

KATHON™ FP1.5 FUEL BIOCIDES APPROVAL STATUS

ISSUE DATE 10th February 2010

KATHON® FP 1.5 fuel biocide is designed to combat microbial contamination and related operational problems in refined fuel. KATHON® FP 1.5 is registered with the EPA as a fuel biocide, and is used very successfully worldwide. Through continuous testing with a large number of manufacturers and organizations, a wide variety of approvals has been obtained.

This technical note provides a summary of test results and current approval status. It will be updated as new test results and approvals become available.

KATHON® FP 1.5 biocide is the solely world widely approved biocide allowed for use in Aviation Fuels.

I. DIESEL FUEL

A. Compatibility study - E.W. Saybolt Co., Inc.

At 6.5 times the recommended use level KATHON® FP 1.5 biocide did not alter the base fuel with respect to 19 crucial properties. Treated fuel met all ASTM specifications.

B. Military Approvals and users

* United States' Military Approval: KATHON® FP 1.5 biocide complies with the military specification MIL-S-53021a for diesel fuel and is included in the Qualified Products List 53021.

- * French Army : Fully approved
- * Belgian Army
- * Australian Army
- * Hungarian Army
- * Czech Army
- * Royal Netherlands Army
- * Polish Army
- * French Navy: Fully tested and approved since 1987.
- * Canadian Navy: Fully approved
- * Italian Navy
- * German Navy
- * Belgian Navy
- * Dutch Navy
- * Spanish Army
- * Royal Air Force (RAF)
- * Motoren Turbinen Union (Engine suppliers to German Navy)

C. Industrial Gas Turbines and Diesel Engines

KATHON® FP 1.5 biocide has been fully approved for use at recommended levels by the following gas turbine and diesel manufacturers:

1. Rolls Royce
2. General Electric
3. United Technologies Turbo Power
4. Motoren Turbinen Union
5. S.E.M.T. Pielstick
6. Siemens Power Corporation

II. JET FUEL AND AVIATION EQUIPMENT

The approval process for additives in commercial and military aviation fuel is extremely rigorous. KATHON® FP 1.5 biocide has already been successfully evaluated by a number of suppliers and users of aviation hardware, and testing continues worldwide.

A. Compatibility

1. Jet Fuel Study - Eastern Airlines Engineering Labs ASTM 1655 and DERD 2494

ASTM 1655 and DERD 2494: Compatibility with Jet A fuel was examined by Eastern Airlines Engineering Laboratories. Analysis indicated that fuel containing Kathon FP 1.5 biocide at 4 times the recommended level complies with the requirements of ASTM D1655 and DERD 2494. Kathon FP 1.5 biocide also complies with ASTM D4054, Part B and D975. Testing by S.E.C.L.F. showed no effect on fuel properties.

2. Filter Coalescers - Velcon and Rellumix Filters

KATHON® FP 1.5 biocide did not affect coalesced water drop size at 4 times the recommended use level. Soak tests in treated fuel did not reveal any deterioration of components. Testing was carried out by Velcon and the Service des Essences des Armées (France).

3. Filter/Separator study - Specification MIL-F-8901E S.E.A. filters test bench

KATHON® FP 1.5 at 4 times the recommended use level did not affect separator filters performance complied with the requirements of MIL-F-8901E specification.

B. Airframe Testing

Boeing Commercial Airplane Group tested fuel treated with KATHON® FP 1.5 biocide at 4 times the recommended use level to determine effects on airframe fuel system components. Results of these tests showed:

1. No effect on integral fuel tank coatings and substrates
2. No effect on elastomers
3. No effect on sealants

Deutsche Aerospace/Dornier also tested KATHON® FP 1.5, with the result that it was recommended for incorporation into the Dornier 228 Maintenance Manual. Detailed reports of these tests are available upon request.

C. Engine Testing

Rolls Royce conducted a thorough test of KATHON® FP 1.5 biocide in aero turbine engines, focusing on the following parameters:

- * Hot end corrosion
- * Fuel thermal stability
- * Solubility
- * Corrosion of fuel system components (cold)

Results showed that KATHON® FP 1.5 biocide presents "no hazard to engine performance and integrity." Rolls Royce concluded that KATHON® FP 1.5 is "satisfactory for use." A detailed report is available upon request. Similar testing by SNECMA resulted in the approval for use of KATHON® FP 1.5 in all SNECMA civil and military aero engines.

D. Aviation Approval Status

1. IATA APPROVAL.

Guidance Material on Microbiological Contamination In Aircraft Fuel Tanks 2nd Ed. Dec 2004.

2. AIRFRAME MANUFACTURERS

Boeing	Approved for use.
Dornier Luftfahrt GmbH	Fully approved.
British Aerospace	Approved for military aircraft and Airbus Airframe.
McDonnell-Douglas	Approval pending.
Airbus	Approved for aircraft equipped with CFM, G.E. and Rolls Royce engines.
Dassault	Approval pending.
Fokker Aircraft	Approval for F100 and F28. F50 approval pending.
Bombardier Aerospace	Approval pending

3. ENGINE MANUFACTURERS

Rolls Royce	Fully approved for use in all commercial aircraft engines except the V2500. Approvals certified by the CAA.
General Electric	Fully approved.
Pratt & Whitney	Approved for service evaluation.
SNECMA	Approved for all civil and military engines.
CFM International	Approved.
International I.A.E.	Approval pending, subordinate to P&W.

4. AUXILIARY POWER UNITS

Allied Signal	Fully approved.
Garret APU	Fully approved.
P & W Canada	Approval pending, subordinate to P&W USA.
Sunstrand (Auxiliary Power International Corp.)	Fully approved.

5. AIRLINE APPROVALS

United Airlines
Continental
US Air
American Airlines
Southwest Airlines
Frontier Airlines
North American Airlines
UPS Air Cargo
Northwest Airlines
ATA Airlines

6. MILITARY APPROVALS AND USERS

French Air Force	Fully approved.
Royal Air Force	Fully approved.
Belgian Air Force	Fully approved.
South African Air Force	Fully approved.

7. OTHER PENDING APPROVALS

British Airways

United Airlines

Royal Netherlands Air Force

Italian Air Force

Czech Republic Air Force

Armee de L'Air (France)

8. FILTERS

Velcon Approved

Raycor Pending

Faudi Pending

Facet Pending

II. SUITABLE MATERIALS FOR CONTACT WITH KATHON FP 1.5 (as supplied):

	Metals	Plastics	Elastomers	FRP / Coatings
Compatible	316L SS Titanium Hastalloy C276	HDPE FI-HDPE Ryton Polypropylene Teflon	Viton	Vinyl Ester (Plasite 4300) Baked Epoxy (Plasite 9570) Polyester Fumarate Resin (Atlac 382)
Not compatible	Carbon Steel 316 SS 316 Ti-SS* 304L SS 304 SS	PVC	EDPM-Nordel Butyl Rubber Buna N Buna S Neoprene	

Compatibility determined at ambient temperatures up to 40°C.

* Titanium stabilized 316 can have variable metallurgy and some versions are not compatible with Kathon formulations.

Kathon FP 1.5 Compatibility with Fuel System Components

A. Additives

Biocide Biobor JF
Ethyl Antioxidant 33
DuPont Antioxidant No. 23
DuPont Antioxidant No. 31
DuPont Metal Deactivator
Antistatic Additive ASA-3
Antistatic Additive STADIS 450
Fuel System Icing Inhibitor (Ethylene Glycol Monomethyl Ether)
Fuel System Icing Inhibitor (Diethylene Glycol Monomethyl Ether)
Corrosion Inhibitor DuPont DCI-4A

B. Super Alloys

After high temperature corrosion procedure
C1023 Pure Silver
N 108 Pure Copper
IN713LC Lead-Bronze with an indium diffusion coating S31
Aluminum Alloy –fresh exposed
MarM 002 uncoated Aluminum Alloy – with anodized finish
MarM 002 Aluminized
SRR99

C. Filters

Velcon

D. Paint & Coatings

PR 143
PUIFT 823-707
PR 1560
Primers 5805-1103

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