Flexible Face Tensioning Procedure

ABC's "Easy Sheet" series on building extruded aluminum sign frames - 9/08

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ABC's Tensioning system is fast and cost effective. Typically, for an 8' x 12' sign it requires about 10 to 15 minutes for one man to layout the Reference and Trim Lines and trim each face to size. Two men can tension a face this size in 15 to 20 minutes, although one man can do it once it is placed on the sign.

ABC's patented frame and tensioning system was the first in the industry. It's a simple, easy and economical way to produce trouble-free, dependable signage.

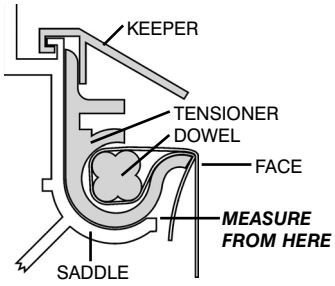
Signs are easy to service in the field without ever touching the face. There's no guesswork, for ABC provides complete engineering information for the proper use of its system in our 2005 edition of ***Wind Speed and Design Criteria for Flexible Face Signs Constructed of ABC Extrusions.*** The engineering data from that publication is reproduced here on the back page. Proper design of the internal structure of the sign frame and proper tensioning of the faces work together to ensure lasting, trouble-free signs.

ABC's system always results in a properly tensioned face when used correctly, (tensioning flexible substrates either too tight or too loose may cause trouble in extreme cases). Millions of tensioners have been used in many thousands of signs since 1980 with virtually no failures - even in hurricanes.

Keep in mind that ABC's Tensioning System is suitable for use in dry, dry and damp, or wet location. It is not acceptable where an electrical enclosure is required.

Standard Procedures for the following frames:

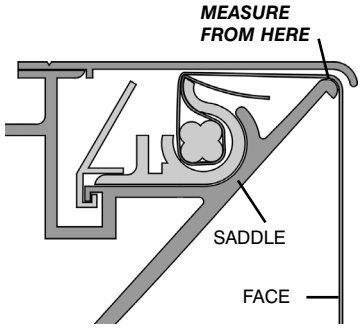
Large A/ Flexframe
Small A/Flexframe
Wide-Fab Frame
Retro Frame
Retro Saddle



	HEIGHT	LENGTH
Measure the outside distance from lip to lip of FRAME SADDLE, ***add 1"*** to height & length	_____	_____
Subtract a tensioning factor of ***1/16***" per foot, ***but not to exceed 1"***	- _____	_____
These are **TENSIONER REFERENCE LINE** dimensions, that are marked on the face	_____	_____
Add 2-3/4" on all sides to get Trim Lines	**+ 5-1/2"**	**+ 5-1/2"**
These are the **TRIM LINE** dimensions	_____	_____

Bleedface Procedures for the following frames:

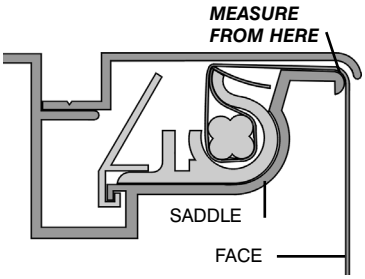
Large A/ Bleedframe
Small A/ Bleedframe
Wide or Retro Bleedframe



	HEIGHT	LENGTH
Measure the outside distance from lip to lip of FRAME SADDLE, ***add 2-3/4"*** to height & length	_____	_____
Subtract a tensioning factor of ***1/16***" per foot, ***but not to exceed 1"***	- _____	_____
These are **TENSIONER REFERENCE LINE** dimensions, that are marked on the face	_____	_____
Add 2-3/4" on all sides to get Trim Lines	**+ 5-1/2"**	**+ 5-1/2"**
These are the **TRIM LINE** dimensions	_____	_____

Hinge-Frame (F-Saddle) Procedures for the following frames:

F-Saddle
F-Hinge
(Retro or Hinge)



	HEIGHT	LENGTH
Measure the outside distance from lip to lip of FRAME SADDLE, ***add 2-1/4"*** to height & length	_____	_____
Subtract a tensioning factor of ***1/16***" per foot, ***but not to exceed 1"***	- _____	_____
These are **TENSIONER REFERENCE LINE** dimensions, that are marked on the face	_____	_____
Add 2-3/4" on all sides to get Trim Lines	**+ 5-1/2"**	**+ 5-1/2"**
These are the **TRIM LINE** dimensions	_____	_____

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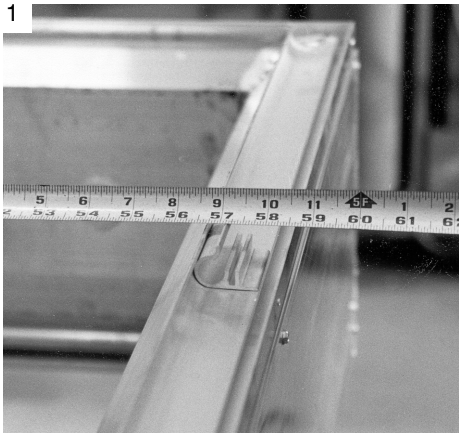
ABC® Sign Products

Flexible Face Tensioning Procedure (cont.)

MEASURING FOR LAYOUT LINES

As illustrated on the first page, ABC offers two types of frames and retro-frames for flexible substrate: (A) Five frames which use the tensioners parallel to the face, and (B) Two styles of six frames which use the tensioners perpendicular to the face. In all cases, you measure from lip to lip of the frame's SADDLE, displayed in each diagram on the first page, and in the photo below, (fig.1).

1



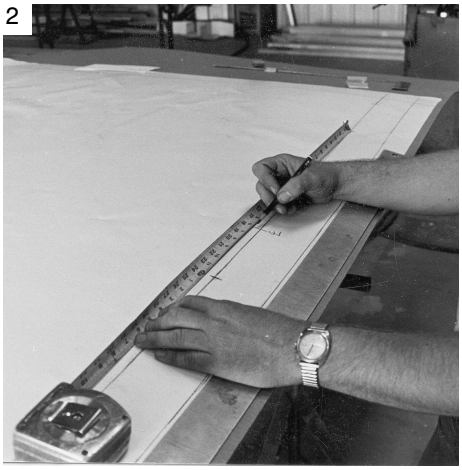
MEASURING FROM THE LIPS OF THE SADDLE OF THE A/FLEXFRAME

MARKING THE FACE

Use the correct Flexible Face Worksheet for your frame, (on the first page), to get the Tensioner Reference Line Dimension.

With the substrate laying flat and face-up, on a clean surface, mark the Tensioner Reference Lines on the face with a pen or marking pencil. Make sure the opposite lines are perfectly parallel, (fig. 2).

2

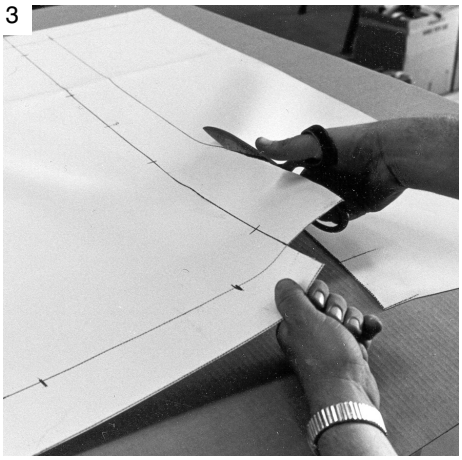


Draw the Trim Line 2-3/4" all around the outside of the Tensioner Reference Line.

Cut along the Trim Line to trim the face to to it's overall size.

Cut the corners with a 90 degree notch as shown, (fig. 3). The trimmed size will leave about a 3/4" flap of material under the Tensioner when the face is installed.

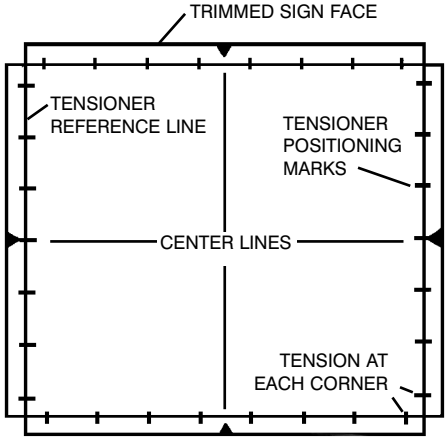
3



Mark centerlines on the Reference Line on all sides of the face.

Beginning from these center lines, draw marks on the Reference Line for positioning the Tensioners on the face, usually 12" on center, (see Tensioner Hardware Spacing chart on the back page).

DIAGRAM OF A MARKED AND TRIMMED FACE

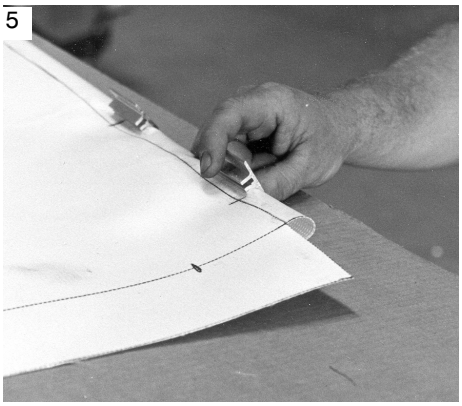


INSTALLING TENSIONERS

Place a dowel under the face about 3/4" outside and parallel to the Reference Line and fold the face material around and under the dowel (fig. 4).

4

5



Pinch the face at one end of the Dowel, and slide the Tensioner over the vinyl face and Dowel.

By rotating the Tensioner, while holding one end of the Dowel, the lip of the Tensioner can be made to move inside or outside the Reference Line.

Normally, the lip of the tensioner should be directly under the Reference Line. However, in making any final adjustments of the face, particularly at the corners to remove wrinkles, the face may be made tighter by rotating the Tensioner to move the lip inside the line, or outside the line to make it looser.

When all Tensioners are on the face, the lever ends of the Tensioner will lean inward about 30 degrees.

Flexible Face Tensioning Procedure (cont.)

INSTALLING THE FACES

With the sign frame laying flat and face up, mark a center line on each side of the frame to locate the center lines on the face. This will orient the face precisely to the frame. Then place clean slats, rods or cardboard over the frame. Lift the face with Tensioners mounted, and place it over the frame. Position the slats, rods or cardboard to allow the Tensioners to seat properly in the Saddle of the frame at the center of every side.

Place the two Tensioners on each side of the center mark in the saddle of the frame across the short dimension of the sign. Using the Tensioning Tool in the slot of the tensioner, (fig. 6), rotate the "lever" of the Tensioner back flat against the frame, then fit a Keeper into the under-cut track of the frame and slide it over the Tensioner. It is then locked in place, (fig. 7).

6

ABC provides the Tensioning Tool , or you can make your own from a blunted 1-1/2" wood chisel. The leverage provided by the tool makes it easy to hold the lever of the Tensioner flat against the frame, and easy to slide the Keeper in place.

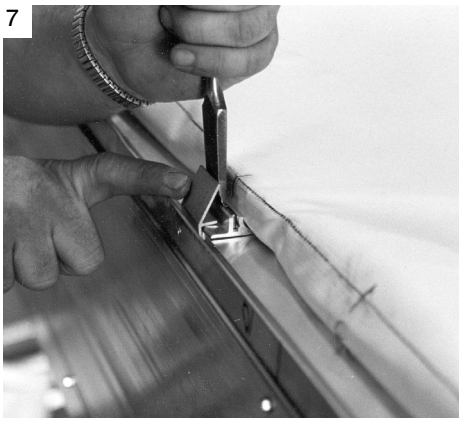
Repeat the process to lock the two center Tensioners down in the long direction of the sign. Next lock down the Tensioners on that side at the corners. Tap the corner Tensioners towards the ends of the frame until all slack or wrinkles between the center and the corners are pulled out.

Return to the center of the short sides of the sign and lock down the remaining Tensioners on both ends, working from the center out to the corners.

Then, go back to the centers of the long sides and work towards the ends of the sign. Two people, working opposite one another makes this a very fast, efficient process. One person can tension a face following the same procedures.

If slight wrinkles develop, take a mallet and screwdriver and tap the Tensioners towards the nearest corner, (fig. 8). Only ABC's patented Retainers allow for quick sideways adjustment like this.

7



8

It may be necessary to release the corner Tensioners, adjust the position of the Tensioners over the Dowels, (inwardly to tighten, outwardly to loosen), to remove any remaining wrinkles in the corners.

Once tensioned, the friction of the Tensioners and Keepers against the frame make them very unlikely to move sideways. However, on very large signs (150 sq. ft. or more),which may be installed in high wind regions, or if a sign is to be shipped or hauled far by truck, apply a "dab" of silicone or install a #7 sheet metal screw into the frame, just below the Tensioners near the Keepers on the vertical sides of the sign. It is then impossible for the Keepers to vibrate loose. This only takes a few minutes. When completed, the face should be perfectly smooth, and quite taught, yet somewhat flexible when hit with the flat of the hand.

TIPS FOR UNUSUAL APPLICATIONS

RADIUS CORNERS & CURVES.....

When tensioning radius corners or curves, the Tensioners need to be on much closer centers to keep the face free of wrinkles. The Tensioners can be sawed in half to make them only 1" wide for helping with a tight radius. In this case, you do not use a keeper. Instead, use a c-clamp to hold the tensioner in place and drill a 1/8" diameter hole through the tensioner and insert a 7x1/2" sheet metal screw.

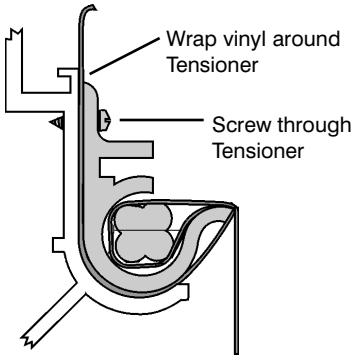
HUGE, OR VERY HIGH SIGNS.....

If a sign to be tensioned is huge, or is installed very high in the air where it could be difficult or expensive to service, use the following technique, one that makes it ***impossible*** for faces to come loose:

1. Use the same method for laying out the Tensioner Reference Line, but move the Trim Reference Line to 5" all around the face, (10" total).

2. The flap of the face is then wrapped under the Tensioner as it is placed in the saddle of the frame. In this case, you do not use a keeper.

3. While holding the lever of the Tensioner back flat against the frame with a c-clamp, install a # 7 x 1/2" screw through the Tensioner into the frame. This requires more time and is only recommended in extreme situations.



ENGINEERING ABC FRAMES FOR FLEXIBLE FACES

1. Determine maximum wind velocity for your area.

2. Determine the Design Wind Pressure from the table below, or obtain that information from your local building codes.

DESIGN WIND PRESSURE TABLE

Distance from ground to top of sign Cabinet.	Design Wind Pressure (Pounds per square foot)		
	90 MPH	100 MPH	110 MPH
10 to 20 feet	30 PSF	40 PSF	50 PSF
21 to 30 feet	35 PSF	45 PSF	55 PSF
31 to 50 feet	40 PSF	50 PSF	60 PSF
51 to 100 feet	50 PSF	60 PSF	70 PSF
101 to 120 feet	50 PSF	60 PSF	75 PSF

EXCEPTIONS:

A. Single face wall-mounted signs use 5 PSF less than shown.

B. The table is a general reference minimum, and does not apply to known Special Wind Regions requiring greater Design Wind Pressure.

C. Local Building Codes supercede Table.

3. Calculate the Perimeter Bending Force (on the sign Frame) by using the following formula: $W = \frac{A \times P}{L} + 30$

WHERE: W = PERIMETER BENDING FORCE (lbs. sq. ft.)
A = AREA OF SIGN (sq. ft. per face)
P = DESIGN WIND PRESSURE (lbs. sq. ft.)
L = PERIMETER OF THE SIGN FRAME (feet)

4. Determine the Maximum span between structural strut (braces) for the perimeter of the sign cabinet using the MAXIMUM SPAN BETWEEN STRUTS TABLE below. Reading across the top to the Table, locate the perimeter Bending force as calculated in Step 3. The distance listed in the columns below the PBF is the maximum span, in Inches, between Struts.

5. Based upon the Perimeter Bending Force, select the proper spacing of Tensioners for attaching the flexible face to the frame from the chart below. Follow instructions for proper Tensioning.

TENSIONER HARDWARE SPACING
(Based on Perimeter Bending Force)

Up to 100 lbs/ft	12” centers, max.
101-110 lbs/ft	11” centers, max.
111-130 lbs/ft	10” centers, max.
131-150 lbs/ft	9” centers, max.
151-200 lbs/ft	8” centers, max.
201-300 lbs/ft	7” centers, max.
301-500 lbs/ft	6” centers, max.

Note: Bleedface frames require 6” centers to prevent wrinkles where there are no visible retainers or trim.

This engineering for flexible faces is taken from the WIND SPEED AND DESIGN CRITERIA FOR FLEXIBLE FACE SIGNS CONSTRUCTED OF ABC EXTRUSIONS. If you do not have copies of that free ABC publication, please call. More Comprehensive engineering data is given in that document.

MAXIMUM SPAN, IN INCHES, BETWEEN STRUCTURAL STRUTS OR SUPPORT MEMBERS

PERIMETER BENDING FORCE	80	100	120	140	160	180	200	220	240	260
SPAN (in inches):										
LARGE A/FLEXFRAME	94”	87”	82”	78”	74”	72”	69”	67”	65”	63”
SMALL A/FLEXFRAME	98”	90”	85”	81”	77”	74”	72”	69”	67”	66”
2 X 2 X 3/16 STEEL L FRAME	73”	66”	60”	55”	52”	49”	46”	44”	42”	41”

QUICK REFERENCE CHART FOR INTERNAL STRUT MEMBERS
ASTM-36 Steel or 6061 T6 Aluminum

STRUT LENGTH	STEEL ANGLE	ALUM. ANGLE	STEEL SQ. TUBE	ALUM. SQ. TUBE
to 45 inches	1.5 x 1.5 x .125” 1	.5 x 1.5 x .125”	1 x 1 x .083”	1 x 1 x .083”
46 to 60 inches	2 x 2 x .125”	2 x 2 x .125”	1.25 x 1.25 x .083”	1.25 x 1.25 x .125”
61 to 72 inches	2.5 x 2.5 x .188”	2.5 x 2.5 x .188”	1.25 x 1.25 x .083”	1.25 x 1.25 x .125”
73 to 84 inches	3 x 3 x .188”	3 x 3 x .250”	1.5 x 1.5 x .083”	1.5 x 1.5 x .125”
85 to 114 inches	3.5 x 3.5 x .250”	4 x 4 x .250”	2 x 2 x .083”	2 x 2 x .125”
115 to 144 inches	4 x 4 x .250”	4 x 4 x .250”	2 x 2 x .083”	2 x 2 x .125”

Note: From the above chart, it is obvious that steel tubes are the most efficient for struts. To simplify inventory, we suggest stocking 1”, 1-1/4”, 1-1/2”, 2” and 3” steel square tubing.

Please contact ABC if you have any questions:
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