SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS4984A

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Revised 2011-07

Superseding AS4984

(R) Coating Requirements for Aerospace Hand Tools

RATIONALE

Ths update of AS4984 is to be incorporate improvements complied from customer feedback. The improvements include the acceptance of alternate coating (used in lieu of nickel chromium plating). Major revison of AS4984 to include the expanding requriements in manufacturing processes that reflect and are asociate with Aerospace hand tools.

1. SCOPE

This SAE Aerospace Standard (AS) covers requirements for nickel-chromium coatings, black oxide or black phosphate coatings, and alternate coatings for aerospace hand tools.

1.1 Classification

Coatings covered by this document shall be of the following types, as specified:

1.1.1 Type I - Nickel-Chromium Coating

1.1.2 Type II - Black Oxide, Black Phosphate Coating, or other Black finish coatings

1.1.3 Type III - Alternate Coatings, used in lieu of nickel-chromium plating

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A 754-96 Coating Thickness by X-ray Fluorescence, Standard Test Method for

ASTM B 487-85 Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of a Cross Section, Standard Test Method for

ASTM B 499-96 Measurement of Coating Thickness by the Magnetic Method, Standard Test Method for

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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AS4984A

ASTM B 530-96 Measurement of Coating Thickness by the Magnetic Method: Electrodeposited Nickel Coatings of Magnetic and Nonmagnetic Substrates, Standard Test Method for

ASTM B 568-91 Measurement of Coating Thickness by X-ray Spectrometry, Standard Test Method for

ASTM B 571-91 Adhesion of Metallic Coatings, Standard Test Methods for

ASTM B 748-90 Measurement of Thickness of Metallic Coatings by Measurement of Cross Section with a Scanning Electron Microscope, Standard Test Method for

ASTM B 117-95 Salt Spray (Fog) Apparatus, Standard Test Method of

ASTM B 537-70 Standard Practice for Rating of Electroplated Panels Subjected to Atmospheric Exposure

ASTM D 968-93 Standard Test Methods for Abrasion Resistance of Organic Coatings by the Falling Abrasive Tester

3. REQUIREMENTS

3.1 Requirements for Nickel-Chromium Coating

3.1.1 General

The tool shall be electroplated with a nickel (Ni) followed by chromium (Cr) coating.

3.1.2 Appearance

The coating shall be bright, continuous, and consistent. Visible contact marks resulting from electroplating operations shall be confined to the tool interior. Surfaces of the electroplated tool shall be adherent, smooth, continuous, and free of visible defects, such as blisters, roughness, and uncoated areas which may adversely impact the item's serviceability, durability, safety and/or appearance. Surfaces shall not be stained or discolored and shall have a bright appearance. Different plating processes, such as trivalent chromium process, shall be similar in appearance on exterior surfaces relative to hexavalent chromium coatings. Minor differences in shading are acceptable.

3.1.3 Adhesion

The coating shall be subjected to the adhesion test as specified in 4.1.3. The plated specimen shall have "perfect" adhesion as defined in ASTM B 571.

3.1.4 Thickness

The minimum coating thickness for chromium and nickel shall be in accordance with the applicable SAE standard. If the standard and or specification does not state a minimum thickness, the minimum thickness shall be, chromium 0.000007 in (0.000178 mm) and nickel 0.000200 in (0.00508 mm).

3.2 Requirements for Type II Black Oxide, Black Phosphate Coating or other black finish coatings.

3.2.1 General

The tool shall be coated with chemically produced black oxide or black phosphate coating followed with a rust preventative coating. Other black finish coatings shall conform to requirements as outlined in 3.1.

3.3 Requirements for Type III Alternative Coatings (used in lieu of nickel-chromium plating)

3.3.1 General

The tool coated with an alternate coating in lieu of nickel-chromium plating shall meet the appearance, corrosion, adhesion and abrasion requirements as specified herein. All coatings shall meet the appearance requirements of 3.1.2. Alternate coatings shall be similar in appearance on exterior surfaces to a nickel-chromium plating. Minor differences in shading between the alternative coating and a nickel-chromium plating are acceptable. When like products are furnished in a set or kit consisting of numerous pieces, i.e., the sockets in a socket wrench set, and some are furnished with a nickel-chromium plating and some with an alternative coating, there shall be no appreciable difference in appearance on exterior surfaces between the coatings of the like products having a nickel-chromium plating and those with an alternative coating. Minor differences in shading on interior surfaces, such as the inside of socket wrenches, are acceptable. All qualitative appearance requirements as specified herein for Type III coatings shall be established by the customer and manufacturer and tested in accordance with 4.2.2.

3.3.2 Corrosion

Alternate coatings shall be capable of withstanding 72 h of exposure to the salt spray test specified in 4.2.5 without falling below a rating of seven as defined in ASTM B 537. A rating of six is considered a failure.

3.3.3 Adhesion

The coating shall be subjected to the adhesion test as specified in 4.2.4. The plated specimen shall have "perfect" adhesion as defined in ASTM B 571.

3.3.4 Abrasion

The coating/plating shall have no underlying steel exposed anywhere on the test surface, after being subjected to the abrasion test as specified in 4.2.3.

4. TEST PROCEDURES

4.1 Testing of Type I Nickel-Chromium

4.1.1 Thickness

One measurement of the thickness of nickel and one measurement of the thickness of chromium shall be made in each of the areas indicated on Figures 1 and 2 using any of the following appropriate, methods: ASTM A 754, ASTM B 487, ASTM B 499, ASTM B 530, ASTM B 568, and ASTM B 748.

4.1.2 Adhesion

Adhesion shall be tested as specified in 4.2.4 or in ASTM B 571 using one of the following methods: grind-saw, push, file, or burnishing.

4.1.3 Test Reports

Test reports shall contain the actual data recorded during the examinations and testing.

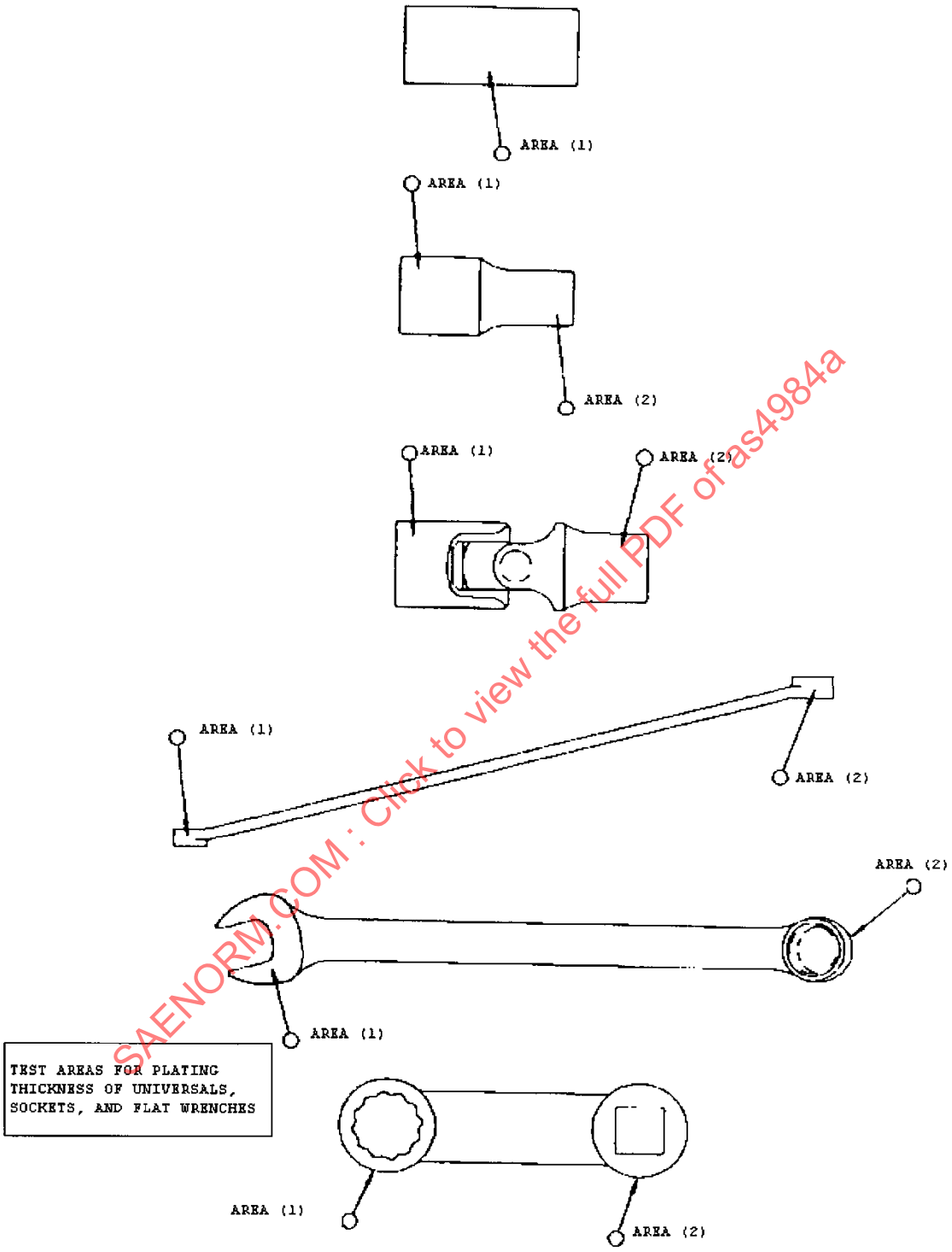

FIGURE 1 - LOCATION OF COATING MEASUREMENT

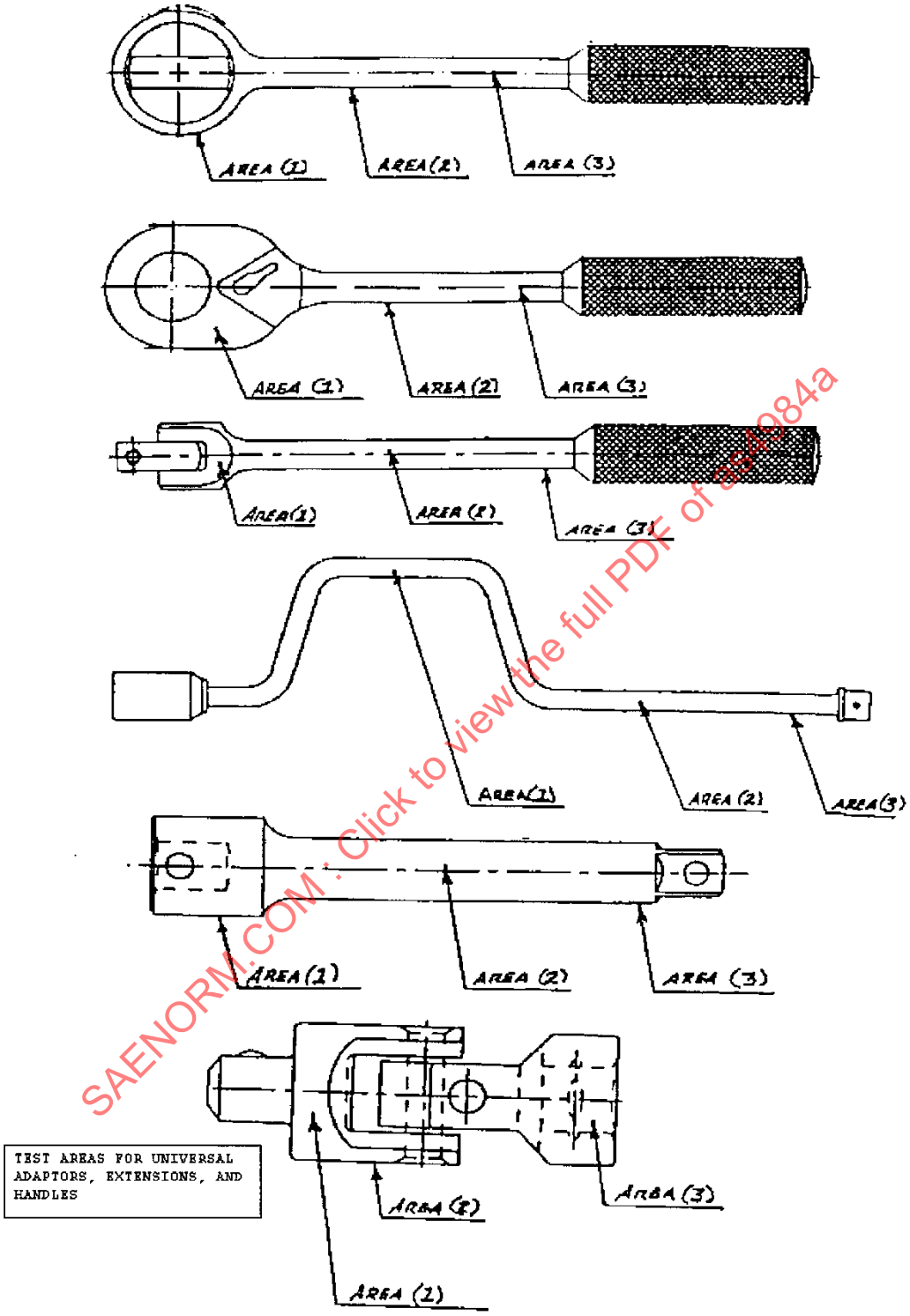

FIGURE 2 – LOCATION OF COATING MEASUREMENT