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8. APPENDIX

8.1. TYPES OF FLUTING

The "Flute" refers to the wave shaped cardboard reinforcement that make up the board's core. This is the board's corrugation.
Flutes come in several sizes, known as flute profiles. The standard profiles range from A-flute (the largest) to F-flute and below (microflutes).

A-flute = 33 flutes/linear foot (1/4" thick)
B-flute = 47 flutes/linear foot (1/8" thick)
C-flute = 39 flutes/linear foot (11/64" thick)
E-flute = 90 flutes/linear foot (1/16" thick)
F-flute = 128 flutes/linear foot (1/32" thick)

Generally, larger flutes provide greater strength and cushioning, while smaller flutes have better printability and foldability.
Flute profiles can be mixed and matched within the same piece of combined board, to manipulate printability, compression strengths, cushioning strengths and the total thickness of the board. For instance, CE double wall gets its durability from its C-flute layer, while the E-flute gives it a smoother printing surface.

8.1.1. A-Flute

A-Flute, the original flute, is the highest flute size, and therefore, when combined with an inner and outer facing, is the thickest. With 36 flutes to the foot, A-Flute makes the most of corrugate cushioning and stacking properties for fragile and delicate items. Because A-Flute offers excellent stiffness qualities and short column crush resistance, it has application across a broad range of customer uses. Its structure is 36 Flutes / Foot, or approximately ¼" thick.

8.1.2. B-Flute

B-Flute, the second flute size adopted by the corrugated industry, has lower arch heights than A-Flute and more flutes per foot (50). This means that the medium contacts and supports the liners at a greater number of points, providing a stiff, flat surface for high quality printing and die cutting and with excellent crush resistant properties. B-Flute is also preferred for high speed, automatic packing lines and for pads, dividers, partitions and other forms of inner packing. Complex die cuts and beverage trays are excellent applications for B-Flute as are can cases, wrap-around blanks, glass-to-glass packs and slip sheets. B-Flute is generally combined with light weight liners but can be used with heavier facings if the need arises.

- 49 Flutes / Foot
- good puncture resistance
- less space consumed in warehouse
- uses: canned goods, displays

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8.1.3. C-Flute

C-Flute came along next to split the difference between A and B Flutes. With 42 flutes per foot, it's thinner than A-flute, thicker than B, and offers good cushioning, stacking and printing properties. C-Flute is by far the most widely used flute size. An estimated 80% of today's corrugated containers are made of C-Flute board.

- 41 Flutes / Foot
- good stacking strength
- good crushing resistance
- very common
- uses: glass, furniture, dairy

8.1.4. E-Flute

E-Flute has the greatest number of flutes per foot at 94 which gives it the greatest crush resistance and the flattest surface for high quality printing applications. The thin board profile of E-Flute (it is one-fourth the thickness of C-Flute) reduces box size and saves storage space. Because of its thin profile and excellent cushioning properties, E-Flute can often substitute for conventional folding cartons or solid fiber containers. Examples of E-Flute applications include boxes for cosmetics, fragile glass and ceramic items and delicate instruments. Another growing end-use is for pizza boxes where the retailer wants a cost effective container with good graphics and excellent product protection.

- 95 Flutes / Foot
- light weight
- strong alternative to paper board
- superior printing surface
- excellent for custom die cut boxes
- uses: displays, point of purchase boxes

8.1.5. F-Flute

F-Flute, the newest flute, is just a little more than half the thickness of E-Flute and is the newest growth segment in the corrugated industry. The idea behind the new flute, originally developed in Europe, is to make packages with lower fibre content.
With F-Flute, converters can reduce the total amount of fibre in the packaging, thereby creating a more rigid box with less solid waste going into landfills. In Europe, F-Flute is being used for specialty packaging, point-of-purchase displays, jewelry and cosmetic packages and shoe boxes. In the U.S., the McDonald's Big Mac clamshell in F-Flute has received great attention. Dairy Queen, too, is using the F-Flute clamshell for its "Ultimate sandwich" and its hot dogs.

- 128 Flutes / Foot
- 1/32"

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8.2. TYPES OF CORRUGATED MATERIALS

8.2.1. Single Face Sheet

A corrugated medium with a linerboard facing adhered to one side. It can be manufactured in sheets or rolls. Single face is principally used as a wrapping material, and occasionally for interior packing or padding.

8.2.2. Single Wall Corrugated

A corrugated medium with a linerboard facing adhered to both sides. It is also referred to as “Double Face”. This popular and versitile 3-ply construction is converted into a wide variety of containers and packaging components. This type is the most popular, and offers a wide range of strengths.

8.2.3. Double Wall Corrugated

Two corrugated mediums (B & C Flutes) with a linerboard facing adhered between them and to both sides. This 5-ply construction is most applicable for packing heavy items where high rigidity and protection is required. It offers extra padding and strength, which is suitable for stacking heavy items.

8.2.4. Triple Wall Corrugated

Three corrugated mediums and four linerboard facings (2 layers of C-Flute and one layer of B-Flute). This 7-ply construction is used where large container sizes are involved, such as pallet packs. It is very strong, crush resistant, and is excellent for storage and transit.

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8.3. CORRUGATE OUTSIDE LINERS

To vary the look of your corrugated box, you have the following choices in outside liner grades:

8.3.1. Kraft

Naturally brown in color. The most commonly used and least expensive liner.

8.3.2. #3 White

Mottled white, with underlying kraft showing through. Provides a cleaner look and better printability than kraft.

8.3.3. #1 White

Bleached bright white. Offers very good printability, but easily soils during transit.

8.3.4. Premium Grades

Surfaces have a bright white clay coating, minimizing porosity so printing inks sit up on the surface. Gives excellent printability as colors are more vibrant and lower absorbency improves registration. However, because of the high hold-out, ink rub can be a problem.

8.3.5. Litho

Printed labels (for labels laminated onto corrugated boxes).

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8.4. Conversion Charts

Minimum Bursting Test, Singlewall, Doublewall (lbs. per sq. in)	Minimum Edge Crush Test **(ECT)** (lbs. per in. width)	Minimum Combined Weight of Facings, Including Center Facing(s) of Doublewall	Maximum Weight of Box and Contents (lbs.)	Maximum Outside Dimensions, Length, Width, and Depth Added (inches)
SINGLEWALL				
125	23	52	20	40
150	26	66	35	50
175	29	75	50	60
200	32	84	65	75
250	40	111	80	85
275	44	138	95	95
350	55	180	120	105
DOUBLEWALL				
200	42	92	80	85
275	48	110	100	95
350	51	126	120	105
400	61	180	140	110
500	71	222	160	115
600	82	270	180	120
E FLUTE				
150	26	66	35	50
200	32	84	50	60
F FLUTE				
150	26	66	35	50
200	32	84	50	60

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9. WEPACKIT SPECIFICATIONS

9.1. RSC SPECIFICATIONS AND GUIDELINES

The following section outlines General Construction Guide Lines to be respected on RSC/HSC used on WePackit Inc. automation system. It is understood that it is very difficult to adhere to these specifications. The objective is to come as close to it as possible. The important factor is consistency, which directly affects equipment set-up.

9.2. GENERAL CONSTRUCTION GUIDELINES

- The RSC/HSC shall be constructed without delamination or rough cut
- The case shall meet the manufacturer ECT/Burst Strength and shall be at least 29 ECT (175 Mullen)
- All panel scores shall be well pronounce, allowing easy folding without misdirection of crease path
- Slots must me clean of debris
- Tapered slots (1/4 in) are ideal
- The case's 'hand' shall match the system's 'hand': i.e. 'Right hand' case can only run on a 'Right hand' case erector

9.3. RSC/HSC TYPICAL TOLERANCES

The following section outlines typical RSC/HSC tolerances to be respected on RSC/HSC used on WePackit Inc. Automation System.
These allowances shall be respected between RSC/HSC run successively to assure repetitively of the systems without adjustments.
Deep or Shallow slots are unacceptable because they will create problems when folding the flaps. Therefore the slots must be within +/- 1/16" (1.2mm) of the flap length.
The width dimension of the major flaps shall be:

AT LEAST:* Dimension = ("Minor Flap Length" / 2) – 1/2 in

IDEALLY:** Dimension = ("Minor Flap Length" / 2) – 1/4 in

AT MOST:*** Dimension = ("Minor Flap Length" / 2) – 1/16 in

* A flap **shorter** then this dimension will most likely create a gap when the joining of the flap is done by the case erector or top closer/taper.
** More critical on 720 series where side belt pressure is used to drive the case through the erector
*** A flap longer then this dimension will most likely create an overlap when the joining of the flap is done by the case erector or top closer/taper. This would create an unstable box and an uneven taping/gluing of the RSC/HSC
Figure 2.1

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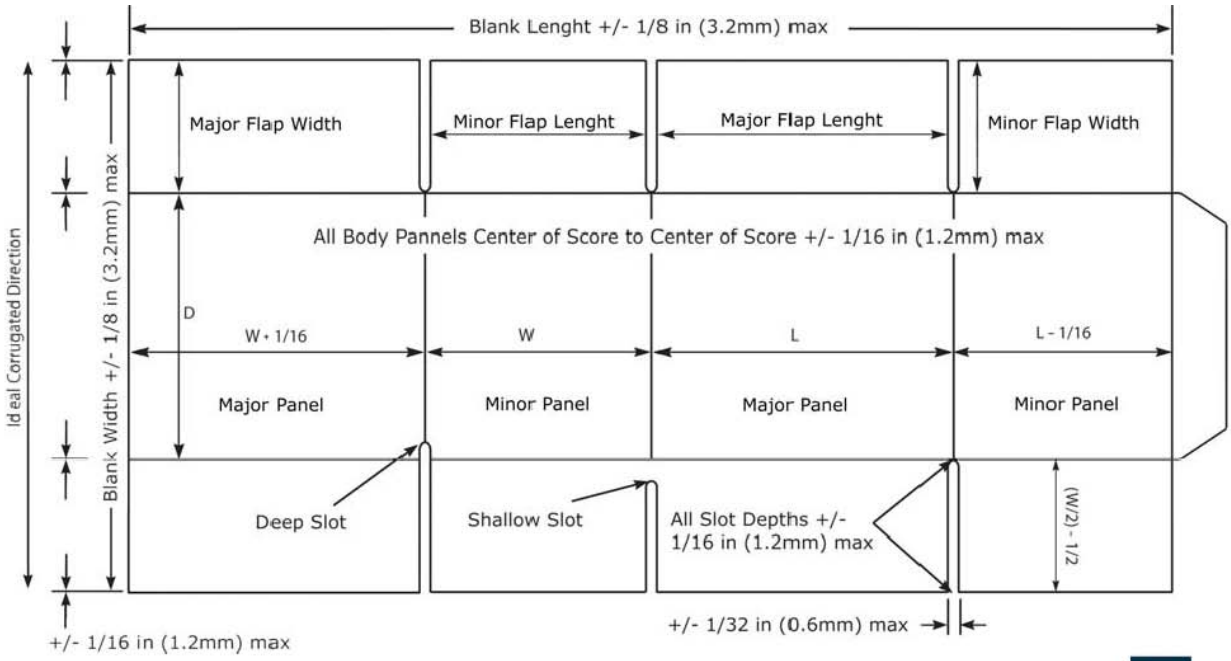
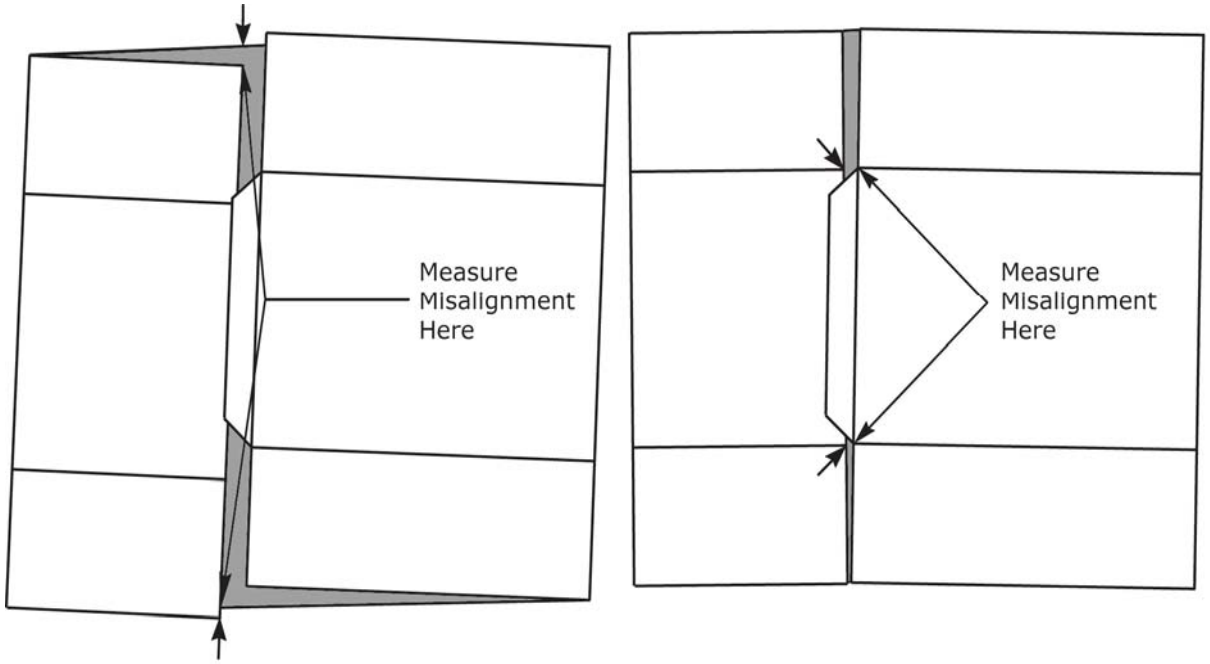


9.4. RSC/HSC OUT-OF-SQUARE AND FISHTAILING ("V" JOINT)

The following section outlines Out-of-Square and Fishtailing ("V" Joint) manufacturing defects. These defects can create serious problems when erecting, sealing and closing RSC/HSCs. Therefore the maximum allowance difference between the two (2) measurements shall be **1/8" (3.2mm)**.



Out-Of-Square Fishtailing

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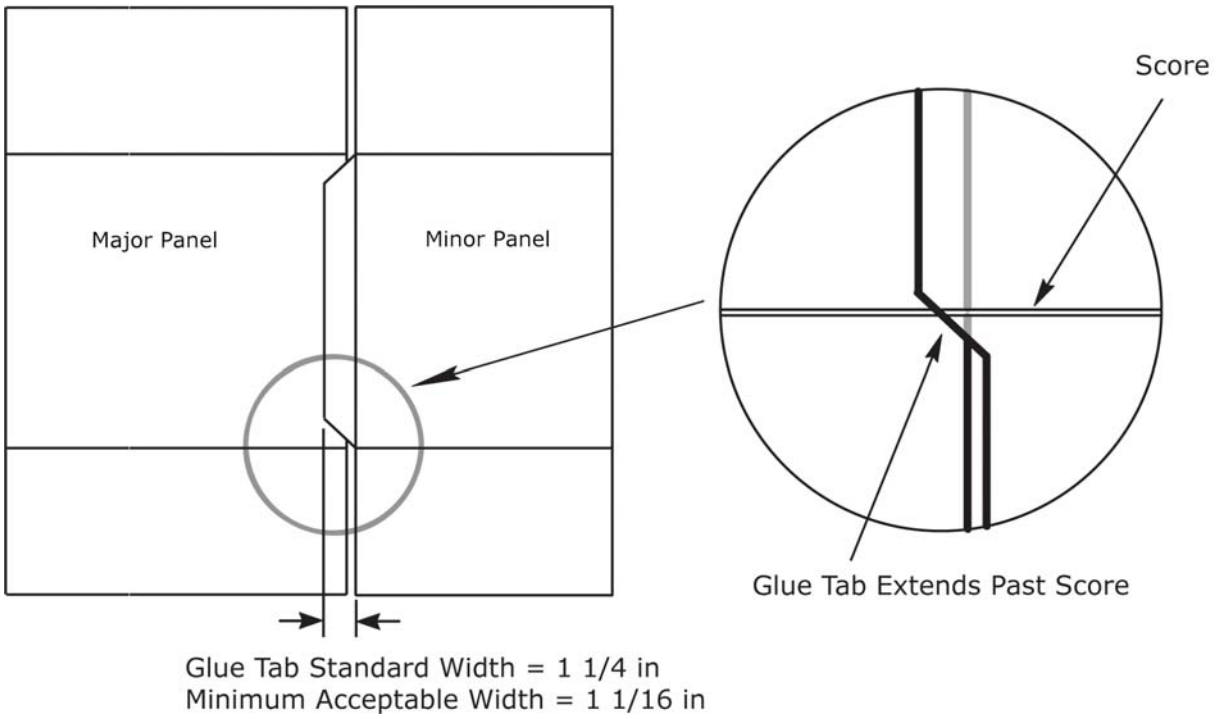
9.5. GLUE TAB SPECIFICATION AND TOLERANCES

The following section outlines Glue Tab Specification and Tolerances to be respected on RSC/HSC used on WePackit Inc. Automation System.

9.5.1. Positioning, Length and Width of Glue Tab

The Glue tab shall be ideally placed on the inside of the case and shall extend from the minor panel and be glued to the minor panel* 2) The glue tab shall be at least 1 1/16in in width. 3) Glue tabs extending more than 1/16in (1.2 mm) beyond horizontal male scores or that hinder proper flap folding are unacceptable. The condition causes out-of-square cases.



* More critical on 720 series where side belt pressure is used to drive the case through the erector it is recommended that the manufacturer's seam is configured such that the minor flap is glued to the major flap (as per sketch above). This is because out of spec cases will have variances down the length of the case, and not across the width. This is most critical for the 720E where the side belts are positioned for a specific case width, and variations across the width may affect performance.

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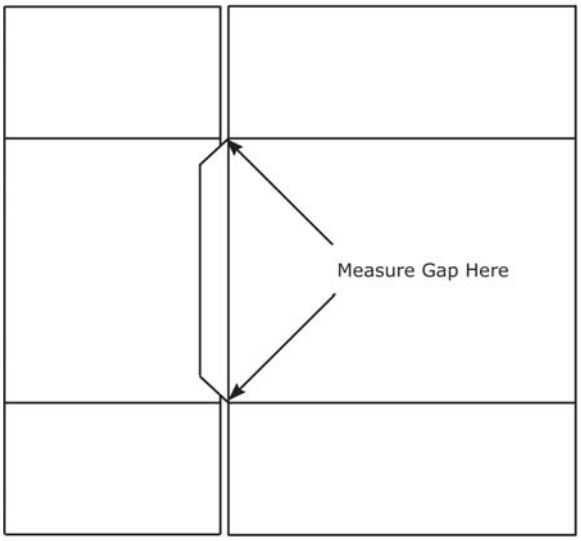
9.5.2. Gap Tolerances and Overlap

The glue tab gap shall conform to the following guidelines. Non-conformance can create problems when erecting, sealing and closing RSC/HSCs.

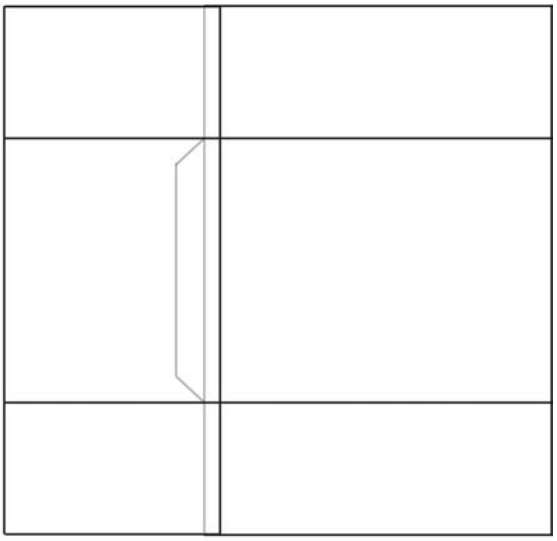
	B-Flute	C-Flute
Minimun	1/16 in	1/16 in
Ideal	3/16 in	7/32 in
Maximum	5/16 in	3/8 in

Any amount of overlap is unacceptable:

Inside View



Outside View - RSC Flatten Down



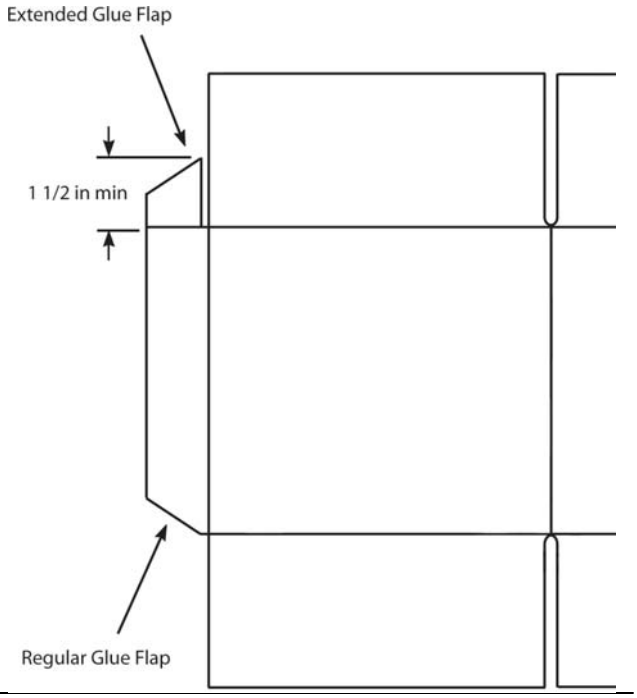
End pannel overlap
the side panel

9.5.3. Regular and Extended Glue Tab

Extended glue tab are required when packing products with square corners. A regular glue tab will most likely create interference with this type of product when
the case packing system places the container into the RSC/HSC.

Note: In order for a glue tab to be called extended, it must extend at least 1 ½ in from the score.

The best configuration has the manufacturer's seam on the outside of the case. This eliminates the possibility of product getting caught on the manufacturer's seam during loading.



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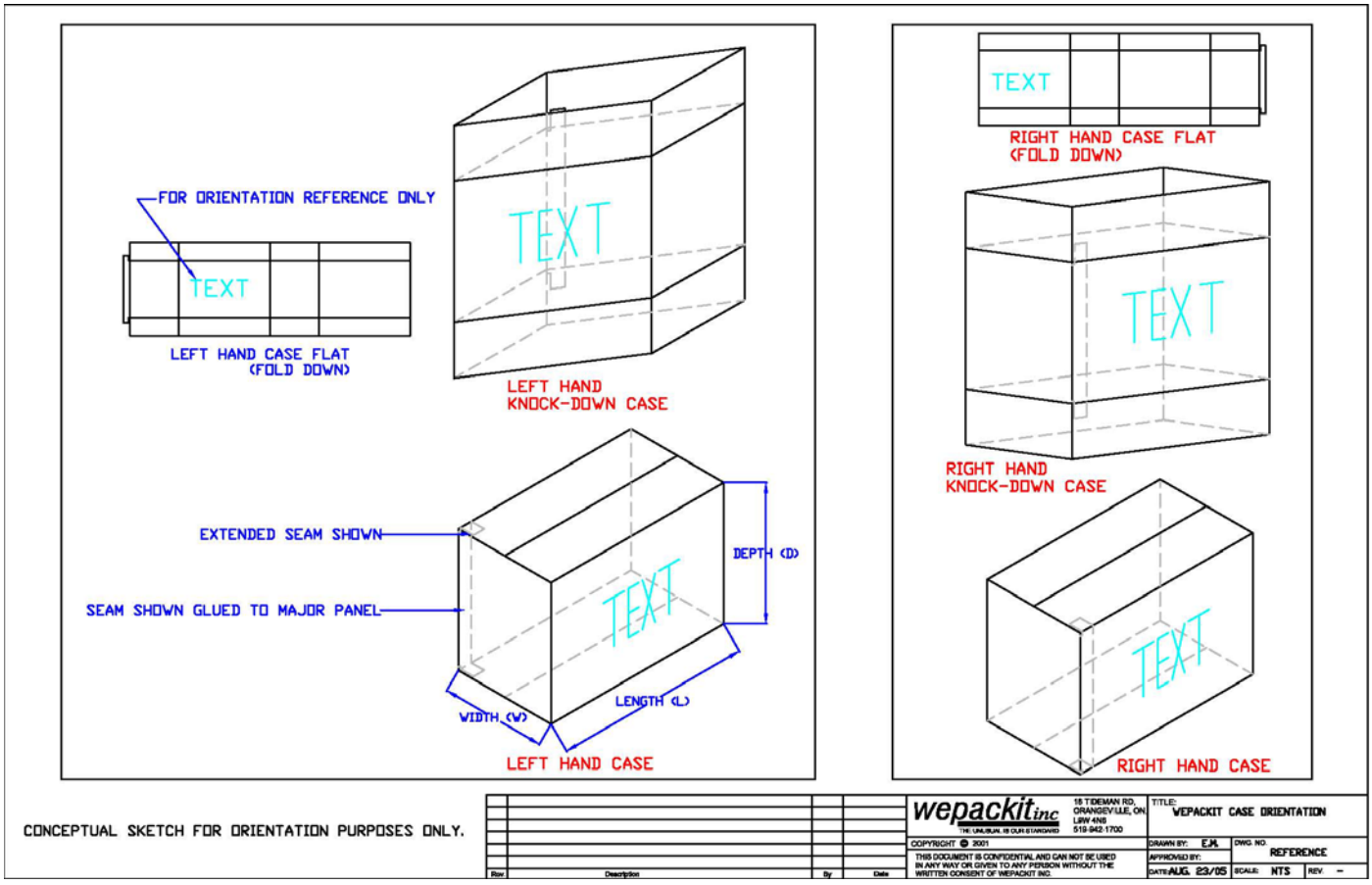
9.5.4. Case Handing Diagram

This sketch illustrates the difference between Left Hand and Right Hand cases. This is important because LH cases can only run on LH erectors, and vice-versa.



9.5.5. V-Cut Specifications

V-Cut Specification for 375ml Bottles

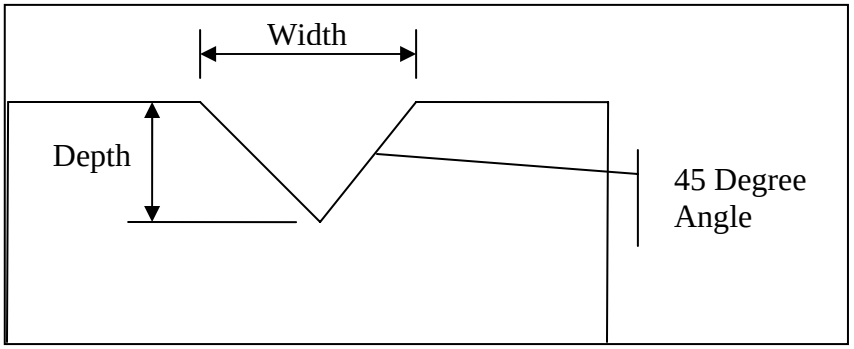
- 1.5” wide x ¾” deep min.

V-Cut Specification for 750ml Bottles

- 2” wide x 1” deep min.

V-Cut Specification for 1.5L Bottles

- 2.5” wide x 1.25” deep min.



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10. GLOSSARY OF TERMS

Below is a list of terms as they pertain to WePackit equipment. Many of these terms are used universally, but some are specific to WePackit.

AFM - All Flaps Meet

Bundle - A shipping unit of two or more cases wrapped and fastened together by suitable means.

Bursting Strength - Measurement of the resistance of a material to bursting expressed in pounds per square inch. The test is made on a Mullen tester.

Carton - Container usually constructed of chipboard/fiberboard material

Case - Container constructed of fluted corrugate material.

Certificate, Box Makers - A statement printed on a corrugated fibreboard box or a solid fibreboard box testifying that all applicable construction requirements have been observed.

Chipboard - A paperboard generally made from recycled paper stock. Applications include: partitions within boxes, backing sheets for padded paper, sample boards and the center ply or plies of solid fiberboard.

Depth - Height of the case (does not include any flaps)

Die Cut - A cut made with special steel rule dies. The act of making a part of container which is cut and scored to shape by such tools. Also used to denote aboard which has been die-cut.

FAT - Factory Acceptance Test. Used as a pre-ship verification, to allow the customer to confirm that their equipment meets all requirements outlined in the Quote and P.O.

Fibreboard - As used in our industry, a general term applied to fabricated paperboard utilized in container manufacture.

Flaps - The closing members of a fibreboard box.

Flute Direction - The normal direction is parallel to the depth of the box. Side stacked boxes may have their fluting reversed, but this may pose a problem during case erecting.

Flute or Corrugation - One of the wave shapes in the inner portion of combined corrugated fibreboard.

FOL – Full Overlap Slotted Container. A box made with all flaps the same length (box width). The outer Flaps will come within in one inch of a complete overlap when closed. This box style is very resistant to rough handling. If the box is stacked on its bottom panel the overlapping flaps provides super cushioning. Extra stacking strength is realized when the box is stacked on its side.

HSC - Half Slotted Container. A box made in a similar format to the RSC, but there are no top flaps.

IFM - Inner Flaps Meet

IPF - One Piece Folder

Knocked Down (KD) - A case that has not yet been erected.

Kraft - A word meaning strength applied to pulp, paper, or paperboard produced from wood fibers by the sulfate process.

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Left Hand Packer - Packer that picks from the product conveyor into the box, moving it from right to left (while looking downstream). As a result, the product conveyor is on the right side of the machine and the case conveyor is on the left.

Left Side - On the left side, while looking downstream.

Length - Long dimension of the case

Liner - A creased fibreboard sheet inserted in a container and covering all side walls.

Major Flap - The longest of the closing members of a case. Can be a top or bottom major flap.

Manufacturers Joint - The pre-glued joint on a knocked down case. Sometimes called a lug.

Minor Flap: The shortest of the closing members of a case. Can be a top or bottom minor flap.

Operator Side - While looking downstream, the side where the operator controls are located.

Pad - A corrugated or solid fibreboard sheet or other authorized material used for extra protection or for separating tiers or layers of articles when packed for shipment.

Panel - A “face” or “side” of a box. Major Panels have larger surface area than their corresponding Minor Panels. Flaps are not considered part of a panel.

Partitions - A set of corrugated or solid fibreboard pieces slotted so they interlock when assembled to form a number of cells into which articles may be placed for shipment.

POL - Partial Overlap Slotted Container

Product - Item that is being placed into the case. Can be a can, bag, carton, roll, etc.

Right Hand Packer - Packer that picks from the product conveyor into the box, moving it from left to right (while looking downstream). As a result, the product conveyor is on the left side of the machine and the case conveyor is on the right.

Right Side - On the right side, while looking downstream

RSC - A regular slotted case run on a printer/slotter with top and bottom, side, or end flaps

Score - An impression or creased in corrugated or solid fibreboard to locate and facilitate folding.

Slit - A cut made in a fibreboard sheet without removal of material.

Slit-Score - A cut made in a fibreboard sheet extending through only a portion of the thickness.

Slot - A cut made in a fibreboard sheet, usually to form flaps and thus permit folding.

Tab-Loc - an RSC with it's major and minor flaps attached with a tab and folded down on the outside of the erected case

Tray - A corrugated container formed from a flat blank with sides and ends folded up and glued or stapled

Width - Short dimension of the case