Stamping Material Selection Guide

Bend Rating Key:

ESI's Bend Rating scale measures the formability of a material based on its ability to bend or form without tearing or breaking. "Green" designates easier formability all the way through "red" as most difficult.

Green	Yellow	Orange	Red
Easy formability	Moderate formability; possible strain	Limited formability; chance of tearing	Difficult formability; likelihood of tearing
			
0t to 3t	3t to 6t	6t to 9t	9t +

Radii for various thicknesses, whereas "t"=times thickness.

Aluminum

	Summary	Recommended Finishes?	Applications	Conditions Available	Bend Rating	Magnetic?	Tensile Strength Minimum (KSI)		Elongation Minimum (% 2 " Gauge)	Yield Strength Minimum (0.2% offset)		Hardness (Min-Max)	Density (lb/cu in)		Corrosion Resistance	Cost?
							KSI	MPa		KSI	MPa		(lb/in^3)	(g/cm^3)		
1100	Aluminum 1100 is one of the softest aluminum alloys, which makes it unsuitable for high-pressure or high-strength applications. It is frequently cold-worked, but can be hot-worked as well. Most often, it is shaped by processes that do not require the use of high heat, such as spinning, stamping, and drawing.	Anodize, Alodyne, Phosphate	Fin stock, heat exchanger fins, spun hollowware, dials and name plates, decorative parts, giftware, cooking utensils, rivets and reflectors, sheet metal work	Aluminum 1100 0 Temper (Annealed)	Green	No	13	90	40%	5	34	Brinell 23	0.098	2.713	2	$$$$
				Aluminum 1100 H12 (1/4 Hard)	Green	No	14	97	12%	11	76	Brinell 28	0.098	2.713	2	$$$$
				Aluminum 1100 H14 (1/2 Hard)	Green	No	18	124	10%	16	110	Brinell 32	0.098	2.713	2	$$$$
2024	2024 is a heat-treatable aluminum alloy with copper as the primary alloying element. It's commonly used in aerospace applications, like aircraft structures, for its high strength and fatigue resistance.	Anodize, Alodyne, Phosphate	Aircraft structural components, aircraft fittings, hardware, truck wheels, parts for the transportation industry	Aluminum 2024-O	Yellow	No	30	207	10-20%	14	97	Brinell 49	0.1	2.768	2	$$$$
				Aluminum 2024-T3	Yellow	No	63	434	10-15%	42	290	Rockwell B75	0.1	2.768	2	$$$$
				Aluminum 2024-T4	Yellow	No	62	427	12-15%	40	276	Rockwell B75	0.1	2.768	2	$$$$
				Aluminum 2024-T6	Orange	No	64	441	5%	50	345	Rockwell B78	0.1	2.768	2	$$$$
3003	Aluminum 3003 alloy has good corrosion resistance and moderate strength, which can be increased by cold working.	Anodize, Alodyne, Phosphate	Ductwork, chemical equipment, general sheet metal work	Aluminum 3003 0 Temper (Annealed)	Green	No	14	97	18%	5	34	Brinell 28	0.099	2.740	2	$$$$
				Aluminum 3003 H12 (1/4 Hard)	Green	No	17	117	3%	12	83	Brinell 35	0.099	2.740	2	$$$$
				Aluminum 3003 H14 (1/2 Hard)	Yellow	No	20	138	2%	17	117	Brinell 40	0.099	2.740	2	$$$$
5005	Alloy 5005 is a non-heat-treatable 0.8% magnesium alloy that is available in flat rolled coil, plate, and sheet from an array of producing mills. The 5000-series alloys have high strengths because of the addition of magnesium, with 5005 having a very small amount, making it the least strong of this series.	Anodize, Alodyne, Phosphate	Architectural applications, general sheet metal work, high strength foil	Aluminum 5005 0 Temper (Annealed)	Green	No	18	124	25%	6	41	Brinell 28	0.098	2.713	2	$$$$
				Aluminum 5005 H12 (1/4 Hard)	Yellow	No	20	138	10%	19	131	Brinell 38	0.098	2.713	2	$$$$
				Aluminum 5005 H14 (1/2 Hard)	Yellow	No	23	159	6%	22	152	Brinell 43	0.098	2.713	2	$$$$
5052	Aluminum alloy 5052 contains nominally 2.5% magnesium and 0.25% chromium. It has medium static strength, good weldability and workability, high fatigue strength, and excellent corrosion resistance, which is ideal for marine applications. 5052 has the excellent thermal conductivity and low-density features that appear in other aluminum alloys.	Anodize, Alodyne, Phosphate	Architecture, general sheet metal work, heat exchangers	Aluminum 5052-O (Annealed)	Green	No	28	193	30%	13	90	Brinell 47	0.097	2.685	2	$$$$
				Aluminum 5052 H32 (1/4 Hard)	Green	No	31	214	4-10%	23	159	Brinell 60	0.097	2.685	2	$$$$
				Aluminum 5052 H34 (1/2 Hard)	Yellow	No	34	234	3-8%	26	179	Brinell 68	0.097	2.685	2	$$$$
				Aluminum 5052 H36 (3/4 Hard)	Orange	No	37	255	2-4%	29	200	Brinell 73	0.097	2.685	2	$$$$
				Aluminum 5052 H38 (Full Hard)	Red	No	39	269	2-4%	32	221	Brinell 77	0.097	2.685	2	$$$$
6061	One of the most adaptable of the heat-treatable alloys, 6061 is a precipitation-hardened aluminum alloy with silicon and magnesium as its primary alloying elements. It is favored for its excellent corrosion resistance, good toughness, and medium to high strength requirements.	Anodize, Alodyne, Phosphate	Building products, electrical products, piping, recreational products	Aluminum 6061-O	Yellow	No	18	124	25%	8	55	Brinell 33	0.098	2.713	2	$$$$
				Aluminum 6061-T4	Orange	No	35	241	22%	21	145	Brinell 63	0.098	2.713	2	$$$$
				Aluminum 6061-T6	Red	No	45	310	12%	40	276	Rockwell B53	0.098	2.713	2	$$$$
7075	Aluminum 7075 has zinc as the main alloying element. While it has average machinability and less corrosion resistance compared to many other aluminum alloys, it has a strength comparable to many steels, low density, excellent thermal properties, ability to be polished, and good fatigue strength. It's commonly used in mold tool manufacture.	Anodize, Alodyne, Phosphate	Aircraft fittings, gears and shafts, missile parts, regulating valve parts, worm gears, aerospace/defense applications	Aluminum 7075-O	Orange	No	33	228	16%	15	103	Brinell 59	0.098	2.713	2	$$$$
				Aluminum 7075-T6	Red	No	83	572	11%	73	503	Rockwell B82	0.098	2.713	2	$$$$

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