



ACE FOUNDRY

ALUMINUM PERMANENT MOLDS • SAND CASTING • AIR-SET SAND CASTING • HEAT TREATING • MACHINE SHOP SERVICES

ALUMINUM ALLOY SPECIFICATIONS

PROCESS	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	PERM	PERM	PERM	PERM	PERM	PERM
ALLOY	319	319	356	356	356	356	535	713	319	319	333	356	356	356
HEAT TREAT	F	T-6	F	T-51	T-6	T-7			F	T-6	T-6	F	T-51	T-6
CHEMICAL COMPOSITION									(in %)					
Silicon	5.5-6.6	5.5-6.7	6.5-7.5	6.5-7.6	6.5-7.7	6.5-7.8	0.15	0.25	5.5-6.6	5.5-6.7	8-10.	6.5-7.5	6.5-7.6	6.5-7.7
Iron	1	2	0.6	0.6	0.6	0.6	0.15	1.1	1	2	1	0.6	0.6	0.6
Copper	3-4.	3-4.	0.25	0.25	0.25	0.25	0.05	.40-1.0	3-4.	3-4.	3-4.	0.25	0.25	0.25
Manganese	0.5	0.5	0.35	0.35	0.35	0.35	.10-.25	0.6	0.5	0.5	0.5	0.35	0.35	0.35
Magnesium	0.1	0.1	.20-.45	.20-.46	.20-.47	.20-.48	6.2-7.5	.20-.50	0.1	0.1	.05-.50	.20-.45	.20-.46	.20-.47
Chromium								0.35						
Nickel	0.35	0.35						0.15	0.35	0.35	0.5			
Zinc	1	1	0.35	0.35	0.35	0.35		7.0-8.0	1	1	1	0.35	0.35	0.35
Titanium	0.25	0.25	0.25	0.25	0.25	0.25	.10-.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
other	0.5	0.5	0.15	0.15	0.15	0.15	0.15	0.25	0.5	0.5	0.5	0.15	0.15	0.15
STRENGTH									(IN 000 lbs)					
Tensile ultimate	23	31	19	23	30	31	35	32	28	34	35	21	25	33
Yield	13	20	13	16	20	29	18	22	14	27	30	13	20	22
% elongation	1.5	105	2	2	3	2	9	3	1.5	2	1.5	3	2	3
Brinell	55-85	65-95	40-70	45-75	55-90	60-90	60-90	60-90	70-100	75-105	85-115	40-70	55-85	65-95
CHARACTERISTICS									(a= excelent, f= poor)					
Pressure tight	b	b	a	a	a	a	f	d	b	b	b	a	a	a
Heat treated	yes	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes
Corrosion rest.	c	c	b	b	b	b	a	c	c	c	c	b	b	b
Machineability	c	b	c	b	b	b	a	a	c	b	c	c	a	a
Polishing	d	d	d	d	d	d	a	a	d	d	c	d	d	d
Anodizing	d	d	d	d	d	d	a	a	d	d	d	d	d	d
Weldability	b	b	a	a	a	a	d	d	b	b	c	a	a	a
PHYSICAL PROPERTIES														
Electric conduct	27	27	39	39	39	39	23	30	27	27	29	39	39	39
Thermal conduct	0.260	0.260	0.360	0.360	0.360	0.360	0.240	0.290	0.260	0.260	0.290	0.360	0.360	0.360
Density	0.101	0.101	0.097	0.097	0.097	0.097	0.094	0.102	0.101	0.101	0.100	0.097	0.097	0.097
NOTES														
Chemical specifications are in percents. Strength numbers in 1000's pounds.														
Characteristics are graded A= Excelent, B= Good, C= Average, D= Fair, F= Poor.														
Sand = Sand casting, Perm = Permanent mold casting.														

This lists the most common aluminum alloys cast. For special requirements contact

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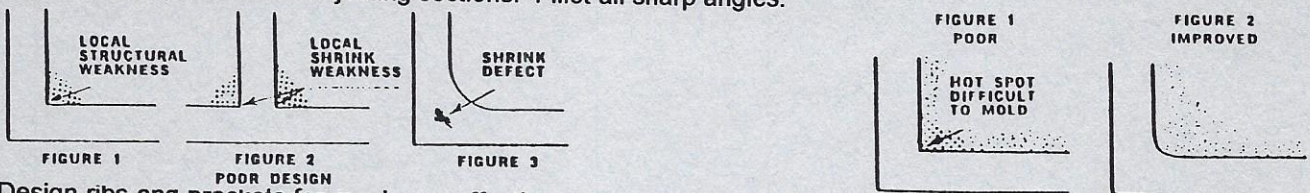
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BASIC CASTING DESIGN RULES

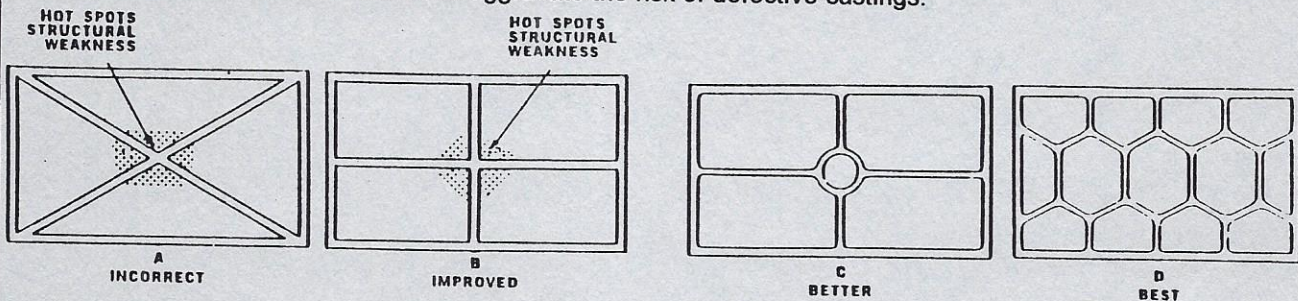
Specifications from the
Aluminum Association

It is all too common to design to suit the engineering department but not the foundry, and the result may be failure or disappointment. From the foundryman's viewpoint, it is of first importance to design a casting that can be made rather than one that may be perfect engineering-wise but which cannot be produced commercially and free from structural weakness. Consultation between Designer and Foundryman will permit consideration of the foundry problems that are likely to be encountered and will promote the making of a sound casting. The time and cost of manufacture can also be considered at this preliminary stage of casting design. Important questions that the foundryman can answer include: type of pattern equipment needed, metal shrinkage, molding method required, conditions necessary to make a dependable casting, machine finish and dimensional limitations.

In designing adjoining sections, avoid acute angles. Replace all sharp angles with radii and minimize heat stress concentration. Design all sections as nearly uniform in thickness as possible. Avoid abrupt section changes, eliminate sharp corners at adjoining sections. Fillet all sharp angles.



Design ribs and brackets for maximum effectiveness avoid cross ribs or ribbing on both sides of a casting. Avoid complex ribbing. It simplifies molding procedure, assures more uniform solidification conditions and eliminates hot spots. Casting stresses and stress distribution favor omission of ribbing if the casting wall can be made of ample strength and stiffness itself. Avoid the use of ribs meeting at an acute angle. Ribs meeting at acute angles cause molding difficulties, increase costs and aggravate the risk of defective castings.



Bosses, lugs & pads should not be used unless absolutely necessary. Bosses and pads increase metal thickness, create hot spots and cause open grain or draws. Blend into casting by tapering or flattening the fillets. A continuous rib instead of a series of bosses permits shifting hole location. Thickness of bosses & pads should preferably be less than the thickness of the casting section they adjoin. Design all sections as nearly uniform in thickness as possible.



When the inside diameter of a cylinder is less than the wall thickness of the casting, it is better to cast solid. Holes can be produced by cheaper and safer methods than by coring.

ACE PATTERN & FOUNDRY OF KANSAS INC.

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