INEOS Olefins & Polymers Europe

GUIDELINES FOR SAFE UNLOADING OF POLYOLEFINS IN BULK

V5

January 2021

CONTENTS

1: INEOS O&P – CUSTOMER COMMITMENT

In support of the increasing demand for Polyolefins, INEOS Olefins & Polymers (O&P) has developed a network of modern production facilities spread across Europe. The locations are determined largely by the proximity to feedstock supply and, to aid efficiency and product quality, they tend to specialise in specific polymer types.

The Polyolefins referred to in this booklet are Polyethylene (Linear Low Density, Low Density and High Density) and Polyproylene.

For the customer, INEOS O&P recognises the need for materials of all grades to be available to meet both regular delivery lead times and support the development of planned inventory management systems.

In order to achieve the highest level of availability and service, INEOS O&P use the most modern distribution techniques. These include the use of specialised vehicles and containers for road, road-rail or road-ship deliveries. Supply reliability is also optimised by using strategically located Polyolefins material stocks across Europe. Furthermore, the continuous development of effective bulk handling and customer supply for Polyolefins remains an important part of INEOS O&P' distribution service.

Quality and Safety are one of the keywords of INEOS O&P strategy. All the Company's European Polyolefins production centres are registered to ISO 9001 standards. This demonstrates the commitment by the Company to the product manufacturing and distribution network, performing to specification – first time and every time. But to you, the customer, this simply means material delivered on-specification and on-time.

Bulk handling has long been recognised in other volume industries as the most effective method of distribution. In developing its bulk handling systems, INEOS O&P is committed to improving its service and supporting its customers. Improvements include more efficient distribution and easier product handling, both at source and during the customer's processing. This booklet, which outlines some of the principal requirements for the bulk handling of INEOS O&P, is published as part of the Company's service to its customers. The recommendations are designed to help minimise disruption to the converters' plant operations and maximise the overall efficiency of the service. It outlines some of the industry standards of practice, the more specific requirements of the Company's bulk Polyolefins delivery services and other relevant information. Whilst the information is of a general nature, further details and technical support are available from INEOS O&P.

These guidelines are available on the Ineos O&P public website:
http://www.logisticsmatters.info/default.aspx

In this document, reference is made to other related guidelines developed by the European Chemical Industry Council (CEFIC) and the European Chemical Transport Association (ECTA):

Best Practice Guidelines for safe (un)loading of road freight vehicles covering technical, behavioural and organisational aspects:
http://www.ecta.com/media/2670/Best%20Practice%20Guidelines%20for%20Safe%20Loading%20and%20Unloading%20of%20Road%20Freight%20Vehicles%20December%202013.pdf

Best Practice Guidelines for cleanliness of rotary valves and unloading equipment for bulk deliveries:
http://www.ecta.com/media/2659/Best%20Practice%20Guidelines%20Rotary%20Valve%20%20Associated%20equipment%20%20Issue%201%20November%202013%20(2).pdf

Best Practice Guidelines for the safe Working At Height in the logistics supply chain and allied sectors:
http://www.ecta.com/media/1524/working_at_height_nov_2012_rev_1.pdf

Best Practice Guidelines for Safe tipping of Silo trucks/ Trailers, Silo Containers and bag-in-box containers:
http://www.ecta.com/media/3079/ecta_guidelines_on_silo_tipping_equipment_issue__november_2014.pdf

2: INEOS O&P – SAFETY POLICY

It is Ineos O&P policy that safety of operations must be paramount.

These guidelines are issued in order to fulfil this aim.

Ineos Group maintain a very high safety standard and have developed 10 Behaviour Safety principles and 7 Life Saving Rules which must be adhered to by all Ineos Employees and contractors (including drivers)

BS principles:

1. We believe all incidents and injuries can be prevented
2. Everyone's first responsibility is to ensure they work safely
3. Everyone has the duty to stop work if they feel the situation is unsafe
4. The expectations and standards are the same for everyone on the site
5. Rules and procedures must be observed and respected
6. We should look out for each others safety and unsafe situations
7. All injuries and incidents /near misses must be reported and investigated
8. Risk assessment must be carried out prior to, during and on completion of work
9. All team leaders have a special responsibility for promoting and upholding these principles
10. We must always work within the limit of our competency and training

Life Saving Rules:

1: No consumption or being under the influence of alcohol or drugs on company property.
2: No smoking outside dedicated smoking areas.
3: No work on live equipment/machines to commence without authorisation.
4: Safety critical devices/interlocks must not be disabled or overridden without authorisation
5: Persons working at height must use proper fall protection
6: No entry to confined space without authorisation and gas test
7: Lifting & hoisting – no unauthorised person to enter the defined danger zone where objects can fall.

3:TYPE OF DELIVERIES

Polyolefins products can be delivered in either road/rail silo tankers or in Bag-In-Box containers. The standard load size for bulk delivery varies between a maximum of 28 tonnes for granulates and 20 tonnes for powder (in Scandinavia, load sizes of 34 tonnes are allowed), depending on the equipment used and transit regulations. INEOS Polyolefins equipment specifications ensure that both types of delivery system provide the maximum protection for the product during transit.

We recommend that customers should carefully consider their optimum storage capacity, taking account of current and future usage and delivery requirements. Adequate volume should be available to take a full delivery before the existing stock has been exhausted and hold sufficient material to meet contingencies.

- ## Silo Tankers

  Discharge of silo tankers is by gravity using the tanker's hydraulic lifting equipment to tilt the load towards the outlet. The tank is pneumatically pressurised to discharge and convey the pellets or powder into the receiving hopper or silo. Compressed air is provided by the vehicle's on-board compressor.

- ## Bag-In-Box Containers

  Container deliveries are made in 30 ft Bag-In-Box bulk containers. These are containers fitted with a Polyethylene inner liner.

  Containers may be transported by road, rail or ship but are presented for discharge on purpose-built tipping trailers fitted with a rotary valve and air compressor. Compressed air for discharge is provided by the vehicle's on-board compressor .

For more detailed information see section 7: vehicles used

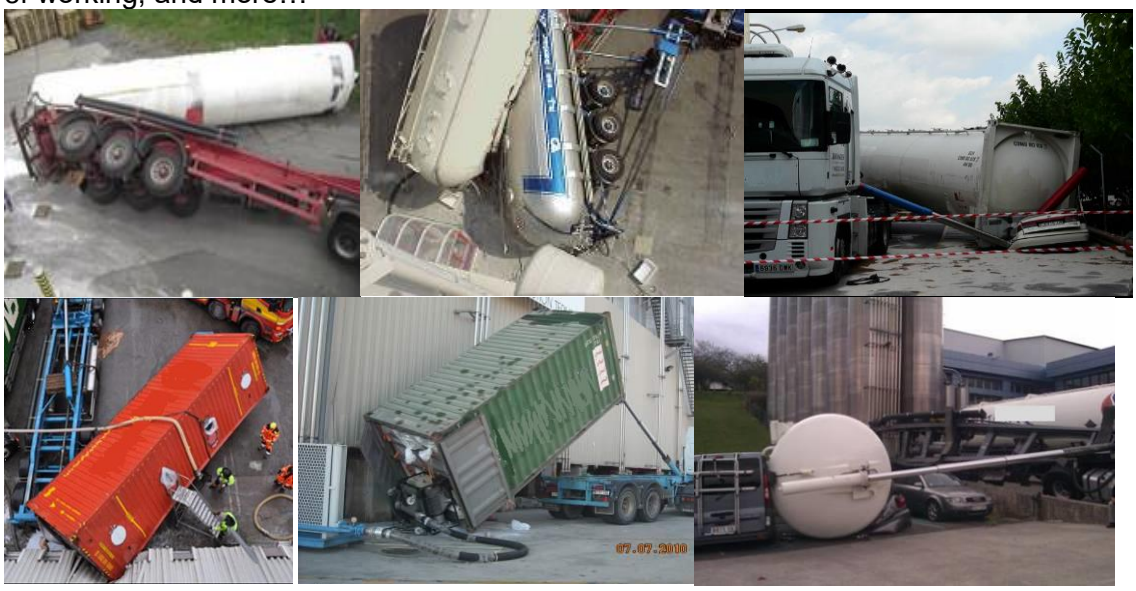
4: RISK ASSESSMENT

4.1 General

The unloading of Silo trucks/ silo containers and Bag-In-Box containers is undertaken by tipping and this places multiple requirements on the construction of the equipment, on their proper maintenance, on the unloading area conditions and unloading procedures.
Although serious accidents during unloading may be rare, silo trucks/ containers and Bag-In-Box containers may fall over while raised/tipped for unloading.

These accidents constitute a serious safety threat to the personnel, driver and/or site operators surrounding the equipment and always cause additional important material costs.

There are several causes for a fall over e.g. high wind speed, mechanical failure rear stabilizing legs, unlocked twist locks, insufficient rigidity or level plane of the unloading area, incorrect way of working, and more…



The unloading site must therefore perform a **Risk Assessment** to assess the potential impact on people and equipment like product lines, silo discharge lines, steam lines, pumps and compressors, buildings, car park, (pedestrian) roads and/or the site border fence, in the event of a silo truck/ silo container or Bag-In-Box container falls over or slides off the chassis during the unloading in raised position.
The risk assessment should highlight actions that must be taken to mitigate the risk to an acceptable level.
The risks assessment must take into account at least the following:

1. The “impacted area” the so called “danger zone”. This is the zone in which the silo truck or container can fall down when it tips over.

2. The unloading area (condition of the road surface, other activities in the area, no overhead obstructions etc..)

3. Training of operators and degree of supervision (checks)

The transport companies are also required to do a risk assessment of their activities which must include:

1. Training of drivers

2. Equipment and maintenance of the trucks

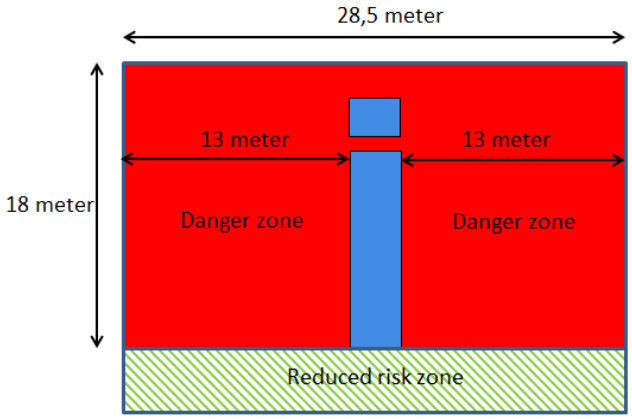
3. The product to be unloaded. (Some products require maximum tipping at the start of the unloading process. For other products, tipping at the start is not necessary and therefore not allowed. The risk for a trailer to fall over increases with the increase in tipping height of the silo tank/ container and the weight of the product inside. Unnecessary raising must be prevented at all times).

4.2 Danger zones and reduced risk zones

The "Impacted" area in the event of a silo trailer/ container falling over is shown as the **'Danger Zone'** and is highlighted in **RED** (see schematic below).
The zone which provides the least risk to the driver during the unloading process is highlighted in **GREEN** and is called the **'Reduced risk zone'.** This is the area for the driver to operate and observe the unloading process. In this area the driver has the opportunity to step aside into a safe position in case the trailer falls over.

The danger zones are theoretically defined, based on the maximum tipping height of the different trailers (trailer with silo tank, pressurized and non-pressurised containers and 20, 30 and 40 ft. containers).

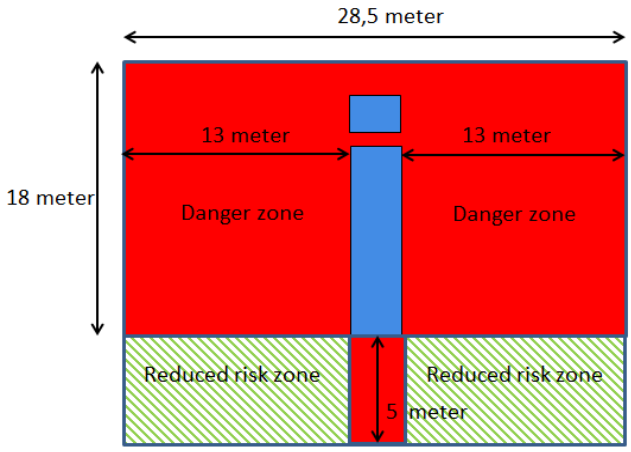
4.2.1 Silo truck



Silo truck trailer danger zones and reduced risk zone

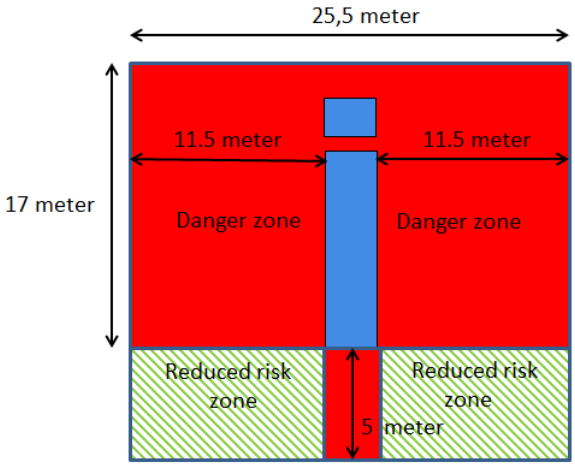
4.2.2 Container on trailer

With respect to **a container on a trailer**, the area behind the trailer can also be impacted if the container slides from the trailer during tipping (see schematic below with danger zone behind the trailer).

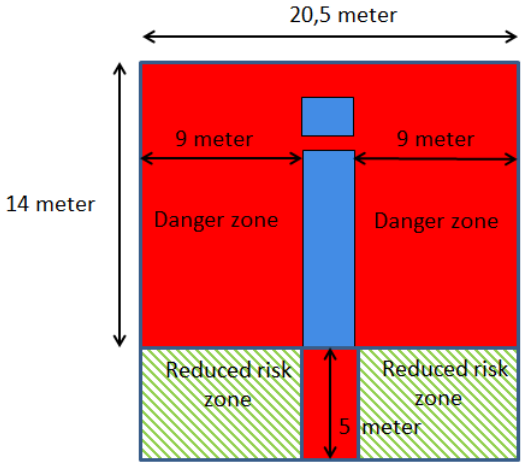


40 ft. Container on trailer with danger zone behind the trailer

In case of a 30 and 20 ft. container the danger zones are smaller (see schematics below)



30 ft. Container on trailer with danger zones



20 ft. Container on trailer with danger zones

4.2.3 Reduction of the danger zones by installing a mechanical protection

To protect silo's, buildings, facilities, traffic, site road/public road or other unloading trailers, a construction, strong enough to hold a falling trailer, can be considered as shown in photos below.

Mechanical structure to protect people/ equipment/ vehicles in the event of a silo truck falling over

5: THE UNLOADING AREA

5.1 The unloading area must be located within the site premises and NOT on the public road (See picture below) unless there is a permit from the local authorities and the unloading is done under controlled conditions (e.g. marking, fencing off the unloading area, etc..)

Not OK

Parked on a public highway with the discharge hose trailing across the pedestrian walkway

5.2 The access road to the unloading area is easily accessible (e.g. sufficient width, spacious curves, no obstacles (height) and rigid surface with sufficient load bearing capacities – see 5.4 below), in order to have sufficient space to manoeuvre to and from the unloading point.

Not OK

5.3 In the event that reverse driving is necessary, a competent ‘guide’ is recommended to support the driver and to avoid damaging (e.g. construction, building, facility or trailer). At the unloading place, a “reverse stop” either through signage or a physical barrier on the ground is recommended.

5.4 The surface of the unloading area must be firm and even

When tipping the trailer, please take into account that forces **up to 25 ton** can be exerted on each stabilizing leg.

The surface should be capable to accommodate this without deformation and should preferably be constructed of concrete.

Take care in case of asphalt, because hot weather can make it too soft. Also the potential for sewer systems or underground pipes, close to the rear legs position must be taken into account.

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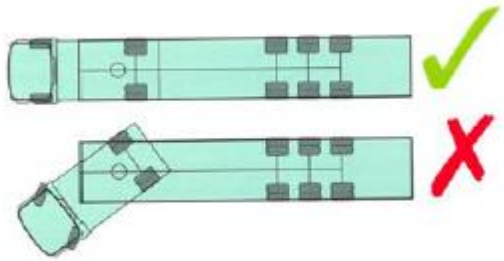
The design/ strength of the concrete floor (the rear legs support area) should be based on calculation.

OK

Not OK

5.5 The lay out of the unloading area must be such that the traction unit and trailer can be positioned in a straight line.



5.6 A slight slope of the unloading place is acceptable in longitudinal line, e.g. in the same plane as the tipping of the container/ silo.

Lateral angles of slope e.g. left to right across the chassis are not acceptable.

The angle of the slope will affect the maximum tipping height.

These cases must be considered in the risk assessment.

OK

Unloading on a slope in longitudinal line

Not OK

Unloading on a lateral incline

5.7 The surface of the unloading area should be made of suitable material minimizing dust and other material (e.g. gravel) in order to avoid contamination of the product. The working area should be adequate anti-slip, properly drained, frequently cleaned, be kept snow and ice free and free from tripping hazards.

5.8 There should be NO overhead obstruction in case the trailer is tipped to the maximum height (e.g. overhead lines, gantries or electric power cables).

Not OK

5.9 The unloading area must have lighting that is suitable for unloading activities during hours of darkness and that must cover the complete area and trailer.

5.10 The unloading area must have a fit for purpose, and properly marked earthing connection, and preferably, with a positive earth prove indicator (see picture)

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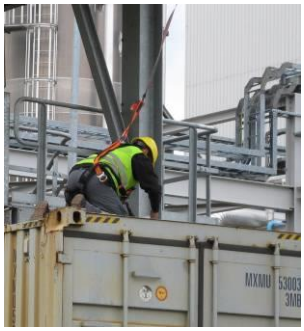
5.11 A spill kit must be available in case of leakage of hydraulic oil, diesel or cooling water at the unloading location or site.

5.12 The average unloading time is between 1 and 2 hours. During the unloading the driver must stay in the vicinity of the trailer in the reduced risk zone (see diagrams) to observe the unloading process. To protect the driver against heavy rain, snow, ice, cold, heat and/or sun a shelter should be provided. The shelter must be located outside the danger zone behind the trailer or a short distance and with a free view to the rear of the trailer. Also a restroom within walking distance should be made available.

5.13 The unloading site must be equipped with a wind speed meter (anemometer) and alarm system/ procedure in order to stop and/or adjust the unloading activity in case of strong wind. Average wind speed above 4 beaufort scale (6,5 m/sec) will increase the risk of tipping over. The risk assessment needs to consider wind speeds, wind directions and physical layout of the unloading place.

5.14 In case the unloading site requires a sample from the top of the silo tank or container, provisions to work safely at height must be implemented (e.g. stairs, fall arrest system in combination with safety harness). **The Chemical Industry no longer accepts the handrail on top of a silo truck or container as a suitable and safe means for working at height. Top sampling is therefore only allowed if a life line system or safe working platform is made available to the driver.**



6: STORAGE FACILITIES

6.1 Discharge pipe work

6.1.1 Construction

The most common pipe material is aluminium. Stainless steel is however harder and will last 7-8 times longer.

The physical length of the discharge pipe work determines the total discharge time. Therefore vehicles should be able to get close to the silo fill point. It is recommended to use a maximum of two hose lengths (each 4-5 meters). Each additional hose will increase discharge time by 10 - 15 minutes.

All piping should have a diameter of at least 100 mm, preferably 120 mm. In case of long pipe work, it is recommended to increase the diameter of the last 20-30 metres up to 150 mm. This will reduce the discharge time and the formation of streamers.

All pipes must be strictly horizontal or vertical, but not inclined, except for the inlet line (see next page).

The radius of the bends in the pipes should have a diameter of at least 5 to 6 times the diameter of the pipes.

The number of bends must be kept to a minimum.

The delivery inlet on the customer's silo should be fitted with an industry standard, 110mm Storz (A) fitting. Other connections can be accommodated by prior arrangements.

The inlet connection should be capped and fitted with a lock to prevent unauthorized access and operators/ drivers connecting the hose onto the wrong silo.

The inlet connection should be marked with the name of the product and the silo number.

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The end of the silo inlet pipe should be between 0.8 and 1,5 metre above ground level to ease manual handling during hose connection.

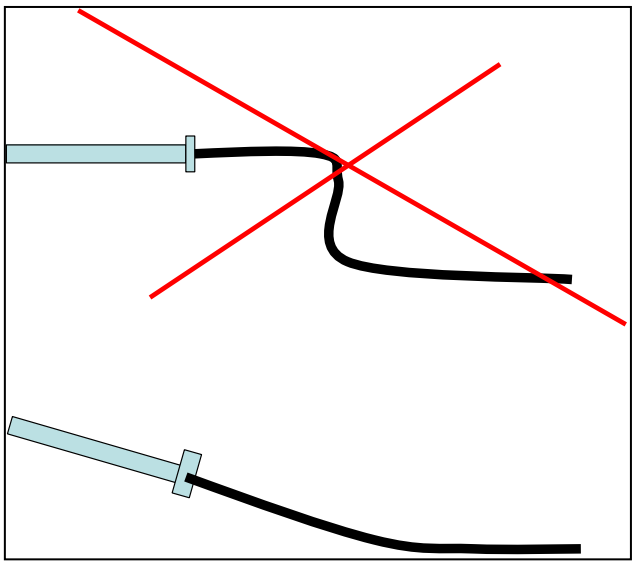
The orientation of the inlet connection must be downwards or in a downward angle. The inlet connection may not have a horizontal orientation.

OK

OK

OK

NOK



Access to the connection point should be free of obstructions. The inlet point should NOT be located in the silo farm. It should be protected from collisions.

Earthing facilities should be provided at the unloading point, using a flexible cable with a suitable attachment for connection to the delivery vehicle.

If there are any uncertainties over the siting of a delivery point, a trial run with an empty vehicle can be arranged.

Recommended types of gaskets: white EPDM rubber or Low density Polyethylene

6.1.2 Material flow and Floss development

Discharge times range typically from 1 to 2 hours, dependent on pressure and pipe work configuration.

Whenever Polyolefin pellets and similar resinous type materials are conveyed pneumatically, the heat generated by friction can damage the product and develop floss, a generic name for 'stings', 'streamers', 'dust', 'angel hair' etc. If the conditions continue to develop because of too high a throughput velocity for the product's characteristics, or poor pipe work design, the floss will seriously impede the material flow, possibly blocking the line completely. Similarly, if the adverse conditions persist over a period of time, the transfer lines can become coated internally with a Polyolefins skin which can detach itself from the pipe bore and contaminate incoming material.

The Polyolefins are manufactured to the highest specification, with extensive developments in pelletisation and handling at the plant to minimise the creation of floss during processing. Similarly, the Company's drivers are trained to minimise discharge velocities during customer deliveries to avoid this situation.

Also it is recommended to keep the air pressure below 1.2 bar and the air temperature below 70°C (for some product grades a maximum of 50°C may be required).

It should be emphasized that it's the responsibility of the receiver and in their own interest to construct the piping in such a way that the unloading can be made without too much back pressure. If the piping is too long or too narrow, streamers and dust can be formed (see below).

6.1.3 Internal Surface Finish of pipe work

Types

Smooth Bore Pipes – tend to generate floss as a result of granules smearing on the pipe wall. The recommended practice, to avoid the problems of floss, it to regularly inspect lines for a build-up of material on the walls and remove and shot blast clean as appropriate. Pipe work design and delivery conditions can be tailored to minimise floss creation.
The internal roughness of the pipes should be 100 – 150 µ. This can be obtained by sand blasting but preferably by shot peening (using small metal balls to dimple the pipes).

Roughened Bore Pipes – prevent floss formation but tend to result in a low level of fines being generated. These can be continually removed by the fitting of disentraining cyclones to reception silos.

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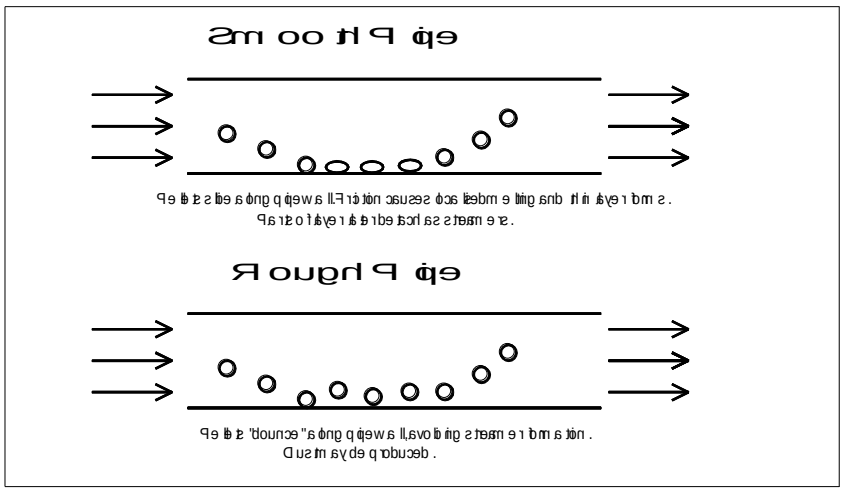
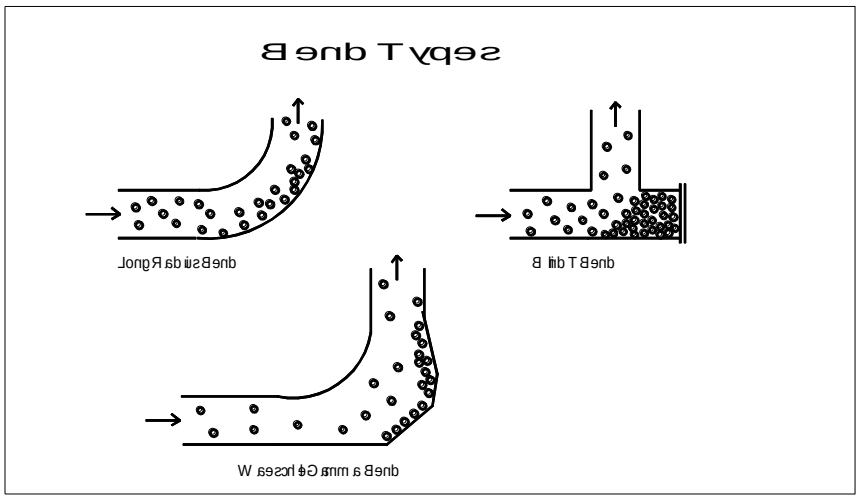


Geometry

Long pipe runs, particularly those of more than 100 metres, or tortuous routes with a high number of bends also increase the tendency to floss and should be avoided.

The type of bend used in a conveying line also has an effect on streamer generation. Long radius bends, although attractive in terms of pressure drop, are prone to streamer generation, as pellets “cling” to the pipe surface as they traverse the bend.
Blind T bends allow pellets to collect in a “dead leg” on start-up and subsequent pellets collide with a pellet layer, rather than the pipe wall. These bends are effective in reducing streamer formation, but they exhibit a very high pressure drop, which will limit the throughput on a conveying system, unless allowed for at the design stage.
Various other bend designs have been produced, including the Waeschle “Gamma” bend, which seeks to deliver the same advantages as the Blind T, but with a much lower pressure drop



6.1.4 Maintenance

Whilst measures are taken, such as those described, floss can still accumulate over time and it is advisable to inspect the facilities regularly. The timing of such inspections is dependent on system design and tonnage throughput.

Floss accumulation in silos can be dealt with by water jetting, having previously isolated the silo from the previously isolated the silo from the production stream and connected the silo's discharge to drain.

Equally, pipe work will require periodic inspection and cleaning by shot blasting.

6.2 Silo design and construction

Silo design is a specialised area of engineering but can be generally described as consisting of an upper cylindrical section mounted on a conical base; at the lower end of the conical section is the discharge outlet. Similarly, silos with square or rectangular cross-section can also be used.

Silos normally discharge by gravity with flow characteristics being determined by the cone angle and outlet diameter.

Silo's should be large enough to accommodate at least one full truck load and have a capacity of minimum 70 m^3.

6.2.1 Silo construction Materials

Silos can be fabricated from a variety of commercially available materials;

Aluminium alloy – is the most commonly used material for the construction of small to medium sized silos. Under normal, circumstances this material offers minimal risk of product contamination through corrosion and can be readily earthed.

Stainless steel – is an excellent construction material for a silo but is significantly more expensive than its aluminium alloy equivalent.

Glass Reinforced Plastic (GRP). Offering a high quality, non-corrosive finish, is a suitable material for the construction of a silo, with little risk from product contamination. GRP's translucency also offers a readily visible indication of the silo contents, without the need for an additional contents gauge. However, GRP silos are not easily modified to accommodate additional capacity and can be difficult to earth.

6.2.2 Silo Fittings

Fill Line
A 100mm aluminium alloy or stainless steel fill line should be provided, running from the tanker fill point into the top of the receiving silo, but kept as short and straight as possible. The inlet point should be fitted with the recommended Storz (A) connection and located at a convenient height.

Venting – Pellet Silos
Simple 'Swan Neck' vents, fitted with a wire mesh screen to prevent product being blown out during filling and contamination by incoming wildlife, can be used on pellet silos. The atmospheric vent should preferably be located at the top of the silo and have a minimum diameter twice the diameter of the inlet line, but recommended min. 200 - 250 mm, and without any obstruction in order to prevent over-pressurisation during filling.

Venting – Powder Silos
The vent on a powder silo should be fitted with a suitable filter to prevent the discharge of powder fines to atmosphere during filling. These filters are normally

insertable, reverse jet, automatic types which either project into the roof of the silo or are mounted on top of it.
The filter must have a capacity to evacuate the discharging air without increasing the air pressure in the silo (at least 15 000 litres/min)

Contents indicators
Three principal types of contents indicators are used:

- Load cells – most suitable and accurate type.
- Ultrasonic level indicators – commonly used, lower cost but not as accurate as the load cell.
- Automatic dipping indicators – mounted in the silo itself.

It is recommended that the display of these devices is located at the unloading place.

High Level Alarms
To guard against overfilling, level switches must be fitted to silos. These fall into the following general types:

- Electro-mechanical paddle level switches
- Capacitance switches
- Tuning fork switches
- Ultrasonic switches

These devices can be fitted either in the roof or the wall of the silo. When triggered, they must generate an audible and/or optical alarm at the unloading place. Clear instructions should be in place of actions to take in case the alarms goes off. Ideally, the alarm could automatically close an automatic inlet valve in the discharge line in order to stop the flow.
High level Alarms must be tested on a regular basis.

Explosion Relief:

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Explosion relief devices are not normally required for pellet silos. However, they are usually fitted on powder silos and can be of the following types:

- Trap door – the most common type which, as the name implies, comprises a lightweight trap door held in place either by springs, shear bolts or magnetic catches. This system requires protection against vacuum (when the door shuts after an explosion, gas inside the silo will cool down and contract).

- Diaphragm – These are often referred to as bursting disc type. They comprise a disc made of a lightweight material such as paper, cloth, plastic or metal foil which bursts in the event of an explosion.

- Pop out panel – A lightweight flexible panel held in a frame which 'pops out' in the event of sudden over-pressurisation.

In all cases, there must be a safe area or restricted access around the vent.

Earthing

When plastic resins are conveyed in transport systems, static electricity is generated. Being a good insulator, plastics will keep their charges for a long time. The whole silo can be charged and the voltage can be built up to such a level that a spark can arc from the metal in the silo to the ground, releasing the stored energy in one single spark. The energy of such a spark can exceed the minimum energy required to ignite plastic dust. It is therefore essential that all metal parts in the transport system, the truck, the lines, valves, silos, blowers etc are bonded and grounded.
The resistance to earth should be no greater than 10 Ω. This must be checked frequently.

GRP silos are more difficult to earth, but this can be achieved by the use of graphite joint rings on the cone flange or stainless steel strips attached to the inner wall of the silo, or preferably both.

One must take into account that, even when the silo is earthed, there is a possibility of a cone discharge. The degree of hazard from this depends on the diameter of the silo, the size of the particles and the Minimum Ignition Energy (MIE) of the dust

7: VEHICLES USED

7.1 Silo tankers

The silos of bulk trucks are made of aluminium. Because of their round shape, they can be pressurised up to max 2 barg.

The silos and the hoses are cleaned at an SQAS assessed cleaning station before each loading. The EFTCO European Cleaning Document (ECD) (see www.eftco.org) which identifies each of the EFTCO codes required according the "Polymer Industry cleaning specification" is available on request from the dispatch of the loading site.

The loading is done by 'top loading' via the top hatches.

The trailer is fitted with manually or hydraulically operated stabilizing legs. For unloading, the silo is tilted stepwise by an hydraulic ram whereby the product can flow into the unloading cone.

The silo is put under a pressure of about 1 barg by using the air compressor on board of the vehicle. It is recommended not to exceed 1.2 bar.
The air lines are fitted with a relief valve which has a setting of about 2 barg.

The vehicle has suitable, cleaned, hoses on board to make the connection between the silo truck outlet and the storage silo inlet.

The standard type of connection is Storz A.

7.2 Bag-In-Box containers

The most commonly used Bag-In-Box containers are 30 ft steel or aluminium ISO containers which can be used for multimodal (road/rail, road/sea) transport.

Bag-in-box containers are placed on a tilting chassis and secured by means of twist locks.

Bag-in-box containers are fitted with a polyethylene safety liner which allows automatic venting and sampling from ground level. The liner is removed and replaced by a new one after each delivery.

The loading is done by 'top loading' via the top hatches.

To unload, the doors of the containers remain closed, only the discharge hatch (letter box) is opened. The funnel discharge sleeve is connected to a rotary valve which is powered by pneumatic conveying air (blower).

The tilting chassis is normally fitted with manually or hydraulically operated stabilizing legs. For unloading, the container is tilted stepwise by an hydraulic ram whereby the product can flow into the tundish and the rotary valve.

All vehicles are equipped with suitable flexible hoses to connect between the rotary valve and the silo inlet connection. The standard type of connection is Storz A.

8: DISCHARGE OPERATIONS

8.1 Personal Protective Equipment (PPE)

Drivers working on behalf of INEOS O&P are required to wear at the discharge area, as a minimum the following Personal Protective Equipment (PPE): normal working clothes, safety helmet, gloves, safety shoes and safety glasses. It is strongly advised that the same PPE is worn by the unloading operators. At places where there is regular traffic of forklifts trucks etc.. a High Visibility jacket should be worn.
Depending on the noise level, ear protection should also be a requirement.

8.2 Driver instructions

It is recommended that the whole operation is supervised by an operator.

In the absence of an operator, the driver must receive clear instructions in writing, comprising:

-the exact discharge location
-the silo number
-the site safety requirements
-the unloading procedure
-instructions what to do in case of a problem or incident

If the operator is not participating in the unloading operation, it is advisable that the operator carries out checks every 30 minutes to ensure that the driver is OK.

Example of checklist that can be used: see under 8.5

It is the customer's responsibility to ensure that the product is unloaded into the right silo. Ideally, the responsibilities and roles as defined in the ECTA/ CEFIC "Best Practice Guidelines for the safe (un)loading of road freight vehicles" should be followed. See :

Best Practice Guidelines for safe (un)loading of road freight vehicles covering technical, behavioural and organisational aspects.

Drivers may not have full understanding of the local languages. In this respect all instructions and signage should be either multilingual or pictorial in nature.

Example:

8.3 Sampling and working at height

Bag-in-box containers are fitted with safety liners which allow automatic venting and sampling from bottom level.
S*ilo tankers* do not require going on top for discharge either.
In both cases, when the driver is taking the sample, the assistance of an operator is recommended

If customers require a sample before discharge, it must be taken from bottom level except when proper fall arrest systems are available (e.g. life line system or platform with safety cage). The handrail on top if silo trucks or Bag-in-Box containers is not considered to be a suitable fall arrest system.

When taking top samples one must take into account the risk of electrostatic discharges:

- Plastic granules/powders accumulate static charges during transfer operations. The total energy stored can go up to 10kV. Plastics can keep this charge for a long time.
- Earthing of the truck during loading will not prevent this charge accumulation as:
  1: The loading time is much shorter than the time needed for the charge to dissipate completely.
  2: The plastic liner in the Bag In Box containers prevents the charge to dissipate to the metal container wall
- When a sample is taken, from the top, the charge may be released via the human body by means of a spark
- The electrostatic discharge has not enough energy to kill a person but it is painful and sudden movements of the person as a result of the shock could lead to injuries.
- When a sample is taken with a metal scoop, the metal should always touch the hatch so hat the charges can flow away via the silo (make sure the truck is earthed first).
- An alternative is the use of a non conductive sampling device (e.g. a plastic beaker on a wooden rod) : see picture

INEOS O&P require drivers to report any occasion, whereby they have been asked to access the top of their vehicle without a proper fall arrest system, as a safety infringement.

8.4 Making the connections

The customer is responsible for ensuring that the delivery hose is connected onto the correct silo inlet point .
Ideally, the silo number must be given to the driver in writing and the inlet point should be capped and locked. In the absence of an operator, the driver should be given the key that will only unlock the specific silo.
If this is not done, the operator must at least indicate the inlet connection to the driver and supervise that the connection to the silo is done correctly.

In order to prevent hand injuries, purging of the rotary valve before discharge may only be done with the safety grid in place.

For silo trucks: When the unloading elbow is connected to the left direction (see picture) , the momentum applied on the hose coupling during tipping may cause the hose to disconnect. If possible, try to place the truck in such a way that the unloading can be done from the right side. If not possible, always put a safety clamp on the hose connection
If no pins or clamps are used, regular checks of the tightness of the connections must be done by the driver.
During unloading, drivers must always remain close to the back of the truck to take immediate action in case the hose becomes disconnected.
Guillemin couplings are preferred to Storz couplings as the Guillemins are not prone to unintended disconnection.

The silo tanker or container must be earthed before discharge. Before commencing any discharge activity, an earthing cable must be fitted onto the vehicle. If no earthing cable is available an earthing plate must be fitted to allow the driver to connect his earthing cable. The earthing cable or earthing plate should be marked with an ‘earthing’ pictogram.

To ensure a good earthing in established, an ‘earth proving device’ can be installed.

8.5 Discharging

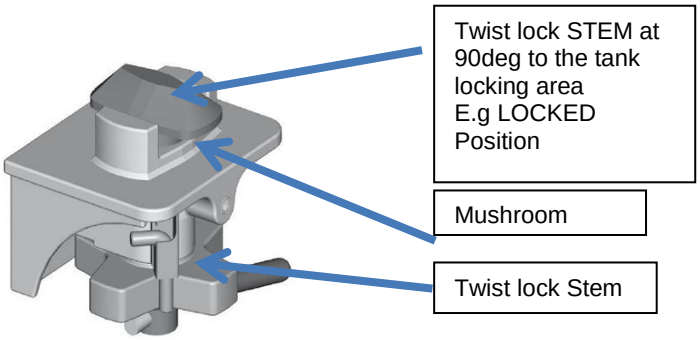
Before discharge, the operator should check whether there is enough capacity in the silo to accommodate the full load.

The vehicle must be immobilised by using wheel chocks.

For silo containers or bag-in-box containers, fitted on a tipping chassis, the driver will check whether all twist locks are engaged and in the locked position. It is strongly recommended that also the **unloading operator performs a check** of the twist locks as most incidents with containers that tip over or slide off the chassis are caused by no or improper securing of the twist locks.(see checklist below)

The mushroom head of the bolt should be completely embedded (at 90deg – see below)in the twist lock when the twist lock is closed properly. This means that the bolt is properly inserted, also check and ensure that the Twist Locks are engaged and secured, with locking pin in place

GUIDELINES FOR SAFE UNLOADING OF POLYOLEFINS IN BULK



Before unloading the driver must screw down the hand nut of all twist locks tightly (no spanner needed).

For Ineos O&P, the twist locks must be fitted with yellow twist lock indicators which clearly indicate whether or not the twist lock is engaged

Indicator at the front Indicator at the back
In both cases is the twist lock not engaged

The rear stabilizing legs, if fitted, must be lowered.

During the tipping of the tank, the driver needs to push down a button.
Near misses have been reported in the past whereby the control button to raise the silo had been blocked.
The buttons on the remote control box need to be pushed down while raising or lowering the tank. This is a safety design to ensure that the driver remains in control during the tank motion at all times. A driver who is dealing with any other part of the unloading process during tipping stops focusing on the most hazardous part of the operation and therefore he puts himself and others at risk. Also, the tank may not be raised in one go but in several stages during the tipping operation to ensure that the centre of gravity remains as low as possible.

GUIDELINES FOR SAFE UNLOADING OF POLYOLEFINS IN BULK

During the discharge, hazards may arise from the use of air and fluids under pressure. It is essential that the driver is with his vehicle at all times when discharging in case such spillage occurs or in case of a silo overfilling.

It is to be recommended to keep suitable spillage limitation equipment available on site in case an hydraulic oil spillage occurs.

Due to the hazards associated with tipping equipment, all people should keep away from the vehicle except the driver when carrying out raising and lowering operations. Containers can slide from the chassis when the twist locks are not properly engaged, therefore do not stand immediately behind the vehicle when the container is being elevated.

Elevated silo's / box containers can also topple over because of:

- Wear and deterioration of the landing gear
- Sticking and suddenly shifting ('avalanche") of the cargo (powders)
- Displacement of the truck during unloading
- Side wind
- Unsuitable surface/ uneven ground
- Collision with another vehicle
- Etc…

See also in 4.2: danger zones and reduced risk zones.

For Polypropylene and Polyethylene, which are free flowing products, no tipping is needed at the start of the unloading process.
During unloading, step-by-step tipping is allowed as required to assist with unloading the product. **In order to keep the centre of gravity as low as possible, the silo/ container may not be tipped to the maximum at the beginning of the unloading**.

At no time should the vehicle be moved with the tank or box in a raised position.

The usage of blocks under the landing legs may be a potential threat to the stability of the equipment. If blocks are used, these should be strong and of monovolume type. Wooden planks are not acceptable.

The average unloading pressure is
For bag in box containers: 0,5 to 0,7 bar
For silo tankers: 0,9 to 1 bar.

If there is a pressure limitation for the discharge pipe work or silo, the driver must be informed before starting the discharge.

GUIDELINES FOR SAFE UNLOADING OF POLYOLEFINS IN BULK

The maximum unloading temperature is 70°C.

The unloading (tipping) must be stopped in case of wind (gust) speeds above 8 Beaufort (+/- 62km/ hr – 17 m/ sec).
In area's where high wind speeds occur regularly, it is advisable to install a wind speed meter with an alarm, set at 8 Beaufort.
Mobile wind speed meters are also available on the market.

At the end of the unloading a peak airflow may occur when the silo tanker is allowed to depressurise in an uncontrolled manner. The higher the tanker pressure or the shorter the delivery line, the higher the airflow. Silo's which are not in direct contact with the open atmosphere may be overpressurised if the pressure relief valve is not designed for a peak flow rate. In these cases it is recommended to install an automatic shut off system comprising of a control unit in the silo and an actuated valve in the silo fill line. Also for freely vented silo's, the driver should receive clear instructions not depressurize into the silo if it is filled up to the maximum.

In case a customer uses **nitrogen** for unloading (e.g. for powders), it must be ensured that the silo truck is properly marked with a hazard sign indicating the presence of nitrogen in the silo truck.

For Bag in Box containers:
As safety liners are self venting, the vent pipe for venting the rotary valve, may not be put in a manhole in order to improve the venting of the liner.

Unloading of a balance in the truck in case the silo would be full, may not be done into big bags or octabins unless it is done via an approved filling installation. The driver may not be involved in this operation.

Checklist that can be used by the unloading operator:

Nr	**operator checklist**	**Yes, No, N/A**
1	It is checked that the receiving silo has sufficient capacity to accept the full consignment	
2	Tipping operations are clear of overhead obstructions	
3	All unnecessary personnel are excluded from the danger zone.	
4	There are no other operations (dangerous activities) going on in the danger zone	
5	The driver is wearing the right PPE (Personal Protective Equipment)	
6	The unloading area is clean (e.g. free from granules, ice and snow), free from obstacles	

7	The site requirements regarding weather conditions are met	
8	The truck is well positioned according to the site instructions	
9	The tractor unit and semi-trailer are in line	
10	In case of a container, the twist locks are in locked position and the hand nut is well secured and locked with a locking pin or alternative system	
11	The rear stabilizing legs touch the road surface	
12	The road surface is stable, even, firm and is not damaged	
13	The stabilizing legs are free from cracks, deformation and damage	
14	The trailer is equipped with a level indicator and levelled with the rear stabilizing legs.	
15	Hoses are fitted with a restraint system (safety clamps/ collars/ locking pins..) to prevent that they become inadvertently disconnected under pressure	
16	The silo truck/ container is earthed	
17	For free-flowing products (e.g. PE/PP/PVC granules): no elevation of the silo/ container is done to the full height at the beginning of the unloading. Only progressive raising at appropriate intervals.	
18	The driver is in the reduced risk zone and only enters the danger zone for the following activities. i. to manipulate the tipping switch ii. to re- adjust the pressure of the air compressor iii. to check the tipping equipment (e.g. hydraulic piston and pressure).	
19	All spilled product has been cleaned up according to site requirements	

8.6 Clearing and departure

At completion of the discharge, the hoses and earthing cable are disconnected.

Any spilt product must be cleaned up immediately.

The driver should be allowed to depressurize the silo tanker safely.

The customer representative enters date and time on the CMR and signs the document.

If necessary, the operator assists the driver in leaving the unloading area.

8.7 Reporting

Operators and drivers must be encouraged to report all problems, unsafe situations and incidents which have occurred during discharge.

9. GOOD MANUFACTURING PRACTICE

9.1 General

INEOS Olefins and Polymers produce various grades of polymer and these are targeted at many different markets ranging from construction, car fuel tanks, high integrity pipelines to medical blister packs. INEOS Olefins and Polymers is committed to ensuring that these products are manufactured and distributed in conformity with all applicable rules and regulations.

The INEOS expectations with respect to cleanliness requirements, including product black lists, are described in the Ineos O&P Code of Practice for Sensitive Applications which is available on www.logisticsmatters.info

9.2 Requirements of our contracted hauliers

The hauliers transporting our products must provide on request:

- The full details of the 3 last products carried, and the associated cleaning certificates.
- The demonstration that:
  - Food-contact requirements such as defined by the Regulation (EC) 1935/2004, art 3, are included in its Declaration of Quality Policy
  - Its personnel are aware of requirements for the transportation of materials that will be transformed into articles intended for food packaging
  - Any contamination by substances that could alter the food-contact status of transported products is excluded, in particular:
    - Other products previously transported by means of appropriate cleaning procedures and the observance of the black-list in attachment.
    - Non food-contact approved substances from the environment or contained in utilities (water, compressor oil, air,…) or tools (conveyor belts…) used during transfers by applying the following precautions:
      1) Air filtration : 5 µm
      2) systematic sealing of containers / silo's
      3) oil-free air blowers
      4) 0.9 - 1 bar unloading pressure max.
      5) systematic checking of presence and apparent good working status of the blower filter
      6) periodic cleaning & routine maintenance operations of the filter & compressor by hauliers

Also, bulk hauliers carrying Bag In Box containers are required to be in compliance with the Best Practice Guidelines for Cleanliness of Rotary Valve and Unloading equipment for Bulk deliveries

10. INEOS O&P CUSTOMER SUPPORT

For further information about INEOS O&P products
or technical advice about product handling, please contact your local Regional Sales Representative or the Ineos O&P Customer Service Center in Köln.

This document and other Logistics HSE information of INEOS O&P can be found on the following web site: http://www.logisticsmatters.info/

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