



BV - EN 228

Gasoline E5 – August 23, 2018



**BUREAU
VERITAS**

In August 2018, the independent and accredited laboratory Bureau Veritas analyzed a sample of road Unleaded Gasoline treated with **XBEE Enzyme Fuel Technology**. The analysis demonstrated that such fuel remains in compliance with the EN 228 standard.

Conclusions by Bureau Veritas:

"The tested sample, blended with XBEE technology copes with the specification limits of EN228 standard."

Analyses	Methods	Without t XBEE	With XBEE	Units	Limits
Appearance at 20°C	Visual	Clear & bright	Clear & bright	-	Clear & bright
Density at 15°C	ISO 12185	749.20	750.10	kg/m ³	720-775
Vapor pressure	EN ISO 13016-1	58.60	57.10	kPa	45-60
Volatility (10*VP+7*E70)	Calculation	787.20	841.00	-	1 160 max
Research octane number (RON)	EN ISO 5164	95.90	95.80	-	95.00 min
Motor octane number (MO)	EN ISO 5163	85.20	85.50	-	85.00 min
Copper corrosion (3H 50°C)	EN ISO 2160	1A	1A	Class	Class 1
Final boiling point	EN ISO 3405	203.30	204.90	°C	210 max
Oxidation stability	EN ISO 7536	>360	>360	minutes	360 min
Distillation · Evaporated at 70°C · Evaporated at 100°C · Evaporated at 150°C	EN ISO 3405	37.70 56.10 85.00	37.40 55.80 85.00	% vol	20-48 46-71 75.00 min
Sulphur content	EN ISO 20846	4.40	5.30	mg/kg	10.00 max
Olefins	ISO 22854	9.40	9.10	% vol	18.00 max
Aromatics	ISO 22854	30.70	31.30	% vol	35.00 max
Benzene	ISO 22854	0.93	0.92	% vol	1.00 max
Lead	EN 237	<2.5	<2.5	mg/L	5.00 max
Existent gums (washed)	EN ISO 6246	<1.0	<1.0	mg/100 ml	5.00 max
... next page	IP 470	30	30	mg/kg	350 max

BV - EN 228

Gasoline E5 – August 23, 2018

Analyses	Methods	Without XBEE	With XBEE	Units	Limits
Phosphorous	ASTM D-3231	nil	nil	mg/L	2.00 max
Manganese	EN 16135	<0.5	<0.5	mg/L	2.0 max
Oxygenates: · Methanol · Ethanol · Iso-propyl alcohol · Iso-butyl alcohol · Ter-butyl alcohol · Ethers (5 or more C atoms) · Other oxygenates · Total oxygen	ISO 22854	<0.1 4.82 <0.1 <0.1 <0.1 4.40 <0.1 2.47	<0.1 4.75 <0.1 <0.1 <0.1 4.53 <0.1 2.46	% vol	3.0 max 5.0 max 10.0 max 10.0 max 7.0 max 15.0 max 10.0 max 2.7 max

Annexes

Original reports

CERTIFICATE OF ANALYSIS

N° 68180807

Operation : Testing Oil Product : Unleaded gasoline meeting EN228 specification Client : XBEE DISTRIBUTION NETWORK Contract Ref. : 797225/180801-0039 Rev0 Grade : EN228 unleaded gasoline 95 min RON	Sample origin : Petrol Station Sample point : Flowmeter Sampling date : 03/08/2018 Sample type : Gasoline SP95 Bureau Veritas Ref. : 8139722
--	---

Tests	Methods	Units	Results	Limits	Status
Density @ 15°C	ISO 12185	Kg/m3	749,2	720,0-775,0	
Appearance	Visual	-	Clear & Bright	Clear & Bright	
Distillation					
Evap. @ 70°C	EN ISO 3405:2011	% Vol	37,7	20,0-48,0	
Evap. @ 100°C	EN ISO 3405:2011	% Vol	56,1	46,0-71,0	
Evap. @ 150°C	EN ISO 3405:2011	% Vol	85,0	75,0 min	
Final boiling Point	EN ISO 3405:2011	Deg C	203,3	210,0 max	
DVPE	EN ISO 13016-1	kPa	58,6	45,0-60,0	
VLI (10*VP+7*E70)	Calculated		787,2	1160 max	
Sulphur	EN-ISO-20846	mg/kg	4,4	10,0 max	
Copper Corrosion 3H 50 °C	EN ISO 2160:1999	Deg C	1a	Class 1	
RON	EN ISO 5164:2014		95,9	95,0 min	
MON	EN ISO 5163:2014		85,2	85,0 min	
Olefins	ISO 22854:2016	% Vol	9,4	18,0 max	
Aromatics	ISO 22854:2016	% Vol	30,7	35,0 max	
Benzene	ISO 22854:2016	% Vol	0,93	1,0 max	
Lead	EN 237:2005	mg/L	<2,5	5 max	
Oxydation stability	EN ISO 7536:1994	minutes	>360	360 min	
Existent Gums (washed)	EN ISO 6246:2017	mg/100ml	<1	5 max	
Phosphorous	ASTM D-3231:2011	mg/L	nil	nil	
Manganese	EN 16135:2016	mg/L	<0,5	2,0 max	
Oxygenates					
Methanol	ISO 22854:2016	% Vol	<0,1	3,0 max	
Ethanol	ISO 22854:2016	% Vol	4,82	5,0 max	
Isopropyl. A	ISO 22854:2016	% Vol	<0,1	10,0 max	
Tertbuthyl A	ISO 22854:2016	% Vol	<0,1	7,0 max	
Isobuthyl A	ISO 22854:2016	% Vol	<0,1	10,0 max	
Ethers (MTBE + ETBE)	ISO 22854:2016	% Vol	4,40	15,0 max	
Others	ISO 22854:2016	% Vol	<0,1	10,0 max	
Total Oxygen	ISO 22854:2016	% Wt	2,47	2,7 max	

Comments

All results matching EN228 specification limits.

Certificate of analysis issued

On : 13/08/2018

Adèle Bruntz

Tested on : 05-12/08/2018



CERTIFICATE OF ANALYSIS

N° 68180809

Operation : Testing Oil Product : Unleaded gasoline meeting EN228 specification Client : XBEE DISTRIBUTION NETWORK Contract Ref. : 797225/180801-0039 Rev0 Grade : EN228 unleaded gasoline 95 min RON	Sample origin : Petrol Station Sample point : Flowmeter Sampling date : 03/08/2018 Sample type : After hand-blend Bureau Veritas Ref. : 8139722
--	--

Tests	Methods	Units	Results	Limits	Status
Density @ 15°C	ISO 12185	Kg/m3	750,1	720,0-775,0	
Appearance	Visual	-	Clear & Bright	Clear & Bright	
Distillation					
Evap. @ 70°C	EN ISO 3405:2011	% Vol	37,4	20,0-48,0	
Evap. @ 100°C	EN ISO 3405:2011	% Vol	55,8	46,0-71,0	
Evap. @ 150°C	EN ISO 3405:2011	% Vol	85,0	75,0 min	
Final boiling Point	EN ISO 3405:2011	Deg C	204,9	210,0 max	
DVPE	EN ISO 13016-1	kPa	57,1	45,0-60,0	
VLI (10*VP+7*E70)	Calculated		841,0	1160 max	
Sulphur	EN-ISO-20846	mg/kg	5,3	10,0 max	
Copper Corrosion 3H 50 °C	EN ISO 2160:1999	Deg C	1a	Class 1	
RON	EN ISO 5164:2014		95,8	95,0 min	
MON	EN ISO 5163:2014		85,5	85,0 min	
Olefins	ISO 22854:2016	% Vol	9,1	18,0 max	
Aromatics	ISO 22854:2016	% Vol	31,3	35,0 max	
Benzene	ISO 22854:2016	% Vol	0,92	1,0 max	
Lead	EN 237:2005	mg/L	<2,5	5 max	
Oxydation stability	EN ISO 7536:1994	minutes	>360	360 min	
Existent Gums (washed)	EN ISO 6246:2017	mg/100ml	<1	5 max	
Phosphorous	ASTM D-3231:2011	mg/L	nil	nil	
Manganese	EN 16135:2016	mg/L	<0,5	2,0 max	
Oxygenates					
Methanol	ISO 22854:2016	% Vol	<0,1	3,0 max	
Ethanol	ISO 22854:2016	% Vol	4,75	5,0 max	
Isopropyl. A	ISO 22854:2016	% Vol	<0,1	10,0 max	
Tertbutyl A	ISO 22854:2016	% Vol	<0,1	7,0 max	
Isobutyl A	ISO 22854:2016	% Vol	<0,1	10,0 max	
Ethers (MTBE + ETBE)	ISO 22854:2016	% Vol	4,53	15,0 max	
Others	ISO 22854:2016	% Vol	<0,1	10,0 max	
Total Oxygen	ISO 22854:2016	% Wt	2,46	2,7 max	

Comments

Testing was performed after laboratory hand-blend at 1/4000 Xbee additive doping rate, followed by two week retention period at constant temperature. The tested sample, blended with Xbee technology copes with the specification limits of EN228 standard.

Certificate of analysis issued

On : 23/08/2018

Adèle Bruntz

Tested on : 22-23/08/2018

