

BULLETIN 137

## SUPPLY CHAIN: PERIODIC TESTING OF AVGAS

21/07/2021

### Objectives

This bulletin requires mandatory action from Avgas storage terminal operations upstream of airports and is also for awareness of airport operators supplying Avgas and revision of best practice for longer-term management of on-airport Avgas storage.

The objective of this Bulletin is to improve the control requirements for Avgas grades at supply terminals and airports to ensure that the product meets the specification at the point of delivery. This Bulletin relates to a need to carefully manage those Avgas properties that may deteriorate when kept in tank for extended periods, or where certain product properties are already close to specification limits which may limit the remaining storage life of the product.

### Background

When aviation fuels are in storage, they may be subject to changes in their properties and composition over time. The primary mechanisms for these changes are chemical reactions (such as oxidation or polymerisation of the fuel) or evaporative loss of the more volatile components within the fuel. Many factors affect this, including the length of time since production, whether the fuel has been stored in over-ground or underground storage tanks, tank size (and relative ullage volume), ambient temperature changes, the effectiveness of pressure / vacuum vents and fuel composition.

Under normal circumstances such changes are gradual and do not adversely affect the fuel's fitness for purpose unless fuel is stored for extended periods before use. To manage this risk within the supply chain, EI/JIG 1530 stipulates that aviation fuel shall have been tested at least 180 days prior to delivery to an airport.

Recent evidence has shown that this control alone is not robust in preventing some fuels from being delivered to airports outside of specification limits: specifically, this is related to evaporative losses in Avgas. In these circumstances, properties of particular concern are the Reid Vapour Pressure (hereafter RVP) and the 10% volume recovery temperature within in the distillation test (hereafter T10).

Aside:

RVP is a measurement of the pressure at which a given liquid fuel can form a stable vapour forms at a fixed temperature. Light components in a fuel contribute to a higher vapour pressure and the removal of these light components causes the RVP to reduce. Similarly, the T10 temperature will increase with a fuel when light components are lost as the remaining fuel lacks the more volatile elements and this results in a higher temperature before 10% of the fuel is recovered during distillation.

Both a decrease in RVP and increase in T10 is an indication of the evaporation of light components within the fuel, which can adversely affect engine starting performance amongst other things.

This bulletin is intended to bring awareness of this issue to suppliers of Avgas and to have them increase the frequency of testing of all grades of Avgas whenever these parameters are approaching the specification limits.

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As part of the investigation work, volatile loss was also found to affect product density. Work was done to estimate how changes in T10 and RVP and T10 might correlate with changes in density of Avgas, and this has been used to set additional margins above the specification limits for RVP and T10 that would allow 180-day testing at the supply point to continue to be robust without additional action. This is seen as being effective since Control Checks on the fuel limit the difference in density to 3 kg/m<sup>3</sup> and should identify fuels which have suffered large volatile losses, thereby restricting such fuels from being released to, or accepted by, an airport.

When a fuel has RVP and T10 results closer to the specification limits than those which would allow a Control Check to be an effective barrier in identifying evaporative losses, then the frequency of testing of RVP and T10 shall be increased at the supplying terminal and is the subject of this Bulletin.

## Reference to Previous JIG Bulletins

This bulletin shall be read in conjunction with EI/JIG 1530 and is intended to be implemented in addition to the requirement in section 2.2.6 which states:

Any movement of aviation fuel shall be supported by an RCQ, CoA or RT Certificate that is less than 180 days old.

Note: Drum stocks are exempt from this requirement; here the certification is valid for 12 months from filling date or the last retest date for the batch of drums. (See 10.4.2.5)

If the latest test certificate (RCQ, CoA or RT) for a batch of product is more than 180 days old a CoA test shall be conducted on the batch of fuel (with exception of ASTM D909 test for Avgas which is optional). A comparison of the new CoA shall be made with the original RCQ/CoA/RT. Any significant differences (see 4.5.6, Table 3, for allowable test variances) shall be investigated prior to release to confirm that the product is fit for purpose.

If there have been changes to the fuel specification since the date on the test certificate, any additional testing required shall be conducted in accordance with the current specification at the time of retesting.

Where the RCQ, CoA or RT is more than 180 days old, a new CoA shall be issued.

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## **Actions to Implement this Bulletin (See Table 1 for Action Type Codes)**

### **Supply Terminal Operations**

All storage terminals handling aviation fuels shall conform to EI/JIG 1530 Edition 2 Section 2.2.6. which requires that any movement of aviation fuel shall be supported by an RCQ, CoA or RT Certificate that is less than 180 days old.

In addition, specifically for storage terminals delivering any Avgas grades, if the T10 is greater than 69°C or the RVP is less than 45 kPa, then:

- 1) Testing of Reid Vapour Pressure and Distillation shall be carried out at a frequency of no more than 30 days and reported on the release documentation.
  - a. Results shall be within specification limits.
  - b. Results should be compared with previous results to determine the rate of change of these properties to ensure that the fuel will continue to meet the specification requirements while on delivery.

### **Airport Operations**

The guidance on periodic testing of products within JIG 2 Section 2.3.4 (c) shall be used as a minimum requirement for periodic testing of aviation fuels at airports.

However, the primary product quality requirement for the fuel supplier is to ensure that the product meets the relevant fuel specification requirements at the point of delivery to the aircraft. Therefore, if a storage location has features that could promote evaporative losses from Avgas, periodic testing of critical properties (RVP and T10) should be more frequent than 6-monthly to ensure that the product meets the specification limits at the point of delivery to aircraft.

Features that encourage evaporative loss include:

- Above ground tanks more so than underground tanks
- A small amount of fuel relative to the tank size (i.e. a large relative ullage volume)
- High ambient temperatures
- Lack of effective pressure / vacuum vent valves
- Changes in fuel formulations practice that can occur between different manufacturing sources.

Information is contained within this bulletin about the values of RVP and T10 for incoming fuel that may be significant in determining the potential for fuel to remain on-spec between the normal 6-month periodic testing period. For values of RVP and T10 that are closer to the specification limits, trend monitoring of the rates of change of both RVP and distillation (especially T10) at the storage location should be used to predict the maximum period that a given fuel might reasonably be expected to remain within the specification limits while on supply at that location.

This information should be used to develop an appropriate periodic testing frequency programme.

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PRODUCT QUALITY

Action Description	Action Type	Target Completion Date
1. Supply Terminals operating to EI/JIG 1530 are to implement changes to testing frequency of RVP and T10 for Avgas grades if results are within the limits designated within this Bulletin.	JS	Effective Immediately
2. Airport Operations operating to JIG 2 are to consider the risk of RVP and T10 for Avgas grades degrading below the specification limits while in storage. If such risks exist, then consideration shall be given to increasing the frequency of product testing.	RP	Effective immediately

## Relevant Publications

EI/JIG 1530

**Table 1 Action Type Codes**

Action Type	JIG Bulletin Action Type Definition
JS	Change to JIG Standard – to be adopted by JV and/or Operator to continue to meet the JIG Standard(s) (JIG 1, 2, 4 and JIG HSSE Management System) (**).
RP	JIG Recommended Practice which the JV should consider adopting as its own practice (**).
I	Issued for information purposes only.
Note (**) - If the JV agreements require any of the JIG Standards and/or any of the JIG Common Processes as the governing operational standard then adoption of changes to applicable JIG Standards and/or Common Processes should not be considered optional by the JV Board.	

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