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INCH-POUND *

GGG-W-644C

April 30, 1992

SUPERSEDING

GGG-W-644B

November 2, 1967

FEDERAL SPECIFICATION

WRENCH, SOCKET (WHEEL NUT)

This specification is approved by the Commissioner,
Federal Supply Service, General Services Administration, for
the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers socket wrenches of the cross type and double end type (with bar handle) for installing and removing automotive vehicle wheel nuts.

1.1.1 Federal specification coverage. Federal specifications do not include all varieties of the commodity as indicated by the title of the specification, or which are commercially available, but are intended to cover only those generally used by the Federal Government.

1.2 Classification.

1.2.1 Types and sizes. Wrenches shall be of the following types:

Type I - Cross type (see 3.5 and see figure 1)
Type II - Double end type (see 3.6 for sizes, and see figure 2 for wrench and see figure 3 for handle). Handle may be procured separately

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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Beneficial comments (recommendations, additions, deletions) and any pertinent
*data which may be of use in improving this document should be addressed to: *
*Commanding Officer (Code 156), Naval Construction Battalion Center, Port *
*Hueneme, CA 93043-5000, by using the Standardization Document Improvement *
*Proposal (DD Form 1426) appearing at the end of this document or by letter. *
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FSC 5120

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Federal Standards

FED-STD-123 - Marking for Domestic Shipment (Civil Agencies)

Military Specifications

DOD-P-16232 - Phosphate Coatings, Heavy, Manganese or Zinc Base (For Ferrous Metals)

Military Standards

MIL-STD-105 - Sampling Procedures and Tables for Inspection by

Attributes

MIL-STD-129 - Marking for Shipment and Storage

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Other publications. The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the issues in effect on date of invitation for bids or request for proposal shall

apply:

American National Standards Institute, Inc. (ANSI)

ANSI B18.2.2 Square and Hexagon Nuts

(Application for copies should be addressed to the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.)

ASTM

ASTM D3951 - Standard Practice for Commercial Packaging
ASTM E18 - Test Methods for Rockwell Hardness and
Rockwell Superficial
Hardness of Metallic Materials

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. REQUIREMENTS

3.1 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification.

3.2 Design. The design shall be in accordance with the best engineering practice. Socket surfaces shall be well-defined.

3.3 Coating. Unless otherwise specified (see 6.2), the coating shall be in accordance with the manufacturer's commercial practice.

3.3.1 Phosphate coating. When specified (see 6.2), the wrenches and handles shall be coated in accordance with type Z, class 2, of DOD-P-16232.

3.4 Dimensions and test loads. The distance across flats, dimensions and

test loads shall be in accordance with table I. The test load shall be applied as specified in 4.6.1.

TABLE I. Loads for testing.

* Nominal socket size test load * (square or hex.) *	* Distance across flats *	* Socket

* Inches Inch-pounds *	* Inches	*
* 5/8 900	* 0.632 - 0.643	*
* 3/4 1300	* 0.757 - 0.768	*
* 13/16 1600	* 0.820 - 0.831	*
* 7/8 1900	* 0.885 - 0.900	*
* 15/16 2200	* 0.948 - 0.965	*
* 31/32 2300	* 0.979 - 0.994	*
* 1 2500	* 1.010 - 1.025	*
* 1-1/16 2800	* 1.072 - 1.087	*
* 1-1/8 3500	* 1.135 - 1.150	*
* 1-3/16 3800	* 1.198 - 1.213	*
* 1-1/4 4200	* 1.260 - 1.275	*
* 1-1/2 4700	* 1.510 - 1.525	*
* 1-3/4 7500	* 1.760 - 1.775	*

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3.5 Type I wrench. Type I wrenches shall be in the shape of a cross. The two cross bars shall be joined in such a manner that the four arms will be equal in length within 1/2 inch. The angle between any two adjacent arms shall be 90

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degrees +/-2 degrees. Sockets shall be hardened to 35-39 on the Rockwell C scale (35-39 HRC). Wrenches shall conform to the dimensional requirements of table II and table IIA for the size number specified (see 6.2) and be similar to figure 1.

TABLE II. Type I, cross type wrench.

* Size *	* Nominal hexagon *		* Nominal square *	
* Cross bar *	* socket size *		* socket size *	
* length +/-1/2 in. *				

* No. *	* Inches *		* Inches *	
* Inches *				
* 1	* 7/8, 13/16, 3/4, 5/8 *		* - *	
14				
* 2	* 15/16, 7/8, 13/16, 3/4 *		* - *	
15				
* 3	* 15/16, 7/8, 13/16, 3/4 *		* - *	
20				
* 4	* 1-1/16, 1, 15/16, 7/8 *		* - *	
20				
* 9	* 1-1/2, 1-1/4, 1-1/8, 7/8 *		* 13/16, 5/8 [1] *	
23				
* 10	* 1-1/2, 1-1/4, 1-1/16 *		* 13/16 *	
27				

[1] The 13/16 square opening in the size 9 is located at the base of the 1-1/8

hexagon opening, and the 5/8 square opening is located at the base of the 7/8 hexagon opening.

TABLE IIA. Type I, cross type wrench.

* eccentricity * * Nominal hexagonal openings to * * socket size diameter of head *	* Head Diameter * maximum	* Permitted * of wrench * outside

* Inches (maximum) *	* Inches	* Inches
* 5/8 *	* 1	* 0.020
* 3/4 *	* 1-3/16	* 0.020
* 13/16 *	* 1-5/16	* 0.020
* 7/8 *	* 1-3/8	* 0.020
* 15/16 *	* 1-1/2	* 0.020
* 1 *	* 1-1/2	* 0.020
* 1-1/16 *	* 1-5/8	* 0.030
* 1-1/8 *	* 1-5/8	* 0.030
* 1-3/16 *	* 1-3/4	* 0.030
* 1-1/4 *	* 1-3/4	* 0.030
* 1-1/2 *	* 2-1/8	* 0.030

3.6 Type II wrench. Type II wrenches shall be of one-piece

construction
with sockets at each end. Sockets shall be hardened to 24-28
HRC. Wrenches are
intended to be used with the handles specified herein, shall
conform to the
dimensional requirements of figure 2 and table III for the size
number specified
(see 6.2), and be similar to figure 2.

[1] The 5/8 square opening in the size 5 is located at the base of the 1-1/4 hexagon opening.

3.6.1 Handles. Handles shall be supplied as separate items or with type II wrenches as required (see 6.2 and tables III and IV). The handles shall be hardened to 24-28 HRC, conform to the dimensions of figure 3 and table IV, and meet the test load of table IV when tested as specified in 4.6.1.

TABLE IV. Handle for type II wrench.

* Size	* Diameter + 1/64 D	* Length + 1/2 L	* Test load (Min.)
* No.	* Inches	* Inches	* Pounds
* 1	* 3/4	* 20	* 250
* 2	* 3/4	* 30	* 150
* 3	* 1	* 30	* 300

3.7 Identification marking. Each wrench and handle shall be marked in a plain and permanent manner with the name or trademark of the manufacturer so that the source of manufacture may be readily determined.

3.8 Workmanship. Workmanship shall be of the highest grade throughout and in accordance with good commercial practice. Burrs, sharp edges, flash, and other harmful or extraneous material shall be removed. Exposed edges shall be broken to 1/64 radius minimum.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein.

Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government.

The Government reserves the right to perform any of the inspections set forth in this document where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this document shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for ensuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to ensure compliance with all dimensional requirements.

4.2 Sampling procedures. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105. Data for sampling shall be as stated in table V.

TABLE V. Sampling Data.

* Category * Reference *	* Sample * unit *	* Inspection * level *	* Acceptable * quality * level *	* AQL expressed * in terms of
* Visual * 3.1, 3.2, * * examination units * 3.3, 3.5, * * 3.6, 3.7, * * 3.8 *	* 1	* II	* 4.0	* Defects per * hundred
* Dimensional * 3.4, 3.5, * * examination units * 3.6 *	* 1	* II	* 4.0	* Defects per * hundred

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* Testing      *      1 *      S-3      *      4.0      * Defects per
* 3.4, 3.5,   *
*              *      *              *              *      hundred
units * 3.6    *
*-----*
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4.3 Visual and dimensional examination. Each sample unit shall be examined for any nonconformance in design, material, finish, coating, construction, workmanship, marking, and dimensional requirements.

4.4 Testing. Each sample unit shall be tested in accordance with 4.6.1 and 4.6.2.

4.5 Packaging inspection. The package shall be inspected to verify conformance to the requirements of section 5.

4.6 Tests.

4.6.1 Test load. Each socket on all sample wrenches shall be tested. Prior to application of the load, the ends of the wrenches and handles shall be marked for later reference. The marking shall be such that distortion after the test shall be visible. Test mandrels shall be hardened to 50-55 HRC. Mandrels for sockets shall conform to ANSI B18.2.2, for the "across the flats" dimensions and be of a length suitable to insure full socket engagement. When one wrench contains two or more sockets, each socket shall be tested separately.

4.6.1.1 Handle test. Handles shall be tested by clamping one end in a vise for a distance of 6 inches. The load specified in table IV shall be applied to the opposite end of the bar at a distance of 12 inches from the vise jaws for the size 1 and 22 inches for sizes 2 and 3. Other methods of test satisfactory to the inspector may be used provided they apply a torque load equal to the

product of the force and distance specified herein.

4.6.1.2 Wrench test. Types I and II wrenches shall be tested in a like manner. The type II wrench shall have a bar of suitable strength inserted through the hole of the wrench farthest from the socket being tested. The wrench shall be placed on the test mandrel with the opposite end guided but free to rotate. Force shall be applied to the crossbar to produce the specified test load.

4.6.2 Hardness test. A hardness test shall be conducted in accordance with ASTM E18 to determine compliance with 3.5, 3.6, and 3.6.1.

5. PACKAGING

5.1 Preservation, packaging, and packing. Unless otherwise specified (see 6.2), the wrenches shall be preserved, packaged, and packed in accordance with ASTM D3951.

5.2 Marking.

5.2.1 Civil agencies. In addition to markings required by the contract or order, the interior packages and shipping containers shall be marked in accordance with FED-STD-123.

5.2.2 Military agencies. In addition to markings required by the contract or order, the interior packages and shipping containers shall be marked in accordance with MIL-STD-129 or ASTM D3951 as applicable.

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6. NOTES

6.1 Intended use. The wrenches covered by this specification are intended for use on automotive vehicle wheel nuts.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type and size required (see 1.2.1, 3.5 and 3.6).
- c. If handles are required, state size number (see 3.6.1 and tables III and IV).
- d. If phosphate coating is required (see 3.3 and 3.3.1).
- e. Packing and packaging required if different (see 5.1).
- f. Additional marking required (see 5.2).

6.3 Supersession data. Type II bung wrenches of the non-sparking and nonmagnetic type formerly included in this specification are now covered by GGG-W-642. Type II bung wrenches (made of hardened steel) formerly included in this specification are now covered by GGG-W-647. Type III lineman's wrenches formerly included in this specification are now covered by GGG-W-648.

MILITARY INTERESTS:

CIVIL AGENCY

COORDINATING ACTIVITIES:

Military Coordinating Activity

GSA - FSS

Navy - YD
ACTIVITY

PREPARING

Custodians

Navy - YD

Army - GL
5120-D008)
Navy - YD

(Project

User Activities

Army - AR, CE
Navy - MC

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.