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Benel Singapore Pte Ltd.
Date: Oct 28, 2013

Report No.:100917074GRR-001E
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Test Report For:
Benel Singapore Pte Ltd.
ANSI/BIFMA X5.1-2011
CHAIR TEST STANDARD
EVO CHAIR

Lynwood Pearson
Project Manager

Anthony Serge
Reviewer

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DATE RECEIVED: 10/1/2012
DATES TESTED: 10/2/2012 – 5/6/2013

DESCRIPTION OF SAMPLES:

Part Description: Evo Chair
Condition of Test Sample: New

WORK REQUESTED/APPLICABLE DOCUMENTS:

To test the submitted sample per ANSI/BIFMA X5.1-2011 Chair Test Standard for the following test program:

<u>Test No.</u>	<u>Test Description</u>
5	Back Rest Strength-Tilt
7	Base
8	Drop-Dynamic
9	Swivel Cycle
10	Tilt Mechanism
11	Seating Durability
12	Stability
14	Arm Strength-Horizontal
15	Backrest Durability-Tilt
17	Caster/Chair Base Durability
21	Arm Durability

CONCLUSION:

The submitted sample meets the acceptance criteria of the tests listed above.

TEST EQUIPMENT:

Asset	Description	Cal Date	Cal Due
138272	LOAD CELL 0-1,000 #	2/22/2013	2/22/2014
138039.1	BAG WEIGHT- (300 lbs)	12/07/2007	VBU
138039.2	BAG WEIGH- (225 lbs)	12/07/2007	VBU
138042	SEATING IMPACT / 2 STATION	VBU	VBU
138043	BACK DURABILITY 0-300lbs	VBU	VBU
138112	GRADUATED RULE 36"	08/27/2008	08/27/2013
138296	STOPWATCH	06/06/2012	06/06/2014
138170	FRONT STABILITY WEIGHT	04/14/2008	VBU
138012	SCALE / 0-1,000 #	12/14/2012	12/14/2013
138148	DIGITAL PROTRACTOR	09/26/2012	09/26/2013
138913.2	LOAD CELL 0-10 K	10/14/2012	10/14/2013
138279	FORCE GAGE; DIGITAL 100LB	04/02/2013	04/02/2014
138916.2	TIMING BOX	VBU	VBU
138047	CASTER DURABILITY	VBU	VBU
138906	OBSTACLE PLATE 17"	7/25/2006	VBU
138907	OBSTACLE PLATE 17"	7/25/2006	VBU
138908	OBSTACLE PLATE 17"	7/25/2006	VBU

5. BACK STRENGTH PROCEDURE - STATIC (Type I - Tilting Seat):

Date Tested: 3/25/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1 2011; Test No. 5
Functional Load: 200 lbf.
Proof Load: 300 lbf.
Number of Samples Tested: One (1)

Acceptance Criteria:

Functional Load: There shall be no loss of serviceability to the chair.

Proof Load: There shall be no sudden and major change in the structural integrity of the product. Loss of serviceability is acceptable.

Results:

Sample ID	Static Load	Description of Results
3	200	Pass
	300	Pass

The submitted sample meets the acceptance criteria of the test described above.
Refer to the following page for photograph



Back Strength Test

7. BASE TEST - STATIC:

Date Tested: 11/26/2012
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 7
Time Duration of Test: 1 Minute
Functional Static Load: 2500 lbf.
Proof Static Load: 2500 lbf.
Number of Samples Tested: One (1)

Acceptance Criteria:

There shall be no sudden and major change in the structural integrity of the base. The center column may not touch the test platform during the load application.

Results:

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



Base Test – Static

8. DROP TEST – DYNAMIC:

Date Tested: 3/26/2013
Condition of Test Sample: Production

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 8
Functional Load: 225 lbs.
Proof Load: 300 lbs.
Drop Height: 6"
Number of Samples Tested: One (1)

Acceptance Criteria:

Functional Load: No structural breakage or loss of serviceability, including stacking ability if applicable.

Proof Load: No sudden and major change in the structural integrity of the product. Loss of serviceability is acceptable.

Results:

Sample Number	Highest Position	Results
3	Functional Load - 225 lbs	Pass
	Proof Load - 300 lbs	Pass

Sample Number	Lowest Position	Results
3	Functional Load - 225 lbs	Pass
	Proof Load - 300 lbs	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



DROP TEST – DYNAMIC

9. SWIVEL TEST - CYCLIC:

Dates Tested: 10/02/2012 – 10/08/2012
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 9

Number of Cycles:

Highest Seat Position: 60,000
Lowest Seat Position: 60,000
Rotation: 360°
Cycles per Minute: 5-15
Load in Seat: 250 lbs.
Number of Samples Tested: One (1)

Acceptance Criteria:

There shall be no loss of serviceability.

Results:

Sample ID	Seat Position	Number of Cycles	Description of Results
1	Highest Setting	60,000	Pass
	Lowest Setting	60,000	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



Swivel Test – Cyclic

10. TILT MECHANISM TEST-CYCLIC: (Type I & Type II Chairs)

Dates Tested: 12/28/2012 – 1/10/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 10
Tilt Adjustments: Set all adjustments at normal use conditions.
Number of Cycles: 300,000
Cycles per Minute: 10 to 30
Load in Seat: 225 lbs.
Number of Samples Tested: One (1)

Acceptance Criteria:

There shall be no loss of serviceability to the tilt mechanism.

Results:

Sample ID	Number of Cycles	Description of Results
1	300,000	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



Tilt Mechanism Test-Cyclic

11. SEATING IMPACT TEST

Dates Tested: 3/11/2013 – 3/18/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 11

Section 11.3

Seat Center Impact Test

Bag Diameter: 16"
Bag Weight: 125 lbs.
Number Cycles: 100,000
Height of Drop: 1.2"
Cycles per Minute: 10 to 30

Section 11.4

Load Ease Test

Bag Diameter: 8"
Bag Weight: 165 lbs.
Number of Cycles Required: 20,000 to each Front Corner
Cycles per Minute: 10 to 30
Number of Samples Tested: One (1)

Acceptance Criteria:

There shall be no loss of serviceability to the chair after completion of both the Impact and Load Ease Tests.

Results:

Section 11.3

Sample No.	Number of Cycles	Description of Results
3	100,000	Pass

Section 11.4

Location of Force	Number of Cycles	Description of Results
Left Front Corner	20,000	Pass
Right Front Corner	20,000	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following pages for photographs.



Seating Impact Test



Front Load Ease

12. STABILITY TEST -DYNAMIC (Front and Rear):

Date Tested: 1/11/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 12
All of the chair's adjustable features shall be set for the most unstable conditions.

Chair Type: I

Weight in Seat

(Rear Stability Only):
Type I: 286 lbs. (13 disks)
Type II: 286 lbs (13 disks)
Type III: 132 lbs (6 disks)

Front Stability:

Alternative: N/A
Vertical Load: 135 Lbs
Horizontal Force: 4.5 Lbs
Number of Samples Tested: One (1)

Acceptance Criteria:

Front Stability: The chair shall not tip over as the result of the force application of 4.5 lbf..

Rear Stability:

The force to tip shall not be less than:
Type I: Chair must not tip over
Type II: Chair must not tip over
Type III: [F = 1.1 (47 – H) pounds force.]. H is the seat height in inches. For chairs with seat height equal to or greater than 710 mm (28.0 in.), a fixed force of 93 N (20.9 lbf.) shall be applied.

Results:

Sample ID	Front Stability	Rear Stability	Results
2	21.5 lbf. to tip	Pass	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following pages for photographs.



Stability Test - Rear



Stability Test - Front

13. ARM STRENGTH TEST VERTICAL-STATIC:

Date Tested: 5/6/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 13
Functional Static Load: 169 lbf.
Proof Static Load: 253 lbf.
Number of Samples Tested: One (1)

Acceptance Criteria:

Functional Load: There shall be no loss of serviceability.

Proof Load: There shall be no sudden and major change in the structural integrity of the chair. Loss of serviceability is acceptable.

Results:

Sample ID.	Static down Load (lbf.)	Description of Results
1	169	Pass
	253	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



Arm Strength Test Vertical-Static

14. ARM STRENGTH TEST- HORIZONTAL-STATIC:

Date Tested: 3/26/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 14
Functional Force: 100 lbf.
Proof Load: 150 lbf.
Number of Samples Tested: One (1)

Acceptance Criteria:

Functional Load: A functional load applied once shall cause no loss of serviceability.

Proof Load: A proof load applied once shall cause no sudden and major change in the structural integrity of the unit. Loss of serviceability is acceptable.

Results:

Chair	Load (lbs)		Results
4	Functional Load	100	Pass
	Proof Load	150	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



Arm Strength Test- Horizontal-Static

15. BACK DURABILITY TEST-CYCLIC (Type I):

Dates Tested: 3/15/2013 – 3/20/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 15
Backrest Width: 17-1/2"
Number of Cycles Required: 120,000
Center Pull Location: 80,000
Off Center Pull Location: 40,000
Force Applied to Chair Back: 100 lbf.
Load in Seat: 225 lbs.
Cycles per Minute: 10 to 30
Number of Samples Tested: One (1)

Acceptance Criteria:

No structural breakage or loss of serviceability.

Results:

Sample ID	Pull Location	Number of Cycles	Description of Results
3	Center Pull	80,000	Pass
	Off Center Pull	40,000	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following pages for photographs.



Back Durability Test-Cyclic

17. CASTER/CHAIR BASE DURABILITY TEST - CYCLIC:

Dates Tested: 10/02/2012 – 10/08/2012
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 17
Number of Casters on Base: 5
Type of Casters (Hard or Soft): Hard
Travel Distance (Inches): 30 Inches
Number of Cycles Required: 100,000
Cycles over Obstacles: 2,000
Cycles over Smooth Plate: 98,000
Cycles per Minute: 9
Weight in Seat: 250 lbs.
Number of Samples Tested: One (1)

Acceptance Criteria:

Durability Cycling: There shall be no loss of serviceability.

Caster Retention: The caster shall not separate from the base as a result of the application of the 5 lb. force.

Results:

Sample ID	Test Condition	Number of Cycles	Description of Results
1	Over Obstacles	2,000	Pass
	Over Smooth Plate	98,000	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



Caster/Chair Base Durability Test - Cyclic

21. ARM DURABILITY TEST- CYCLIC:

Dates Tested: 5/3/2013 – 5/6/2013
Condition of Test Sample: New

Test Procedure:

Test Method: ANSI/BIFMA X5.1-2011; Test No. 21
Load To Each Arm: 90 lbs.
Angle of Force: 10 Degrees from Vertical
Number of Cycles Required: 60,000
Cycles per Minute: 10 to 30
Number of Samples Tested: One (1)

Acceptance Criteria:

Structural breakage or loss of serviceability shall constitute failure. No failure that in any way would cause personal injury to the occupant shall be allowed.

Results:

Sample ID	Number of Cycles	Description
1	60,000	Pass

The submitted sample meets the acceptance criteria of the test described above. Refer to the following page for photograph.



Arm Durability Test – Cyclic

Revisions Made To Test Report

Index	Date	Revision Description	Revised by
001	28 – Oct - 2013	Initial release.	Lynwood Pearson <i>Lynwood Pearson</i>