

Issued 1944-05  
Revised 2001-10  
Reaffirmed 2012-11  
Superseding AS176B

Limits, Table of Limits and Lubrication Charts

RATIONALE

AS176C has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

This specification covers the requirements for the preparation of Limits, Table of Limits and Lubrication Charts in published form for service and production use.

1.1 Purpose:

The Table of Limits and the corresponding Limits and Lubrication Charts covered by this specification are to be used in connection with inspection, repair and assembly operations of aircraft engines. Included are such items as fits, clearances, backlashes, spring loads, and the methods of tightening threaded parts such as torque, angle of turn, or bolt stretch. The Lubrication Charts, if furnished, are to be used for tracing the oil flow through the engine.

2. REFERENCES:

There are no referenced publications specified herein.

3. GENERAL REQUIREMENTS:

3.1 Units of measurement shall be in inches for fits, clearances, backlashes and bolt stretch; in pounds for spring loads; in degrees for angles of turn; and in pound-inches (or pound-feet) for wrench torque.

3.2 Revisions shall be effected by the issuing of later editions or by the use of revised or additional pages.

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 revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2012 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: +1 724-776-4970 (outside USA)  
Fax: 724-776-0790  
Email: CustomerService@sae.org  
http://www.sae.org

SAE WEB ADDRESS:

**SAE values your input. To provide feedback  
on this Technical Report, please visit  
<http://www.sae.org/technical/standards/AS176C>**

#### 4. DETAIL REQUIREMENTS:

##### 4.1 Table of Limits:

These shall be published on 8.5 x 11 inch pages (use of both sides permissible) with suitable margins to accommodate the type of binder or cover to be used. The text may be set in either one or two columns and the size of type shall not be smaller than eight point.

- 4.1.1 Title Page: When used, the title page shall include the engine manufacturer's name (and seal, if desired) and address, the title, designation number and the engine series (or models) covered. Although the composite table may apply to more than one engine model, the limits of each model shall be clearly identified in the Limits Charts and/or the Table of Limits.
- 4.1.2 Introduction: The introduction shall contain a comprehensive description of how the table shall be used, including an explanation of all terms, units of measurement, abbreviations, and symbols employed in the publication. Any company standards pertaining to the tightening of regular nuts and bolts, threaded connectors, plugs, etc., shall be included in this section.
- 4.1.3 Table: The first part of the table shall consist of a listing of all the diametral (or chordal) fits and clearances, and gear backlashes applicable to the engine or engines being covered by the table. In the case of large engines, it may be subdivided according to sections of the engine such as reduction gear section, power section, compressor section, combustion and turbine section, accessory section, etc. The second part of the table shall contain such items as methods of tightening threaded parts such as torque, angle of turn, or bolt stretch; spring loads with spring compressed to a specified height; bevel gear mounting distances and any other limiting dimensions for which a spacer is fitted at assembly, except as noted in paragraph 4.2.2.
- 4.1.4 The data specified in paragraph 4.1.3 should be arranged with reference numbers in numerical order as shown in Figure 1. The next column headed "Fig. No." refers to the applicable Limits Chart to be used with the table. The description column contains the item names of the parts to which the fit limits apply. The item description may be abbreviated as necessary to fit within the space available. The "dimensions for ref." columns refer to the maximum and minimum dimensions as shown on the applicable parts drawings. The limits columns show first minimum fit between the parts, the second column shows the maximum fit and the last column should show the fit under which the parts require replacement. For those fits in which there is a positive clearance between the parts, a suffix letter "L" may be used if desired. For those fits in which there is a negative clearance or an interference fit between the parts, a suffix letter "T" shall always be indicated. The "min" limit, as shown in Figure 1, indicates minimum positive clearance or maximum interference fit; while "max" limit indicates maximum positive clearance or minimum interference fit as applicable. Each page of the table shall indicate the engine manufacturer's name, and the engine or engines to which it is applicable. At the bottom of each page shall appear the latest revision date. Following the table shall appear the reduced size limits and lubrication charts (when required) as described under paragraph 4.2.

Ref. no.	Fig. no.	Description	Dimensions for ref.		Limits		
			Min	Max	Min	Max	Replace if over
510	11-2	Main Accessory Drive Shaftgear Spline Starter Drive Coupling Spline	.1937 .1962	.1947 .1972	.0015	.0035	.0050
511	11-2	Accessory Drive Shaft Coupling Spline Accessory Drive Gear Spline	.0976 .0981	.0986 .0991	.0005T	.0015	
512	11-2	Accessory Drive Bearing Liner Accessory Drive Adapter	1.437 1.431	1.438 1.432	.007T	.005T	.000
513	11-2	Backlash - Oil Pump Drive Gear Accessory Drive Gear			.004	.006	#
514	11-1	Second Stage Compressor Disk Locating Dimension - by Selection			2.532	2.542	
515	11-1	Gap Compressor rear bearing seal spring retaining ring and seals. Gap at 4.250 gage Housing	.018 4.249	.028 4.251	.015	.031	
536	11-1	Compressor Drive Turbine Shaft Coupling Lock Spring at 1.500 Inches			29	31	< 15

# Typical symbol indicating gears shall be replaced when service has produced scuffing, pitting, galling, or excessive wear.

< Typical symbol indicating that the part shall be replaced when the limit is less than the value shown.

FIGURE 1 - Table of Limits

## 4.2 Charts:

Limits and Lubrication Charts are supplemental to the Table of Limits. They shall be published in a form for inclusion in a binder or cover, and may also be published in a form for wall mounting. Charts for binders or covers shall be 8.5 x 11 inches for single pages, and 11 inches by any required length for fold-over pages. Wall charts shall be 20 inches horizontal by 30 inches vertical.

- 4.2.1 Charts shall be identified by a suitable title and chart number, and shall indicate the engine series (or models) to which they are applicable.
- 4.2.2 Limits Charts shall show clearly all locations of limits appearing in the Table of Limits, and shall identify each location by the reference number used in the Table of Limits, and an arrow pointing to it. Except where special instructions may be required at assembly and the use of a picture with arrows will be beneficial (such as fitting spacers or checking runout, etc.), limits shall not be shown on the chart. Where several limits occur near one location on a chart, one arrow to this point may be used with an appropriate tabulation in the Table of Limits. Charts shall be cross-sectional and show the entire engine or portions of the engine as desired.