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An American National Standard

Standard Specification for Jet B Wide-Cut Aviation Turbine Fuel[1]

This standard is issued under the fixed designation D6615; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This specification covers the use of purchasing agencies in formulating specifications for purchases of aviation turbine fuel under contract.

1.2 This specification defines one specific type of aviation turbine fuel for civil use. This fuel has advantages for operations in very low temperature environments compared with other fuels described in Specification D1655. This fuel is intended for use in aircraft that are certified to use such fuel.

NOTE 1—The technical requirements of this product, at the time of the first publication of this specification, are substantially identical to the requirements of Jet B in Specification D1655.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure
D130 Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
D323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)
D381 Test Method for Gum Content in Fuels by Jet Evaporation
D1094 Test Method for Water Reaction of Aviation Fuels
D1266 Test Method for Sulfur in Petroleum Products (Lamp Method)
D1298 Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
D1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption
D1322 Test Method for Smoke Point of Kerosine and Aviation Turbine Fuel
D1655 Specification for Aviation Turbine Fuels
D1660 Method of Test for Thermal Stability of Aviation Turbine Fuels[3]
D1840 Test Method for Naphthalene Hydrocarbons in Aviation Turbine Fuels by Ultraviolet Spectrophotometry
D2276 Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling
D2386 Test Method for Freezing Point of Aviation Fuels
D2622 Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry
D2624 Test Methods for Electrical Conductivity of Aviation and Distillate Fuels
D3227 Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)
D3240 Test Method for Undissolved Water In Aviation Turbine Fuels
D3241 Test Method for Thermal Oxidation Stability of Aviation Turbine Fuels
D3338 Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
D3948 Test Method for Determining Water Separation Characteristics of Aviation Turbine Fuels by Portable Separometer
D4052 Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

[1] This specification is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.J0.01 on Jet Fuel Specifications.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

~~[3] Withdrawn.~~

[3] Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

***A Summary of Changes section appears at the end of this standard.**

D4171 Specification for Fuel System Icing Inhibitors
D4176 Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)
D4294 Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry
~~D4305Test Method for Filter Flow of Aviation Fuels at Low Temperatures~~
D4306 Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination
D4529 Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
D4809 Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)
D4865 Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems
D4952 Test Method for Qualitative Analysis for Active Sulfur Species in Fuels and Solvents (Doctor Test)
D5001 Test Method for Measurement of Lubricity of Aviation Turbine Fuels by the Ball-on-Cylinder Lubricity Evaluator (BOCLE)
D5006 Test Method for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
D5191 Test Method for Vapor Pressure of Petroleum Products (Mini Method)
D5452 Test Method for Particulate Contamination in Aviation Fuels by Laboratory Filtration
D5453 Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence ~~D5901Test Method for Freezing Point of Aviation Fuels (Automated Optical Method)~~
D5972 Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method)
D6379 Test Method for Determination of Aromatic Hydrocarbon Types in Aviation Fuels and Petroleum DistillatesHigh Performance Liquid Chromatography Method with Refractive Index Detection
E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *IP Standards:*[4]
225 Copper Content of Aviation Turbine Fuel
227 Silver Corrosion of Aviation Turbine Fuel

2.3 *Other Standard:*[5]
CAN/CGSB 3.22-97 "Aviation Turbine Fuel, Wide Cut Type" includes grade Jet B and NATO grade F-40 fuel

2.4 *Military Standard:*[6]
MIL-DTL-5624 Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST

3. General

3.1 This specification, unless otherwise provided, prescribes the required properties of Jet B wide-cut aviation turbine fuel at the time and place of delivery.

4. Classification

4.1 One type of aviation turbine fuel is provided, as follows:

4.1.1 *Jet B*—A relatively wide boiling range volatile distillate.

5. Materials and Manufacture

5.1 ~~Aviation turbine fuel, except as otherwise specified in this specification, shall consist of blends of refined hydrocarbons derived from crude petroleum, natural gasoline, or blends thereof with synthetic hydrocarbons.~~ Aviation turbine fuel, except as otherwise specified in this specification, shall consist of blends of refined hydrocarbons (see Note 2) derived from conventional sources, including crude oil, natural gas liquid condensates, heavy oil, shale oil, and oil sands. The use of jet fuel blends, containing components from other sources, is permitted only on a specific individual basis.

NOTE 2—Conventionally refined jet fuel contains trace levels of materials which are not hydrocarbons including oxygenates, organosulfur, and nitrogeneous compounds.

5.1.1 Fuels used in certified engines and aircraft are ultimately approved by the certifying authority subsequent to formal submission of evidence to the authority as part of the type certification program for that aircraft and engine model. Additives to be used as supplements to an approved fuel must also be similarly approved on an individual basis (see X1.2.4 ~~and X1.11.1~~and X1.12.1).

5.2 *Additives*—May be added to each type of aviation turbine fuel in the amount and of the composition specified in the following list of approved material:[7]

5.2.1 *Antioxidants*—In amounts not to exceed 24.0 mg/L active ingredients (not including weight of solvent):

[4] Available from Directorate of Standardization, Stan 1, Room 5131, Kentigern House, 65 Brown St., Glasgow, G2 8EX, United Kingdom.
[5] Available from the Canadian General Standards Board (CGSB), Ottawa, Canada K1A 1G6.
[6] Available from Dept. of Defense Single Stock Point, Bldg 4D, 700 Robbins Ave., Philadelphia, PA 19111-5098.
[7] Supporting data (guidelines for approval or disapproval of additives) have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-1125.

5.2.1.1 2,6-ditertiary-butyl phenol.

5.2.1.2 2,6-ditertiary-butyl-4-methyl phenol.

5.2.1.3 2,4-dimethyl-6-tertiary-butyl phenol.

5.2.1.4 75 % minimum 2,6-ditertiary-butyl phenol, plus 25 % maximum mixed tertiary and tritertiary-butyl phenols.

5.2.1.5 55 % minimum 2,4-dimethyl-6-tertiary-butyl phenol, plus 15 % minimum 2,6-ditertiary-butyl-4-methyl phenol, remainder as monomethyl and dimethyl tertiary-butyl phenols.

5.2.1.6 72 % minimum 2,4-dimethyl-6-tertiary-butyl phenol, 28 % maximum monomethyl and dimethyl-tertiary-butyl phenols.

5.2.2 *Metal Deactivator*, in amount not to exceed 5.7 mg/L (not including weight of solvent):

5.2.2.1 *N*,*N* -disalicylidene-1,2-propane diamine.

5.2.3 *Electrical Conductivity Additive*—Stadis 450[8] not to exceed 3 mg/L.

5.2.3.1 When loss of fuel conductivity necessitates retreatment with electrical conductivity additive, the following concentration limits apply:

	At Manufacture	
Stadis 450		3 mg/L, max
	Retreatment	
Stadis 450		cumulative total 5 mg/L, max

5.2.4 *Leak Detection Additive*—Tracer A[9] may be added to the fuel in amounts not to exceed 1 mg/kg.

5.2.5 Other additives are permitted under 5.1 and Section 7. These include fuel system icing inhibitor, other anti-oxidants, inhibitors, and special purpose additives. The quantities and types must be declared by the fuel supplier and agreed to by the purchaser. Only additives approved by the aircraft certifying authority are permitted in the fuel on which an aircraft is operated.

5.2.5.1 Biocidal additives are available for controlled usage. Where such an additive is used in the fuel, the approval status of the additive and associated conditions must be checked for the specific aircraft and engines to be operated.

5.2.5.2 *Fuel System Icing Inhibitor* :

(1) Diethylene Glycol Monomethyl Ether (DIEGME), conforming to the requirements of Specification D4171, Type III, may be used in concentrations of 0.10 to 0.15 volume %.

(2) Test Method D5006 may be used to determine the concentration of DIEGME in aviation fuels.

~~5.3Guidance material is presented in~~

5.3 Guidance material is presented in Appendix X3 concerning the need to control processing additives in jet fuel production.

6. Detailed Requirements

6.1 The aviation turbine fuel shall conform to the requirements prescribed in Table 1.

6.2 Test results shall not exceed the maximum or be less than the minimum values specified in Table 1. No allowance shall be made for the precision of the test methods. To determine conformance to the specification requirement, a test result may be rounded to the same number of significant figures as in Table 1 using Practice E29. Where multiple determinations are made, the average result, rounded in accordance with Practice E29, shall be used.

7. Workmanship, Finish, and Appearance

7.1 The aviation turbine fuel specified in this specification shall be visually free of undissolved water, sediment, and suspended matter. The odor of the fuel shall not be nauseating or irritating. No substance of known dangerous toxicity under usual conditions of handling and use shall be present, except as permitted in this specification.

8. Sampling

8.1 Because of the importance of proper sampling procedures in establishing fuel quality, use the appropriate procedures in Practice D4057 ~~.~~ to obtain a representative sample from the batch of fuel for specification compliance testing. This requirement is met by producing fuel as a discrete batch, then testing it for specification compliance. This requirement is not satisfied by averaging online analysis results.

8.2 A number of jet fuel properties, including thermal stability, water separation, electrical conductivity, and others, are very sensitive to trace contamination, which can originate from sample containers. For recommended sample containers, refer to Practice D4306.

9. Report

9.1 The type and number of reports to ensure conformance with the requirements of this specification shall be mutually agreed upon by the seller and the purchaser of the aviation turbine fuel.

9.2 A suggested form for reporting inspection data on aviation turbine fuels is given in Appendix X4 of Specification D1655.

10. Test Methods

10.1 Determine the requirements enumerated in this specification in accordance with the following ASTM test methods.

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[8] Stadis 450 is a registered trademark marketed by Innospec Inc., Innospec Manufacturing Park, Oil Sites Road, Ellsmere Port, Cheshire, CH65 4EY, UK.

[9] Tracer A (LDTA-A) is a registered trademark of Tracer Research Corp., 3755 N. Business Center Dr., Tucson, AZ 85705.

TABLE 1 Detailed Requirements of Aviation Turbine Fuels[A]

Property		Jet B	ASTM Test Method[B]
1. Aromatics, vol %	max	25	D1319
2. Aromatics, vol %	max	26.5	D6379
Sulfur, mercaptan,[C] mass %	max	0.003	D3227
Sulfur, total mass %	max	0.30	D1266, D2622, D4294, or D5453
Distillation temperature, °C:			
20 % recovered, temperature	min	90	D86
20 % recovered, temperature	max	145	
50 % recovered, temperature	min	110	
50 % recovered, temperature	max	190	
90 % recovered, temperature	max	245	
Distillation residue, %	max	1.5	
Distillation loss, %	max	1.5	
Density at 15°C, kg/m^3		751 to 802	D1298 or D4052
Vapor pressure, 38°C, kPa		14 to 21	D323 or D5191[D]
~~Freezing point, °C~~	~~max~~	~~–50[E]~~	~~D2386, D4305[F], D5901,or D5972[G]~~
Freezing point, °C	max	–50[E]	D2386or D5972[F]
~~Net heat of combustion, MJ/kg~~	~~min~~	~~42.8[H]~~	~~D4529, D3338, or D4809~~
Net heat of combustion, MJ/kg	min	42.8[G]	D4529, D3338, or D4809
One of the following requirements shall be met:			
(*1*) Smoke point, mm, or	min	25	D1322
(*2*) Smoke point, mm, and	min	18	D1322
Naphthalenes, vol, %	max	3.0	D1840
Copper strip, 2 h at 100°C		No. 1	D130
Thermal Stability:			
(2.5 h at control temperature of 260°C min):			
~~Filter pressure drop, mm Hg~~	~~max~~	~~25[I]~~	~~D3241[J]~~
Filter pressure drop, mm Hg	max	25[H]	D3241[I]
~~Tube deposits less than~~		~~Code3~~	
Tube deposits less than		3	
	No *Peacock* or *Abnormal* Color Deposits		
Existent gum, mg/100 mL	max	7	D381
ADDITIVES		See 5.2	
~~Electrical conductivity, pS/m~~		[~~K~~]	~~D2624~~
Electrical conductivity, pS/m		[J]	D2624
~~Microseparometer Rating[L]~~			~~D3948~~
Microseparometer Rating[K]			D3948
Without electrical conductivity additive	min	85	
With electrical conductivity additive	min	70	

[A] For compliance of test results against the requirements of Table 1, see 6.2.
[B] The test methods indicated in this table are referred to in Section 10.
[C] The mercaptan sulfur determination may be waived if the fuel is considered sweet by the doctor test described in Test Method D4952.
[D] Cyclohexane and toluene, as cited in 7.2 and 7.7 of Test Method D5191, shall be used as calibrating reagents. Test Method D5191 shall be the referee method.
[E] Other freezing points may be agreed upon between supplier and purchaser.
~~[F] When using Test Method D4305, use Procedure A only, do not use Procedure B. Test Method D4305 shall not be used on samples with viscosities greater than 5.0 mm^2/s at -20°C. If the viscosity of the sample is not known and cannot be obtained by means of the batch certificate(s), then it shall be measured. The viscosity shall be reported when reporting the Test Method D4305 results. In case of dispute, Test Method D2386 shall be the referee method.~~
[~~G~~] Test Method D5972 may produce a higher (warmer) result than that from Test Method D2386 on wide-cut fuels such as Jet B or JP-4. In case of dispute, Test Method D2386 shall be the referee method.
[~~H~~G] Use either Eq 1 or Table 1 in Test Method D4529 or Eq 2 in Test Method D3338. Test Method D4809 may be used as an alternative. In case of dispute, Test Method D4809 shall be used.
[~~I~~H] Preferred SI units are 3.3 kPa, max.
[~~J~~I] ~~Thermal stability test (JFTOT) shall be conducted for 2.5 h at a control temperature of 260°C,but if the requirements of Table 1 are not met, the test may be con ducted at 245°C. Results at both temperatures shall be reported in this case. Tube deposit~~s shall always be reported by the Visual Method~~; a rating by the Tube Deposit Rating (TDR) optical density method is desirable but not mandatory~~.
[~~K~~J] If electrical conductivity additive is used, the conductivity shall not exceed ~~45~~ 600 pS/m at the point of use of the fuel. When electrical conductivity additive is specified by the purchaser, the conductivity shall be 50 to ~~45~~ 600 pS/m under the conditions at point of delivery.

$$1\ \text{pS/m} = 1 \times 10^{-12}\ \Omega^{-1}\ m^{-1}$$

[~~L~~K] At point of manufacture.

10.1.1 *Density*—Test Methods D1298 or D4052.
10.1.2 *Distillation*—Test Method D86.
10.1.3 *Vapor Pressure*—Test Methods D323 or D5191. Test Method D5191 shall be the referee test method.
10.1.4 *Freezing Point*—Test Methods D2386 ~~, D4305, D5901, or~~ or D5972. Test Method D2386 shall be the referee test method.
10.1.5 *Net Heat of Combustion*—Test Methods D4529, D3338, or D4809.
10.1.6 *Corrosion (Copper Strip)*—Test Method D130.
10.1.7 *Sulfur*—Test Methods D1266, D2622, D4294, or D5453.
10.1.8 *Mercaptan Sulfur*—Test Method D3227.
10.1.9 *Water Reaction*—Test Method D1094.

10.1.10 *Existent Gum*—Test Method D381.

10.1.11 *Thermal Stability*—Test Method D3241. ~~Note2—Table 1 requires the measurement of thermal stability at a tube temperature of 260°C, but permits a retest at 245°C if the first test fails. This two-tier system was developed to resolve a dispute over the equivalence of results by Test Method D3241 compared with Test Method D1660, the original thermal stability method. A more detailed discussion of test conditions is found in X1.3.2.~~

~~10.1.12~~

10.1.12 *Aromatics*—Test Methods D1319 or D6379. Test Method D1319 shall be the referee test method.

10.1.13 *Smoke Point*—Test Method D1322.

10.1.14 *Naphthalene Content*—Test Method D1840.

10.1.15 *Electrical Conductivity*—Test Method D2624.

11. Keywords

11.1 aviation turbine fuel; avtag; Jet B; jet fuel; turbine fuel; wide-cut

APPENDIXES

(Nonmandatory Information)

X1. PERFORMANCE CHARACTERISTICS OF AVIATION TURBINE FUELS

X1.1 Introduction

X1.1.1 This appendix describes the performance characteristics of aviation turbine fuels. A more detailed discussion of the individual test methods and their significance is found in ASTM Manual No. 1.[10]

X1.2 Significance and Use

X1.2.1 Specification D6615 defines one type of jet fuel for civil use. Limiting values for the two types of fuel covered are placed on fuel properties believed to be related to the performance of the aircraft and engines in which they are most commonly used.

X1.2.2 The safe and economical operation of aircraft requires fuel that is essentially clean and dry and free of any contamination prior to use. It is possible to measure a number of jet fuel characteristics related to quality.

X1.2.3 The significance of standard tests for fuel properties may be summarized for convenience in terms of the technical relationships with performance characteristics as shown in Table X1.1.

X1.2.4 The acceptability of additives for use must ultimately be determined by the engine and aircraft type certificate holder and must be approved by his certifying authority. In the United States of America, the certifying authority is the Federal Aviation Administration.

[10] ASTM MNL 1, *Manual on Significance of Tests for Petroleum Products*, ASTM International, W. Conshohocken, 1993.

TABLE X1.1 Performance Characteristics of Aviation Turbine Fuels

Performance Characteristics	Test Method	Sections
Engine fuel system deposits and coke	Thermal stability	X1.3
Combustion properties	Smoke point	X1.4.2.1
	Aromatics	X1.4.2.2
	Percent naphthalenes	X1.4.2.3
Fuel metering and aircraft range	Density	X1.5.1
	Net heat of combustion	X1.5.2
Fuel atomization	Distillation	X1.6.1
	Vapor pressure	X1.6.2
Fluidity at low temperature	Freezing point	X1.7.1
Compatibility with elastomer and the metals in the fuel system and turbine	Mercaptan sulfur	X1.8.1
	Sulfur	X1.8.2
	Copper strip corrosion	X1.8.3
Fuel storage stability	Existent gum	X1.9.1
Fuel cleanliness, handling	Water reaction	X1.10.1
	Water separation characteristics	X1.10.2
	Free water and particulate contamination	X1.10.3
	Particulate matter	X1.10.4
	Membrane color ratings	X1.10.5
	Undissolved water	X1.10.6
Static electricity	Conductivity	X1.10.7
Fuel lubricating ability (lubricity)	Fuel lubricity	X1.11
Miscellaneous	Additives	X1.12.1
	Sample containers	X1.12.2
	Leak detection additive	X1.12.3
	Color	X1.12.4

X1.3 Thermal Stability

X1.3.1 Stability to oxidation and polymerization at the operating temperatures encountered in certain jet aircraft is an important performance requirement. The "thermal stability" measurements are related to the amount of deposits formed in the engine fuel system on heating the fuel in a jet aircraft. Commercial jet fuels should be thermally stable at fuel temperature as high as 149°C (300°F). Such fuels have been demonstrated to have inherent storage stability.

~~X1.3.2Originally,~~X1.3.2 Originally, thermal stability was measured by Test Method D1660, known as the ASTM Coker. When this test was replaced by Test Method D3241~~, the JFTOT,~~ a correlation study was conducted between the two methods. (CRC Report 450, dated 1969 and revised in 1972. See also Bert and Painter's SAE paper 730385.[11]) It was concluded that, on average, a Test Method D3241test at 245°C was equivalent to the original Test Method D1660requirement of 300°F/400°F/5 lbs/h (149°C/204.5°C/2.27 kg/h). However, the data scatter about the best fit line was such that users insisted on the initial test of 260°C as a safety margin but permitted a retest at 245°C.

X1.4 Combustion

X1.4.1 Jet fuels are continuously burned in a combustion chamber by injection of liquid fuel into the rapidly flowing stream of hot air. The fuel is vaporized and burned at near stoichiometric conditions in a primary zone. The hot gases so produced are continuously diluted with excess air to lower their temperature to a safe operating level for the turbine. Fuel combustion characteristics relating to soot formation are emphasized by current specification test methods. Other fuel combustion characteristics not covered in current specifications are burning efficiency and flame-out.

X1.4.2 In general, paraffin hydrocarbons offer the most desirable combustion cleanliness characteristics for jet fuels. Naphthenes are the next most desirable hydrocarbons for this use. Although olefins generally have good combustion characteristics, their poor gum stability usually limits their use in aircraft turbine fuels to about 1 % or less. Aromatics generally have the least desirable combustion characteristics for aircraft turbine fuel. In aircraft turbines, they tend to burn with a smoky flame and release a greater proportion of their chemical energy as undesirable thermal radiation than the other hydrocarbons. Naphthalenes or bicyclic aromatics produce more soot, smoke, and thermal radiation than monocyclic aromatics and are, therefore, the least desirable hydrocarbon class for aircraft jet fuel use. All of the following measurements are influenced by the hydrocarbon composition of the fuel and, therefore, pertain to combustion quality: luminometer number, smoke point, percent naphthalenes, and percent aromatics.[12]

X1.4.2.1 *Smoke Point*—This method provides an indication of the relative smoke-producing properties of jet fuels and is related to the hydrocarbon-type composition of such fuels. Generally, the more highly aromatic the jet fuel, the more smoky the flame. A high smoke point indicates a fuel of low smoke-producing tendency.

X1.4.2.2 *Aromatics*—The combustion of highly aromatic jet fuels generally results in smoke and carbon or soot deposition, and it is therefore desirable to limit the total aromatic content as well as the naphthalenes in jet fuels.

X1.4.2.3 *Percent Naphthalenes*—This method covers measurement of the total concentration of naphthalene, acenaphthene, and alkylated derivatives of these hydrocarbons in jet fuels containing no more than 5 % of such compounds and having boiling points below 600°F (316°C).

X1.5 Fuel Metering and Aircraft Range

X1.5.1 *Density*—Density is a property of a fluid and is of significance in metering flow and in mass-volume relationships for most commercial transactions. It is particularly useful in empirical assessments of heating value when used with other parameters, such as aniline point or distillation. A low density may indicate low heating value per unit volume.

X1.5.2 *Net Heat of Combustion*—The design of aircraft and engines is based on the convertibility of heat into mechanical energy. The net heat of combustion provides a knowledge of the amount of energy obtainable from a given fuel for the performance of useful work; in this instance, power. Aircraft design and operation are dependent upon the availability of a certain predetermined minimum amount of energy as heat. Consequently, a reduction in heat energy below this minimum is accompanied by an increase in fuel consumption with corresponding loss of range. Therefore, a minimum net heat of combustion requirement is incorporated in this specification. The determination of net heat of combustion is time consuming and difficult to conduct accurately. This led to the development and use of the aniline point and density relationship to estimate the heat of combustion of the fuel. This relationship is used along with the sulfur content of the fuel to obtain the net heat of combustion by Test Method D4529 for the purposes of this specification. An alternative calculation, Test Method D3338, is based on correlations of aromatics content, gravity, volatility, and sulfur content. This method may be preferred at refineries where all these values are normally obtained and the necessity to obtain the aniline point is avoided. The direct measurement method, Test Method D4809, is normally used only as a referee method in cases of dispute.

[11] This specification is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.J0.01 on Jet Fuel Specifications.

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[12] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-1258. A task force studied the possible use of hydrogen content as an alternative to aromatics content and completed the report in 1989.