

Summary of IFT Biodiesel Research and Testing

Positive Impact on Biodiesel/Biodiesel Blend Stability

For complete test reports, contact Paul Lee at 314.863.3000 or plee@internationalfuel.com



DiesoLIFT EM1™ || BIODIESEL BLEND STABILITY

BfB Laboratories Testing

ABOUT THE TECHNOLOGY

- Multi-functional additive technology
- Patented
- Formulations based on surfactant chemistry
- Blends are optimized for specific application: diesel, gasoline, kerosene
- While most conventional fuel additives are derived from petroleum sources, IFT's revolutionary formulations utilize unique naturally occurring renewable fractions
- Safe to handle
- Fuel specifications unchanged after treatment
- No harm to equipment

EFFICIENCY, RELIABILITY, AND DURABILITY

- Improved combustion, ensuring better engine performance and significantly improved fuel efficiency
- Integrity of engine parts preserved- protects internal parts and will not cause any harm to engines
- No effect on fuel composition, make-up, or standard specification- diesel fuel characteristics remain within standard specifications after treatment with IFT products
- Longer engine life and reduced maintenance costs

DiesoLIFT EM1™ || BIODIESEL BLEND STABILITY

BfB Laboratories Testing

BIODIESEL BLEND STABILITY

Use of biodiesel creates issues for the resulting fuel blend that need to be addressed with fuel additives. Specifically, oxidation stability and deposit control are two common fuel problems that are exacerbated by the introduction of biodiesel.

A recently released report from BfB Laboratories (Gembloux, Belgium) compared the effect of a variety of additives, from various world-renowned fuel additive companies, on oxidation stability and deposit reduction in biodiesel blends. At the conclusion of all testing at BfB Laboratories, IFT's DiesoLIFT EM1™ proved to be the among the best for improving oxidation stability and reducing deposits in biodiesel blends.

The test procedures conducted at BfB Laboratories are outlined in this document.

EN 14112 (RANCIMAT) OXIDATION STABILITY TEST

0.25% BioDiesel + 0.25% IFT DiesoLIFT EM1™

	Result at 110°C	EN 14214:2003 spec. (Biodiesel EU specification)
Biodiesel	4.0 hours	6.0 hours minimum
Biodiesel + 0.25% IFT DiesoLIFT EM1™	7.2 hours	6.0 hours minimum

DiesoLIFT EM1™ || BIODIESEL BLEND STABILITY

BfB Laboratories Testing

ASTM D4625 STABILITY/DEPOSIT CONTROL TEST

0.25% Additive in B100 - Testing in B100

Results correspond to insolubles in fuel after 24 weeks at 80°C.

Name of Additive	Result (mg/kg)
Pure biodiesel	> 1000
BHT (Butylated Hydroxytoluene)	165
Propyl Gallate	641
Butylated Hydroxyanisole	108
Al alpha tocopherol	66
Octylated butylated diphenylamine	174
Phenolic thioether	290
Trisnonylphenyl phosphite	176
2,5 ditert-pentyhydroquinone	126
Butylated phenol	231
* IFT DiesoLIFT EM1™	60
Hydroxyethylated amino ethylamine	330
Diphenylamine derivative	> 1000
2,6 diter-butyl 4 methylphenol	211

* IFT DiesoLIFT EM1™ is showing the best performance in deposit control.

DiesoLIFT EM1™ || BIODIESEL BLEND STABILITY

BfB Laboratories Testing

ASTM D2274 OXIDATION STABILITY TEST

0.25% additive in B100 – Testing in B5

Results correspond to deposits/insolubles after 48 hours at 110°C.

Name of Additive	Total Insoluble (mg/100 ml)
EN 590 diesel fuel	18
Biodiesel	22
BHT (Butylated Hydroxytoluene)	23
Propyl Gallate	15
Butylated Hydroxyanisole	5
Al alpha tocopherol	360
* IFT GasoLIFT™	1
* IFT DiesoLIFT EM1™	4
Octylated butylated diphenylamine	192
Phenolic thioether	16
Trisnonylphenyl phosphite	17
2,5 ditert-pentyhydroquinone	140
Butylated phenol	33
Hydroxyethylated amino ethylamine	36
** Diphenylamine derivative	1
2,6 diter-butyl 4 methylphenol	26

* IFT GasoLIFT™ and DiesoLIFT EM1™ show best performance in deposits/insolubles control.

** The Diphenylamine derivative with a rating of 1 shows a 5.8 hours at 110°C in the EN 14112 Rancimat oxidation test below the limit of 6.0 hours minimum. The same product also shows a result > 1000 in the ASTM D4625 storage stability test compared to 60 for DiesoLIFT EM1™.

DiesoLIFT EM1™ || BIODIESEL BLEND STABILITY

BfB Laboratories Testing

ASTM D2274 OXIDATION STABILITY TEST

0.25% additive antioxidants + 0.15% IFT DiesoLIFT EM1™ in B100 – testing in B5 – Procedure C Modified

Additive	Insolubles (mg/kg) After 48 hours	Insolubles (mg/kg) After iso-octane wash
BHT (Butylated Hydroxytoluene)	310	23
BHT (Butylated Hydroxytoluene) + DiesoLIFT EM1™	17	3
2,6 diter-butyl 4 methylphenol	300	26
2,6 diter-butyl 4 methylphenol + DiesoLIFT EM1™	17	3
2,5 ditert-pentyhydroquinone	7100	140
2,5 ditert-pentyhydroquinone + DiesoLIFT EM1™	<1	3
Phenolic thioether	180	16
Phenolic thioether + DiesoLIFT EM1™	3	4

Test shows synergistic effect between antioxidants and IFT DiesoLIFT EM1™.