



Performance  
Validation  
Integrity

**DEPARTMENT OF TRANSPORTATION PERFORMANCE ORIENTED  
PACKAGE TESTING CERTIFICATION**

**Performed by:**

**HighQ Testing, LLC**

271 S Pleasant St  
Oberlin, OH. 44074

**Testing performed for:**



**Your Business**

0123 Anystreet Way  
Anytown, CA 12345

**PERIODIC RETESTING OF A UN 4G FIBERBOARD BOX  
FOR TRANSPORT OF PACKING GROUP II ARTICLES**



**4G/Y9.9/S/\*\*  
USA/+CE0XXX**

\*\*Is to be replaced by the year of manufacture.



## General Information

<b>REPORT TO:</b>	Your Business
<b>PROJECT:</b>	Performance Testing of Package (4G)
<b>ATTENTION:</b>	Mr. John Doe
<b>HIGHQ PROJECT NO.:</b>	H207XX-XXX
<b>DATE:</b>	November 12 <sup>th</sup> , 20XX
<b>HIGHQ LAB NO.:</b>	HQE3

HighQ, LLC has performed testing on the above referenced project. The results of HighQ's testing are presented in the accompanying report.

The results contained this report are related only to the item(s) tested. The pages of this report, including attachments, shall not be reproduced, except in full, without written approval of HighQ, LLC. All testing was conducted by and under the continuous, direct supervision of HighQ, LLC.

Please contact us if you have any questions concerning this report.

HighQ LLC is a current DOT UN Third-Party Certification Agency under §107.403

**Respectfully submitted,**

HighQ, LLC

A handwritten signature in black ink, appearing to read "Barry E. Johnston".

Barry E. Johnston,  
President

A handwritten signature in black ink, appearing to read "Johnathon Polhe".

Johnathon Polhe,  
Laboratory Manager



#### SCOPE OF SERVICES

On November 10<sup>th</sup>, 20XX eleven (11) samples of one (1) type of combination packaging were submitted to HighQ, LLC for Design Qualification Testing. Testing was conducted between November 10<sup>th</sup> – 12<sup>th</sup>, 2020, in general accordance with the performance requirements of the Department of Transportation's Title 49 CFR, Part 178, Subparts L & M.

Paper or fiberboard packagings are conditioned for at least twenty-four (24) hours immediately prior to testing in an atmosphere maintained at 50%  $\pm$  2 % relative humidity and at a temperature of 23°C  $\pm$  2°C (73°F  $\pm$  4°F).

It is the responsibility of the end user to ensure that the packaging is prepared for shipment as described in the following section, as well as compliance with any specific requirements of any applicable regulations.

#### *Description of Packaging:*

The tested packaging was a combination packaging with a single-wall fiberboard outer carton containing a 10-piece divider and 16 poly bags.

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**Section 1 – Packaging Description**

**Fiberboard Box:** See Appendix A for drawing.

Manufacturer:	
Box style:	
Part number:	
Box maker's certification:	
Outer dimensions, cm. (in.):	
Inner dimensions, cm. (in.):	
Manufacturer's joint:	
Tare weight:	
Flaps (top & bottom):	

**Partition:** See Appendix A for drawing.

Manufacturer:	
Partition style:	
Part number:	
Material:	
Dimensions (assembled) cm (in):	
Tare weight (assembled):	

**Basis Weights of Box and Partitions:**

Item	Facing or Corrugation	Location	Basis Weight Lbs/1000ft <sup>2</sup>
Box:	Facing	Outer	42.4
	Facing	Inner	41.3
	Corrugation	C-Flute	22.5
Partition:	Facing	Outer	33.2
	Facing	Inner	32.4
	Corrugation	C-Flute	25.7

**Combined Board Caliper:**

Box:	3.3 mm (0.129")	3.3 mm (0.129")	3.3 mm (0.129")
Partition:	3.0 mm (0.117")	3.0 mm (0.117")	3.0 mm (0.117")

**Combined Board Weight:**



Box:	
Partition:	

**Bag:**

Manufacturer:	
Part#:	
Quantity:	
Material:	
Dimensions, cm (in.):	
Tare Weight:	
Thickness:	

**Contents:**

Description:	
Material:	
Quantity:	
Dimensions, cm (in):	
Tare Weight:	
Model:	

**Closing Methods:**

Sealing method for the fiberboard box (top and bottom flaps):	
Tape manufacturer and style:	
Tape dispenser:	
Bag sealer:	

**Additional Test Information:**

Overall tare weight of package:	
Test contents:	
Minimum weight of package as tested:	
Authorized package gross weight:	
Testing:	



## Section 2 – Testing

### TEST DESCRIPTIONS AND RESULTS

**Package Preparation for all testing:** Packages were conditioned fully assembled and closed for transport.

**Drop Test:**

- Test method 49 CFR 178.603.
- Number of packages tested was five (5).
- Drop height – 1.2 meters.

Testing was conducted to certify the package for PGII articles.

Short side, long side and corner drops are performed on the orientation that includes the box joint.

**Conditioning:** The packages were conditioned to 23°C and 50% RH in accordance with 49CFR 178.602(d)(1). The packages were conditioned for a minimum of 24 hours to ensure the package and contents were at the proper temperature prior to testing. Drop testing was conducted immediately after removing the test package from the conditioning chamber.

#### RESULTS of Drop Test

Box#	Test Weight	Orientation	Result
1	9.98 kg	Bottom	Pass, no damage to package or contents.
2	9.98 kg	Top	Pass, no damage to package or contents.
3	9.98 kg	Long side	Pass, Ends of divider slightly crushed, no significant damage to package or contents.
4	9.98 kg	Short side	Pass, Ends of divider slightly crushed, no significant damage to package or contents.
5	9.98 kg	Bottom corner	Pass, slight crushing of impacted corner of outer box and divider, no other damage to package or contents

**Pass/Fail Criteria:** A package is considered to successfully pass the drop test if for each sample tested there is no damage to the outer packaging likely to adversely affect safety during transport, if there is no leakage of the filling substance from the inner packaging, and if any discharge from a closure is slight and ceases immediately after impact.



**Test Photos**

Bottom box 1



Top box 2



Long Side box 3



Short Side box 4



Corner box 5



Contents





**Stacking Test:**

- Test method: 49 CFR 178.606
- Free standing: X
- Guided load:
- Packages tested: three (3) stacked individually
- Test duration: 24 hours

The packages were conditioned in accordance with 49 CFR 178.602(d) to 50% RH ± 2% at 23°C for 24 hours.

- Stacking test weight: 190.51 kg. (Rounded up from 189.4 kg.)  
See Appendix B for calculation.

The stacking test load was applied to the top of the packages by loading each package with 190.51 kg. and the weight was maintained for 24 hours.

**RESULTS of Stacking Test**

Package 6	Pass, no damage to packaging or contents
Package 7	Pass, no damage to packaging or contents
Package 8	Pass, no damage to packaging or contents

Note: Stacking stability was not assessed since a guided load test was not performed.

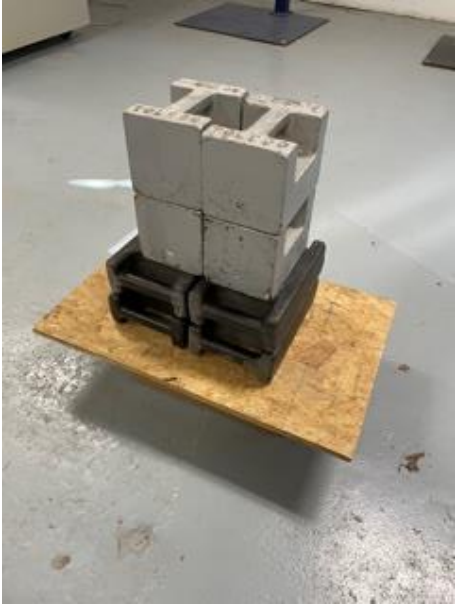
**Pass/Fail Criteria:** No test sample may leak. There must not be any leakage of the filling substance from the inner receptacle or inner packaging. No test sample may show any deterioration, which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages or cause damage to inner packagings likely to reduce safety in transportation.





**Test Photos**

Package 6



Package 7



Package 8





**Vibration Standard:**

- Packages tested: three (3)
- Test method: 49 CFR 178.608 on a rotary vibration table in accordance with ASTM D999-08.
- Duration: one (1) hour
- Frequency: 293 rpm

**RESULTS of Vibration Standard**

Package 9	Pass, no damage to packaging or contents
Package 10	Pass, no damage to packaging or contents
Package 11	Pass, no damage to packaging or contents

**Pass/Fail Criteria:** A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

**Cobb Test:**

- Test Method: ISO International Standard 535 as required by 49 CFR 178.516(b)(1).
- Samples were taken from the boxes and subjected to a water absorption test in accordance with ISO International Standard 535.
- Samples tested: five (5)

**RESULTS of Cobb Test**

Sample Number	Water Absorption	Pass/Fail
Sample 1	113 g/m <sup>2</sup>	Pass
Sample 2	115 g/m <sup>2</sup>	Pass
Sample 3	111 g/m <sup>2</sup>	Pass
Sample 4	111 g/m <sup>2</sup>	Pass
Sample 5	116 g/m <sup>2</sup>	Pass
Average	113.2 g/m <sup>2</sup>	Pass

**Pass/Fail Criteria:** An increase in mass of greater than 155 g/m<sup>2</sup> over the 30-minute duration of the test represents an unacceptable level of water resistance



**Test Photos**

Package 9



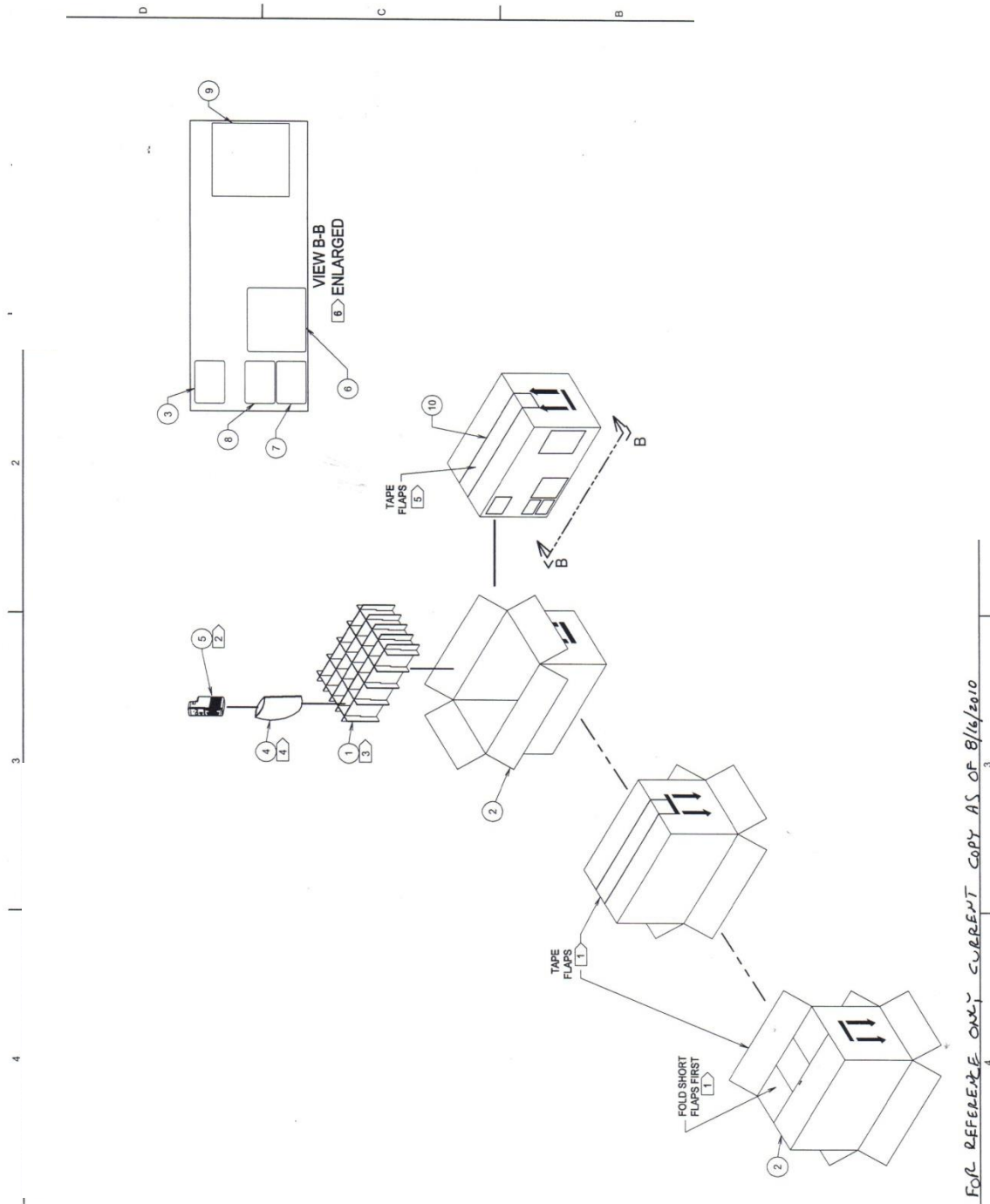
RPM on package 10



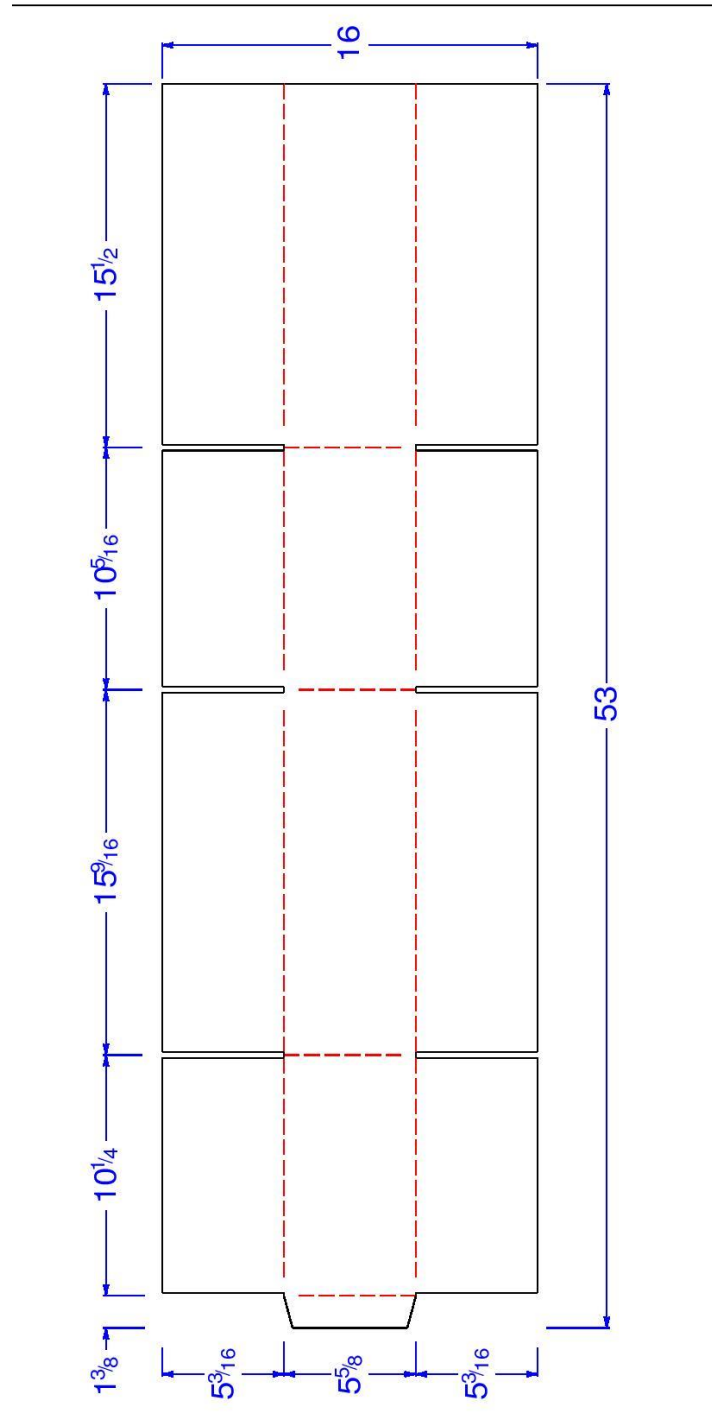
Package 11 on side

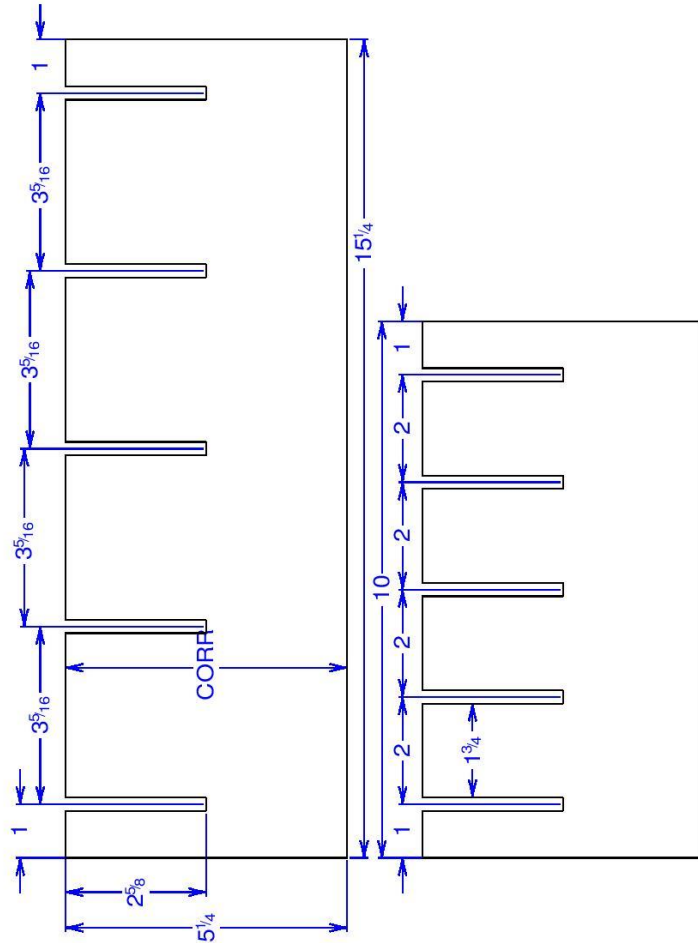


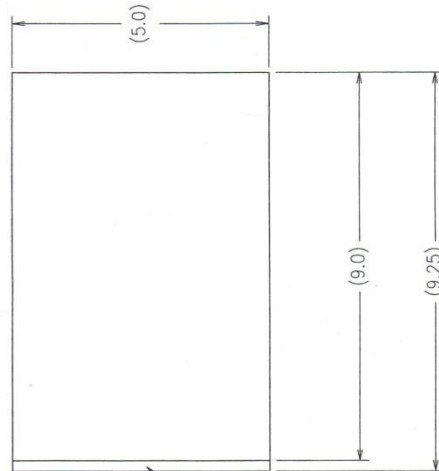
Appendix A – Drawings of Packaging Components



FOL REFERENCE ONLY CURRENT COPY AS OF 8/16/2010







HEAT SEALED  
AT ONE END





**APPENDIX B - CALCULATIONS**

**Weight of test package**

Weight of outer box:	325.9 Grams
Weight of Divider:	204.1 Grams
Weight of Bags 2.7 (16):	43.2 Grams
<b>TOTAL:</b>	<b>573.2 Grams</b>

**Filled package weight:**

Weight of test contents 588.4 (16):	9414.4 Grams
Weight of empty test package:	573.2 Grams
<b>Total:</b>	<b>9987.6 Grams</b>

**Drop test height:**

Packaging group of certification:	II
Drop Height for PG II Articles:	1.2 meters

**Marked Weight:**

Tare Weight of package:	573.2 Grams
Weight of test contents:	9414.4 Grams
<b>Marked weight (rounded down):</b>	<b>9.9 kg</b>

**Stack Test Weight:**

Marked weight of package:	9.9 kg
Exterior height of package:	14.9 cm
<b>[(300/14.9)-1]9.9=</b>	<b>189.4 kg rounded up to 190.51</b>





**Appendix C – Test Equipment and Instrumentation**

<b>Instrument or Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Calibration Date</b>
Gram Scale	Ohaus	sp2001	7124090889	11-3-2020
6" Caliper	Unknown	SR44		11-3-2020
24" Caliper	Carera		477905-1	11-3-2020
Micrometer	Mitutoyo	103-260		11-3-2020
100lb scale	NCI		2612231-2pt	11-3-2020
Torque wrench	CDI	75ILDIN	0101000307	11-3-2020
Pressure/Vacuum gauge	Ashcroft	25 1009swl 02I		11-3-2020

Calibration Lab – PBC Industries, LLC. McDonald, PA. 15057

**Appendix D – Photographs of Tested Packaging**









## Appendix E – Assembly Instructions

- 1) Each battery is inserted into a PE bag and heat sealed after removing as much air from the bag as possible.
- 2) The bottom flaps of the outer box are folded in, end flaps first followed by the long side flaps.
- 3) Flaps are taped along the center seam with one piece of Shurtape HP200 2" clear tape extending 3" over the ends.
- 4) The divider is assembled by locking the short and long pieces together perpendicular to each other at the slots in each piece.
- 5) The divider is inserted into the outer box forming 16 cells within the package.



- 6) One battery, inside a bag, is inserted into each cell.



- 7) Steps 2 and 3 are repeated for the top flaps completing the package.