

**METRIC
AEROSPACE
STANDARD**

SAE MA4535

Issued 1995-08
Reaffirmed 2004-01

Wrenches, Box and Open End Combination
Twelve Point, High Strength, Thin Wall,
Metric

1. SCOPE:

This SAE Metric Aerospace Standard (MA) provides dimensional, performance, testing and other requirements for high strength, thin wall, double head box and combination wrenches which possess an internal wrenching design so configured that, when mated with hexagon (6 point) fasteners, they shall transmit torque to the fastener without bearing on the apex of the fastener's wrenching points. This standard provides additional requirements beyond ANSI B107.9 appropriate for aerospace use.

Inclusion of dimensional data in this document is not intended to imply all of the products described therein are stock production sizes. Consumers are requested to consult with manufacturers concerning lists of stock production sizes.

1.1 Classification:

Box and combination wrenches covered by this document shall be of the following types, classes, and styles as specified.

a. Type I: Box Wrench, Double Head:

(1) Class 1: 15° offset each end

(a) Style 1: Regular length

(b) Style 3: Long length

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2004 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER:

Tel: 877-606-7323 (inside USA and Canada)

Tel: 724-776-4970 (outside USA)

Fax: 724-776-0790

Email: custsvc@sae.org

<http://www.sae.org>

SAE WFR ADDRESS:

Copyright SAE International

Provided by IHS under license with SAE

No reproduction or networking permitted without license from IHS

Not for Resale

SAE MA4535

1.1 (Continued):

- (2) Class 2: Deep offset each end
 - (a) Style 1: Regular length
- (3) Class 3: Modified offset each end
 - (a) Style 1: Regular length
 - (b) Style 2: Short length

b. Type III: Combination Wrench, Open End and 15° Offset Box Opening:

- (1) Regular length
- (2) Short length
- (3) Long length
- (4) Extra short length

2. APPLICABLE DOCUMENTS:

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 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 SAE Publications:

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

AS478 Identification - Marking Methods

SAE MA4535

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM A 754	Coating Thickness by X-ray Fluorescence, Standard Test Method for
ASTM B 487	Measurement of Metal and Oxide Coating Thickness, Examination of a Cross Section
ASTM B 499	Measurement of Coating Thickness by the Magnetic Method, Standard Test Method for
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 of 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 Metallic 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 Methods of Test of

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI B107.9	Wrenches, Box, Open End, Combination and Flare Nut (Metric Series)
ANSI B107.17M	Gages, Wrench Openings, Reference