



AEROSPACE INFORMATION REPORT

AIR81™

REV. E

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Importance of Physical and Chemical Properties of Aircraft Hydraulic Fluids

RATIONALE

A limited scope revision is required to correct a typing mistake on Page 5. MIL-PRF-87287 should be MIL-PRF-87257.

FOREWORD

This document discusses in qualitative terms the properties of a fluid relevant to use for aerospace hydraulic systems. Further, it discusses the effect of the fluid properties on the design of aerospace hydraulic systems and components. AIR1362 and AIR1116 (noncurrent) also are concerned with fluid properties, but contain specific data on current fluids.

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1. SCOPE

This document discusses the relative merits of the physical and chemical properties of hydraulic fluids in relation to the aerospace hydraulic system design, and the related materials compatibility. The discussion in this report applies both to hydrocarbon and phosphate ester based aircraft hydraulic fluids. In some cases, numerical limits are suggested, but, in general, the significance and effect of a property is noted qualitatively.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document 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.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AIR810	Degradation Limits of Hydrocarbon-Based Hydraulic Fluids, MIL-H-5606, MIL-PRF-6083, MIL-PRF-83282 and MIL-H-46170 Used in Hydraulic Test Stands
AIR1116	Fluid Properties
AIR1362	Aerospace Hydraulic Fluids Physical Properties
AIR4713	Aerospace - Chlorinated Solvent Contamination of MIL-H-5606/MIL-PRF-83282 Vehicle Hydraulic Systems
ARP598	Aerospace Microscopic Sizing and Counting of Particulate Contamination for Fluid Power Systems
AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428- 2959, Tel: 610-832-9585, www.astm.org.

ASTM D92	Flash and Fire Points by Cleveland Open Cup Tester
ASTM D93	Flash Point by Pensky-Martens Closed Cup Tester
ASTM D97	Pour Point of Petroleum Products
ASTM D445	Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
ASTM D471	Rubber Property-Effect of Liquids
ASTM D892	Foaming Characteristics of Lubricating Oils
ASTM D972	Evaporation Loss of Lubricating Greases and Oils
ASTM D2619	Hydrolytic Stability of Hydraulic Fluids (Beverage Bottle Method)
ASTM D2603	Sonic Shear Stability of Polymer-Containing Oils

ASTM D2624	Electrical Conductivity of Aviation and Distillate Fuels
ASTM D2717	Thermal Conductivity of Liquids
ASTM D2766	Specific Heat of Solids and Liquids
ASTM D2780	Solubility of Fixed Gases in Liquids (Ostwald Coefficient)
ASTM D2879	Vapor Pressure-Temperature Relationship by Isoteniscope
ASTM D3427	Air release properties of Petroleum Oils
ASTM D3825	Dynamic Surface Tension by the Fast-Bubble Technique
ASTM D4052	Density and Relative Density of Liquids by Digital Density Meter
ASTM D4172	Wear Prevention Characteristics of Lubricating Fluids (Four-Ball Method)
ASTM D4289	Elastomer Compatibility of Lubricating Greases and Fluids
ASTM D4308	Electrical Conductivity of Liquid Hydrocarbons by Precision Meter
ASTM D4636	Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants and Other Highly Refined Oils
ASTM D5306	Linear Flame Propagation Rate of Lubricating Oils and Hydraulic Fluids
ASTM D6304	Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration
ASTM D6793	Isothermal Secant and Isothermal Tangent Bulk Modulus
ASTM E659	Autoignition Temperature of Liquid Chemicals

2.1.3 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

FED-STD-313	Material Safety Data, Transportation Data, and Disposal Data for Hazardous Materials Furnished to Government Activities
FED-STD-791	Lubricants, Liquid Fuels, and Related Products; Methods of Testing Methods 3458 and 3459: Low Temperature Stability Methods 3603 and 3604: Rubber Swelling
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base
MIL-PRF-87257	Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile