Intelligent Automation

GED Integrated Solutions, Inc. 31100 Diamond Parkway Glenwillow, OH 44139	Document No: ES-0008	Revision Level: I	DATE: 08/18/10
Subject: ***Intercept® Spacer Frame Finished Quality Specifications***			
Written By: Ken Collier	Approved By: Bill Briese		

Revision History:	**Release No.:**	**Changed By:**	**Date:**
I Update splay & bow specification	04365	Bill Briese	08/18/10
H Removed 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
G Edit formatting		Ken Collier	02/01/08
F Added detailed pictures on pg. 7 showing corner measuring techniques.	03626	Tim Hall	06/03/05
E Correct tolerances for corner flare & protrusion, re-format text, update GED's address.	03111	Ken Collier	01/17/03
D Reorganized , made corrections	02628	Ken Collier	07/19/00
C Revised Side and Upward/Downward Bow measuring methods	01622	TBM	06/30/97
B Revised Bow, twist and Finish section; Min. corner gap was .030"	01469	MJG	03/03/97
A Original Release	--------	MJG	----------

Intercept™ Spacer Frame Finished Quality Specifications

GED Integrated Solutions, Inc.

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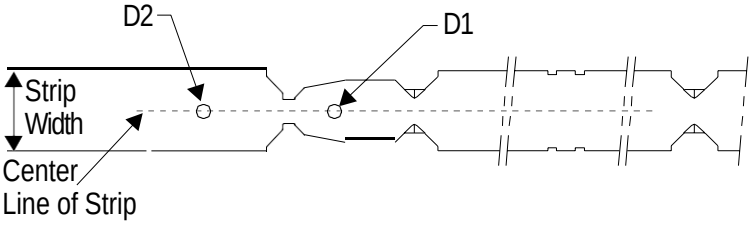
Punches & Punch Depths

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

- All punches should be clean and neat.
- The corner crease should be centered in the webs.
- There should be no excess parting material.
- The punch dimensions should match the appropriate drawing for the spacer profile (see table).
- The diameter of the fastener holes should match the table.

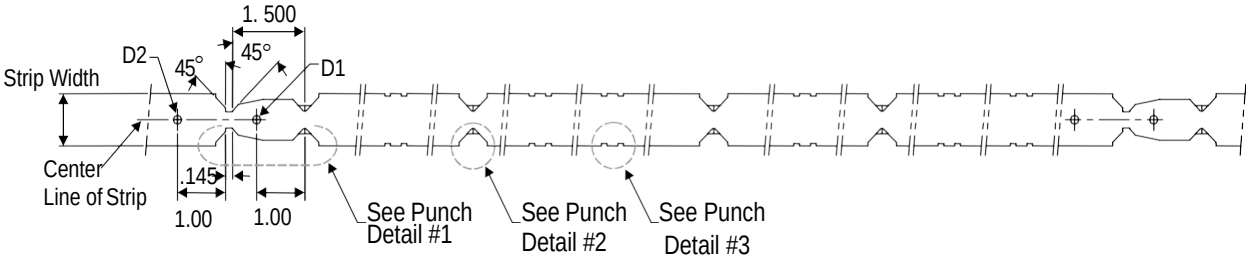


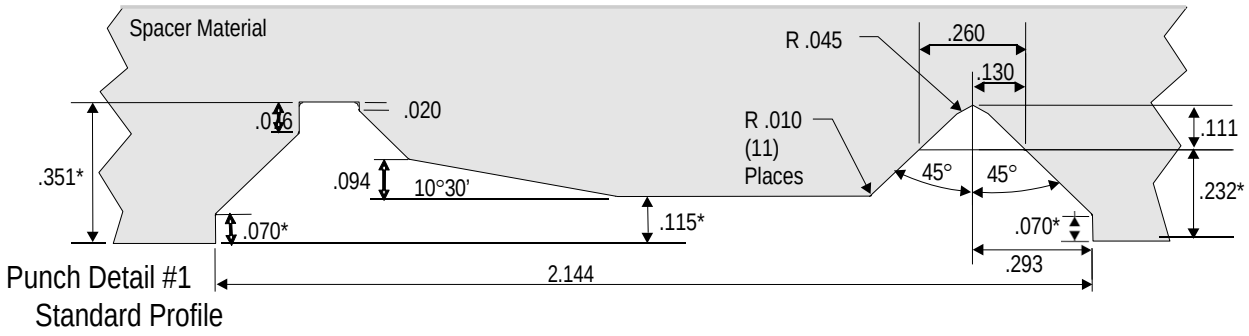
Fastener Type	Diameter #1 (D1)	Diameter #2 (D2)
3mm Rivet	.141	.141
4mm Rivet	.171	.171
# 8-32 Screw	.123	.171
# 10-32 Screw	.157	.188

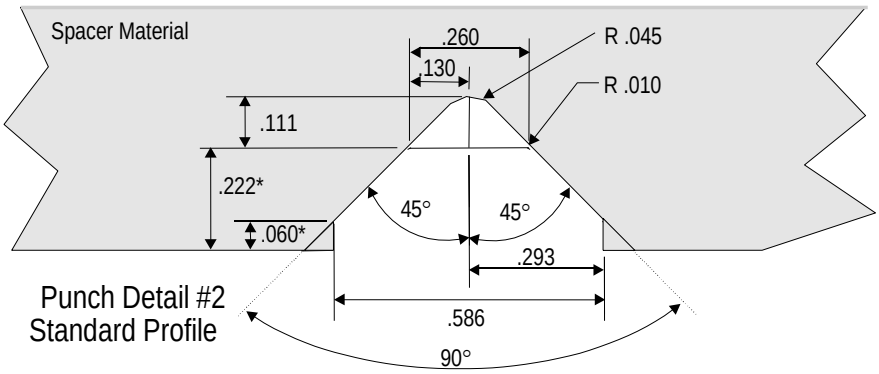
Intercept Reference Drawings - Punched Strip, Strip Width and Spacer

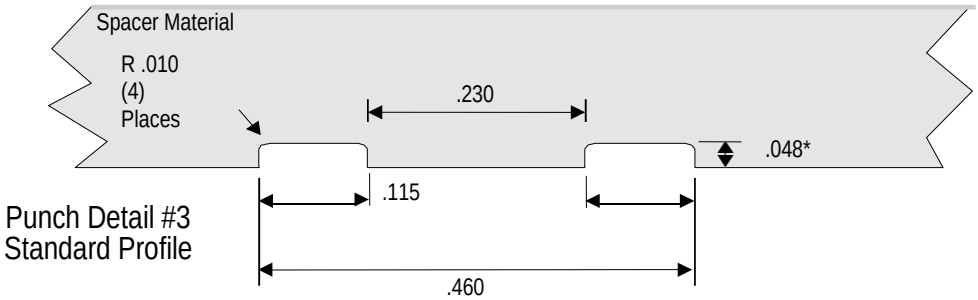
GED DWG #	TYPE	PROFILE	MATERIAL	CORNER	UNITS
1-12238	strip punched	std.	all	high	English
1-12717	strip punched	low	all	high	both
1-12121	strip punched	std.	all	std.	English
1-12125	strip punched	low	all	std.	English
1-12126	strip punched	low-low	all	std.	English
3-11968	strip widths	std.	tin	std.	English
3-11970	strip widths	std.	stainless	std.	English
3-11969	strip widths	low	tin	std.	English
3-11971	strip widths	low	stainless	std.	English
3-12062	strip widths	low-low	tin	std.	English
3-12031	strip widths	low-low	stainless	std.	English
3-11972	strip widths	std.	tin	std.	metric
3-11974	strip widths	std.	stainless	std.	metric
3-11973	strip widths	low	tin	std.	metric
3-11975	strip widths	low	stainless	std.	metric
3-11126	spacer	std.	all	std.	English
3-11349	spacer	low	all	std.	English
3-12235	spacer	low-low	all	std.	English
3-11692	spacer	std.	tin	std.	metric
3-11744	spacer	std.	stainless	std.	metric
3-11693	spacer	low	tin	std.	metric
3-11694	spacer	low	stainless	std.	metric

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



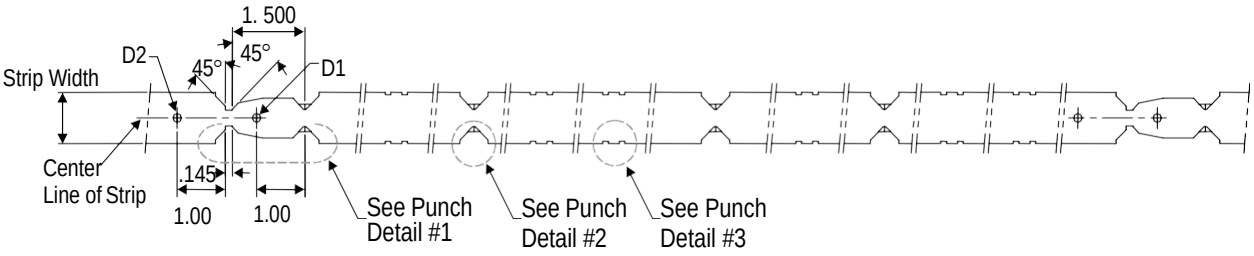


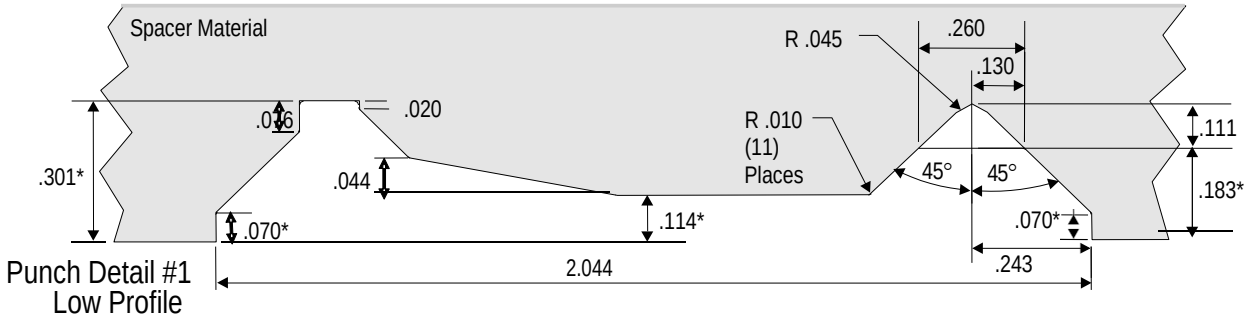


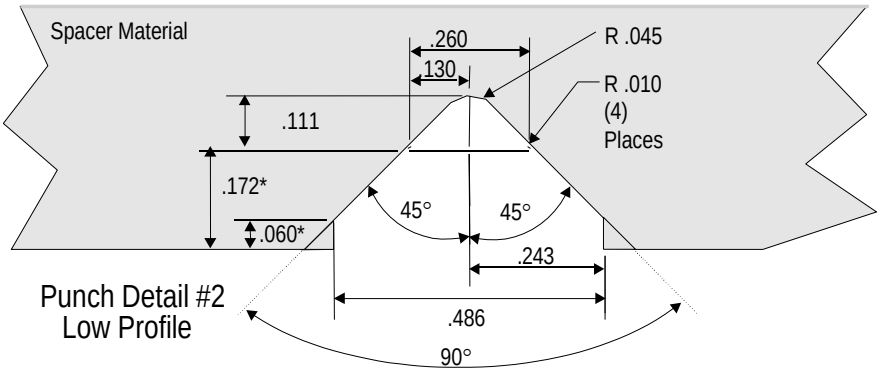


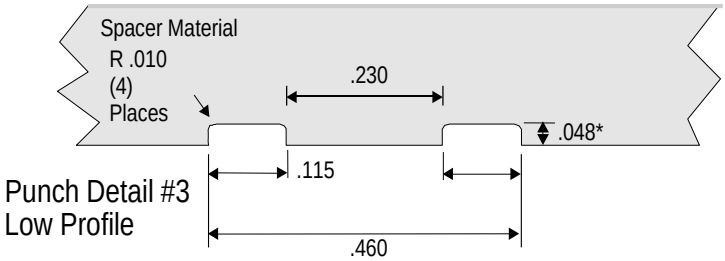
NOTE: Theoretical dimensions are marked (*). Actual setup dimensions may vary to maintain finished spacer specification.

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









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

Finished Spacer Dimensions

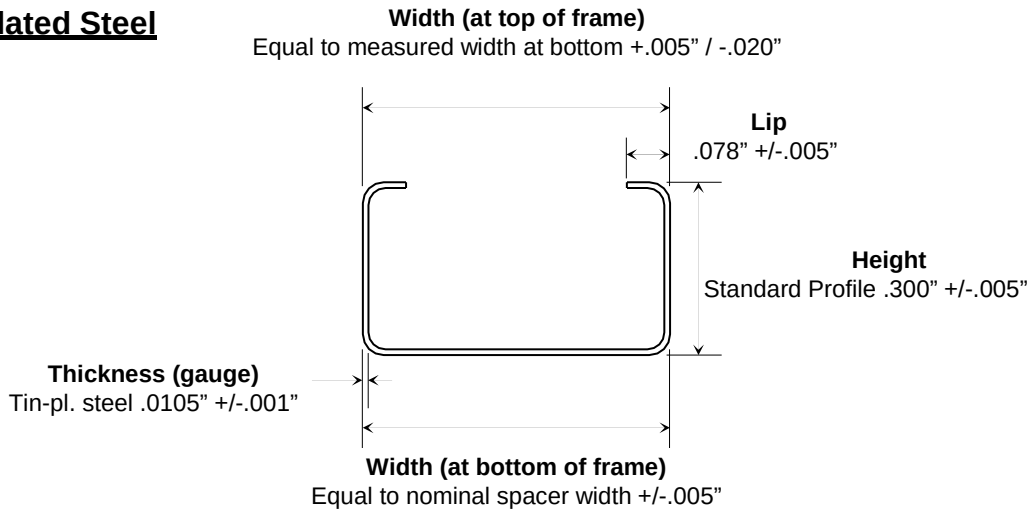
- Nominal Dimensions - Dimensions of the spacer that should be targeted when setting up the machine.
- Measured Dimensions - Actual dimensions that are measured on the roll formed spacer. Unless otherwise specified, the spacer should be folded.

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

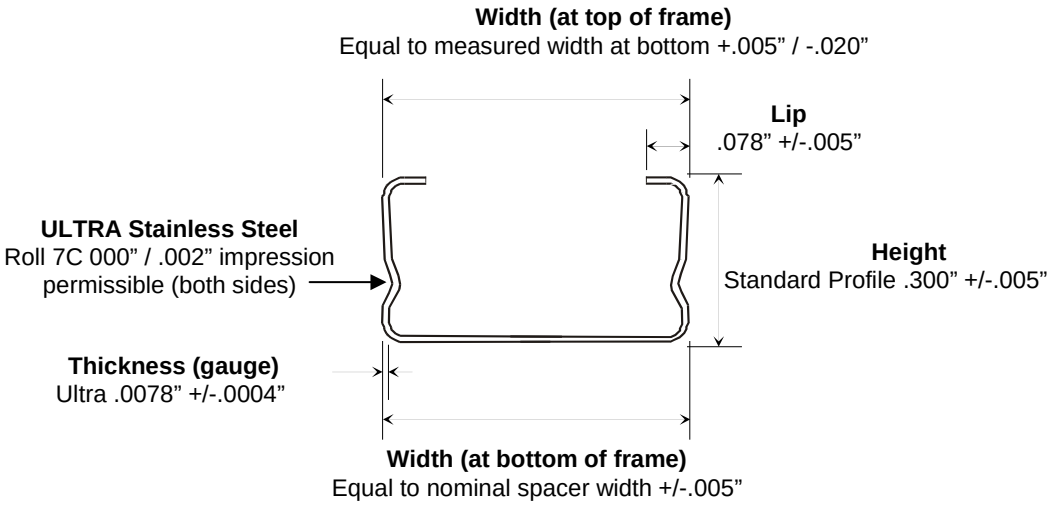
Overall Dimensions

- 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



Item	Acceptable Spacer Dimension
Width of the outside corner of frame	The nominal spacer width +/- .005”
Width of the inside corner at the lip	The nominal spacer width +.005”/-.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 +/-.005”.

Splay

- The difference between the width at the bottom of the frame and the width at the top of the frame. It should be no more than +.005"/-.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)

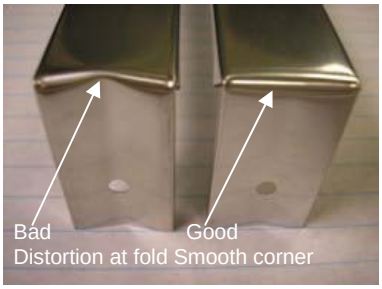
- Place the folded spacer on a flat surface and measure the outside height and width. The height and width should be within +/- .032” of the specified nominal dimensions.

Tab Swage & Fold

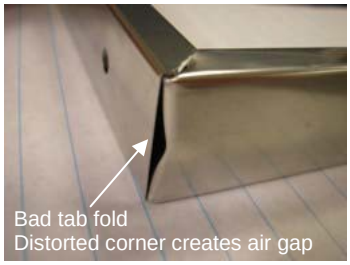
The Cutoff parts (separates) the formed spacer material into individual frames, swages the tab and creases the web on the tab.

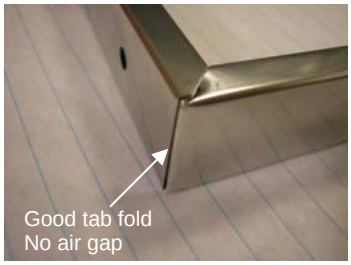
- Swage distortion should not extend past the tab after folding (see images below).
- The tab should measure approximately .025" to .035" less than the overall spacer width, and should insert with slight friction.
- The swage allows the tab to be inserted into the last side of the spacer. Ideally, the 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.

Swage Distortion



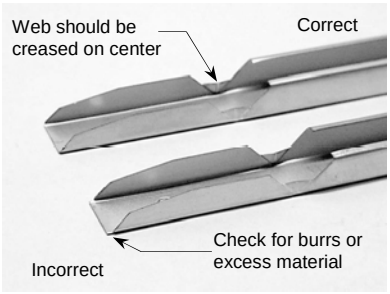
Before Tab is Inserted





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, 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 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 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)

Corner Flare may be the result of over bending a corner, twisting the corner or improper machine set-up (maintenance function).

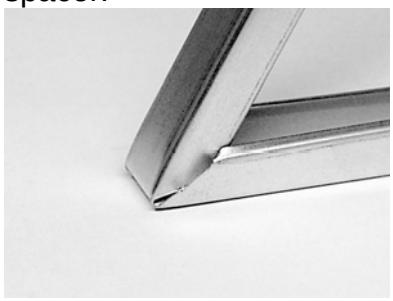
Measuring

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

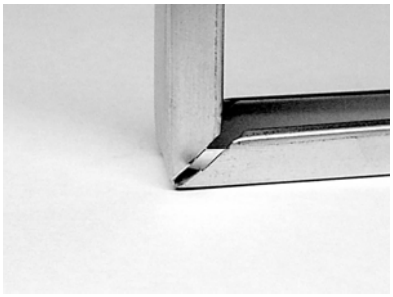
Measure the corner across the fold at its inner most point, across the middle and lastly at the far outside point. Keep in mind that the dimension cannot exceed .005" per side in respect to the overall spacer width.

Over Bending

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



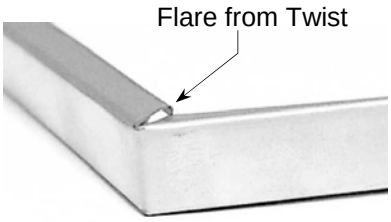
Over Bent Corner



Result of Over Bending

Corner twist

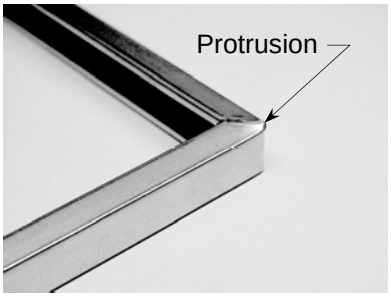
- Corner flare can also be caused from not folding spacers in a plane perpendicular to the belt.



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).

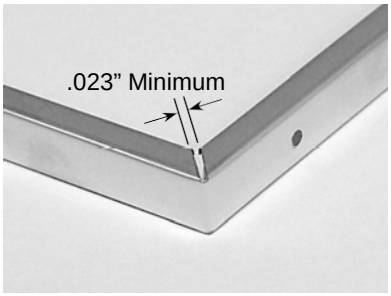


Corner Protrusion

Corner gap

(Minimum .023" in a folded spacer)

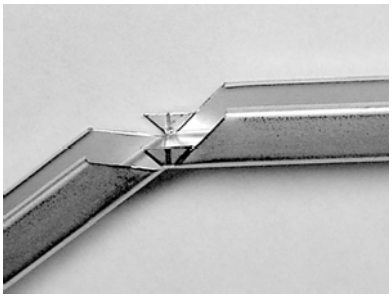
- Corner gap, like corner protrusion, is also a result of incorrect punching depth on the corner dies. If the corner dies are not punching deep enough the corner gap will be too narrow.



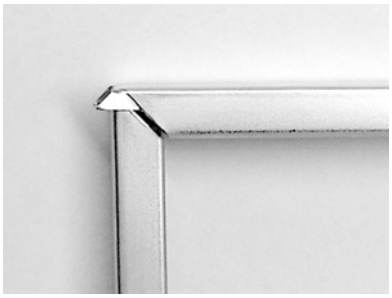
Corner Gap

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



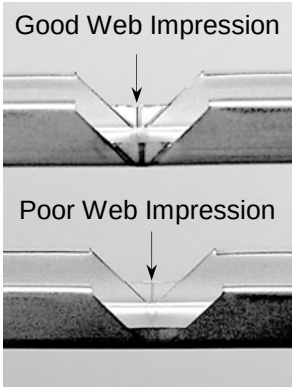
Back Bent Corner



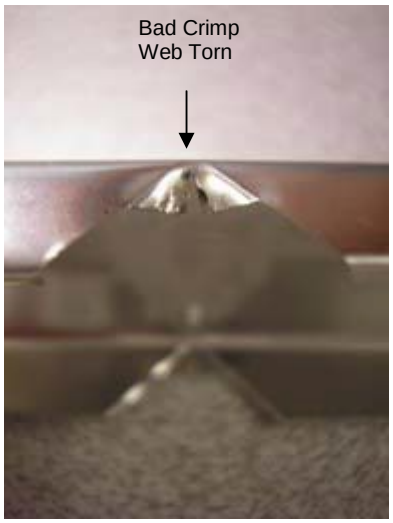
Result of Back Bending

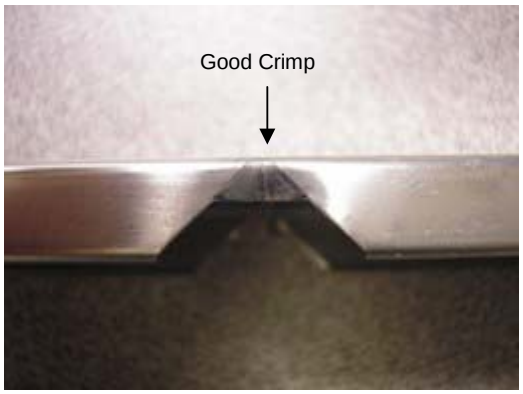
Web Impression/Punch Pressure

- 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.



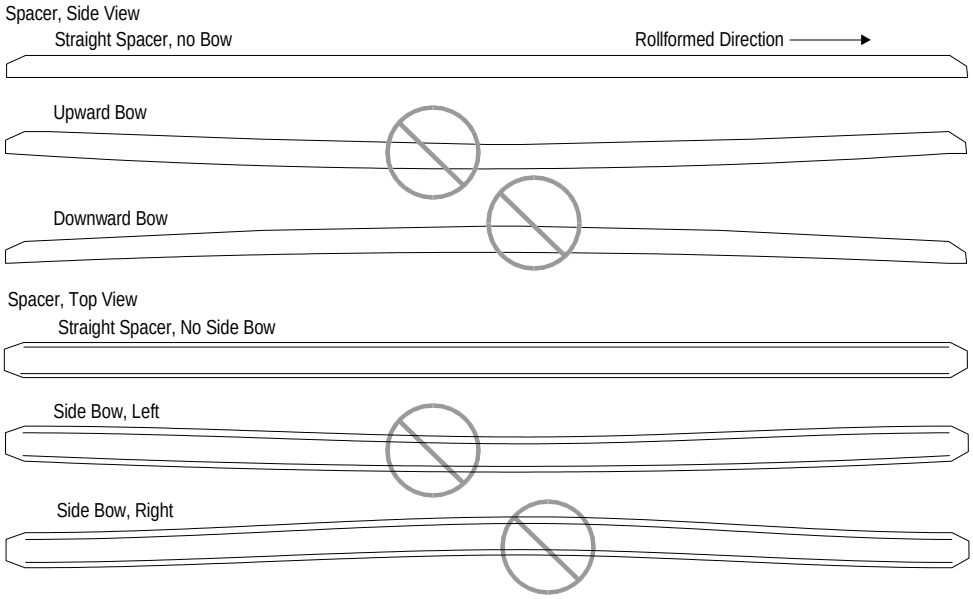
- If the roll former has a crimping station installed, each corner is crimped which helps the web impressions fold inward. When crimping occurs there should not be any tearing of the web impression. The crimping station should also not cause outward distortion of the adjacent spacer walls which can result in undesirable corner flare.





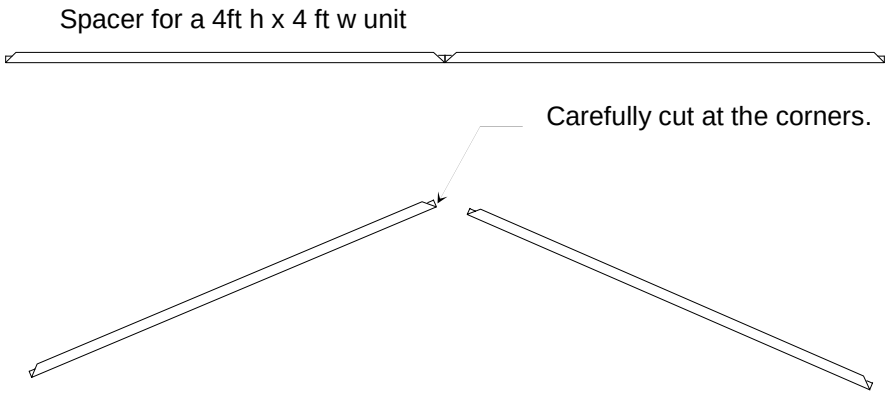
Bow, Twist, and Finish

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



Making the Test Spacers

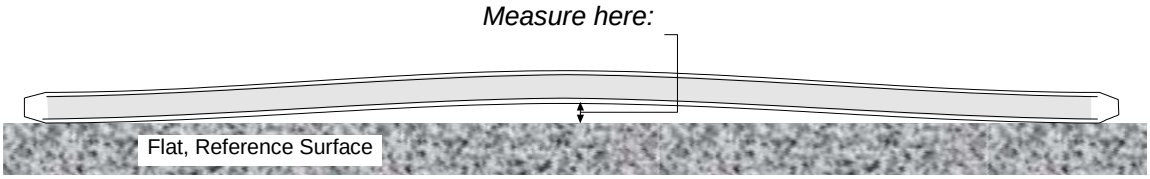
1. Make a 4’ h x 4’ w unit on the Intercept® machine.
2. Cut the spacer into 4’ segments by cutting it at each corner. Handle segments carefully, do not bend or twist them.
3. Use the 4’ segments to check for bow as described in the following sections.



Checking for Side Bow

1. Place a spacer segment on it's 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.

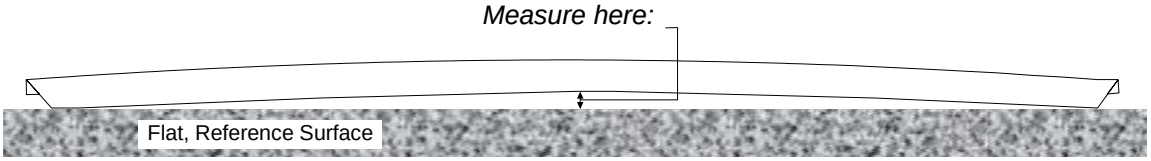
Place the spacer on its side so that both ends are touching the reference surface. Measure the largest gap between the spacer and the reference surface as seen below.



Checking for Upward/Downward Bow

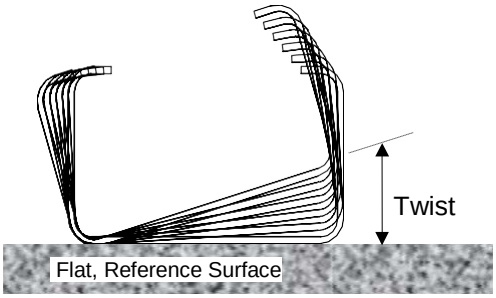
1. Check for upward/downward bow by placing the spacer on a flat reference surface, so that the ends of the spacer are touching the reference surface and the any bow is lifting the center of the spacer above the surface, as in the illustration below.
2. Measure the largest gap between the spacer and 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 using one of the spacer segments. 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**

Quality Now - PPG IG Quality Assurance Manual