UDC 621·3·035·221·23 : 669·268

(Reaffirmed 2006)

Indian Standard

SPECIFICATION FOR ALLOY LEAD ANODES FOR CHROMIUM PLATING

(Second Revision)

1. Scope — This standard lays down the requirements for alloy lead anodes used in chromium plating.

2. Chemical Composition

2.1 In chromium plating, pure lead anodes are attacked by the bath when the current is off; therefore the more resistant alloys with about 6 percent antimony or tin are used.

2.2 The material shall conform to the chemical composition requirements of any one of the following grades as given in Table 1 when analyzed in accordance with IS : 403-1964 'Methods of chemical analysis of lead and antimonial lead (*revised*)'.

TABLE 1 CHEMICAL COMPOSITION OF ALLOY LEAD ANODES FOR ELECTROPLATING

Grade	Elements, Percent								
	Sb	Pb	As, *Max*	Sn, *Max*	Cu, *Max*	Bi, *Max*	Fe, *Max*	Zn, *Max*	Ag, *Max*
PbSb6	5·5-6·5	Remainder	0·05	0·06	0·05	0·02	0·01	0·05	0·008
PbSb7	6·5-7·5	Remainder	0·05	0·06	0·05	0·02	0·01	0·05	0·008
PbSb8	7·5-8·5	Remainder	0·05	0·06	0·05	0·02	0·01	0·05	0·008
PbSn5·5	—	Remainder	0·05	5·0-6·0	0·05	0·02	0·01	0·05	0·008

Note 1 — Grade PbSn5·5 is generally recommended for use in self-regulating high speed baths as well as conventional hard and bright chromium plating baths.

Note 2 — A small loss due to chromate formation cannot be avoided and the anodes do not last indefinitely. The rate of chromate formation is lessened and the desirable reoxidation of trivalent to hexavalent chromium in the bath is favoured if the anode has a film of brown lead peroxide on its surface. This may be formed by anodic treatment in sulphuric acid electrolyte overnight or for several days. It will be converted to chromate when the chromium bath is idle but will reform, with some loss, when the bath is again used.

3. Shape and Size — Alloy lead anodes shall be supplied in as cast, rolled, or extruded form as specified by the purchaser. Dimensions of anodes shall be as agreed to between the purchaser and the supplier.

Note — The reoxidation of trivalent to hexavalent chromium is also favoured by a large anodic area and many special anode cross sections, some of them patented, are available. These may be ridged, ribbed, corrugated or multi-edged. One study has indicated that round cross sections are preferable to flat or oval shapes in that the entire anode surface is active. It was also shown that there was little difference in performance between rod and tubular anodes of the same outside diameter; the latter represented a saving in weight of 25 to 40 percent. Anodes made by casting lead around a steel or copper core are also available. These have added strength, rigidity and conductivity and are necessary when very long anodes are used and in other special applications. Lead-plated copper rods serving as anodes in the chromium plating of gun barrels has been described. Flame-surfacing the lead anode prior to use allegedly improves its resistance to attack by the chromium bath. A cast alloy lead anode, containing 1 percent each of tin and silver is reported to perform best in a continuous strip plating line for chromium.

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Gr 2

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4. Freedom from Defects – Anodes shall be clean and free from visual defects such as cracks, inclusions, warps and sponginess which may adversely affect uniform dissolution while in use.

5. Sampling and Preparation of Sample for Analysis — Sampling of alloy lead anodes for chemical analysis shall be as agreed to between the manufacturer and the purchaser. A recommended sampling procedure and criterion for conformity are given in Appendix A.

6. Packing — Unless otherwise specified, anodes shall be separated according to their sizes and shall be packed in such a manner as to ensure safe transportation to the point of delivery. Wherever practicable, anodes of same size shall be packed in a single container.

7. Marking — The anodes shall be marked with the name, initials or trade-mark of the manufacturer. In case of anodes with hooks, the mark shall be placed near the hooks.

7.1 *Standard Marking* — Details available with the Bureau of Indian Standards.

APPENDIX A

(Clause 5)

SAMPLING PROCEDURE FOR LEAD ANODES FOR CHROMIUM PLATING

A-1. Lot — In any consignment, all the brass anodes of the same type and manufactured under similar conditions of production shall be grouped together to constitute a lot.

A-2. Scale of Sampling — The number of anodes to be selected at random from the lot shall depend upon its size and shall be as given below:

No. of Anodes in the Lot	*No. of Anodes to be Selected*
Up to 25	2
26 to 50	3
51 to 100	4
101 to 200	5
201 to 300	7
301 and above	10

A-3. Drilling

A-3.1 From each of the anodes selected in **A-2**, drillings shall be obtained from not fewer than three widely-spaced positions. These drillings shall be obtained as specified in **A-3.2** and drillings from each anode shall be tested separately.

A-3.2 Select a sharpened twist drill (6 to 10 mm drill should be suitable). Thoroughly clean the drill in light petroleum and wipe clean with muslin. Free the anode from any loose impurity by means of a steel wire brush. Bore the holes to approximately 10 percent of the thickness of the anode and discard the drillings therefrom. Place the anode on a clean tinned iron sheet and drill a further 80 percent of the thickness. Collect the drillings thus obtained and transfer to a clean container. If a larger quantity of drillings is required, more holes may be drilled as described above. Before analysing, the drillings should be washed in light petroleum. Pass a magnet over the drillings spread out on a piece of paper to remove any free iron or steel particles.

A-4. Number of Tests — The drillings from each anode selected in accordance with **A-2** shall be separately tested for requirements mentioned in **2.**

A-5. Criterion for Conformity — From the test results, average and the range shall be calculated and for each of the characteristics, the lot shall be considered as conforming to the requirements of this specification if the conditions mentioned below are satisfied for each characteristic:

a) If the maximum limit is specified, then (average + 0·6 range) shall be less than or equal to the limit specified; and

b) If the minimum limit is specified, then (average — 0·6 range) shall be greater than or equal to the limit specified.

EXPLANATORY NOTE

This standard was earlier published in 1964 and subsequently revised in 1979. In the present revision, the more resistant alloy with 6 percent tin has been specified for self-regulating high speed bath. An attempt has also been made to cover the various sizes and shapes of anodes along with their advantages in chromium plating, being used now-a-days.

In the preparation of this standard, due consideration has been paid to the manufacturing and trade practices followed in the country in this field.

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