

# Preliminary C of A

The official Certificate of Analysis will be sent when finalized.

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Sample Number	BE001938-07	Sida 1 (3)	
Customer Number	8464148-1173705		
Sample Type	Fuel Energi		
	Sampled Date	2007-10-25	
	Arrival Date	2007-10-24	
	Report printed	2007-11-14	
Sample Identity	Hydrolyzed lignin, Immidj-Tonalex Ltd Zaporizhya, Ukraine		

Analysis	Result	Units	Acc.	Method/ref	Site
Moisture	51.5	%	± 3 %	CEN/TS 14774-1,2	L
Ash cont.	14.5	% d.m	± 10 %	CEN/TS 14775	L
Ash cont. as rec.	7.0	%	± 10 %	CEN/TS 14775	L
Sulphur S	0.45	% d.m	± 10 %	SS 187177/ASTM D 4239 C	L
Sulphur S as rec.	0.22	%	± 10 %	SS 187177/ASTM D 4239 C	L
Chlorine Cl	1.41	% d.m	± 25 %	ASTM-D 4208	L
Chlorine Cl as rec.	0.68	%	± 25 %	ASTM-D 4208	L
Carbon C	51.5	% d.m	± 10 %	CEN/TS 15104	L
Carbon C as rec.	25.0	%	± 10 %	CEN/TS 15104	L
Hydrogen H	5.2	% d.m	± 10 %	CEN/TS 15104	L
Hydrogen H as rec.	8.3	%	± 10 %	CEN/TS 15104	L
Nitrogen N	0.39	% d.m	± 30 %	CEN/TS 15104	L
Nitrogen N as rec.	0.19	%	± 30 %	CEN/TS 15104	L
Oxygen O (calc.)	26.6	% d.m		ASTM-D 5373	L
Oxygen O as rec. (calc.)	58.6	%		ASTM-D 5373	L
CALORIFIC VALUE	,		± 3 %	CEN/TS 14918	L
dry basis	20.365	MJ/kg	± 3 %	CEN/TS 14918	L
dry basis	4867	Kcal/kg	± 3 %	CEN/TS 14918	L
dry basis	5.655	MWh/ton	± 3 %	CEN/TS 14918	L
dry basis	8755	BTU/lb	± 3 %	CEN/TS 14918	L
as received	9.877	MJ/kg	± 3 %	CEN/TS 14918	L
as received	2361	Kcal/kg	± 3 %	CEN/TS 14918	L
as received	2.743	MWh/ton	± 3 %	CEN/TS 14918	L
as received	4246	BTU/lb	± 3 %	CEN/TS 14918	L
Const volume-db	19.293	MJ/kg		SS-ISO 1928	L
Const volume-db	4611	Kcal/kg		SS-ISO 1928	L
Const volume-db	5.358	MWh/ton		SS-ISO 1928	L
Const volume-db	8294	BTU/lb		SS-ISO 1928	L
Const volume-as rec.	8.173	MJ/kg		SS-ISO 1928	L
Const volume-as rec.	1953	Kcal/kg		SS-ISO 1928	L
Const volume-as rec.	2.270	MWh/ton		SS-ISO 1928	L
Const volume-as rec.	3513	BTU/lb		SS-ISO 1928	L
Const pressure-db	19.240	MJ/kg		SS-ISO 1928	L
Const pressure-db	4598	Kcal/kg		SS-ISO 1928	L
Const pressure-db	5.343	MWh/ton		SS-ISO 1928	L
Const pressure-db	8271	BTU/lb		SS-ISO 1928	L
Const pressure-as rec.	8.075	MJ/kg		SS-ISO 1928	L
Const pressure-as rec.	1930	Kcal/kg		SS-ISO 1928	L
Const pressure-as rec.	2.242	MWh/ton		SS-ISO 1928	L

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Analysis	Result	Units	Acc.	Method/ref	Site
Const pressure-as rec.	3471	BTU/lb		SS-ISO 1928	L
Const pressure-db ashfree	22.503	MJ/kg		SS-ISO 1928	L
Const pressure-db ashfree	5378	Kcal/kg		SS-ISO 1928	L
Const pressure-db ashfree	6.249	MWh/ton		SS-ISO 1928	L
Const pressure-db ashfree	9674	BTU/lb		SS-ISO 1928	L
Const volume-db ashfree	22.565	MJ/kg		SS-ISO 1928	L
Const volume-db ashfree	5393	Kcal/kg		SS-ISO 1928	L
Const volume-db ashfree	6.266	MWh/ton		SS-ISO 1928	L
Const volume-db ashfree	9701	BTU/lb		SS-ISO 1928	L
Ash fusibility	,		± 5 %	SS-ISO 540	L
Deformation Temp. DT	1180	C	± 5 %	SS-ISO 540	L
Sphere Temp. ST	1200	C	± 5 %	SS-ISO 540	L
Hemisphere Temp. HT	1220	C	± 5 %	SS-ISO 540	L
Flow Temp. FT	1240	C	± 5 %	SS-ISO 540	L
Anthimony Sb	<0.2	mg/kg	± 20 %	NMKL161 mod.; ICP-MS	L
Anthimony Sb	<0.21	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-MS	L
Boron B	<5	mg/kg	± 30 %	NMKL161 mod.; ICP-MS	L
Boron B	<5.2	mg/kg d.m	± 30 %	NMKL161 mod.; ICP-MS	L
Aluminium Al	560	mg/kg	± 20 %	NMKL161 mod.; ICP-MS	L
Aluminium Al	590	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-MS	L
Calcium Ca	15000	mg/kg	± 15 %	NMKL161 mod.; ICP-AES	L
Calcium Ca	15700	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-AES	L
Iron Fe	1500	mg/kg	± 20 %	NMKL161 mod.; ICP-AES	L
Iron Fe	1600	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-AES	L
Potassium K	550	mg/kg	± 10 %	NMKL161 mod.; ICP-AES	L
Potassium K	570	mg/kg d.m	± 10 %	NMKL161 mod.; ICP-AES	L
Magnesium Mg	630	mg/kg	± 15 %	NMKL161 mod.; ICP-AES	L
Magnesium Mg	660	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-AES	L
Mangan Mn	92	mg/kg	± 15 %	NMKL161 mod.; ICP-AES	L
Mangan Mn	96	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-AES	L
Sodium Na	8200	mg/kg	± 15 %	NMKL161 mod.; ICP-AES	L
Sodium Na	8600	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-AES	L
Arsenic As	1.3	mg/kg	± 15 %	NMKL161 mod.; ICP-MS	L
Arsenic As	1.4	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-MS	L
Lead Pb	8.2	mg/kg	± 30 %	ALC208:902; ICP-MS	L
Lead Pb	8.6	mg/kg d.m	± 30 %	ALC208:902; ICP-MS	L
Barium Ba	25	mg/kg	± 20 %	NMKL161 mod.; ICP-AES	L
Barium Ba	26	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-AES	L
Cadmium Cd	0.019	mg/kg	± 20 %	NMKL161 mod.; ICP-MS	L
Cadmium Cd	0.020	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-MS	L
Cobalt Co	0.22	mg/kg	± 15 %	NMKL161 mod.; ICP-MS	L
Cobalt Co	0.23	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-MS	L
Koppar Cu	52	mg/kg	± 15 %	NMKL161 mod.; ICP-AES	L
Koppar Cu	54	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-AES	L

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Cromium Cr	6.8	mg/kg	± 20 %	NMKL161 mod.; ICP-MS	L
Cromium Cr	7.1	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-MS	L
Mercury Hg	0.052	mg/kg	± 30 %	NMKL170 mod.; AFS (kalf.)	L
Mercury Hg	0.054	mg/kg d.m	± 30 %	NMKL170 mod.; AFS (kalf.)	L
Molybdenum Mo	0.82	mg/kg	± 15 %	NMKL161 mod.; ICP-MS	L
Molybdenum Mo	0.86	mg/kg d.m	± 15 %	NMKL161 mod.; ICP-MS	L
Nickel Ni	2.4	mg/kg	± 25 %	NMKL161 mod.; ICP-MS	L
Nickel Ni	2.5	mg/kg d.m	± 25 %	NMKL161 mod.; ICP-MS	L
Vanadium V	2.0	mg/kg	± 20 %	NMKL161 mod.; ICP-MS	L
Vanadium V	2.1	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-MS	L
Tin Sn	0.35	mg/kg	± 40 %	NMKL161 mod.; ICP-MS	L
Tin Sn	0.37	mg/kg d.m	± 40 %	NMKL161 mod.; ICP-MS	L
Zink Zn	5.8	mg/kg	± 20 %	NMKL161 mod.; ICP-AES	L
Zink Zn	6.1	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-AES	L
Selenium Se	0.14	mg/kg	± 25 %	NMKL161 mod.; ICP-MS	L
Selenium Se	0.15	mg/kg d.m	± 25 %	NMKL161 mod.; ICP-MS	L
Titanium Ti	47	mg/kg	± 20 %	NMKL161 mod.; ICP-AES	L
Titanium Ti	49	mg/kg d.m	± 20 %	NMKL161 mod.; ICP-AES	L