

Best Practice Guidelines for Cleanliness of Rotary Valve and Unloading equipment for Bulk deliveries.



Rotary Valve Cleaning with safety grid in place.



Rotary valve set up for "discharge Operations".



Compressor and Rotary valve - side operation



Showing Rotary valve position

DISCLAIMER

This document is intended for information only and sets out guidelines for the safe Unloading of Bulk chemical products via the Rotary Valve system and at the same time mitigating the chance of contamination. The information provided in these guidelines is provided in good faith and, while it is accurate as far as the authors are aware, no representations or warranties are made with regards to its completeness. It is not intended to be a comprehensive guide for the Unloading of Bulk chemical products via the Rotary Valve system. No responsibility will be assumed by ECTA or the co-authors in relation to the information contained in these Guidelines.

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1.0 INTRODUCTION

NB These guidelines should be read in conjunction with the ECTA/Cefic Guidelines :-

Reference is made to the following ECTA Guidelines which are available online at www.ecta.com

- BBS Safe Driving of Vehicles
- Best Practice Guidelines for Safe (un)loading of Road Freight vehicles, covering Technical, Behavioural and Organisational aspects.
- Best Practice Guidelines for the Safe Working at Height in the Chemical Logistics Supply Chain
- Best Practice Guidelines for the Safe Use of “Lined” ISO Box Containers for the movement of Dry Bulk Products
- Best Practice Guidelines for the Safe Tipping of Silo Tanks
- ECTA codes

Continuous efforts to improve safety and reduce the incidence of contaminations during the transport and discharging of Bulk products and the associated handling of chemicals, are part of the overall aim to improve the safety & performance of both the chemical industry and the transport industry.

Analysis of statistics indicates that contamination, although low in frequency, have the potential to be very high in costs; this excludes the cost of additional man hours required to restore the status quo. Further analysis shows human factors to be the most significant cause. It is therefore essential to increase the known requirements during unloading by influencing these human behaviours.

These guidelines aim at offering guidance regarding the overall safety of unloading operations both from an organisational, technical and behavioural point of view.

2.0 OBJECTIVE AND SCOPE

The objective of these guidelines is to provide assistance in the prevention or elimination of contamination of product conditions and situations during unloading operations, recognising the need for interaction between the different parties involved.

These guidelines define the responsibilities and roles of the different parties involved in unloading operations, in particular operators and drivers.

The scope of these guidelines includes the safe unloading of chemical and non-food products by operators and drivers at production sites, storage terminals, customers, receivers and covers the unloading of bulk chemicals.

In all circumstances, the applicable national or international regulations should always be complied with and take precedence over the recommendations made in these guidelines.

The guidelines are of a voluntary nature. Individual companies may decide to apply the guidelines either in full, or in part, according to their own judgement (risk based assessment) and in light of their specific circumstances.

- *The conditions required to allow safe unloading operations thereby mitigating the potential for contamination.*
- *The different unloading systems, the hazards and operational risks and precautions to be taken.*
- *Responsibilities and roles in unloading operations*
- *The minimum training requirements*

3.0 ROLES and RESPONSIBILITIES

3.1 Site Management & Site Operators, Transport Management & Drivers

Communication at (un)loading sites is one of the most common sources for discussion and unsafe actions during (un)loading.

For assuring that drivers and operators understand each other when communicating during the (un)loading process a common language has to be found. For **international transport**, drivers and operators often do not share a common language; both drivers and operators should be familiar with a fixed set of the most common expressions in a shared language.

Both transport companies and (un)loading locations should make sure that their drivers/operators have knowledge and can make use of at least the fixed set of expressions in English.

Transport companies and (un)loading sites should ensure that their drivers and operators obtain the required skills. This can also involve the development of supporting means (e.g. leaflets, apps, handbooks).

Rather than instructing by elaborate sentences, pictures or pictograms can be used

The expressions required to be known by both drivers and operators are the ones defined in Transperanto (www.transperanto.org).

Many of these expressions are also conveyed in pictogram see: www.transperanto.org


3.2 Training and Communication of Drivers and Unloading Operators

It is recommended that all activities associated with the movement of dry bulk products in box containers are performed by professional companies that have a proven experience in handling and logistics of dry bulk products.

These companies have the ability to identify the critical activities in the supply chain and can:-

- Identify and mitigate all risks and hazards for each activity (such as static electricity and dust explosion etc.)
- Identify the severity of the risks for each activity by the use of a Risk Matrix
- Identify persons who may be involved in the work associated with known risks
- Develop training programmes for each Risk/Hazard
- Train all involved personnel and conduct refresher training when required including the recording and maintenance of personnel files that training has been conducted.

The document covers only general PPE requirements that are applicable for general chemical products of most sites. For specific chemical plant environments, additional specific PPE may be required in accordance with the relevant safety data sheet (SDS) and risk assessments. These additional PPE requirements are not included in the present document and are to be communicated to the carrier with sufficient notice or will be made available by the chemical plant.

PPE	Reference to standard	Description	
Safety Spectacles	EN 166-3 with side protection	Type 2 : Drivers loading and unloading bulk granulates or other solid chemicals without danger classification	 <p>Protection against liquid droplets/splashes Minimum EN 166 with side protection. This side protection is guaranteed if special shaped spectacles are used. If straight shape spectacles are used, side protectors are to be present.</p> <p>Product giving rise to “dust” may require alternate PPE.</p>
Protective clothing	Arms + legs + body covered		<p>For packaged goods, drop and swap and bulk products protective clothing which covers arms + legs + body is sufficient.</p> <p>A jumpsuit or vest + trousers are acceptable.</p> <p>It is recommended that clothing should not have “pockets”, to prevent items falling from pockets into the product and discharge system.</p>
Safety shoes	EN 20345 S1 – closed		<p>Steel toe, antistatic, absorption around heel. Safety boots are acceptable too. Steel sole (EN 20345-S3) is not recommended as it is uncomfortable for driving. Clogs, even EN 20345 are not acceptable.</p>
Helmet	EN 397		<p>Industrial helmet protection. Safety caps do not provide sufficient protection from falling objects.</p>
Hearing Protection	EN 352-3 Ear Defender on Helmet EN 352-2 Ear Plugs		<p>Ear defenders and ear plugs</p>
Safety gloves (Suitable for Bulk work)			<p>Safety gloves.</p>
Warning vest	EN 471		<p>High-visibility clothing for professionals – warning vest</p> <p>Same standard of high visibility clothing is already required for ADR as well as for all drivers in most European countries.</p>
Fall arrest harness	EN 361		<p>See Note Best Practice Guidelines for the Safe Working at Height in the Chemical Logistics Supply Chain. www.ecta.com</p>

5 Product Segregation/Cleaning methods

- 5.1 The rotary valve and discharge equipment are designed to cover the delivery of a wide range of (chemical) products. When the correct cleaning, set up and disassembly procedures are followed as per these guidelines, the risk of product contamination is mitigated.
- 5.2 Dedicating equipment to a single product or grade of products is one method to reduce the chance of product cross contamination. However, this is not always possible due to cost or equipment requirements.
- 5.3 The next consideration is “similar products” being grouped for the delivery equipment being utilised, e.g. a particular type of polymer or product and its grades, would be handled by the same delivery equipment. This method must be supported by correct cleaning and checking procedures both during and between delivery discharges.
- 5.4 There is then the final step of broader product segregation e.g. powders, solids, types of chemical products etc. Volume (number of deliveries) to receiver or activity levels are an important element for both the supplier and the LSP to consider in the correct and efficient use of the delivery equipment in planning dedicated or semi dedicated equipment duties.
- 5.5 When accepting product to be carried with bag in box, alu van or van box technologies; consideration must be given to the product characteristics and the cleaning regimes required to remove all trace of the material from the delivery equipment and system.
- 5.6 This should be discussed with the supplier or producer of the product before undertaking the activity. A cleaning regime should be agreed and must be communicated to the LSP despatch office and driver to ensure it is planned and carried out.
- 5.7 Product cross contamination can occur where the cleaning is not robust or rigorous enough or where the preparation in equipment set up is not applied correctly, see Section 11. The dual person check in Section 8 reflects the need for the receiver to cross check the work undertaken by the LSP’s driver in this important step of the delivery.

6 Customer Instructions for Unloading

The details listed in Section 9 through 14 cover the expectations between loading operatives, driver and unloading operatives. These should be clear with each party’s role and activity described and for best practice within job instructions. It is recommended that drivers undergo site induction and training before delivering product to site. See

“Best Practice guidelines for Safe (un)loading of Road Freight vehicles, covering Technical, Behavioural and Organisational aspects”. www.ecta.com

7 Handover Responsibilities

NB The main message communicated to consignees is that the goods are considered to have been delivered, (also valid for bulk deliveries), **when the truck is "ready for unloading" at the consignee's premises**, and that the driver is the agent of the **consignee**, and not of the supplier, during the unloading process. Therefore the consignee has the responsibility to check and control the unloading equipment and the unloading process.

Also according to the CMR terms (Article 30.1) the consignee has a responsibility to check the cargo before delivery takes place:

<http://www.jus.uio.no/lm/un.cmr.road.carriage.contract.convention.1956/doc.html#157>

Summary Incoterms 2000/2010

The summary/commentary of the 2000 Edition of the Incoterms states that DDP " *...means that the seller delivers the goods to the buyer ... not unloaded from any arriving means of transport at the named place of destination ...*". The summary/commentary to the 2010 Edition of Incoterms states that DDP means " *... the seller delivers the goods when the goods are placed at the disposal of the buyer ... on the arriving means of transport ready for unloading at the named place of destination*". This simply repeats, and adds nothing to, what is contained in the Incoterm itself.


8 Dual Person Check

Following the above statements (section 7) it is recommended that the receiver of the product being delivered takes an active part (checking presented documentation, cleanliness of the unloading equipment, correct silo for the product delivery etc) in the delivery process for example with a delivery checklist. This should define the responsibilities at unloading and should be jointly signed for between the Site operative and the Carrier Driver.


A checking system is recommended to ensure safe and secure delivery of product and to mitigate contamination issues.

Although this Best Practice Guideline is mainly focussing on the cleanliness of the unloading equipment, it is considered as very important, that the following points are already checked before loading, so the container is fit for purpose and there is no risk of associated contamination:

General application for Container Cleanliness Process – Delivery Procedure Audit

Step	Responsible	Process Description	Tools	Quality Critical Elements
1	Customer Service	<u>Supplier / Customer Order</u> Quality Critical: List exceptional and agreed customer requirements in the instruction issued to the carrier.	Business and customer requirements to be captured in the Order template.	<ul style="list-style-type: none"> - Option to present ECD or liner certificate to customer (on request) - - Loading times, Delivery times plus any special requirements.
2	Carrier	<u>Pickup of empty container at terminal or other such location</u> Quality critical: check container on 'fit for load'	Carrier check list including container and chassis cleanliness (outside appearance) inspection regimes.  roof/ top of container is bowed down. In case the roof / or top of the container is not flat, rain water may enter into the container, below that hatch.	<ul style="list-style-type: none"> - Container outside: free from damages which affect the integrity of the container, clean, odour free, rust free especially around the roof hatches. See picture left - Chassis: undamaged, clean, odour free. - Recommended use of an interchange document between parties.
3a	Carrier	<u>Installation of liner</u> Quality critical: Install the correct type of new liner and place seal at letterbox.	Carrier container check list covering cleanliness and 'fit for purpose' including liner certificate (inside appearance).	<ul style="list-style-type: none"> - Container inside: dry, clean, odour free, ready for liner installation - Twist and bend loading sleeves (create 'swan neck' and tie in a bow) and suspend inside the roof liner attachment point (if applicable), after lining & in advance of loading. - Complete liner certificate (provide copy for customer or customer upon request).
3b	Carrier	<u>Check cleanliness of 'alu box' or 'van box' container.</u> Quality critical: container inspection	Carrier provides Europe Cleaning Document (ECD), reloading confirmation (in case of same reload with no cleaning required)	<ul style="list-style-type: none"> - ECD according to customer specification. - Reloading confirmation.
4	Site Logistics	<u>Check-in of truck / container on site</u> Quality critical: Shipment id, time-stamp 'in', ECD docs etc.	- ECD checklist (if required) or Liner Document	<ul style="list-style-type: none"> - Check ECD against agreed requirements.

5	Site Logistics	<u>Inspection upon site arrival</u> Quality critical: Inspect container and (chassis cleanliness)	Equipment Checklist including container inspection	<ul style="list-style-type: none"> - Container outside: free from damages which affect the integrity of the container , clean, odour free, rust free, no rust or watermarks around the roof hatches. See above point 2 - Chassis: undamaged, clean, odour free Non-compliance (rejection) identified via customer requirements. - Note. For intermodal movements the loading chassis may not be the delivery chassis.
6	Carrier	<u>Prepare equipment to load</u> Quality critical: Open container and prepare for loading	Carrier Driver Handbook – loading	<ul style="list-style-type: none"> - Ensure top of container is clean. - Install liner around roof hatches with proper devices (loading rings). - Inspect inside and seals of roof hatches. - If loading rings are not used the liner is drawn up and attached to the loading chute - Prevent ingress of water, dirt or foreign objects.
7	Site Logistics	<u>Load product into container</u> Quality critical: load correct batch and quantity	Customer / Receiver Packing List	<ul style="list-style-type: none"> - Correct silo number for loading.
8	Carrier	<u>Sealing of container after loading</u> Quality critical: Close liner. Close and seal all roof hatches	Carrier Driver Handbook – close liner and container	<ul style="list-style-type: none"> - Twist and bend loading sleeves (create ‘swan neck’ and tie in a bow) and suspend inside the roof liner attachment point (if applicable). - Close all loading hatches and seal each individual hatch with the seal numbers provided by loading point or carrier.
9	Site Logistics (Check out)	<u>Prepare CMR / Delivery documentation</u>	CMR and Delivery Note documents	<ul style="list-style-type: none"> - Prepare necessary CMR and customer delivery Note documents. - Add correct batch number loaded etc. - Add seal numbers applied to roof hatches, container doors and other sealed points. - Use weigh tickets to record proper net weight. Goods issue correct net weight.
10	Carrier	<u>Transport container to shipping terminal</u>	CMR / Delivery Note documentation	<ul style="list-style-type: none"> - Ensure customer documents are kept with the shipment until delivery.
11	Carrier (Container)	<u>Pick-up of container at destination terminal</u> Quality critical: identify shipment and container ‘fit for unload’	Carrier container collection checklist	<ul style="list-style-type: none"> - Container (outside): free from damages which affect the integrity of the container, clean, odour free, rust free (especially around the roof hatches) - Validate container collection with CMR and Delivery Note
12	Carrier	<u>Check unloading equipment at destination</u>	Carrier Unloading Equipment check (may be	<ul style="list-style-type: none"> - Ensure cleaning and last cargo records for container, appliances

	(Equipment)	<u>terminal</u> Quality critical: Chassis and unloading equipment inspection. Proper procedures to ensure equipment cleanliness	part of container collection checklist) Carrier Driver Handbook: use and check of hoses, check on equipment cleanliness Carrier procedures on 'product segregation', chassis cleaning (incl. toolboxes, airlines, ...), unloading hoses (labelling, checks, cleaning), rotary valves (check, cleaning, ...)	and rotary valve are available for future reference. - Check if pressure and temperature gauges, filter and cooler are present and have no apparent defects. - Check if airlines, hoses, rotary valve and chassis are undamaged and clean.
13	Carrier	<u>Receipt of correct paperwork at destination terminal</u> Quality critical: correct documentation set (including customer delivery note that has unloading requirements)	Carrier checked, ECCMR and Delivery Note paperwork	- Ensure all agreed documentation is present including CMR, Delivery note. - Ensure all original customer documents are available (CMR, Delivery Note).
14	Carrier	<u>Arrival at receiver/unloading site.</u>		
15	Receiver	<u>Receipt of cargo</u> Quality critical: identify cargo, container and seals.	Receiver verifies cargo and container.	- Check CMR and Delivery Note (and date and time stamp). - Visually inspect container for id code and seal numbers. - Mark unloading silo number on the carrier documentation and CMR.
16	Receiver	<u>Prepare Unloading</u> Quality critical: document correct unloading location(s).	Carrier truck and container unloading checklist.	- Ensure driver has proper instructions. - Receiver should check the cleanliness, preparation and set up of delivery equipment.
17	Carrier	<u>Provide sample to receiver</u> Quality critical: sampling. SAMPLE TAKING If possible a "Safety Liner" should be used. This design allows ground level sampling. When sampling at the top is required, Working at Height measures must be implemented. The special designed sampling point is located at the inside of the back of the container and can be reached by opening the unloading "hatch"	Carrier Driver Handbook. See also ECTA/Cefic guidelines on sampling contained in :- <i>"Best Practice guidelines for Safe (un)loading of Road Freight vehicles, covering Technical, Behavioural and Organisational aspects"</i> . www.ecta.com When sample taking it is common practice to hold a sample bag below/ around the sampling point. See picture right Be aware that in that area little particles of dust, rust or paint may be present and can fall into the sample bag.	Follow Carrier Driver Handbook. See also ECTA/Cefic guidelines on sampling contained in :- <i>"Best Practice guidelines for Safe (un)loading of Road Freight vehicles, covering Technical, Behavioural and Organisational aspects"</i> . www.ecta.com  (sample taking at the designed sampling point... at the rear of the container) (rust and dirt at the back outside and inside of the container)

18	Carrier	<u>Unloading of container at receiving site</u> Quality critical: clean unloading hose, rotary valve, follow receivers unloading instructions	Carrier Driver Handbook –correct unloading, apply receivers unloading conditions as marked on delivery note or suppliers instruction.	<ul style="list-style-type: none"> - Ensure all equipment (unloading hose, airlines, rotary valve) is clean. - Blow down unloading hose. - Properly connect unloading hose to truck and to receiver’s silo, it is recommended that hose clamps or suitable mechanisms are used. - Connection to silo should be the last activity in the preparation for delivery.
19	Receiver	<u>Unloading of container at receiver site</u> Quality critical: clean unloading hose, rotary valve, follow customer’s unloading instructions	Receiver site operating instructions.	<ul style="list-style-type: none"> - Verify the activities of the driver in the preparation for delivery. - It is recommended there is a sign off (see Point 8 above) between carrier and receiver before beginning to physically transfer the material - Connect the discharge hose to receiving silo.
20	Carrier	<u>Unloading of container at receiver site</u>	Carrier Driver Handbook	<ul style="list-style-type: none"> - Follow receiver’s unloading instructions (max temperature, max pressure, ...), <u>if there are differences contact Producer of product for clarification</u> - In case water or moisture is discovered, stop unloading and notify despatch office.
21	Carrier	<u>Complete unloading</u> Quality critical: disconnect unloading hose, avoid spills	Carrier Driver Handbook – complete unloading	<ul style="list-style-type: none"> - Properly disconnect hoses after emptying truck - Avoid spills. If these occur, report to the receiver (& Supplier, despatch office) and clean up as required.,
22	Carrier	<u>Cleaning of unloading equipment</u>	Carrier Driver Handbook – clean unloading equipment after unloading	<ul style="list-style-type: none"> - Avoid spills. If these occur, report to the receiver (& Supplier, despatch office) and clean up as required., - differentiate cleaning based on dedication of flows, separation of product types, etc)
23	Receiver	<u>Check-out</u> Quality critical: verify completion of unloading	Check-out Supplier CMR and Delivery Note	<ul style="list-style-type: none"> - Note any special unloading incidents and unloading times on the CMR document - Signed, named and dated for driver and receiver. - Retain one CMR for carrier, one CMR copy to stay at receiver.
24	Carrier	<u>Leaving receiver’s site</u>	Carrier Driver Handbook – de-install liner	<ul style="list-style-type: none"> - Carried out as instructed with the despatch office.

10 Operational

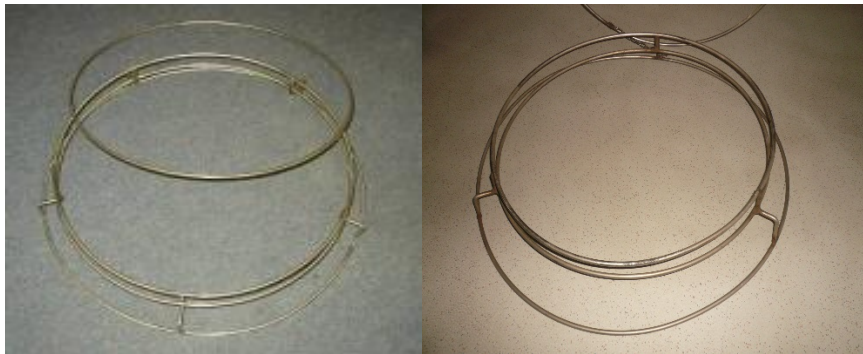
10.1 Preparation for loading - Bag-in-Box Container:

Visually inspect the container for damages and is "fit for loading":-

- check that the roof is not badly dented,
- man lids are not below roof level, as this will allow possible water ingress at the man lid area.
- check that the container floor is dry, swept out properly, that there is no sign of condensation or other such contamination on the walls & roof.
- preventive actions regarding rust around the man lids and letterbox area should be taken and the liner is installed correctly.
- make sure that the unloading sleeve is correctly fitted (not under the inner liner) and all liner attachments are fixed to the container in the correct locations
- close the filling necks, using swan neck method, suspend and close man lid covers until arrival at the loading station.
- seal all openings.

10.1.1 At the loading station:

- Check the container with the operator, a joint sign off to the condition of the container and the liner installation is recommended.
- Have loading rings available to secure liner at manlid area to prevent the liner from collapsing.
- If loading rings are not used the liner is drawn up and attached to the loading chute.
- Ensure during loading no objects fall into the inner liner (e.g. seals, rings, helmet, ear plugs, gloves, equipment on filling gantries etc), that could contaminate the product.



Expanded Type Loading Ring

Flat Type configuration Loading Ring

- If spillages occur on to the top of the liner, this must be reported and resolved by the loading site. Note. Product on the outside of the liner can effect liner fitment and cause issues in delivery.
- After loading: Twist the filling necks and close them off, to avoid ingress of foreign material (see pictures below).
- If not done by loading site operator, driver to seal the opened manlid again and note numbers on the transport documents. Report any abnormality / non-conformity to the loading site operator.

Swan neck correctly fitted and tied

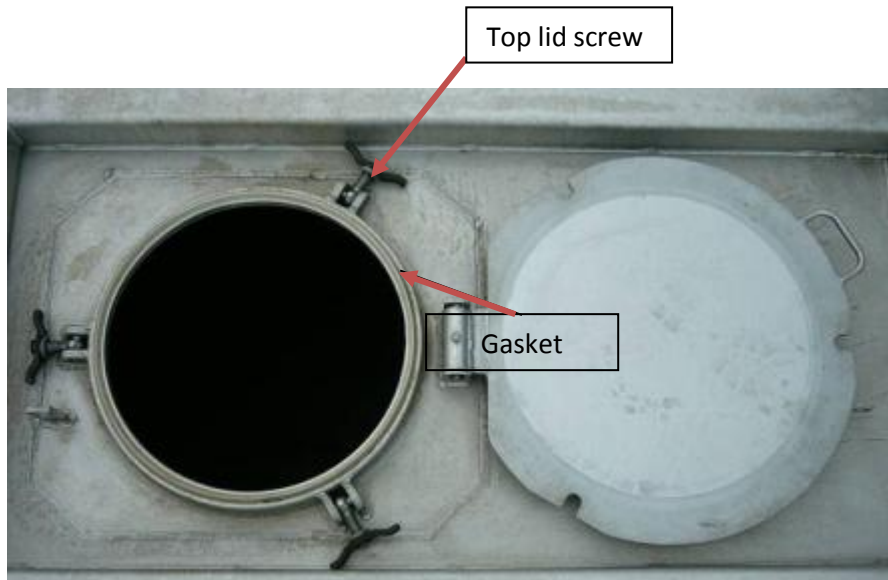


Swan neck incorrectly fitted and tied



10.2 Preparation for loading - Non-Pressurised Alubox/Vanbox:

- Visually inspect the container for damages and is “fit for loading”
- Check the cleaning certificate and confirm cleanliness by inspecting the inside of the box.
- Make sure that manlid gaskets are fit for purpose and all screws are tightened properly.



Top view of van box manlid

10.2.1 At the loading station:

- Check the container with the operator, a joint sign off to the condition of the container is recommended.
- After loading: If not done by loading staff, seal all openings and note numbers on the transport documents.

11 Chassis and Rotary Valve Cleanliness

The rotary valve has a major function when unloading containers, whether this is bag in box or alubox/vanbox. Due to this key function the driver has to ensure the following points make it fit for purpose:

11.1 Introduction.

Under no circumstances should a person put their hands, finger or objects inside the rotary valve when the power is engaged, this includes the top or outlet area.

NB All power **MUST** be disengaged, de-energised and NOT simply set in neutral. Engine must be turned off!

- 11.1.1 Compressed air lines are used to clean and blow down the equipment. Under NO circumstances should air be used to blow dust etc from overalls or person.
- 11.1.2 Eye protection must be worn when using compressed air lines.
- 11.1.3 Gloves should be worn (see PPE schedule) when setting up and handling equipment which can come into contact with products.
- 11.1.4 The cleaning of the discharge equipment, the rotary valve, the top plate, the flow control valve, the hose etc is a critical step in preventing cross contamination of previous cargo or other such contaminates.

11.2 Lack of correct maintenance

The photographs below show in detail the lack of correct maintenance, this area has a major impact on the risk of contamination of product.

It is essential that LSP's have in place a preventative maintenance programme to ensure "fit for purpose" equipment at all times.



Rust in all areas that could fall into the product

Product granules from previous load



Broken grid



General lack of inspection
eg not clean see loose product on chassis frame

11.3 Visual Inspection.

11.3.1 Drivers can only see parts of the delivery equipment, they cannot see inside the rotary valve body or inside non clear hoses or pipes etc.

11.3.2 However, where it is reasonably expected a person could see from looking down, through or into the equipment, then this should be part of the joint inspection process.



Rotary Valve outlet







Rotary Valve blades



Inside of Rotary Valve outlet

11.3.3 This includes those areas highlighted in the checklist shown below

Example of Joint Inspection check sheet

Date		
Registration number of chassis		
Name of checker		
Task to carry out	Signature	
Blind caps of air intake, product outlet and top cover in place.		
Check inside for cleanliness (especially spaces between rotor and both side caps). No granule or powder residues are visible.		
Unlock blind caps and check product outlet flange and air intake for cleanliness.		
Check spherical assembly for cleanliness: - Top plate (with return air connection) - Connecting hose between flow regulator and rotary - Flow regulator(ABC-tundish for Alu-boxes) - Return air filters		
Check if product conveying hose and air hoses are covered with blind caps on both sides. Unlock blind caps and check hoses inside for cleanliness.		
Remarks:		

11.3.4 Tools such as flash lights or external illumination can be used to aid the inspection process.

11.3.5 If, during the visual inspection and during the setting up phase, the driver notes any materials stuck or unable to be removed by air blowing, this must be reported to the LSP's despatch office for further advice.

11.4 Conveying Air Line system.

The air that feeds the rotary valve to “blow forward” the product must pass through a filtration system.



Air intake filtration system for SDU chassis.

The filter must remove particulates and other such air borne debris that can be pulled into the air intake system.

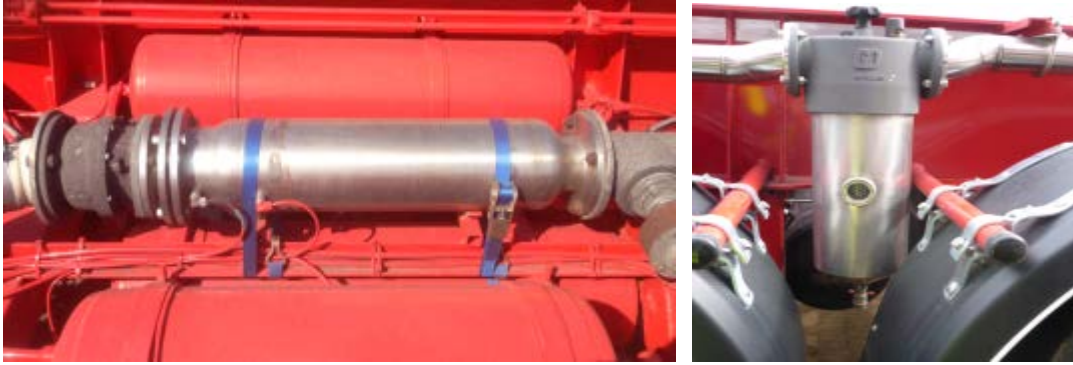
11.4.1 The air intake must be away from any exhaust system on the power unit / compressor, and above ground level to ensure it does not introduce debris etc into the discharge system. For example above the truck cabin.

Air intake independent from engine



Air filter under housing

Compressors air intake filter on tractor unit.



Compressed Air Filter, typically 5micron in size, to the rotary valve.

- 11.4.2 The filter system should have a pressure gauge before and after the filters mechanism. The intention of this is to monitor the pressure differential across the filter. A difference in readings across the two gauges indicating any blockage on the filter and also indicates the presence of a filter.
- 11.4.3 All filters used must be on a maintenance/inspection regime. This should be checked by a qualified person, especially when the filters may need to be stripped down from the compressed air system, rather than a simple filter cartridge change.
- 11.4.4 After working on the compressed air system or when refitting filters etc the system should be blown forward for 5 -10minutes to ensure there is nothing in the system that could blow through in the first delivery operation.

11.5 Equipment assembly and cleanliness check prior to commencing unloading.

The receiving site operator should check the container number and product identification with the transport order before allowing the delivery of product.

- 11.5.1 The correct sequence of set up is to prevent the entry of foreign bodies, equipment or other such items into the discharge process and hence through to the receivers storage silo or production.
- 11.5.2 Driver and site operators need to consider the areas they are working in for “pick up” of external contamination; mud, dirt, grime, other products in discharge area that may be on the ground to debris on the chassis etc from being on the road.
- 11.5.3 When setting up, drivers and site operators should follow an agreed BBS protocol that defines their responsibilities. E.g. driver operating their equipment – site operator plant equipment. Driver must observe site rules at all times and only begin to assemble and clean equipment when given permission to proceed from the site operator.
- 11.5.4 Check the area for delivery to ensure flat and suitable ground. Release and slide out the rotary valve at the rear of the vehicle. Leave the top plate in position which covering the rotary valve blades and discharge equipment. Ensure the drive system is turned off and the operating handle in neutral.



Operating handle for rotary



Sliding out the rotary valve for set up of equipment

11.5.5 Remove the rotary valve cover and fit the safety guard over the top. Clean the rotary valve using the compressed air line, blowing down and into the rotary valve blades and body. Engage power to the system and turn the rotary valve at slow speed. This process is to remove any debris or possible contamination that has entered since previous clean. Remove safety grid and re fit the blank plate, this is to prevent anything dropping into the now clean rotary valve. When this section is completed power **MUST** be disengaged with the engine turned off. As this is moving machinery, consideration must be given for the installation of interlocks and cut outs to prevent injury.

11.5.6 Remove the top plate from the tool box and clean before assembly, blow down with the compressed air line. The equipment **MUST NOT** be placed directly onto the ground during cleaning. This is to prevent the equipment coming into contact with loose gravel, dirt or rain water etc. Inspect that there are no contaminants; foreign objects e.g. dirt and grime etc. before proceeding to fit onto the rotary valve. Refit the top plate cover to prevent anything entering the system.



Cleaning the top plate



Fitting top plate on rotary valve

11.5.7 Blow clean the vent pipe and then fit to the rotary valve body. Fit a clean vent bag tightly to the vent pipe but leave loose for it to be able to inflate in use.

11.5.8 Before starting this next section of the delivery, the driver should ensure they have site permission to break seals and open the container. This includes signatures on the delivery checklist or paperwork etc. Check the seal number on the rear hatch corresponds to that recorded on the paperwork. Remove the seals and dispose of correctly. Unlock the discharge hatch. Care must be taken when opening and lifting the discharge hatch as the locking mechanism and hinges can be stiff. Secure opening by using the safety chain or rope.



11.5.9 Remove the tundish, clean thoroughly using the compressed air line. When clean, attach the tundish to the discharge opening at the rear of the container. Ensure the retaining bolts are fully extended and fixed in place.

11.5.10 Remove the flow control valve from the tool box and thoroughly clean using the compressed air line. Check the condition of the seal. Do not place the flow control valve on the floor during cleaning and when cleaned.



Ancillary equipment toolbox

11.5.11 After opening the liner, pull the discharge spout through the tundish opening and then fit the flow control valve on to the tundish, ensure the flow control valve is closed. The flow control valve should fit tightly and securely into the top rotary valve via the top plate gasket.

11.5.12 Hang the vent pipe from the rear of the container. Do not climb on the chassis to do this.



Top plate flow control valve



Vent pipe and vent bag

11.5.13 Remove the correct discharge hose for the product (ensure product compatibility) from the trailer.

- Thoroughly clean with the compressed air line.
- Check hose condition,
- check for holes;
- damages in body;
- check the end connectors are in good order;
- check the seals in the couplings to be present and in good condition

11.5.14 When using site hoses, drivers should check :-

- with site operators they are correct and product compatible
- clean and ends covered
- and are fit for purpose

11.5.15 The product conveying hose is connected to the rotary valve and the other end remains loose. The driver starts the compressor (wearing hearing protection) for about 5 minutes to blow air through all product touching parts. This operation is a safety measure to avoid the potential for contamination.

11.5.16 In case the receiver/supplier wishes a purging by product the driver, prior to starting the compressor connects a purge bag at the end of the product conveying hose. The driver then opens the flow control valve to let an agreed/appropriate amount of product flush the rotary valve and the conveying hose. The product taken for purging must be disposed in a waste bin at consignee's site according to local legislation.

NB A purge bag is NOT a sample bag

On completion of the product purge:-

- close the flow control valve,
- switch off the engine and remove the purge bag.
- visually inspect the product in the purge bag for foreign objects or other such materials. Repeat the process if purge bag is not free of contaminants.

11.5.17 Discharge system is now ready for delivery. Follow site instructions related to site operator and when the hose is connected to the receiver's silo. Secure hose connections by safety clamp to prevent hose disconnecting.



The silo Number MUST be allocated and the number entered onto the Delivery Checklist by the site staff BEFORE connecting to the silo. It is recommended there is a sign off (see Point 8 above) between carrier and receiver before beginning to physically transfer the material.

12. Prior to tipping of container:

NB Site operator to check Twist locks that ALL are secure, and that container is correctly fixed on the trailer chassis.

See “Best Practice Guidelines for the Safe Tipping of Silo Tanks” www.ecta.com

The discharge of the product should now take place. The agreed level of supervision should take place to ensure a safe and secure delivery.

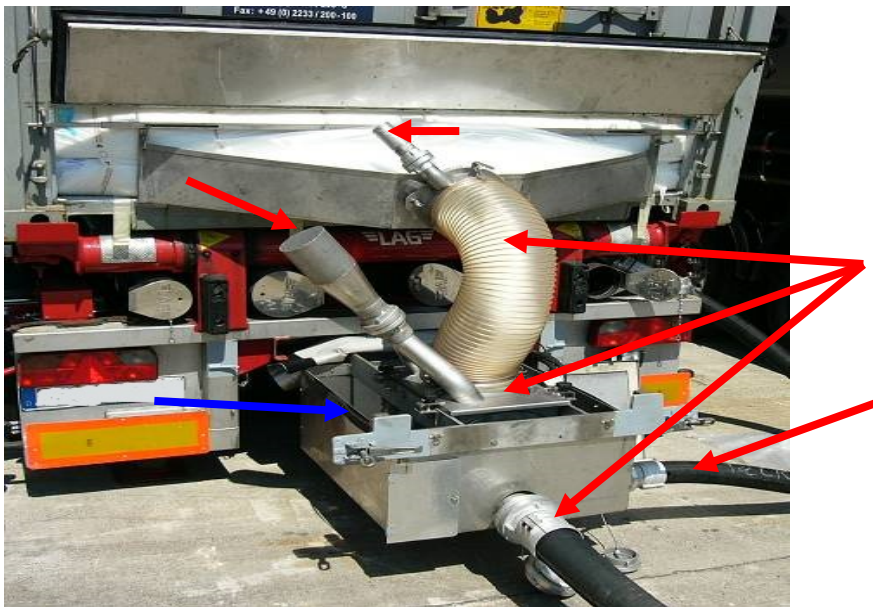
13. After Delivery – Disassembly and disconnection of equipment.

- 13.1 After completion of the unloading, the unloading equipment is to be cleaned during disassembly. Switch the power off to the rotary valve and conveying air system. The driver/operator disconnects the hose from the silo and the driver fits a purge bag to the end of the hose. There are other systems used when disconnecting eg blow residue back into liner via the flexible hose.
- 13.2 Remove flow control valve. Clean the flow control valve using compressed air gun and place in the tool box. Push the empty liner discharge sleeve back through the unloading hatch into the container for later appropriate disposal / recycle.
- 13.3 Remove and clean the tundish before securing to the side of the chassis.
- 13.4 Remove the top plate. Place the safety grid over the rotary valve. Blow clean the top plate with compressed air and return to the tool box.
- 13.5 With the safety grid in place and the purge bag fitted to the end of the discharge hose (see 13.1), blow clean the rotary valve using compressed air. The rotary valve should be turned at slow speed. Eye protection must be worn when using the compressed air line. Do not put fingers or equipment into the path of the blades or the rotary valve.
- 13.6 When the rotary valve is clean secure the blanking plate over the top.
- 13.7 Remove the hose and blow clean with compressed air, remove the purge bag, replace the hose caps on the two ends and return to its hose carrier. Replace the end cap onto the hose carrier and secure for transport.
- 13.8 The driver must clean the discharge area of any product that has been spilled during cleaning or the delivery process.

14.0 Further Cleaning / Cleaning station

- 14.1 If during those steps in section 13, do not remove all product then there will be a requirement for further cleaning techniques. Drivers should speak with their despatch office for direction on this.
- 14.2 In the event that cleaning by air is not sufficient, other methods of cleaning will need to be considered eg SQAS assessed cleaning station to remove such residues (see 14.4). After washing down, the equipment must be dried and blown with air to remove all traces of water. Where cleaning products are used, it is essential that all traces of the product are removed.

- 14.3 After cleaning, the driver or the personnel of the cleaning station inspects all parts thoroughly. If the design of the rotary does not allow an easy inspection from both sides (air intake / product outlet) tools like a flashlight should be used.
- 14.4 Cleaning all parts at a SQAS cleaning station, 3rd party LSP approved cleaning facility or at an operating terminal of the carrier is recommended. Use of a SQAS cleaning station may be affected by the availability to be reached within an acceptable economical range.
- 14.5 Rotary valve must be cleaned after every unloading process – even for the use of dedicated equipment – with a minimum by compressed air. All parts of the rotary (blue arrow, see below) and the peripheral parts (red arrows, see below) like filters, connections, air hoses, etc. must be cleaned. If approved by consignee the cleaning by air can be performed on site. Residue product / dust can so be disposed into the used liner.



Equipment set up

The rotary valve should be designed to allow easy inspection from each side, air intake and product outlet. Although this does depend on the style, type, and manufacturer of such equipment and that chosen by the carrier for use.



Rotary valve inlet / outlet

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