

Guide to the Safe Delivery of Bitumen

UK Version



Guide to the Safe Delivery of Bitumen

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Eurobitume, July 2018 info@eurobitume.eu

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Eurobitume Guide to the Safe Delivery of Bitumen

Eurobitume is an association representing the bitumen industry in Europe, one of its missions is to promote the safe use of bitumen. It encourages good operational, safety and environmental policies and practices for the benefit of all those involved in the delivery of bituminous products.

The Eurobitume Guide to Safe Delivery of Bitumen was produced by Eurobitume members to highlight the responsibility of those involved throughout the supply chain and summarise best practices. For the launch at national / regional level adjustments have been included to account for local conditions and regulations.

The laws and regulations in Europe require employers to provide safe systems of work to ensure the safety of their employees and the public. Health and safety laws impose duties on all relevant stakeholders and on all involved parties to provide safe systems of work. This Guide to Safe Delivery of Bitumen is intended to help all parties comply with their responsibilities during the delivery of bitumen products and does not alter the legal responsibility of either party.

The document aims to define the minimum industry standards for design, equipment and procedures based on legislation and experience. These standards should be used by member companies, bitumen hauliers and customer sites. It is specified where standards are mandatory, by stating that such levels must be achieved. In other areas the standards should be seen as industry recommendations, for example where best practice is not currently achievable due to infrastructure or legacy issues.

It is recognised that there are national differences in bitumen delivery practices and legislation, therefore an Appendix has been included in the document (Appendix 4) where additional procedures have been incorporated.

The information and recommendations in this guide are given in good faith and belief in its accuracy at the time of publication, but do not imply any legal liability or responsibility of the association.

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Introduction

Bitumen is delivered hot (up to 230°C) and may be under pressure. Therefore exercising extreme caution and correct handling of bitumen helps minimise risk of burns or other injury to those associated with deliveries as well as damage to the environment or equipment.

This document is intended to raise awareness on safety and environmental aspects within the delivery process and to highlight the responsibilities of those involved within the supply chain. European legal requirements as well as the ADR regulations are also considered.

Safety during delivery requires the commitment of all stakeholders, e. g.:

- Suppliers
- Hauliers
- Drivers
- Receivers
- Customers

This document is intended to define good practice in the following areas:

1. Customer Site
2. Personal Protective Equipment
3. Delivery Vehicle
4. Operation and Maintenance of Storage Tanks and Pipework.
5. Delivery Procedures
6. Bitumen Specific Training
7. Bitumen Safety Documentation

In accordance with Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace, it is a legal requirement for every employer and self-employed person to make an assessment of the health and safety risks arising out of their work. The purpose of the assessment is to identify what needs to be done to control health and safety risks. This should be repeated at regular intervals and after any safety incident, or changes to work site equipment / procedures.

In addition to personal safety risk assessments, consideration should be given to risks such as loss of containment, fire and explosion.

A number of important European safety and environmental regulations are referenced in Appendix 1 of this document.

1. Customer Site

1.1. Access and induction

- 1.1.1. The bitumen delivery driver must receive a site specific safety induction, preferably including site plans for the driver to retain. The induction must be documented signed and dated.
- 1.1.2. The customer is responsible for the driver's well-being while on their premises.
- 1.1.3. All site roads must be clearly marked, signposted and well-lit during hours of darkness.
- 1.1.4. If drivers are required to exit their delivery vehicle, e.g. to weigh in and out at the delivery site, a clearly marked pedestrian route must be provided to enable safe access to and from the delivery vehicle.

1.2. Delivery point

- 1.2.1. The traffic management system must consider the impact of nearby access roads and movement of plant or equipment in the vicinity of the delivery point.
- 1.2.2. The need for delivery vehicle reversing must be minimised. Where reversing is required, safety measures should be implemented.
- 1.2.3. Surrounding or adjacent operations which could impair a safe delivery must be avoided.
- 1.2.4. A flat and even surface must be provided for the delivery vehicle in order to minimise the risk of slips, trips and falls.
- 1.2.5. The area around the delivery point should be kept tidy and clear of obstruction.
- 1.2.6. A suitable system (e.g. sand bed receptacle) for the collection and disposal of all hose and pipe drainings must be provided.
- 1.2.7. The entire discharge area must be adequately illuminated.
- 1.2.8. Adequate space around the delivery vehicle must be provided to allow unrestricted movement for the driver.
- 1.2.9. A 6 metre exclusion zone should be marked with signs or barriers if possible.
- 1.2.10. A safe emergency exit route must be available for the driver.
- 1.2.11. Clearly identifiable, simple instructions on operational and safety procedures must be available in the immediate area of the customers' inlet pipework.

1.3. Emergency equipment

- 1.3.1. The location of emergency equipment must be clearly indicated.
- 1.3.2. Emergency equipment must be maintained, inspected and/or tested regularly and a record kept.
- 1.3.3. At least one (6kg) dry powder extinguisher must be available in the area of the delivery point.
- 1.3.4. Extinguishers should be housed in suitable weather-proof boxes or shrouds to ensure serviceability at all times.
- 1.3.5. At least one emergency shower must be provided in the area of the delivery point. It is recommended that the shower should be positioned at a minimum distance of 6 metres and no further than 20 metres away from the discharge point. If the shower is positioned within 6 metres of the discharge point it must be screened from the possible effects of bitumen spray.

- 1.3.6. The shower must be capable of immediately providing sustained volumes of clean water for at least 15 minutes from point of activation at any time, including during freezing conditions.
- 1.3.7. If the shower becomes temporarily inoperative, a suitable alternative system must be in place prior to the delivery.
- 1.3.8. The shower must be easily operated by an operative in distress, e.g. foot plate.
- 1.3.9. It is recommended that the shower is alarmed in such a way as to ensure site management are aware of its use.
- 1.3.10. Advice on the treatment of bitumen burns must be displayed in the delivery area and made available in the event of further medical treatment being required (see Eurobitume Bitumen Burns Card).

1.4. Site specific safety and emergency procedures

- 1.4.1. Site management must document and provide a compilation of site specific safety instructions for bitumen deliveries for both employees and delivery drivers.
- 1.4.2. Site specific safety and emergency procedures should be tested, if possible with appropriately trained staff and local emergency services.
- 1.4.3. Site employees must be trained in site procedures and emergency procedures must be tested.
- 1.4.4. Safety Data Sheets must be available at the delivery site for all hazardous products handled and should be used to prepare risk assessments and work instructions and to inform site personnel of the hazards and controls that are necessary to protect people against injuries caused by products.

2. Personal Protective Equipment (PPE) (drivers and site staff)

2.1. Personnel involved in the delivery of bitumen

- 2.1.1. Any person within 6 metres of the delivery of bitumen, irrespective of their specific duties, must wear appropriate PPE.
- 2.1.2. PPE must be compliant with Appendix 2 or superior standards, be in good condition and fit for purpose.
- 2.1.3. PPE must be provided by the haulier for all drivers.
- 2.1.4. The site must provide PPE for relevant site staff.
- 2.1.5. All PPE must be regularly checked and cleaned or replaced. Responsibility lies with the user as well as with the company providing the PPE.

3. Delivery Vehicle

3.1. Vehicle design

- 3.1.1. All delivery vehicle discharge equipment must be operable from ground level in order to avoid the need for the driver to climb on top of the delivery vehicle during delivery.
- 3.1.2. If it is necessary for the driver to climb on top of the delivery vehicle, fall protection must be provided.
- 3.1.3. The delivery vehicle must be fitted with brake interlocks, or other means to ensure that the delivery vehicle cannot move during discharge.
- 3.1.4. The delivery vehicle must be fitted with an Emergency Secondary Safety Valve (ESSV) with a recommended minimum of 3 emergency shut-down devices at different positions.
- 3.1.5. Reverse Camera/Sensors, or other similar reversing aid must be fitted.
- 3.1.6. Reverse noise warning bleeper must be fitted.
- 3.1.7. The position of the delivery vehicle discharge valve actuator wheel (Homir valve) must ensure that the driver is not in the path of a bitumen spray in the event of a flange or hose failure.

3.2. ADR requirements

- 3.2.1. In accordance with ADR, all hauliers and suppliers of bitumen must engage a Dangerous Goods Safety Advisor (DGSA).
- 3.2.2. ADR markings must be displayed on the delivery vehicle and the delivery vehicle must carry equipment according to ADR requirements.

4. Operation and Maintenance of Storage Tanks and Pipework

4.1. Hazard Identification and Hazard and Operability studies

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

Before a HAZID/HAZOP study is started, detailed information on the process should be available including:

- Up-to-date process flow diagram (PFD);
- Process and instrumentation diagram (P&ID);
- Detailed equipment specifications;
- Construction materials.

A Functional Safety Assessment (FSA) should be carried out in accordance with EN 61511.

This process ensures a systematic and well documented evaluation of hazards and will assist in the identification of:

- Any safety instrumented systems that are required by EN 61511.
- Directive 99/92/EC - on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.

4.2. Storage tank markings

- 4.2.1. Each storage tank and its associated delivery pipework and control valve must be uniquely identified with the storage tank number.
- 4.2.2. The contents of each storage tank must be clearly identified and labelled with the product/grade.
- 4.2.3. Safe Working Capacity (SWC) must be displayed for each individual storage tank and be visible to the operator and driver (see also 5.1.2.).
- 4.2.4. It is good practice that storage tanks should display an “Elevated Temperature” sign in a size suitable for the size of the storage tank.

4.3. Storage tank gauges

- 4.3.1. Adequate and reliable means of gauging the storage tank contents and ullage must be available (See Appendix 4.1).
- 4.3.2. Such gauges must clearly identify which storage tank they refer to and must be visible from the driver’s position at the discharge point.
- 4.3.3. Storage tank gauges must be operational and calibrated.
- 4.3.4. Content gauges must be regularly checked, maintained in accordance with the manufacturer’s recommendations and service logs maintained.
- 4.3.5. Wherever possible a duplicate system should be provided in the plant control room.

4.4. Storage tank alarms

- 4.4.1. A high level alarm (HLA) and an independent high-high level alarm (HHLA) must be installed on each storage tank.
- 4.4.2. The activation of the HHLA must be independent of the contents gauging system.
- 4.4.3. The HLA should be set to trigger at the available capacity of the storage tank less 10 % (see Appendix 3). The HHLA should trigger at the available capacity less 7.5 %. The HAZOP and HAZID may indicate that the trigger points may vary depending on storage tank size, pump rate and measurement accuracy.
- 4.4.4. Alarms must clearly identify which storage tank they refer to, when activated.
- 4.4.5. Alarms must be audible and/or visible to all those responsible, including the delivery driver, for the safe delivery of product.
- 4.4.6. In the event of an alarm being triggered ground based pumps should automatically switch off, valves closed to a safe position and the pump must not be re-started until the cause of the alarm has been investigated and resolved. (See 5.2.7).
- 4.4.7. All alarms must be operational and calibrated.
- 4.4.8. Alarms must be regularly checked, maintained in accordance with the manufacturer's recommendations and recorded.

4.5. Storage tank openings

- 4.5.1. Vent pipes must be located where product emission or release do not pose a risk to any personnel or delivery vehicles.
- 4.5.2. Storage tank lids must be kept closed and secured at all times during the delivery.
- 4.5.3. It is recommended that storage tanks should be fitted with a correctly designed drain valve to enable the safe emptying of the storage tank for cleaning and maintenance. In the absence of a drain valve, a specific risk assessment must be carried out prior to any uplift of product.
- 4.5.4. Samples must not be taken from the delivery vehicle or hoses at the delivery site unless equipment is fitted to do so safely.
- 4.5.5. If there is a requirement to take product samples a purpose designed valve should be permanently fitted to the storage tank (or corresponding pipework).
- 4.5.6. At high temperature the headspace of storage tanks can contain hydrogen sulphide, which may reach dangerous concentrations. Appropriate control measures should be applied which may include delineation of zones, information panels, detectors set to signal if concentrations approach the Occupational Exposure Limit (OEL), use of adequate local ventilation.

4.6. Storage tank pipework and flanges

- 4.6.1. Installation of a ground based pump is the preferred means of delivery. Such installations must be subject to a thorough hazard operability study (HAZOP) during design and construction.
- 4.6.2. The customer's storage tank inlet pipework must be of appropriate design, well supported and maintained to ensure no residue will block or seriously reduce the nominal bore of the pipework.
- 4.6.3. All storage tank pipework should be insulated.

- 4.6.4. Storage tank flanges should be vertical and located between 500 mm (as measured from the bottom of the flange face) and 1000 mm above ground level (as measured to the top of the flange face).
- 4.6.5. Coupling design, including adaptors, must provide a safe and secure connection between the hose and the storage tank flange (see Appendix 4.3 for flange design).
- 4.6.6. To contain any spray of hot bitumen at the storage tank flange, flange shrouds must be fitted and used during the delivery.
- 4.6.7. It is recommended that an end valve is fitted behind the storage tank flange which can be closed in the event of an emergency.
- 4.6.8. Access to the storage tank connection flange must be such as to allow for safe and easy connection of the delivery hose.
- 4.6.9. The distance between the delivery vehicle and the storage tank flanges must not be more than one hose length in order to avoid two flexible hoses being connected to each other.
- 4.6.10. A connection security system (e.g. locks) should be fitted to control discharge, prevent cross contamination and possible spillage. Each system should be robust, storage tank specific and fit for purpose.
- 4.6.11. Discharge inlet pipework flanges must be clean and serviceable, e.g. free from warping, excessive wear, rust and fractures.
- 4.6.12. Storage tank vent/overflow pipes must be kept clear of blockage at all times.
- 4.6.13. The pipework between the customer's delivery flange and the storage tank must not be flexible.
- 4.6.14. Whenever flexible hoses are provided at customer sites, the customer is responsible for their maintenance (including periodic inspection) and function.

4.7. Storage tank design and use

- 4.7.1. If customer storage tanks are fitted with inlet/fill pipes that pass through the top of the storage tank and extend to the bottom of the storage tank (to minimise oxidation of the bitumen during circulation), the inlet pipe must be slotted or fitted with an alternative device to prevent spillages resulting from siphoning at the end of the delivery.
- 4.7.2. All access ladders and walkways on storage tank roofs must be fitted with suitable guards to prevent falls.
- 4.7.3. Where other product storage tanks, e.g. bitumen emulsion, kerosene, etc. are present, all supply and return pipework must be segregated from the bitumen pipework system and identified.
- 4.7.4. Where out of service bitumen storage tanks are being returned to service after maintenance or long interruption, clear procedures must be developed to ensure that the storage tank is safe to operate and is free of water.
- 4.7.5. Polymer modified bitumen and oxidised bitumen storage tanks should be located closest to the discharge connection to minimise the risk of pipework blockages.

4.8. Storage temperature

- 4.8.1. For recommended and maximum storage temperatures please refer to the supplier's Safety Data Sheet.
- 4.8.2. Storage temperatures must not exceed the Eurobitume maximum safe handling temperatures.

5. Delivery Procedures

5.1. Pre-delivery

- 5.1.1. It is the responsibility of the customer to authorise each delivery. (See also 5.4.3 and Appendix 4.2 for the Bitumen Discharge Permit).
- 5.1.2. It is the customer's responsibility to ensure that there is sufficient storage tank ullage. Sufficient ullage to take the load + 10 % safety margin must be provided (see Appendix 3).
- 5.1.3. It is the responsibility of the customer to confirm that the grade and quantity being delivered are correct, as stated on the drivers' delivery documentation, preferably in writing.
- 5.1.4. It is the responsibility of the customer to confirm that the driver has connected to the appropriate storage tank flange for the delivery and the lines and valves are routed to correct storage tanks.
- 5.1.5. The customer must make sure the emergency safety shower is working.
- 5.1.6. Where necessary guard rail systems on the delivery vehicle, or provided by the customer, must be used for work at height. It is the responsibility of the customer to ensure that the equipment is used (see section 3.1.).
- 5.1.7. The delivery vehicle must be immobilised by engaging the braking system and, if necessary, wheel chocks should be used.
- 5.1.8. Avoid breathing the vapours, which escape when the manhole or valves are opened or closed.

5.2. During delivery

- 5.2.1. Only operatives involved in the delivery process and wearing the correct Personal Protective Equipment (PPE, see Appendix 2, also see 2.1) are allowed within 6 metres of the discharge point.
- 5.2.2. The customer must monitor the driver during the discharge process by at least one of the following methods:
 - a) Visually monitoring, e.g. line of sight or CCTV; or
 - b) Regular checks made during the delivery process as per site specific risk assessment for bitumen delivery; or
 - c) Attend the discharge process with the driver.
- 5.2.3. Personnel must not be permitted on top of the storage tanks, or on top of the delivery vehicle during the delivery.
- 5.2.4. Where storage tanks are situated inside buildings, activities inside the building must be kept to a minimum and notice must be given that a delivery is taking place (e.g. mobile sign). It is recommended that the building has a suitable extraction or ventilation system. Entry to the building must be restricted to authorised personnel only.
- 5.2.5. The driver is solely responsible for the operation of the delivery vehicle and equipment throughout the discharge procedure and must remain by the delivery vehicle shut off valves while the discharge is taking place.
- 5.2.6. The driver must wear the required PPE at all times correctly during the discharge process as stated in Appendix 2.

- 5.2.7. If the high level alarm is activated, discharge of product must stop and must not resume until the cause of the alarm activation has been identified and resolved (see 4.4.6 and Appendix 4.2 for Authority to Discharge).
- 5.2.8. Appropriate control measures should be applied at delivery sites to reduce the possibility of exposure to bitumen emissions, including Hydrogen Sulphide, potentially present, this may include delineation of zones, information panels, detectors set to signal if concentrations approach the Occupational Exposure Limit (OEL), driver training, documentation, use of adequate local ventilation.
- 5.2.9. The driver must stop the discharge whenever there is concern about safety for any reason (e.g. people without PPE entering the 6 metre zone, vehicle movements in close vicinity, excessive dust, etc.).
- 5.2.10. At the end of the delivery the driver should minimise the amount of air that is blown into the storage tank to avoid the formation of a flammable atmosphere in the storage tank headspace.

5.3. Split loads

- 5.3.1. Split loads are not recommended and should be avoided whenever possible.
- 5.3.2. If the load is to be delivered into more than one storage tank, each storage tank must be treated as a separate delivery point.
- 5.3.3. If the delivery vehicle needs to be moved, the delivery procedure must be repeated in full. This will require the removal of the delivery hose from both the delivery vehicle outlet and customer flange.
- 5.3.4. Delivery documents must be endorsed by the customer accordingly to identify the additional storage tank(s) and, in particular, that ullage and grade checks have been completed prior to delivery.

5.4. Post-delivery

- 5.4.1. The driver must clear all discharge delivery pipework and disconnect the delivery hose.
- 5.4.2. All hose drainings must be disposed of in a safe and suitable receptacle provided by the customer for this purpose, e.g. a sand bed.
- 5.4.3. On completion of the delivery, it is the customer's responsibility to complete and sign the delivery documents to acknowledge receipt of the load. The customer should also confirm that the pipework connection security system is re-instated and the delivery area is clean and tidy.
- 5.4.4. Drivers must report any defects that they identify at customer sites to the customer and to the bitumen supplier, so that corrective action can be taken.
- 5.4.5. Any non-compliance to site specific rules or the driver's delivery procedures, the customer must promptly report to the bitumen supplier and/or haulier who will investigate and take corrective action. The customer must intervene immediately and appropriately.
- 5.4.6. After unloading bitumen, personnel should allow gases and vapours to dissipate before securing the delivery vehicle. Avoid breathing the vapours, which escape when the manhole or valves are opened or closed.

6. Bitumen Specific Training

6.1. Delivery drivers

- 6.1.1. Hauliers are responsible for ensuring that their drivers have received training and instruction on loading, transport and unloading the delivery vehicle.
- 6.1.2. All drivers employed in the transportation and delivery of bitumen products must have received training and been issued with an ADR Vocational Training Certificate (VTC) for the relevant class, in tanks. Drivers must have their ADR VTC with them at all times.
- 6.1.3. All drivers must additionally receive industry specific hazard awareness and safety training prior to working unassisted (see Appendix 4.2 for bitumen drivers passport). Training should include actions to be taken in the event of incidents. (Refer to Eurobitume bitumen burns and safe handling cards and section 1.4 of this document).
- 6.1.4. Site specific induction on operations and safety and emergency response must be provided and must be documented by customer personnel. (See sections 1.1.1 and 1.4.1.).
- 6.1.5. Training requirements should be reviewed regularly and refresher training provided as required.
- 6.1.6. Training records of all individuals must be kept on file.

6.2. Site operatives

- 6.2.1. Site management is responsible for ensuring that site operatives have received training and instruction on safe handling, storage and receipt of bitumen products.
- 6.2.2. Customer representatives and operatives must receive competence training on the safe handling, storage and receipt of bitumen products. Training should include actions to be taken in the event of incidents (see to Eurobitume Bitumen Burns and Safe Handling Cards, and section 1.4. of this document).
- 6.2.3. Most bitumen suppliers will, upon request, offer assistance and advise on safe handling of bitumen.
- 6.2.4. Training requirements should be reviewed regularly and refresher training provided as required.
- 6.2.5. Training records of all individuals must be kept on file.

7. Bitumen Safety Documentation

The following documents are available from the Eurobitume website:

- Eurobitume Bitumen Burns Card;
- Eurobitume Safe Handling of Bitumen Card;
- Eurobitume Safety Shower Guidance;
- Eurobitume H2S Card: Hydrogen Sulphide (H2S) in Bitumen Emissions;
- RBA Guidance Document for the Design and Use of Ground Based Pumps;
- Updated Eurobitume Technical Guidance on Maximum Safe Handling Temperatures for Bitumen;
- Eurobitume UK Toolbox Talks;
- Eurobitume Loading Compatibility Matrix.

In addition, the following document is available from the Energy Institute:

- Model Code of Safe Practice Part 11: Bitumen safety code, Energy Institute

8. Glossary

ADR:	European Agreement concerning the International Carriage of Dangerous Goods by Road
CCTV:	Closed Circuit Television
DGSA:	Dangerous Goods Safety Advisor
ESSV:	Emergency Secondary Safety Valve
HAZOP:	Hazard Operability study
HAZID:	Hazard Identification study
HLA:	High Level Alarm
HHLA:	High-High Level Alarm
OEL:	Occupational Exposure Limit
PFD:	Process Flow Diagram
P&ID:	Process and Instrumentation Diagram
FSA:	Functional Safety Assessment
PPE:	Personal Protective Equipment
SWC:	Safe Working Capacity
VTC:	Vocational Training Certificate

Appendix 1: Reference Literature and Legislation

The following documents represent a non-exhaustive list of relevant legislation within the European Union. These documents will, in most cases, be incorporated into national legislation within EU member states. Please refer to the UK HSE website (www.hse.gov.uk) for the relevant UK legislation.

1. Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace
2. Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work
3. Council Directive 92/58/EEC of 24 June 1992 on the minimum requirements for the provision of safety and/or health signs at work
4. 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, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
5. Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) of Council Directive 89/391/EEC)
6. Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)
7. Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work (seventh individual directive within the meaning of Article 16(1) of Directive 89/391/EEC)
8. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
9. Fire safety legislation
10. Council Directive 89/656/EEC of 30 November 1989 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace (third individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC)
11. ADR http://www.unece.org/trans/danger/publi/adr/adr_e.html
12. Model Code of Safe Practice Part 11: Bitumen safety code, Energy Institute, ISBN 9780852934029.
13. Council Directive 1999/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)
14. Directive 2009/104/EC of the European Parliament and of the Council of 16 September 2009 concerning the minimum safety and health requirements for the use of work equipment by workers at work (second individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)
15. EN 13108: Bituminous mixtures - Material specifications - Part 21: Factory Production Control
16. Eurobitume UK/MPA Guidance for safe bitumen tank management
17. Updated Eurobitume Technical Guidance on Maximum Safe Handling Temperatures for Bitumen, Eurobitume, 2013

Appendix 2: Personal Protective Equipment

Minimum level of PPE for all personnel around the delivery. Higher level of PPE may be required locally. Consideration to the relevant EN specifications must be given when ordering PPE.

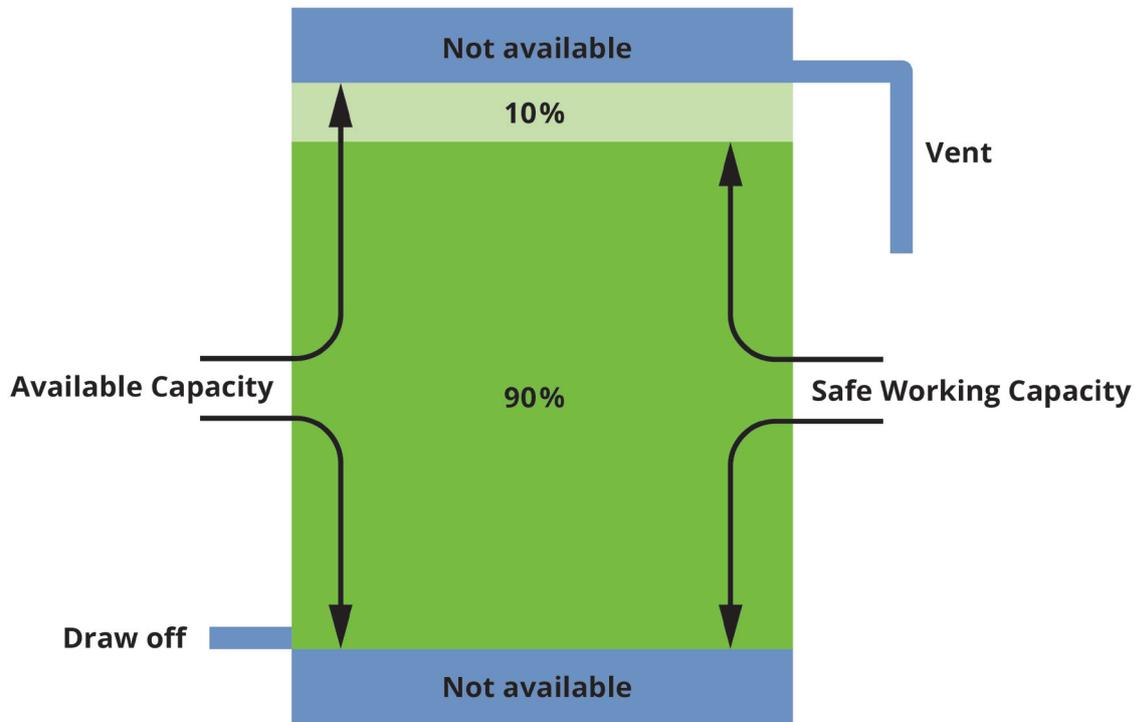
1. Safety helmet; preferably fitted with a chin strap
2. Full visor to protect the face
3. Safety glasses
4. Neck apron
5. Heat-resistant gloves with long sleeves
6. 100 % cotton and fire retardant (Proban® or similarly treated) coverall, preferably with high visibility markings
7. Coverall, legs to be worn over the boots
8. Safety boots that can be removed easily



Note: Site specific PPE requirements may apply outside the 6 metre zone.

Appendix 3: Tank capacity

For detailed calculation of tank capacity please see reference 16.



Appendix 4: National requirements

Appendix 4.1 Tank gauging

To supplement the tank gauging system it is recommended to employ a physical inventory stock reconciliation system. The calculated bitumen consumption can then be cross checked with the bitumen consumption determined from the contents gauge.

Appendix 4.2 - Delivery procedures

Bitumen Discharge Permit

A Bitumen Discharge Permit (BDP) must be completed before commencing the bitumen discharge. The BDP should be initiated by the customer, completed and signed by both the customer and the delivery driver. (See 5.1.1 and 5.1.2).

Authority To (Continue) Discharge (ATD)

If the load is to be delivered into more than one tank, each tank must be treated as a separate delivery point, and an ATD must be completed. A new BDP must be completed for each delivery. (See 5.3.2 and 5.3.4).

Eurobitume UK bitumen driver's passport

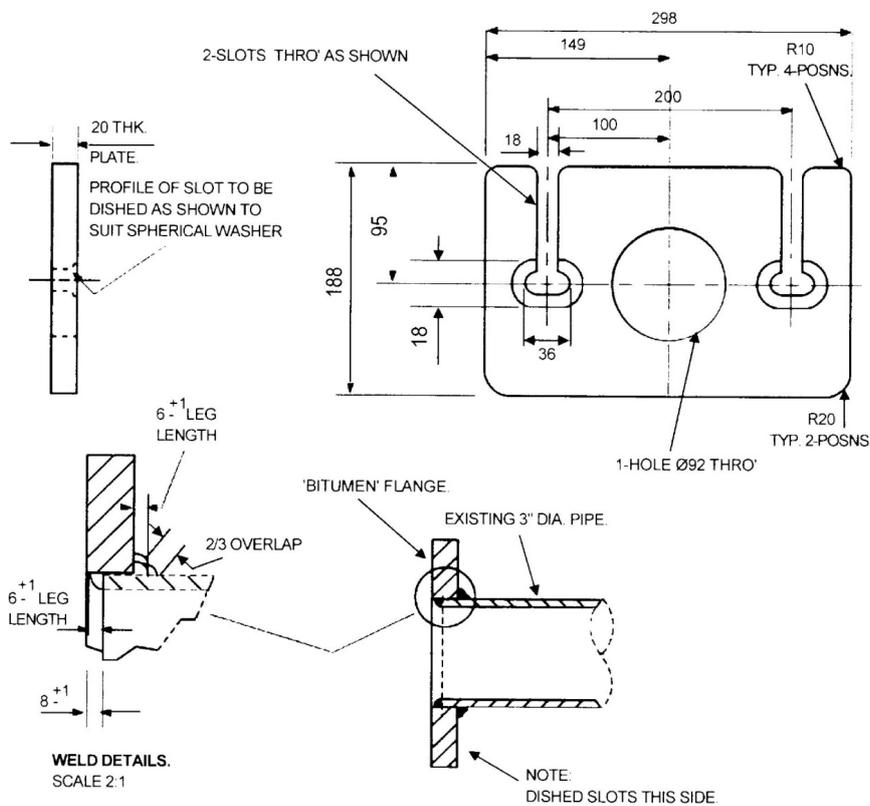
All drivers must satisfactorily complete the current Eurobitume UK bitumen driver's passport training. This training is refreshed at least every 3 years. (See 6.1.3).

Appendix 4.3 – Delivery flange design

2005 Design Flange

NOTE REMOVE ALL SHARP CORNERS AND BURRS

MATERIAL: MILD STEEL



ASSEMBLY DETAILS.



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