

## Lubricity test for Xp3 in Kerosene and Diesel Evaluation of the lubricity improvement of the diesel and kerosene when Xp3 is added.

### Test

Turbine Fuels by the Ball-on-Cylinder Lubricity Evaluator (BOCLE), ASTM D-5001.

Laboratory that conducted the test:

SAYBOLT

[www.corelab.com/saybolt/](http://www.corelab.com/saybolt/)

### Process

1) Six samples were produced for this specific test:

- Sample # 1 Kerosene 100%
- Sample # 2 Kerosene 100% + Xp3L (1/4000) (\*)
  
- Sample # 3 Kerosene 80% + Diesel 20%
- Sample # 4 Kerosene 80% + Diesel 20% + Xp3L (1/4000) (\*)
  
- Sample # 5 Kerosene 70% + Diesel 30%
- Sample # 6 Kerosene 70% + Diesel 30% + Xp3L (1/4000) (\*)

(\*) Xp3 was added to the fuel in a proportion of 1 part of Xp3 for 4000 parts of fuel

b) Each sample was tested to measure:

- API Gravity @ 60°F (ASTM D-1298)
- BTU Gross (BTU/lb) (ASTM D-240)
- Lubricity test (BOCLE)
- Wear Scar Diameter (mm) (ASTM D-5001)

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### Xp Lab, Inc.

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# LAB TEST RESULTS



## Results

### Kerosene 100%

Description	ASTM	#1 Kerosene 100% Base	#2 Kerosene 100% + Xp3L (1:4000)
API Gravity @ 60°F	D-1298	42.3	42
BTU (BTU/lb)	D-240	19771	19773
Lubricity, BOCLE (mm)	D-5001	0.750 (1)	0.490 (1)

### Kerosene 80% + Diesel 20%

Description	ASTM	#3 Kerosene 80% + Diesel 20% Base	#4 Kerosene 80% + Diesel 20% + Xp3L (1:4000)
API Gravity @ 60°F	D-1298	41.9	41.9
BTU (BTU/lb)	D-240	19873	19874
Lubricity, BOCLE (mm)	D-5001	0.630 (1)	0.470 (1)

### Kerosene 70% + Diesel 30%

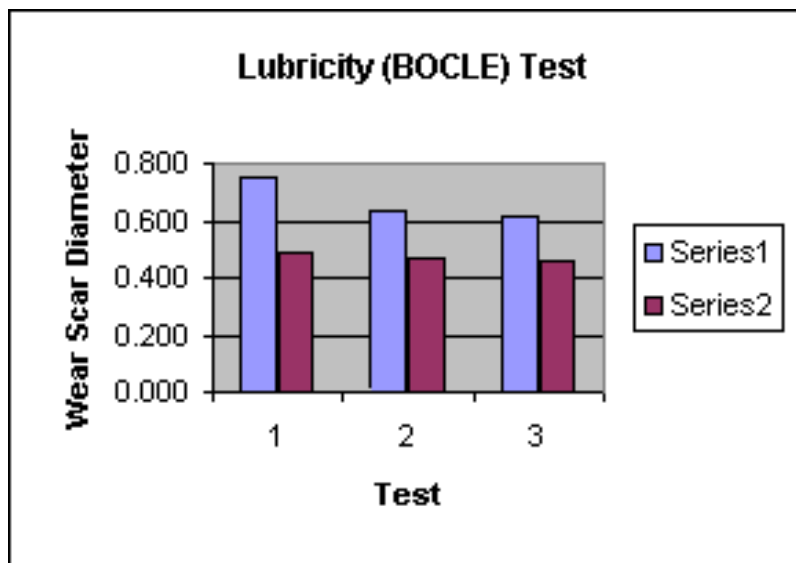
Description	ASTM	#5 Kerosene 70% + Diesel 30% Base	#6 Kerosene 70% + Diesel 30% + Xp3L (1:4000)
API Gravity @ 60°F	D-1298	41.5	41.5
BTU (BTU/lb)	D-240	19936	19937
Lubricity, BOCLE (mm)	D-5001	0.610 (1)	0.460 (1)

## Notes:

- (1) The smaller wear scar generated in the ball-on-cylinder lubricity evaluator shows a much better lubricity of fuel when treated with Xp3
- (2) Xp3 was added to the fuel in a proportion of 1 part of Xp3 for 4000 parts of fuel

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## Attachments

Laboratory test report

## Report Date

08/30/02

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# LAB TEST RESULTS



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946 W. Hawthorn St.  
San Diego, CA 92101

Date Reported: 8/30/02  
Date Received: 8/16/02

## Analysis Report

Test	Result	Units	Method	Date	Analyst
Sample Number:	121082-001		Sample ID: Sample # 1 Kerosene		
API Gravity @ 60° F	42.3	API	ASTM D-1298	8/22/02	OE
BTU Gross	19771	BTU/lb	ASTM D-240	8/22/02	OE
Lubricity test (BOCLE)					
Wear Scar Diameter	0.750	mm	ASTM D-5001	8/30/02	SRI
Sample Number:	121082-002		Sample ID: Sample # 2 Kerosene + Xp3L		
API Gravity @ 60° F	42.3	API	ASTM D-1298	8/22/02	OE
BTU Gross	19773	BTU/lb	ASTM D-240	8/22/02	OE
Lubricity test (BOCLE)					
Wear Scar Diameter	0.490	mm	ASTM D-5001	8/30/02	SRI
Sample Number:	121082-003		Sample ID: Sample # 3 Kerosene 80% + Diesel 20%		
API Gravity @ 60° F	41.9	API	ASTM D-1298	8/22/02	OE
BTU Gross	19873	BTU/lb	ASTM D-240	8/22/02	OE
Lubricity test (BOCLE)					
Wear Scar Diameter	0.630	mm	ASTM D-5001	8/30/02	SRI
Sample Number:	121082-004		Sample ID: Sample # 4 Kerosene 80% + Diesel 20% + Xp3L		
API Gravity @ 60° F	41.9	API	ASTM D-1298	8/22/02	OE
BTU Gross	19874	BTU/lb	ASTM D-240	8/22/02	OE
Lubricity test (BOCLE)					
Wear Scar Diameter	0.470	mm	ASTM D-5001	8/30/02	SRI
Sample Number:	121082-005		Sample ID: Sample # 5 Kerosene 70% + Diesel 30%		
API Gravity @ 60° F	41.5	API	ASTM D-1298	8/22/02	OE
BTU Gross	19936	BTU/lb	ASTM D-240	8/22/02	OE
Lubricity test (BOCLE)					
Wear Scar Diameter	0.610	mm	ASTM D-5001	8/30/02	SRI

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# LAB TEST RESULTS



Sample Number:	121082-006	Sample ID:	Sample # 6 Kerosene		
API Gravity @ 60° F	41.5	API	ASTM D-1298	8/22/02	OE
BTU Gross	19937	BTU/lb	ASTM D-240	8/22/02	OE
Lubricity test (BOCLE)					
Wear Scar Diameter	0.460	mm	ASTM D-5001	8/30/02	SRI

The lubricity tests (BOCLE) were performed by a third party laboratory

Approved By:  
GEORGE SUNNA'A  
LAB MANAGER

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