ORACLE

Document Number and Revision: 425-1020-03 Rev 53

Package Inspection, Regulatory Requirements, and Corrugated Fiberboard Workmanship Standards

Overview

This Specification defines criteria for Rejectable Packaging Graphics, Rejectable New and Rejectable Used Packaging Materials, Packaging Regulatory Requirements and Corrugated Fiberboard Workmanship Standards.

Audience

Oracle Packaging Suppliers, EMs, RVs.

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1.0 SCOPE

This Specification defines criteria for Rejectable Packaging Graphics, Rejectable New and Rejectable Used Packaging Materials, Packaging Regulatory Requirements and Corrugated Fiberboard Workmanship Standards, and applies to all Oracle Hardware Finished Goods Packaging (Systems, X-Options and FRUs).

2.0 APPLICABLE DOCUMENTS

2.1 The following document(s) form a part of this specification to the extent specified herein:

2.2 Oracle Specifications:

425-1019-XX	Palletization Requirements for Inbound/Outbound Shipments
425-1228-XX	Packaged Product Marking Requirements and Graphics Standards
923-3763-XX	Packaging First Article Inspection Reporting (FAIR)
914-1742-XX	WWOPS Supplier Eng.: RoHS-Compliant and Lead(Pb)-Free Supplier Specification

2.3 Industry Standards and Practices: Regulatory Requirements

NMFC Item 222	National Motor Freight Traffic Association, Inc.
UFC Rule 41	American Association of Railroads
ASTM D-257	ASTM International
DOT-CFR-49	U.S. Department of Transportation
ISPM-15	International Standards for Phytosanitary Measures Guidelines for Regulating Wood Packaging
MIL-PRF-81705E	Naval Air Systems Command
IATA/ICAO	Air Transportation Association/International Civil Aviation Organization
Directive 1994/62/EC	European Parliament and Council of the European Union

2.4 Industry Standards and Practices: Corrugated Fiberboard Workmanship Standard

ASTM D4727/D4727M-91	Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes
ASTM D585-93	Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard and Related Product
TAPPI T803-88	Puncture Test of Containerboard
TAPPI T807-11	Bursting Strength of Linerboard
TAPPI T810-11	Bursting Strength of Corrugated Board
TAPPI T811-07	Edgewise Compressive Strength of Corrugated Fiberboard (Short Column Test)

2.5 Order of Precedence: In the event of a conflict between requirements the following order of precedence will apply:

1. Component Specification/Drawing
2. Oracle Specifications
3. This Specification
4. Industry Standards and Practices

2.6 In the event of a conflict between this document and any documented Oracle product specification, process, purchase order, contractual commitment, or individual product requirement, the latter takes precedence. Nor does this document take precedence over any requirement prescribed by official Government or Regulatory Agency. In the event of a conflict at the same level contact Oracle Packaging Engineering.

3.0 GENERAL REQUIREMENTS

3.1 This specification shall be used in conjunction with the packaging component's specification drawing.

3.2 The component's specification drawing takes precedence over this specification.
3.3 This specification is intended to be used by Oracle or Oracle EMs and RVs.
3.4 All inspection of incoming printing quality will be completed at the time each shipment is received from the packaging supplier.
3.5 Conditions: Normal daylight lighting.
3.6 Most packaging materials will be cosmetically degraded by handling throughout their entire distribution cycle. In general, unless one or more defects significantly affect the overall appearance and / or performance of the packaging material, it is acceptable.

4.0 DEFINITIONS

4.1 Viewing Distance: 24 inches from the material or component under normal daylight lighting.

4.2 Packaging Material Defect: an imperfection that will impair the usability or significantly detract from the overall appearance and / or performance of the packaging material.

4.3 Packaging Material: a substance from which packaging components are made (i.e. corrugated, wood, etc.).

4.4 Packaging Component: one or several pieces of packaging material assembled into one physical entity with an associated Oracle part number and engineering drawing (i.e. box, corrugated, foam, pallet, etc.).

3.5 Packaging Material Reject: an unacceptable packaging material for use with Oracle products.

4.6 Solid Wood Material: Material derived entirely from a single wood source, not involving glue, heat or pressure. i.e. dimensional lumber.

4.7 Manufactured Wood Material: Material comprised wholly of wood-based products such as plywood, particle board, oriented strand board, veneer, wood wool etc. which has ben created using glue, heat and pressure or a combination thereof.

5.0 REJECTABLE PACKAGING GRAPHICS

5.1 Packaging Graphic/printing reject criteria

Defect	Definition	Reject Criteria
Halos or Ghosting	Lines or shadow images within the specified image boundaries	Greater than 1/32 inch (0.8 mm) in any one direction per occurrence or having two or more halos per panel
Leading Edge Halo	Lines or halos outside the specified image boundaries	Greater than 1/32 inch (0.8 mm) in any one direction per occurrence or having two or more halos per panel
Fill-In	Ink that fills-in spaces that should remain free of ink	Any area filled-in that should be free of ink
Mottle	Uneven coverage of ink that causes random light and dark spots within what is specified as a solid area of the image	Two or more light and/or dark areas are visible within a solid area of a single image
Piling	Build-up of ink in an area where solid coverage is required and is evenly distributed elsewhere within the image	Greater than 1/16 inch (1.6 mm) in any one direction per occurrence
Feathering	Excess ink build-up at the edge of the image, causing a frayed or feathered look	Any feathering
Pinholes, Fisheyes and Hickeys	Unprinted spots in solid ink areas	Greater than 1/16 inch (1.6 mm) in any one direction per occurrence or having three or more unprinted spots that are visible per panel
Line Breaks	Breaks in the continues lines of an image	Any line breaks due to missing ink coverage
Striations	Visible vertical lines within a solid ink area	Any visible striations in any image
Checking	Cracks or breaks in the printed image and packaging material at unspecified points	Outside linerboard cracks or breaks occurring at any point measuring greater than 1/2 inch (12.7 mm) in any direction

5.2 Packaging Graphic Tolerances

5.2.1 Die sizes are specified in the vertical direction. The tolerance is +/- 1/16 inch (1.6 mm) on printed images.

5.2.2 Color-to-color tolerance:
+/- 1/16 inch (1.6 mm).

5.2.3 Image-to-container score line tolerance:
- 0 / + 1/8 inch (3.1 mm).

6.0 REJECTABLE NEW PACKAGING MATERIALS

6.1 Corrugated Fiberboard Reject Criteria

Defect	Definition	Reject Criteria
Stains	To include permanent discoloration resulting from contact with, but not limited to dirt, water, and grease.	>1/4 inch [6.4mm] in any one direction or there are 3 or more stains of any size
Punctures	To include unspecified holes in, on, or through the material.	>1/4 inch [6.4mm] in any one direction or there are 3 or more punctures of any size
Abrasion	To include "scuffing or scratching" of the material and/or graphics.	>1/4 inch [6.4mm] in any one direction or there are 5 or more abrasion points which are visible
Printing	All direct or preprinted text and/or images specified on a Oracle materials.	All printing must meet the requirements of Oracle Graphics Inspection Criteria 425-1018-XX-XX
Dusting	To include high levels of excess fiberboard debris on, or in the materials.	20 or more visible pieces of "excess" fiberboard debris, of any size, are present on the material
Creasing	To include major bending or folds of the material in unspecified places.	Any crease running the entire length or width of the corrugated material
Dents	To include a significant depression in the material.	> 3/8 inch [9.5mm] in diameter and > 1/8 inch [3.1mm] deep or there are 5 or more dents of any size
Checking	To include material which cracks or breaks at unspecified points.	Outside liner board "cracks or breaks" when bent for the purpose of package assembly at any point measuring > 1/2 inch [12.7mm] in any one direction
Moisture	To include material that is wet, moist or has visible signs of being subjected to high concentrations of moisture.	If the material is wet, moist or appears to have been subjected to high concentrations of moisture in any two points measuring > 1/2 inch [12.7mm] in any one direction or there are 5 or more moisture points
Delamination	To include separation of material layers.	If there is delamination of the "liner and medium" measuring > 1/4 inch [6.4mm] in any one direction
Frayed Edges	To include material that does not have a clean, sharp edge; free of excess, untrimmed fiberboard fibers.	If any continuous edge of the corrugated material has "frayed edges" measuring > 1/2inch [12.7mm]
Cleanliness	To include material that has dirt, grease, or other foreign debris on it which does not constitute a stain, but is physically present on the material.	> 1/2 inch [12.7mm] in any one direction, or there are 5 or more unclean points
Cuts	To include unspecified cuts in, on, or	> 1/4 inch [6.4mm] in any one direction or

Defect	Definition	Reject Criteria
	through the material.	there are 3 or more cuts of any size in the material
Skewing	To include misalignment of materials rendering the product out of square.	Horizontal score lines align +/- 1/8 inch [3.1mm] after the carton is set up
Tears	To include a significant rip of the corrugated material in unspecified places.	> 1/2 inch [12.7mm] in any one direction or there are 3 or more tears of any size in the material
Joint	To include separation of material layers held together with glue, tape, or staples.	> 1/2 inch [12.7mm] separation of the materials held together with glue or tape, or the separation of materials at 1 or more staple locations
Gap & Overlap	To include the distance between the edges on external carton flaps which are intended to meet, when in a closed position.	No overlap on external carton flaps which are intended to meet, when in a closed position. Gap > 3/8 inch [9.5mm] on external carton flaps which are intended to meet, when in a closed position.

6.2 Cushioning Materials Reject Criteria

Defect	Definition	Reject Criteria
Stains	To include permanent discoloration resulting from contact with, but not limited to dirt, water, and grease.	> 1/4 inch [6.4mm] in any one direction or there are 5 or more visible stains of any size
Punctures	To include unspecified holes in, on, or through the material.	> 1/4 inch [6.4mm] in any one direction or there are 3 or more punctures of any size
Dents	To include a significant depression in the material.	> 3/8 inch [9.5mm] in diameter and > 1/8 inch [3.1mm] deep or there are 5 or more dents of any size
Moisture	To include material that is wet, moist or has visible signs of being subjected to high concentrations of moisture.	If the material is visibly wet or moist to the touch at any point
Cracks	To include material that has fractures running through the part or material.	If any continuous edge of the material has "cracks" measuring > 1/4 inch [6.4mm]
Rips	To include material that is torn fully or partially through the material.	>1/4 inch [6.4mm] in any one direction
Cleanliness	To include material that has dirt, grease, or other foreign debris on it which does not constitute a stain, but is physically present on the material.	> 1/2 inch [12.7mm] in any one direction, or there are 5 or more unclean points
Bead Fusion	To include molded cushion, bead-to-bead surface area contact and structural integrity of the molded part.	Bead surface to surface contact area < 70%
Flash	To include excess material formed at the parting line on a molded part.	> 1/4 inch [6.4mm] in width, or any width when the flash > 3 inches [76.2mm] in length.
Color	To include fading or color variation of the material.	>10% bead color other than specified
Smudging	To include printing that is wet to the touch and can be smeared.	If the print is visibly wet or smears upon contact
Scaling	To include loose materials that are the result of the die cutting process.	> 5 loose pieces or any piece that is greater than 1 in^2 [6.5cm^2]

6.3 Films, Laminates & Plastic Sheet Stock Reject Criteria

Defect	Definition	Reject Criteria
Stains	To include permanent discoloration resulting from contact with, but not limited to dirt, water, and grease.	> 1/16 inch [1.6mm] in any one direction or there are 5 or more visible stains of any size
Punctures	To include unspecified holes in, on, or through the material.	No punctures allowed
Abrasion	To include "scuffing or scratching" of the material and/or graphics.	>1/4 inch [6.4mm] in any one direction or there are 5 or more abrasion points which are visible
Moisture	To include material that is wet, moist or has visible signs of being subjected to high concentrations of moisture.	If the material is visibly wet or moist to the touch at any point
Rips	To include material that is torn fully or partially through the material.	> 1/16 inch [1.6mm] in any one direction
Cleanliness	To include material that has dirt, grease, or other foreign debris on it which does not constitute a stain, but is physically present on the material.	> 1/16 inch [1.6mm] in any one direction, or there are 5 or more unclean points
Color	To include fading or color variation of the material.	Any visible color variations noted at the specified viewing distance
Smudging	To include printing that is wet to the touch and can be smeared.	If the print is visibly wet or smears upon contact
Oily	To include non-permanent substances on the materials surface.	If the material is oily to the touch at any point

6.4 Wood Reject Criteria

Defect	Definition	Reject Criteria
Stains	To include permanent discoloration resulting from contact with, but not limited to dirt, water, and grease.	> 4 inch [101.6mm] in any one direction or there are 10 or more visible stains of any size
Cracks	To include material that has fractures running through the part or material.	Any piece that is loose as a result of being cracked or broken, including knots. If lumber ≥2.5 inch [63.5mm] in both nominal dimensions (3x4, 4x4, 4x6 and larger) is not Free of Heart Center (FOHC).
Warp	To include material which is twisted or bent.	> 1/4 inch [6.4mm] over a 4 foot [1.22mm] length
Abrasion	To include scuffing or scratching of the material and/or graphics.	> 4 inch [101.6mm] in any one direction or there are 10 or more abrasion points which are visible
Moisture	To include material that is wet, moist or has visible signs of being subjected to high concentrations of moisture.	If the material is wet, moist or appears to have been subjected to high concentrations of moisture in any two points measuring > 1 inch [25.4mm] in any one direction or there are 5 or more moisture points
Pitch Content	To include large amounts of sap or pitch that is physically visible.	> 1/4 inch [6.4mm] in any one direction or > 7 points where pitch is present
Bark	To include tree bark on any part of the material.	Any visible tree bark on the part
Splinters	To include large pieces of wood or slivers protruding from the material.	>5 splinters protruding from the material each measuring > 1 inch [25.4mm]
Cleanliness	To include material that has dirt, grease, or other foreign debris on it which does not constitute a stain but is physically present on the material.	> 4 inch [101.6mm] in any one direction or there are 10 or more visible stains of any size
Delamination	To include separation of material layers.	If there is delamination of any layers measuring > 1/2 inch [12.7mm] in any one direction
Voids	To include a significant lack of material.	> 5 voids or any 1 void > 4in²[26cm²]of a depth > 1/8 inch [3.1mm]

6.5 Rivet T-Nuts Reject Criteria

Defect	Definition	Reject Criteria
Missing	A T-nut specified on the component drawing that is missing from the physical part.	A single missing t-nut *
Spinning	T-Nuts are riveted into wood with appropriate air pressure to flange the barrel of the T-nut into the wood. When done correctly, the T-nut will be held firmly in place and not fall out or spin in the wood.	A single t-nut that is not held firmly in the wood *
Fall out	T-Nuts are riveted into wood with appropriate air pressure to flange the barrel of the T-nut into the wood. When done correctly, the T-nut will be held firmly in place and not fall out or spin in the wood.	A single missing t-nut *
Cross threaded	The inside of the barrel of the t-nut is threaded. Cross threading occurs when the threads of a bolt shift off center and cut into the female threads of the t-nut. The t-nut is then permanently damaged and a bolt can no longer be threaded into the t-nut correctly.	Oracle's AML Packaging Suppliers test the threads on every t-nut to certify that they are known good. If a t-nut later becomes cross threaded, then the pallet shall be scrapped * **
Deformed barrel	Sufficient air pressure is required to flange/rivet the t-nut into wood. Too much pressure can cause the barrel of the t-nut to deform to the point that a bolt cannot be properly threaded into the full length of the t-nut threads.	If a t-nut barrel has been deformed from the riveting process, causing the threads to not be able to accept a bolt, then the pallet shall be scrapped *

*There are multiple sets of t-nuts on the front end of a pallet that are used to secure the FRONT of a rack down to the pallet. Each set of t-nuts are used to bolt multiple different racks to the pallet. A pallet can still be used with a damaged, missing, spinning, deformed barrel or cross threaded t-nut, ONLY if the location of the damaged t-nut is not required for bolting down the front of that specific rack being shipped. Pallets with a damaged t-nuts used to bold the front of a rack to a pallet, do not need to be scrapped, if that pallet can instead be used to ship a different rack that does not require the use of that t-nut.

A damaged t-nut used to:

- bolt down the rear of a rack to the pallet
- attach the ramps to the pallet for either shipping or for rolling the rack off the pallet
- attach a wooden brace that gives added strength to the pallet in the width dimension

Damage to the above t-nuts, renders the pallet unusable, and the pallet shall be scrapped.

**If there is a spike in the occurrence of cross threaded t-nuts delivered from the Packaging Supplier, then a RCCA shall be initiated, and Oracle Packaging Engineering will make a determination on disposition.

7.0 REJECTABLE USED PACKAGING MATERIALS

7.1 Used corrugated Fiberboard Rejection Criteria

Defect	Definition	Reject Criteria
Punctures	To include unspecified holes in, on, or through the material.	>4in^2 (26cm^2) within 2 inches (50.8mm) of any edge, or > 9 in^2 (58 cm^2) at any location
Creasing	To include major bending or folds of the material in unspecified places.	>3/8 inch (9.5mm) wide, running horizontally, the entire width or length of the carton
Dents	To include a significant depression in the material.	>3 inches (76.2mm) in length and > 2 inches (50.8mm) deep at any corner or edge
Moisture	To include material that is wet, moist, or has visible signs of being subjected to high concentrations of moisture.	High concentrations of moisture in any two points measuring > 16 in^2 (104 cm^2), or there are 10 or more saturated points
Delamination	To include separation of the corrugated liner from the medium.	If there is delamination of the liner and medium measuring > 3 inches (76.2mm) in any one direction
Cuts	To include unspecified cuts in, on or through the material.	>25% of the box's panel length, in any one direction, or there are 5 or more cuts of any size through the material on any one panel
Tears	To include a significant rip of the corrugated material in unspecified places.	>1/3, the length of a side, long or 3 or more tears of any length, or tears that result in inadequate function of corro-clips
Joint	To include separation of material layers held together with glue, tape, or staples.	>1/2 inch (12.7mm) separation of the materials held together with glue or tape, or the separation of materials at 1 or more staple locations

7.2 Used Ramp Rejection Criteria

Defect	Definition	Reject Criteria
Ramp Label	Ramp labels that provide illustrations/instructions for safely removing a Rack from pallet and rolling it down the ramps.	Damaged or missing labels okay for OCI use provided users are already familiar with ramp label instructions – this allows OCI to reuse ramps. For external customers or non-OCI use, label instructions need to be legible.
Hardware	Hardware used to attach ramp to pallet	Any missing, damaged or cross threaded M10-1.5 Flat Head Allen head bolts that securely attach the ramp to the pallet (2 bolts required per ramp) (missing push and/or rubber washers okay)
Hardware	Hardware used to attach metal ramp channel to ramp plywood or lumber	Any missing, loose, cross threaded or damaged M10-1.5 flat head Philips Screw or Sigma T-nut PS10M21
Sheet metal	Sheet Metal Ramp Channels which provide a hard surface for the Rack castors to roll on, and have vertical walls to corral the castors to safely roll on or off the pallet.	Metal Ramp Channels must meet specification and must maintain bend angles. Tips of ramp metal touching floor allowed +/- 0.06" deformation from flat. No burrs or share edges.
Plywood	Plywood used in the construction of the ramp.	Any crack in plywood >2.00" linear, or propagating through more than 3 layers of plywood laminate (within a single piece of plywood)
Caution: If for any reason the user feels the integrity of the ramp is compromised, then replace ramp or ramps with new prior to use.		

7.3 ADDITIONAL PACKAGING REJECTION CRITERIA

6.1 Cushioning should be intact and able to serve its function of protecting the product. Cushioning with a fracture or break that results in separated foam pieces should be replaced.

6.2 Pallets with broken and separated pieces should be repaired or replaced.

6.3 Loose or broken tape must be appropriately retaped.

6.4 Missing or damaged corro-clips must be replaced

6.5 In the event questions arise concerning the usability of a particular component, contact Oracle Packaging Engineering.

8 PACKAGING REGULATORY REQUIREMENTS

8.1 General Regulatory Requirements

Oracle suppliers are responsible to ensure that they comply with all relevant, local, regional and world-wide regulatory & compliance requirements related to packaging and packaging materials.

This following list of regulatory requirements is not intended as an all-inclusive, comprehensive list. Instead, it is a list of regulatory requirements that must be followed. Additional regulatory requirements may be required for some packaging materials. Suppliers are responsible to provide materials in the latest version of these requirements or to the requirements which replaced them.

8.2 Hazardous Materials:

All hazardous materials will be labeled, marked, and packaged in accordance with the International Air Transportation Association/International Civil Aviator Organization (IATA/ICAO) regulations, Department of Transportation (DOT-CFR-49) regulations, the International Maritime Dangerous Goods Code and all other applicable International, National, State and Local regulations concerning hazardous materials.

8.3 Wood Materials:

All wood materials must comply with all local, regional and international regulatory requirements, including but not limited to Heat Treatment and Marking as referenced in Oracle Specification 425-1228-22: Package Material Identification Marking.

8.4 Toxic Metals:

Packaging materials, including printing inks, dyes, pigments, adhesives, stabilizers and other additives, shall comply with Oracle Specification 914-1742-xx: WWOPS Supplier Engineering RoHS-Compliant and Lead(Pb)-Free Supplier Specification. The international introduction of lead, cadmium, mercury or hexavalent chromium in any packaging or packaging component supplied to Oracle is prohibited. The incidental (background) presence of lead, cadmium, mercury or hexavalent chromium in any packaging or packaging component supplied to Oracle should be limited to 100 parts per million total weight.

8.5 Ozone Depleting Substances:

The use of ozone depleting substances (ODSs) as blowing agents in the production of foam packaging supplied to Oracle is prohibited. ODSs include Class I substances (CFCs) and Class II Substances (HCFCs), as defined under Section 611 of the 1990 Clean Air Act Amendments.

8.6 Deviations

Deviations must comply with Oracle Operations Deviation (DA) process. Deviations originate with Oracle Operations and must be authorized by Oracle Packaging Engineering.

8.7 Exemptions

Exemptions to any Regulatory Requirements in Section 3.0 must be requested in writing and approved by Oracle Packaging Engineering.

9.0 CORRUGATED FIBERBOARD WORKMANSHIP STANDARD

9.1 Corrugated Fiberboard Material Requirements

Linerboard: Kraft paperboard containing less than 40% recycled fibers that is at least 9 point (.009 inches) in thickness or 26 lb/1000 ft² in weight, depending on the burst strength of the finished board. It is used for the flat facings in corrugated fiberboard. To prevent warping, the outer linerboards of the corrugated fiberboard sheet shall be the same thickness.

Corrugated Medium (Flute): Paperboard made from any suitable fiber that is at least 9 point (.009 inch) in thickness or 26 lb/ft² in weight, depending on the burst strength of the finished board. It is used to form the fluted portion of the corrugated fiberboard.

Corrugated Board: The structure formed from the process of laminating the corrugated medium to the linerboard. Poor lamination or delamination of linerboard and corrugated medium is not acceptable. Part rejection may result if the area of delamination is greater than 36 square inches.

- Single-Face: Corrugated fiberboard made by laminating one corrugated medium to one linerboard.
- Single-Wall: Corrugated fiberboard made by laminating one corrugated medium in between two linerboards.
- Double-Wall: Corrugated fiberboard made by laminating two corrugated mediums to three linerboards in an alternating sequence.
- Triple-Wall: Corrugated fiberboard made by laminating three corrugated mediums to four linerboards in an alternating sequence.

9.1.3 Flute Sizes:

Flute	Flutes Per Foot	Flute Height
A	33 +/- 3	3/16 inch
B	47 +/- 3	3/32 inch
C	39 +/- 3	9/64 inch
E	90 +/- 4	3/64 inch

Notes: 1. Flutes per Foot to be measured peak-to-peak.
2. Height of the flutes does not include the thickness of the linerboard(s).

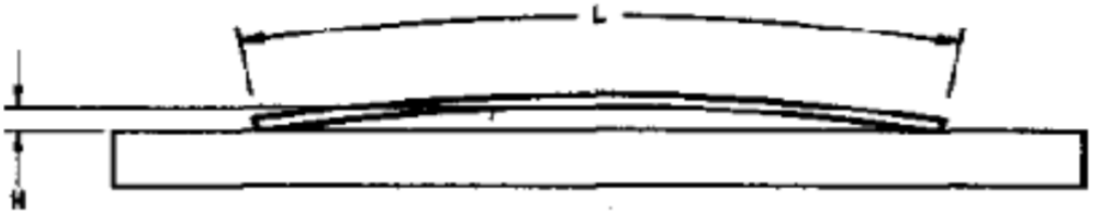
9.1.4 Flute Sequence: When double- or triple-wall corrugated fiberboard is specified, it is necessary to give the flute sequence; the first flute letter given shall be nearest the outside of the finished container. Example: “BC Doublewall”, the B flute shall be nearest to the outside of the container.

9.1.5 The flute sequence is most important when highly decorative printed board is specified. This will reduce any ‘washboard’ effect and maximize print quality.

9.1.6 Warp: The amount of warp shall not exceed 0.50 inches in height over a 24.0 inch span. This can be measured by placing the blank corrugated fiberboard on a flat surface so that any bow rises between the ends of the blank. The maximum distance from the bottom of the sample to the flat

surface shall be measured along the length of the sample. (Reference ASTM D4727 Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes)

H/L = .50/24.0



9.2 Conductive Corrugated Fiberboard Material Requirements

CORSTAT™ Conductive Corrugated (or equivalent approved by Oracle Packaging Engineering)

ANSI/ESD-S541 and ANSI/ESD S20.20 compliant

Electrical

Surface Resistance (per ANSI/ESD STM11.11)

Buried Shielding-layer Ohms 10^3 – 10^4 ohms

Outer Dissipative-layer Ohms 10^4 – 10^6 ohms

(Outer Dissipative-layer seals the conductive layer)

Chemical

Corrosivity

Reducible Sulphur .00035%

(.0008% no tarnishing to silver, solder and copper per TAPPI-406)

Amines None

Galvanic Reaction None

Mechanical

Conductive 2 sided

Kraft Paper Stock Base Fiberboard

Rub Resistance, Shielding Layer Excellent (Per Sutherland Ink Rub Test)

Shelf Life 10 Years

Cracking CORSTAT™

(will not lose continuity above 105 ohms/sq. when flexed at score line 10 times in a 180degree motion)

9.3 Corrugated Material Strength

Burst Strength: The strength of the corrugated material is expressed in pounds per square inch for single- and double-wall using the Mullen Test, per TAPPI T810 (Bursting Strength of Corrugated Board). Triple-wall is measured in inch/ounces per inch of tear, per TAPPI T803 (Puncture Test of Containerboard).

Edge Crush: Alternatively, the strength of the corrugated material may be expressed in pounds per inch width using the Edge Crush Test per TAPPI T811 (Edgewise Compressive Strength of Corrugated Fiberboard (Short Column Test). When explicitly noted on the component specification, the following Edge Crust Test substitutions may be made for Burst/Mullen Test corrugated board:

Burst Strength, lbs per in²	Minimum Acceptable Edge Crush Substitute, lbs per in. width
200 Single-wall	32 Single-wall
275 Single-wall	44 Single-wall
275 Double-wall	51 Double-wall
350 Double-wall	61 Double-wall
400 Double-wall	71 Double-wall
450 Double-wall	82 Double-wall
500 Double-wall	82 Double-wall
600 Double-wall	May Not Be Substituted
1100 Triple-wall	90Triple-wall

9.4 CORRUGATED CONSTRUCTION

Score: An impression or crease in corrugated to locate and facilitate folding. The depth of the score is dependent upon the type of corrugated to be scored. The score should be deep enough to allow folding of the board with minimal effort. The fold should follow the straight line of the score without migrating to either side more than 0.25 inch.

Single-wall: Upon folding single-wall corrugated board along scorelines 180° toward the inner linerboard, no visual surface breaks shall be observed longer than 0.50 inches on either side of the score. (Reference ASTM D4727 Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes)

Double-wall: Upon folding double-wall corrugated board along scorelines 180° towards the inner linerboard on scores parallel to the corrugation, and 90° toward the outer linerboard and then 90° toward the inner linerboard on scores perpendicular to the corrugation, no visual surface breaks shall be observed longer than 0.50 inch on either side of the score. (Reference ASTM D4727 Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes)

Triple-wall: Upon folding triple-wall corrugated board along scorelines 180° toward the inner linerboard on scores parallel to the corrugation, and 90° toward the outer linerboard on scores perpendicular to the corrugation, no visual surface breaks shall be observed longer than 0.50 inch on either side of the score.

Slit-score: A cut or series of cuts made in a corrugated sheet extending only partly through the thickness of the sheet; this score allows the bending of the corrugated board to be easier and results in an edge that is more uniformly square.

Slot: A cut made in a corrugated sheet to form flaps. Slot widths shall be between 0.25 and 0.38 inch.

Perforations: A series of cuts made in corrugated sheet extending completely through the thickness of the sheet. Perforations allow for the optional removal of sections or parts of a finished corrugated container or cur shape. Perforations are specified in the format A x B, where A is the length of the cut to be made and B is the distance between cuts.

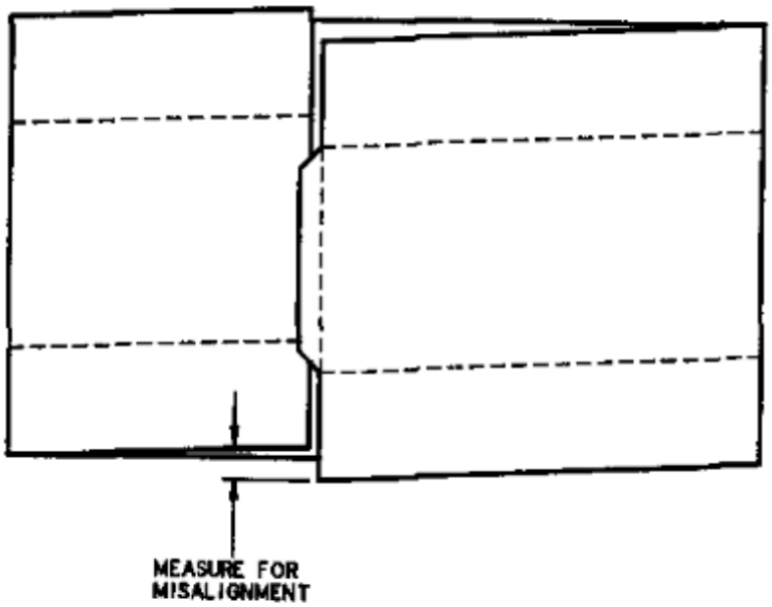
Manufacturer's Joint: A joint which holds the container together by butting the edges together, or by overlapping an extended flap at least 1.25 inches long (measured from the center of the score to the edge). The joint can be taped, glued, or stitched.

Glued Joints: This joint is formed by an extended flap which is glued to the adjacent panel. The extended flap may be specified to be inside or outside of the container. A firmly glued joint will yield the strongest joint and is indicated when mutilation of the surface fibers accompanies separation of the joined areas. A waterproof glue should be used in forming this type of joint.

Stitched or Stapled Joints: REQUIRED for 400 Mullen Burst and greater. This joint is formed by an extended flap which is stitched or stapled to the adjacent panel. The extended flap may be specified to be inside or outside of the container. The metal stitches or staples should be equally spaced not more 2.5 inches apart, and the first and last stitch or staple should not be more than 1.0 inch from the horizontal score lines. The size of the stitching wire or pre-formed staples should be at least 0.28 inch by 0.10 inch in cross section.

9.2 Folding Alignment:

The folding alignment of a flat (knocked-down) container is checked by measuring the variance between the leading and trailing edge of the container at the manufacturer's joint:



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9.4.1 Slot Width Opening at Manufacturer's Joint: The slot width at the manufacturer's joint shall be at least 0.13 inch and not more than 0.50 inch for single-wall and double-wall containers.

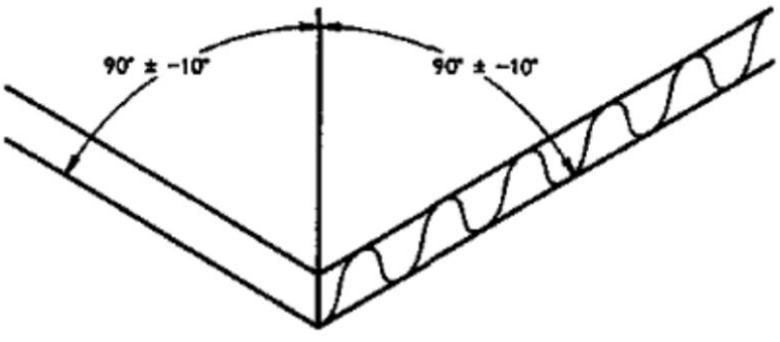
9.4.2 Slot Width Variations at Manufacturer's Joint: The slot width variation is the difference between the slot width at the top score line and slot width and the bottom score line of the manufacturer's joint. If the difference is greater than 0.25 inch for single-wall and double-wall containers, the container may be rejected.

9.5 Adhesive:

The adhesive shall be capable of adhering linerboards to the corrugated medium, and manufacturer's joints in forming containers. The linerboard and mediums of corrugated fiberboard shall remain securely and continuously adhered to their contacting surfaces. Edge separation shall not exceed 0.25 inch in depth.

9.6 Edges:

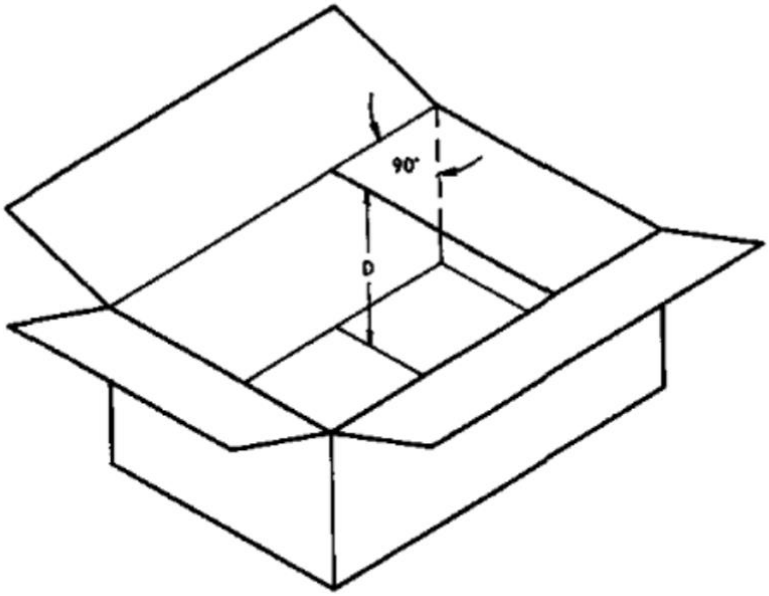
The edges of the corrugated shall be cut cleanly such that no more than 2 tears longer then 0.25 inch per foot are observed. The edge must be 90° +/- 10° to the adjacent face:



9.7 MEASURING OF CORRUGATED CONTAINERS AND CUT SHAPES

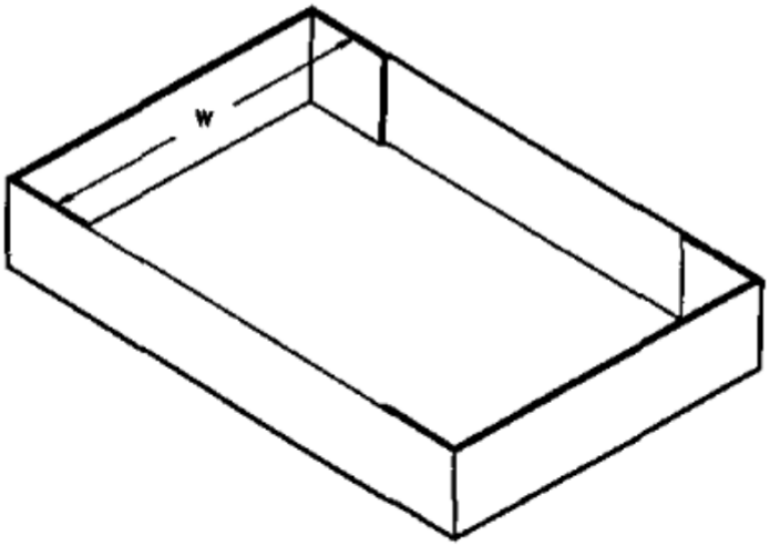
Inside Dimensions: Corrugated containers and cut shapes are specified using inside dimensions and therefore the inside dimensions should be measured correctly. Common styles shall be specified per the International Fiberboard Case Code, and by common name.

9.7.1 Regular Slotted Container (RSC), Code 0201: The container must be set-up and the inside length, width, and depth must be measured. With the flaps open, the length is the longer of the two dimensions, the width is the shorter. This measurement shall be taken from at least three different locations along the inside walls. The values shall then be averaged. The depth is always perpendicular to the length and the width dimensions. The depth is measured from the top of the inner flap on the bottom to the bottom of the inner flap at the top, with the inner flaps folded 90° to the inside container wall. This measurement shall be taken from at least three different locations along the flaps and the values averaged.



9.7.2 Half Slotted Container (HSC), Code 0200: The container must first be set-up and the inside length, width, and depth must be measured. From the open end, the length is the longer of the two dimensions, the width is the shorter. This measurement shall be taken from at least three different locations along the inside walls. The values shall then be averaged. The depth is always perpendicular to the length and the width dimensions. The depth is measured from the top of the inner flap on the bottom to the top, with the inner flap folded 90° to the inside container wall. This measurement shall be taken from at least three different locations along the flap and the values averaged.

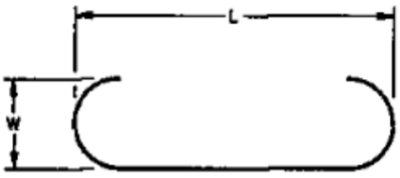
9.7.3 Container Caps and Interior Trays, Code 0911: Container caps or interior trays having tabs folded to the inside when set-up (design-style) shall be measured as follows. The length is the distance between the inside of the opposite walls not containing the corner tabs. The width is the distance between the inside of the opposite walls containing the corner tabs. This distance is to be measured from the inside of the tabs. The depth is the distance between the edge and the inside of the bottom of the cap or tray. Each distance shall be measured from at least three different locations and the values averaged.



9.7.4 Die Cut and Special Design Containers: The measurements of die cut and special design containers shall be made using the engineering specification as a guide. Each measurement should be taken from at least three different locations where practical, and the values averaged.

9.7.5 Hand Holes: Hand holes are cut out (Type P) or partially cut out (Type U) of the corrugated to help facilitate lifting of the container. Hole reinforcement is recommended for heavy load applications.

Length	Width	Type
3.50 in	1.00 in	P, U
3.50 in	1.50 in	P
4.00 in	2.00 in	P



TYPE U

TYPE P

9.8 TOLERANCES

9.8.1 Dimensional Tolerances: Dimensional tolerances are acceptable variations in the length, width, or depth of corrugated fiberboard sheet stock, cut shapes, and containers. Unless otherwise specified, the tolerance value is dependent upon the type of corrugated:
Single-wall: +/- 0.13 inch
Double-wall: +/- 0.19 inch
Triple-wall: +/- 0.25 inch

9.8.2 Burst Strength/Edge Crush and Puncture Resistance: The burst strength, edge crush strength, or puncture resistance of the corrugated fiberboard must be greater than or equal to the strength specified in the component specification.

9.8.3 Hand Holes: Hand hole tolerances are acceptable variations in the location of the hand holes and the size of the hand holes. The location tolerance for hand holes shall be +/- 0.13 inch in any direction from the specified placement. The size tolerance for hand holes shall be +/- 0.13 inch from any dimension.

9.9 MARKING REQUIREMENTS

9.9.1 All packaging components are required to be marked per 425-1228- XX, Packaged Product Marking Requirements and Graphics Standards.
9.9.2 Some of the above marking requirements for FRU boxes may be satisfied by adding the markings onto the 950-1419 Packaged Product Finished Goods Bar Code Label.

Document History

REVISON	ECO NUMBER	DESCRIPTION	DATE
50	WO 34991	Engineering Release	1/26/07
51	E0006573	Add new reference documents	9/13/11
52	E58535	Combining with 425-1016, 425-1017, 425-1018, 13010218 and 1094000-02.	12/16/22
53	E60688	Added Conductive Corrugated Fiberboard Material Requirements in section 9.2. Adjusted Mullen/ECT equivalent numbers in section 9.3.	8/3/23

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