

DOCUMENT INFORMATION

This Page provides a sequential record of changes for a multi-page drawing.
All pages shall carry the same revision letter as shown on this page.

Title:	Specifications for Corrugated Containers and Components
Written By:	Scott Longtin
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REVISION HISTORY

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A	As Released per PCO 4618861	09/06/2007	Perry Biancavilla	PB

1 SCOPE

This document defines the Hewlett-Packard Company requirements for corrugated fiberboard material, components, and boxes.

If any of the requirements in this document cannot be met due to regional methods or practices, please contact HP Package Engineering or the Regional Representative for variances and exceptions.

2 REFERENCED DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

- HP-00011-00 HP General Specification for the Environment
- HP 5971-3628 HP Packaging Test Manual, section 5.5
- ASTM D996 Standard Terminology of Packaging and Distribution Environments, American Society for Testing and Materials
- ASTM D1029 Standard Test Method for Peeling Resistance of Paper and Paperboard, American Society for Testing and Materials
- ASTM D2658 Standard Test Method for Determining Interior Dimensions of Fiberboard Boxes (Box Gage Method), American Society for Testing and Materials
- ASTM D4727 Standard Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes, American Society for Testing and Materials
- ASTM D5118 Standard Practice for Fabrication of Fiberboard Shipping Boxes, American Society for Testing and Materials
- ASTM D5264 Standard Practice for Abrasion Resistance for Printed Materials by the Sutherland Rub Tester, American Society for Testing and Materials
- TAPPI T 410 Weight per Unit Area (Basis Weight or Substance), Technical Association of the Pulp and Paper Industry
- TAPPI T 467 Abrasion Loss of Paper and Paperboard, Technical Association of the Pulp and Paper Industry
- TAPPI T 803 Puncture and Stiffness Test of Container Board, Technical Association of the Pulp and Paper Industry
- TAPPI T 810 Bursting Strength of Corrugated and Solid Fiberboard, Technical Association of the Pulp and Paper Industry
- TAPPI T 811 Edgewise Compressive Strength of Corrugated Fiberboard (short column test), Technical Association of the Pulp and Paper Industry
- Fibre Box Handbook Fibre Box Association, Rolling Meadows, IL 60008

These documents can be found at the following web sites:


- www.astm.org (ASTM and some TAPPI standards can be found in volume 15.09)
- www.tappi.org
- www.fibrebox.org
- www.packaging.hp.com
- www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html

3 CORRUGATED MATERIAL CONSTRUCTION

- 3.1 All material must comply with Hewlett-Packard (HP) Document HP-00011-00, General Specification for the Environment.
- 3.2 Corrugated fiberboard shall be made with two, three, or four facings for single wall (refer to FIGURE 1), double wall (refer to FIGURE 2) or triple wall, respectively in accordance to ASTM D4727. Each facing shall be separated by and securely adhered to the corrugated medium. Litho laminated boxes will have an additional outer layer containing graphics.
- 3.3 For parts specified by Mullen bursting strength, basis weight of the combined corrugated fiberboard shall conform to the requirements in TABLE 1. Refer to TAPPI T 410, TAPPI T 810 and TAPPI T 803.
- 3.4 For parts specified to Edge Crush Test (ECT), the corrugated fiberboard construction may be verified by testing to TAPPI T811.
- 3.5 Corrugated Fiberboard specified with flute structure shall conform to the number of flutes per length specified in ASTM D4727, or as specified in the individual part drawing.
- 3.6 White liners shall be certifiably elementally chlorine free or totally chlorine free.
- 3.7 Liners shall not delaminate from the fluted medium for a distance greater than 6 mm (.25 inch) from the edges of the combined corrugated board. Refer to ASTM D 4727.
- 3.8 Liners shall resist peeling when subjected to testing in accordance to ASTM D1029.

4 GENERAL CORRUGATED BOX CONSTRUCTION REQUIREMENTS

- 4.1 Box construction shall be per ASTM D5118/D 5118M unless otherwise noted herein.
- 4.2 Inside box dimensions are cited in the sequence of length, width and depth as illustrated in ASTM D5118/D 5118M. The dimensions can be verified using a steel rule tape or the procedure defined in ASTM D2658.
- 4.3 A crease in any panel, deep enough to form a false score and cause the panel to collapse while forming the box, will be cause for rejection.
- 4.4 Knife-cut edges, trim and slots must be clean cut and free of debris. Attached scrap shall not account for more than one piece per one hundred (100) boxes.

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4.5 Warping shall not exceed 6 mm (.25 inch) for 305 mm (12 inch) of material as recommended in the Fibre Box Handbook.

5 SCORE BENDING AND FOLDING REQUIREMENTS

5.1 Flap scores of slotted style boxes shall be deep enough to allow folding with one hand without creating false scores.

5.2 The corrugated fiberboard shall show no continuous visual surface break, or cracking of the inner or outer facings per the bending requirements specified in ASTM D4727.

6 SLOTING REQUIREMENTS FOR SLOTTED CONTAINERS

6.1 Slot depths shall be within 5 mm (0.19 inch) double wall and 3mm (.13 inch) for single wall from the center of the score line forming the flap, unless otherwise specified on the individual carton drawing. Refer to FIGURE 3.

6.2 Flap slots shall be centered to within 1.5 mm (0.06 inch) of the centerline of the aligning panel scores as recommended in the Fibre Box Handbook.

7 MANUFACTURER'S JOINT FOR SLOTTED CONTAINERS

7.1 The manufacturers' joint tab shall extend the full inside depth of the box at the joint score line and may be attached to either the length or width panel of the slotted box. The joint tab shall be crushed along its entire length. The joint tab may be specified to extend beyond the top and bottom score lines of the adjoining panel for added box strength. Extended tabs should only be used when they are attached to the length (largest) panel and fastened to the inside of the width (smallest) panel to assure proper flap alignment and evenness of the closed box. Refer to the individual carton drawing for the preferred style of manufacture's joint.

7.2 Slot Gap at the Manufacturer's Joint

7.2.1 The width of gap at the manufacturers' joint, measured at the flap score lines, shall be no less than 1.5 mm (0.06 inch) and not vary more than one board thickness from the widths of the cut flap slots, as recommended in the Fibre Box Handbook. Refer to FIGURE 4.

7.2.2 Variation in the width of each gap at the manufacturers' joint on the same box (skew) shall not exceed ± 3 mm (± 0.13 inch) when measured at the flap score lines, as recommended in the Fibre Box Handbook. Refer to FIGURE 4.

7.2.3 Gap at the manufacturers' joint, measured at the ends of the flaps, shall not be less than 1.5 mm (0.06 inch) as recommended in the Fibre Box Handbook. Refer to FIGURE 4.

7.3 Glue Joints

- 7.3.1 Glue joints shall consist of an adhesive bond that covers a minimum of 85% of the total joint tab area with a minimum of 75% fiber tear. No more than a 3 mm (0.12 inch) bead of glue shall be visible on the exterior of the box.
- 7.3.2 Glue tabs should not be coated or laminated on boxes with special coatings or full litho laminates to assure a good adhesive bond.
- 7.3.3 Glue tab lengths shall be no shorter than 38 mm (1.50 inch) for single wall and 51 mm (2.00 inch) for double wall unless otherwise specified on the individual carton drawing. These are minimum values with some designs requiring additional considerations. Refer to FIGURE 4.

7.4 Stitch Joints

- 7.4.1 Stitches shall be no more than 51 mm (2.00 inch) apart, evenly spaced, and placed approximately 45 degrees to the score line with the nearer ends of the stitches closest to the flap scores not to exceed 25 mm (1.00 inch). Stitches are to have evenly formed legs. Stitches shall not be on the outer top or bottom flaps except for securing an extended tab. Refer to FIGURE 5 and ASTM D 5118.
- 7.4.2 Tab length of the stitched joint shall be no shorter than 38 mm (1.50 inch). Refer to FIGURE 4.

7.5 Tape Joints

Taped joints are to only be used upon Package Engineering (special) approval.

8 FLAP GAP FOR RSC AND HSC BOXES


- 8.1 The major flaps of a closed box shall not overlap and the gap between these flaps should not exceed the thickness of the corrugated board as recommended in the Fibre Box Handbook unless otherwise specified on the individual carton drawing.

9 COMPRESSION REQUIREMENTS FOR SLOTTED CONTAINERS

- 9.1 Box compression requirements that are specified on the individual box drawing are to be verified by the supplier per Hewlett-Packard Package Test Manual, 5971-3628, Section 5.5. The supplier shall maintain documentation of board combination and compression test results with manufacturing dates.

10 MARKINGS, IDENTIFICATION AND ARTWORK REQUIREMENTS

- 10.1 All markings shall be printed in the locations indicated on the individual carton drawing.

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10.2 Box Maker's Certificate

When specified on the individual specification, the certification stamp shall indicate that the material meets the material requirements specified as it relates to Item 222 of the National Motor Freight Classification and Rule 41 of the Uniform Freight Classification.

10.3 Statement of Guaranteed Box Compressive Strength

When specified on the individual carton drawing, the statement shall indicate that the finished carton meets the specified compression requirements when tested to 5971-3628. The statement shall read "MINIMUM AVERAGE COMPRESSIVE STRENGTH OF THIS BOX IS XXX KG (XXX LBS)". This statement shall be printed in the same general location as the Box Maker's Certificate.

10.4 Part Number, Revision, Date Codes and Bar Codes

All parts shall be marked with the part number, current revision and date of manufacture using standard shop block lettering, unless otherwise specified. Part number bar coding requirements are specified on the individual part drawing.

10.5 Corrugated Recycling Symbols

A number of countries and regions have specific requirements for recycling symbols and markings. Refer to HP-00011-00, General Specification for the Environment, to assure use of the proper recycling symbol(s) to meet specific regional requirements.

10.6 Other Markings and Artwork

Product name, product part number and other markings may be required on the individual part drawing. Artwork requirements are specified on the individual part drawing.

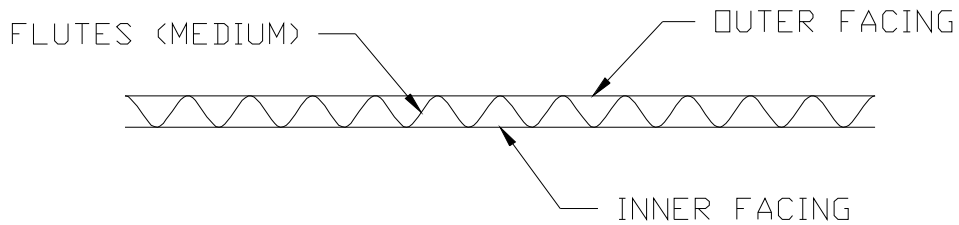
10.7 Abrasion Resistance of Printed Materials

Printing and markings shall resist abrasion under normal handling and distribution conditions. Suspected materials may be subjected to abrasion testing under TAPPI T476 or ASTM D 5264 to determine whether or not the material meets mutually agreed upon regional quality standards. Disposition of cartons demonstrating low abrasion resistance will be handled on a case-by-case basis by HP Package Engineering or the Regional Representative.

**TABLE 1
MINIMUM COMBINED WEIGHT OF FACINGS
FOR CORRUGATED SPECIFIED BY BURSTING STRENGTH**

Variety	Specified Grade	Minimum Combined Weight of Facings, grams/sq. meter (lbs./1000 sq. feet)	Minimum Bursting Strength, kPa (lbs./sq. inch)
Singlewall	125	254 (52)	862 (125)
Singlewall	150	322 (66)	1034 (150)
Singlewall	175	366 (75)	1207 (175)
Singlewall	200	410 (84)	1379 (200)
Singlewall	250	542 (111)	1724 (250)
Singlewall	275	674 (138)	1896 (275)
Singlewall	350	879 (180)	2413 (350)
Doublewall	200	449 (92)	1379 (200)
Doublewall	275	537 (110)	1896 (275)
Doublewall	350	615 (126)	2413 (350)
Doublewall	500	1084 (222)	3447 (500)
Doublewall	600	1318 (270)	4137 (600)

**FIGURE 1
SINGLE WALL CORRUGATED**



**FIGURE 2
DOUBLE WALL CORRUGATED**

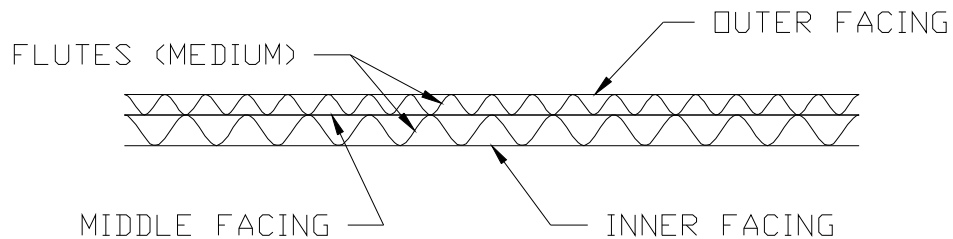


FIGURE 3
SLOT CUTS FOR SLOTTED CONTAINERS

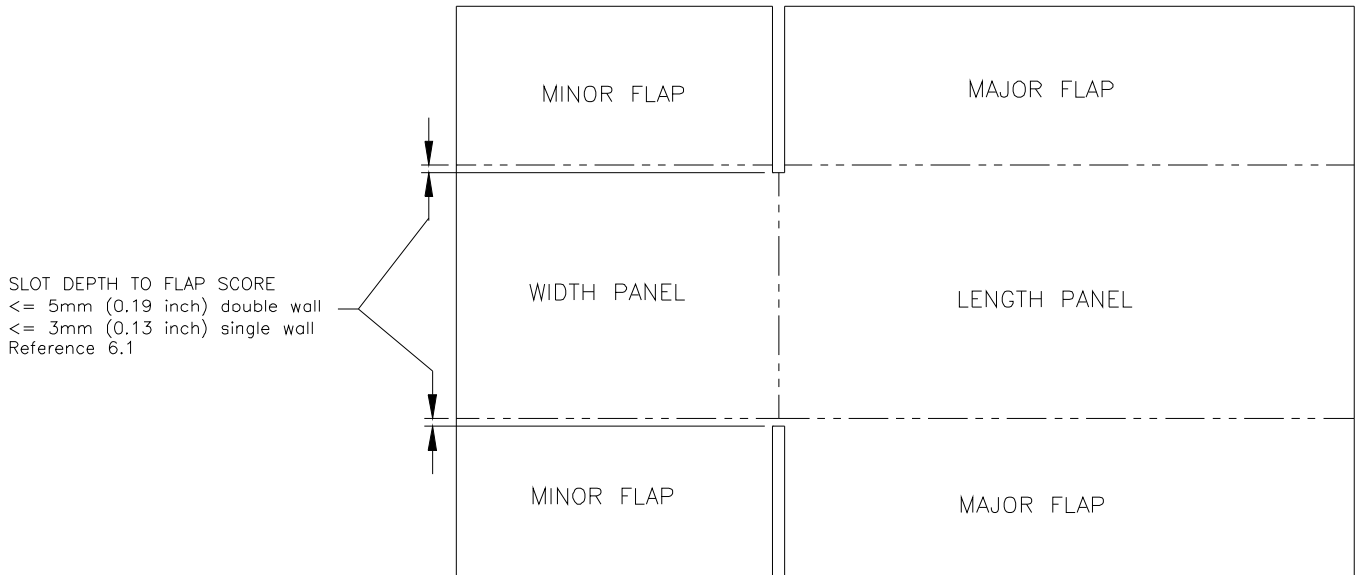


FIGURE 4
SLOTTED CONTAINER MANUFACTURER'S JOINT

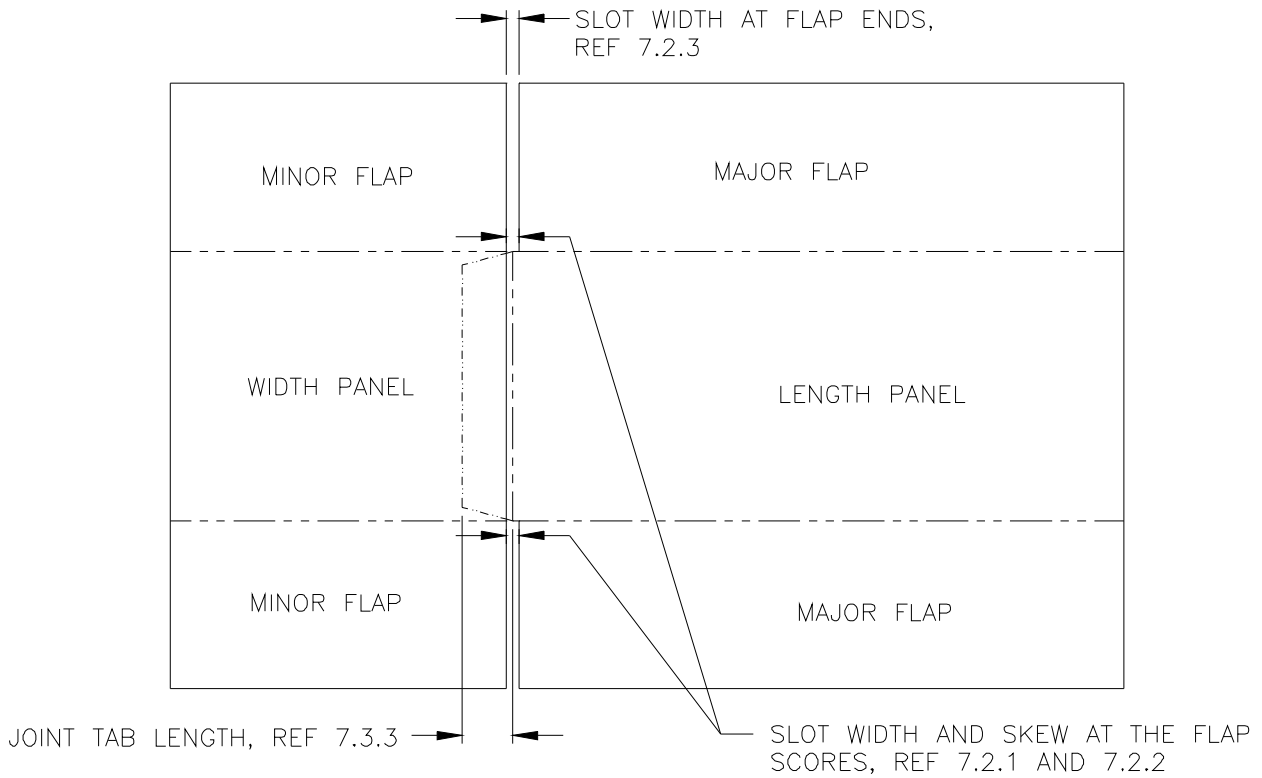


FIGURE 5
STITCHED MANUFACTURER'S JOINT

