AdBlue®?






All you need to know about AdBlue:
the facts, myths and usage

GreenChem

Your European AdBlue Provider

AdBlue is used in trucks, buses, cars, vans, boats, excavators, tractors, etc.

AdBlue combined with an SCR-catalyst converter has proven to be the leading technology for reducing Nitrogen Oxide (Nox) in exhaust gasses which are created in the combustion process in diesel engines.
It all started in the heavy duty truck sector with Euro 4, progressed to Euro 5 and almost all truck manufacturers have embraced AdBlue in Euro 6 emission legislation.

In 2011, the NOx reducing emission legislation came into place for the off-road sector. Some off-road manufacturers had already opted for the SCR technology. With the Stage 4 / TIER 4 Final emission legislation almost all off-road machinery will be fitted with an SCR system. Also the passenger car industry has selected the combination of SCR-catalyst technology and AdBlue in a wide range of cars.

For many people AdBlue is a totally new product, which will raise many questions. This booklet, developed by GreenChem, is to inform you about AdBlue. It will address questions such as: “What does AdBlue do?” and “What are its benefits?”. Quality and safety precautions will also be addressed.

Enjoy your reading, if there are any further questions or you want to purchase AdBlue please contact us via www.greenchem-adblue.com

Best regards,

GreenChem Holding B.V.

All you need to know about AdBlue

About AdBlue

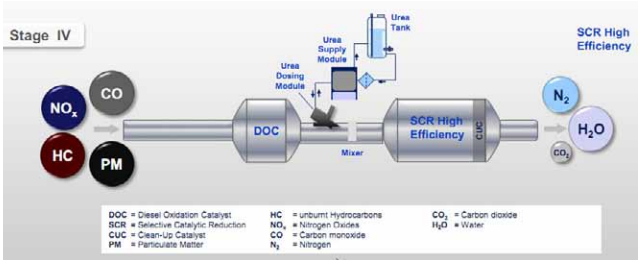
What is AdBlue and what does it do?

AdBlue is a highly purified colorless liquid. It contains demineralized water and urea (32.5%). AdBlue is used with diesel engines and is also known outside of Europe as DEF, ARLA 32 or AUS 32.

The main active component of AdBlue is ammonia. This is chemically formed by hydrolising automotive urea, which is the main raw material for AdBlue. Urea is also used in the production of fertilizers and many more applications.

AdBlue is used with diesel engines using SCR technology. This technology (Selective Catalytic Reduction) reduces harmful emissions (NOx).

AdBlue is injected into the catalyst of the SCR system, where it triggers a chemical reaction with the ammonia. This chemical reaction converts the toxic nitrogen oxides (NOx) into nitrogen (N2) and water vapor (H2O). Water vapor and nitrogen are naturally occurring gasses that are harmless to the environment.



Properties of AdBlue

Appearance:	Colourless and clear liquid
Chemical Composition:	NH2)2CO + H2O
ISO:	ISO22241: NOx reduction agent AUS 32
Freezes at:	-11°C
Evaporates at:	40°C
Corrosive:	Yes
Crystallization:	Yes
Expiration date:	Best before 18 months after production in a sealed correctly stored package (after 18 months, quality testing is advised)

Do I need AdBlue?

If you use a modern diesel powered machine fitted with an SCR catalyst, you will need AdBlue.

Why do I need AdBlue?

Your vehicle needs AdBlue to reduce NOx output. Due to the increasingly stringent emission legislation, diesel engines need to run more cleanly. NOx standards have sharpened for transportation vehicles, as well as off-road vehicles and passenger cars.
All commercial vehicle manufacturers have to meet the Euro 5 and Euro 6 standards for diesel engine emission. Although Euro 5 emission standards could be met by different technologies, Euro 6 standards (into force January 2014) require the use of Selective Catalytic Reduction with AdBlue.

Will I need AdBlue in the future?

Yes, you probably will.
Based on the current developments in engine technology, if you run a diesel engine you will still need NOx reducing fluids in the future.
Emission legislation for transportation and off-road vehicles will become more demanding. Euro 6 (due in

2014) will require the use of SCR technology and AdBlue for all transportation vehicles and passenger cars.
So it is likely that you will require AdBlue in the future.

As a fleet owner you will also need AdBlue for your replacement vehicles. Since 2006, most newly built trucks and buses are fitted with an SCR system that uses AdBlue. Putting new trucks into use will automatically require you to familiarise yourself with AdBlue.
Current developments also point towards an increase in the use of catalytic reduction in off-road vehicles.
Stage I to IV (emissions legislation due in 2014) demand cleaner off-road vehicles with lower NOx output. AdBlue is the best way to achieve this.

2014 will also change the diesel technology in passenger cars. SCR and AdBlue will become a standard feature for diesel driven cars, which will make AdBlue a part of daily life.

Is AdBlue hazardous?

No, Adblue is not a hazardous substance. It has no known significant effects or critical hazards.
The raw material, urea, even occurs naturally in our digestive system. However, we strongly dissuade you to ingest AdBlue or inhale AdBlue vapors, due to the risk of an allergic reaction.

AdBlue is corrosive and can dissolve materials that are not listed as AdBlue proof in ISO 22241. These materials could create malfunctions in your SCR-catalyst.
More information on properties and safety precautions can be found in the Material Safety Data Sheet which can be downloaded at www.greenchem-adblue.com.

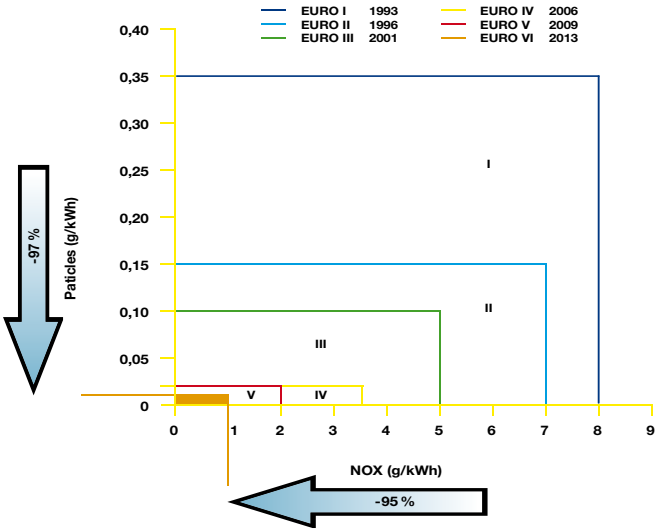
AdBlue and emission legislation

Is my vehicle subject to this emission legislation?

The Euro 1-6 emission legislation applies to motorcycles, heavy duty vehicles (buses, trucks) and passenger cars. However, not all vehicles are required to meet the same standards.

Stage I to IV legislation applies to most off-road machinery as used in construction, for farming and other applications. Whether you need to use SCR technology and AdBlue accordingly, depends on the emission levels of your machine or vehicle.
More information on the appliance of legislation on your vehicle can be obtained from the manufacturer.

Emission legislation in the European Union



Legislation for transportation vehicles

EURO 6
Euro 6 will come into force in 2014. It will especially affect standards for diesel driven vehicles, requiring further reduction of NOx and Hydrocarbon emission. Consequently, the SCR system and AdBlue will become vital to meet the Euro 6 standards. Euro 6 legislation will immediately come into force for trucks in January.

New introduced passenger cars will have to meet the legislation before september 2014 and in january 2015 all newly delivered cars will have to meet Euro 6.

EURO 5 (715/2007/EC)
Euro 5 was introduced in the EU in 2009. It proposes to limit harmful emission from Heavy Goods Vehicles (HGVs).

EURO 4 (98/69/EC, 2002/80/EC)
Euro 4 was introduced in the EU in 2005. It proposed further limiting of petrol and diesel vehicles emissions. In Euro 4 the emission of NOx has been limited for the first time.

EURO 3 (98/69/EC)
Euro 3 was introduced in the EU in 1999. It limited diesel car emissions. Euro 3 also included legislation for Heavy Duty Vehicles.

EURO 1 & 2 (91/441/EEC, 93/59/EEC & 94/12/EC, 96/69/EC)
Euro 1 came into force in 1993, setting emission standards for commercial vehicles and light trucks. It was the start of a step by step reduction of emissions from all engines to improve air quality in Europe. Euro 1 was soon followed by Euro 2 in 1996, which included legislation for motorcycles.

Legislation for off-road vehicles

Stage III and IV and Stage IV B
Addressing a wider range of off-road vehicles. Stage III and IV contain more elaborative and demanding standards. Stage IV will be introduced in 2014. To meet these emission standards almost all manufactorers will use AdBlue. Stage IV B was introduced in 2011 leading major non-road suppliers towards implementation of SCR technology.

Stage I and II (1997-2004)
The first non-road diesel engine regulations were introduced in 1997. These stages did not yet include railroad engines, inland vessels or airplanes.

Buying AdBlue

Where can I buy AdBlue ?

AdBlue is widely available in 10 and 20L cans, 200L drums and 1000L Intermediate Bulk containers (IBC's) or via designated AdBlue dispensing systems. Most truck stops already sell AdBlue in cans or bulk. Europe also has a widespread network of AdBlue distributors and commercial suppliers. Look for dispensing units with the AdBlue logo and fill your tank just as you would tank fuel.

Visit the GreenChem website to find the best solutions for your AdBlue supply:

www.adblue4you.com
www greenchem-adblue.com

AdBlue®4you
...available throughout Europe

How much AdBlue do I need?

Your AdBlue consumption depends on your type of operation. A full tank of AdBlue will last several tanks of diesel.

Estimated usage for trucks:

The average use of AdBlue vs diesel for tucks is 4 to 8%.
- Local distribution: Approximately 500L in one year
- National distribution: Approximately 1,000L in one year
- International distribution: Approximately 2,500L in one year

Estimated usage for Passenger cars:

- Mid class diesel (For example Opel Insignia or Peugeot 508): 1 llitre AdBlue for 1,000 km
- SUV/MPV class diesel (for example Opel Zafira or VW touran): 1.5 litre AdBlue for 1,000 km

Estimated usage for off-road vehicles:

Because of the wide variety of off-road vehicles, it is difficult to pinpoint their exact usage. A large heavy duty tractor can use 2,500L of AdBlue a year.
A ratio of 5 to 10% of the diesel usage is used to calculate the required AdBlue.

How can I recognise quality AdBlue?

Look for the AdBlue logo and a green and blue checkerboard pattern:

AdBlue should always be a colorless clear liquid.
If you buy drums or cans, watch out for brand names that are similar to AdBlue. You could be dealing with a brand of inferior quality. Make sure that you buy AdBlue from a VDA licensed partner and look for this text on the container or dispensing system: “AdBlue according ISO 22241”.

You can also look for the GreenChem logo to be sure that you top up with premium quality AdBlue.

Did you know...

The first SCR systems were constructed for industrial use (in boilers). As the technology became more advanced, SCR was used in much smaller diesel engines in the automotive industry. Trucks and busses were equipped with SCR, with great results.

SCR has excellent fuel economy and reliability and does not require extra circulation of exhaust gasses through the engine, keeping it cool and clean.

Running out of AdBlue

Warning: *Running out of AdBlue could result in fines, penalties or limited engine performance. In some cases it will prevent your engine from starting at all. Be smart and make sure you have an emergency supply on board.*

If I run out of AdBlue, am I running illegally?

AdBlue limits the amount of harmful emission from your engine. Emission legislation allows only small amounts of NOx. If you exceed this limit when running without AdBlue, you may be running illegally.

Note: Legislation will not allow you to start your engine without AdBlue.

Does running out of AdBlue damage the engine?

No, the engine will not be damaged when you run out of AdBlue. You can continue to the next AdBlue distribution point or use your emergency supply at the next stop. However the engine performance could be effected until you fill up.

If I run out of AdBlue will the engine shut down?

No, the engine will not shut down, but some engines automatically limit engine performance when AdBlue supplies are depleted.

If your engine is equipped with SCR technology, your vehicle will lose power, and reduce its emission according to legal standards. The vehicle's performance will be restored when AdBlue levels are up again.

Note: Some engines will not start after you have run out of AdBlue. Make sure that you have an emergency supply on board, or continue to the next distribution point without shutting down your engine.

Dispensing AdBlue

Do I need to wear protective clothing when I dispense AdBlue?

This is not necessary. You might want to wear gloves to keep your hands clean, but any spilled AdBlue can easily be washed off with water. Adblue can cause staines on clothes or upholstery.

What to do in the case of:

Ingestion
You can wash out your mouth with water and drink small amounts of water.

Skin contact
If you spill AdBlue on your skin, wash it with soap and water. AdBlue will dissolve in water. Skin is normally unaffected by AdBlue.

Inhalation
Inhalation of AdBlue vapor may result in nausea or lightheadedness. If you experience the latter, relocate to a place with fresh air and wait for the symptoms to subside.

Eye contact
AdBlue is not irritant, but may cause discomfort in the case of eye contact. Remove any contact lenses and flush your eyes with plenty of water. Get medical attention if irritation occurs.

What do I do when I have accidentally put AdBlue in my diesel tank?

Do not start your engine! Depending on the amount of AdBlue, you may damage your engine when you start it. You should empty and clean your tank. You will have to empty the whole tank and discard the mixture.

For further instructions on emptying and cleaning your tank, please contact your vehicle supplier.

What do I do when I have accidentally put diesel in my AdBlue tank?

Do not start your engine! Even the slightest drop of diesel will pollute the AdBlue in your tank. One drop of diesel will pollute up to 20 liters of AdBlue. Running with polluted AdBlue will disrupt your SCR system. To prevent further damage to your vehicle, it is best to contact your vehicle manufacturer. You may need to replace certain AdBlue components.

How do I recognise the AdBlue tank?

You can recognise your AdBlue tank by its blue cap or an AdBlue label, but it is a totaly separate tank.

The filling point is often fitted near your diesel cap. Some passenger cars have an AdBlue tank in the boot or in the engine bay.

The opening for your AdBlue tank is narrower than the opening for a diesel tank, so you should not be able to put diesel in the wrong tank (the nozzle does not fit).

What do I do when I have spilled AdBlue?

AdBlue is not dangerous to the environment. A small AdBlue spill can be diluted with water. It is best to mop up the spillage and avoid flushing it down a drain or waterway. In case of a large spill, try to prevent the spillage from entering drains or waterways. Contain the spill with sand, earth or your spill kit and dispose of it properly. Spill kits are available in different sizes and sets.

Note: The surface on which you spill AdBlue may become slippery. Make sure that you clean up the spill as quickly as possible to prevent slipping and falling.

Can I reuse spilled AdBlue?

No, never try to reuse spilled AdBlue!
Spilled AdBlue will always be contaminated. Using contaminated AdBlue can cause costly damage to your vehicles' SCR system, so no matter how great the spill, you cannot reuse it!

Did you know...

That you are helping the environment when you use AdBlue? AdBlue reduces the amount of NOx that is emitted by diesel engines.

AdBlue usage contributes to cleaner air and cleaner surroundings.

How will AdBlue be available?

The GreenChem AdBlue solutions

AdBlue is available in cans, drums, IBC's or through a bulk dispensing unit. The kind of packaging that you need depends on your usage and the most efficient way to top up your vehicle.

Jerry cans (10 or 20L)

AdBlue jerry cans are the perfect way to equip yourself with an emergency supply of AdBlue. Jerry cans can be bought via GreenChem dealers, autofactors, (OEM) dealers and truckstops.

GreenChem uses canisters with an integrated spout, which provides more comfort and a clean refilling.

Drum AdBlue (200L)

The drum can be used with an AdBlue approved selfpriming pump or an AdBlue handpump.
The drum was developed for dispensing and storing small amounts of AdBlue.

IBC (1,000L)

An IBC is a universal container for storing liquids.
An IBC can be filled with AdBlue and can be equipped with variety pumps to dispense AdBlue.

Smart Mobile (250L or 450L)

This container was especially developed for off-road users in remote locations.
Refilling on site is easy with the integrated 12/24 Volt dispensing unit.
This container offers extra protection from contamination in the rough off-road environment.

Dispensing Equipment

Rotary Drum/IBC Handpump
This mechanical operated pump is a cost effective way of refilling the AdBlue tank of the machines. Especially designed to be used for AdBlue dispensing.

Smart IBC Pro and Pro Plus
For the mid size fleets the use of an electric IBC Pump provides a comfortable and clean matter of refilling the AdBlue tank.

Tailored solutions

GreenChem offers tailored solutions for AdBlue customers, such as special canisters or branded products. Please contact us for more information on tailored solutions: info@greenchem-adblue.com

Can I get my own dedicated AdBlue storage/dispensing system?

Yes you can. GreenChem has a wide variety of dedicated AdBlue storage and dispensing systems.
GreenChem provides home base units for fleet owners and commercial systems for commercial filling stations.

The GreenChem product line:

Smart One and Smart Home Base (2,900L)

The Smart is an above ground storing and dispensing solution. The systems have an integrated dispensing unit.

The Smart One is the next step after using IBC's.

The Smart Home Base is a more complete version of the Smart One, including hose reel, heating, venting and flowmeter with pulse out.

Did you know...

We install telemetry in our advanced Smart storage and dispensing systems. Via machine to machine communication this technology monitors AdBlue storage levels and notifies GreenChem.

A care-free solution for keeping AdBlue levels up and your machines running.

Smart XL (6,200L)

The Smart XL is a bigger version of the Smart and can contain up to 6,200 litres of AdBlue. It has an integrated dispensing unit suitable for moderate AdBlue users.

Smart XLe (6,200L)

The Smart XLe can contain up to 6,200L of AdBlue just like the Smart XL. However, the Smart XLe is designed for left/right or double dispensing nozzles.

Smart T (6,000 to 15,000L)

The Smart T systems are suitable for storing large quantities of AdBlue on site. These systems have a separate storage tank that can contain up to 15,000 liters of AdBlue.

The storage tank is connected to a small dispensing unit through piping, which saves precious space at your filling point.

Please contact us for more information about Smart dispensing units.

Did you know...

Air quality has improved significantly in the last ten years, but urban areas in Europe still cope with health problems due to pollution. Euro 6 restricts the allowed emission levels, but also aims to improve the availability and quality of spare parts and anti-pollution devices.

According to the Euro legislation, it should be easy to access information on vehicle repairs. Manufacturers must ensure restriction free access to the information for upkeep and repair of their vehicles. This also includes on board diagnostic software.

The regular upkeep of vehicles will further improve our living conditions and reduce health risks.

Can I use homemade storage equipment for AdBlue?

You can use your own storage system for the dispensing of AdBlue, but it must be a system that is designed for AdBlue. If you decide to use a homemade solution for dispensing AdBlue, consider that many materials are not resistant to AdBlue.
Storing AdBlue in the wrong equipment may result in costly damage to your vehicles due to contamination.

Always respect the storage requirements to keep your AdBlue integrity. Make sure that you read our tips on maintaining AdBlue quality in the next section.

Storing and dispensing your own AdBlue

Optimal storage conditions for AdBlue

AdBlue should be stored out of direct sunlight between -6°C and 25°C in a clean and sealed container or dispensing unit.

Storage Requirements

Environment:
Check local legislation for environmental requirements. Some countries require a bunded AdBlue storage tank when you are storing AdBlue or an anti spill container under the IBC or drums. Contact local authorities for further information on storage requirements.

Suitable containers:
AdBlue can only be stored in high density Polyethylene, polypropylene or stainless steel containers.

Suitable materials for piping, insulation and sealing:
- Polyisobutylene (synthetic rubber), free of additives (for seals and hoses)
- PFA, PVDF & PTFE (teflon) free of additives (for sheet lining for chemical equipment/support rings, seals)
- Copolymers of (P)VDF and HFP (viton), free of additives (for the insulation of electrical wires & seals/o-rings)

Do not use corrosive materials like copper, nickel, zinc, mild iron or aluminum. You can check the entire list in the ISO 22241 recommandations.

How to keep your AdBlue Clean?

The quality of AdBlue is of the utmost importance. Contamination can result in damage to your SCR catalyst or aftertreatment and increases in harmful emission. Be smart and mind the environment: Keep your AdBlue clean!

Handling:

- Protect AdBlue against any contamination at all times (fuel, oil, water, dust, dirt, metals, detergent etc.)
- Don't put anything inside the AdBlue container. This will compromise quality.
- Make sure that you do not mix AdBlue with diesel or any other liquids.
- Do not try to mix your own AdBlue, urea quality is very important.
- If you use a jug or vessel to transport AdBlue, make sure that it is clean. Do not use vessels that have previously been used to transport diesel or oil.
  Use AdBlue dedicated materials instead.

Dispensing AdBlue:

- AdBlue is not an additive to diesel. Always put AdBlue into its dedicated tank.
- Only top up AdBlue with a dedicated filling system. Homemade equipment may compromise AdBlue quality due to corrosion or breaches.
- Check the filling equipment for crystallization and blockages before you start dispensing.
- If you are using AdBlue jerry cans, make sure that the opening and spout are clean.

Buying AdBlue:

- **Only** buy AdBlue from AdBlue licensees, registered by VDA. They produce according ISO 22241.
- Not every urea solution is AdBlue and you should be suspicious for AdBlue that is sold at a very low price. If you are unsure whether you are dealing with legitimate AdBlue, request the lab test results.
- Make sure your AdBlue distributor has sufficient knowledge and solutions for dispensing AdBlue, select the professional...

Storage and dispensing:

- Do not attempt to refill AdBlue drums or jerry cans by yourself.
- Use dedicated equipment for storage and dispensing.
- Store the AdBlue between -6°C and 25°C in a closed container to maintain minimum shelf life of 18 months.
- Do not store AdBlue in direct sunlight. UV radiation is harmful to AdBlue.
- Do not use fuel or lubricants or any non-dedicated equipment for your AdBlue.
- Do not use AdBlue containers with broken seals.
- Only use refilled AdBlue containers which are sealed and clean (i.e.: IBC, drums).
- If your AdBlue has frozen, it can be used once thawed out.

Did you know...

Greenchem AdBlue is produced by mixing high quality urea prills with demineralized water? The water has to be heated up before urea is blended in the reactor/mixer-tank. Urea dissolves quite fast, which ensures us a fast and flexible production. Every batch is produced under strict quality requirements and tested by a third party laboratory.

About GreenChem

GreenChem is one of the largest European distributors of AdBlue. It was founded in Breda (The Netherlands) in 2003 and began as a pioneer in NOx reduction.

GreenChem became a part of Agrofert Holding in 2009 and profits from a rapidly growing AdBlue market. We are proud to deal with many vehicle manufacturers (OEM) that have chosen GreenChem as their sole AdBlue distributor and supplier.

GreenChem has 20 AdBlue blending facilities all over Europe and more than 3.500 contracted AdBlue tanksystems (3.000 to 15.000 litres) equipped with telemetry in the European market.

GreenChem offices are spread all over Europe to remain in contact with our customers so if you're looking for premium quality AdBlue, GreenChem is the way to go.

GreenChem values quality products as well as quality of life. We work according to DIN ISO 9001:2008 and ISO 14001:2004 and stand for reliable delivery and knowledge, constant quality control and satisfied customers. This is how we continue to raise the bar on AdBlue quality and customer satisfaction.

AdBlue®4you
www.adblue4you.com