x 2.4m bbi BlondeLine Birch Poplar Core Plywood 12mm one side Walls with Brackets.

- 1. BU wind = 127 (106 BU/m) as limited by the serviceability load capacity.
- 2. BU Earthquake = 127 (106 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

Wall Construction

bbi BlondeLine Birch Poplar Core Plywood 12mm one side,

90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs

Plywood fixed with 50x2.8mm Galv clouts at 150 centres to end studs and plates, 300mm centres on internal stud

GIB Handibracs brackets used

M12 hold down bolts to bottom plate and brackets

P21 Supplementary restraints used.

**RISK AND LIMITATION OF LIABILITY**: Scion's liability to the Client arising out of all claims for any loss or damage resulting from this work will not exceed in aggregate an amount equal to two times the Service Fees actually paid by the Client to Scion. Scion will not be liable in any event for loss of profits or any indirect, consequential or special loss or damage suffered or incurred by the Client as a result of any act or omission of Scion under this Agreement. **USE OF NAME**: The Client will not use Scion's name in association with the sale and/or marketing of any goods or services

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Figure 1: Wall 289127

No obvious signs of failure to framing or plywood Plywood pulling on bottom plate nails.



Figure 2: Wall 289128



Figure 3: Wall 289129

P21:2010 BRACING	G RA	CKING TEST	RESULT EVA	LUATION				
Wall Construction								
1200mm, bbi Blon	deLi	ne Birch Pop	lar Core Plv	wood 12mm	one side			
90x45 H1.2 SG8 fra	amin	g, studs at 60	0mm centre	s, no nogs				
Plywood fixed 50	nmx	2.8mm Galv S	Steel Nails a	at 150mm ce	ntres	Summary		
to plates and exte	rnal	studs, 300mm	n to internal	studs,		Earthquake	106 (U)	BU/m
7mm min edge di	stanc	es all around	d. GIB Hand	ibracs used	each end	Wind	106 (S)	BU/m
M12 hold down bo	olts to	bottom plat	e & brackets	i				
P21 Supplementa	ry re	straints used						
Date of test:-		25-May-22	Ship No.	3251		Tested by	John Lee	
Date of calc's:-		25-May-22	Job No.	TE21-068		Analysed by	Doug Ga	unt
Calculated to BRANZ	Z P21	:2010, AS/NZS	1170.2&5, NZS	53604:2011	Scion, Private	Bag 3020 Rote	orua.	
		Serviceability	Cycles	Ultimate Cyc	cles			
		Cycle to H/300 c	or DLQ or DLW	Cycle to Dis	placement		Wall dim	ensions
		8.0	X mm	y=(mm)			L(mm)	H(mm
Lab Number	ion	Loads	Residual	Maximum			1200	2410
	ect	(P ₈ )	Defln, C	Load	def @ P		d at P/2	4th, F
	Dir	kN	mm	P(kN)	y (mm)	P/2 (kN)	d mm	kN
289127	+	3.92	2.40	7.90	36.0	3.95	8.2	7.05
	-	3.90	3.50	8.00	36.0			7.05
289128	+	3.62	3.30	7.75	36.0	3.88	12.2	6.70
	-	3.88	3.00	7.72	36.0			6.96
289129	+	3.52	3.00	7.55	36.0	3.78	8.7	6.80
	-	3.75	3.30	7.45	36.0			6.80
		(P ₈ )	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry)
Averages		3.77	3.08	7.73	36.00	3.87	9.70	6.89
Coefficient of Variat	ion %	4.01	11.45	2.44	0.00	1.85	18.35	1.95
v = average failure o	deflec	tion or peak d	eflection of th	e three tests.		1		
d= average first cyc	le dis	placement at	half peak, (th	e very first cy	cle wall reach	es the load)		
R = Residual load,	P = F	Peak Load, S =	Serviceabilit	y load				
Displacement Reco	very l	Factor (K1), (0	.8 <= K1 <=	1.0)	System	ns factor K2 =	1.2	
Average Structural I	Displa	acement Ducti	lity factor			u = y/d	3.71	
Ductility Modificatio	n fac	tor				K4 =	0.92	
DLW = Selected de	flecti	on limit for win	d forces	DLQ = Selec	ted deflection	limit for earth	quake for	es
P21:2010 BR Calc	's	K1	EQ ultimate	EQ service	Wind Ultimate	Wind Service		
Lab Number		(= 1.4 - C/X)	BU's	BU's	BU's	BU's		
289127	(BU)	1.00	130.0	170.6	159.0	132.2		
(	BU/m)		108	142	133	110		
289128	(BU)	1.00	125.9	163.6	154.7	126.8		
(	BU/m)		105	136	129	106		
289129	(BU)	1.00	125.4	158.6	150.0	122.9		
(	BU/m)	000407	104	132	125	102		
		289127	3% OK result	o% OK result	4% OK result	6% OK result		
<20% Result Check		289728	-1% OK result	-1% OK result	0% Ok result	-1% Ok result		
Notes Missing the	luce it	289729	-2% Ok result	-5% OK result	-5% Ok result	-5% Ok result		
either of the other tw	iue of Io sne	ык vvina or BR I cimens assian i	=♀ for any spec t a value of 1 2 f	imen is more th imes the lower v	an 20% greater t /alue before ave	rian radind		
	5 500					~ <i>3</i> ///g.		
Average Earthqua	ke B	R	<u>Ultimate</u>			<u>Serviceabili</u>	ty	
EQ (BU's)		20 x K4 x Ry =	127	(P8 x K1)	x (K2/0.55) =	164		
. ,		106	BU/m	. ,	Limited by	Ultimate lim	it state	
Average Wind BR			<u>Ultimate</u>			Serviceabili	ty	
Wind (BU's)		20 * P =	155	(P8 x K′	1) x (K2/0.71) =	127		
		106	BU/m		Limited by	Serviceabili	tv limit s	ate

Figure 4: P21:2010 calculations for 1200mm x 2.40m bbi BlondeLine Birch Poplar Core Plywood 12mm one side wall

Please feel free to contact me to discuss this information.

Cant Doug Gaunt

## **Notes**


## **Notes**






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