Ensuring a comprehensive methodology for quality in the AdBlue® market with reference to the Latin American and Chinese markets

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NPL BlueSky Automotive

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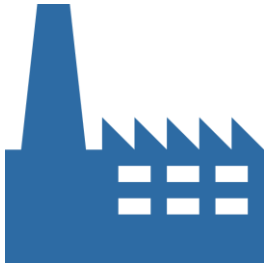
Pioneer of AdBlue® Manufacturing in India. Plant established in 2011.

NPL BlueSky Automotive Pvt Ltd is a Technical Joint Venture between Nandan Petrochem Ltd (NPL) and KRUSE Automotive GmbH, Germany.



Manufacturing plant is in Silvassa near Gujarat.
The plant is imported from Germany and is same being used all over the world by KRUSE. It is patented by KRUSE and is certified by German Automobile Association "VDA" to produce AdBlue® meeting ISO 22241 standards.

The objective of setting up this company is to supply AdBlue® to Automotive OEMs in India for their first fill as well as aftermarket requirement.

NPL BlueSky Automotive
Technical JV between Nandan Petrochem and KRUSE Automotive GmbH, Germany

KRUSE Automotive GmbH

KRUSE Automotive is a part of the Stockmeier Group which was founded in 1920

Kruse Automotive has a market share of about 25% in the German AdBlue® market

KRUSE offers custom-made filling solutions (packaged and dispensing) and In house fleet of tank trucks for timely supplies of bulk deliveries

Stockmeier Group turnover is about €1.25Bn, of which KRUSE accounts for roughly 20%

Nandan Petrochem Limited

VELVEX AdBlue by NPL BlueSky Automotive | KRUSE

Nandan Petrochem Limited

25+
Years of Exp in Lubricants

Automotive Lubricants
Industrial Lubricants
Greases
Process Oils
Transformer Oils

ISO
9001| 14001 Certified

German
technology
Lubricants

200+
employees

3 Production Plants. Equipped with R&D & In house accredited LAB facility

10+
OEM Approvals

ONE
Point solution for all lubricating & Specialty oils | Greases

IN-HOUSE
Packaging
Manufacturing unit

50 M $
Annual Turnover

Above **1,02,000** MT
Total Production Capacity

Supplier of Genuine Oils to **OEMs**

700+
Range of products

15+
Major industries Catered

Our Valued Customers

VELVEX AdBlue by NPL KRUSE NPL BlueSky Automotive

TATA

Mahindra

EICHER

MAN

AMW BUILT TO WIN

Cummins

Mercedes-Benz
Trucks you can trust

Albonair

BANGALORE METROPOLITAN TRANSPORT CORPORATION

NPL AdBlue Distribution

Channels:

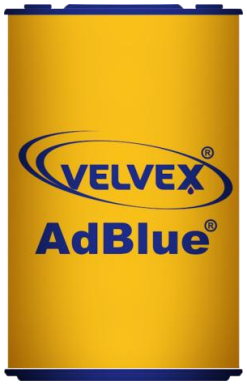
- OEM dealership/ franchise workshops
- OEM spare-part distributors
- Oil Distributors
- Aftermarket OES
- Fuel Retail Outlets

इंडियनऑयल
IndianOil

VELVEX AdBlue will now be available through IOC Retail Outlets across the country

Pack sizes

- Pails/Drums (26L, 20L,10L)
- Barrels (210L)
- Intermediate bulk container (IBC)



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- Implications of using wrong AdBlue
- Storage, Handling & Transportation
- Dispensing Solutions
- Learning from Brazil and China
- India: Likely Scenario
- VDA licensed AdBlue
- Way Forward

AdBlue® Specification

VELVEX AdBlue® by NPL KRUSE NPL BlueSky Automotive

Characteristics	Unit	Limits		Test methods
		min.	max.	
Urea content [a]	% (m/m) [d]	31,8	33,2	ISO 22241-2 Annex B [e] ISO 22241-2 Annex C [e]
Density at 20 °C [b]	kg/m^3	1 087,0	1 093,0	ISO 3675 or ISO 12185
Refractive index at 20 °C [c]	—	1,381 4	1,384 3	ISO 22241–2 Annex C
Alkalinity as NH_3	% (m/m) [d]	—	0,2	ISO 22241–2 Annex D
Biuret	% (m/m) [d]	—	0,3	ISO 22241–2 Annex E
Aldehydes	mg/kg	—	5	ISO 22241–2 Annex F
Insoluble matter	mg/kg	—	20	ISO 22241–2 Annex G
Phosphate (PO_4)	mg/kg	—	0,5	ISO 22241–2 Annex H
Calcium	mg/kg	—	0,5	ISO 22241–2 Annex I
Iron	mg/kg	—	0,5	
Copper	mg/kg	—	0,2	
Zinc	mg/kg	—	0,2	
Chromium	mg/kg	—	0,2	
Nickel	mg/kg	—	0,2	
Aluminium	mg/kg	—	0,5	
Magnesium	mg/kg	—	0,5	
Sodium	mg/kg	—	0,5	
Potassium	mg/kg	—	0,5	
Identity	—	identical to reference		ISO 22241–2 Annex J

Urea Specification

Characteristics	Limit: Fertilizer Grade Urea (IS: 5406)	Limit: Automotive Grade Urea (ISO 22241)
Total nitrogen, percent by mass, Min	46	46
Moisture, percent by mass, Max	1	0.2
Biuret, percent by mass, Max	1.5	0.8
Aldehydes	Coated with formaldehyde/Neem	< 5 ppm
Source	Locally manufactured, import through STE's	Import in 1000 Kg Bags

Source: Indian Standard IS 5406:1979 & ISO Standard 22241

Deionized water specification

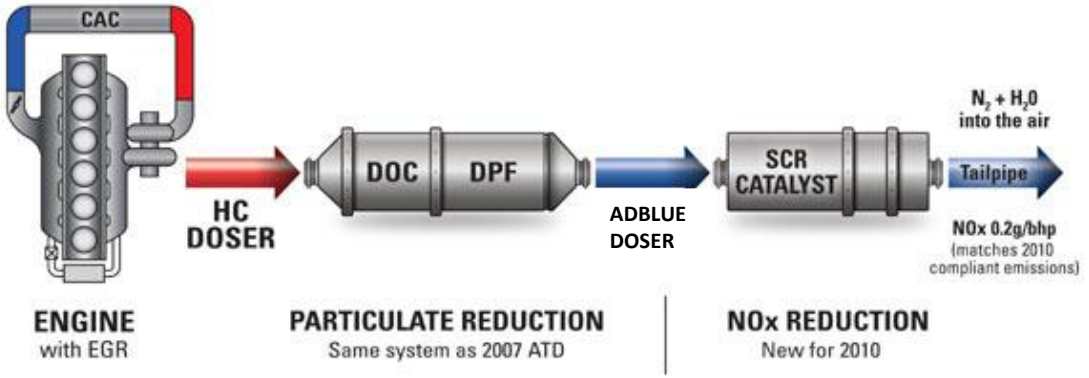
Characteristics	Limit: Drinking Water (IS: 10500)	Limit: Deionized Water (ISO 22241)
Aluminium mg/l, max	0.03	0.5
Calcium mg/l, max	75	0.5
Iron mg/l, max	0.3	0.5
Magnesium mg/l, max	30	0.5
Conductivity, µS/m	5,000-50,000	5.5

Source: Indian Standard IS 10500:2012 & ISO Standard 22241

Implications of using wrong AdBlue®

- Contaminants are the biggest cause of damage to an SCR System and the repair costs are expensive

- Major components that can be damaged include:
  - AdBlue® Dosage Pump
  - Urea Injector
  - The Catalyst
  - AdBlue Filter



- Effective NOx conversion does not take place which will lead to engine torque reduction

Storage, Handling & Transportation

- ISO 22241-3 fixes responsibility of AdBlue® licensees for both sides of the supply chain on manufacturer's side
- Manufacturers have the responsibility to control their part of the distribution chain to ensure the quality of AdBlue® all over
- AdBlue® is corrosive to non-ferrous metals, their alloys and carbon steel
- It should be blended, stored and refilled in compatible materials
- AdBlue® should be stored in plastic without additives and only specific types of steel
- AdBlue® should be stored in the manufacturer’s original container
- AdBlue® should ideally be stored within a temperature range between 0°C & 40°C and kept under covered roof with good ventilation protected from direct sunlight

Contamination is a concern

- AdBlue® cleanliness is a major concern as contaminants will reduce the life of the SCR system along with the AdBlue® liquid
- Poor AdBlue® quality can also lead to fault codes in the system and cause the emission system to fail
- Contamination can also occur at the time of filling, hence some pointers need to be kept in mind:
  - Clean filling area before dispensing AdBlue®
  - Avoiding transfer of product from manufacturers original packaging
  - If filling equipment is used, it should be clean and dedicated only for the use of AdBlue®

Contaminated AUS 32

Dispensing Solutions

- Pumps are available em
- ISO 22241:3 standar nsportation standards for AUS 32
- These pumps meet t n reducing contamination at the filling/refilling p

Motorized barrel dispensi solution

Manual barrel dispensing system

Future of the AdBlue Dispensing System

Bulk Transport of AdBlue

Dispensing equipment at large consumers

Dispensing units at fuel retail outlets

Lessons to be learnt - Brazil

- The Inmetro (Brazilian Institute of Metrology) is responsible for conformity assessment of a range of products manufactured and sold in Brazil

- Its goal is to run a systematic process with pre-established rules, monitored and evaluated in order to provide ADEQUATE LEVEL OF CONFIDENCE that a product, process or service, or a person meets the pre-established standards or regulations requirements with the best COST BENEFIT relation to the society

- For ARLA 32 (Brazilian for AdBlue), it has tied up with 4 accredited Certification Bodies, and 2 accredited laboratories.

Regulatory framework:

Conformity assessment	Portaria 139, 21/03/2011
Regulation	Instrução Normativa IBAMA 23, 11/07/2009
Standard	ISSO 22241:2006 Part 2

Source: Integer

Lessons to be learnt - Brazil

- The 1st Conformity Assessment Program took place in 2014-2015
- Products from 42 different companies were selected, but only 9 were verified
- Companies having off-spec products were fined
- Penalties described on Article 8 of Law 9933/99 are:
  - I – warning
  - II – fine
  - III – ban
  - IV – seizure
  - V – destruction
  - VI – license suspension
  - VII – license cancellation

Incorrect AUS 32 damaging the SCR system

Source: Integer

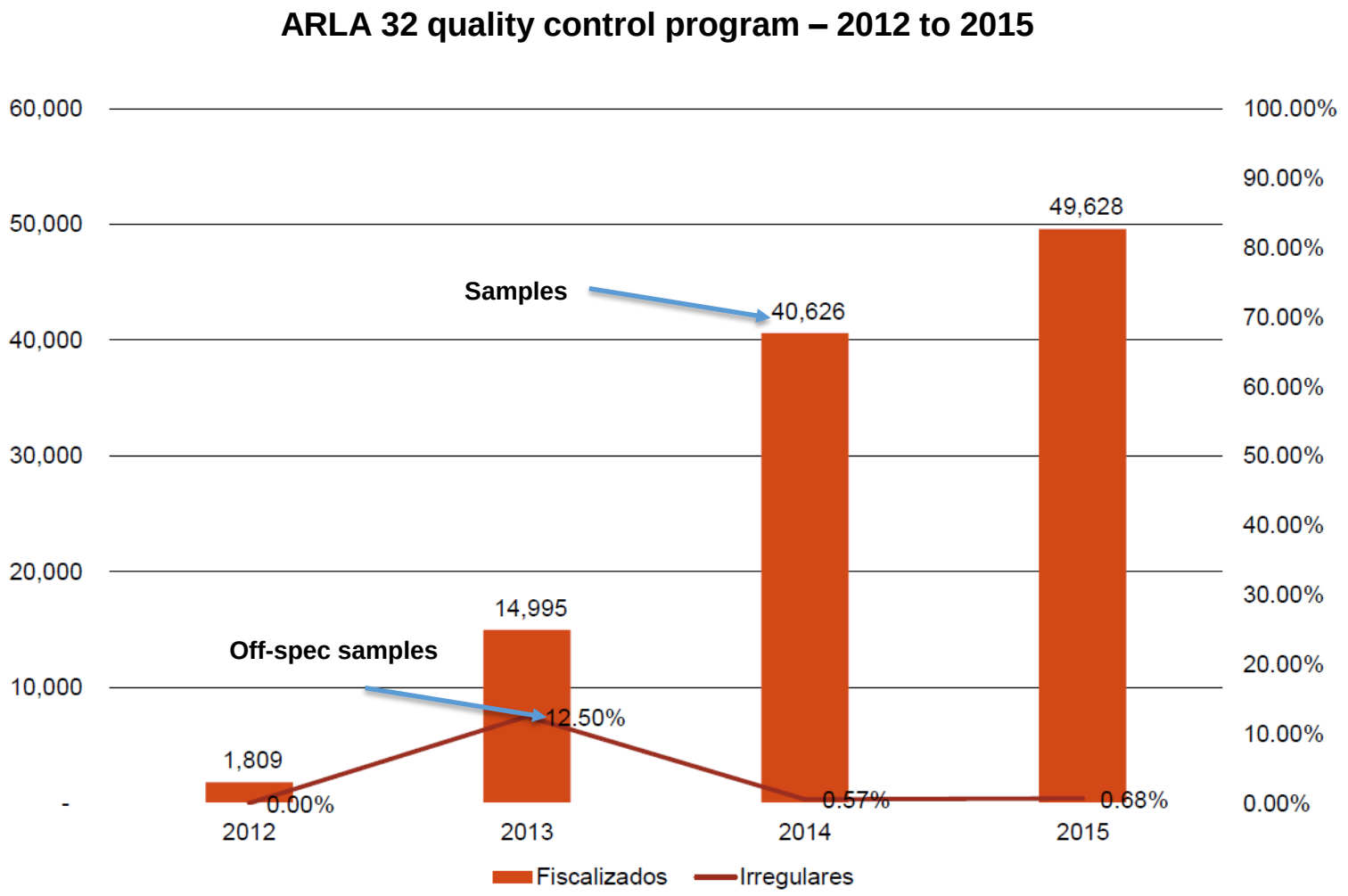
Quality Control Results - Brazil

Empresa *(Company)*	Parâmetro	Resultado	Especificação
Empresa A	Aldeído *(Aldehyde)*	8,1 mg/kg	Máx. 5,0 mg/kg
Empresa B	Aldeído	146,5 mg/kg	Máx. 5,0 mg/kg
	Cálcio *(Calcium)*	3,8 mg/kg	Máx. 0,5 mg/kg
	Fosfato *(Fosfate)*	29,44 mg/kg	Máx. 0,5 mg/kg
	Magnésio *(Magnesium)*	1,6 mg/kg	Máx. 0,5 mg/kg
	Potássio *(Potassium)*	26,10 mg/kg	Máx. 0,5 mg/kg
	Sódio *(Sodium)*	2,98 mg/kg	Máx. 0,5 mg/kg
Empresa C	Aldeído	864,8 mg/kg	Máx 5,0 mg/kg
	Sódio	1,54 mg/kg	Máx. 0,5 mg/kg
Empresa D	Aldeído	821,9 mg/kg	Máx. 5,0 mg/kg
	Fosfato	1,71 mg/kg	Máx. 0,5 mg/kg
	Sódio	4,79 mg/kg	Máx 0,5 mg/kg
Empresa E	Aldeído	12,0 mg/kg	Máx. 5,0 mg/kg
	Densidade *(Density)*	1070,7 kg/m³	Min. 1087,0 e Máx. 1093,0
	Índice de refração *(Refraction)*	1,3721	Min. 1,3814 e Máx. 1,3843
	Teor de uréia *(%)*	25,3 %	Min. 31,8 e Máx. 33,2
Empresa F	Aldeído	51,5 mg/kg	Máx. 5,0 mg/kg

- High aldehyde content – use of fertilizer-grade urea
- High calcium, phosphates, magnesium, potassium, sodium content – use of tap water
- Density, refractive index and urea content – dilution with de-ionized water

Source: Integer

Quality Control Program – Brazil



Source: Integer

Lessons to be learnt - China

- National standard, GB 29518, introduced in 2013. This standard follows the ISO standards for urea and AdBlue.

- Four Chinese companies hold VDA licenses to use the AdBlue trademark and are subject to regular quality checks from the VDA (German Automotive Association)

- According to Chinese AUS 32 producers, more than 40% of AUS 32 volumes are below standard.

- AdBlue quality control has always been one of the biggest challenges for OEMs, to track the product source and to fix responsibility in case of failure.

- The OEM industry appealed to the Government and Industry Association to conduct stricter inspection and monitoring process for a sustainable market development

Use of agricultural urea and tap water

Source: Integer

Lessons to be learnt - China

- April 2015, the Internal Combustion Engine Industry Association set up a certification system for AdBlue. The certificate is called CGT.

- CGT has its own testing procedure on AdBlue quality, quality assurance system, production process, material quality testing laboratory, material sampling, product validation, environmental protection laws and regulations, and other extra points.

- The CGT certification authorizes enterprises to use the trademark. In order to obtain the CGT certification and use the trademark CGT on the packaging, enterprise must clear the audit.

- CGT certificate is valid for three years.

- The CGT certification has its own certification standards, it is {Diesel engine nitrogen oxide reducing agent urea aqueous solution production conditions and product quality supervision and management practices implementation details}


CGT

CGT 证书

CGT Certificate

江苏可兰素汽车环保科技有限公司

Jiangsu Kelan Environmental Technology Co., Ltd.

[中国江苏南京市栖霞区/Qixia, Nanjing, Jiangsu, China]

尿素水溶液(AUS 32)生产技术和产品质量符合CGT认证要求。

The production technology and quality of aqueous urea solution (AUS 32) meet the CGT certification requirements.

编　号：2015-002

有 效 期：2015年7月16日-2018年7月15日

Validity：July 16, 2015-July 15, 2018

Source: Integer

India: Likely Scenario

- With volume increase, many smaller manufacturers setting up shop to provide AUS 32 in the market
- Manufacturers supplying AUS 32 with trademark AdBlue without VDA license
- Lack of Quality Assurance Systems/in-house testing infrastructure at smaller manufacturers to ensure consistent quality of every batch produced
- Cheaper Industrial/Agricultural grade urea may be used to reduce cost
- Spurious manufacturers may also supply AUS 32 with lower concentration urea to reduce cost
- AUS 32 contamination is taking place due to Non dedicated dispensing equipment
- Cheat technologies available online to bypass the SCR system to avoid usage of AdBlue (OBD II emulator)

We should learn from the already developed AdBlue markets, unless we do something about it we may suffer like Brazil and China

VDA licensed AdBlue

- AdBlue is a registered trademark of VDA - Germany (Verband der Automobilindustrie)
- VDA is a German group of Automobile industry of both
  - German Automobile Manufactures and
  - German Automobile Component Suppliers.
- For using trademark AdBlue, supplier should hold VDA license.
- Certified companies show their intention and commitment to produce and to provide a product, which fulfills the requirements of ISO 22241 in an exemplary manner
- VDA Audit steps
  - Inspection of the management system documentation
  - Inspection of the process instructions
  - Observations and Interviews on shop floor
  - Internal discussion between the auditors and evaluation
  - Creation of an audit report
  - Presentation of audit reports

VDA | Verband der Automobilindustrie

Way Forward

- Government bodies like SIAM/ARAI to set up a licensing & auditing system for AUS32, in the interest of customers & the environment.

  Only licensed AUS 32 manufacturers should be allowed to sell their product in the market

- Customers purchasing AUS 32 with trademark AdBlue should verify the VDA license
- Ban the sale of cheat devices
- Penalties should be in place for:
  - Vehicles running without licensed AUS 32/AdBlue
  - using cheat devices to avoid AUS 32
- OEMs to develop robust control system to avoid the use of cheat devices which bypass the system
- Customer education by OEMs about usage of genuine product at the point of purchase
- Refractometers to be made available to ensure right concentration of urea in AdBlue
- Having approved/licensed product in the market will help reduce the presence of inferior AUS 32 in the market

Vehicles running with inferior quality or without AUS32 are more harmful to the environment as they emit more NOx than BS I standard

The pioneer of AdBlue manufacturing in India

VELVEX® AdBlue® by NPL | KRUSE AUTOMOTIVE

NPL BlueSky Automotive

Technical JV between Nandan Petrochem and KRUSE Automotive GmbH, Germany

Established in 2011

Technical Collaboration with KRUSE Automotive GmbH, Germany

VDA approved

Approved by major OEMs in India

Plant Equipped with German Technology

Thank You