

TESTING WATER SEPARATION PROPERTIES OF JET FUEL DOWNSTREAM OF POINT OF MANUFACTURE (REVISED MSEP PROTOCOL)

THIS PROTOCOL SUPERSEDES JIG BULLETIN 121

Summary of changes versus JIG Bulletin 121

- 1) ASTM D3948 can continue to be conducted downstream of point of manufacture in facilities operating in accordance with the JIG Standards (for example as part of Recertification testing and Certificate of Analysis testing)
- 2) ASTM D7224 and ASTM D8073 remain preferred methods for determining water separation characteristics downstream of the point of manufacture
- 3) Some anomalies in the results between the allowed methods have been noted in the field and are under investigation
- 4) The date for withdrawal of ASTM D3948 from JIG Standards has been suspended until an investigation into the anomalies is complete
- 5) Users experiencing anomalies between the methods are requested to report them to JIG (info@jigonline.com).

Update to JIG Bulletin 121.

JIG Bulletin 121 was issued in May 2019 and updated the MSEP Protocol that was detailed in JIG Bulletin 65 (2013). Experience over the previous 12 months with one of the new water separation property methods that was detailed in Bulletin 121, the ASTM D7224 method has, in a small number of circumstances, shown sensitivity to some fuels e.g. those that have shown a poor response to Static Dissipator Additive (SDA). This sensitivity could produce a failing result, whereas the other two permitted methods produce a passing result. This unexpected anomaly will require further industry investigation.

JIG Bulletin 121 indicated that method ASTM D3948 could only be used for testing water separation downstream of point of manufacture until the end of May 2020. However, in order to avoid unnecessary supply disruption, the date for withdrawal of ASTM D3948 from JIG Standards has been suspended until an investigation into the anomalies is complete. JIG will issue a follow up Bulletin when this work has been concluded.

Revised JIG Protocol for Water Separation Testing Downstream of Point of Manufacture

Where water separation testing is conducted downstream of point of manufacture in facilities operating in accordance with the JIG Standards, the following protocols shall apply.

- 1) Testing should be done using either**
 - a. ASTM D7224 with a minimum limit of 85, or**
 - b. ASTM D8073 (IP624) with a minimum limit of 88.**

Despite the sensitivity with some fuels as explained above, these methods are the preferred methods as they have improved precision relative to MSEP (ASTM D3948). There is currently no difference in the limits when SDA is or is not present.

- 2) Alternatively, and until further notice, testing may also be conducted using ASTM D3948 (it is noted that JIG still intends to withdraw this method in the future).**
 - a. If the results are between 60 and 70 for fuel containing SDA or 70 and 85 for a fuel not containing SDA, a confirmation test shall be run of the original sample. Provided the two test results are within the repeatability window of the ASTM D3948 method, enter the average MSEP result from the two tests onto the test certificate. Subject to all other properties meeting the specification requirements, the certificate can be issued. The batch may be released without recourse to other fuel suppliers involved at the location concerned, subject to local procedures. The local Re-certifying authority shall endorse the certificate. "MSEP result within precision limits of the test method". All fuel suppliers at the location should be advised of this occurrence retrospectively.
 - b. If the result of ASTM D3948 testing is less than 60, a test shall be run on the original sample using either ASTM D7224 or ASTM D8073 (IP624). If the result of the test is greater than 85 for ASTM D7224 or 88 for ASTM D8073 (IP624), this result shall be entered onto the test certificate. Subject to all other properties meeting specification requirements, the certificate can be issued. The batch may be released without recourse to other fuel suppliers involved at the location concerned, subject to local procedures.
- 3) If the initial test result for ASTM D7224 or ASTM D8073 (IP624) is below the stated minimum limit for these tests shown under item 1 or 2b above, the protocols detailed in EI/JIG 1530 Annex E should be followed, to establish the final result before quarantining the fuel pending an investigation to determine the source of the failure.**
- 4) A useful part of the investigation should be to carry out a test on the same sample with the other test method listed in 1. Results for a sample which has a pass result for one method but a fail result by the other should be reported to JIG (info@jigonline.com).**
- 5) Where investigation presents data to suggest contamination may be present, remediation actions such as, but not limited to, clay treating or dilution may be used to achieve the required minima for ASTM D7224 or ASTM D8073 (IP624). (Note that clay**

treatment and/or dilution may result in loss of electrical conductivity in the fuel batch, which may need subsequent correction by redosing SDA.)

- 6) When investigation presents additional data to suggest that contamination may be present, and where remediation is not feasible, the product shall be downgraded to non-aviation use.
- 7) If, after an investigation, there are no other data (from testing or other sources) to suggest possible product contamination, then a low water separation result shall not be the sole reason to reject a fuel.

Throughout transfers of fuel associated with batches released under this protocol, special care should be taken to ensure that water draining is done in accordance with the operating standards in effect at the location, either JIG 1/2 or EI/JIG 1530, to further ensure that the fuel is free of excess water and dirt when delivered into aircraft.

Subject to the endorsement of all fuel suppliers at a specific location, the above protocol shall be advised to their recertification laboratory(s) for automatic implementation. However, ensuring the integrity of Jet Fuel is at all times the paramount consideration. Nothing in this protocol shall be deemed to override this principle. Fuel suppliers retain the right, in the absence of positive evidence of an investigation and any subsequent suitable corrective/preventative action, to ultimately withdraw their support for the use of this protocol.

Although it remains permissible at this point, it is the intention of JIG, at some future date, to withdraw the use of ASTM D3948 as a product quality control method downstream of point of manufacture. This withdrawal will be the subject of a future Bulletin.

Actions to Implement this Bulletin (See Table 2 for Action Type Codes)

Action Description	Action Type	Date
Where water separation performance testing is conducted downstream of point of manufacture in facilities operating to the JIG Standards, the revised protocol defined in this Bulletin shall apply	JS	With Immediate Effect

Background Information

The name surfactants is a compression of surface active agents and describes a class of chemicals that may be present in Jet fuel. These can be present due to:

- the intentional addition of permitted performance additive materials (such as lubricity improvers, corrosion inhibitors, static dissipator additives (SDA))
- trace material from the crude oil
- unintended incidental contamination which occurs during fuel distribution.

Not all surfactants are a concern, but they need to be controlled in Jet fuel as their presence may cause disarming of filtration systems which are designed to coalesce and remove water from onward transfer of the fuel. Surfactants can also act to disperse particles (or in extreme cases act as detergents to mobilise otherwise stable particles) which can result in fuel that is difficult to settle or filter.

Water separation testing of fuel is conducted for two main reasons with jet fuel:

1. To limit, at the point of manufacture, the level of unintended surfactants which could carry over from the crude (for this purpose the industry currently prefers ASTM D3948)
2. To predict the potential impact of a fuel on the performance of filters (for this purpose ASTM D3948, ASTM D7224 and ASTM D8073 can be used).

Both Defence Standard 91-091 and ASTM D-1655 (the prime fuel specifications that make up the latest edition of AFQRJOS 'Checklist' Issue 31) require testing of water separation properties by Microseparometer (MSEP by ASTM D3948) and describe test limits with and without the addition of Static Dissipator Additive (SDA). A high rating suggests a fuel free of harmful surfactants; a low rating indicates that harmful surfactants may be present. The reason that two limits are specified is that the test method (ASTM D3948) is sensitive to the presence of Static Dissipator Additive (SDA), but the surfactant effects of this additive are not deemed as concern to operations as they have a negligible impact on both filtration efficiency and settling.

Both primary specifications contain a statement indicating that results from MSEP (ASTM D3948) testing downstream of the point of manufacture are not to be used as the sole reason for rejection of fuel, but they can indicate a mandatory need for further diligent investigation. This statement is based on significant historical information where failing MSEP (ASTM D3948) results downstream of the manufacturing location have been found to be due to either poor test method precision, or presence of surfactants which do not affect filtration performance. Due to the potential for unnecessary supply disruption, a protocol for handling failing MSEP



(ASTM D3948) results was introduced by JIG initially in Bulletin 14 (2007) and this has been updated by Bulletin 65 (2013) and Bulletin 121 (2019).

Table 2 Action Type Codes

Action Types	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, EI/JIG 1530 and the JIG HSSE Management System).
RA	Required Action to implement one off verification or checks outlined in the table of actions.
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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