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MILITARY STANDARD

METHOD OF DIMENSIONING AND DETERMINING CLEARANCE FOR AIRCRAFT TIRES AND RIMS

FSC 2620

DEPARTMENT OF DEFENSE
WASHINGTON, D. C. 20301

Method of Dimensioning and Determining Clearance for Aircraft Tires and Rims

MIL-STD-878A

1. This Military Standard is mandatory for use by all Departments and Agencies of the Department of Defense.

*2. Recommended corrections, additions, or deletions should be addressed to the Aeronautical Systems Division, Attn: ASNPS-30, Wright-Patterson Air Force Base, Ohio 45433.

* CONTENTS

METHOD OF DIMENSIONING AND DETERMINING CLEARANCE FOR AIRCRAFT TIRES AND RIMS

1. SCOPE

1.1 Purpose. This standard establishes the procedures for dimensioning and determining clearance for aircraft tires and rims.

2. REFERENCED DOCUMENTS

*2.1 The issue of the following documents in effect on the date of invitation for bids form a part of this standard to the extent specified herein.

SPECIFICATIONS

Military

MIL-T-5041	Tires, Pneumatic, Aircraft
MIL-R-7726	Repair and Retreading of Used Pneumatic Tires and Repair of Inner Tubes

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. GENERAL REQUIREMENTS

3.1 Proportions and clearances. The proportions and clearances of aircraft wheels and tires shall be in accordance with figure 1. Figure 1 is based upon the following considerations:

(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_{SG}. 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-T-5041 and MIL-R-7726.

(f) Radii $\frac{W_S}{2}$ and $\frac{W_{SG}}{2}$ 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 Definitions of figure 2. Clearance allowance between the tire and the adjacent parts of the aircraft should be based on 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:

Rx (min) = Radial distance from axle centerline (CL) to adjacent part = $\frac{D_G}{2} + C_R$

Wx (min) = Lateral distance from the CL to adjacent part = $\frac{W_G}{2} + C_W$

Sx (min) = Clearance allowed between tire shoulder area and adjacent part = $\frac{C_W + C_R}{2}$

* TABLE I. Growth factors

Classification		Growth factor	
T and RA type	Squatness ratio	G_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

NOTES ON TABLE I:

*1. The general squatness ratios, aspect ratio $\frac{H}{W}$ 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 allowances 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.

4. INTERNATIONAL STANDARDIZATION

*4.1 International standardization agreement. Certain provisions of this standard are the subject of international standardization agreement (ASCC Air Standard 17/14). When amendment, revision, or cancellation of this standard is proposed, which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

(The margins of this standard are marked with an asterisk to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.)

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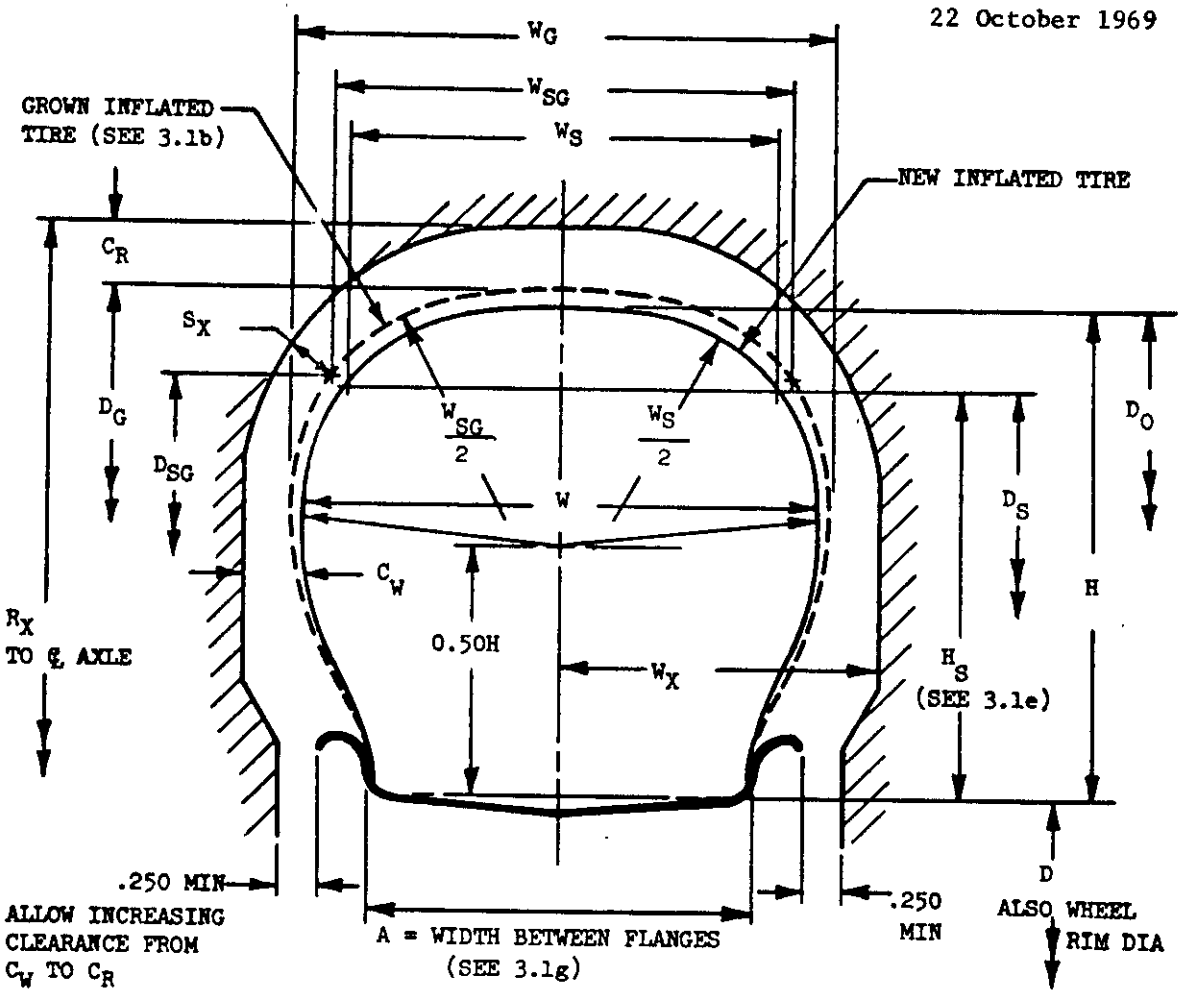


GROWN INFLATED TIRE

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

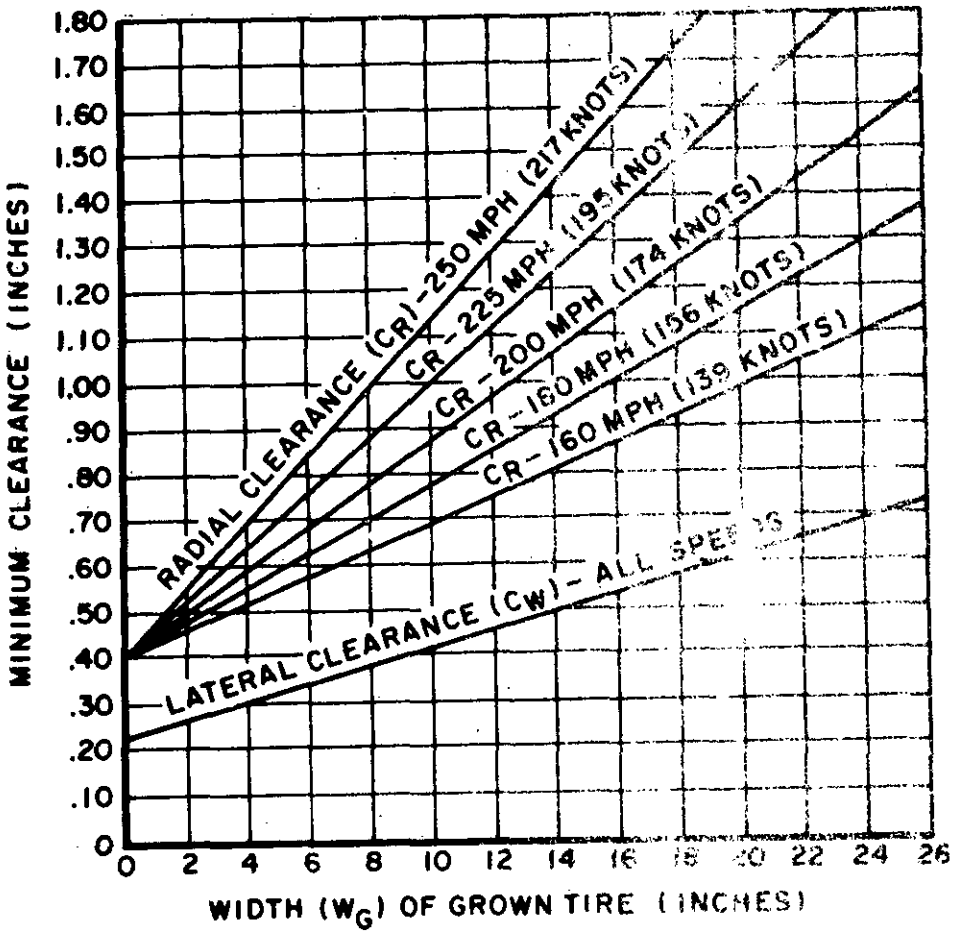
D_S = MAXIMUM SHOULDER DIAMETER

H_S = MAXIMUM SHOULDER HEIGHT

W_S = MAXIMUM SHOULDER WIDTH

A = WIDTH BETWEEN FLANGES

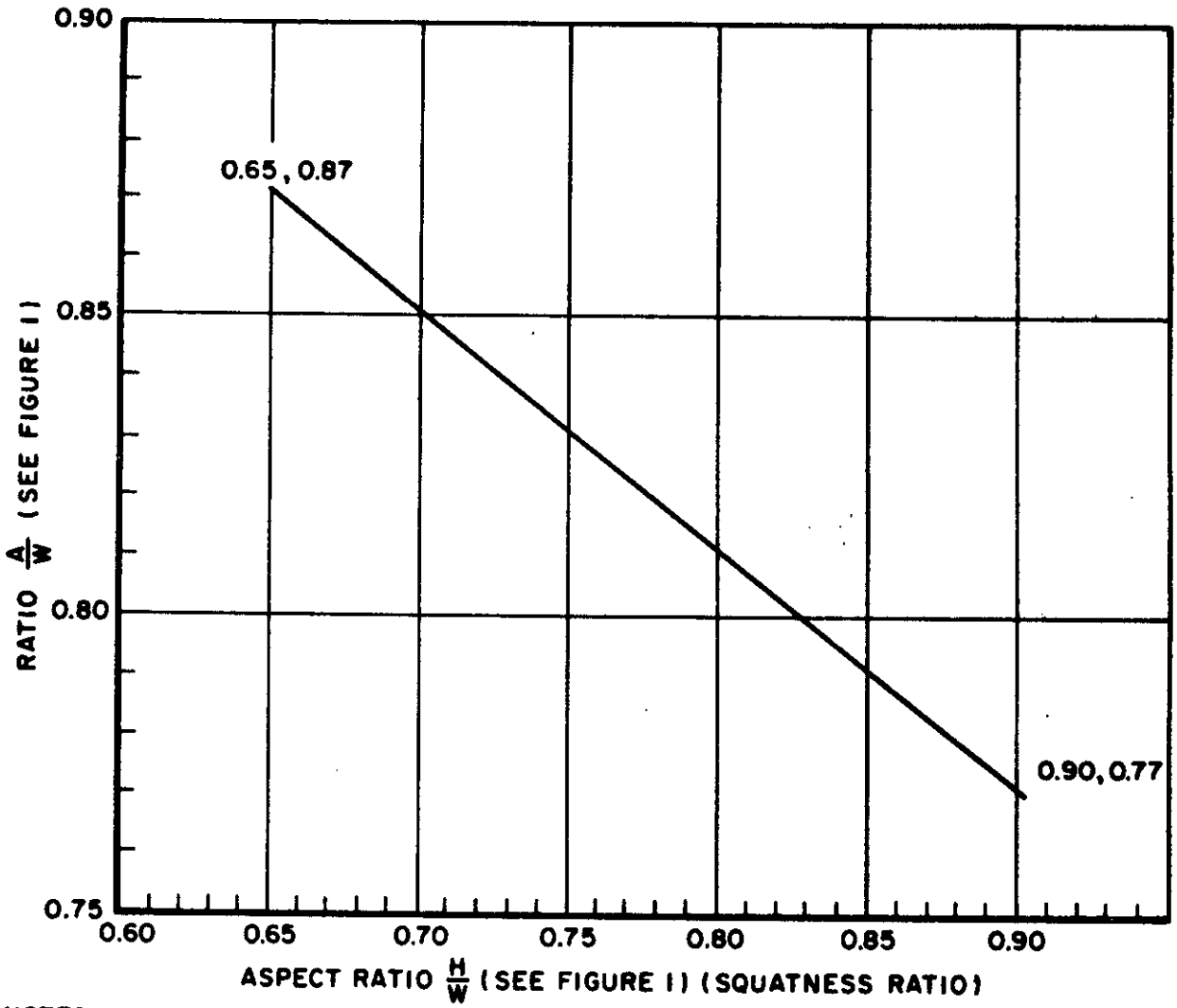
FIGURE 1. Profile Proportions for Aircraft Landing Wheel Tires



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



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 1) 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"

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