



Designation: B630 – 88 (Reapproved 2021)

Standard Practice for Preparation of Chromium for Electroplating with Chromium¹

This standard is issued under the fixed designation B630; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice is intended to serve as a process guide (not as a standard procedure) for producing adherent electrodeposits of chromium on chromium for engineering use.

1.2 Only well-known, generally practical methods using hexavalent chromium plating baths have been included. Some of the newer proprietary chromium plating processes produce chromium plating for which this process is unsuitable. Suppliers of the processes should be consulted.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*:²

[B177 Guide for Engineering Chromium Electroplating](#)

3. Significance and Use

3.1 Electrodeposits of chromium on chromium are produced in cases where it is desired to obtain a better performing coating, to reclaim plated parts that are defective, or restore worn chromium coatings to original dimensions.

¹ This practice is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.02 on Pre Treatment.

Current edition approved Oct. 1, 2021. Published October 2021. Originally approved in 1977. Last previous edition approved in 2017 as B630 – 88 (2017). DOI: 10.1520/B0630-88R21.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4. Preparation of Surface

4.1 *Surface Finishing*—The smoothness of the chromium coating before electroplating with chromium should closely approximate the requirements of the finished part. It is usually achieved by appropriate grinding with a diamond wheel.

4.2 *Stripping and Basis Metal*—With previously electroplated parts where the chromium deposit has been worn through, or where grinding has exposed the basis metal, preferred results are obtained by stripping the remaining chromium completely. However, it is possible to obtain satisfactory deposits on such substrates by careful attention to details in the pretreatment and electroplating process steps.

4.3 Stripping may be done by several methods, including proprietary processes or inhibited hydrochloric acid solution (10 to 20 % by volume), or anodic treatment at 55 to 800 A/m² (5 to 75 A/ft²) in a solution of 35 to 50 g/L (5 to 7 oz/gal) of sodium hydroxide or 60 to 75 g/L (8 to 10 oz/gal) of sodium carbonate at 20 to 25°C (70 to 80°F).

4.4 *Process Outline*:

4.4.1 Preclean (see 5.1.1 and 5.1.2),

4.4.2 Alkaline electrolytic clean (see 5.1.3),

4.4.3 Rinse (cold water),

4.4.3.1 Rinse (hot water),

4.4.3.2 Dry,

4.4.3.3 Mask (see 5.2),

4.4.4 Activate (see 5.3),

4.4.5 Chromium electroplate,

4.4.6 Rinse (cold water),

4.4.7 Rinse (hot water), and

4.4.8 Dry.

5. Procedure

5.1 *Cleaning*—The following cleaning treatments may be used for all conditions and types of electrodeposited chromium. The choice of the procedures will be governed largely by the condition of the surface.

5.1.1 *Precleaning*—When considerable amounts of grease and oil are present on the surface, precleaning (emulsion or alkaline spray or soak) is necessary to remove the bulk of the soil.

5.1.2 *Abrasive Cleaning*—Oxide and other films may be removed by mechanical techniques using such abrasives as fine emery on a cloth or a wheel, pumice slurry, or greaseless

buffing compounds. Grit blasting, shot blasting, wet blasting, or vapor honing may also be used. Abrasive cleaning is generally not necessary when suitable mechanical finishing procedures have been used.

5.1.3 *Cathodic Alkaline Cleaning*—Removal of final traces of dirt, grease, and oil is best accomplished by cathodic alkaline cleaning. Cathodic electrocleaning is necessary because anodic electrocleaning will strip chromium and may expose the basis metal. In cathodic cleaning, the parts are negatively charged and attract positively charged metallic ions, soaps, and other colloidal materials in the solution, causing them to “plate out” as loose smut on the surfaces being cleaned. Thus, do not allow the cleaning solution to become heavily contaminated with dirt, grease, or oil.

5.2 *Masking*—Rigid, nonconductive materials or stop-offs, which are especially compounded nonconductive tapes, waxes, lacquers, or polymeric materials, will protect areas that are to remain free of chromium. Due to the varying kinds of chromium electroplating solutions and interactions with these materials, vendor instructions should be followed.

5.3 *Activating:*

5.3.1 The procedure used for etching or activating the chromium surface is most important and usually determines the soundness of the adhesion. Chromium exhibits a strong tendency to acquire surface oxides rapidly (air passivity) that reduce the adhesion of subsequent chromium deposits. Anodic etching in a chromic acid solution, 250 g/L, at room temperature is recommended. In some instances, this procedure may be performed in the chromium electroplating solution.

5.3.2 Give the part an anodic etch for 5 to 60 s at 6 V. For effective control, confirm etch action by visual observation of uniform gassing; increase etch time if necessary. When basis metal is exposed or high-speed chromium electroplating solutions are used, keep the time as short as possible.

5.3.3 When the part to be electroplated has a large mass, allow it to reach the temperature of the electroplating bath before etching.

5.4 *Chromium Electroplating:*

5.4.1 Make the part cathodic up to 3.0 V. Slowly increase the voltage in steps of 0.25 V so that gassing and electroplating start after 30 to 60 s and full current is reached in 5 min.

5.4.2 The composition of the ordinary or “conventional” solution is 250 to 400 g/L of chromic acid (CrO_3) and sulfate radical (SO_4^-) to maintain a ratio by weight of CrO_3 to SO_4^- of 100 to 1, although many electroplaters prefer ratios as low as 80 to 1, which facilitates electroplating chromium on chromium. The sulfate is generally added as sulfuric acid (94 to 96 mass % H_2SO_4). Refer to Guide **B177** for more information on the operation of the electroplating solution.

5.4.3 Some proprietary baths contain a supplementary catalyst in the form of fluorides or other mixed catalysts. Some of these baths are satisfactory, but some could be unsuitable. The supplier of any proprietary bath should be consulted for specific information.

6. Keywords

6.1 activation; chromium; cleaning; preparation; striking

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