



AEROSPACE STANDARD

AS28431™**REV. A**

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Superseding AS28431

Aerospace Hand Torque Wrenches (Mechanical, Impulse)

RATIONALE

Conversion of Federal Specification GGG-W-2843 dated May 7, 1993.

1. SCOPE AND CLASSIFICATION

1.1 Scope

This SAE International Aerospace Standard covers requirements for micrometer adjustable, feel impulse, torque wrenches. The torque wrench is used to apply a pre-set torque to threaded fasteners and other torque requirements.

1.2 Classification

Torque wrenches covered by this specification shall be one of the following types and classifications, as specified.

Type I Bi-directional torque wrench

- Class 1 Non-ratchet head (precise clockwise torque)
- Class 2 Ratchet head (precise clockwise torque)
- Class 3 Non-ratchet head (precise counter-clockwise torque)
- Class 4 Ratchet head (precise counter-clockwise torque)
- Class 5 Interchangeable head (precise clockwise torque)
- Class 6 Interchangeable head (precise counter-clockwise torque)

Type II Uni-directional torque wrench

- Class 1 Non-ratchet head (precise clockwise torque)
- Class 2 Ratchet head (precise clockwise torque)
- Class 3 Non-ratchet head (precise counter-clockwise torque)
- Class 4 Ratchet head (precise counter-clockwise torque)
- Class 5 Interchangeable head (precise clockwise torque)
- Class 6 Interchangeable head (precise counter-clockwise torque)

1.2.1 Class Accuracy

Type I bi-directional torque wrenches shall have an accuracy of $\pm 4\%$ in the precise torque direction, and $\pm 6\%$ in the opposite direction, and shall signal in both directions.

Type II uni-directional torque wrenches shall have an accuracy of $\pm 4\%$ in the precise torque direction, and shall signal in the precise torque direction.

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1.2.2 Accuracy

Torque accuracy is defined as the difference between the applied torque and the pre-set torque divided by the pre-set torque expressed as a percentage.

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 the 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.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AS4984 Coating Requirements for Aerospace Hand Tools

2.1.2 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 E18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials, Standards Methods of Test for

2.1.3 ASME Publications

Available from American Society of Mechanical Engineers, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900, Tel: 973-882-1170, www.asme.org.

ASME B107.4 Driving and Spindle Ends for Portable Hand, Air, and Electric Tools

ASME B107.10 Handles and Attachments for Hand Socket Wrenches - Inch and Metric Series

ASME B107.17 Gages and Mandrels for Wrench Openings

3. REQUIREMENTS

3.1 Torque Wrench

The torque wrench shall have an accurate micrometer-type, pre-setting mechanism upon which the required torque can be hand set by adjusting the mechanism. The torque wrench shall have a locking mechanism which holds the pre-set torque securely during use of the torque wrench. Operation of the pre-setting mechanism and locking mechanism shall not require the use of tools or equipment. The torque wrench shall have a torque signaling device that meets the requirements of 3.3.6.

3.2 Illustrations

The illustrations herein are descriptive and are not intended to preclude the purchase of torque wrenches otherwise conforming to this specification.

3.2.1 Torque Wrench – Type I and Type II, Class 1 and Class 3

Class 1 and Class 3 torque wrenches shall be similar to Figure 1; except 500 to 2000 ft-lb capacity torque wrenches similar to Figure 2.

3.2.2 Torque Wrench – Type I and Type II, Class 2 and Class 4

Class 2 and Class 4 torque wrenches shall be similar to Figure 3.

3.2.3 Torque Wrench – Type I and Type II, Class 5 and Class 6

Class 5 and Class 6 torque wrenches shall be similar to Figure 4. Interchangeable heads shall be similar to Figure 5, however, connection configurations can be different than illustrated.

3.3 Design, Materials and Construction

The torque wrench design, materials and construction shall be of uniform high quality adequate to meet the requirements of this specification and capable of providing repeated accuracy over an expected service period.

3.3.1 Handle

The torque wrench shall have a metal handle of one-piece or multi-piece design using a threaded or other mechanically fitted joint. A suitable portion of the handle shall be knurled, grooved, ribbed or provided with a non-toxic rubber cover that facilitates turning of the adjustable portion of the handle.

3.3.2 Drive Requirements – Type I and Type II, Classes 1, 2, 3, 4

Torque wrenches of classes 1 through 4 shall have a male square drive with a spring-loaded steel ball or similar retaining mechanism which conforms to the requirements of ASME B107.4, and shall be tested in accordance with 4.10. The spring-loaded steel ball or similar retaining mechanism shall be located as shown in Figure 1. The male square drive hardness shall be Rockwell C 40 to 60, and shall be tested in accordance with 4.10.1. On non-ratcheting torque wrenches, two opposite flats of the male square drive shall be parallel within 5 degrees of the longitudinal axis of the torque wrench.

3.3.3 Drive Requirements - Classes 5 and 6

Interchangeable head class 5 and 6 torque wrenches shall have interchangeable connection on the end of the drive tang, which allows attachment of mating drive heads. The interchangeable connection shall have an enclosed retaining system to prevent accidental disengagement of the interchangeable head during normal use. The drive tang hardness shall be Rockwell C 40 to 60 and shall be tested in accordance with 4.10.1.

3.3.4 Interchangeable Head Requirements – Type I and Type II, Class 5 and Class 6

Fixed square drive interchangeable heads shall conform to the requirements of ASME B107.4 and shall be tested in accordance with 4.10. Ratcheting interchangeable heads shall meet the requirements of 3.3.5. Open end, flare nut, and box interchangeable heads shall meet the dimensional requirements of ASME B107.17M. The interchangeable head shall be designed so that interchanging one head for a different head shall not require the torque wrench to be recalibrated. The interchangeable head hardness shall be Rockwell C 40 to 60 and shall be tested in accordance with ASTM E18. The torque wrench and interchangeable heads shall be supplied by the same manufacturer. Markings shall meet the marking requirements in 3.10.

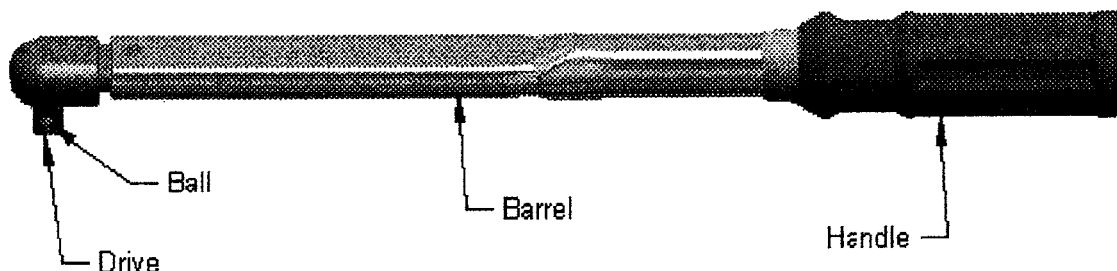


FIGURE 1 – TYPE I AND TYPE II, CLASSES 1 AND 3 TORQUE WRENCH, MICROMETER ADJUSTABLE, TORQUE PRE-SETTING, FEEL IMPULSE, NON-RATCHETING

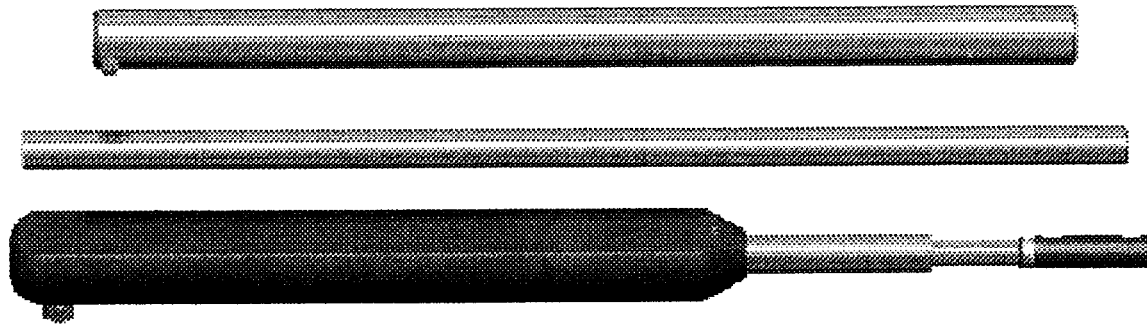


FIGURE 2 – TYPE I AND TYPE II, CLASSES 1 AND 3 TORQUE WRENCH (500 TO 2 000 FT-LB CAPACITY), MICROMETER ADJUSTABLE TORQUE WRENCH, FEEL IMPULSE, NON-RATCHETING HEAD



FIGURE 3 – TYPE I AND TYPE II, CLASSES 2 AND 4 TORQUE WRENCH, MICROMETER ADJUSTABLE TORQUE, FEEL IMPULSE, RATCHETING HEAD



FIGURE 4 – TYPE I AND TYPE II, CLASSES 5 AND 6 TORQUE WRENCH, MICROMETER ADJUSTABLE TORQUE, FEEL IMPULSE, INTERCHANGEABLE HEAD

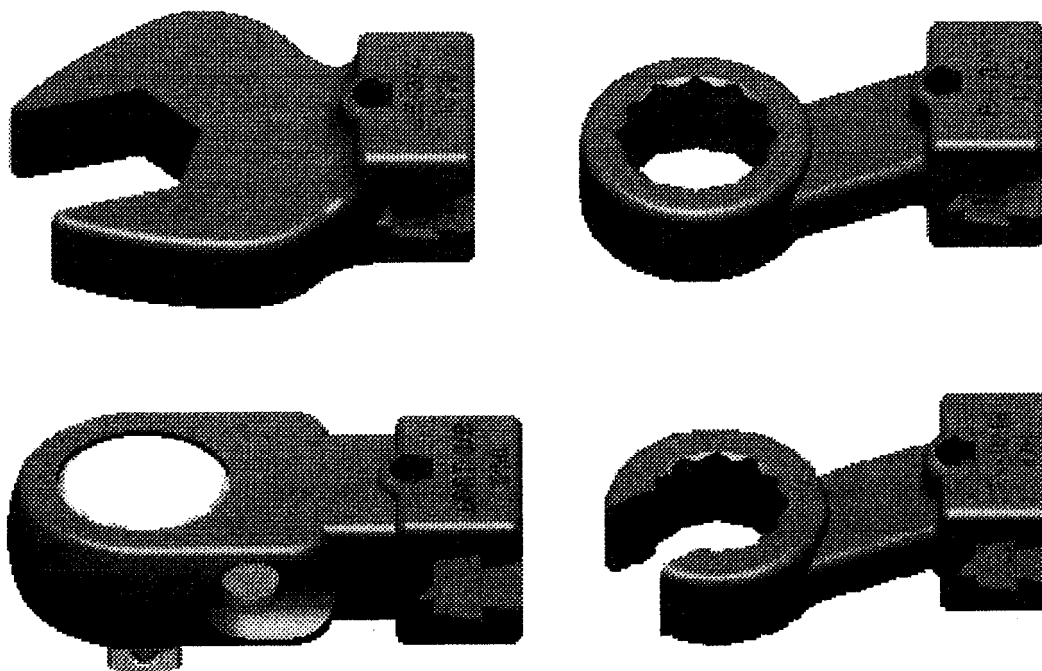


FIGURE 5 - INTERCHANGEABLE HEADS, FOR CLASSES 5 AND 6 TORQUE WRENCH