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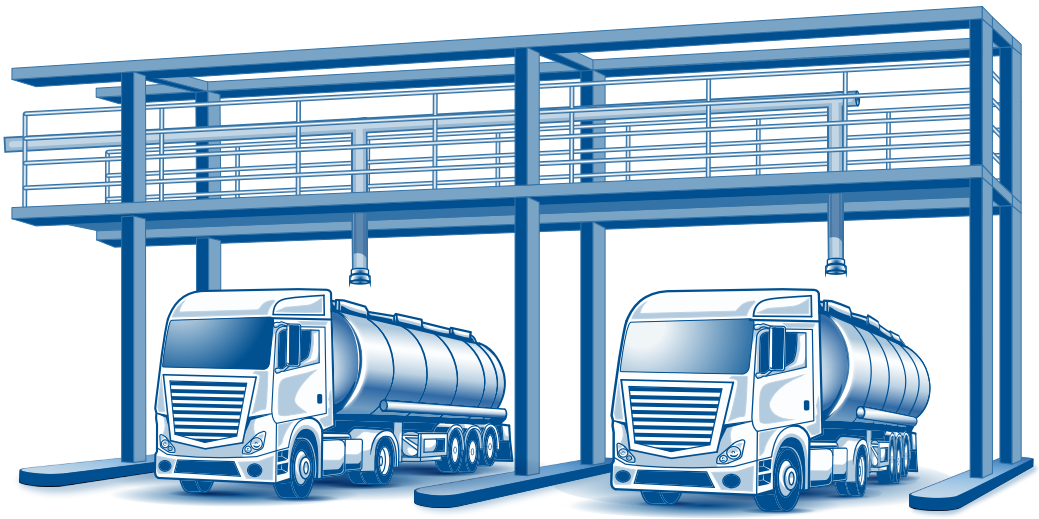
# Guidance for Safe Loading of Bitumen



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# Scope

The Eurobitume guidance for the safe loading of bitumen was produced to provide guidance on design aspects and procedures associated with bitumen loading activities. In addition to this guidance there may be local conditions and regulations covering plant design and loading procedures which need to be taken into account.

The document is intended as guidance for everybody involved in loading processes of hot bitumen. It is left to each individual entity to use the document and tailor it to their own requirements. Clearly, standardisation, common procedures and processes contribute significantly to overall safety, especially for drivers who load at different sites. Recognising that technical environments are varied, this document describes best practice.

# 1 Introduction

Bitumen is loaded hot (up to 200 °C for paving applications, and up to 230˚C for oxidised bitumen) and mostly at top loading facilities. Exercising extreme caution and correct handling of bitumen helps minimise the risk of burns or other injury to those associated with loading activities as well as damage to the environment or equipment.

This document is intended to raise awareness of safety issues associated with the loading process and to highlight the responsibilities of participants according to European legal requirements as well as the ADR regulation. Influencing aspects that may affect any of these participants are considered. The information contained in this guide builds on the experience of Eurobitume member´s experts.

The objective of this document is to provide guidance on management and operational measures to avoid incidents and accidents by defining good practices.

Good practices are dealt with in the following sections:

- Management and organisation
- Design of loading site and loading rack / gantry
- Personal Protective Equipment
- Procedures prior to, during and after loading activity
- Bitumen Specific Training

The scope of the document covers all truck loading sites, although refineries may have additional requirements.

The safe operation and maintenance of tank farms and related storage activities are not covered in this guideline but in the Eurobitume “Safe Delivery of Bitumen” guide. The two documents should therefore always be used in conjunction when assessing safety at a loading site.

This document should be seen as the guideline for loading operations across Europe. It´s execution will require the commitment of all stakeholders involved in the loading process

# Section HSE Requirements

## 2 Management and organisation

The loading site must have a detailed risk assessment covering all of its activities, including loading. The transporter of the bitumen should also have a detailed risk assessment covering specific aspects of loading. Any unacceptable conditions identified in either risk assessment must be recorded and an action plan, with agreed timescale, developed to ensure that these are rectified.

Safety inspections should only be carried out by qualified staff.

2.1 A management system reflecting the local activities should be in place.

2.2 The management system should be certified, with a clear statement of the scope and validity of the certificate.

2.3 Certain roles must be formally nominated to designated persons, e.g. safety advisers for the carriage of dangerous goods, first aider etc.

2.4 An organisation chart defining the roles and responsibilities of operating personnel and showing names of designated persons, such as first aiders, safety advisers for the carriage of dangerous goods, etc., should be available.

2.5 The company should develop site specific policies and procedures for the location with regard to HSE, including:

- 2.5.1 Smoking including electronic cigarettes, drugs and alcohol regulations.
- 2.5.2 Emergency procedures.
- 2.5.3. Traffic rules, e.g. maximum speed, seat belt use, use of cell phones and electronic devices inside site.
- 2.5.4 PPE requirements according to section 3 of this document, including how and where to wear.

2.6 A Management Handbook / Operating Manual should be readily available for those people conducting critical activities, e.g. loading a truck or handling bitumen products. The following topics should be covered as a minimum:

- 2.6.1 Work instructions for driver entry to the site, including advance notice and registration requirements, formal random ADR checks with checklist, type of power allowed to use by the truck on the premisses.
- 2.6.2 Work instructions for loading activities, including drivers´ formal notification and training about general and specific obligations for all activities while on loading sites.
- 2.6.3 Work instructions for operating and maintaining pumps, vents and measuring equipment, etc.
- 2.6.4 Work instructions for sampling.

2.6.5 Adequate programme for inspection, maintenance and calibration for rack and equipment, heating installations, pipe bridges, platforms, stairways, alarms, weight, flow meters and other critical equipment. Date of last cleaning and inspection of equipment at gantry need to be available.

2.6.6 Emergency response plans explaining actions to be taken in the event of incidents, including procedures for evacuation and spill containment plus which type of equipment needed.

2.7 A management of change process for handling temporary deviations and permanent changes to the operating manual, including defining the level of approval required, should be in place.

2.8 The company should have a formalised risk management process in place that:

2.8.1 Enables to identify potential hazard events, assess the probability of occurrence and determine the potential consequences of the event (e.g. spill, collision, fire, burns, other injuries), and put in place procedures to prevent their occurrence.

2.8.2 Requires periodic review of the facilities and operations to identify potential hazards and the associated risks, which may demonstrate the need for additional or revised risk assessments.

2.9. All relevant Products Safety Data Sheets must be available at the site and easily accessible for all relevant staff at site, including e.g. external contractors, and drivers.

2.10. Eurobitume guidances including, but not limited to, bitumen burns cards, PPE cards, $H_2S$ cards, or Safe Handling of Bitumen cards should be readily available.

# 3 Personal Protective Equipment (driver and site staff)

3.1 Any person within the vicinity of the loading of bitumen, irrespective of their specific duties, must wear appropriate Personal Protective Equipment (PPE).

3.2 The haulier must provide PPE for all drivers.

3.3 The site must provide PPE for relevant site staff.

3.4 All PPE should be regularly checked and cleaned, or replaced if no longer fit for purpose. Responsibility for checking the status of PPE lies with the user as well as with the company providing the PPE.

3.5 PPE must be compliant with the Eurobitume Guidance on Personal Protective Equipment or superior standards, be in good condition and fit for purpose.

# 4 Bitumen specific training - Loading site operatives

4.1 Loading site operatives and representatives must receive competence training on the safe handling of bitumen.

Workers´ protection is enhanced by understanding the hazards and associated risks related to the operations of transport of bitumen and by following good working practices.

4.2 The training requirements should be reviewed regularly.

4.3 Training records of all individuals must be stored and easily retrievable.

4.4 Training and testing emergency response procedures should be carried out in joint exercises with local emergency services.

# Section Design Requirements

## 5 Loading site

All facilities must meet all applicable EU and national safety codes, standards and regulatory requirements.

5.1 The loading area should be tidy and clear of obstruction. In particular, fire alarms, emergency stop buttons, emergency equipment, emergency safety showers, paths, emergency walkways and steps should be easily accessible.

5.2 Clear general safety signage should be provided on site (several examples are given in Appendix 1).

5.3 In deciding the loading point location, due regard should be paid to nearby access roads and other vehicle activities as part of the traffic management system.

Crossing of vehicle streams should be minimised and, where reversing is required, safe procedures should be in place. Reverse driving should be avoided especially for emergency purpose.

5.4 Clearly designated routes to and from the loading points should be provided to the truck driver (e.g. site plans with areas where potential ignition sources are prohibited, heights etc. are recommended).

5.5 Surrounding or adjacent operations, which could impair safe loading, should be avoided.

5.6 A flat even surface without a gradient should be provided for the vehicle, where the driver can load the product in safety. Both vehicle and driver should be protected from other traffic movements.

5.7 Adequate space around the vehicle is required during loading and the driver should be able to move around the vehicle without restriction.

5.8 Pump platforms should be bunded and located on an impervious floor. To help cleaning, it is recommended to cover the floor with a layer of sand.

5.9 Dedicated waste bins should be provided.

5.10 A safe exit route should be provided both for the driver leaving the gantry itself and for the vehicle leaving the loading bay in the event of an emergency.

5.11 Fire fighting facilities must be fit for purpose, checked regularly in accordance with local regulation and a record maintained.

5.12 Emergency response equipment must be fit for purpose and readily available, e.g. emergency safety shower equipment, first aid equipment, shovel, broom, sand or other bund material.

5.13 If a gantry loudspeaker (tannoy) system is installed, it must work properly and should be checked regularly.

# 6 Loading rack / gantry

Bitumen road tankers are normally loaded through top connections. It is therefore necessary to provide safe means of access to the tank top for loading operations.

6.1 The entire loading area must be adequately illuminated.

6.2 Clearly identifiable, simple instructions for operational and safety procedures for the loading operations should be posted in the immediate area of the loading activity.

6.3 At each rack, signs denoting which products are available should be posted.

6.4 A system to ensure correct vehicle position and to prevent drive-away from under the loading arm should be installed.

6.5 If an electrical bonding system to avoid static charge build-up is installed, it should include an automatic system to prevent loading if the system is not connected.

6.6 Gantries

6.6.1 Gantries´ height should be fitted to the highest possible truck or bitumen container. However, gantries should be adjustable to all vehicles.

6.6.2 Gantries should be dedicated to bitumen loading only. It is not recommended to allow loading of hot bitumen and emulsion on the same gantry.

6.6.3 Gantries should be constructed in steel and concrete or other materials that do not support combustion.

6.6.4 Gantries should be equipped with a roof or other weather protection enclosures, which must be adequately ventilated.

6.6.5 Loading gantries should allow unobstructed access to the driver's cabin when the road tanker is in position for loading.

6.6.6 Gantries should be equipped with safe means of escape, preferably at both ends.

6.7 Drivers must be prevented from falling from height. An elevated platform structure for safe driver/loader access to the top of the truck should be available at each loading point and be designed for the height of vehicles to be loaded.

6.7.1 Safe access to and egress from the platform must be possible.

6.7.2 The platform should have a safety cage enclosing all sides and the ramp leading towards the truck should have suspended handrails on both sides of the ramp.

6.7.3 Handrails should have top and intermediate railings.

6.7.4 Any safety gratings should have anti-slip surfaces.

6.7.5 The platform should be designed to ensure that it does not damage the vehicle.

6.7.6 The vehicle must not interfere with the operation of drop-down platforms for access to the top of the vehicle or loading arms.

6.7.7 If platforms and safety cages cannot be installed on the loading gantry then another suitable means to prevent persons from falling should be installed.

6.8 Personnel should not be required to remain next to the road tanker manhole during loading operations (see 9.4).

6.8.1 If personnel are required to remain in the vicinity of the loading arm, appropriate control measures should be applied to reduce the potential for exposure to hydrogen sulphide that may be present.

This includes technical / engineering controls, and administrative controls such as development of efficient procedures to minimize the time the worker is exposed and delineation of zones, information panels, detectors set to signal if concentrations approach the OEL (Occupational Exposure Limit), driver training, documentation, use of adequate local ventilation (refer to Eurobitume $H_2S$ guidance and 6.8.2).

Safety assessment from the site should lead to recommend specific protection, procedure (e.g. personal alarms, alarmed monitors, etc.).

6.8.2 Local exhaust ventilation (LEV) systems should be installed.

6.9 A monitoring system should be in place to ensure the loader supervises loading e.g. CCTV (also see 9.3).

6.9.1 If a dead-man equipment is fitted it should be located away from the road tanker manhole (also see 9.4). A dead-man equipment with timer requesting action is preferable to a permanent-press equipment.

6.10 Readily accessible emergency stop devices for each loading rack / gantry must be installed (also see 9.3), so that they can be operated both locally and remotely from a safe location to stop all product flow quickly.

6.10.1 Emergency stop devices should be configured to close the flow control valve and/or shut off electrical power to the product pumps. No unexpected product flow should occur on reset.

6.11 If there is a requirement to take product samples a purpose-designed valve should be permanently fitted to the corresponding pipework.

6.12 Pipework

6.12.1 All pipework should be insulated. The insulation and the material used should be in good condition and clean.

6.12.2 All pipework related to loading a vehicle must be well supported and maintained to prevent blockage or reduction of the nominal bore of the pipework when not in use. (This could be done by e.g. continuous circulation, trace heating, draining when empty etc.).

6.13 Loading arms

6.13.1 Moveable loading arms should be fitted with a locking device to prevent movement during loading.

6.13.2 Loading arms should be properly counter-balanced for easy and safe operation.

6.14 Product load control

6.14.1 A flow meter or weighing system, or similar integrated with product delivery pumps should be installed. Systems should be configured with electronic quantity pre-set and automatic shut-off.

6.14.2 Initial and final product flow rate into trucks should be limited (start slowly and finish slowly) with a flow control valve or remote electronic means. The flow control valve or remote electronic means should be configured to prevent manual override.

6.14.3 An automatic overfill protection or similar safety system should be integrated into the loading arm.

6.15 At least one dry powder fire extinguisher should be available in close proximity to the loading point.

6.16 An emergency safety shower and eye-wash unit must be located near the loading rack. For details, reference is made to Eurobitume´s Emergency Safety Shower Guidance.

# Section Loading-related procedures

## 7 Access to the loading site (driver arriving at site)

7.1 Hauliers should ensure truck technical requirements and driver language capabilities are compatible with loading site requirements.

7.2 Hauliers must ensure general pre-load restrictions are followed (see Eurobitume Compatibility Matrix).

7.3 The loading site must:

7.3.1 Ensure truck technical requirements, driver´s language capabilities and PPE are compatible with loading site requirements.

7.3.2 Provide induction training when drivers arrive at site for the first time.

The training must be recorded and repeated at regular intervals.

7.3.3 Carry out regular random checks on ADR compliance of vehicles.

7.3.4 Check the pre-load weight of vehicle to ensure it is empty and capable of receiving the required load.

7.3.5 For each load, ask the driver for confirmation that vehicle is water free. If confirmation is not received there is a risk of a major accident and loading must not commence (see Eurobitume Recommendations to reduce the risk of boil-over during loading of bitumen).

7.3.6 Be satisfied that the previous load is compatible with the product to be loaded (see Eurobitume Compatibility Matrix).

7.4 Drivers should identify themselves and / or truck and trailer at site (Load-ID, ID Cards etc.).

7.5 Drivers should confirm loading identification (grade, volume, customer).

# 8 Prior to loading

In some facilities loading is carried out by the driver, in others site personnel carry out this function. In such circumstances the responsibilities of the driver and the loader must be clearly defined.

In this section the person carrying out the loading activities is referred to as the loader.

8.1 The loading site must:

- 8.1.1 Regularly test emergency shower equipment and record tests.
- 8.1.2 Take measures to prevent bacterial contamination and airborne issues, such as legionella, to comply with local control and testing legislation.
- 8.1.3 Regularly check all fire extinguishers.

8.2 If additives are required to be included in the load without in-line blending facilities, procedures should be in place to ensure safe loading.

8.3 Drivers:

- 8.3.1 Should only commence loading once permission is received from the operator / system.
- 8.3.2 Should complete the declaration of tanker being water free (see 7.3.5).
- 8.3.3 Should ensure that the vehicle is correctly marked.
- 8.3.4 Should doublecheck correct loading point for the product ordered.
- 8.3.5 Should immobilise the vehicle by engaging the vehicle braking system (if necessary, wheel chocks should be used).
- 8.3.6 Should close vehicle doors and windows.
- 8.3.7 Must ensure all tanker outlet valves are closed.

8.4 It is the responsibility of the loader:

- 8.4.1 To check that tanker openings are of the correct size for the loading arm (size and positioning of domes).
- 8.4.2 To remove drip container from loading arm to avoid spraying of bitumen (spill, burns).
- 8.4.3 To lock the secure / lock mechanism, if one is fitted to the loading arm (see 6.13.1).
- 8.4.4. To ensure proper operation of the loading arm: If there is a loading cone associated with the overfill protection device and/or fumes recovery, the loading apparatus must be positioned tightly closed to the dome (round manhole not oval). The loading arm must be correctly positioned to avoid risk of spills and ensure that the systems attached to the device work properly.
- 8.4.5 To report any issues to the loading facility management (near miss / potential incident).
- 8.4.6 To wear the proper PPE.

# 9 During loading

In some facilities loading is carried out by the driver, in others site personnel carry out this function. The responsibilities of the loading operator and, respectively, the driver must be clearly defined.

In this section the person carrying out the loading activities is referred to as the loader.

9.1 The loading facility personnel are responsible for the driver's and/or loader´s well-being while on the premises. The loading facility must monitor the driver's and/or loader´s safety during the loading process by at least one of the following methods:

- 9.1.1 Visually monitoring e.g. line of sight or CCTV, or;
- 9.1.2 Regular checks made during the loading process in accordance with specific risk assessment for bitumen loading, or;
- 9.1.3 Attend the loading process with the driver.
- 9.1.4 If the loading site permits accordingly, the driver might be loading alone without loading facilities personnel being available. In these situations, an on person „work alone alarm" must be used.

9.2 The driver is solely responsible for the operation of his vehicle and its equipment throughout the loading procedure.

9.3 The loader must remain by the shut-off buttons whilst loading is taking place. If a 'dead-man equipment" is installed this must be used correctly (also see 6.9 and 6.10).

9.4 The loader should stand clear of the manhole to avoid being within the emission plume (monitor wind direction).

9.5 The loader must stop the loading immediately whenever there are concerns about the safety of the loading activity for any reason (see 8.4.5).

9.6 Loading of the product must not exceed maximum gross weight and axle weight restrictions for the countries the vehicle will travel through for the delivery.

9.7 The load must not exceed 95% of available capacity (ADR).

9.8 Loaders must ensure the loading arm fully drains before removal from the truck, secure the loading arm and return the drip container.

9.9 The loader must ensure all loading point valves are closed.

# 10 Post loading

The driver or loader, depending on site-specific rules, must:

10.1 Secure all hatches and manlids on the vehicle after loading before moving the vehicle.

10.2 Secure all loading arm installations.

10.3 Remove platform structure (see 6.7).

10.4 Remove static electricity bonding system (if fitted).

10.5 Remove wheel chocks (if used).

# 11 Return loads

Return loads (overloads or customer returns) should be considered as a delivery and therefore should follow the Eurobitume Guide to the Safe Delivery of Bitumen, incorporating the site specific rules and procedures of the receiving facility.

# Abbreviations and acronyms

| | |
|---|---|
| ADR | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| CCTV | Closed Circuit Television |
| CMR | Convention on the Contract for the International Carriage of Goods by Road (Convention relative au contrat de transport international de Marchandises par Route) |
| OEL | Occupational Exposure Limit |
| PPE | Personal Protective Equipment |

# External references

UN/Economic Commission for Europe: ADR - Agreement concerning the International Carriage of Dangerous Goods by Road

# Eurobitume reference documents

Eurobitume Bitumen Burns Card

Eurobitume Loading Compatibility Matrix

Eurobitume Emergency Safety Shower Guidance

Eurobitume Guidance on Personal Protective Equipment (PPE)

Eurobitume Guide to the Safe Delivery of Bitumen

Eurobitume Hydrogen Sulphide ($H_2S$) in Bitumen Emissions Card

Eurobitume Pocket Guide Managing $H_2S$ Risks during Bitumen Operations

Eurobitume Guidance Potential Risks of Hydrogen Sulphide through the Bitumen Manufacture and Delivery Process

Eurobitume Recommendation to reduce the Risk of Boil-Over during Loading of Bitumen

Eurobitume Safe Handling of Bitumen Card

# Appendix 1 - Safety signage

This is not an exhaustive list but gives some examples:

Road marking, smoking restrictions, escape routes, fire extinguishers, PPE, speed restriction, mobile phone restrictions, First Aid, emergency stop, assembly point, restricted access area, emergency safety shower equipment and direction.

# Appendix 2 - Informative haulier / driver requirements

Procedures to be followed by hauliers / drivers

## Procedure

In most cases the haulier is not under direct control of the loading facility. Therefore this section covers the elements that are the responsibility of the hauliers and drivers, rather than the loading facility. The loading facility should check and confirm that the relevant requirements on hauliers and drivers have been met.

## Guidance

A.1. The haulier must ensure that:

- A.1.1. The delivery vehicle is compliant with technical ADR regulations and complies with other applicable requirements.
- A.1.2 The driver possesses the necessary ADR certificate.
- A.1.3. All safety instructions (Instructions in Writing) are provided to the driver in language(s), which each crew member can read and understand, before commencing the journey.
- A.1.4. Each member of the vehicle crew concerned understands and is capable of carrying out the instructions properly: https://unece.org/transport/road-transport/linguistic-versions-adr-instructions-writing
- A.1.6. All drivers comply with PPE requirements. All PPE should be regularly checked and cleaned or replaced whenever their function to protect personnel cannot be judged as fit for purpose anymore. Responsibility lies with the driver as well as with the haulier providing the PPE.

A.2 Hauliers are responsible for ensuring that their drivers have received bitumen specific training and instruction on loading, transport and unloading the vehicle.

A.3 An optional annex, specific to the product transported, is strongly recommended to be added to the safety information provided to the driver for the transport of hot bitumen.

A.4 Apart from complying with general regulations on road traffic and dangerous goods, the driver must:

- A.4.1. Drive safely.
- A.4.2. Carry the necessary documentation.
- A.4.3. Ensure that the vehicle equipment is in good operating condition. It is recommended to have a daily checklist for the roadworthiness of the vehicle (e.g. tyres brakes, lights, steering system, etc.).
- A.4.4. Follow all instructions given during site specific induction.
- A.4.5. Complete a visual check of vehicle, equipment and placards.
- A.4.6. Prepare documents for transportation (CMR) as required.