

GED Integrated Solutions, Inc. 31100 Diamond Parkway Glenwillow, Ohio 44139	Document No: ES-0008	Revision Level: R	DATE: 07/19/23
Subject: <i>Intercept™ Spacer Frame Finished Quality Specifications</i>			
Written By: M. Gardner		Approved By: B. Briesse	
Revision History:	Release No.:	Changed By:	Date:
R Correct SureLock dimensions	05972	John Laskowski	07/19/23
Q Added SureLock	05692	Roger Eberwein	01/20/22
P #8-32 Scrivet, Diameter #1 .133" was .123"		Roger Eberwein	09/08/20
O Removed "Intercept Reference Drawings – Punched" chart	05157	Roger Eberwein	04/23/19
N Edit method of making test spacer, Update references with the Vitro Intercept Quality Manual	04977	Ken Collier	03/01/18
M Add OptiClose Fastener Hole Specification	04761	Bill Briesse	10/28/15
L Upd. Corner + Tab Dimensions	04738	Bill Briesse	08/11/15
K Add Corner + Specifications	04674	Bill Briesse	01/20/15
J Update hole punch dimensions for Gen I, II and i3.	04625	TAG	05/08/14
I Update splay & bow specification	04365	Bill Briesse	08/18/10
H Rmv tolerances on Punch Detail #3 on page 4 & 5; added swage crease, corner folding ULTRA data & crimping information on pages 7, 8 & 11	04293	Roger Eberwein	05/13/09

Intercept® Spacer Frame Finished Quality Specifications



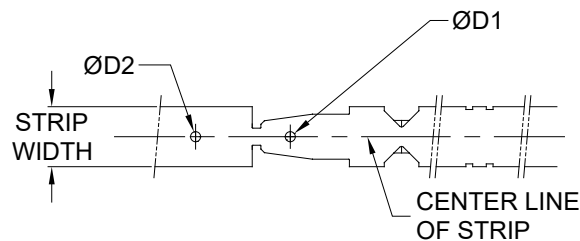
Contents

INTERCEPT® SPACER FRAME FINISHED QUALITY SPECIFICATIONS	2
Punches & Punch Depths	4
Intercept Reference Drawings - Punched	5
Standard Profile with Standard Tab (Ref. GED Drawing # 1-12121)	5
Standard Profile with Corner + Tab (Ref. GED Drawing # 1-30496)	6
Standard Profile with SureLock (Ref. GED Drawing # 1-40505)	7
Low Profile with Standard Tab (Ref. GED Drawing # 1-12125)	9
Finished Spacer Dimensions	10
Overall Dimensions	10
Formed Spacer Width	11
Splay	11
Assembled Spacer Size (in box form)	11
Tab Swage & Fold	12
Cut-off Location	13
Corners	13
Corner Flare	13
Measuring	13
Over Bending Corners	15
Twisting Corners	15
Corner Protrusions	15
Corner gap	15
Back Bending	16
Web Impression/Punch Pressure	16
Bow, Twist, and Finish	17
Making the Test Spacers	17
Checking for Side Bow	18
Checking for Upward/Downward Bow	18
Checking for Twist and Finish	19
Additional References:	19
Intercept® Raw Material Specifications	19
Vitro Intercept® Spacer System Quality Assurance Manual	19

Punches & Punch Depths

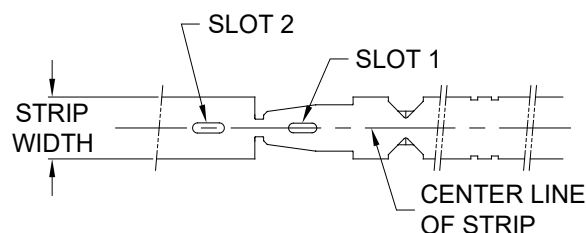
Refer to the drawings on the following pages for more details, including specific punch dimensions. In general:

- All notches and holes should be clean and burr free.
- The corner crease should be centered in the web.
- There should be no excess parting material.
- The punch dimensions should match the appropriate drawing for the spacer profile (see table on page 4).
- The size of the fastener holes should match the tables below.



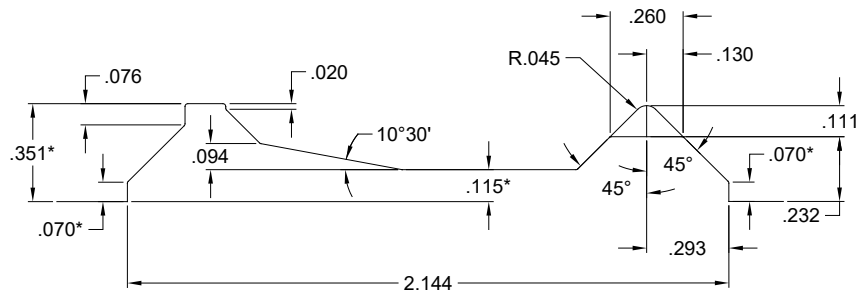
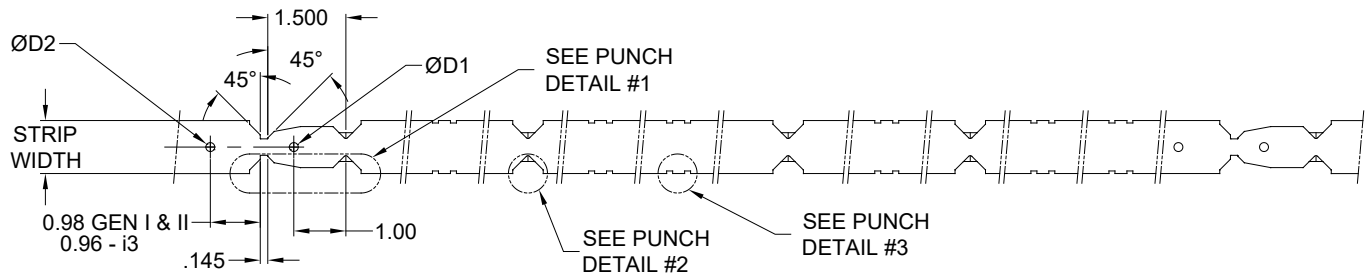
Fastener Type	Diameter #1 (D1)	Diameter #2 (D2)
3mm Rivet	0.141"	0.141"
4mm Rivet	0.171"	0.171"
#8-32 Screw	0.123"	0.171"
#8-32 Scrivet	0.133"	0.171"
#10-32 Screw	0.157"	0.188"
#10-32 Scrivet	0.157"	0.188"
¼-28 Screw	0.203"	0.250"
SureLock	0.133"	0.133"

Fastener Type	Slot 1	Slot 2
OptiClose	0.158" x 0.472"	0.167" x 0.532"

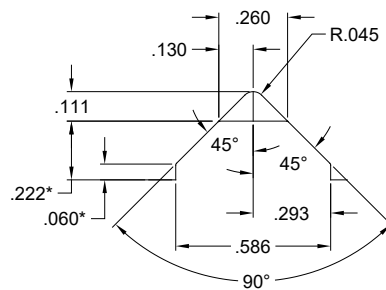


Intercept Reference Drawings - Punched

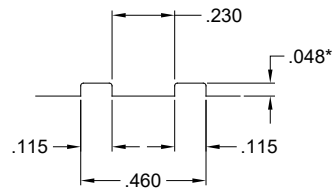
Standard Profile with Standard Tab (Ref. GED Drawing # 1-12121)



DETAIL #1



DETAIL #2

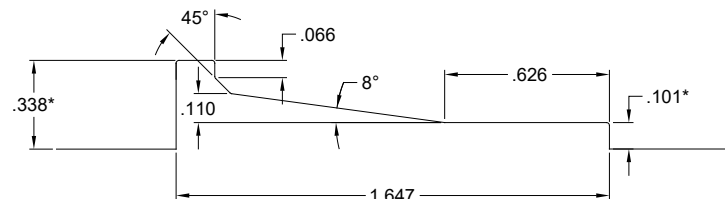
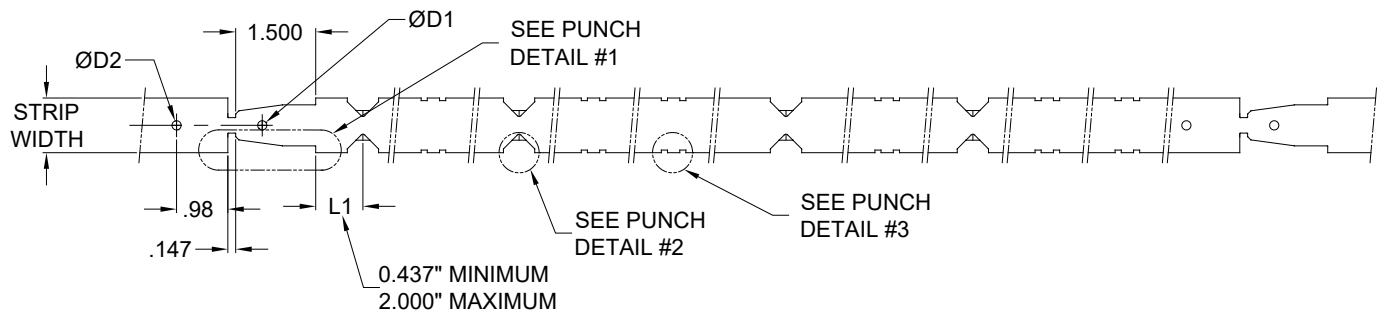


DETAIL #3

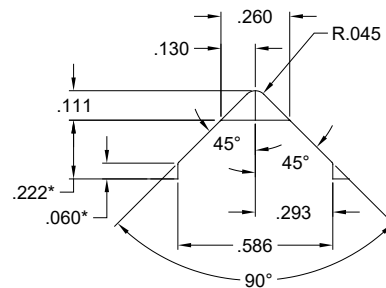
NOTE:

Theoretical dimensions are marked (*). Actual setup dimensions may vary to maintain finished spacer specification.

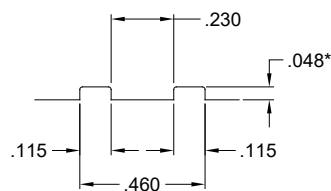
Standard Profile with Corner + Tab (Ref. GED Drawing # 1-30496)



DETAIL #1



DETAIL #2

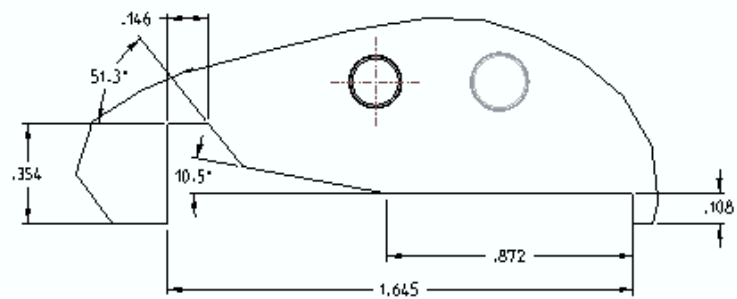
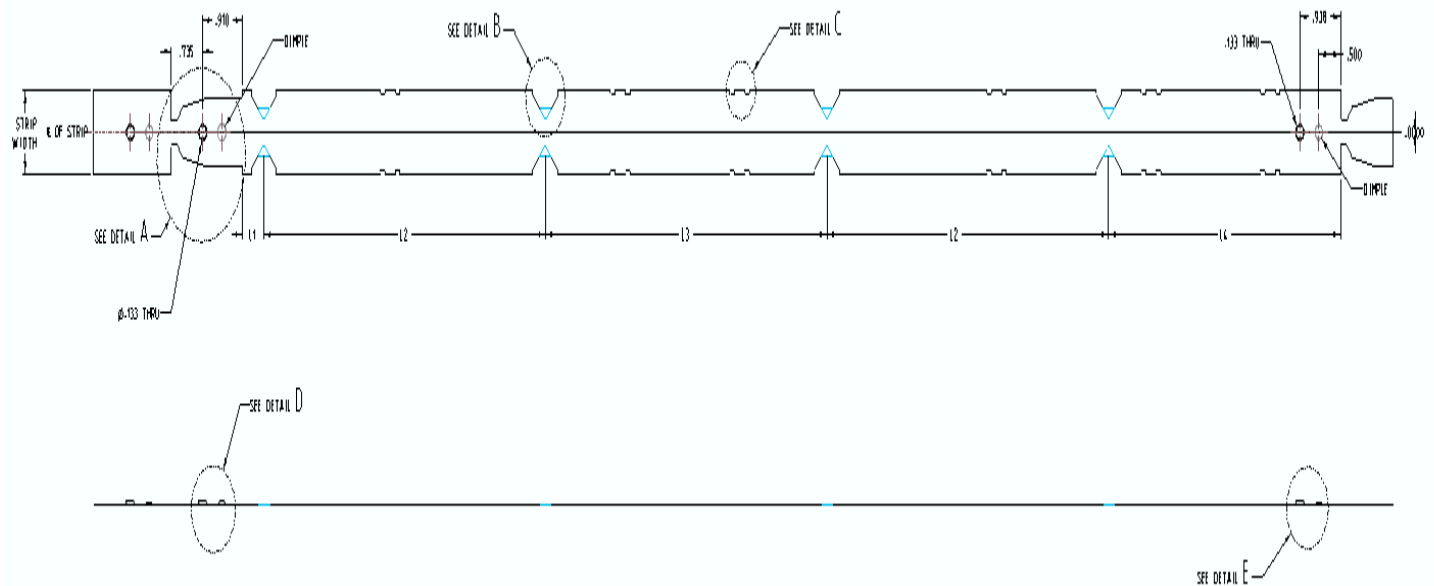


DETAIL #3

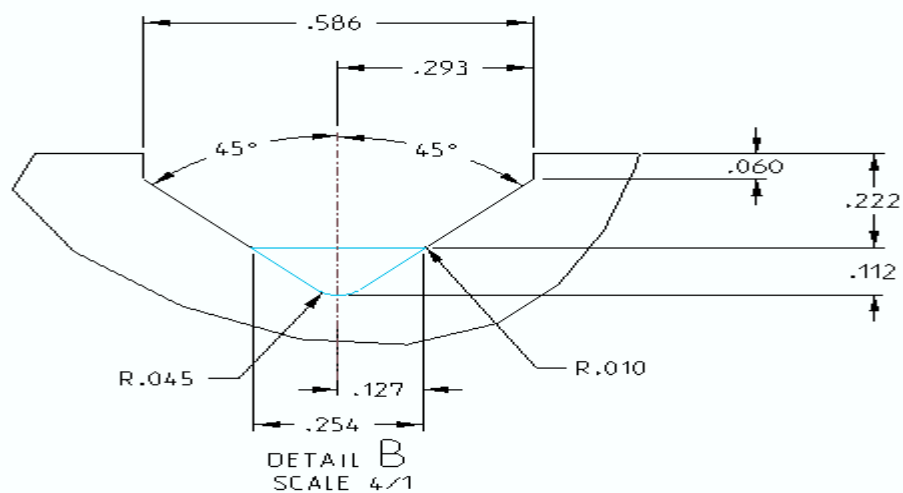
NOTE:

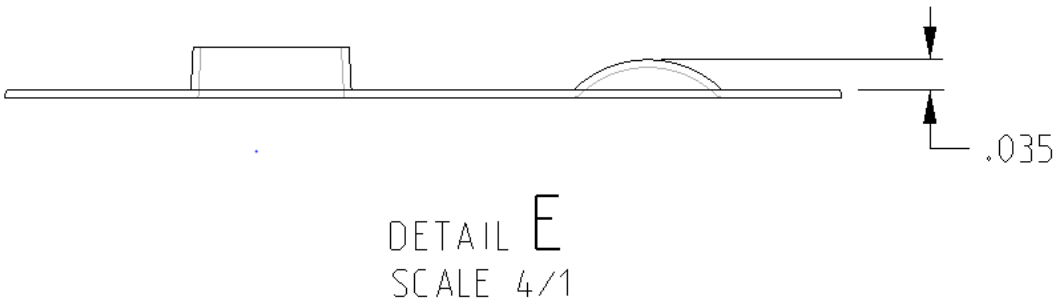
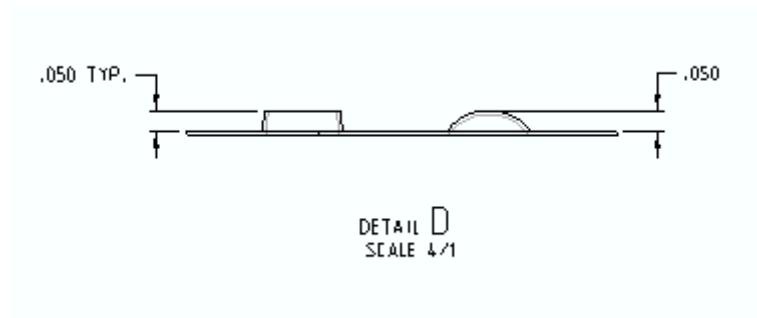
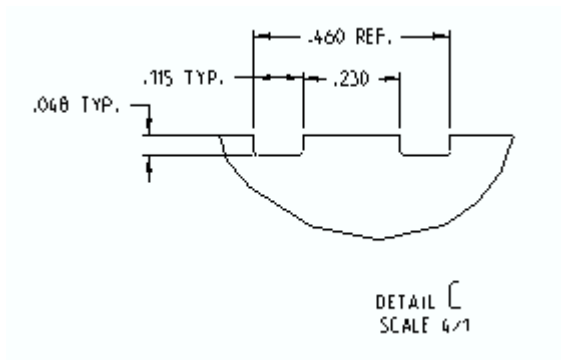
Theoretical dimensions are marked (*). Actual setup dimensions may vary to maintain finished spacer specification.

Standard Profile with SureLock (Ref. GED Drawing # 1-40505)



DETAIL A
SCALE 3/1

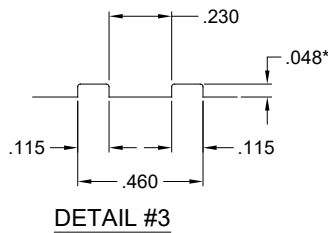
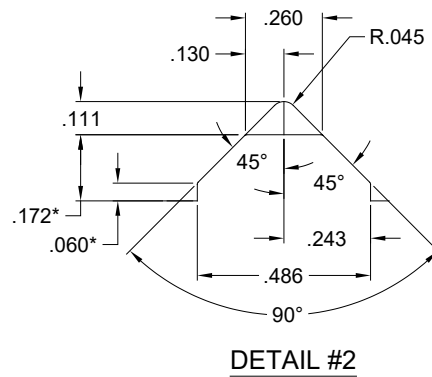
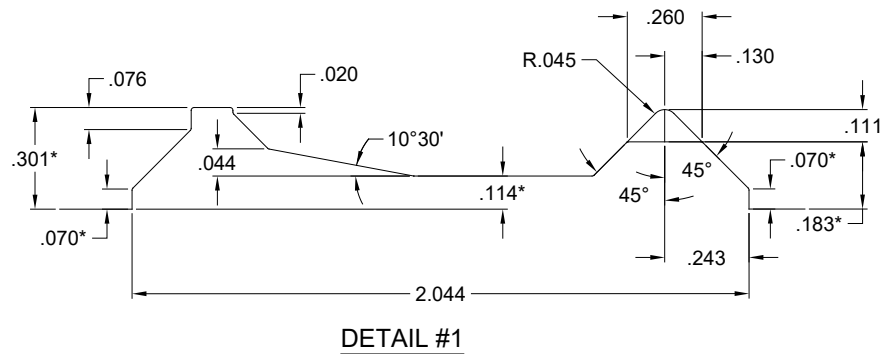
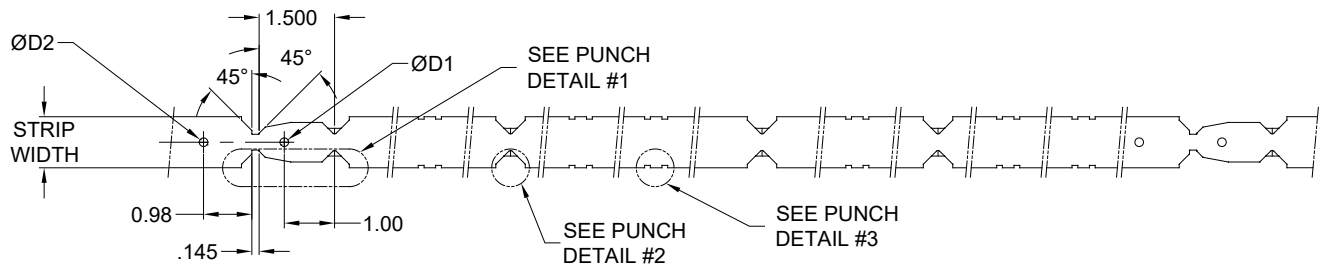




NOTE:

Theoretical dimensions are marked (*). Actual setup dimensions may vary to maintain finished spacer specification.

Low Profile with Standard Tab (Ref. GED Drawing # 1-12125)



NOTE:

Theoretical dimensions are marked (*). Actual setup dimensions may vary to maintain finished spacer specification.

Finished Spacer Dimensions

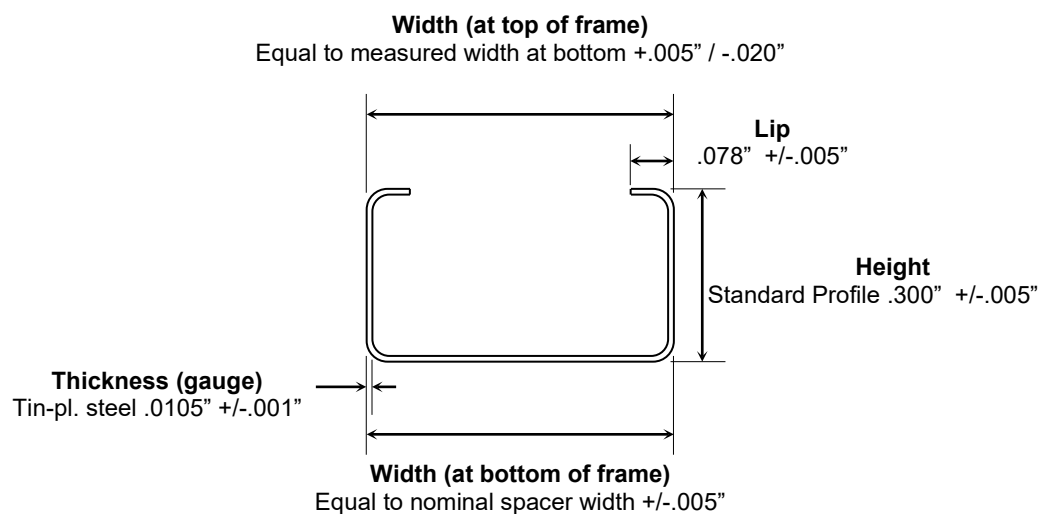
- Nominal Dimensions - Dimensions of the spacer that should be targeted when setting up the machine.
- Measured Dimensions - Actual dimensions that are measured on the roll formed spacer. Unless otherwise specified, the spacer should be folded.

Nominal Spacer Widths (inch) of Tin Plate and Stainless Steel			
Fraction	Decimal	Fraction	Decimal
7/32	.219	9/16	.562
1/4	.250	19/32	.594
9/32	.281	5/8	.625
5/16	.312	21/32	.656
11/32	.344	11/16	.687
3/8	.375	23/32	.719
13/32	.406	3/4	.750
7/16	.437	25/32	.781
15/32	.469	13/16	.812
1/2	.500	27/32	.844
17/32	.531	7/8	.875

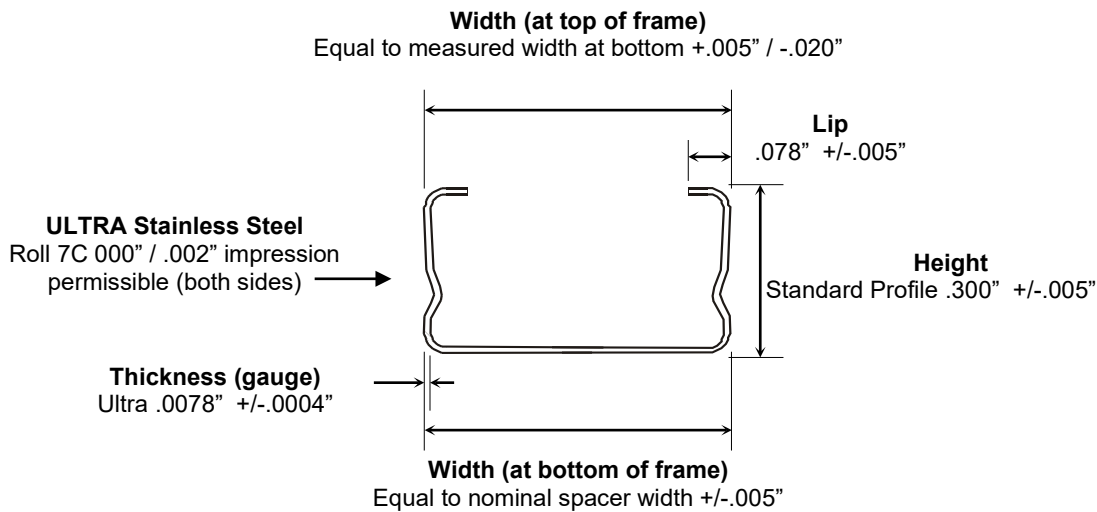
Overall Dimensions

- The measurements of the formed and folded spacer should match the dimensions on the drawing and table, within the specified tolerances.

Tin Plated Steel



ULTRA Stainless Steel & ThinPlate Steel



Item	Acceptable Spacer Dimension
Width of the outside corner of frame	The nominal spacer width $+/-0.005''$
Width of the inside corner at the lip	The nominal spacer width $+0.005''/-0.020''$ total
Width of the swaged tab	Approx. $.025''$ to $.035''$ less than the measured width

Formed Spacer Width

- Measure the width at the bottom of the frame as shown in the figure. It should equal the nominal spacer width $+/-0.005''$.

Splay

- Splay is typically regarded as the difference between the width at the bottom of the frame and the width at the top of the frame but in general it is the spread or turning of the channel legs. It should be no more than $+0.005''/-0.020''$ (as compared to the measured width at the bottom of a folded spacer). Excessive splay can adversely affect the thickness and/or the width of the seal path.
- Splay is measured on straight spacer sections at least 3" from corners, muntin notches or any other interruption in the spacer bar.

Assembled Spacer Size (in box form)

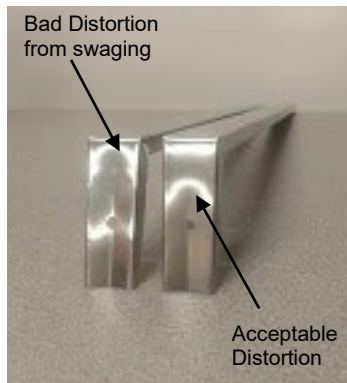
- Place the folded spacer on a flat surface and measure the outside height and width. The height and width should be within $+/-0.032''$ of the specified nominal dimensions.

Tab Swage & Fold

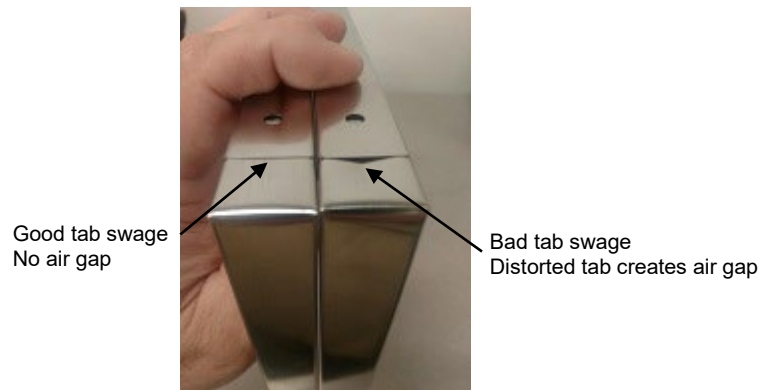
The Cutoff parts (separates) the formed spacer material into individual frames, swages the tab and creases the web on the tab.

- Swage distortion should not extend past the tab after folding (see images below).
- The tab should measure approximately .025" to .035" less than the overall spacer width, and should insert with slight friction.
- The swage allows the tab to be inserted into the last side of the spacer. Ideally, the tab should insert easily, and remain in place during handling, without flaring the sides. If the tab fit is too tight, excessive handling damage may occur to the sealant, due to the extra force required to push the tab in.
- Insufficient hold-down pressure from the Swage Die Fingers can allow force of the Swage Anvils to be applied across the back of the spacer causing it to buckle as shown below. When the fingers have adequate pressure the sides will push up and in narrowing the spacer at the tab.

Swage Distortion – Corner+ Tab

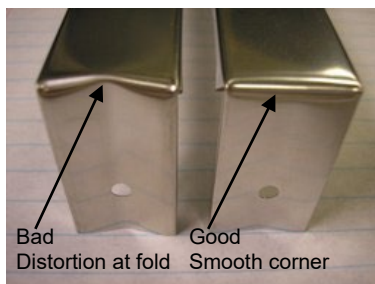


Before Tab is Inserted

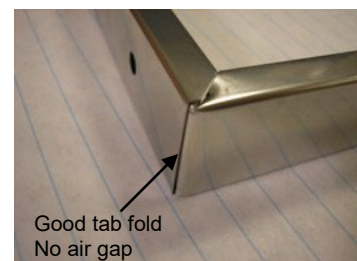
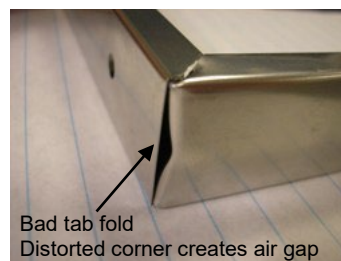


After Tab is Inserted

Swage Distortion – Standard Tab



Before Tab is Inserted

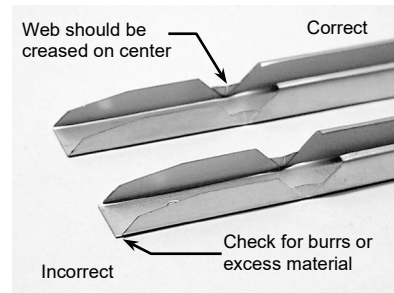


After Tab is Inserted

Cut-off Location

The Cut-Off Location or *Parting Area* is where the roll formed material is separated into individual spacer frames.

- An incorrect cut-off will leave excess material at one end of the spacer and crush the sides at the other end leaving burr or protrusions outward.
- Also on Standard Tab only, if the cut-off location is incorrect, the swage dies will not crease the web of the first corner on center. Creasing the tab in the correct location helps the web fold inward with greater ease. If the crease does not hit on the center of the web, the tab may twist or deform when folded.



A desired cut-off location will have the tab corner webs creased on center (Standard Tab only) and the ends should have minimal parting material present and no burrs.

Corners

Protrusions on bearing surfaces should not exceed $+.005"$. Such protrusions may be a result of over-bending or twisting the corners, insufficient punch depth from the edge of the material, insufficient web embossing or flaring due to roll forming. Such deformities may adversely affect the sealant thickness. If a minimum seal thickness is not achieved, premature seal failure is likely. Typically the sealant thickness between the glass and spacer in a finished IG unit is a minimum of $.015"$ to a maximum of $.025"$ in all areas.

Corner Flare

(Maximum $+.005"$ per side)

It is natural for the Corners to Flare on the spacer as the sides in these areas lack some support from the material which is cut away to make the Corner. Typically this can be minimized in the Rollforming process but can be best controlled with the Crimper Station. While the Crimper was added for Intercept Ultra Stainless Steel Spacers to influence the webs to fold inward it also added crimp pins or screws that help control Corner Flare. Corner Flare however may also be the result of over bending a corner past 90 degrees or twisting the corner by not folding the spacer perpendicular to the extruder exit conveyor.

Measuring

Measuring Corner Flare

It is necessary to measure the corners of the finished spacer at three separate locations across the fold.

Measure the corner across the fold at its inner most point, across the middle and lastly at the far outside point. Keep in mind that the dimension cannot exceed .005” per side in respect to the overall spacer width.

Measuring with Calipers



Inside of the Corner



Outside of the Corner



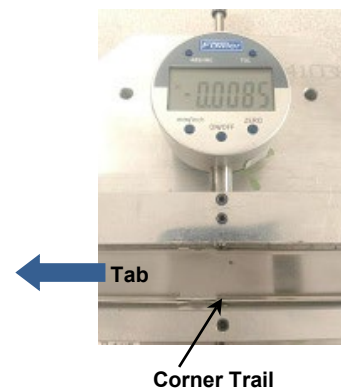
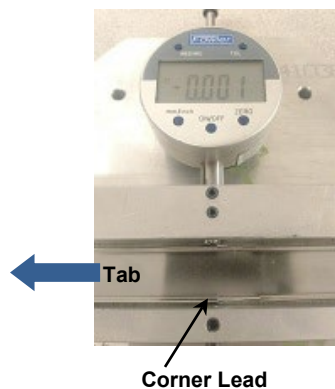
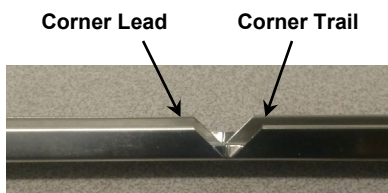
Middle of the Corner

Measuring with GED Corner Flare Gauge 3-29790



The GED Corner Flare Gauge measures the overall flare at the corner.

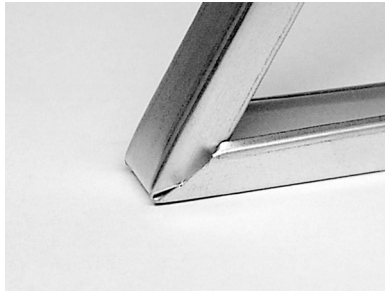
Measuring with GED Splay Gauge 3-29787



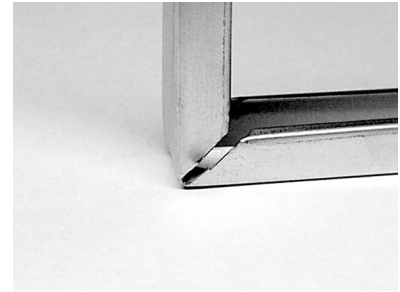
By measuring the width of the Corner Lead and Corner Trail the crimp pins in the Crimper may be adjusted so the Corner Flare in both areas is roughly the same as the measured Splay. This will help insure that the wet-out at the Corners is consistent with the wet-out on the sides of the spacer.

Over Bending Corners

- Over bending corners will cause severe flaring and deformation of the spacer.



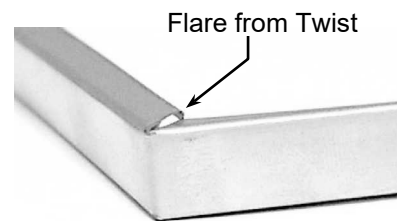
Over Bent Corner



Result of Over Bending

Twisting Corners

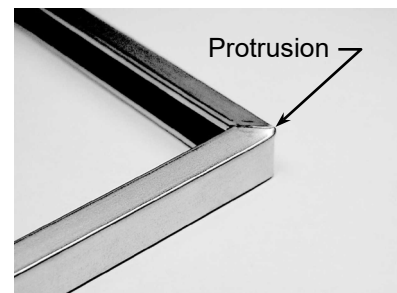
- Corner flare can also be caused from not folding spacers in a plane perpendicular to the extruder exit conveyor. This can be an issue when folding large units with one operator. Larger units may be best folded using two people.



Corner Protrusions

(Maximum +.005" per side in a folded spacer)

- Incorrect punch depth from the edge of the material will cause the corners to protrude when folded. In addition to an insufficient seal thickness, this also creates a pressure point on the corner of the glass, which can result in breakage. The punch depth should initially be set to the print requirements (maintenance function).

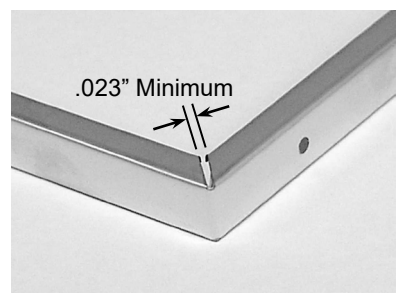


Corner Protrusion

Corner gap

(Minimum .023" in a folded spacer)

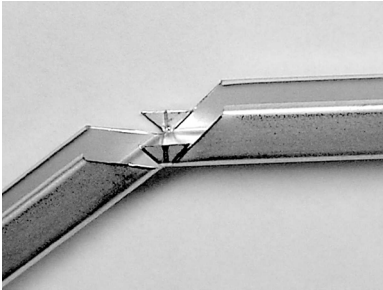
- Corner gap, like corner protrusion, is also a result of incorrect punching depth on the corner dies. If the corner dies are not punching deep enough the corner gap will be too narrow.



Corner Gap

Back Bending

- Allowing the spacer to bend backwards, “back bending” breaks the web. This shortens the seal path and results in a premature failure. Also, when folded, the broken web will overlap the side of the spacer resulting in a glass to metal condition



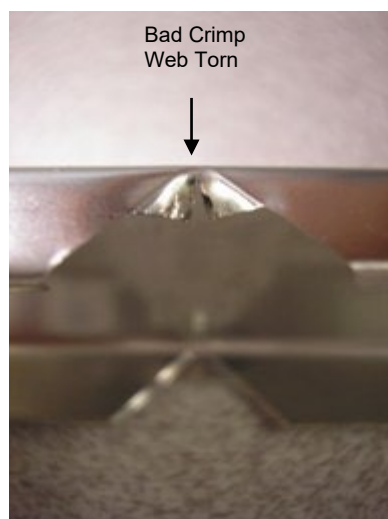
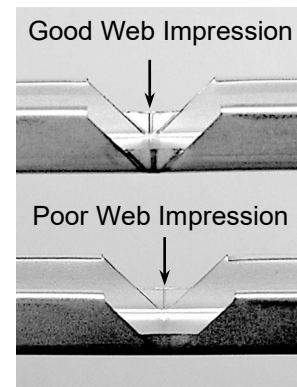
Back Bent Corner



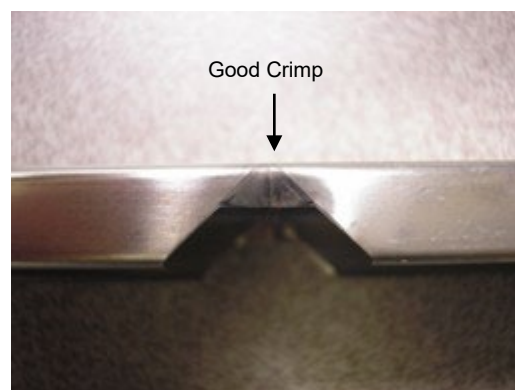
Result of Back Bending

Web Impression/Punch Pressure

- The punch pressure is, in part, a function of the height of the positive stops (maintenance function) but is also affected by air pressure. Insufficient web impression will allow the webs to fold outward instead of inward.
- If the roll former has a crimping station installed, each corner is crimped which helps the web impressions fold inward. When crimping occurs there should not be any tearing of the web impression. The crimping station should also not cause outward distortion of the adjacent spacer walls which can result in undesirable corner flare.



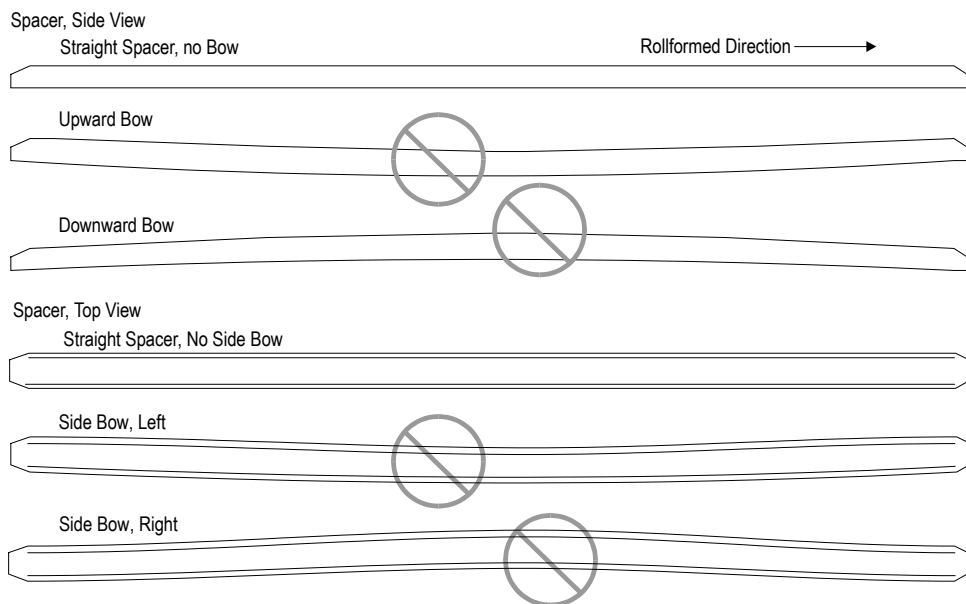
Bad Crimp
Web Torn



Good Crimp

Bow, Twist, and Finish

- Check for bow (curve) using a section of roll formed, unfolded spacer, 4' long. Use the methods described below.



Making the Test Spacers

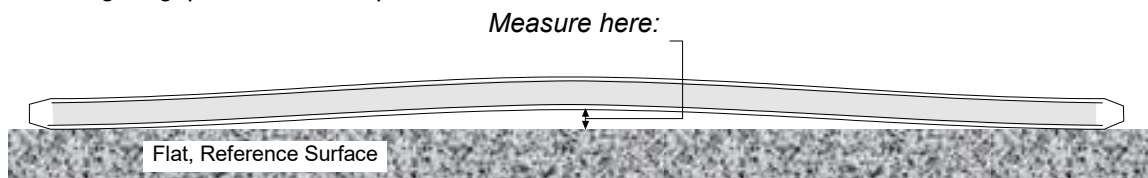
When checking the spacer for bow or twist it is important to eliminate outside influences on the spacer to determine if the spacer deformity is due to a roll forming issues or some other outside factor.

- 1) Cut a 4 foot long strip of material off the coil on the Uncoiler. This removes the Feeder Press from the equation. The dies, guide bearing or feed rolls can induce deformities.
- 2) Size the Rollformer and remove other outside influences such as:
 - a) Open the Cut-Off dies so they don't influence the spacer
 - b) Open the Conveyor guides so they don't influence the spacer
 - c) Remove the spring from the Pacer Encoder
 - d) If equipped with a Crimper, remove the High Speed Crimper or if it is the older style then remove the top and bottom rolls so the crimper does not contact the spacer.
- 3) Jog the 4 foot strip through the Rollformer watching any contact with the Encoder bracket, Cut-Off or Conveyor.
- 4) Place the spacer on a flat surface such as the top plate on the Rollformer.

Checking for Side Bow

1. Place a spacer on its side on a flat surface, so that the ends of the spacer are touching the reference surface, and any bow is lifting the center of the spacer above the surface, as in the illustration below.
2. Check for side bow by measuring the largest gap between the flat reference surface and the spacer. The total bow should not exceed .020" per foot, and no more than .064" per 4' section.

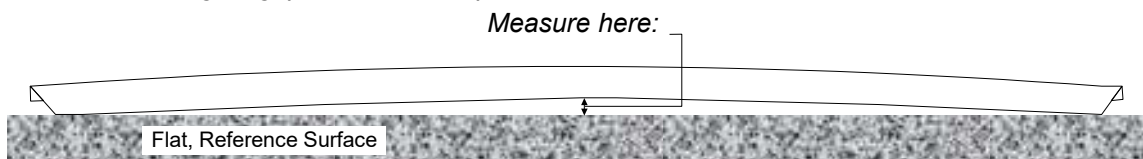
Place the spacer on its side so that both ends are touching the reference surface. Measure the largest gap between the spacer and the reference surface as seen below.



Checking for Upward/Downward Bow

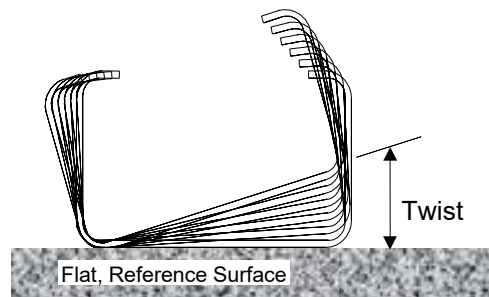
1. Check for upward/downward bow by placing the spacer on a flat reference surface, so that the ends of the spacer are touching the reference surface and the any bow is lifting the center of the spacer above the surface, as in the illustration below.
2. Measure the largest gap between the spacer and the reference surface. The total bow should not exceed .020" per foot, and no more than .093" per 4' section.

Place the spacer (top up or bottom up) so that both ends are touching the reference surface. Measure the largest gap between the spacer and the reference surface as seen below.



Checking for Twist and Finish

- Check for twist in the spacer. The spacer should not twist more than .015" per 4 foot length.
- Make sure the finish is clean and unblemished.



Additional References:

For additional information, please refer to these documents:

Intercept® Raw Material Specifications

- GED Document # ED-0019

Vitro Intercept® Spacer System Quality Assurance Manual

Page Intentionally Left Blank