

alumina
ceramics



THE ULTIMATE IN HIGH TEMPERATURE— HIGH STRENGTH CERAMICS

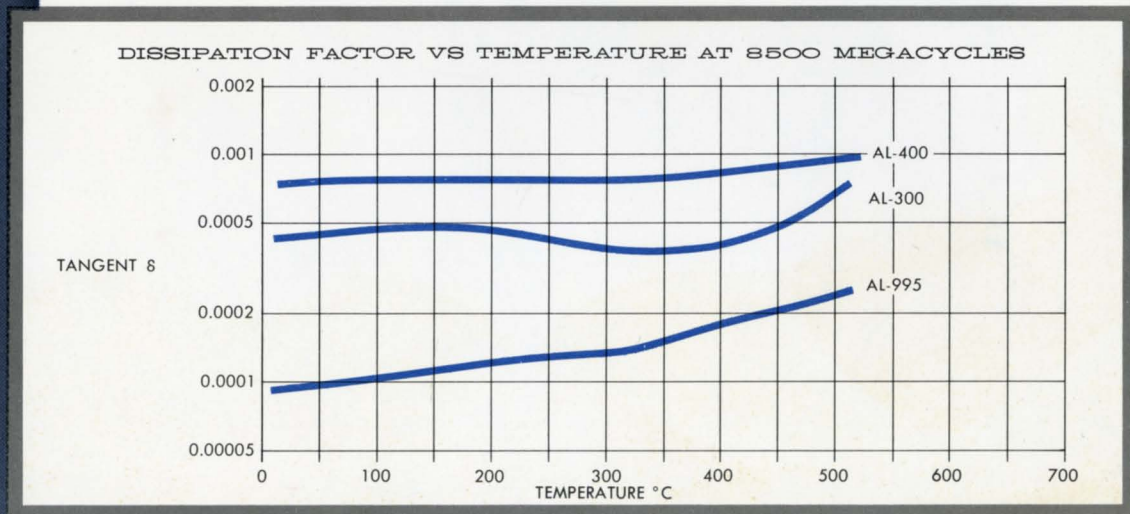
Since one composition rarely meets all service requirements, Wesgo has developed three dense, vacuum tight aluminas with Al_2O_3 contents from 95% to 99.5% and one, virtually pure (99.85% minimum Al_2O_3), porous body. Years of experience in the production of only quality ceramics to almost any part geometry enables us to produce these alumina bodies to meet individual design requirements.

The vacuum tight bodies, as a group, feature very high strength and abrasion resistance, permanent dimensional stability, high thermal conductivity, chemical inertness and exceptional electrical properties at elevated, as well as room temperatures. The vacuum tight bodies can all be metallized by the sintered molybdenum or reactive metals techniques, with consistently high strength bonds. The unusually large combination of desirable properties possessed by these vacuum tight ceramic bodies indicate their use for high voltage insulators, vacuum tube envelopes and internal spacers, R. F. windows, heat sinks, and a host of applications wherein their high mechanical strength, abrasion resistance, chemical inertness and high temperature properties make them of extreme value.

The porous (AL-1009) body is a very high purity, re-crystallized alumina body which, due to its complete freedom from any readily reducible impurities and extremely high melting point (over 2000°C), is widely used in such critical high temperature applications as cathode heater insulators in vacuum tubes.

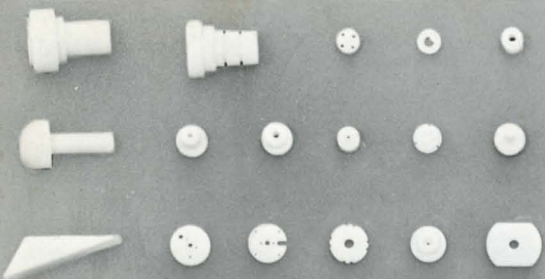
In parts of a compact nature, all of these bodies can be supplied in the "as moulded and fired" condition to dimensional tolerances of within $\pm 1\%$, with a normal minimum of $\pm .002''$. Certain shapes, such as relatively thin walled hollow cylinders, can only be supplied "as moulded and fired" to within $\pm 2\%$. Tighter dimensional tolerances than above can be held by resorting to diamond grinding on fired part. We do not, however, recommend grinding on our AL-1009 porous ceramic due to probability of contamination from the grinding process.

Material alone does not assure a reliable part . . . the exceptional performance characteristics associated with Wesgo aluminas are directly related to manufacturing knowledge and techniques. Since 1948, Wesgo has perfected precise controls over purity, composition and manufacturing techniques that alone impart a uniform quality to alumina ceramic parts. Quality can only be superficially specified . . . knowledge of alumina ceramics plus quality consciousness are the important extras offered by Wesgo.



PROPERTIES OF WESGO ALUMINAS

PROPERTY	UNIT	AL-400	AL-300	AL-995	AL-1009								
AL ₂ O ₃ CONTENT	%	95.0	97.6	99.5	99.85 min								
FLEXURAL STRENGTH	psi	64,000	46,000	62,000	23,000								
COMPRESSIVE STRENGTH	psi	>300,000	>250,000	>300,000	>100,000								
BULK SPECIFIC GRAVITY	---	3.70	3.76	3.89	3.0-3.2								
POROSITY	--- % water absorption	vacuum tight 0.00	vacuum tight 0.00	vacuum tight 0.00	porous 6.0-7.0								
COLOR	---	white	white	white	white								
HARDNESS	Mohs' scale	9	9	9	9								
THERMAL CONDUCTIVITY	cal/cm ² /cm/sec/°C	0.055	0.064	0.070	0.038								
COEFFICIENT OF LINEAR THERMAL EXPANSION	per °C (x 10 ⁻⁶)	25° - 200°C	8.0	8.5	6.9	---							
		200° - 400°C	8.0	8.5	8.5	---							
		400° - 600°C	8.5	9.0	9.0	---							
		600° - 800°C	9.5	8.3	9.8	---							
		800° - 1000°C	12.5	12.5	13.0	---							
MAXIMUM WORKING TEMPERATURE	°C	1500	1650	1725	1800								
DIELECTRIC STRENGTH	D.C. volts/mil (.100" thick—under oil)	700	1100	800	---								
Te VALUE	°C	>1000	>1000	>1000	>1000								
VOLUME RESISTIVITY	ohm-cm	25°C	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴							
		300°C	4.0 x 10 ¹³	1.0 x 10 ¹²	2.0 x 10 ¹¹	7.0 x 10 ¹¹							
		600°C	2.4 x 10 ¹⁰	2.3 x 10 ¹⁰	6.0 x 10 ⁸	1.2 x 10 ¹⁰							
		900°C	1.7 x 10 ⁷	5.0 x 10 ⁸	2.5 x 10 ⁶	1.6 x 10 ⁸							
DIELECTRIC CONSTANT (ε'/ε ₀)	10 MC. 1000 MC. 8500 MC.	25°C	9.39	9.90	10.12	9.53	9.91	10.14	9.58	9.92	10.20	200°C	---
		---	9.00	---	---	9.00	---	---	9.30	---	---	---	---
		---	9.04	9.34	9.55	9.04	9.32	9.54	9.37	9.61	9.82	7.07	---
DISSIPATION FACTOR (TAN δ)	10 MC. 1000 MC. 8500 MC.	25°C	0.00013	0.00024	0.00152	0.00004	0.00016	0.00052	0.00003	0.00035	0.00211	200°C	---
		---	0.00051	---	---	0.00030	---	---	0.00014	---	---	---	---
		---	0.00077	0.00080	0.0010	0.00045	0.00040	0.00072	0.00009	0.00014	0.00025	0.000011	---
LOSS FACTOR	10 MC. 1000 MC. 8500 MC.	25°C	0.00122	0.00238	0.01538	0.00038	0.00158	0.00527	0.00029	0.00347	0.0215	200°C	---
		---	0.00459	---	---	0.00270	---	---	0.00130	---	---	---	---
		---	0.00696	0.00747	0.00955	0.00407	0.00373	0.00687	0.00084	0.00135	0.00245	0.00075	---



In addition to the alumina ceramics described in this pamphlet, our Ceramic Division also manufactures Wesgo VX Super Refractory. This composition, in contrast to most ceramics, is virtually immune to cracking and spalling due to thermal shock. By virtue of this unusual characteristic, "VX" is widely used in the form of boats, slabs and special fixtures for applications such as furnace brazing, sintering and other high temperature processes where a high degree of thermal shock is encountered.

Our Metals Division has pioneered in the development of low vapor pressure brazing alloys designed specifically for use in high vacuum systems. A complete range of melting temperatures is available, offering the vacuum tube designer maximum flexibility in the brazing process. These alloys have become a standard in an industry where performance requirements demand continuing excellence.

Separate catalogs describing the above products are available upon request.

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