



SUBJECT CATHODE ELECTRO-POLISHING  
 Process Specifications

SUPERSEDED DATE 8/29/46

Process described herein has been found to improve emission.

1. EQUIPMENT

- a. Two glass tanks 6" x 6" x 12" for polishing solutions. While one is in operation, set up other one.
- b. Lead cooling pipes 1/4" O.D. for cooling polishing solution, maintained as cathode in solution.
- c. Three 4-liter Pyrex beakers for hot distilled water.
- d. Three 950 watt electric hot plates (8 in. disc) for heating distilled water.
- e. Two shallow Pyrex dishes.
- f. Mesh Baskets 1" x 1" x 3-1/2"
- g. Two 1-liter beakers
- h. Two large ring stands
- i. Two loading bars
- j. Clips (at least 2) to hold cathodes. Clips should be covered with rubber cement, except surface which makes contact with cathode tabs, and which must be sand papered to a bright metallic finish,
- k. Ammeter and rheostat connected in series on anode side of circuit.
- l. Air oven (110°C)
- m. Fisher Filtration Apparatus

2. MATERIAL

- S22 Acid Sulphuric C.P.
- M15 Methanol C.P.
- A9 Ammonium Hydroxide C.P.
- \*W60 Deionized water

\*\*

DANGER

SULPHURIC ACID SAFETY PRECAUTIONS: See 33-2-7C  
 AMMONIUM HYDROXIDE SAFETY PRECAUTIONS: See 33-2-8A

3. PREPARATION OF BATHS

- a. Polishing bath - Solution of 50% distilled water and 50% sulphuric acid by volume. ALWAYS POUR ACID SLOWLY INTO WATER. NEVER THE REVERSE.
- b. Ammonia rinse - 33.3% solution by volume,
- c. Dilute ammonia bath - 25cc ammonium hydroxide in 250cc of distilled water.

4. PROCEDURE

- a. Straighten cathodes in loaded rack into a perpendicular position and then clamp clip (item lj) on tabs of cathodes. Caution must be exercised in clamping so that all cathodes are in nearly the same plane and at equal distances from clamps. Load about 33/bar in case of 6AK5 and 2D21, and about 68/bar for other types.
- b. Fasten loaded clip to loading bar attached to ring stand, immersing cathodes up to embossing. Loading bar is maintained as the positive connection in the solution.
- c. Electro-polish as follows:

Type	One Bar	Two Bars
6AK5	1-1/2 min. at 13-1/2 amps.	1-1/4 min. at 20 amps.
6J6	1-1/2	1-1/2 20
Acorn	1-1/4 10	1-1/4 20
Midget	1-1/4 9	1-1/4 15
2D21		2 25
9005		1-1/4 8
6F4	1-1/4 15	
6J4		1-1/4 10
1644		1-1/2 20
6AK6		1-1/4 15

PCH1038-35/EG

SUBJECT ELECTRO-POLISHING - Cathodes

SUPERSEDED DATE 12/27/43

4. PROCEDURE (Cont'd)

- d. Wash clip and cathodes thoroly in running cold tap water.
- e. Unload clip into shallow dish containing about 1/4" of dilute ammonia solution.
- f. When about 1,000 cathodes have been unloaded, wash polished cathodes as follows:
  1. Drain off ammonia water, being careful not to spill cathodes.
  2. Load cathodes into mesh basket.
  3. Immerse basket in 33.3% ammonia solution for 30 seconds.
  4. Rinse for 1 minute in running tap water.
  5. Place basket in an empty 400cc beaker. Add 300cc distilled water and place beaker on "Filtrator" base. Wet rim of bell jar with water. Cover beaker with bell jar. Be sure mesh guard is around the bell jar. Turn on the vacuum and allow solution to bubble for at least 2 minutes. Turn off the vacuum; remove the bell jar and then the basket.
  6. Immerse basket of cathodes for 3 minutes in each of 3 tanks filled with hot distilled water (about 90°C).
  7. Rinse in 500cc of methanol for 30 seconds.
  8. Dry in oven for 15 minutes at 110°C.
  9. Empty into molybdenum boat and fire in line hydrogen at 600°C for 10 min.

5. PRECAUTIONS

When bath is operating correctly, gas bubbles are emitted from each cathode suspended in the bath, as well as from the negative elements, the lead cooling pipe.

Cathodes which do not make good contact to the clip do not emit gas and come out of the bath with a very dull, etched surface.

The clip \*\*or clips should be suspended midway between the two negative electrodes. This is important. Avoid getting any water into polishing bath. Clips should be thoroly dried before polishing the next lot of cathodes.

6. MAINTENANCE

- a. Refill each of three hot distilled water beakers every hour or after every 1000 cathodes.
- b. Renew ammonia rinse bath every 1000 cathodes.
- c. Change methanol 3 times per 8 hr. shift. Save used methanol for reclaiming.
- d. Change ammonia twice per 8 hr. shift.
- e. Cooling water should run thru the lead cooling pipes at all times that the bath is in use. Keep temperature at 10° to 30°C.
- f. Electro-polishing bath should be renewed every day.

STANDARDIZING SECTION  
ENGINEERING DEPT.