

SAFETY IS NO ACCIDENT OBSERVE, THINK AND ACT



SAFE HANDLING OF BITUMEN



Solutions for the transition to a sustainable society

Nynas offers bitumen and naphthenic specialty products for applications that touch people's lives every day, for example in electrification and road infrastructure. Our core competence is to upgrade heavy molecules into high performance, long-lasting specialty products. We operate in an international market with a strong focus on Europe, working closely with customers to create solutions to meet challenges and capture opportunities in the transition to a sustainable society.

Index

About Nynas.....	5
Product information	6
Types of bitumen	7
Modified bitumen and bituminous mixtures	8
Effect of contamination on product quality	9
Classification and labelling	11
Risks associated with bitumen.....	12
Temperature control for storage and handling of bitumen.....	13
Bitumen burns	14
Personal Protective Equipment (PPE)	14
Safety showers	15
First aid in case of burns	15
Hydrogen sulphide	16
Actions to prevent exposure to Hydrogen sulphide	18
First aid in case of intoxication or excessive fume exposure	19
Hot bitumen in contact with water	20
Actions to prevent boil-over	21
Fire hazard.....	22
Bitumen fumes	24
Actions to prevent exposure to bitumen fumes.....	25
Emissions to air, water and soil	26
Guidance in case of spills.....	27
Entry into tanks and confined spaces	27
Safe delivery	28
Safe loading	32
Safe discharging	33
Annexes	36
Personal Protective Equipment (PPE)	36
Eurobitume bitumen barns card	37
Occupational exposure limits	38
ADR	39
References and further information	41



**SAFETY
FIRST**

About Nynas

At Nynas, we are dedicated to developing solutions that support the transition to a more sustainable society.

Nynas Bitumen is at the forefront of sustainability in road construction. We provide bitumen binders that are 100% reusable, emit no CO₂ during the use phase, and are never burnt. Our focus is on delivering durable, high-quality products that extend the service life of road surfaces while reducing the overall carbon footprint and the need for virgin materials. By promoting polymer modified bitumens (PMB), we enhance durability and longevity. Additionally, we support sustainable practices through warm, half-warm, and cold mix binders that lower energy consumption, minimize bitumen ageing, and reduce workplace exposure risks. Backed by research and innovation, Nynas Bitumen continues to lead the industry in creating solutions that anticipate future challenges.

Safety is a fundamental priority in everything we do. Whether in our production facilities, during transport, or at customer sites, we are committed to providing a safe and healthy working environment for employees, contractors, and visitors. Our ambition is to maintain a safety performance that exceeds industry standards, ensuring that both personal and process safety remain central to our operations.

This handbook serves as a guide to maintaining and strengthening our safety culture. The advice given in this publication reflects the current knowledge of the hazards and risks associated with the handling of bitumen products. If the product is mixed with other materials, the users shall take these into account when identifying any additional hazards and risks which might arise.

Nynas has made great efforts to ensure the reliability of data used in this publication but gives no guarantees and takes no responsibility, direct or indirect, for damage or loss, nor for any infraction of applicable international, governmental or local laws, nor for infringement of rights owned by third party, as a consequence of the use of this publication. Extracts from this publication may be reproduced without any reformatting except for commercial purposes.

This guide, Nynas Safety Data Sheets and other safety-related information are available on www.nynas.com

Product information

Bitumen is a versatile construction product made by refining crude oil or crude oil-derived feedstock to meet specific physical property requirements for various uses. Its primary characteristics—being adhesive, waterproof, thermoplastic, durable, modifiable, and recyclable—make bitumen ideal for construction and engineering applications. Bitumen comes in many forms with numerous uses in both road construction and industrial manufacturing. It is classified as a construction material under the Construction Products Regulation (CPR)¹.

Bitumen is a complex mixture of hydrocarbons containing many different chemical compounds of relatively high molecular weight. It should not be confused with coal tar, which is produced from black coal through destructive distillation at high temperatures. Coal tar has a completely different chemical composition and physical properties and is classified as carcinogenic. Coal tar is no longer used in paving applications in Europe. Naturally occurring asphalts are unrefined products and are not considered bitumen.



¹ Regulation (EU) 2024/3110 of the European Parliament and of the Council of 27 November 2024 laying down harmonised rules for the marketing of construction products.

TYPES OF BITUMEN

There are three main types of bitumen.

Paving grade bitumen is mainly used in asphalt paving applications for roads.

Hard bitumen is manufactured using similar processes to paving grade bitumen but is harder and more brittle. Its principal uses include flooring, bitumen paints, and preserving fibreboard.

Oxidised bitumen (air-blown) is produced by passing air through a bitumen feedstock, causing the oxygen to react with bitumen hydrocarbons. This results in a product with a higher softening point and reduced temperature susceptibility.

A mild degree of air-blowing, known as air-rectification, is commonly used to adjust the physical properties to manufacture substances used in paving. Air-rectified bitumens have penetration index ($PI \leq 2$). An intense degree of blowing (oxidation) is commonly used to adjust the physical properties to manufacture substances used severely in industrial applications. The main uses for severely oxidised bitumen include roofing material, waterproofing, electrical insulation and many other building and construction materials. Severely oxidized bitumens have $PI > 2$.



MODIFIED BITUMEN AND BITUMINOUS MIXTURES

Bitumen can also be used as a raw material to create mixtures with improved handling and application characteristics. These mixtures enhance the physical properties of the bitumen.

Polymer modified bitumen (PMB) combines bitumen with polymers, giving extra strength, high cohesiveness, and resistance to fatigue and deformation.

Binders for warm mix asphalt applications (WMA) can be produced using organic or chemical additives. Adding wax, an organic additive, produces binders with lower viscosity than unmodified bitumen at elevated temperatures. Warm Mix Asphalt (WMA) allows asphalt production and laying at lower temperatures compared to traditional hot mix asphalt, leading to improved working conditions, lower energy usage, and reduced emissions.

Bitumen emulsions are fine dispersions of bitumen or modified bitumen in water. In Europe, emulsions are typically cationic (acidic) and can be used at temperatures ranging from ambient to about 90°C.

Cutback bitumen consists of bitumen mixed with volatile diluents like kerosene or white spirit to make it more fluid. This makes it easier to handle and apply at room temperature. Cutbacks are mainly used for road surface dressings and tack coating.

Fluxed bitumen is made by mixing bitumen with non-volatile oils, making the product softer and easier to apply. The oils used are usually high boiling distillates or process oils that stay in the binder after application. Fluxed bitumen is mostly used for flexible road pavements in cold climates or for pothole patching.

Sometimes, an adhesion agent is added to all types of bitumen to improve the adhesive performance of the asphalt mix.

Effect of contamination on product quality

Contamination of bitumen can greatly affect its quality and performance. If bitumen gets contaminated with light oil or other substances during transport or application, it should be retested to ensure its quality. Even small amounts of solvents, petrol, fuel oil, or diesel can significantly change the properties of bitumen, making it less adhesive and more likely to fail in an asphalt mix. Bitumen characteristics can also change if stored for long periods at high temperatures. Over time, bitumen will oxidize and harden, which reduces its penetration value, a measure of hardness. This hardening process speeds up at higher storage temperatures and is worse in partially filled tanks where more air is present.

Mixing different types of bituminous products during transport can negatively impact bitumen performance and pose health and safety risks. For more details, please see the Eurobitume Loading Compatibility Matrix.

Our bitumen and naphthenic specialty products are used for all kinds of applications that people come into contact with every day, such as electricity, roads, bridges, and other infrastructure.

Classification and labelling

Bitumen is registered under REACH² by EU manufacturers and importers. There are currently four different bitumens registered under REACH. The paving grade bitumens, including air-rectified bitumens ($PI \leq 2$), are mainly covered by the following bitumen substances:

- Asphalt, CAS 8052-42-4
- Residues (petroleum), vacuum, CAS 64741-56-6
- Residues (petroleum), thermal cracked vacuum, CAS 92062-05-0

Severely oxidized bitumen ($PI > 2$) is covered by the following substance

- Oxidized asphalt, CAS 64742-93-4

Based on available data, paving grade bitumen and air-rectified bitumens are not classified as hazardous for human health, safety, or the environment according to the European Classification, Labelling, and Packaging regulation (CLP)³.

Animal studies on fume condensates from severely oxidized bitumen ($PI > 2$) generated at high temperature indicate that repeated exposure to these fumes may present a weak carcinogenic hazard. The cancer classification criteria are not fulfilled, but additional risk management measures are communicated in the Safety Data Sheets for these products.

A new study carried out for REACH has looked at fumes from severely oxidized bitumen ($PI > 2$). The study found that these fumes can harm fertility. Because of this, severely oxidized bitumen is now classified as Reproductive Toxicity Category 1B (H360F) – may damage fertility.

Bitumen mixtures containing solvents, flux, emulsifiers, and other additives may be classified as dangerous to health or the environment. The classification of these mixtures depends on the ingredients and their quantities. It is crucial to check the Safety Data Sheet (SDS) for each product. Nynas provides SDS for all its bitumen products. For more information, please visit www.nynas.com or contact your local Nynas representative.

² Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

³ Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures

Risks associated with bitumen

There are risks when working with bitumen due to the high temperatures involved in its manufacture, transportation and handling. The key risks and measures to reduce these risks, along with first aid procedures, are outlined in the following sections.



Temperature control for storage and handling of bitumen

Temperatures should be kept as low as reasonably possible and below the maximum handling and storage temperatures to minimize the risks of fumes, flammable atmospheres, and fires while maintaining product quality. The maximum storage and handling temperature is 200 °C for straight-run bitumen and 230 °C for severely oxidized bitumen. Also make sure that bitumen is stored at least 30 °C under its flash point.

Bitumen must be stored in well-insulated tanks with heaters. Different heating systems should be considered. Coils can have a buildup of coke or residue that insulate which will make the tank temperature drop. Electrical heaters can also have a buildup of coke or residue which may lead to overheating issues and leakages due to material stress.

Regular stirring is essential to keep the product homogeneous. During tank inspections, ensure coils and heaters are clean and functional. Discharge pipelines and pumps should be heat-traced and insulated to prevent blockages and hose ruptures.

If bitumen is overheated locally, coke deposits may form on heating coils and other internal parts of storage tanks. These coke deposits can eventually fall off and interfere with pumping or mixing actions.



Bitumen burns

Bitumen is usually produced, stored, transported, and handled while hot and therefore the most significant hazard posed by bitumen is the potential to cause severe burns.

Several scenarios pose a risk of personnel being exposed to hot bitumen, including:

- A hose or gasket bursting
- Boil-over of a truck or storage tank
- A valve blockage releasing
- Sampling without the correct Personal Protective Equipment (PPE) or proper experience in opening the valve

PERSONAL PROTECTIVE EQUIPMENT (PPE)

To minimize the risk of burns, always wear PPE and follow proper procedures. Choose PPE based on a thorough risk assessment for the specific task and location.

For loading and discharging operations full PPE is required:

- Safety helmet with chin strap and visor
- Neck apron
- Coveralls with high visibility markings
- Heat resistant gloves with long sleeves
- Safety boots which can be easily removed
- Personal dosimeter (PDM) to measure hydrogen sulphide

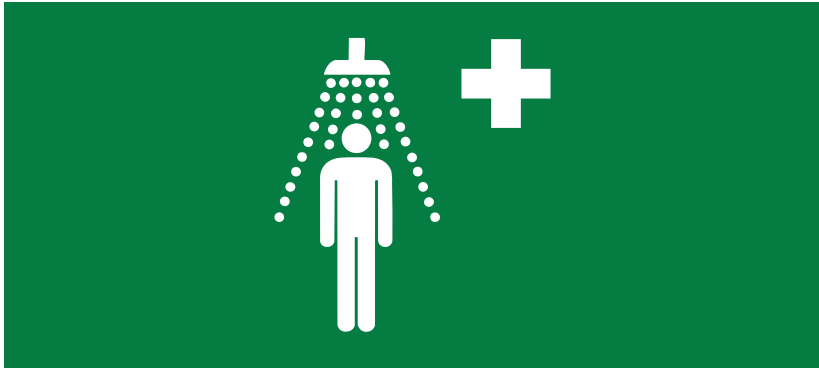
Locally, there may be additional requirements for PPE, such as personal lone worker alarms. A Personal Dose Monitor (PDM) for hydrogen sulphide must be used during loading and is strongly recommended during discharging operations.



SAFETY SHOWERS

Safety showers must meet the following standards:

- Position the shower at least 6 meters away but no further than 20 meters from the discharge point. If within 6 meters, it must be screened from the possible effects of bitumen spray
- Location of the shower to be clearly signposted and well- lit
- The shower must operate in all weather conditions and provide water for at least 20 minutes. Water should be tepid to avoid hypothermia
- The shower should be alarmed to alert staff on site when it is being used



FIRST AID IN CASE OF BURNS

Cool bitumen burns for at least 20 minutes, first with tepid water to reduce pain, then with warm water to prevent hypothermia if the burn is larger than the size of a hand. Irrigate eye burns for at least 5 minutes.

DO NOT ATTEMPT TO REMOVE THE BITUMEN AT THE WORK SITE

For more detailed information, see the Annex Eurobitume Burns Card.

Hydrogen sulphide

Hydrogen sulphide is released from crude oil and heated bitumen and is common in the petroleum industry.

Hydrogen sulphide, H₂S, (CAS # 7783-064, EINECS # 231-977-3) is a toxic, flammable gas that is heavier than air and can accumulate in low areas and confined spaces. The gas is characterised by a strong odour of “rotten eggs” at low concentrations, but this odour cannot be relied upon to warn of the presence of dangerous concentrations as the gas rapidly deadens the sense of smell. When handled hot, bitumen odour will also camouflage the rotten egg odour of hydrogen sulphide.

Symptoms of hydrogen sulphide exposure may include eye irritation, nausea, vomiting, dizziness, and headaches.

In open areas, hydrogen sulphide is usually not a health risk. However, it can build up in closed spaces like the headspace of storage and transport tanks containing bitumen, reaching dangerous and even lethal levels.

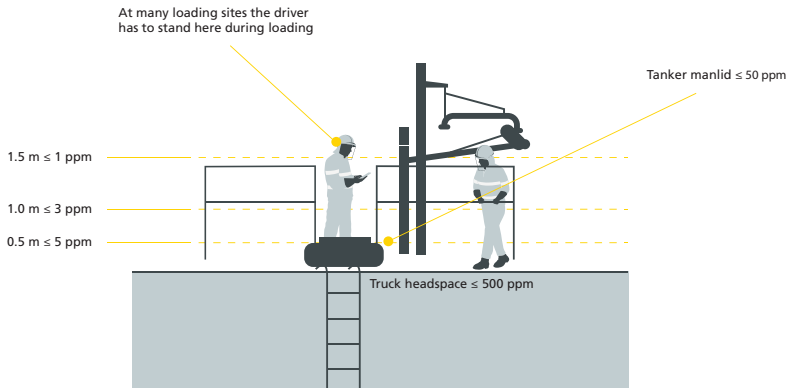
Example of areas where there is a risk of exposure to hydrogen sulphide include proximity to manlids, pressure release vents of trucks, and ventilation outlets from storage tanks. During filling of tanks special attention should be paid to the ventilation outlets.

During loading and discharging operations, releasing the tank pressure and opening the manlids are critical activities with higher risk of exposure to hydrogen sulphide.

There is also a risk of dangerous levels of hydrogen sulphide in bitumen storage tanks at asphalt plants.

If sulphur is added to bitumen or modified products, the concentration of hydrogen sulphide is elevated in storage and transport tanks. The risk of exposure to hydrogen sulphide during loading and discharging operations is consequently also increased. Please note that in these cases, the subsequent deliveries may also be impacted by the high concentrations of hydrogen sulphide.

To reduce the amount of hydrogen sulphide, a chemical that reduces hydrogen sulphide concentrations, so-called scavenger, could be added to the bitumen product.



Note: Values are examples obtained from Nynas hydrogen sulphide measurements. Concentrations could be significantly higher if sulphur is added without using a scavenger.

ACTIONS TO PREVENT EXPOSURE TO HYDROGEN SULPHIDE

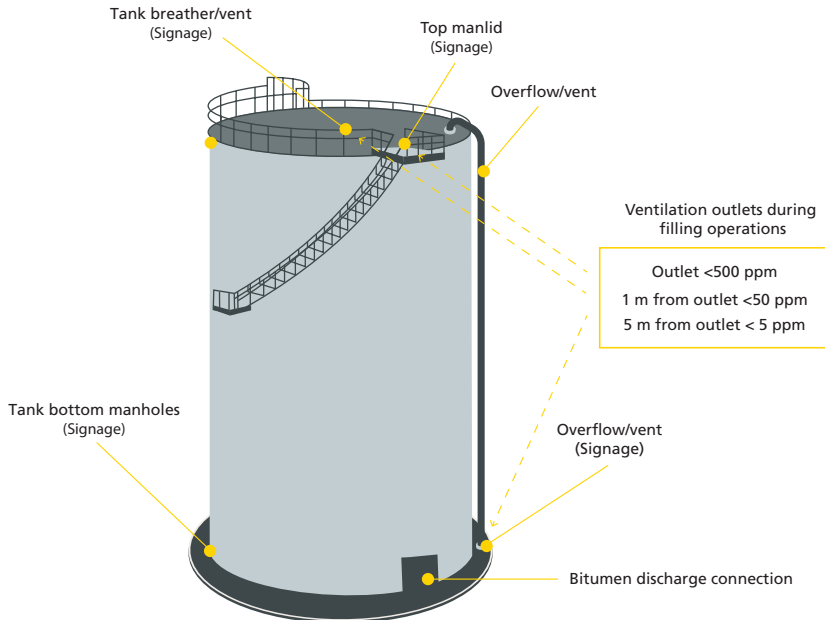
- Always identify the potential exposure and do a risk assessment.
- Do not stand in the wind direction from outlets when releasing tank pressure, opening manlids or taking out samples.
- Position ventilation outlets away from the storage tank headspace to minimize human exposure to bitumen fumes and hydrogen sulphide.
- Install warning signs for hydrogen sulphide close to ventilation outlets from bitumen storage tanks and at loading and discharging sites.
- Apply extract ventilation during truck loading operations.
- Apply ground-based operations during discharge, ie the driver shall not go up on the truck to release the tank pressure via a vent or open the manlid. The operation should be done from the ground level with a safe distance from any venting.
- A Personal Dose Monitor (PDM) for hydrogen sulphide must be used during loading and is strongly recommended during discharging activities. Alternatively, equip the site with permanently installed monitors.
- While bitumen storage tanks are being filled, prohibit access to bitumen storage tank roofs and areas on ground levels close to ground-levels ventilation outlets.
- Wear a full gas mask when access to ventilation outlets is necessary, such as for manual tank measurements, inspection. Gas mask is also strongly recommended during discharging operations where ground-based operation is not possible.
- Always check for hydrogen sulphide and follow local regulations for entry into confined spaces before entering confined vapour spaces in bitumen storage and transport tanks.

Please note that hydrogen sulphide is heavier than air and may accumulate in the bottom of tanks. Product deposits in storage tanks may contain pockets of hydrogen sulphide.

There are national Occupational Exposure Limits (OEL) for hydrogen sulphide. For more details, see Annex Occupational Exposure Limits or the Safety Data Sheet for more details.

FIRST AID IN CASE OF INTOXICATION OR EXCESSIVE FUME EXPOSURE

- Under safe conditions, remove the person from the contaminated area to fresh air.
- Follow rescue procedures and wear appropriate personal protection, ie respiratory protection, belt and safety rope.
- If trained, start artificial respiration if the person has stopped breathing. Providing oxygen may help. Get medical advice for further treatment.
- If the gas has affected the eyes, wash the eyes with water for at least five minutes and seek medical attention.



Note: Values are examples obtained from Nynas hydrogen sulphide measurements.

Hot bitumen in contact with water

Even a small amount of water in a truck or storage tank with hot bitumen could cause a dangerous boil-over. Therefore, it is crucial to ensure that tanks and trucks are completely free from water.

Examples of boil-over risks include:

- Previously carrying bitumen emulsion or any product containing water
- A cold truck or storage tank (water condensation/mist)
- Trapped water in a storage tank
- After tank maintenance involving high-pressure water jet cleaning



ACTIONS TO PREVENT BOIL-OVER

Ensure that storage tanks and transport trucks are completely free from water. It is especially important to confirm that a new tank or a tank returning from service is free from water. The same applies to the pipes used for transferring hot bitumen into the tank. Additionally, prevent water from entering or forming inside bitumen storage tanks.

When filling an empty cold tank initially, do so gradually to allow any moisture to evaporate. For tanks with cold bitumen, heat slowly until the bitumen reaches 120 °C to let any moisture evaporate before adding more hot bitumen.

Make sure bitumen covers the heating tubes during heating. More information is available in the Eurobitume Boil-Over prevention.

Fire hazard

If bitumen is overheated, vapours from bitumen in confined spaces may form flammable mixtures which may be ignited.

There is a risk of ignition if bitumen leaks into tank insulation, as hydrocarbon from the contaminated insulation could be ignited by the hot tank surface at temperatures below 100 °C.

Pyrophoric content trapped in coke deposits may develop on walls and roofs of bitumen storage tanks. In the presence of oxygen, these might develop a risk of self-ignition.

There is a risk of fire due to exposed over-heating elements in tanks if the bitumen does not cover the bitumen coils/elements.

ACTIONS TO PREVENT FIRE AND EXPLOSIONS

- Store bitumen below the maximum storage temperature and at least 30 °C under its flash point
- Ensure that storage tanks and storage and transport tanks are in good condition and free of leaks
- Replace insulation that has been contaminated, especially after a storage tank overflow
- Use steam lances to reduce the risk of fire in contaminated insulation that cannot be immediately replaced
- Maintain controlled oxygen depletion to avoid the formation of pyrophoric coke deposits. Oxygen concentrations between 4% and 6% are recommended to prevent the build-up of coke deposit⁴
- Displace potentially flammable vapours before allowing air to enter the tank, such as by cooling before maintenance. Do not open the tank to the atmosphere until all flammable vapours have been removed
- Make sure to have sufficient bitumen in the tank to cover the coils/elements
- Avoid open flames near bitumen road tankers and storage tanks that have contained cutbacks

EXTINGUISHING BITUMEN FIRES

NEVER USE A WATER JET!

- Bitumen fires must be extinguished by smothering to prevent the continued supply of oxygen
- Small fires can be put out with foam, dry powder, or carbon dioxide extinguishers
- Large fires should be extinguished using foam or dry powder extinguishers, but there is a danger of fires flaring up again. Foam and powder do not provide a lasting oxygen-free atmosphere in bitumen fires
- Use steam from a spray unit or a dry powder extinguisher for fires in tank insulation

If a bitumen fire occurs, call the local emergency fire services and inform them that bitumen is involved.

⁴ Energy Institute/Eurobitume, Model Code of Safe Practice Part 11, Safety, health and environmental aspects of design, construction, operation, inspection and maintenance of Bitumen manufacture, blending, storage, distribution, product handling and use, and sampling, 5th edition

Bitumen fumes

Heated bitumen emits fumes. Exposure to high concentrations of bitumen fumes can irritate the eyes, nose, and respiratory tract. Both the amount and the composition of the bitumen fumes depend on the temperature, so it's crucial to handle bitumen at the lowest possible temperature.

Bitumen naturally contains very small amounts of polycyclic aromatic hydrocarbons (PAHs), some of which can cause cancer. Because of this, researchers have studied whether people who work with asphalt have a higher risk of getting cancer.

A large international study by IARC⁵ looked at asphalt workers in several European countries. The study found that some groups had a slightly higher rate of lung cancer, but it was not possible to tell whether this was caused by bitumen or by other factors like smoking. A follow up study showed that smoking was the more likely cause of the increase in lung cancer cases. The researchers did not find any direct link between working with bitumen and lung cancer.

In 2013, IARC reviewed all publicly available data on bitumen and bitumen fumes and concluded:

- Roofing work with oxidized bitumen: probably carcinogenic to humans (Group 2A)
- Mastic asphalt work with hard bitumen: possibly carcinogenic (Group 2B)
- Road paving with straight-run bitumen: possibly carcinogenic (Group 2B).

These conclusions refer to exposure to bitumen fumes and did not result in any change in classification for bitumens under CLP regulation but introduced the industry's longstanding maximum handling temperatures in the REACH dossiers to reduce exposure:

- 200 °C for bitumen and air-rectified bitumen (PI_≤2).
- 230 °C for oxidized bitumen (PI_>2).

⁵International Agency for Research on Cancer

The results from the recently completed study on fumes from severely oxidized bitumen (PI > 2) show adverse effect on fertility leading to a hazard classification for fertility. At the time of publication of this handbook there is still work being undertaken by the industry to assess the overall impacts (Derived No Effect Levels (DNEL), exposure scenarios, uses, risk management measures, etc) of these new findings but all users of severely oxidized need to perform new risk assessments to evaluate and manage these risks.

There are no EU occupational exposure limits (OEL) for bitumen fumes, but several European countries have implemented their own limits. These values are specific to each country. For detailed information, please see Annex Occupational exposure limits.

The DNEL which has been derived in the REACH process is 2.9 mg/m³ (Total Hydrocarbon Concentration, 8h) for bitumen based on irritative effects. At the time of publication of this handbook, the derivation of a possible DNEL for severely oxidized and reprotoxicity has not yet been concluded.

ACTIONS TO PREVENT EXPOSURE TO BITUMEN FUMES

To reduce exposure, handle bitumen at the correct temperature and use the right products for each specific application. The bitumen industry has set the maximum recommended temperatures for storage and handling at: 200 °C for paving grade and air-rectified bitumens and 230 °C for severely oxidized bitumen.

If the OELs or DNELs are exceeded control exposure with exhaust ventilation, closed systems, or personal protection.

Key points to prevent exposure to bitumen fumes:

- Maintain low handling and storage temperatures
- Provide adequate ventilation and respiratory protection if needed
- Assess the impact on fuming from all added components
- Do not use diesel fuel as a release and cleaning agent

Emissions to air, water and soil

Bitumen

Bitumen is generally not considered dangerous to the environment, and its use in service, such as in pavements or roofing, does not typically cause environmental impacts.

The main emission from bitumen during storage and handling is bitumen fumes, consisting of volatile organic compounds (VOC) and odour.

Bitumen is an inert material that does not dissolve in water. If leaks or spills occur, the molten hot material can cause severe burns. Once cooled, the bitumen solidifies and can be cleaned up with standard equipment like spades, rakes, and wheel-mounted loaders.

In water, bitumen usually sinks to the sediment at the bottom, though it can sometimes float. The primary effect of a spill is the adsorption of bitumen to sediment, causing physical contamination. The water solubility of bitumen is so low that it is considered negligible, and it is not expected to pose a significant hazard to aquatic environments. Although bitumen constituents can bioaccumulate, their low water solubility and high molecular weight limit bioavailability to aquatic organisms. Therefore, bioaccumulation is unlikely.

Bitumen emulsions

When bitumen emulsion contacts soil, it separates into bitumen and water. The bitumen is absorbed in the upper layer and can be cleaned up like standard bitumen. The water phase runs off into the environment.

Bitumen emulsion spreads on the water surface and blends with the water. Eventually, the emulsion collapses upon dilution. The emulsifier partially dissolves, and the bitumen disperses. Bitumen emulsions contain low concentrations of emulsifiers that may pose an environmental hazard. Studies on runoff water from slurry surfacing show that over 99.9% of the emulsifier binds to the bitumen/aggregate and does not remain in the water phase⁶. The same study showed that the emulsifier is strongly adsorbed onto soils, meaning it remains close to the road surface even if contained in runoff water.

⁶ Environmental and Safety Aspects of Cationic Bitumen Emulsions, Thorstenson/Jame

The study concluded that there is no expected leaching of emulsifiers from the product in service, such as from road or construction sites.

Cutback bitumen

In case of a cutback bitumen spill, cleanup can be more complicated. The lower viscosity of cutback bitumen allows it to penetrate the soil and potentially affect nearby watercourses before hardening. Cutback bitumen contains solvents, presenting an environmental hazard and risking harm to water and soil.

If spilled in water, cutback bitumen forms a film on the surface and spreads. The bitumen adheres to soil, and the solvent evaporates. The bitumen itself remains immobile on the soil surface and can be removed mechanically.

GUIDANCE IN CASE OF SPILLS

Small Spill: Allow the bitumen to cool and solidify. Remove it mechanically into containers for disposal or reclamation according to local regulations.

Large Spill: Prevent spreading by creating a trench or barrier with sand, earth, or other materials. Otherwise, treat it as a small spill. Contact local authorities and emergency services. Always act according to local legislation.

Nynas takes any spill seriously and require reporting of any spill above 50 liters according to CEFIC (European Chemical Industry Council) guidelines.

Entry into tanks and confined spaces

Before entering an empty bitumen tank, a thorough risk assessment must identify hazards such as hydrogen sulphide, carbon monoxide, oxygen deficiency, flammable vapours, pyrophoric content, and falling debris (e.g., coke). Entry must be considered a last resort, with all other alternatives thoroughly evaluated beforehand. If entry is necessary, the tank must be ventilated, gas tested, and a sufficient rescue plan established. PPE, including respiratory protection, must be selected based on the assessment. All work must follow a confined space permit-to-work system to ensure strict adherence to safety protocols.

Safe delivery

At Nynas, safety is the top priority. To avoid accidents, it is crucial to follow proper procedures for loading, transporting, and discharging bitumen. The supplier, haulier, and customer must work together to ensure these processes are safe.

Transporting hot bitumen falls under international UN regulations for dangerous goods (ADR). Bitumen is considered dangerous because it is transported at high temperatures (over 100 °C, but below its flashpoint). Detailed information can be found in Annex ADR.

The following chapter outlines Nynas' minimum requirements for safely loading and discharging bitumen. We also recommend following the Eurobitume "Guide to the Safe Delivery of Bitumen" and other relevant documents available at www.eurobitume.eu.

Training

Site personnel must be knowledgeable enough to train delivery drivers on how to safely load and discharge bitumen at their location. Training should also cover safe handling, storage, and receipt of bitumen products, as well as actions to take in the event of incidents.

All drivers must receive a site-specific safety induction at the start of every season or when arriving to load or discharge for the first time. This induction must be documented, signed, and dated.

Written instructions for the loading and/or discharge procedure must be available for the driver.

Personal Protective Equipment (PPE)

The driver and all personnel within 6 meters of the loading/discharging zone must wear full PPE as outlined in Annex PPE. It is also recommended to have additional PPE on site for those who may need to assist in case of an emergency.

A Personal Dose Monitor (PDM) for hydrogen sulphide (H_2S) must be used during loading and is strongly recommended during discharging operations.



Emergency equipment and procedures

There must be clear, written contact information in case of an emergency at the loading/discharge point.

At least one emergency shower must be available in the loading/discharging area. It should be positioned between 6 and 20 metres away from the loading or discharge point. If the shower is closer than 6 metres, it must be shielded to protect from bitumen spray in case of an incident. It is recommended that the shower also has an eye wash station. The shower must provide a sustained flow of clean, tepid water for at least 20 minutes. The operation of the shower should be simple, such as a footplate, push-bar, or pull-handle.



Emergency equipment related to bitumen loading/discharge must be maintained, inspected, and tested regularly, with records kept. Advice on treating bitumen burns must be displayed in the loading and discharging area and made available if further medical treatment is needed. Please see the Eurobitume Burns Card for more information, Annex Eurobitume Burns card.

Important safety equipment that should be on site includes fire extinguishers, first aid supplies for burns, hydrogen sulphide measurement devices, and PPE according to Annex PPE in order to be able to help injured persons within the 6-meter exclusion zone.

The loading and discharging process should always be monitored. Alternatively, there should be a system in place to alert in case of any issues (such as a lone worker alarm).

It is recommended to establish a physical barriers or other clear ways of demarcation of the 6-meter exclusion zone around the truck, ensuring unauthorized personnel do not inadvertently enter the area during discharge or loading operations.

Drivers' attendance during loading and discharging

There is a risk of splashing, especially at the start of loading. The driver must stay near the emergency stop at all times during loading and discharging. It is strictly forbidden to bypass the operation of any dead man's handle or foot pedal used for loading.

Operating near manlids

Storage and truck tanks may contain high levels of hydrogen sulphide. To avoid exposure during loading and unloading:

- Vent or depressurize the tanker if the manlid needs to be opened.
- Apply ground-based operations during discharge. It is strongly recommended to wear a gas mask if releasing pressure/opening manlid needs to be done on top of the truck.
- Open the manlid and move away immediately
- Do not lean over the manlid or inhale the vapours
- The driver should stay away from the manlid and preferably stand upwind to avoid exposure to fumes
- Use extract ventilation, if available, to reduce exposure to hydrogen sulphide and bitumen fumes



Sampling bitumen products

- Hot bitumen sampling is dangerous because of the risk of splashes and spills, which can cause burns. Always wear the appropriate (PPE) indicated in Appendix PPE
- The sampling area must be easy and safe to access
- The sample device should have a safe design and be easy to use
- Always follow the local site-specific instructions. If you are unsure, ask the site representative
- Samples should not be taken directly from the truck

SAFE LOADING

To minimize accidents and ensure high-quality deliveries, it's crucial that a truck's tank is free of residue from previous loads. This is especially important if previous load has contained emulsions (which contain water) and products with a low flash point. Loading bitumen onto water or emulsion can cause a violent eruption or boil-over and must always be avoided.

Tanks that have carried emulsions or other water-containing products must be steam cleaned and dried before being used for bitumen products. Special care should also be taken when filling tanks that have been out of service, as they may contain condensed water. Even small amounts of water can cause a boil-over when hot bitumen is loaded into the tank.

For more information, consult the Eurobitume Loading Compatibility Matrix and the Eurobitume boil-over prevention. In case of doubt, always consult Nynas.

SAFE DISCHARGING

The site must meet all legal requirements for the equipment used in the discharge and storage of bitumen. The discharge area must be free from obstacles or risks that could block escape routes and must have suitable fall protection where needed.

Overfill Protection

Before starting any transfer into a tank, check to confirm there's enough ullage for the proposed transfer. Adequate and reliable means of gauging the storage tank's contents and ullage must be available. Gauges must clearly identify which storage tank they refer to and should be visible from the driver's position at the discharge point. Storage tanks, pipes, and connections should be clearly marked with the correct product names.



Bitumen storage tanks must be equipped with a high-level alarm (HLA) at 90% available capacity and should also have an independent high-high-level alarm (HHLA) at 92.5%. Both with clear sound and/or light alerts.

Overflow pipes should be positioned in a direction to prevent drivers from being exposed to hydrogen sulphide. Overflow pipes should also be positioned in a direction to protect drivers from the risk of being flushed by hot bitumen.

Use of Hose

The discharging hose is crucial for safely discharging high-temperature products. It is important to use the correct hose for each specific use. The hose should be at least 4 meters long and rated for both temperature and pressure.

Testing the hose should follow local laws and best practices but it is recommended to test them at least annually. This includes certifying the equipment and keeping records of the tests. Hoses that have not been tested should not be used. The hose can also be regularly replaced on the same interval as the test. Drivers should check the hose, connection packings, and gaskets before use on a daily basis. If any faults are found, do not use the defective equipment and take corrective actions.

Other precautions for failures (overfills, blockages, etc)

Gauging: Reliable ways to measure the storage tank's contents and ullage must be available.

Gauges must clearly identify which storage tank they refer to, what the unit of measure is, and be visible from the driver's position at the discharge point.

Vent Pipes: Tank vent pipes must be positioned so that product emissions or releases do not pose a risk to personnel or delivery vehicles.

Traced and Insulated Pipework: Bitumen storage tank inlet must be of appropriate design, well supported and maintained to ensure no residue will block or seriously reduce the nominal bore of the pipework. Tracing and insulated pipework for discharge is recommended to reduce the risk of plugs.

Suction Pump: Installing a suction pump is strongly recommended. It reduces the risk of uncontrolled releases of hot bitumen and significantly lowers bitumen exhaust emissions.

Sites without traced insulated pipework and suction pumps have a higher incidence of personal injuries and spills.

Reporting and inspections

If there is an accident or incident, contact the site personnel and follow local site instructions. Report technical defects, unsafe conditions, and other relevant problems to the site personnel.

Drivers should use their own reporting system but must inform Nynas to ensure preventive and corrective actions are taken as soon as possible.

Annexes

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Acknowledgement to Eurobitume for the use of this illustration.



EUROBITUME BITUMEN BURNS CARD

Visit the Eurobitume website publications section to find the bitumen burns card in in different languages, www.eurobitume.eu/publications/



BITUMEN BURNS

INFORMATION NOTE FOR FIRST AID AND MEDICAL PERSONNEL

All persons working with hot bitumen should be familiar with these recommendations in order to administer first aid to burn victims.

This document should accompany the patient and be placed in a prominent position before transport to a Doctor or Hospital.

FIRST AID

Bitumen burns should be cooled for at least 20 minutes, first with tepid water to reduce pain, then with warm water to prevent hypothermia if the burned surface is larger than the size of a hand. Burns to the eyes should be irrigated for at least 5 minutes.

**NO ATTEMPT SHOULD BE MADE TO REMOVE
THE BITUMEN AT THE WORKSITE**

MEDICAL CARE

(if in doubt do not hesitate to contact a burns centre)

Measures to remove the bitumen layer from the skin should be taken as soon as possible under the supervision of a doctor, or at a hospital. However, this treatment should be carried out with caution because careless removal of the bitumen may result in the skin being damaged further, bringing with it the risk of infection and the possibility of complications.

Initially it is not important to know whether the burn is superficial or deep. The priority should be to remove the bitumen without causing further damage.

ADR

Transporting hot bitumen must follow international UN regulations due to its high transport temperature, which makes it dangerous:

- UN 3257: ELEVATED TEMPERATURE LIQUID, N.O.S. (bitumen) at or above 100 °C and below its flash point
- Class: 9
- Packaging Group: III
- Classification Code: M9

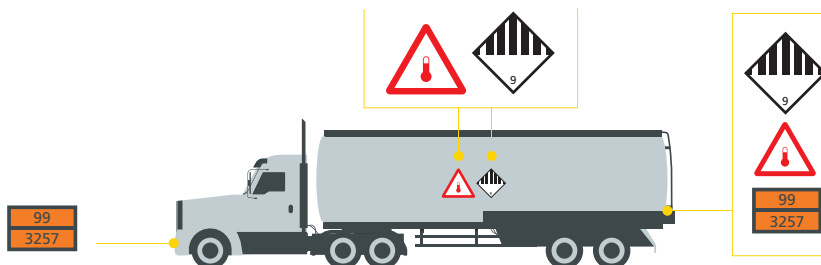
Bitumen cutbacks and emulsions might also be classified as dangerous due to properties like low flash points or environmental impact. Always check the transport information on the Safety Data Sheet.

Transport methods

Most bitumen transportation within Nynas is done by road (ADR). Vehicles and tanks must meet ADR legislation requirements. Bitumen is typically transported in bulk by road tankers or ships. In some countries, rail transport is also used. Smaller volumes can be supplied in drums or intermediate bulk containers, especially for emulsions and cutbacks, though less common for road bitumen.

Dangerous Goods Safety Advisor (DGSA)

All companies involved in transporting and handling dangerous goods must have a certified DGSA. This includes the bitumen supplier, haulier, and receiving companies involved in the discharge process.



Nynas' responsibilities as supplier

Nynas provides Safety Data Sheets with information on the dangerous goods classification of each product. Additional information can be provided upon request. The supplier/consignor is responsible for:

- Classifying products under ADR, RID, ADN, and IMDG
- Using approved packaging for packaged products
- Ensuring correct marking and labelling
- Declaring products in accordance with local regulations
- Issuing correct transportation documents to accompany deliveries

Haulier's responsibilities

The haulier must ensure:

- Vehicles are fully equipped according to ADR legislation and properly marked and labelled
- Drivers have the required training and certificates
- Drivers have 'ADR Instructions in Writing 5.4.3

The hauliers dangerous goods safety advisor must yearly provide Nynas with the Annual report dangerous goods if requested by Nynas.



References and further information

NYNAS

Information on Nynas products and additional Safety information is available on Nynas website, www.nynas.com.

EUROBITUME

Nynas is a member of the European bitumen industry association Eurobitume. An important part of the associations missions is to provide, health, safety and environmental matters. Below are links to some key HSE documents but there are more available on the Eurobitume website, www.eurobitume.eu/publications/

- Guide to the Safe Delivery of Bitumen
- Burns Card
- EB Safety Shower Guidance
- EB Loading Compatibility Matrix
- EB Boil Over Prevention
- Eurobitume Potential Risk Hydrogen sulphide in Bitumen Production and Delivery Process
- The Bitumen Industry – A Global Perspective

ENERGY INSTITUTE

Model Code of Safe Practice, Part 11, Safety, health and environmental aspects of design, construction, operation, inspection and maintenance of Bitumen manufacture, blending, storage, distribution, product handling and use, and sampling, 5th edition: www.energyinst.org





SAFE HANDLING OF BITUMEN

www.nynas.com

© 2025-2026 Nynas AB. All rights reserved.
Nynas and Nynas Logo are trademarks of Nynas.

