Te Papa Tipu Innovation Park
49 Sala Street
Private Bag 3020
Rotorua
New Zealand
Telephone: +64 7 343 5899
DDI: +64 7 343 5763
Facsimile: +64 7 343 5507
Email: douglas.gaunt@scionresearch.com

Results

To:	Edmond Gomes	**From:**	Doug Gaunt
Organisation:	IBS	**Subject:**	2400mm 12mm OSB Ergo with Handibracs– P21 test results.
Location:	Auckland	**Date:**	1 August 2017
Mob No.:		**No. of**	5
Tel No.:	09 5740324	**Pages:**	

Please call +64 7 343 5763 if transmission incomplete

Edmond

Please find below the results of your three 4 x 2.4m 12mm OS Ergo one side walls as tested with GIB Handibracs.

1. BU wind = 48 (20 BU/m) as limited by the ultimate load capacity.
2. BU Earthquake = 65 (27 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

- 90x45 SG10 H1.2 timber studs (600 centres), two rows of nogs
- 90x45 SG10 H1.2 timber top and double bottom plates
- Four 600mm wide sheets horizontally fixed 12 mm OSB Ergo board one Top & 3rd row down sheets joined on centre stud
- OSB fixed with 50x2.55 Jolt head Galv nails at 150mm centres
- GIB Handibrac brackets to ends on bottom plate
- Tested with M12 hold down bolts to GIB Handibrac brackets and bottom plate.

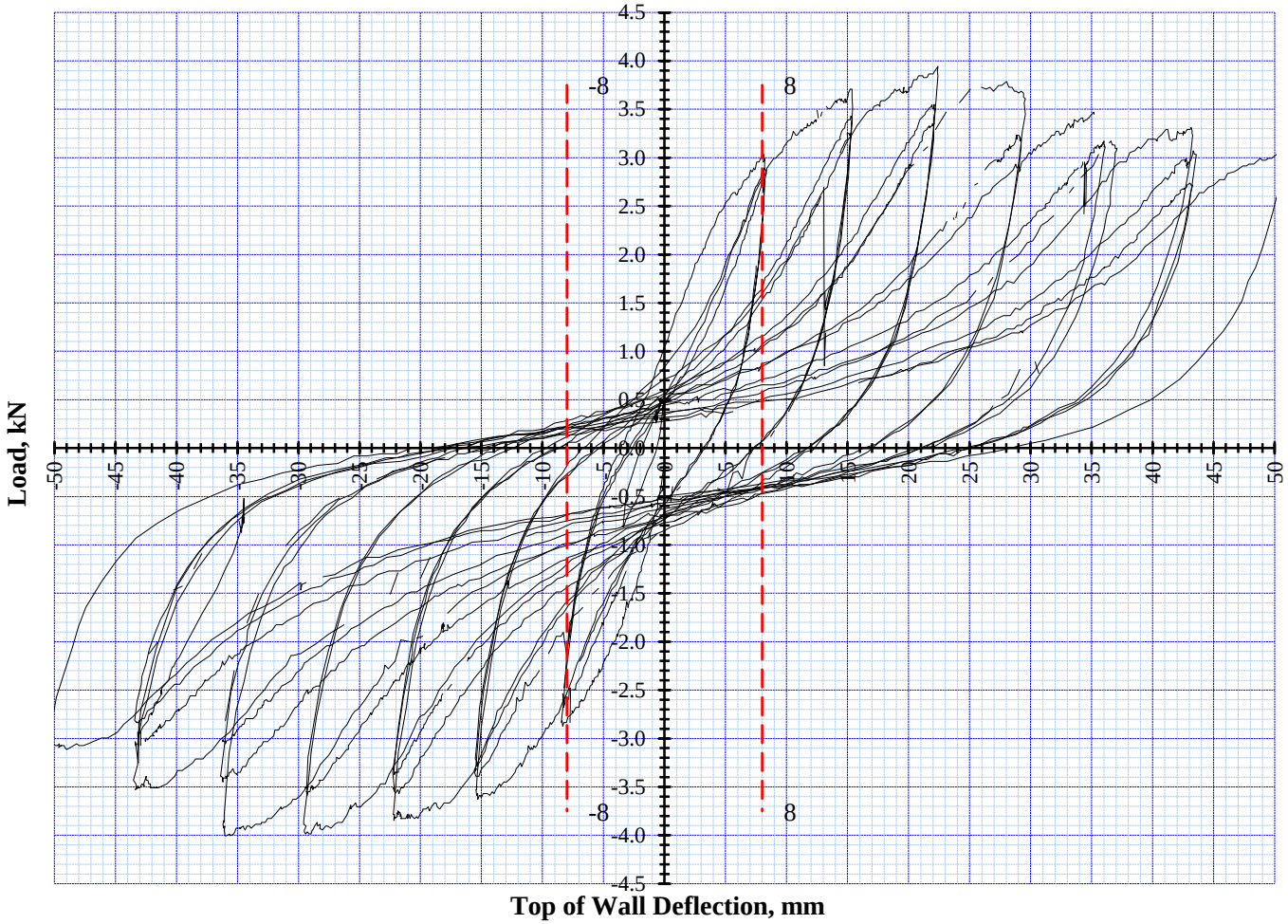

Figure 1: *Wall 278019*

Failure Mode

- No damage to OSB Board or fastenings however horizontal sliding of OSB sheets along each other
- No bending of Handibracs brackets
- No damage to bottom plates
- No damage to other framing

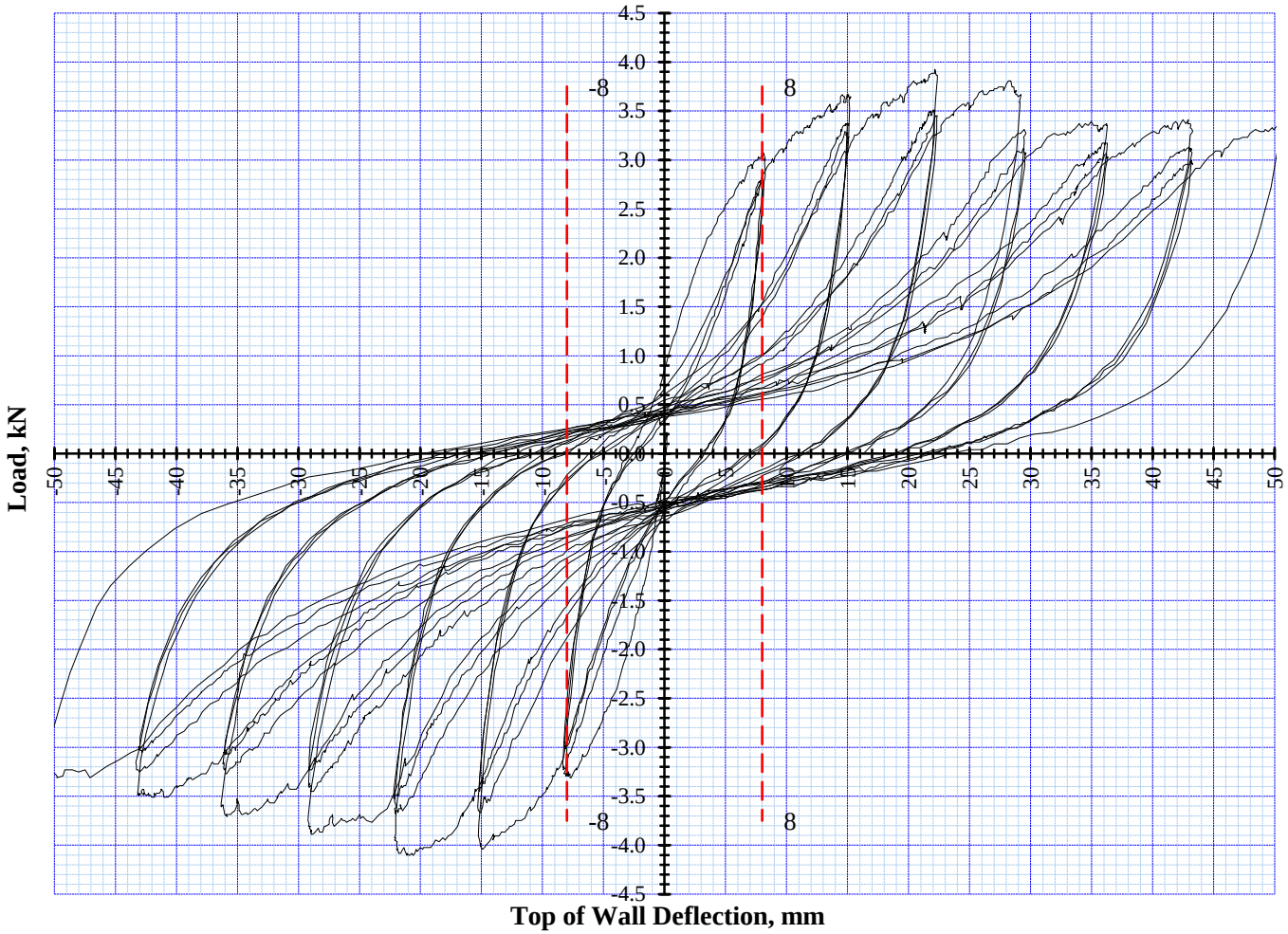

Figure 2: *Wall 278020*

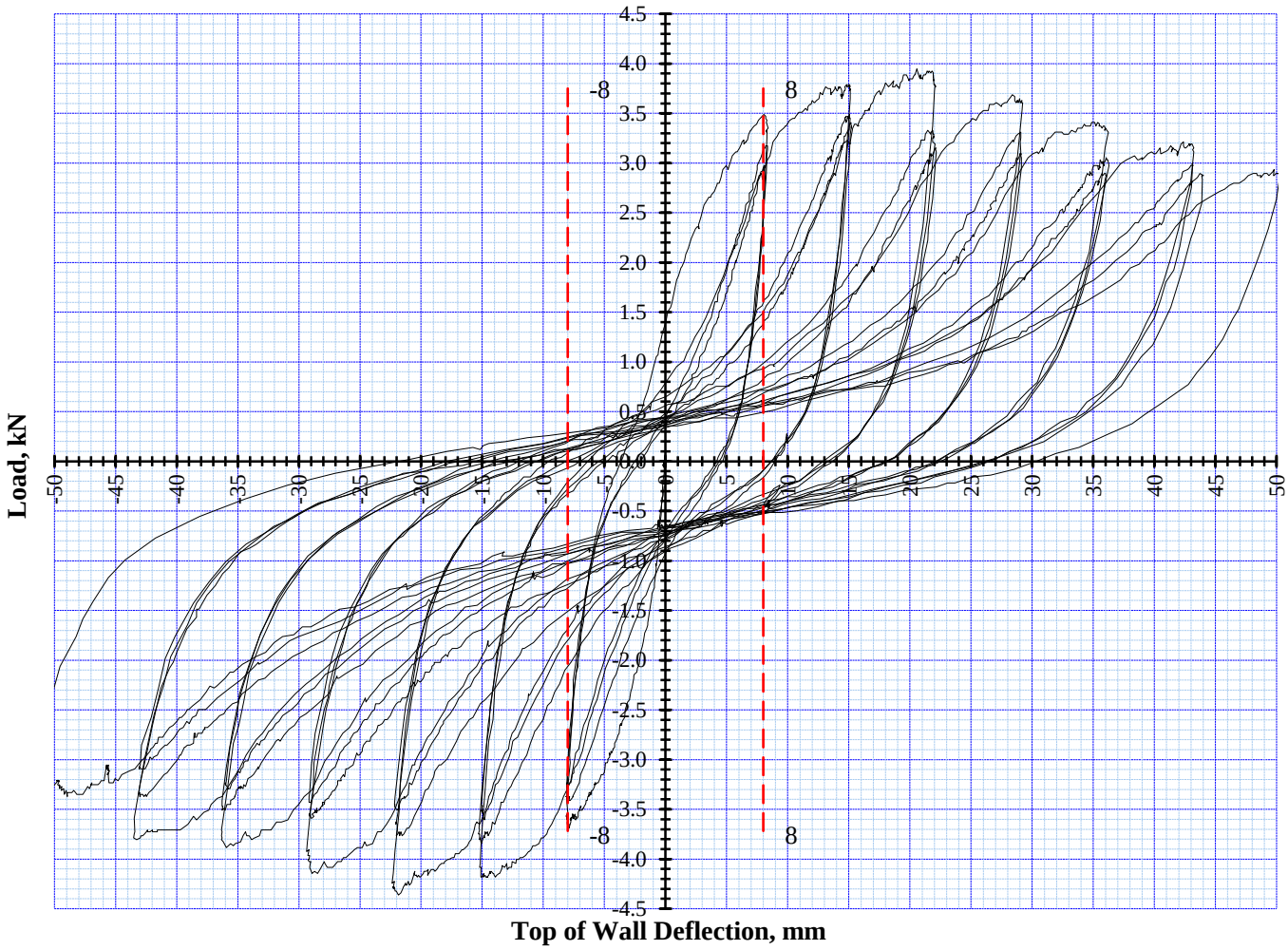

Figure 3: *Wall 278021*

P21:2010 BRACING RACKING TEST RESULT EVALUATION								
Wall Construction								
2400mm, Four 600mm wide sheets Horizontally fixed 12 mm OSB Ergo board,								
Top & 3rd row down Joined at centre stud								
Nailed 150 centres Round outside Studs & Plates using 50x2.55 Jolt head						**Summary**		
90x45 Red Stag SG10 top and Bottom plates and Studs - Two rows of nog						**Earthquake**	**27 (U)**	**BU/m**
GIB Handie Brac Hold down bracks each end with M12 rods to Reaction						**Wind**	**20 (U)**	**BU/m**
Date of test:-		**28-Jul-17**	Ship No.	**2960**		Tested by	Doug Gaunt	
Date of calc's:-		**1-Aug-17**	Job No.	**TE17-007**		Analysed by	Doug Gaunt	
Calculated to BRANZ P21:2010, AS/NZS1170.2&5, NZS3604:2010					*Scion, Private Bag 3020 Rotorua.*			
		Serviceability Cycles		Ultimate Cycles				
		Cycle to H/300 or DLQ or DLW		Cycle to Displacement			Wall dimensions	
		8.0	X mm	y=(mm)			L(mm)	H(mm)
Lab Number	Direction	Loads	Residual	Maximum			2400	2400
		(P_8)	Defln, C	Load	def @ P		d at P/2	4th,R
		kN	mm	P(kN)	y (mm)	P/2 (kN)	d mm	kN
278019	**+**	**3.00**	**3.20**	**3.88**	**22.0**	1.94	**2.5**	**3.25**
	-	**2.80**	**2.80**	**3.82**	**22.0**			**3.23**
278020	**+**	**3.03**	**3.10**	**3.90**	**22.0**	1.95	**2.8**	**3.26**
	-	**3.30**	**2.20**	**4.05**	**22.0**			**3.40**
278021	**+**	**3.48**	**4.50**	**3.91**	**22.0**	1.96	**1.4**	**3.00**
	-	**3.68**	**4.32**	**0.32**	**22.0**			**3.42**
		(P_8)	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry)
Averages		3.22	3.35	3.31	22.00	1.95	2.22	3.26
Coefficient of Variation %		9.39	24.27	40.46	0.00	0.32	28.19	4.22
y = average failure deflection or peak deflection of the three tests.								
d= average first cycle displacement at half peak, (the very first cycle wall reaches the load)								
R = Residual load, P = Peak Load, S = Serviceability load								
Displacement Recovery Factor (K1), (0.8 <= K1 <= 1.0)						Systems factor K2 =	1.2	
Average Structural Displacement Ductility factor						u = y/d	9.92	
Ductility Modification factor						K4 =	1.00	
DLW = Selected deflection limit for wind forces				DLQ = Selected deflection limit for earthquake forces				

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**
278019	(BU)	1.00	64.8	126.5	77.0	98.0
	(BU/m)		27	53	32	41
278020	(BU)	1.00	66.6	138.1	79.5	107.0
	(BU/m)		28	58	33	45
278021	(BU)	0.85	64.2	132.6	42.3	102.7
	(BU/m)		27	55	18	43
		278019	*-1% Ok result*	*-7% Ok result*	*50.8*	*-7% Ok result*
<20% Result Check		*278020*	*3% Ok result*	*6% Ok result*	*50.8*	*6% Ok result*
		278021	*-2% Ok result*	*0% Ok result*	*-85% Ok result*	*0% Ok result*

Note: Where the value of BR Wind or BR EQ for any specimen is more than 20% greater than either of the other two specimens, assign it a value of 1.2 times the lower value before averaging.

Average Earthquake BR		**Ultimate**			**Serviceability**
EQ (BU's)	20 x K4 x Ry =	**65**	(P8 x K1) x (K2/0.55) =		**132**
	27	**BU/m**		**Limited by**	**Ultimate limit state**
Average Wind BR		**Ultimate**			**Serviceability**
Wind (BU's)	20 * P =	**48**	(P8 x K1) x (K2/0.71) =		**103**
	20	**BU/m**		**Limited by**	**Ultimate limit state**

Figure 4: *P21:2010 calculations for 2400mm x 2.4m, 12mm OSB Ergo, Handibracs*

Please feel free to contact me to discuss this information.

Doug Gaunt