LM-5

data sheet

Belmont

Low-Melting (Fusible) Alloys

Low-Melting or Fusible Alloys are generally the alloys that melt below 450°F (233°C). The most useful are the alloys containing high percentages of Bismuth combined with Lead, Tin, Cadmium, Indium and other metals. Many of the Bismuth alloys melt below the boiling point of water and some melt below 150°F. The low melting temperature and unique growth/shrinkage characteristics of these alloys lead to a greater diversity in useful applications than almost any other alloy system. From the machining of aircraft engine turbine blades to the application of radiation therapy shielding, from the triggering of a life-saving sprinkler system to the spring-release of a turkey roast's pop-up "thermometer," Low-Melting alloys continue to have a quiet yet profound impact on our lives.

The alloys shown in the following data table are the most popular alloys. Many fusible alloys are "eutectic," having a single melting point (the freezing point and melting point are the same), while others are "non-eutectic" alloys which start to melt at one temperature but are not fully molten until they reach a higher temperature. (For non-eutectic alloys, "yield" temperatures are shown.) There are hundreds of non-eutectic alloys with known temperature ranges. Other alloys can be formulated to meet special temperature requirements.

Since the effects of varying percentages of Bismuth are well known, alloys can be accurately modified to specific demands. For example, alloys with less than 48% Bismuth normally shrink during solidification, those with 48% to 55 % Bismuth have little dimensional change, while alloys above 55% usually grow during solidification. Lead and other elements can be added to alter the solidification/growth characteristics and melting range. Alloys containing Indium have the ability to adhere to glass and ceramics, adding yet another useful property.

As one of the first commercial manufacturers of Low-Melting Alloys, Belmont has over 65 years of experience in this field, producing both standard and custom alloys for numerous applications. Recent years have shown a marked increase in demand for Belmont's Low-Melting Alloys, especially Bismuth-Tin, due in part to their low environmental impact.

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For maximum variety in non ferrous metals, alloys and shapes.
Custom shapes and compositions available.

Data Table

Belmont Alloy No.	Also Known As	Melting Point Solidus °F	Solidus °C	Liquidus °F	Liquidus °C	Weight lbs/cu. in.	Specific Gravity	Nominal Composition % Bi	% Pb	% Sn	% Cd	% Others	Short-Term Tensile Strength lbs/sq. in.	Yield Temp. °F	% Elongation in 2"–slow loading	Brinell Hardness No. (500 kg.)	Coefficient of Expansion in./°C	% Volume Change (liquid to solid)	% Volume Change (after solidification)	Growth/Shrinkage Time After Casting After 2 min.	After 1 hr.	After 24 hr.	After 500 hr.	Belmont Alloy No.
2451*	Low 117	117	47	117	47	.32	8.9	44.7	22.6	8.3	5.3	In 19.1	5400	117	1.5	12.0	.000025	–1.4	>0.05	+.0005	–.0001	–.0002	–.0002	**2451***
2491*	Low 136	136	58	136	58	.31	8.8	49.0	18.0	12.0	—	In 21.0	6300	136	50	14.0	.000023	–1.35	>0.05	+.0003	.0000	–.0002	–.0002	**2491***
2505*	Bend	158	70	158	70	.339	9.4	50.0	26.7	13.3	10.0	—	5990	158	≈200	9.2	.000022	–1.7	+0.60	+.0025	+.0051	+.0051	+.0057	**2505***
2502	Woods	158	70	169	76	.347	9.6	50.0	25.0	12.5	12.5	—	6100	158	≈190	9.3	.000022	–1.8	+0.4	–.0001	+.0002	+.0031	+.0035	**2502**
2431	Safe	160	71	190	88	.341	9.4	42.5	37.7	11.3	8.5	—	5400	162.5	≈220	9.0	.000024	–2.0	+0.3	–.0004	.0000	+.0022	+.0025	**2431**
2531*	Mellottes	203	95	203	95	.350	9.7	52.5	32.0	15.5	—	—	6100	203	≈213	9.0	.000020	–1.7	+0.4	–.0002	+.0055	+.0057	+.0061	**2531***
2503	Rose	203	95	239	115	.3365	9.3	50.0	25.0	25.0	—	—	6200	203	≈200	9.5	.000020	–1.6	+0.4	–.0001	+.0045	+.0052	+.0060	**2503**
2481	Matrix	218	103	440	227	.343	9.5	48.0	28.5	14.5	—	Sb 9.0	13000	240	>1	19	.000022	–1.5	+0.5	+.0008	+.0048	+.0051	+.0061	**2481**
2562*	Base	255	124	255	124	.38	10.3	55.5	44.5	—	—	—	6400	255	≈65	10.2	.000021	–1.5	+0.3	–.0008	–.0008	+.0008	+.0022	**2562***
2581*	Tru	281	138	281	138	.315	8.7	58.0	—	42.0	—	—	8000	281	≈200	22	.000015	+0.77	+0.05	+.0007	+.0006	+.0005	+.0005	**2581***
2405	Cast	281	138	338	170	.296	8.2	40.0	—	60.0	—	—	8000	302	≈200	22	.000015	+0.5	0	–.0001	–.0001	–.0001	–.0001	**2405**

*Eutectic Alloy

Bi=Bismuth • Cd=Cadmium • In=Indium • Pb=Lead • Sb=Antimony • Sn=Tin

≈Approximate Values

data sheet

Low-Melting (Fusible) Alloys

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Typical Uses

Intricate, compound foundry cores
Metallizing, repairing, and altering patterns & core boxes
"Lost wax" pattern dies
Fusible cores for compound wax patterns
Molds for duplicating plaster or plastic patterns
Anchoring patterns in foundry matchplates
Repairing masonite, plaster, plastic and wood tooling
Heat transfer medium in constant-temperature baths
Heat treating and tempering baths
Seals in bright annealing and nitriding furnaces
Anchoring magnets in chucks, instruments, and holding devices
Anchoring glass parts in metal and metal parts in glass
Chucks for grinding lenses and other optical components
Chucks for holding special or irregular contoured parts during machining, grinding, etc.
Chucks for gem cutting
Fusible element in automatic fire sprinklers, fire alarms, fire doors and other thermal safety devices
Safety plugs for tanks and cylinders for compressed gas, gasoline and diesel fuel
Automatic shut-offs for hot water heaters and furnaces
Molds for false teeth, dental models
Cores for electroforming external & internal shapes of copper, nickel, etc.
Encapsulating jet engine turbine blades for machining
Filler for bending of pipes, tubes, extrusions
Fishing lures to replace Lead-base lures
As master alloys for addition of Lead, Bismuth, or Tin to Aluminum and other metals
Molds for vacuum forming plastic sheet
Dies for sheet metal embossing
Proof casting for accurate internal measurements of machined parts, molds & dies
Counter electrode alloy in selenium rectifiers
Prosthetic device patterns
Shielding blocks for radiation and X-ray therapy
Low temperature solders for delicate instruments, assemblies, etc.
Sealing glass to glass or glass to ceramic in electronic devices, vacuum systems, laboratory apparatus, etc.
Cores for forming fiberglass laminates and plastic parts

Additional Data Sheets for Special Alloys & Applications

Radiation Therapy Alloys [LM-RT]
Tube Bending with Low-Melting Alloys [LM-4]

Forms & Shapes Available

Bar, Cake, Ingot, Links, Shot, Stick, Strip, Wire & Custom Shapes

Note: The information contained in this data sheet is the most accurate in our possession at the time of publication, and is based on our effort to meet industry references, standards, and specifications. However, Belmont cannot assume responsibility for in-service performance of these products due to our lack of control over, or supervision of, their use.

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