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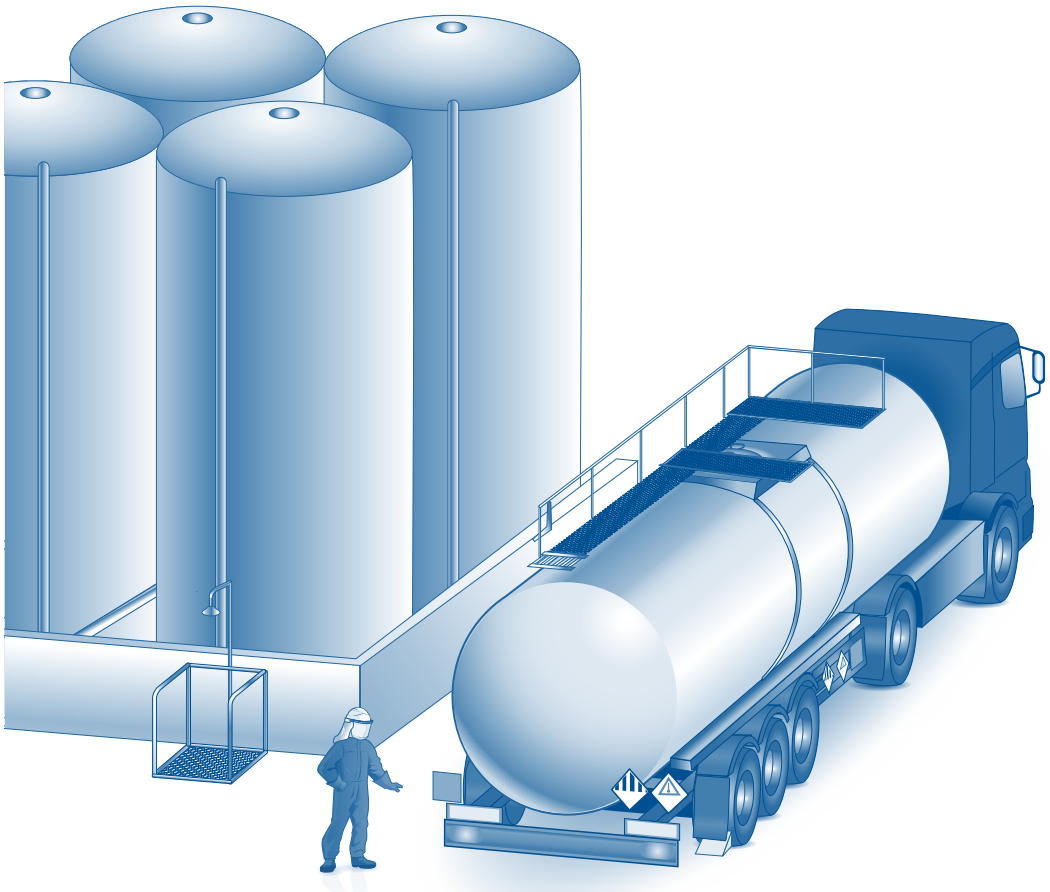
# Guidance on Ground-Based Operations



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# 1 Introduction

Bitumen deliveries should be operated from the ground.

It is strongly recommended that all operations required for safe delivery of bitumen should be carried out from ground level. Ground-based operations, including ground-based pumps, reduce:

- risks of falling from height;
- risks to bitumen fumes exposure, incl. $H_2S$;
- risk of an uncontrolled release of hot bitumen, as no pressure discharge;
- risk of hose, flange connection, joint and other failures; and
- risk of a bow wave on the surface of the bitumen in the storage tank - particularly important in small horizontal storage tanks.

This Eurobitume recommendation is intended for all customers and site managers, as well as hauliers involved in bitumen supply in Europe.

# 2 Considerations for operating at sites

The receiving company should ensure that a safe and effective means of communication local to the discharge point exists between the delivery driver and the plant staff supervising the delivery.

An emergency management plan must be developed by the operating company to instruct all parties of the actions they must carry out in the event of an alarm activation.

The delivery driver must be trained in the unloading and emergency procedures prior to commencement of any delivery.

Procedures and facilities must be in place to allow the driver to clear the discharging hose in the event of a system failure.

## 2.1 Ground-based pumps

- reduce risk of an uncontrolled release of hot bitumen, as no pressure discharge;
- reduce risk of hose, flange connection, joint and other failures;
- and avoid a bow wave on the surface of the bitumen in the storage tank - particularly important in small horizontal storage tanks.

The ground-based pump is an integral part of the bitumen storage plant and, as such, the characteristics of the pump must be considered in conjunction with the characteristics of the whole system to ensure compatibility and safe operation. This must only be undertaken by a competent person.

During the design stage of any new plant and retrospectively for existing plant, a Hazard and Operability (HAZOP) and Hazard Identification (HAZID) study should be carried out. The HAZOP and HAZID techniques are used universally across high hazard industries as a method of identifying hazards and operability problems in new and existing plant.

These processes are very important with any installation and particularly relevant when installing ground-based pumps.

Consideration must be given to the rating of the installed pump, i.e. how many litres per minute. This needs to be measured against the vent line capacity of the bitumen delivery vehicle tank barrel to prevent underpressure, and of the bitumen storage system to prevent overpressure.

The ground-based pump should be situated at a level lower than and as close as is reasonably possible to the delivery flange, to minimise the amount of bitumen in the pipework.

The design should allow for the suction of the pump to be below the outlet flange of the bitumen delivery vehicle, to allow total clearance of the delivery line before the pump loses suction.

The ground-based pump system should comprise of a storage vessel with associated pipework, a pump, in-line valves, a tank gauging system with a High Level Alarm (HLA) and an independent High High Level Alarm (HHLA).

The system must be designed to fail-safe. For example, on activation of either alarm or any system failure, the system will simultaneously and automatically stop the pump, close any in-line valves and stop any ancillary equipment. If any of these components fail the system must stop, e.g. if an in-line valve closes, the pump, additional valves and any ancillary equipment will stop. In any case, due to the hazardous nature of the operation (risk of overpressure in the hoses), a delivery must not be done using simultaneously the tank truck pump and the delivery site ground-based pump.

To ensure the system´s reliability and functionality a robust maintenance regime must always be in place and operated.

### 2.2 Ground-based pump failure

Sometimes, it can happen that the unloading of the bitumen is interrupted due to the breakdown of the ground-based pump (e.g. electrical failure, mechanical failure, etc.). If the repair cannot be easily carried out in a few minutes, Eurobitume recommends the following procedure:

1. The driver must immediately stop the operations in progress and put the tank truck in safety;
2. Similarly, the site operator must immediately secure their facility´s installation;
3. The driver and site operator must inform their managements according to the respective company´s operational procedures;
4. After identification of the delivery concerned, the responsible person of the delivery site may decide to permit the use of an auxiliary pump, in exceptional cases, by requiring:
   - The presence of a representative of the delivery site;
   - The strict compliance with the delivery site safety procedures.
5. Action by the responsible persons of the haulier and the delivery site to remind the driver of the instructions and operating procedures:
   - The written agreement of the responsible person of the delivery site (e.g. by e-mail) to the haulier confirming the need to carry out an operation under exceptional conditions and authorising the resumption of bitumen delivery.

These requirements being respected, the end of the delivery of the bitumen may be carried out in exceptional mode, either by using the pump fitted to the tank truck, or by using a pump specially designed for this purpose, or by using another tank truck equipped with a pump.

In summary, any decision should be taken collectively by all competent persons present on site.

This exceptional procedure is applicable only to complete a started delivery of bitumen. As a result, bitumen supply to the site concerned will only resume after the site's pump has been repaired or replaced.

If it is known in advance that the on-site pump (including mobile mix plant) is not operational, Eurobitume´s recommendation is that bitumen delivery should not take place.

For the specific case of hoses still under pressure, see also the Eurobitume "Recommendations to disconnect hoses still under pressure".

### 2.3 Control of temperature in the delivery pipework

It is strongly recommended that the pump, filters and delivery lines are heat traced and lagged. A written operational procedure should be in place to ensure free flow of the bitumen in the pipeline and thereby avoid prolonged heating and potential coking.

### 2.4 Delivery drivers

Remember that when bitumen is unloaded using pumps, which is recommended, the truck tank needs to be vented. Eurobitume strongly recommends that venting is done from the ground (ground venting). For further information, incl. the case if ground venting is not possible, see section 3.2 of this document.

The pump off-loading must be commenced by the delivery driver only after authorisation is given by the plant operator. In certain circumstances the pump is activated by the site operator from the control room when the driver has connected the hose.

The plant operator specifies which tank the bitumen will flow into and starts the ground-based pump. (In the UK, the driver must not be able to start the ground-based pump until the plant operator specifies which tank the bitumen will flow into).

A panel should be positioned as close as possible to the pump showing the delivery driver the tank status, including level and its unit, and should include controls to start and stop the ground-based pump. Consideration should be given to a hose detection system, being installed so that the system will not start until it detects a connected delivery hose.

An Emergency Shut Down Device, i.e. an E-stop, must be fitted at the delivery point, readily accessible and clearly identified, so that in the event of an emergency the process can be stopped. This must not be self-resetting.

In the event of an alarm activation, the driver must close the delivery valve, contact the plant personnel and await further instruction.

The driver must not be able to reset the system after an activation of any alarm.

In the UK an Authority to Continue Discharge (ATD) must be raised and if it is used, a new authorization (e.g. Bitumen Discharge Permit – BDP - or equivalent) completed if the delivery has been suspended for any reason.

# 3 Considerations for operating bitumen delivery vehicles

## 3.1 Loading

It is recognised that usually vehicle operators need to access the man-lid during loading. These operations are not addressed here, as it is assumed that in refineries, or terminals adequate fall protection is provided through the use of gantries. For further information please consult the Eurobitume Safe Loading Guidance.

## 3.2 Discharge

In bitumen delivery operations it is important to avoid significant over or under-pressure conditions on the tank barrel.

When bitumen is unloaded using pumps, the truck tank needs to be vented. Eurobitume strongly recommends that venting is done from the ground (ground venting).

Any system installed on a delivery vehicle to permit ground-based operation should indicate when the vent valve is open or closed. The system should ensure that, when the bottom valve is open, discharge cannot commence until the vent valve is open. Similarly, the vent valve must be closed at the loading site. A full truck must not be moved with the vent valve opened.

The system control equipment must be safely operable by the driver at any time and in the event of any safety concern, the driver can immediately terminate the delivery using an Emergency Stop. This also applies where bitumen deliveries are not made using ground-based pumps but are made under pressure from the delivery vehicle.

The opening on the tank roof must be correctly dimensioned in relation to the pump flow rate. The aperture should have a minimum diameter of 75 mm to allow sufficient air flow in relation to the flow rate of the ground-based pump used for discharge, to prevent damage to the tank.

If ground venting is not possible, delivery personnel need to open the man-lid (also known as “dome”) on top of the truck tank. This can be done remotely (from the ground), but in some cases the venting operation involves the driver climbing to the top of the vehicle. Climbing on top of the vehicle should only be done if working conditions are safe to do so, e.g. fall protection being used.

> Note: Ground venting might not be possible due to blocked openings. This is best prevented by periodic maintenance. Also, if the ground venting does not work, the unloading procedure should be automatically blocked and indicated by an alarm. The unloading procedure must then be restarted when safe to do so.

It is recommended to have tanks equipped with low pressure automatic valves between 0,25 bar and 0,5 bar to avoid gas accumulation in the tank roof during transport in case of degassing of the product.

# Eurobitume reference documents

Eurobitume Bitumen Burns Card

Eurobitume & MPA Bitumen Discharge Permit (UK)

Eurobitume Emergency Safety Shower Guidance

Eurobitume Guidance on Personal Protective Equipment (PPE)

Eurobitume Guide for the Safe Loading of Bitumen

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 Recommendations to Disconnect Hoses in Case still Under Pressure

Eurobitume Safe Handling of Bitumen Card