



XTECH DESIGN GUIDELINES FOR FRONT PANELS

1. ALUMINUM ALLOY AND TEMPER:

*It is recommended to use 6005 series aluminum alloy for custom high performance front panels. Compared to 6063 Alloy, the most commonly used extrusion material, 6005-T5 offers twice the strength, needed for structural support and has better machining characteristics.

6005-T5 is also very similar to 6061-T6 which is used for various structural applications, but more difficult to extrude into complex profiles.

ALLOY	MAJOR	TEMPER	ULTIMATE	YEILD	ELONGATION
	ALLOYING		TENSILE	TENSILE	IN 2 INCHES
	ELEMENTS %		STRENGTH	STRENGTH	%
			ksi	ksi	
6063	Si 0.20 - 0.60	T5	22	16	8
	Mg 0.40 - 0.90				
	Fe 0.35 Max.				
6061		T6			
6005	Si 0.50 - 0.90	T5	38	31	7
	Mg 0.40 - 0.70	Move to top			
	Mn 0.50 Max.				
	Fe 0.35 Max.				

Si- Silicon Mg-Magnesium Mn-Manganese Fe-Iron

THE SOURCE FOR DATA IS ALUMINUM STANDARDS AND DATA, PUBLISHED BY ALUMINUM ASSOCIATION. (WWW.ALUMINUM.ORG)

TEMPER:

Temper is the combination of hardness and strength imparted to a metal by mechanical or thermal treatments and characterized by certain metallurgical structures mechanical properties determining temper designation per ASTM B221.

Temper: T5 Cooled from an elevated temperature and artificially aged.

Example: 6005-T5 (ALLOY-TEMPER)

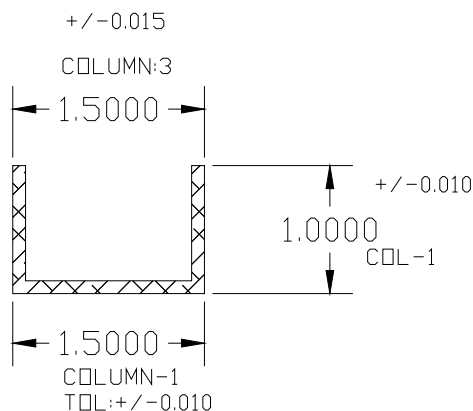


EXTRUSION TOLERANCES:

Front Panel tolerances are based on the shape and size of the profile.
 Tolerances are the allowable deviation from a nominal or specified dimension.
 Allowable standard tolerances are outlined in the chart below in the chart and should be read with reference to the profile drawing.

THICKNESS AND WIDTH:

SPECIFIED DIMENSION IN.	METAL DIMENSION COL-1	TOLERANCES - ±				
		SPACE DIMENSION FROM BASE OF LEG COL-2	COL-3	COL-4	COL-5	COL-6
		0.250-0.624	0.625-1.249	1.250-2.499	2.500-3.999	4.000-5.999
UP TO 0.124	0.005	0.005	0.005	**	**	**
0.125-0.249	0.005	0.005	0.005	0.005	**	**
0.250-0.499	0.005	0.010	0.010	0.005	0.010	**
0.500-0.749	0.005	0.010	0.010	0.010	0.010	**
0.750-0.999	0.005	0.010	0.010	0.010	0.015	0.015
1.000-1.499	0.010	0.010	0.010	0.015	0.015	0.015
1.500-1.999	0.010	0.015	0.015	0.015	0.015	N/A
2.000-3.999	0.010	N/A	N/A	N/A	N/A	N/A
4.000-5.999	0.015	N/A	N/A	N/A	N/A	N/A





FINISHED LENGTH TOLERANCES:

The following “cut length” tolerances are recommended for customer extruded front panels..

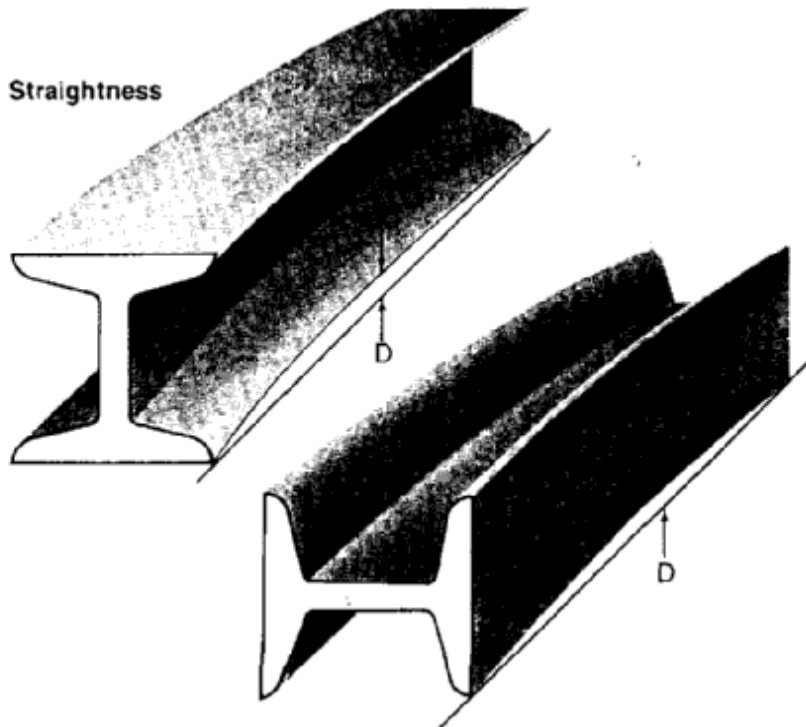
Length: Up to 24” ----- +/- 0.010”
24” to 48”----- +/- 0.015”

STRAIGHTNESS:

Recommended straightness specifications for custom front panels should be specified as:

Straightness: 0.0125” X Length in inches

Straightness is defined as the absence of divergence from straight line in the direction of measurement, often times confused with “flatness”.

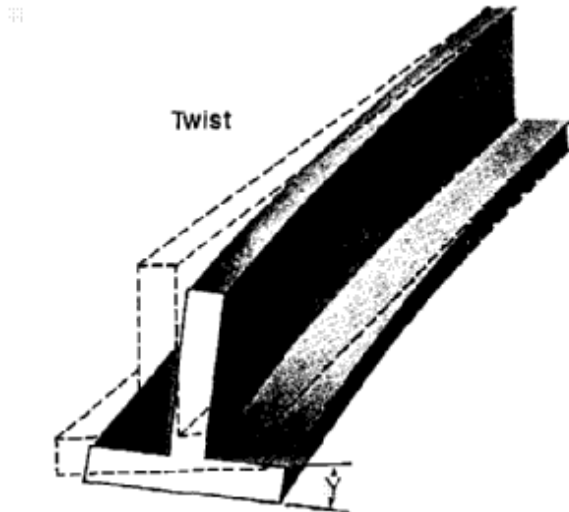


TWIST:

For custom extruded front panels - twist should be specified as:

Twist: 0.017” X width of panel, in, inches

Twist is defined as winding departure from straightness. Twist is normally measured by placing the panel on a flat surface and at any point along its length measuring the maximum distance between the bottom surface of section and the flat surface.



FLATNESS:

In general, flatness should be specified as follows:

Flatness: 0.004 X width in inches

Flatness pertains to the deviation of a cross-section of the profile surface intended to be flat.

2. SURFACE FINISH:

Custom Aluminum Extruded Front Panels are typically produced with a final finish of Clear Chromate or Electroless Nickel. Panels are then often finished with paint or silk screening.

ASSEMBLY (HLA):(high level assembly)

Viewing of the exposed surface shall be at a distance of 24 inches under normal artificial light at the angle of usage.

GENERAL GUIDELINES:

Surface imperfections may exist as part of the normal manufacturing process and are identified as follows:

EXPOSED SURFACE:

Extrusion Technology
358 North Street
Randolph, MA 02368
Tel: 781-963-7200





Exposed surfaces are all surfaces that will be seen during the normal use of product, in its higher level Scratches caused by motion between two contacting surfaces are visible and normally have no depth.

BLISTERS:

No more than 6 per square inches of not more than 0.030” in diameter. Caused by trapped air in material.

SCRATCHES AND GOUGES:

No more than 3 in 6 square inches deeper than 0.012” and longer than 3 inches.

NICKS:

No more than 3 in 6 square inches deeper than 0.020’ or 0.250” in diameter. Caused by a blow from another object.

DIE LINES:

No more than 3 in a 1.0” wide area higher or deeper than 0.010”. Caused by a blow from another object.

MACHINING MARKS:

Deburring marks, swirls, abrasive brush strokes are allowed as normal part of the manufacturing operation.

3. FABRICATION:

The following are acceptable tolerances for all fabrication of custom extruded front panels.

HOLE SIZE	LOCATION	LENGTH	BURR	LENGTH
TOLERANCE		MILL	STANDARD	SAW
Drilled: +/- 0.003	Edge to feature +/-0.005	+/- 0.005	Saw: 0.005	Spec. Saw: +/-0.010(up to 12”)
Pierced: +/-0.002	End to feature +/-0.005		Mill: 0.005	Saw: +/-0.010(up to 24”)
	Punch to Punch +/-0.005		Punch: 0.005	Saw: +/-0.015(greater than 24”)
	Drill to Drill +/-0.005		Drill: 0.005	

BURRS:





A thin ridge of roughness left by a cutting operation such as punching, drilling, sawing, notching etc is call burr. Burrs must be removed by filing, brushing or graining operation.

GENERAL GUIDE LINES:

1. Burrs exceeding 0.005” are not acceptable, with exceptions noted below.
2. Burrs are not allowed to violate the part dimension “limits of size”
3. Burrs that are loose or flake must be removed.
4. Burrs that may result personal injury must be removed.
5. A burr edge from the Saw cut is allowable for parts that are “Mill” finish, shipped as lineal lengths or have no additional operations besides packing performed after the cutting step.
6. Surfaces and edges that are to be totally burrs free must be specified on the part drawing.

PUNCHED AREAS:

1. Acceptable burrs caused by punching will be determined by the wall thickness being punched:
2. 0.000” to 0.124” wall thickness, burr not to exceed 0.005”.
3. 0.125” to 0.374” wall thickness burr not to exceed 0.008”.
4. 0.375” and up wall thickness, burr not to exceed 0.010”.

STEPS:

Where punching or milling a leg perpendicular to an adjacent wall, the tolerance for remaining “step” area will be flush to 0.010” above the surface, unless otherwise specified on the drawing.

HARDWARE INSTALLATION MARKS:

Rings or pressmarks from installation of hardware are acceptable.

4. MACHINING:

TOLERANCE:

Unless otherwise noted tolerance should be:

. xxx +/-0.005

.xxxx +/-0.0015 (At critical dimensions like hole for Pem)

5. COSMETIC STANDARDS:

PURPOSE:

The purpose of this work standard is to document the general cosmetic appearance requirements for the Tech-panel product systems. This standard contains visual



workmanship requirements for front panel overlays and other related items associated with tech-panel.

DEFINITIONS:

Primary Surface: Surfaces visible after the unit is installed in the Higher Level Assembly (HLA)

In the most cases, the HLA would be the chassis that the circuit boards are installed in.

Secondary Surfaces: Surfaces not visible after the unit is installed in the Higher Level Assembly (HLA).

Viewing Distance and Time: Parts to be inspected at not less than 20 inches (arm length) and for no more than 2-3 seconds. Angle and position to match use in HLA.

Lighting: The level of illumination in the inspection work area should be sufficient for the task. The illumination should be obtained through the use of general factory lighting.

GENERAL GUIDELINES:

1. All inspection of Primary and Secondary areas to be conducted at viewing distance and time under lighting as defined above.
2. Dents and nicks (from tumbling and deburring process), Die lines (from the extrusion process) and slight discoloration of clear chromate (from the chromate process) inherent in the manufacturing process are allowable.

OVERLAY:

1. After placement of the overlay, no more than 0.020" of bare metal shall be visible at the opening in the front panel unless covered by another part in HLA.
2. No surface scratches, smearing, blurring, spots or flecks shall be visible.
3. All labels shall be uniform in color and sheen, exhibiting no peeling or blistering.
4. All labels shall be aligned so as to adhered to the base metal and remain inside the channel guides, if present.

SLIDES:

1. The slide label, if present, shall have no lifting and be properly aligned, within +/- 0.020, to the slide and must match the front panel label in the color and sheen.
2. The slide may have some bend (+/-0.025") near the Southco fastener, but must not interfere with the slide action with reasonable force applied.
3. The slide must be able to travel to the top and bottom of the slide track under finger pressure.
4. PEM heads may be visible, unless covered by label.

EJECTOR:

1. The primary surfaces of the ejectors must be completely painted with no light paint areas. The individual part must exhibit uniform appearance from part to part as viewed in the HLA.
2. The secondary areas must be painted and/or masked as specified, but may have faded areas, light areas or bare spots due to racking, so long as they are not visible in the HLA.



OPENINGS:

1. The opening on the front panel shall have no more than 0.020" of bare metal visible. If the opening exhibits greater than 0.020" exposed metal and is covered by a component installed on the front panel at the HLA, it will be considered acceptable.

SHIELDING:

1. Adhesive shielding should lay entirely within the channel, and not ride up over the edges.
2. Shielding length should not exceed:
 - * +0.000/-0.100" for lengths up to and including 20"
 - * +0.000/-0.160" for lengths over 20".
3. Shielding may be butted together within the channel as approved by the shielding manufacturer.

PART NUMBER LABELS:

1. Adhesive backed labels must contain the assembly level part number and revision.
2. Label placement should be approximate and not subject to a specific guideline for skew or exact location, but not visible at the HLA.

6. SECONDARY SURFACES:

Some surface imperfection as listed below may be allowed as a part of normal manufacturing process, but it shouldn't affect the end use of the product.

BLISTERS:

No more than 6 per square inches of not more than 0.030" in diameter.
Caused by trapped air in material during extrusion.

SCRATCHES AND GOUGES:

No more than 3 in 6 square inches deeper than 0.012" and longer than 3 inches.
Scratches caused by relative motion between two contacting surfaces are visible and normally have no depth.

DEBURRING MARKS:

Deburring marks, swirls and brush strokes around holes, cutouts, ends and edges are permissible.

NICKS AND DENTS:

No more than 3 in 6 square inches deeper than 0.020' or 0.250" in diameter.



Caused by a blow from another object.

DIE LINES:

No more than 3 in a 1.0" wide area higher or deeper than 0.010".

Caused during extrusion.

RACK MARKS:

No more deeper than 0.025".

Caused by contact points used to hold the part during anodize or chromate.

HARDWARE INSTALLATION MARKS:

Rings or pressmarks from installation of hardware are acceptable, only if doesn't deform the panel.

7. PAINT/POWDER COAT

PURPOSE:

The purpose of this work standard is to document the standards for appearance and capabilities of any painted or powder coated part. These standards apply in the **absence of specific instructions or specifications listed in the drawing.**

GENERAL GUIDELINES:

1. Threaded holes, screw heads or inserts need not be masked, but must accept its component part, unless otherwise specified.
2. "Touch-up" is acceptable, provided that it is not noticeable with regards to color and texture when viewed from distance as listed below.
3. Masking must be within +/- 0.050" of the nominal location with up to 0.100 "bleed" allowable under the mask, which yields 80% masking of the indicated area.
4. Packing of the parts should insure that no exposed surfaces are touched by anything other than packing materials.

APPEARANCE QUALITY OF FINISHED COATING:

1. Exposed surfaces are all surfaces, which will be seen during the normal use of the product unless otherwise noted in the drawing.
2. Viewing of the exposed surface shall be at a distance of 24 inches under normal artificial light at the angle of usage.
3. Under no conditions should base metal be visible on the Exposed surface.



4. Minor imperfections such as scratches or fibers in excess of 0.125" long by 0.10" wide and 0.010" in height/depth should not exceed three (3) in any 6" by 6" area and shall not exceed eight (8) in any one surface.
5. Minor imperfection such as particles, lumps, chips, dents or spatter which are not more than 0.040" in diameter may not exceed three (3) in any 6" by 6" area and shall not exceed eight (8) in any one surface.
6. No gross imperfections such as gouges, large chips, blisters, oil spots, flaking, peeling, chalking or any indication of corrosion are acceptable.

FINISH CAPABILITY:

1. Painted parts should be tested by using a 3M equivalent masking tape applied to the painted surface with "finger" pressure and pulled off with no paint removal.
2. For powder coated parts, a "razor-blade cross hatch" test may be used to evaluate adhesion.

TORQUE STANDARD:

Torque is a "turning" or "twisting" force. Proper setting of torque is very important in assembly.

This is a reference chart for torque setting, unless otherwise specified.

SCREW SIZE	SCREW MATERIAL	STEEL	ALUMINUM	ST. STEEL
0	STEEL	0.9-1.0	0.3-0.5	0.9-1.0
		0.5-0.7	0.5-0.7	0.5-0.7
		NO DATA	NO DATA	NO DATA
	ST. STEEL	use steel	NO DATA	NO DATA
2	STEEL	1.9-2.3	1.2-1.5	1.9-2.3
	BRASS	1.7-2.0	1.2-1.5	1.7-2.0
	ALUMINUM	NO DATA	NO DATA	NO DATA
	ST. STEEL	NO DATA	NO DATA	NO DATA
4	STEEL	3.7-5.4	3.8-4.6	4.7-5.4
	BRASS	3.6-2.9	3.0-3.5	3.6-4.3
	ALUMINUM	2.4-2.9	2.4-2.9	2.4-2.9
	ST. STEEL	4.7-5.5	3.8-4.6	4.7-5.5
6	STEEL	7.5-10.0	6.8-8.0	8.0-10.0
	BRASS	6.8-7.9	5.5-6.6	6.8-7.9
	ALUMINUM	4.6-5.3	4.6-5.3	4.6-5.3





	ST.STEEL	8.0-10.0	8.0-10.0	6.8-8.0	8.0-10.0
8	STEEL	15.0-18.0	15.0-18.0	12.6-15.0	15.0-18.0
	BRASS	14.0-16.0	14.0-16.0	11.6-13.5	14.0-16.0
	ALUMINUM	9.0-11.0	9.0-11.0	9.0-11.0	9.0-11.0
	ST.STEEL	18.0-21.0	18.0-21.0	12.6-15.0	18.0-21.0
10	STEEL	22.5-29.0	25.0-29.0	20.5-25.0	25.0-29.0
	BRASS	16.0-19.0	16.0-19.0	13.0-16.0	16.0-19.0
	ALUMINUM	12.0-14.0	12.0-14.0	12.0-14.0	12.0-14.0
	ST.STEEL	21.0-24.0	21.0-24.0	20.5-25.0	21.0-24.0

March 2010

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