

Determination of the absorbing capacity of FLUISORB[®] and direct comparison to commercial oil binders for:

- **RME biodiesel fuel (DIN EN 14214)**
- **petroleum diesel fuel (DIN EN 590)**
- **kerosene (JET A-1)**

Method

The absorbing capacity is determined following the requirements of DIN 53 923.

Definition

The Absorbing Capacity is the volume of fuel that a commercial oil binder absorbs if placed in fuel under defined conditions. The actual absorbance of fuel is quoted in two ways: as a percentage [%] and as an absorption value [cm^3/kg] in relation to the dry weight of the oil binder.

Devices

Cylindrical plastic sieve (mesh size 1.0mm) with a diameter of at least 140mm.
Tray with fuel to accommodate the sieve containing the oil binder sample.
Top-loading balance
Laboratory tray to weigh the saturated sample
Stopwatch

Sampling

The sample is taken from commercial oil binders adapted to standard reference atmosphere.

Procedure

- Weigh the sample with an accuracy of ± 0.1 g = g of dry mass
- Put the sieve containing the sample into the tray filled with fuel (biodiesel / petroleum diesel / kerosene); the surface of the sample shall be located approx. 20mm below the fuel level.
- After an exposure time of **60 ± 3** seconds, the sieve with the sample is lifted out of the fuel held up to drop off for **120 ± 3** seconds.
- Remove the sample from the sieve and put it in a tared (set at zero) laboratory tray.
- Weigh the sample with the tared laboratory tray.
- Weight of the wet (soaked) sample = g of wet mass
- Record value.

Evaluation

Calculation of the fuel absorption of commercial oil binders:

$$\text{Fuel absorbance (\%)} = \frac{\text{wet mass (g)} - \text{dry mass (g)}}{\text{dry mass (g)}} \times 100$$

$$\text{Fuel absorbance (cm}^3\text{/kg)} = \frac{\text{wet mass (g)} - \text{dry mass (g)}}{\text{density (g/cm}^3\text{)}} \times 100$$

This procedure applies correspondingly to the determination of the absorbing capacity of

- ❖ RME biodiesel with an average density of 0.880 kg/l;
- ❖ petroleum diesel with an average density of 0,833 kg/l;
- ❖ kerosene with an average density of 0,800 kg/l

for the oil binders listed in the Table of Results.

Results: RME biodiesel 100 (Ø density = 0.880 kg/l):

Oil binder	Basic material	Weight in [g]	Weight out [g]	RME absorpti- on [g]	RME absorpti- on [%]	RME absorpti- on [l/kg]	Index
Kalle FLUISORB® STK 6 TW	cellulose and cotton *	10	79,0	69,0	690	7,84	100
Oil Ex	hydrophobic peat **	10	51,4	41,4	414	4,75	61
CleanSorb	peat / peat moss **	10	50,5	40,5	405	4,60	59
OEL-KLEEN 2000	polyurethane ***	10	44,1	34,1	341	3,88	50
EU-GRITS FEIN	corn cob granules *	10	21,0	11,0	110	1,25	16
EU-GRITS 20	corn cob granules *	10	20,9	10,9	109	1,24	16
Oel-Jäger Y	rubber mulch, perlite, sand ***	10	22,2	12,2	122	1,39	18
Penta 77	calcium silicate hydrate ***	10	21,5	11,5	115	1,31	17
OEL-KLEEN Kerasorb super 0,5-1mm	moler / diatomite ***	10	21,3	11,3	113	1,28	16
Absodan Plus	moler / diatomite ***	10	20,4	10,4	104	1,18	15
OEL-KLEEN Kerasorb 1-3mm	moler / diatomite ***	10	19,7	9,7	97	1,10	14
OEL-KLEEN Multi-purpose binder fine	calcium aluminium silicates ***	10	19,7	9,7	97	1,10	14
OEL-KLEEN Supersorb 0.5-1mm	magnesium hydrosilicate ***	10	18,9	8,9	89	1,02	13
OEL-KLEEN Multi-purpose binder coarse	calcium aluminium silicates ***	10	18,5	8,5	85	0,97	12
Mostert APFA Multi Sorb	multiply calcined alginate ***	10	17,7	7,7	77	0,88	11
OEL-KLEEN MultiSorb Top Quality	clay granulates ***	10	16,4	6,4	64	0,73	9

Legend:

* **raw materials from regrowing, renewable resources:** application is **harmless** from a biological / environmental policy point of view

** **organic sediments:** application is **very critical** from a biological / environmental policy point of view (Hessian Ministry for the Environment, Rural Areas and Consumer Protection; H. Treudt, 11.08.08). **The use of these raw materials is not in line with the principle of ecological sustainability!**

*** **raw materials from non-renewable resources** (as defined by Wikipedia: [...] a natural resource that cannot be produced, re-grown, regenerated, or reused on a scale which can sustain its consumption rate.). **The use of these raw materials is not in line with the principle of ecological sustainability!**

Results: diesel fuel (Ø density = 0.833 kg/l):

Oil binder	Basic material	Weight in [g]	Weight out [g]	Diesel absorption [g]	Diesel absorption [%]	Diesel absorption [l/kg]	Index
Kalle FLUISORB® STK 6 TW	cellulose and cotton *	10	72,7	62,7	627	7,52	100
Oil Ex	hydrophobic peat **	10	47,6	37,6	376	4,51	60
CleanSorb	peat / peat moss **	10	46,3	36,3	363	4,36	58
EU-GRITS FEIN	corn cob granules *	10	17,2	7,2	72	0,86	20
EU-GRITS 20	corn cob granules *	10	16,0	6,0	60	0,72	10
OEL-KLEEN Multi-purpose binder coarse	calcium aluminium silicates ***	10	21,5	11,5	115	1,38	18
OEL-KLEEN Supersorb 0,5-1mm	magnesium hydrosilicate ***	10	21,3	11,3	113	1,36	18
Penta 77	calcium silicate hydrate ***	10	20,9	10,9	109	1,31	17
Absodan Plus	moler / diatomite ***	10	20,8	10,8	108	1,30	17
Oel-Jäger Y	rubber mulch, perlite, sand ***	10	20,5	10,5	105	1,26	17
OEL-KLEEN Multi-purpose binder fine	calcium aluminium silicates ***	10	20,0	10,0	100	1,20	16
OEL-KLEEN Kerasorb 1-3mm	moler / diatomite ***	10	19,9	9,9	99	1,19	16
OEL-KLEEN Kerasorb super 0.5-1mm	moler / diatomite ***	10	19,8	9,8	98	1,18	16
OEL-KLEEN MultiSorb Top Quality	clay granulates ***	10	16,8	6,8	68	0,82	11
Mostert APFA Multi Sorb	multiply calcined alginate ***	10	16,5	6,5	65	0,78	10

Legend:

* **raw materials from regrowing, renewable resources:** application is **harmless** from a biological / environmental policy point of view

** **organic sediments:** application is **very critical** from a biological / environmental policy point of view (Hessian Ministry for the Environment, Rural Areas and Consumer Protection; H. Treudt, 11.08.08). **The use of these raw materials is not in line with the principle of ecological sustainability!**

*** **raw materials from non-renewable resources** (as defined by Wikipedia: [...] a natural resource that cannot be produced, re-grown, regenerated, or reused on a scale which can sustain its consumption rate.). **The use of these raw materials is not in line with the principle of ecological sustainability!**

Results: kerosene (Ø density = 0.800 kg/l):

Oil binder	Basic material	Weight in	Weight out	Kerosene abs.	Kerosene abs.	Kerosene abs.	Index
		[g]	[g]	[g]	[%]	[l/kg]	
Kalle FLUISORB® STK 6 TW	cellulose and cotton *	10	68,3	58,3	583	7,29	100
OEL-KLEEN 2000	polyurethane ***	10	39,9	29,9	299	3,74	51
Oel-Jäger Y	rubber mulch, pearlite, sand ***	10	20,3	10,3	103	1,29	18
Absodan Plus	moler / diatomite ***	10	19,8	9,8	98	1,23	17

Legend:

* **raw materials from regrowing, renewable resources:** application is **harmless** from a biological / environmental policy point of view

** **organic sediments:** application is **very critical** from a biological / environmental policy point of view (Hessian Ministry for the Environment, Rural Areas and Consumer Protection; H. Treudt, 11.08.08). **The use of these raw materials is not in line with the principle of ecological sustainability!**

*** **raw materials from non-renewable resources** (as defined by Wikipedia: [...] a natural resource that cannot be produced, re-grown, regenerated, or reused on a scale which can sustain its consumption rate.). **The use of these raw materials is not in line with the principle of ecological sustainability!**