“Changing the Standard by Design”
BUILDING ENVELOPE SOLUTIONS

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Flat Pattern Calculation

“EVO” -Material required on each finished panel edge based on double route and return flanges at 1.063” each is 1.966” (1.063” + 1.063” -2BD)

Bend Deduction used in panel calculations is .0008” per degree of bend. In the case of the double route and return, both bends are 90 degrees, therefore the bend deduction is .080” per bend. In the case of a corner panel having a bend in addition to the double route and return flanges, the bed deduction is subtracted from the total flat size according to the bend angle. (ie. 45 degree corner panel considers an additional .04” bend deduction)

Example:

A corner panel (90 DEGREE) is ordered at 12” high x 12” left face x 12” right face.

Overall flat size is calculated as such:

FLAT HEIGHT = HEIGHT + 2(EVO)

= 12” + 2(1.966”)

=15.932”

FLAT WIDTH =WIDTH(LEFT) + WIDTH(RIGHT) + 2(EVO) – 1(BD)

=12” + 12” + 2(1.966) – (.0008”x90)

=27.852”

Therefore the overall panel flat dimension is calculated at 15.932” high by 27.852” wide.

Bend Line Location

Bend line location is based on the calculated bend deduction (.0008” x angle) divided by 2, subtracted from the desired flange size. The calculated value describes the distance away from the outside edge of the flat pattern to the bend line or in the case of an existing bend line to the desired bend line, the value is 2 times.

Example:

A 1.063” (outside dimension) flange is required with a 90 degree bend.

Bend line location = 1.063” – ((.0008” x 90)/2)

= 1.023”

A 1.063” (outside dimension) flange is required as the second flange with a 90 degree bend.

Bend line location = 1.063” – (.0008” x 90)

= 0.9830” from bend line to bend line

V-Cut Depth

V-Cutting depth is generally specified but the ACM Manufacturer and is done on the unfinished face of the ACM (Aluminum Composite Material), however typically we at Carter maintain a remaining material thickness (Aluminum skin and Remaining Core of equal thickness, .020” + .020”) of .040. Our manufacturing range is 0.037” to 0.040”. This falls in line with most ACM suppliers that we have dealt with. A pressure foot designed router head is utilized to maintain the consistency of the depth. (In this design, the v-groove depth is maintained by the machine cutting head riding on the material being processed, and is mechanically set.

Example:

Depth of V-Cut = Overall Material Thickness – 0.040”

= 0.159”(4mm) – 0.040”

= 0.119” measured from the back side of the material (unfinished side)

Machine Cutting Feed/Speed

The machine cutting feed and speed have been found to be optimal as below:

3mm Material

V-Grooving (110 degree) 400 inches per minute at 23000 RPM

External profile cutting	300 inches per minute at 23000 RPM
Plunge Speed	50 inches per minute

4mm Material

V-Grooving (110 degree)	400 inches per minute at 23000 RPM
External profile cutting	300 inches per minute at 23000 RPM
Plunge Speed	50 inches per minute

6mm Material

V-Grooving (110 degree)	325 inches per minute at 23000 RPM
External profile cutting	250 inches per minute at 23000 RPM
Plunge Speed	50 inches per minute

These values were discovered through trial and error over the last couple of years.

Bending

There is no secret to bending these panels, they are bent the same way any other ACM panel is bent either by hand or using a fixed rail on a bench (u-channel profile to receive the flange to be bent) We have developed our own set of custom tools for bending, which I intend to create an extruded profile out of and sell to our licensed partners.

Click Lock Corners

The first bend of the double route and return profile miters 45 degrees with a 0.032" clearance between the adjacent 90 degree flange, and is then locked together using a "click-lock" puzzle type of profile. Clearance was determined through trial and error to accommodate ease of folding while maintaining the panel corner tightness. This addition to the design eliminates the possibility of human error during assembly that would ultimately affect the finished panel presentation. The concept of the click lock corners, ensures that the assembled panel, can only be assembled one way, giving the finished product the quality and consistency that EVO demands. The actual profile and clearances used were developed via trial and error.

Perimeter Extrusion Installation

After the double returns are complete, and the corners are locked, the perimeter extrusion is installed.

The required extrusion length is determined by subtracting 3 in from the overall panel face dimension. The ends of the extrusion are cut square to accommodate installing a floating Mid-clip design. Panel weep holes are traced onto the extrusion and pre-drilled before installation on the panel. Clamps are required to ensure that full engagement of the first flange into the extrusion profile and a proper mate between the second flange inner face and the flat vertical face of the extrusion profile. Full engagement must be maintained at all times. Once the flange is fully engaged, Stainless steel self- drilling screws are installed on no less than 16” centres on back horizontal face of the extrusion, centered on the die line present (the die line ensures that the screw will properly penetrate the ACM and sandwich the assembly together. After the perimeter extrusion is installed on all of the finished edges, and additional corner support (.625” wide x 2.25” x 2.25” x .125” thick L shape) is installed in each corner tying the adjacent extrusions together and further reinforcing the corners.

Panel Installation onto Buildings

EVO Panel are installed progressively as are conventional panel systems and details of this are not required in this document.