

Table 1 Requirement for Aviation Turbine Fuels, Kerosene Type, Jet A-1  
(Clauses 3.2.2, 3.2.3.1, 3.2.6, 3.3 and 3.4)

SI No.	Characteristic	Requirement	Method of Test, Ref to [P:] of IS 1448/ASTM/IP/ISO
(1)	(2)	(3)	(4)
i)	<i>Appearance:</i>		
a)	Visual appearance	Clear, bright and visually free from solid matter and undissolved water at ambient temperature	Visual
b)	Colour	Report <sup>1)</sup>	ASTM D 156 or ASTM D 6045
c)	Particulate contamination, at a point of manufacture, mg/l, <i>Max</i>	1.0 <sup>2)</sup>	ASTM D 5452/IP 423
ii)	<i>Composition:</i>		
a)	Total acidity, mg KOH/g, <i>Max</i>	0.015	[P : 113]
b)	Aromatics, percent by volume, <i>Max</i>	25.0 <sup>3)</sup>	[P : 23]
c)	Total sulphur, percent by mass, <i>Max</i>	0.30	[P : 34]
d)	Sulphur mercaptan, percent by mass, <i>Max</i> or Doctor Test	0.0030 <sup>4)</sup> Negative <sup>5)</sup>	[P : 109] [P : 19]
e)	Refining components, at the point of manufacture:		
1)	Hydro-processed components, percent, w/v	Report	
2)	Severely hydroprocessed components, percent, w/v	Report <sup>6)</sup>	
iii)	<i>Volatility:</i>		
a)	Distillation:		[P : 18] <sup>7)</sup>
1)	Initial boiling point, at °C	Report	
2)	10 percent recovery at °C, w/v, <i>Max</i>	205.0	
3)	50 percent recovery at °C, w/v	Report	
4)	90 percent recovery at °C, w/v	Report	
5)	Final boiling point, °C, <i>Max</i>	300.0	
6)	Residue, percent by volume, <i>Max</i>	1.5	
7)	Loss, percent by volume, <i>Max</i>	1.5	
b)	Flash point ( Abel ), °C, <i>Min</i>	38.0	[P : 20] ( see Method B)
c)	Density at 15°C, kg/m <sup>3</sup>	775.0 to 840.0	[P : 16]
iv)	<i>Fluidity:</i>		
a)	Freezing point, °C, <i>Max</i>	-47	[P : 11]
b)	Kinematic viscosity at -20°C, mm <sup>2</sup> /s, <i>Max</i>	8.000	[P : 25]
v)	<i>Combustion:</i>		
a)	Specific energy MJ/kg, <i>Min</i> or Product of API gravity and aniline point, <i>Min</i>	42.80 4800	[P : 6] <sup>8)</sup> [P : 3] <sup>9)</sup>
b)	Smoke point, mm, <i>Min</i> or	25.0	[P : 31] <sup>16)</sup> ; ISO 3014
1)	Smoke point, mm, <i>Min</i> and	19.0	[P : 31] <sup>16)</sup> ; ISO 3014
2)	Naphthalenes, percent w/v, <i>Max</i>	3.00	[P : 118]
vi)	<i>Corrosion:</i>		
	Copper strip corrosion for 2 h at 100°C	Not worse than No. 1	[P : 15]
vii)	<i>Thermal Stability, JFTOT at Control Temperature of 260°C</i>		[P : 97] <sup>17)</sup> ; ISO 6294
a)	Filter pressure differential, mm Hg, <i>Max</i>	25	
b)	Tube rating, visual	Less than 3, No 'Peacock' or 'Abnormal' colour deposits <sup>10)</sup>	
viii)	<i>Contaminants:</i>		
a)	Existent gum, mg/100 ml, <i>Max</i> or Existent gum with air, mg/100 ml, <i>Max</i>	7 7	[P : 29] <sup>11)</sup>
b)	Water reaction:		
	Interface rating, <i>Max</i>	1b	[P : 42]
c)	Micro separometer rating at the point of manufacture:		[P : 142] <sup>12)</sup>
1)	MSEP without SDA, <i>Min</i>	85 <sup>13)</sup>	
2)	MSEP with SDA, <i>Min</i>	70	
ix)	<i>Conductivity:</i>		
	Electrical conductivity, pS/m (at the point, time and temperature of delivery to the purchaser)	50, <i>Min</i> 600, <i>Max</i>	ISO 6297
x)	<i>Lubricity:</i>		
	Wear scar diameter, mm, <i>Max</i>	0.85 <sup>14), 15)</sup>	ASTM D 5001

1) The requirement to report Saybolt Colour shall apply at point of manufacture, thus enabling a colour change in distribution to be quantified. Where the colour of the fuel precludes the use of the Saybolt Colour test method, then the visual shall be reported. Unusual or atypical colours should also be noted. For further information on the significance of colour (see Annex B).

2) Refer to the information on particulate contamination in Annex C.

3) Defence requirements to be met at 22 percent by volume, maximum.

Table 1 (Concluded)

- 4) Defence requirements to be met at 0.002 percent by mass, maximum.
- 5) The mercaptan sulphur determination may be waived if the fuel is considered sweet by the Doctor test. However, in the event of a conflict between sulphur mercaptan (ii) (d) and Doctor test results, requirement (ii) (d) shall prevail.
- 6) Severely hydroprocessed components are defined as petroleum derived hydrocarbons that have been subjected to a hydrogen partial pressure of greater than 7 000 kPa during manufacture.
- 7) A condenser bath temperature of 0 to 4°C shall be used.
- 8) Specific energy by one of the calculation methods listed under foreword will be acceptable. Where a measurement of specific energy is deemed necessary, the method to be used shall be agreed between the purchaser and supplier.
- 9) Convert the aniline point determined in °C to °F. Calculate API gravity from the relative density in accordance with the following formula:

$$\text{API} = [141.5 / (\text{RD } 60/60^\circ\text{F})] - 131.5$$

An estimate of net Specific Energy ( in units of MJ/kg ) can be made from Aniline Gravity Product using either Table 4 or equations 4 and 9 of ASTM D 1405-01.

- 10) Examination of heater tube to determine the visual tube rating using the visual tuberator shall be carried out within 120 min of completion of the test.
- 11) Air may be used instead of steam as the evaporating medium so long as the temperatures remain as specified in [P : 29] of IS 1448, Table 1 — Test Conditions for Aviation Turbine Fuel for Steam Jet Apparatus. When carrying out this procedure, air flow calibration should be adjusted to give an air flow of 600 ml/s at ambient conditions. The beaker should still undergo the same pre-heating as in steam-jet procedure.
- 12) If the sample contains sediment or insoluble matter, it shall be allowed to stand and clear fuel decanted for testing. The sample shall not be filtered.
- 13) These MSEP requirements apply only at the point of manufacture. No precision data are available for fuels containing SDA. If MSEP testing is carried out during downstream distribution no specification limits apply and results are not to be used as the sole reason for rejection of a fuel.
- 14) The requirement to determine lubricity applies only to fuels containing more than 95 percent hydroprocessed material where at least 20 percent of this is severely hydroprocessed ( see footnote 6). The limits apply only at the point of manufacture.
- 15) Defence requirements to be met at 0.65 mm, *Max.* Irrespective of method of production of ATF, that is, Hydrotreated, Mercox or mixed, lubricity in terms of WSD shall be reported in the Test Reports. If 'as is' WSD of ATF is greater than 0.65 mm at the point of production at the refinery, the desired WSD shall be obtained at the refineries after doping with the approved lubricity additive as mentioned in 3.2.4 and the quantity thus required to obtain WSD < 0.65 mm shall be annotated in the Batch Test Reports. If the quantity of LIA required for any of the batches of ATF at the refineries is found to be more than the stipulated maximum of the respective LIA as given in 3.2.4.2, then such batches of ATF shall not be supplied by the refineries nor utilized by the Indian Armed Forces. For the batches of ATF of WSD > 0.65 mm, doping of optimized quantity of respective LIA stipulated by CEMILAC shall be mandatorily undertaken just before ATF is inducted into the aircraft. All activities of compliance in r/o doping and maintenance of relevant records for traceability point of view shall be vested solely by the supplier of ATF namely, AFS.
- 16) Existing [P : 31] method is under revision. Till such time, ISO 3014 shall be followed.
- 17) Existing [P : 97] method is under revision. Till such time ISO 6294 shall be followed.