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In Confidence to the Client:
WOODEVO
Attention: Owen Wang
3 Bass Court
Keysborough VIC 3173

LOAD TESTING OF WOODEVO ADVANCED SQUARE DECKING BOARDS

Date of Testing: 17 October to 30 October 2024

TEST SYNOPSIS:

A consignment of composite decking boards and fasteners were delivered to the MTS laboratory for testing (see Fig. 1). As advised by the client, the decking boards were identified as 'Woodevo Advanced Square Boards 200 × 32 mm'.

FIG. 1
WOODEVO ADVANCED DECKING BOARDS

At the request of the client, a series of simulated Uniformly Distributed Load (UDL) and concentrated load tests were undertaken to determine the flexural strength of the boards. Testing was conducted in accordance with the relevant sections of the following specifications:

- AS/NZS 1170.1:2002 (INCORPORATING AMENDMENT NOS 1, 2, 3, 4 AND 5) – STRUCTURAL DESIGN ACTIONS, PART 0: GENERAL PRINCIPLES
- AS/NZS 1170.1:2002 (INCORPORATING AMENDMENT NOS 1 AND 2) – STRUCTURAL DESIGN ACTIONS, PART 1: PERMANENT, IMPOSED AND OTHER ACTIONS
- AS 2156.2:2001 – WALKING TRACKS, PART 2: INFRASTRUCTURE DESIGN
- AS 3962:2020 – MARINA DESIGN

TEST ITEM DETAILS:

Upon arrival at the MTS laboratory, the test items were inspected. Details recorded during the inspection and the client's documented specifications are provided as follows:

Product Description: *WoodEvo Advanced Square Boards – 200 mm × 32 mm*

Board Dimensions: *1500 × 200 × 32 mm (Length × Width × Thickness)*

Fastener Details: *12G – 45 mm T20 Star Drive, Dacromet Carbon Steel (self-drilling)*

Joist Span: *450 mm Centre Spacings*

TEST PROGRAM:

Testing was conducted in accordance with the following test program:

1. The boards were initially tested for simulated Uniformly Distributed Loading (UDL), whereby three articulated loads were applied to the flooring panel (see Fig.2). The load applicators were positioned such that the test force was applied directly onto the unsupported decking (between the support bearers).
2. Concentrated load tests were conducted using a range of loading indenters (see Fig.3). In this case the loads were applied at positions deemed to be the weakest location, coinciding with the edge of the boards and midway between the supporting bearers. In accordance with Australian Standards, tests were conducted with the following indenter scenarios:

- 75 mm × 75 mm (0.0056 m^2) as per AS 2156.2
- 350 mm^2 as per AS/NZS 1170.1 for select activity / occupancy types
- 100 mm × 100 mm (0.01 m^2) as per AS 3962 & AS/NZS 1170.1 for select activity / occupancy types

Test loads for each configuration are summarised in tables 1 to 4. Three (3) repeat tests were conducted for each configuration.

TEST SETUP:

The composite decking boards were arranged in the testing machine providing a nominal test floor area of 0.84 m^2. The setup incorporated three (3) boards supported in a continuous manner at 450 mm centre spans. Boards were supported atop a rigid support frame with four (4) evenly spaced 50 mm wide bearers. Two (2) screws were driven through each board into the supporting bearer. All construction was conducted in accordance with the client's construction procedures.

The test deck was positioned beneath the actuator of a calibrated structural testing machine. Precision displacement measurement transducers were fitted beneath each span on each end of the deck to determine the deflection of the loaded decking boards.

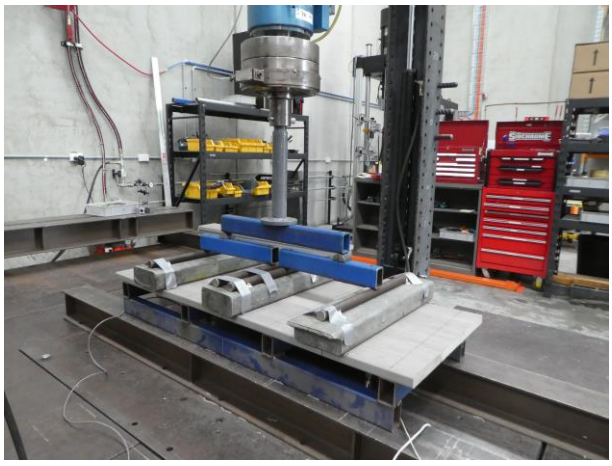

FIG. 2
UDL TEST SET-UP

FIG. 3
100 MM × 100 MM CONCENTRATED LOAD TEST SET-UP

Test Type	Load Cycle	Type	Factor	Pressure (kPa)	Force (kN)
UDL	1	SLS	Q_1	4.0	3.4
	2	SLS	Q_2	5.0	4.2
	3	SLS	$Q_1 \times k_t$	5.3	4.5
	4	SLS	$Q_2 \times k_t$	6.7	5.6
	5	ULS	$Q_1 \times k_t \times 1.5$	8.0	6.7
	6	ULS	$Q_2 \times k_t \times 1.5$	10.0	8.4
	7	ULS	$Q_1 \times k_t \times 2$	10.6	8.9
	8	ULS	$Q_2 \times k_t \times 2$	13.3	11.2
	9	ULS	$Q_1 \times k_t \times 3$	16.0	13.4
	10	ULS	$Q_2 \times k_t \times 3$	20.0	16.8
	11	ULS	$Q_1 \times k_t \times 4$	21.3	17.9
	12	ULS	$Q_2 \times k_t \times 4$	26.6	22.3
Notes: $Q_1 = 4.0\ kPa$ $Q_2 = 5.0\ kPa$ $k_t = 1.33$					

TABLE 1
UDL TEST LOADS

Test Type	Load Cycle	Type	Factor	Force (kN)
Concentrated Load 75 mm x 75 mm	1	SLS	Q_1	1.4
	2	SLS	$Q_1 \times k_t$	1.9
	3	SLS	$Q_1 \times k_t \times 1.5$	2.8
Notes: $Q_1 = 1.4\ kN$ $k_t = 1.33$				

TABLE 2
75 MM × 75 MM CONCENTRATED TEST LOADS

Test Type	Load Cycle	Type	Factor	Force (kN)
Concentrated Load 350 mm²	1	SLS	Q_1	1.8
	2	SLS	$Q_1 \times k_t$	2.4
	3	SLS	$Q_1 \times k_t \times 1.5$	3.6
Notes: $Q_1 = 1.8\ kN$ $k_t = 1.33$				

TABLE 3
350 MM² CONCENTRATED TEST LOADS

Test Type	Load Cycle	Type	Factor	Force (kN)
Concentrated Load 100 mm x 100 mm	1	SLS	Q_1	1.8
	2	SLS	$Q_1 \times kt$	2.4
	3	SLS	Q_2	2.7
	4	SLS/ULS	$Q_2 \times kt$, Q_3, $Q_1 \times k_t \times 1.5$	3.6
	5	SLS	Q_4	4.5
	6	SLS	$Q_3 \times k_t$	4.8
	7	ULS	$Q_2 \times k_t \times 1.5$	5.4
	8	SLS	$Q_4 \times k_t$	6.0
	9	ULS	$Q_3 \times k_t \times 1.5$	7.2
	10	ULS	$Q_4 \times k_t \times 1.5$	9.0

Notes:
$Q_1 = 1.8\ kN$
$Q_2 = 2.7\ kN$
$Q_3 = 3.6\ kN$
$Q_4 = 4.5\ kN$
$k_t = 1.33$

TABLE 4
100 MM × 100 MM CONCENTRATED TEST LOADS

TEST PROCEDURE:

Uniformly Distributed Load (UDL) Tests:

Simulated Uniformly Distributed Load tests (UDL) and factored Ultimate Limit State (ULS) uniform pressure loads were conducted commensurate with the calculated serviceability load. Each loading case consisted of applying a pre-determined test load and maintaining the load for five (5) minutes. The applied force and corresponding deflection of the boards were continuously recorded throughout testing. Visual observations of the decking performance were noted and upon completion of each loading cycle, the applied load was removed and the structure permitted to rebound for a period of sixty (60) seconds before terminating the test.

A total of twelve (12) UDL tests were conducted with a peak test load of 22.3 kN being applied. The corresponding peak test pressure was 26.6 kPa.

Concentrated Load Tests:

Concentrated load testing was also conducted in stages. Loading was initially applied commensurate with the static Serviceability Limit State (SLS) and was maintained for a period of five (5) minutes. After the test period had elapsed, the applied test load was removed and the test panel allowed to rebound for a period of sixty (60) seconds before terminating the test.

Three (3) concentrated load tests were conducted with a 75 mm × 75 mm indenter. In this case, the ultimate factored test load was calculated to be 2.8 kN.

Three (3) concentrated load tests were conducted with a 350 mm^2 indenter. In this case, the ultimate factored test load was calculated to be 3.6 kN.

Ten (10) concentrated load tests were undertaken with the 100 mm × 100 mm indenter. In this case, the ultimate factored test load was computed to be 9.0 kN.

TEST DATA:

Tabulated results and data tables are provided in Appendix A.

Test curves are shown in Appendix B.

TEST RESULTS AND OBSERVATIONS:

Uniformly Distributed Load (UDL) Tests:

In all UDL tests, the decking product achieved the factored SLS and ULS test loads without obvious evidence of cracking, collapse, fastener withdrawal or other indications of failure.

Concentrated Load Tests:

In all concentrated load tests, the decking product achieved the factored SLS and ULS test loads without obvious evidence of cracking, collapse, fastener withdrawal or other indications of failure.

SUMMARY:

The WOODEVO ADVANCED SQUARE DECKING BOARDS 200 MM × 32 MM as reported herein, have **PASSED** the strength tests for factored Uniformly Distributed Loading and Concentrated Loading when supported on multiple bearers at 450 mm spacings for the applied pressures and loads listed below:

- 4.0 kPa in accordance with AS/NZS 1170.0, AS/NZS 1170.1 & AS 2156.2
- 5.0 kPa in accordance with AS/NZS 1170.0, AS/NZS 1170.1 & AS 3962
- 1.4 kN concentrated load over 75 mm × 75 mm in accordance with AS 2156.2
- 1.8 kN concentrated load over 100 mm × 100 mm and 350 mm^2 in accordance with AS/NZS 1170.0 & AS/NZS 1170.1 (Domestic and Residential Activities)
- 2.7 kN concentrated load over 100 mm × 100 mm in accordance with AS/NZS 1170.0 & AS/NZS 1170.1 (Non-Residential Activities)
- 3.6 kN concentrated load over 100 mm × 100 mm in accordance with AS/NZS 1170.0 & AS/NZS 1170.1 (Non-Residential Activities)
- 4.5 kN concentrated load over 100 mm × 100 mm in accordance with AS/NZS 1170.0 & AS/NZS 1170.1 (Non-Residential Activities)

Notes:

1) Melbourne Testing Services (MTS) Pty Ltd shall not be liable for loss, cost, damages or expenses incurred by the client or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall MTS be liable for consequential damages including, but not limited to, lost profit, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested.
2) It remains the responsibility of the client to ensure that the samples tested are representative of the entire product batch.
3) MTS shall take no responsibility for the procurement and authenticity of the test product as described herein.
4) This report is specific to the test items in their state at the time of testing. It should not be taken as a statement that all products in all states of repair, would also perform in the same manner.
5) MTS shall take no responsibility for the installation procedures used for the test items as described herein.
6) MTS shall take no responsibility for the interpretation or misinterpretation of the procedures or calculation methods as provided herein or for the appropriateness or validity of the test procedures for the test items described and reported herein.
7) The tests as reported herein are considered Experimental Type Tests and therefore do not validate or certify the products with any Australian or International standards that may apply.
8) The number of specimens tested herein is not necessarily statistically significant. It remains the responsibility of the reader to conduct rigorous statistical analyses and employ appropriate load reduction safety factors as required.
9) It remains the responsibility of the decking designer to set appropriate deflection limits for the product reported herein. Furthermore, the decking designer shall assess and determine that the information contained in the tables herein satisfies the design loads and serviceability criteria for the select application.
10) MTS shall take no responsibility for the creep performance of the decking product report herein under sustained loading.

DANIEL HUMFREY
AUTHORISED SIGNATORY

YASANTHA PERERA
TEST ENGINEER

APPENDIX A:

Test Type	Load Cycle	Type	Factor	Pressure (kPa)	Force (kN)	Deflection (mm)		Residual Deflection (mm)	
UDL	1	SLS	Q_1	4.0	3.4	0.63 0.58 0.60	0.60	0.04 0.04 0.04	0.04
	2	SLS	Q_2	5.0	4.2	0.77 0.72 0.76	0.75	0.05 0.06 0.04	0.05
	3	SLS	$Q_1 \times k_t$	5.3	4.5	0.82 0.77 0.81	0.80	0.05 0.07 0.05	0.06
	4	SLS	$Q_2 \times k_t$	6.7	5.6	0.99 0.92 0.98	0.96	0.06 0.08 0.08	0.07
	5	ULS	$Q_1 \times k_t \times 1.5$	8.0	6.7	1.17 1.12 1.13	1.14	- - -	-
	6	ULS	$Q_2 \times k_t \times 1.5$	10.0	8.4	1.45 1.36 1.40	1.40	- - -	-
	7	ULS	$Q_1 \times k_t \times 2$	10.6	8.9	1.53 1.46 1.47	1.49	- - -	-
	8	ULS	$Q_2 \times k_t \times 2$	13.3	11.2	1.88 1.79 1.81	1.83	- - -	-
	9	ULS	$Q_1 \times k_t \times 3$	16.0	13.4	2.18 2.12 2.11	2.14	- - -	-
	10	ULS	$Q_2 \times k_t \times 3$	20.0	16.8	2.65 2.60 2.59	2.61	- - -	-
	11	ULS	$Q_1 \times k_t \times 4$	21.3	17.9	2.81 2.75 2.77	2.78	- - -	-
	12	ULS	$Q_2 \times k_t \times 4$	26.6	22.3	3.41 3.32 3.36	3.36	- - -	-

Notes:
$Q_1 = 4.0\ kPa$
$Q_2 = 5.0\ kPa$
$k_t = 1.33$

TABLE A1
UDL TEST RESULTS

APPENDIX A:

Test Type	Load Cycle	Type	Factor	Force (kN)	Deflection (mm)		Residual Deflection (mm)	
Concentrated Load 75 mm x 75 mm	1	SLS	Q_1	1.4	2.30	2.49	0.13	0.13
					2.65		0.13	
					2.52		0.14	
	2	SLS	$Q_1 \times k_t$	1.9	3.15	3.27	0.20	0.18
					3.39		0.15	
					3.26		0.18	
	3	SLS	$Q_1 \times k_t \times 1.5$	2.8	4.63	4.73	0.27	0.24
					4.88		0.24	
					4.67		0.20	
Notes: $Q_1 = 1.4\ kN$ $k_t = 1.33$								

TABLE A2
75 × 75 MM CONCENTRATED LOAD TEST RESULTS

Test Type	Load Cycle	Type	Factor	Force (kN)	Deflection (mm)		Residual Deflection (mm)	
Concentrated Load 350 mm²	1	SLS	Q_1	1.8	4.13	4.27	0.16	0.20
					4.19		0.21	
					4.49		0.23	
	2	SLS	$Q_1 \times k_t$	2.4	5.44	5.52	0.24	0.28
					5.42		0.30	
					5.69		0.30	
	3	SLS	$Q_1 \times k_t \times 1.5$	3.6	8.10	8.20	0.44	0.46
					8.27		0.48	
					8.23		0.45	
Notes: $Q_1 = 1.8\ kN$ $k_t = 1.33$								

TABLE A3
350 MM² CONCENTRATED LOAD TEST RESULTS

APPENDIX A:

Test Type	Load Cycle	Type	Factor	Force (kN)	Deflection (mm)		Residual Deflection (mm)	
Concentrated Load 100 mm x 100 mm	1	SLS	Q^1	1.8	1.92	1.92	0.09	0.08
					2.05		0.10	
					1.79		0.04	
	2	SLS	$Q^1 \times kt$	2.4	2.54	2.52	0.12	0.12
					2.65		0.17	
					2.35		0.06	
	3	SLS	Q^2	2.7	2.88	2.83	0.15	0.15
					2.95		0.21	
					2.66		0.08	
	4	SLS / ULS	$Q^2 \times kt$, Q^3, $Q^1 \times kt \times 1.5$	3.6	3.83	3.74	0.17	0.17
					3.88		0.24	
					3.50		0.09	
	5	SLS	Q^4	4.5	4.75	4.66	0.24	0.19
					4.84		0.18	
					4.38		0.14	
	6	SLS	$Q^3 \times kt$	4.8	5.20	5.03	0.25	0.22
					5.23		0.22	
					4.67		0.18	
	7	ULS	$Q^2 \times kt \times 1.5$	5.4	5.90	5.71	0.33	0.27
					5.96		0.26	
					5.27		0.24	
	8	SLS	$Q^4 \times kt$	6.0	6.64	6.38	0.39	0.33
					6.58		0.35	
					5.93		0.24	
	9	ULS	$Q^3 \times kt \times 1.5$	7.2	7.93	7.73	0.40	0.38
					8.00		0.40	
					7.25		0.34	
	10	ULS	$Q^4 \times kt \times 1.5$	9.0	9.92	9.82	0.49	0.54
					9.96		0.63	
					9.57		0.51	

Notes:
Imposed Action: Q^1 = 1.8 kN *Deflection Limit: Span / 150 = 3 mm at SLS*
Imposed Action: Q^2 = 2.7 kN
Imposed Action: Q^3 = 3.6 kN
Imposed Action: Q^4 = 4.5 kN
Factor for Variability: kt = 1.33

TABLE A4
100 × 100 MM CONCENTRATED LOAD TEST RESULTS

APPENDIX B:

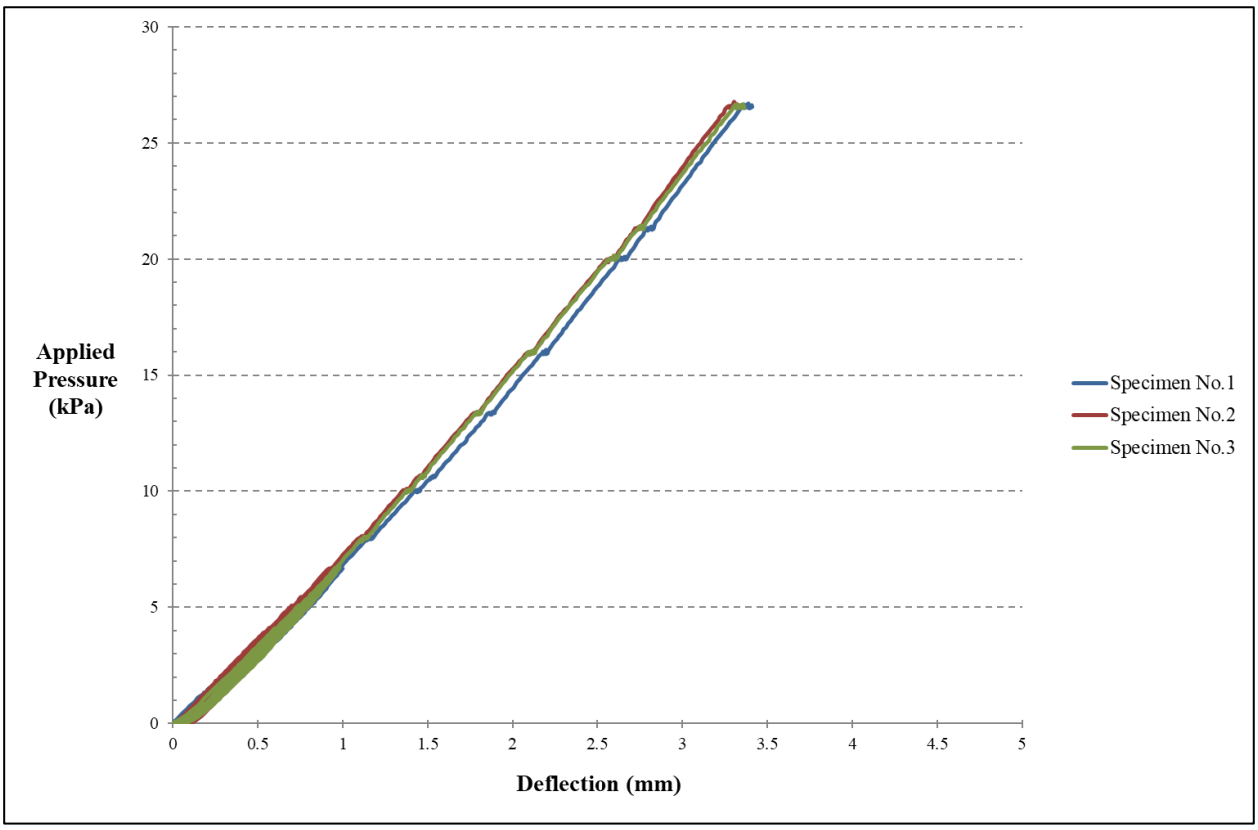

FIG. B1
UDL APPLIED PRESSURE VS DEFLECTION TEST CURVES

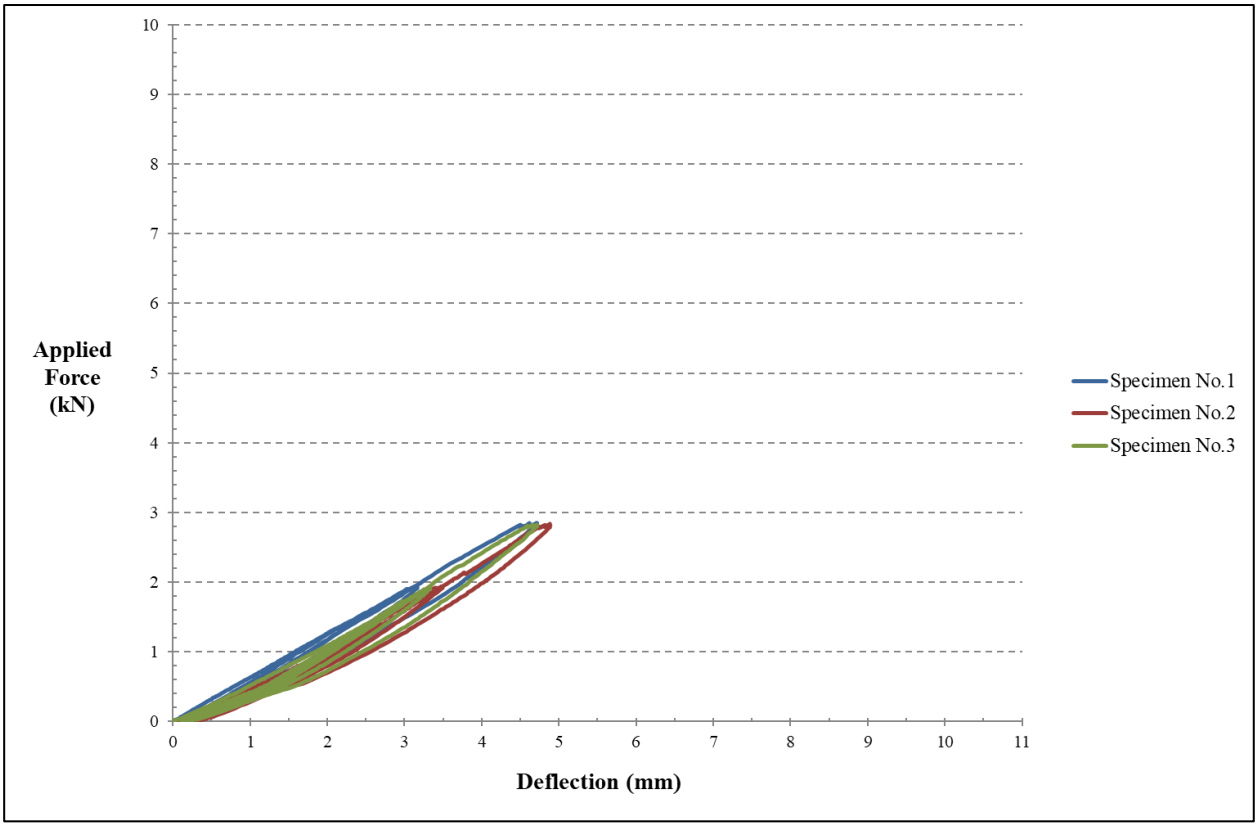

FIG. B2
75 × 75 MM APPLIED FORCE VS DEFLECTION TEST CURVES

APPENDIX B:

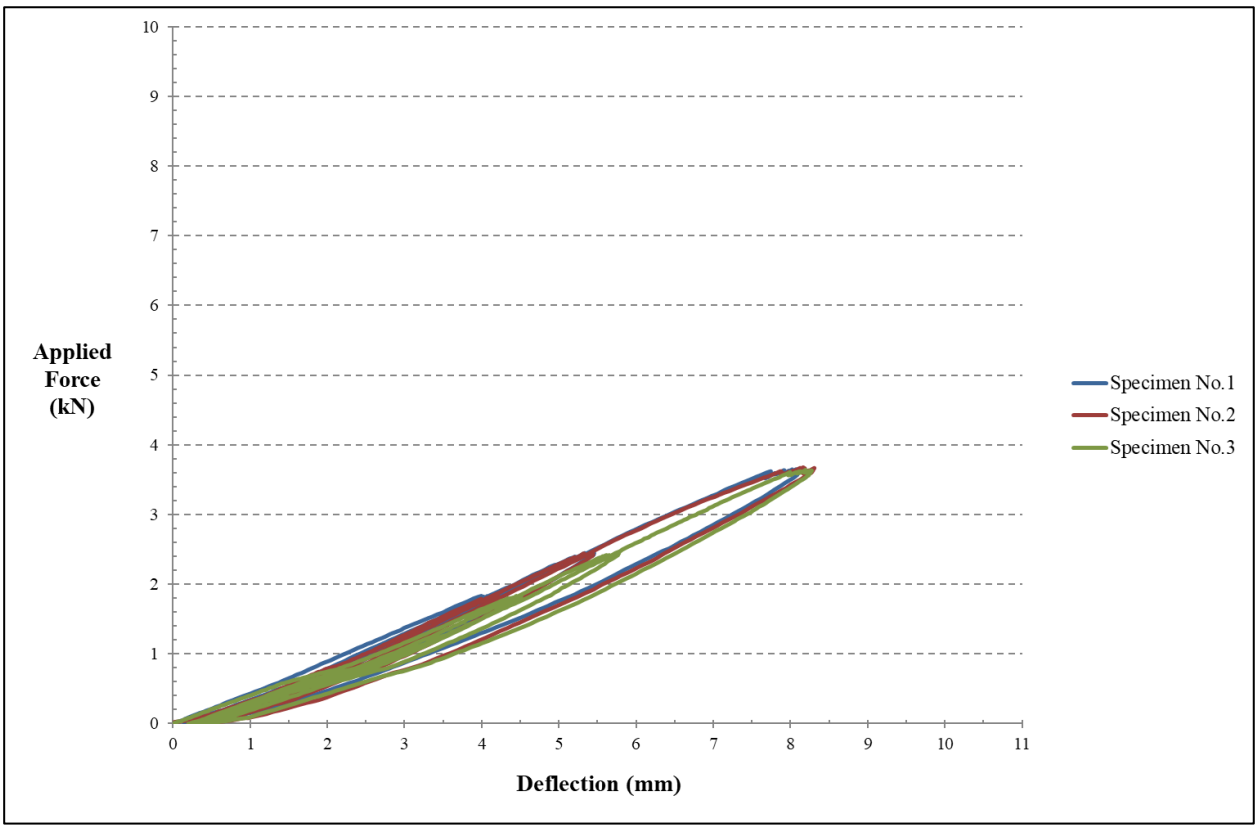

FIG. B3
350 MM² APPLIED FORCE VS DEFLECTION TEST CURVES

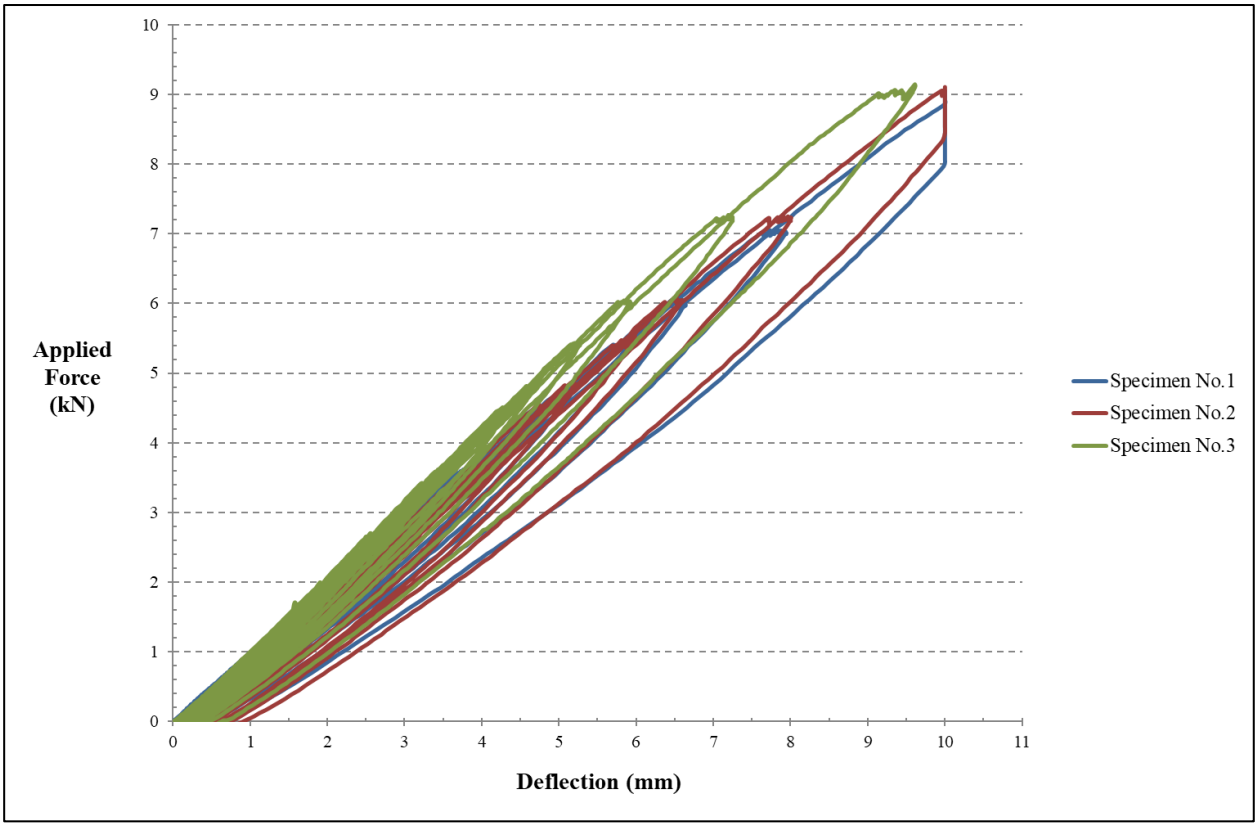

FIG. B4
100 × 100 MM APPLIED FORCE VS DEFLECTION TEST CURVES