SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

SAE AS4283

Issued 1991-08-07

Submitted for recognition as an American National Standard

HANDLES AND ATTACHMENTS FOR HAND SOCKET WRENCHES

1. SCOPE:

This SAE Aerospace Standard (AS) covers handles and attachments for use with sockets and crowfoot wrenches in aerospace applications involving high torque, limited clearances, and generally clean conditions. This document provides additional requirements beyond ANSI B107.10M appropriate for aerospace use. The use of adapters, either enlarging or reducing, for turning high-strength fasteners is an unsafe practice. Adapters are not included in this document. The listing of tools in this document does not insure that they are available commercially.

1.1 Classification:

This document covers handles and attachments for socket wrenches and shall be of the following types, classes, and styles as specified:

a. Type I Handles:

(1) Class 1 - Hinged
(2) Class 2 - Ratchet, reversible

(a) Style A - Coarse action
(b) Style B - Fine action

(3) Class 3 - Speeder, brace type

b. Type II Attachments:

(1) Class 1 Universal joint
(2) Class 2 Bar, extension, solid

2. APPLICABLE DOCUMENTS:

2.1 The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS478 Identification - Marking Methods

2.1.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM B 487 Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of a Cross Section
ASTM B 504 Measurement of Thickness of Metallic Coatings by the Coulometric Method, Standard Test Method for
ASTM B 530 Measurement of Coating Thickness by the Magnetic Method: Electrodeposited Nickel Coatings on Magnetic and Nonmagnetic Substrates, Standard Test Method for
ASTM B 568 Measurement of Coating Thickness by X-ray Spectrometry, Standard Test Method for
ASTM B 571 Adhesion of Metal Coatings, Standard Test Methods for
ASTM B 748 Measurement of Thickness of Metallic Coatings by Measurement of Cross Section with a Scanning Electron Microscope, Standard Test Method for
ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials, Standard Test Methods for

2.1.3 ANSI Publications: Available from American National Standards Institute, 1430 Broadway, New York, NY 10018

ANSI B107.4 Driving and Spindle Ends for Portable Hand, Air and Electric Tools
ANSI B107.10M Handles and Attachments for Hand Socket Wrenches - Inch and Metric Series

3. TECHNICAL REQUIREMENTS:

3.1 Illustrations:

The illustrations shown herein are descriptive and not restrictive and are included for the convenience of requisitioning and purchasing officers and manufacturers and are not intended to preclude the purchase of handles and attachments, which are otherwise in accordance with this document.

3.2 Materials:

Unless otherwise specified hereinafter, the materials used in load bearing components in the manufacture of handles and attachments shall be steel hardened 40 to 54 Rc, the chemical composition and heat treatment of which shall be such as to produce handles and attachments conforming to the physical requirements specified herein. Cast steel shall not be used. Powdered metal pawls may be used.

3.3 Marking:

Marking shall be in accordance with ANSI B107.10M and AS478.

3.4 Manufacture and Design:

3.4.1 General Design: Unless otherwise specified herein, all dimensions and attributes shall be in conformance with ANSI B107.10M.

3.4.2 Drive End Dimensions: Male and female drive end dimensions shall conform to ANSI B107.4.

3.4.2.1 Retention Ball and Spring: The mouth of the hole in which the ball is assembled shall be inspected prior to assembly and shall not be more than the diameter of the ball, +0.002 in/+0.010 in. After assembly, the ball shall project from the surface of the male square by 0.16 to 0.35 times its diameter.

3.4.3 Chromium Plate: The plating shall be electrodeposited metals consisting of nickel, followed by chromium. No other undercoating shall be substituted for nickel. The average of three readings on exterior surfaces shall be equal to, or greater than, 0.000007 in with none of the three readings below 0.000006 in. Chromium plating thickness shall be tested in the three areas specified in Figure 1.

The plating shall be adherent, smooth, continuous, and free from pits, blisters, nodules, and any other defects that would interfere with their protective value and serviceability.

3.5 Type I, Class 1, Handles, Hinged:

Type I, Class 1, Handles, Hinged shall conform to Figure 2.

3.6 Type I, Class 2, Handles, Ratchet, Reversible:

Ratchets shall conform to Figure 3. All screws shall be securely retained by means of either lock washers, nylon inserts, or oil resistant adhesive. The ratchet shall ratchet with equal ease and similar sound in both directions. It shall be free of any neutral, or disengaged, position in which it may easily come to rest. There may be a moment during the reversing process when the ratchet is not engaged in either direction, but it shall not have a tendency to stop in this position during normal ratcheting or reversing. It is not required that the ratchet be open for servicing or cleaning. Ratchet gears integral with the drive tang shall be 42 to 56 Rc.

3.7 Type I, Class 3, Handles, Speeder, Brace Type:

The male square shall be hardened to a hardness of 38 to 54 Rc. The axis of the top and bottom portions of the speeder handle shall be aligned within 0.5 in. The handles shall conform to Figure 4.

3.8 Type II, Class 1, Attachments, Universal Joint:

The universal joint shall conform to Figure 5.

3.9 Type II, Class 2, Attachments, Bar Extension, Solid:

The bar extension shall conform to Figure 6.

4. TEST PROCEDURES:

Testing for requirements contained in the applicable tables herein and the applicable tables in ANSI B107.10M shall be conducted in accordance with ANSI B107.10M unless otherwise specified.

4.1 Hardness Testing:

Hardness definitions, nomenclature, and procedures used herein can be found in ASTM E 18. When grinding is necessary to prepare the test surface, the amount removed must not exceed 0.007 in on the surface contacted by the indenter.

4.2 Plating Testing:

4.2.1 Nickel Thickness: Nickel plating thickness shall be tested in accordance with any of the following documents:

a. ASTM B 487
b. ASTM B 504
c. ASTM B 530
d. ASTM B 568
e. ASTM B 748

4.2.2 Chromium Thickness: Chromium plating thickness shall be tested by the coulometric method in accordance with ASTM B 504.

4.2.3 Plating Adhesion: Plating adhesion shall be capable of withstanding the test specified as Method 9.1 Heat Quench Test of ASTM B 571.

4.3 Ratchet Cycle Test:

The manufacturer shall maintain a record of compliance with the cycle test requirements. The test shall be required whenever the design or method of manufacture is changed significantly. The ratchet mechanism shall withstand a cycle test of 50 000 cycles using the cycle test load as specified in Figure 3 without failure of the ratchet mechanism or loosening of screws or other parts of the ratchet handle. Following the cyclic test, the ratchet handle shall carry the proof load specified in Figure 3 and shall reverse 12 times without jamming or other evidence of malfunction. Tests shall be run at a speed not exceeding 30 load cycles per minute. The ratchet shall advance by 1 to 3 teeth on each cycle. The load shall be measured by a strain gage or other device capable of detecting peak loads. Care must be taken during the test not to impose shock loads greater than specified in Figure 3.

4.4 Speeder Straightness Test:

Straightness shall be measured by placing a straight edge so as to make contact with the stem close to the grip and wherever else it touches the stem in the vicinity of the crank or square. The straight edge shall be approximately in the plane of the crank sweep. If the straight edge fails to touch the stem adjacent to the square or adjacent to the end of the crank toward the square, the gap shall not exceed 0.5 in. This test shall be repeated with the straight edge at approximately 90° to the plane of the crank and the gap shall again not exceed 0.5 in. See Figure 7.

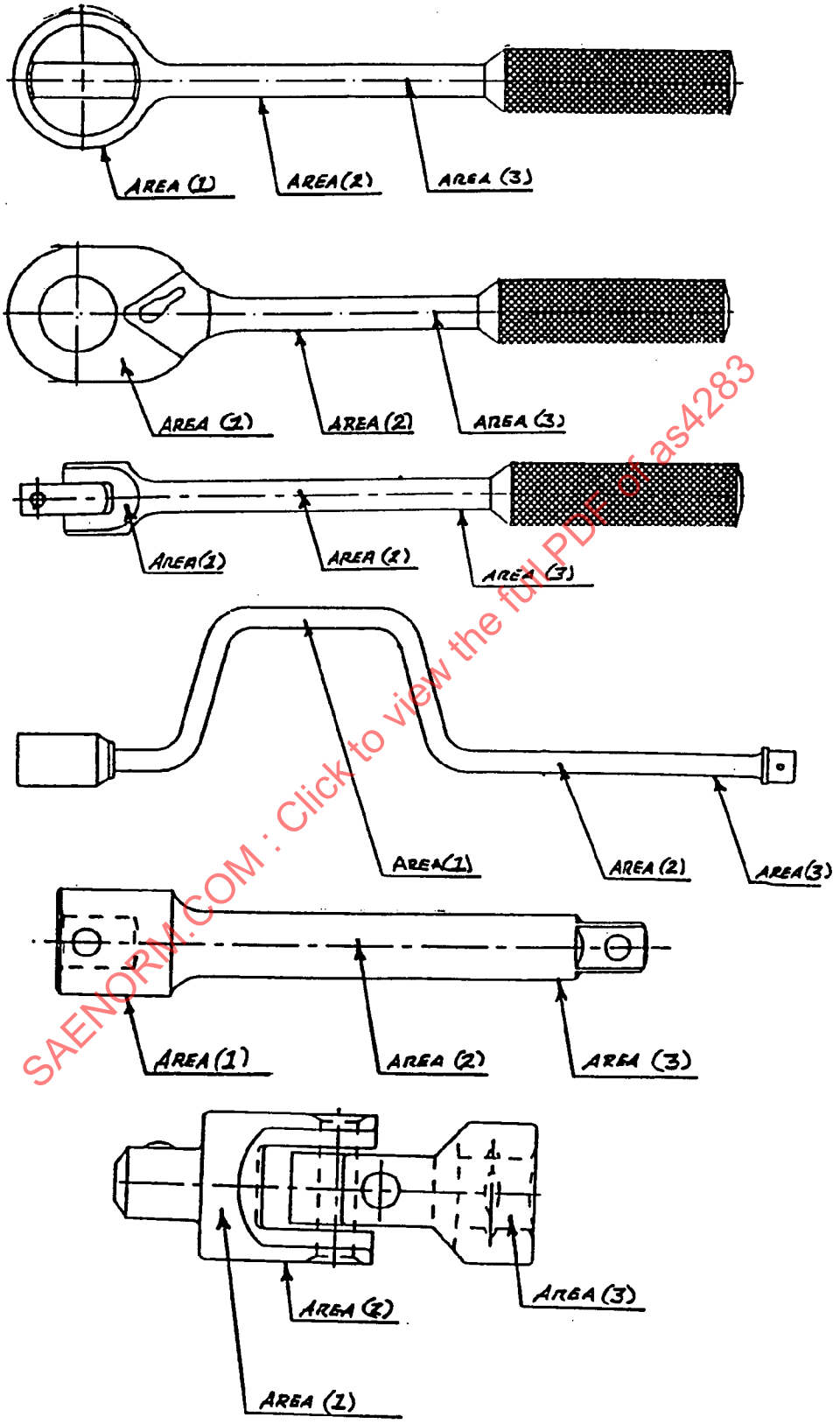
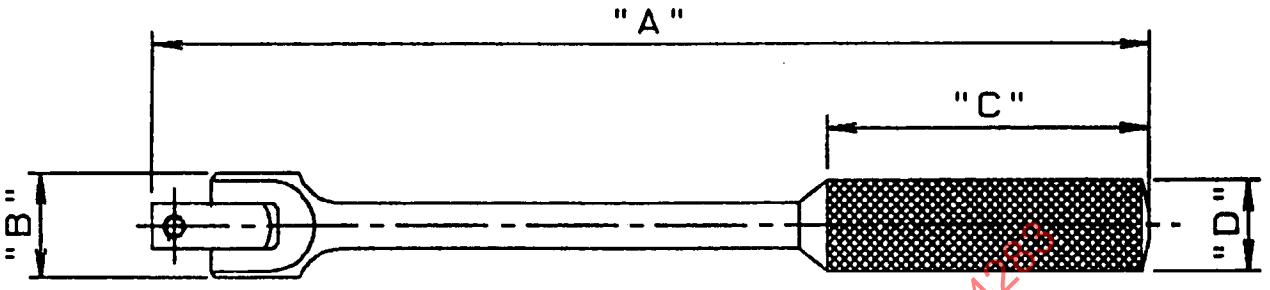
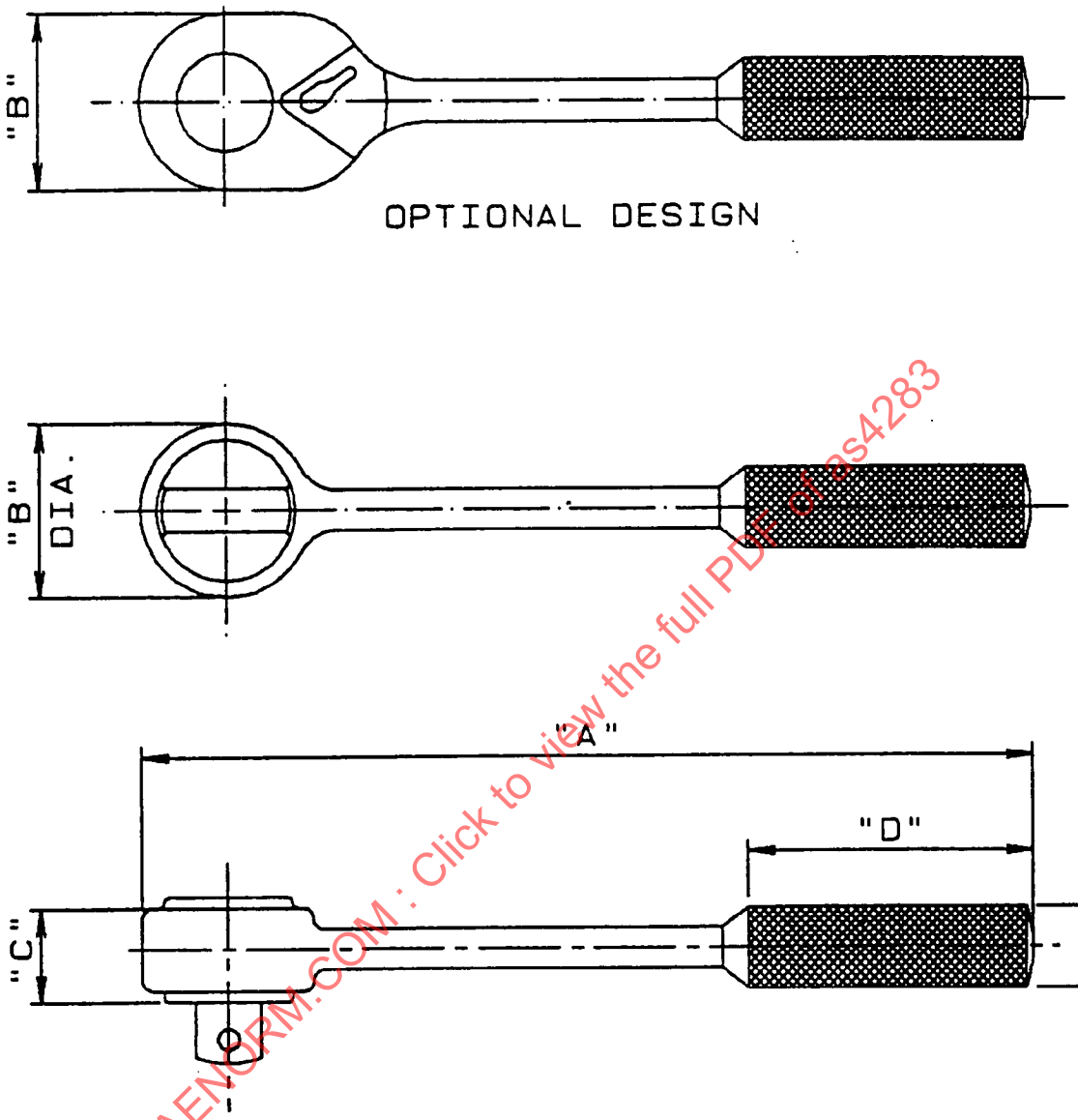


FIGURE 1 - Arrows Indicate Location of Area for Testing Chromium Plating Thickness



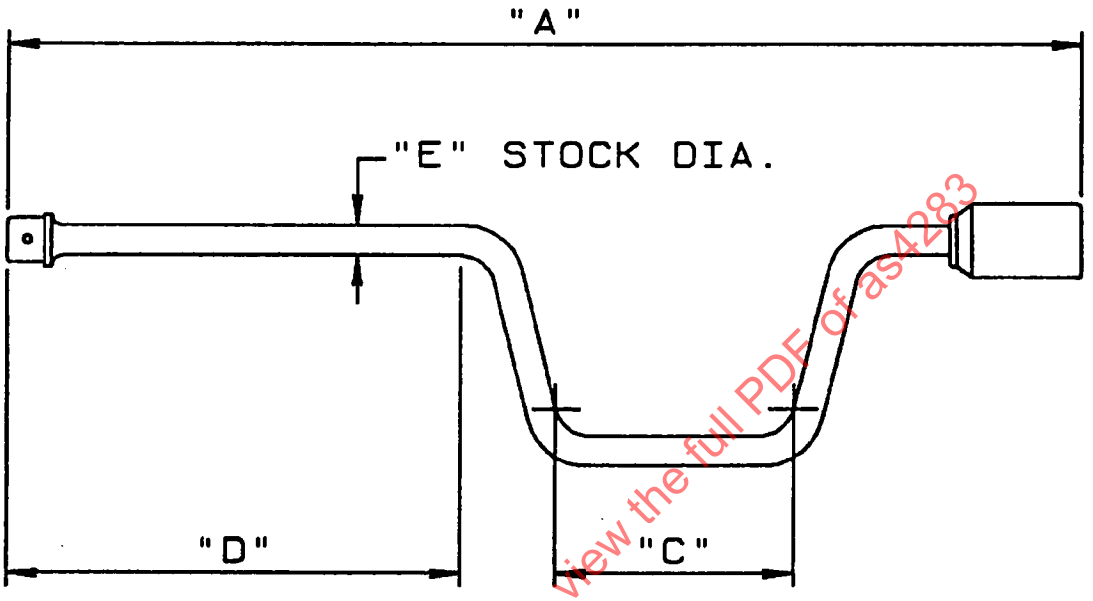
Drive, in	Overall Length, in "A" Min	Overall Length, in "A" Max	Dimension Across Hinge, in "B" Max	Handgrip Length, in "C" Min	Handgrip Diameter or Width, in "D" Min	Test Load in-lb Min
1/4	5.7	6.2	0.625	2.00	0.400	500
3/8	7.8	8.8	0.938	2.50	0.615	2 000
3/8	9.5	10.5	0.938	2.50	0.615	2 000
1/2	17.5	19.0	1.250	3.50	0.750	5 000
1/2	23.0	24.5	1.300	3.50	0.750	5 000
3/4	18.4	23.0	1.940	3.50	0.750	14 000

FIGURE 2 - Type I, Class 1, Handles, Hinged



Drive, in	Overall Length, in "A" Min	Overall Length, in "A" Max	Head Dimensions Width in "B" Max	Head Dimensions Head Thick. Less Tang & Rev. Lever, in "C" Max	Handgrip Length, in "D" Min	Handgrip Diameter or Width, in "E" Min	Style A Coarse Action Number of Teeth In Gear Range	Style B Fine Action Number of Teeth In Gear Min	Test Load in-lb Min	Cycle Test Torque in-lb Min
1/4	4.4	5.4	1.125	0.593	2.000	0.370	20-35	36	500	100
3/8	6.9	7.9	1.875	0.875	2.500	0.530	24-35	36	2 000	500
3/8	10.1	11.1	1.875	0.875	2.500	0.530	24-35	36	2 000	500
1/2	10	11	1.937	1.000	3.500	0.680	24-35	36	5 000	900
1/2	14.8	16.3	1.937	1.000	3.500	0.680	24-35	36	5 000	900
3/4	19.6	24	2.875	1.375	3.500	0.790	24-35	36	14 000	---

FIGURE 3 - Type I, Class 2, Handles, Ratchet, Reversible, Style A and Style B



Drive, in	Dverall Length, in "A" Min	Overall Length, in "A" Max	Grip Length "C" Min	Length, in Extension "D" Min	Diameter of Rod, in "E" Max
1/4	15.2	16.5	3.5	6.4	0.437
3/8	16.0	18.0	3.5	6.4	0.500
1/2	16.5	20.0	3.5	7.0	0.562

FIGURE 4 - Type I, Class 3, Handles, Speeder, Brace Type