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Pilot[®] D-300 Hard Anodizing electrolyte

Anodizing of Aluminum Alloys with Pilot[®] D-300

Pilot[®] D-300 Concentrate is a 50% aqueous solution of 4-sulfophthalic acid. It is the primary component of the preferred electrolyte for the production of “hard” anodic oxide coatings on aluminum and aluminum base alloys. Such coatings, in addition to being highly abrasion resistant, are colored in metallic gray, brownish gray, black, bronzes, gold and dark brown colors, which are attractive for architectural and other uses of aluminum.

The colors obtained with Pilot[®] D-300 depend on the base metal composition, current density, voltage, film thickness and electrolyte composition, particularly the sulfate and aluminum contents. Therefore, it is necessary to control all these factors carefully in order to obtain consistent color in the finished product.

TABLE 1 illustrates the preferred electrolyte composition ranges for anodizing aluminum with Pilot[®] D-300 and TABLE 2 demonstrates typical anodizing formulations. The anodizing coatings produced using the formulations shown in TABLE 2 are distinctly colored and have an extremely high abrasion resistance. Electrolytes A and C depicted in TABLE 2 are preferred in producing colored coatings of high abrasion resistance at room temperature, but D and E, where the proportion of sulfuric acid is much higher, give lighter colored coatings unless the temperature is lowered to 10°C. Pilot[®] D-300 is such an effective and efficient in anodizing electrolyte; it is able to produce an anodized coating of 25µm within 30 minutes at 24°C and 24 amp/sq. ft. (2.59A/dm²) while the voltage increases from 32-70 volts. Pilot[®] D-300 produces colors varying from dull gold on pure aluminum, through bronze on 6063 alloy to black on 7075 alloy. TABLE 3 illustrates that some of many different anodized decorative colors which are achievable with Pilot[®] D-300 by varying the density of the coating on the alloys shown.

Anodizing with Pilot[®] D-300, 4-sulfophthalic acid efficiently produces decorative and protective oxide coatings under a wide range of practical operating conditions, at moderate cost, with moderate voltage and cooling requirements.

TABLE 1
Operating Limits in the D-300 Process

Operating Factor	Typical Ranges
Pilot [®] D-300 Concentrate	70-130 g/l.
Sulfuric Acid	3-10 g/l.
Temperature	15.6-32.7°C
Current Density	12-36 amp/sq. ft. (1.3-3.9 A/dm ²)

TABLE 2
Examples of the D-300 Process

Electrolytes	A	B	C	D	E
D-300 Concentrate g/l.	100	10	75	50	75
Sulfuric Acid g/l.	8	1	10	100	65
Water	Balance				

TABLE 3
Colors Obtained with the D-300 Process

Alloy Description	Nominal Constituents (%)	Color of Coating
1100	Normal impurities	dull gold
5052-H34	2.6 Mg, 0.25 Cr	pale yellow
6061-T6	0.6 Si, 0.3 Cu, 1 Mg, 0.25 Cr	black
6063-T5	0.4 Si, 0.7 Mg	bronze
7075-T6	1.6 Cu, 2.5 Mg, 0.3 Cr, 5.6 Zn	black
8013	0.35 Cr	gold bronze

The information and suggestions given are drawn from data we believe to be reliable, but in all cases the user should check and confirm the suggestions and results in their own use before proceeding further. None of the suggestions or recommendations constitute freedom from any patents that may be existent in the field or be issued

For More Information and Samples, Contact Pilot Chemical

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