INCH - POUND

MIL-STD-878B (USAF)
21 November 2006
SUPERSEDING
MIL-STD-878A
22 October 1969

DEPARTMENT OF DEFENSE
STANDARD PRACTICE

METHOD OF DIMENSIONING AND DETERMINING
CLEARANCE FOR AIRCRAFT TIRES AND RIMS

AMSC: N/A   FSC: 2620

MIL-STD-878B

FOREWORD

1. This military standard is approved for use by Department of the Air Force, and is available for use by all departments and agencies of the Department of Defense.

2. This standard provides guidance on the processes for dimensioning of and the determination of the clearance for aircraft tires and rims of all military aircraft.

3. Beneficial comments, recommendations, additions, deletions, and any pertinent data, which may be of use in improving this document, should be addressed to 984 CBSG/GBCLE; 6040 Gum Lane, Bldg 1216, Hill AFB, UT 84056-5825 or CBSG.GBCL.Workflow@HILL.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil/online/start/.

MIL-STD-878B

1. SCOPE

1.1 <u>Scope.</u> This standard establishes the procedures for dimensioning and determining clearance for aircraft tires and rims.

2. APPLICABLE DOCUMENTS

2.1 <u>General.</u> The documents listed in this section are specified section 4 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in section 4 of this standard, whether or not they are listed.

2.2 <u>Government documents.</u>

2.2.1 <u>Specifications, standards, and handbooks.</u> The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-5041   Tires, Pneumatic, Aircraft

MIL-PRF- 7726   Repair and Retreading of Used Pneumatic Tires
                      and Repair of Inner Tubes

(Copies of these documents are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-4095 or http://assist.daps.dla.mil/online/start/.

2.3 <u>Order of Precedence.</u> In the event of a conflict between the text of this document and the 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.

3. DEFINITIONS (N/A)

4. GENERAL REQUIREMENTS

4.1 <u>Proportions and clearances.</u> The proportions and clearances of aircraft wheels and tires shall be in accordance with Figure 1. Figure 1 is based upon the following considerations:

MIL-STD-878B

  a. The dimensions of new, unused inflated tires after a 12-hour inflation period at rated pressure to remove initial tire stretch shall not exceed dimensions: D_O, H, W, D_S. and W_S.

  b. Provisions shall be made for tire growth represented by dimensions W_G, D_G, W_{SG}, and D_{GS}. Tire growth is based upon the factors listed in Table I.

  c. Minimum radial and lateral clearances beyond tire growth limits are derived from Figure 2.

  d. Tire aspect ratios are obtained from Figure 3.

  e. The maximum shoulder dimensions shown as H_S and W_S shall be 0.82 of the maximum section height for all tire types, 0.85 of the maximum section width for Type III tires, and 0.88 of the maximum section width for Types VII and VIII tires. Types III. VII, and VIII tires are described in MIL-PRF-5041 and MIL-PRF-7726.

  f. Radii $\dfrac{W_S}{2}$ and $\dfrac{W_{SG}}{2}$ are drawn through their respective shoulder points tangentially to D_O and D_G, respectively. Radii below the shoulder points pass through the shoulder points and are tangential to W and W_G, respectively.

  g. Dimension A, the wheel width between flanges, shall be obtained from Figure 3.

  3.2 <u>Definitions of Figure2.</u> Clearance allowance between the tire and the adjacent parts of the aircraft should be based upon the maximum overall tire dimensions, plus growth allowance due to service, plus the increase in diameter due to centrifugal force. Minimum distances to adjacent parts of the aircraft should be determined as follows:

  a. Determine maximum grown tire envelope, i.e. the dotted line labeled "Grown Inflated Tire" on Figure 1.

  b. Obtain radial clearance C_R and lateral clearance C_W from the chart on Figure 2.

  c. Determine distance to adjacent part as follows:

    R_X (minimum) = Radial distance from axle centerline (CL) to adjacent part =
$$\frac{D_G}{2} + C_R$$
    W_X (minimum) = Lateral distance from the CL to adjacent part =
$$\frac{W_G}{2} + C_W$$

    S_X (minimum) = Clearance allowed between tire shoulder area and adjacent

2

MIL-STD-878B

$$part = \frac{C_W + C_R}{2}$$

CLASSIFICATION		GROWTH FACTOR	
T and RA TYPE	Squatness Ratio	C_W	G_H
T and RA (1960)	No recommended limits	1.03	2.06
Type III	No recommended limits	1.04	2.08
Type VII	0.78 and upwards	1.05	2.12
Type VIII	0.65 to 0.77	1.05	2.14

Table I
Growth Factors

NOTES on Table I:

1. The general squatness ratios, aspect ratio $\overline{\frac{H}{W}}$ of Figure 4; i.e. mean section height/mean section width, are shown in Table I but should be used as a design guide only.

2. For new design, the new inflated tire dimensions W, H, W_S and H_S are factorized with the appropriate factors for T and RA Types III, VII, and VIII tires. Tires of similar proportions shall also be classified as one of these three groups for growth determination.

3. Growth determination shall be as follows, using factors from Table I:

$$W_G = G_W.W$$
$$D_G = D + G_H.H$$
$$W_{SG} = G_W.W_S$$
$$D_{SG} = D + G_H.H_S$$
$$H - \frac{D_O - D}{2}$$
$$H_S = \frac{D_S - D}{2}$$

d. The chart on Figure 2 does not cover twin tires or tires in tandem, and clearance allowance between tires should be determined as follows:

1. Twin tires – The distance between the CL of tires shall be 1.18 W_G.

2. Tandem tires – The distance between the axle CL of forward and rear tires shall be:

$D_G + 0.20 W_G$ for tires 10 inches in width and less.
$D_G + 0.15 W_G$ for tires above 10 inches in width.

3

MIL-STD-878B

5. REQUIREMENTS (N/A)

6. NOTES
(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

    6.1 <u>Intended use.</u> The methods covered in this standard are intended to determine the clearance for aircraft tires and rims. These methods apply to all military aircraft for dimensioning and determining this clearance requirement.

    6.2 <u>Subject term (key word) listing.</u>

        Clearance
        Dimensions
        Lateral
        Radial
        Width

    6.3 <u>Changes from previous issues.</u> Marginal notations are not needed in this revision to identify changes with respect to the previous issue due to the extent of the changes.

MIL-STD-878B

MIL-STD-878A
**22 October 1969**
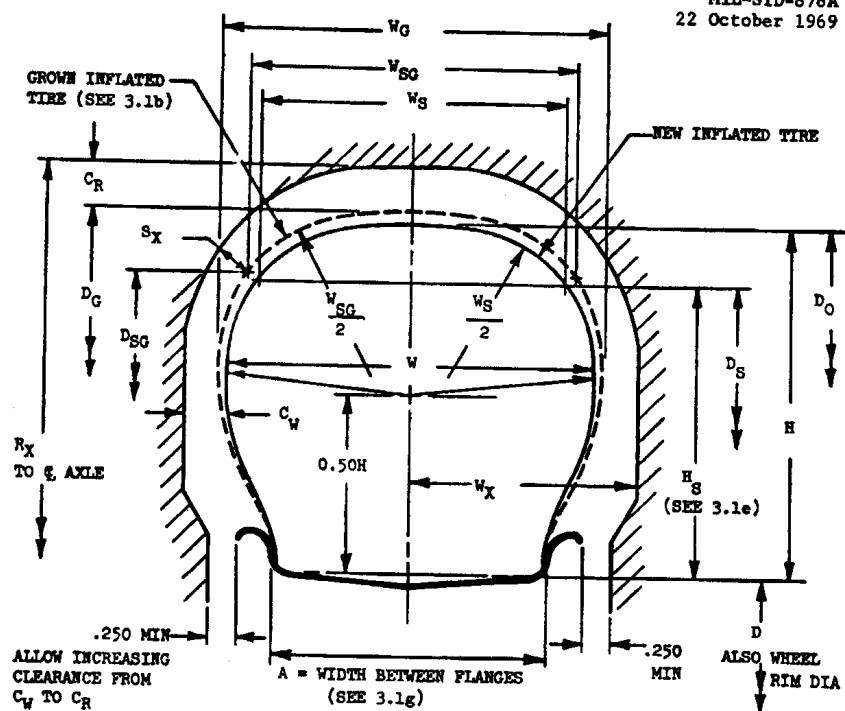
GROWN INFLATED TIRE

W_G = MAXIMUM GROWN SECTION WIDTH

D_G = MAXIMUM GROWN OUTSIDE DIAMETER

W_{SG} = MAXIMUM GROWN SHOULDER WIDTH

D_{SG} = MAXIMUM GROWN SHOULDER DIAMETER

NEW INFLATED TIRE

D_O = MAXIMUM OUTSIDE DIAMETER

H = MAXIMUM SECTION HEIGHT

W = MAXIMUM CROSS SECTION WIDTH

D_S = MAXIMUM SHOULDER DIAMETER

H_S = MAXIMUM SHOULDER HEIGHT

W_S = MAXIMUM SHOULDER WIDTH

A = WIDTH BETWEEN FLANGES

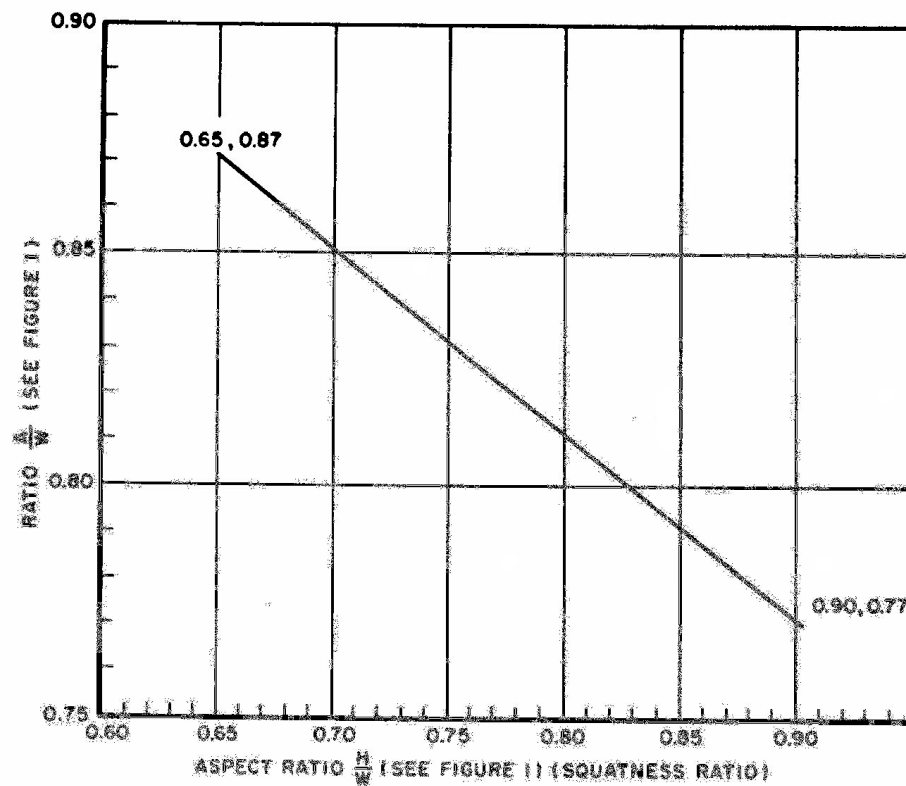FIGURE 1. Profile Proportions for Aircraft Landing Wheel Tires

5

MIL-STD-878B
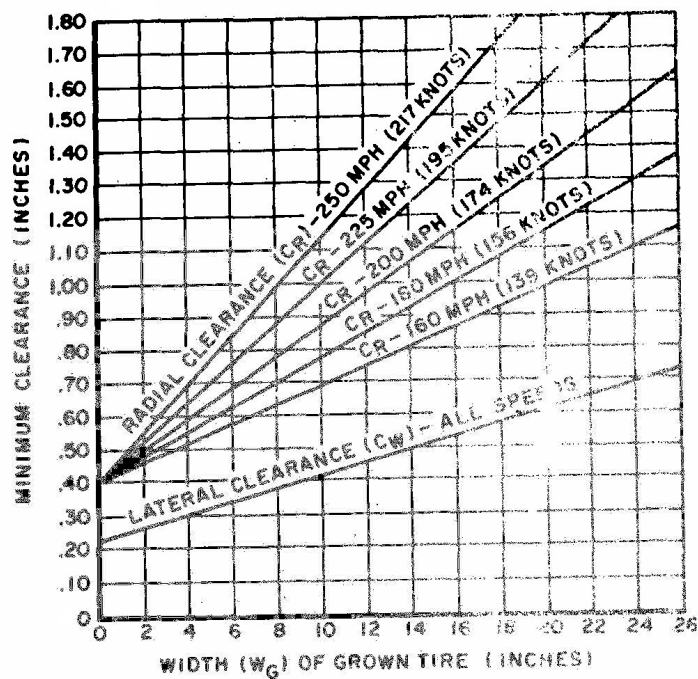
NOTES:

1. MINIMUM CLEARANCE DIAMETER EQUALS MAXIMUM GROWN DIAMETER PLUS $(2 \times C_R)$.

2. MINIMUM CLEARANCE WIDTH EQUALS MAXIMUM GROWN WIDTH PLUS $(2 \times C_W)$.

3. MINIMUM CLEARANCE AT SHOULDER REGION EQUALS
$$\frac{C_R + C_W}{2}$$

FIGURE 2. Chart for Obtaining Radial Clearance C_R and Lateral Clearance C_W

6

NOTES:

1. THE MEAN OR NOMINAL DIMENSIONS H AND W PERTAIN TO A NEW UNUSED INFLATED TIRE.

2. WIDTH BETWEEN FLANGES (DIMENSION A ON FIGURE I) TO BE ADJUSTED TO NEAREST 1/4 INCH.

3. EQUATION FOR LINE FROM 0.65 TO 0.90 ASPECT RATIO "Y" EQUALS $1.13 - \frac{X}{2.5}$.

FIGURE 3. Design Guide for Obtaining Dimension "A"

FIGURE 4. Aircraft Wheel Rim Proportions
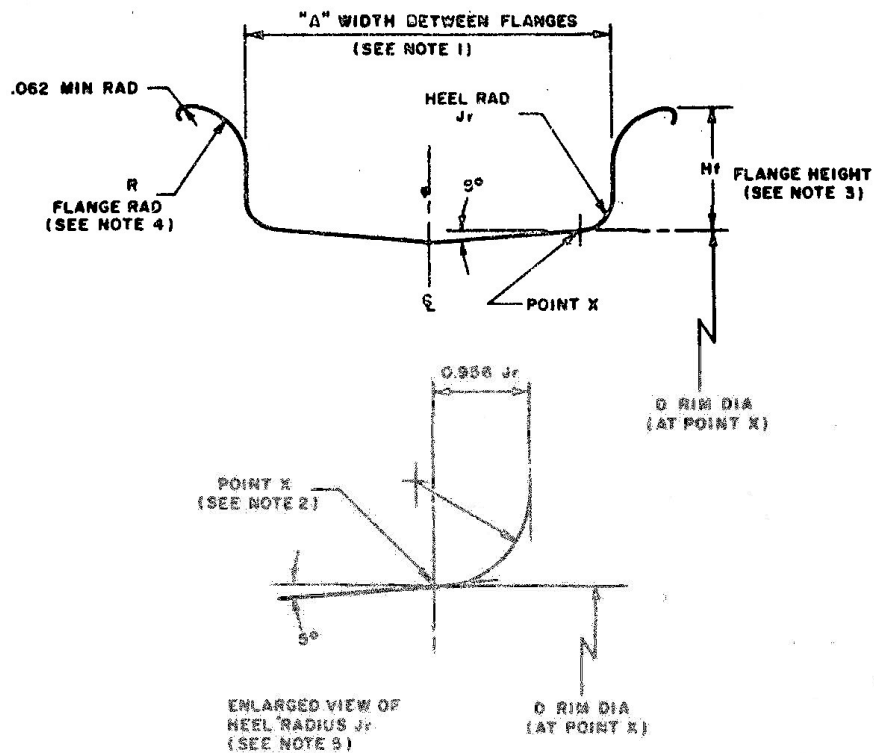
NOTES:

1. DIMENSION "A" MAY BE OBTAINED FROM THE DESIGN GUIDE IN FIGURE 3.
2. POINT X TO DETERMINE RIM DIAMETER D IS MEASURED ON THE 5 DEGREE TAPER BEAD SEAT ON A LINE PERPENDICULAR TO THE WHEEL AXIS PASSING THROUGH A POINT 0.956 Jr FROM FLANGE FACE.
3. FLANGE HEIGHT DIMENSIONS TO BE IN .125 INCH INCREMENTS.
4. FLANGE RADIUS TO BE EQUAL TO 50 PERCENT FLANGE HEIGHT (Hf).
5. HEEL RADIUS IS TO EQUAL 25 PERCENT OF THE FLANGE HEIGHT FOR FLANGES UP TO AND INCLUDING 1.250 INCH IN HEIGHT AND 22-1/2 PERCENT OF THE FLANGE HEIGHT FOR FLANGES OVER 1.250 INCH IN HEIGHT, ADJUSTED TO THE HIGHER 1/32 INCH.

8

MIL-STD-878B

CONCLUDING MATERIAL

Custodians	Preparing Activity
Army - AV	Air Force – 70
Navy – AS	
Air Force - 70	

Reviewing Activities	Project No. 2620-2006-001
Air Force – 11	
DLA – GS	

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, verification of the currency of the information above using the ASSIST Online database at: http://assist.daps.dla.mil.