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Annex II: Checklists for the filling and emptying of tank-wagons for liquids

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Checklists for the filling and emptying of rail tank-wagons for liquids

Guidelines – introductory text

These guidelines have been developed in cooperation with CEFIC, FuelsEurope, and UIP in the form of checklists for tank-wagons for liquids to help fillers and unloaders of tank-wagons comply with RID safety obligations, particularly with respect to the leaktightness of tank-wagons.

Filling and discharging of tank-wagons

Four checklists to help avoid leaks from tank-wagons carrying liquids

Introduction

According to RID 1.4.3.3 (a), (f) and (g), the filler

- shall ascertain prior to the filling that both the tanks and their equipment are technically in a satisfactory condition;
- shall, after filling the tank, ensure that all closures are in a closed position and that there are no noticeable leakages;
- shall ensure that no dangerous residue of the filling substance adheres to the outside of the tanks filled by him.

According to RID 1.4.3.7.1 (b) and (d), the unloader

- shall before and during unloading, check whether the tank has been damaged to an extent which would endanger the unloading operation;
- shall, immediately following the unloading of the tank, ensure the closure of valves and inspection openings;
- remove any dangerous residues which have adhered to the outside of the tank or wagon during the process of unloading.

In addition, the filler and the unloader are required to comply with the requirements of paragraphs 4.3.2.3 (Provisions for operation) and 7.5 (Provisions concerning loading, unloading and handling).

The filler and the unloader must establish procedures to ensure that they fulfil all the requirements they have in accordance with RID Chapter 1.4.

The main aim behind standardised checklists is to avoid leaks from tank-wagons for liquids by means of correct and professional handling on the part of operating staff working for fillers and unloaders. They include the necessary steps (checkpoints) in the appropriate sequence, which is normally observed when filling or emptying liquids into or from tank-wagons in the procedure to ensure leaktightness. They may need to be supplemented by the user with other specific operational steps/procedures (operating instructions).

Depending on the product and specification of the tank and fittings, tank-wagons may:

- be **filled** from the **bottom** through the bottom valve in conjunction with the external shut-off device (discharge valve, dry coupling) or from the **top** through the filling pipe or dome cover;
- **discharged** through the **bottom** shut-off device (discharge valve, dry coupling) or from the **top** through an attached dip tube.

Four checklists have therefore been developed, covering respectively top filling, top discharge, bottom filling and bottom discharge.

They set out a chronological sequence of the steps necessary for the filling and discharge of tank-wagons. If they use them as an aid, users can then be sure that they have followed the steps fully in the correct sequence. If one of the steps cannot be carried out properly, the filling or discharge process is interrupted or stopped until the discrepancy/fault is rectified. This should enable errors and unsafe situations to be recognised in advance and avoided. Damaged tanks or service equipment are not allowed for transport. Further measures must be agreed with the tank-wagon operator (in accordance with the vehicle keeper mark on the wagon).

The term "suitable tool" used in the checklists means a tool with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided. The equipment used must be in compliance with applicable international regulations, e.g. the explosive atmospheres regulations.

These checklists also reflect the obligations of the filler set out in paragraphs (b), (c), (d) and (e) of RID 1.4.3.3 and the obligations of the unloader set out in paragraphs (a) and (c) of RID 1.4.3.7.1.

In addition to the different steps set out in these checklists

– According to paragraph (h) of RID 1.4.3.3, the filler shall also, in preparing the dangerous goods for carriage, ensure that the placards, marks, orange-coloured plates and labels as well as shunting labels are affixed on the tanks, on the wagon and on the containers in accordance with chapter 5.3 of RID;

– According to paragraphs (e) and (f) of RID 1.4.3.7.1, the unloader shall ensure that:

  • the prescribed cleaning, if applicable, of the wagons is carried out;

  • the wagons, once completely unloaded, cleaned and degassed, no longer display placards, marks and orange-coloured plates that had been displayed in accordance with Chapter 5.3 of RID.

In this document, the RID terminology is used. The following table includes equivalent expressions or examples usually used in the industry.

RID terminology	**Industry terminology or examples**
closing devices	caps/blank (blind) flanges/manlids
external stop-valve	side valve/discharge valve
internal stop-valve	bottom valve
manhole cover	inspection lids/manlids
operational openings	filling and/or discharge openings
safety devices	devices to protect against unintentional opening of external and internal stop-valves
service equipment	filling and discharge, breather, safety, heating and heat insulating devices and measuring instruments

The checklist is a guide and does not exempt the various participants referred to in RID Chapter 1.4 from the respective obligations assigned to them under RID.

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The checklists are a new version of the checklists originally developed jointly by

- Verband der Chemischen Industrie e.V. (German Chemical Industry Association) (VCI)
- Mineralölwirtschaftsverband e.V. (Association of the German Petroleum Industry) (MWV)
- Unabhängiger Tanklagerverband e.V. (Independent Tank Storage Association) (UTV)
- Vereinigung der Privatgüterwagen-Interessenten (Association of Private Goods Wagon Users) (VPI).

Points relevant to leaktightness for filling tank-wagons (top filling) for liquids

1. Before filling			
	Check	**Explanation**	**OK**
1.1[1]	Tank and service equipment in technically faultless condition (visual inspection).	Before clearance for filling, the tank and service equipment must be visually checked to ensure that they do not show any obvious damage. No damage to tank and items of equipment that might endanger the filling. Verification refers e.g. to the valves, closing devices, the manhole cover, damage on the shell, thermal insulation.	
1.2[1]	Verify that the date of the next tank inspection has not expired.	RID requires the next tank inspection date to be shown on every side of the wagon to inform the filler of the date of expiry.	
1.3	Verify that the dangerous goods are authorised for carriage in this tank.	This verification includes the verification of the tank code and the special provisions indicated on the tank, taking into account the tank hierarchy in 4.3.4.1.2.	
1.4	The last load and its compatibility with the new load must be determined.	The last load must be determined from data reported in the transport documents and by comparison of the product name with the UN number on the orange-coloured plates and with the product on the loading order. In case of inconsistencies, clarification is needed, e.g. product analysis. Check the documentation if the tank is filled with nitrogen or oxygen. Note: This check is not relevant if the tank-wagon is empty and cleaned and the cleaning document is available.	
1.5[1]	Bottom valve (internal stop-valve) closed and secured against unintentional opening, no leakages visible (visual inspection).	The shut-off devices (valves) must clearly indicate whether the valve position is “open” or “closed”. There must be no leakage, i.e. there must be no drips on the valves. If drips are found, further measures are necessary. This also applies to observing the closure sequence in accordance with RID when discharging residues.	

[1] Points 1.1, 1.2 and 1.5 to 1.7 may also be carried out upon arrival at the facilities (arrival check) rather than directly before filling.

1. Before filling			
	Check	**Explanation**	**OK**
1.6[1]	Discharge valve (external stop-valve) closed (on opposite side also), no leakages visible (visual inspection).	External shut-off devices and fittings must be checked manually or with suitable tools to ensure that they are closed. Any safety devices to protect against unintentional opening must be used if available. There must be no leakage, i.e. there must be no drips on the valves. If drips are found, further measures are necessary. This also applies to the closure sequence in accordance with RID when discharging residues.	
1.7[1]	Closing device (e.g. screw cap, blank flange) closed on both sides, no leakages visible (visual inspection).	There must be no leakage, i.e. there must be no drips on the outlets. If drips are found, further suitable measures are necessary. To close the cap, only suitable tools may be used.	
1.8	Check dome cover/dome cover sealing and other operational openings in the dome area for visually faultless condition. Visual inspection: if the dome is not opened during filling (e.g. chemical dome cover) and shows no sign of leakage and if the caps are in a proper condition, there is no need to open the dome cover to check the seals.	Torn or otherwise damaged dome cover seals must be replaced.	
1.9	The filling devices are properly connected and the internal and external stop-valves (if present) are opened and the closing devices on the opposite side are closed. Before proceeding it must be checked again that there are no leakages at the interface between the tank-wagon and the facility.	The specific operating instructions must be followed.	
1.10	The maximum degree of filling must be determined to ensure that it will not be exceeded.	The filling degree must be determined taking into account the maximum load limit on the wagon panel (load categories) and the maximum degree of filling laid down in 4.3.2.2.1. Note: The residual load (product that is still present in the tank-wagon before loading) must also be taken into account.	

2. During filling			
	Check	**Explanation**	**OK**
2.1	Supervise filling operation to ensure safe operation throughout the process and prevent overfilling.	Permanent supervision will prevent dangerous situations, such as overfilling and will enable rapid emergency response, if necessary.	

3. After filling			
	Check	**Explanation**	**OK**
3.1	Verify that there is no overloading or overfilling.	Immediately after filling, the tank-wagon must be checked again to ensure that it is not overloaded or overfilled, as determined in 1.10. • Overloading means exceeding the maximum load limit of the tank-wagon. • Overfilling means exceeding the maximum (product related) filling degree, according to RID 4.3.2.2.1. These checks must be carried out by using calibrated measuring devices (e.g. by weighing on a calibrated weighbridge). The overloading or overfilling must be remedied by immediate discharge of the excessive load in a safe manner. Further measures shall be agreed with the tank-wagon operator (in accordance with the vehicle keeper mark on the wagon), because: • Overfilling of the tank may generate pressure build-up above the maximum calculation pressure. In this case further investigations are needed to identify whether an inspection of the tank-wagon has to be carried out. • An overfilled tank may cause excessive forces on bearings and axles. If overfilling has occurred, it must be checked whether the bearings and axles have been overloaded before the tank-wagon is brought back into service.	
3.2	Bottom valve (internal stop-valve) closed and secured (visual inspection).	The bottom valve is in a recognisably closed position and secured against unintentional opening.	
3.3	Closing device (e.g. screw cap, blank flange) opened. Discharge valve (external stop-valve) closed and secured, no leakages visible (visual inspection). Then check closing device (e.g. screw cap, blank flange) closed.	External shut-off devices and fittings must be checked manually or with suitable tools to ensure that they are closed. Any safety devices to protect against unintentional opening must be used, if available.	

3. After filling			
	Check	**Explanation**	**OK**
3.4	Operational openings (e.g. dome cover, pressure pipe, inspection openings, vapour return pipe, dip tube) properly closed with the right gaskets, and must be tightened with suitable tools. There must be no leakages (visual inspection).	If tools are used to close and tighten the closing devices, use only suitable tools. The blank flanges on the closure that have been used must be equipped with suitable gaskets. The gaskets must be in a proper condition and must be replaced, if necessary. Bolts in blank flanges must be of appropriate length.	
3.5	The outside of the tank is free of dangerous residues.		
3.6	The closing devices are leaktight (visual inspection) on both sides of the tank-wagon.	If the closing device was only used on one side, it only needs to be checked on this side if the other (unused) device has been sealed or secured and it can thus be ascertained that it has not been used. One component of a final check is to ensure that there are no leaks at all, i.e. there must be no drips on the valves and outlets. If drips are found, further suitable measures are necessary.	

Points relevant to leaktightness for unloading tank-wagons (top discharge) for liquids

1. Before unloading			
	Check	**Explanation**	**OK**
1.1[2]	Tank and service equipment in technically faultless condition (visual inspection).	Before clearance for discharge, the tank and service equipment must be visually checked to ensure that they do not show any obvious damage. No damage to tank and items of equipment that might endanger the unloading. Verification refers e.g. to the valves, closing devices, the manhole cover, damage on the shell, thermal insulation.	
1.2	The stop-valves and the closing device (e.g. screw cap, blank flange) are closed on both sides of the tank-wagon and there are no leakages.	It must be confirmed that the stop-valves are closed. Seals can help to determine that closing devices and valves have not been handled by other parties. In case of own seals, it should be verified that they are in the same proper condition as when they are installed. It can be assumed that valves on tank-wagons returning with original seals are still leaktight.	
1.3	Ascertain that the product in the tank-wagon is the correct one.	The load must be determined from particulars in the transport documents, by comparison with the UN number on the orange-coloured plates, and with the product on the unloading order. In case of inconsistencies, clarification is needed, e.g. product analysis.	
1.4	The discharge devices are properly connected and the stop-valves are opened in the correct order.	The specific operating instructions must be followed. Only use suitable tools.	
1.5	Before proceeding it must be checked again that there are no leakages at the interface between the tank-wagon and the facility.		

[2] Point 1.1 may also be carried out upon arrival at the facilities (arrival check) rather than directly before unloading.

2. During unloading			
	Check	**Explanation**	**OK**
2.1	Supervise the unloading operation to ensure safe operation throughout the process.	For unloading, the operating instructions of the tank-wagon must be complied with. Permanent supervision will prevent dangerous situations and will enable rapid emergency response, if necessary.	

3. After unloading			
	Check	**Explanation**	**OK**
3.1	Check whether the tank is empty (visual inspection or other suitable measure).	Suitable measures are, e.g. sight glass or use flow meters in the discharge device pipes, weighing, change in pump noise, product no longer carried.	
3.2	Verify that stop-valves are closed and secured and there are no leakages.	If tools are used to close and tighten stop-valves, use only suitable tools. Any safety devices to protect against unintentional opening of stop-valves must be used, if available. There must be no leakages.	
3.3	Closing devices are installed correctly with the right gaskets and have been tightened with suitable tools. There must be no leakages.	If tools are used to close and tighten the closing devices, use only suitable tools. The closures must be equipped with suitable gaskets. They must be in a proper condition and must be replaced when necessary. Bolts in blank flanges must be of appropriate length.	
3.4	After unloading, the tank, the service equipment and the opening devices (e.g. pressure pipe, inspection openings, dip tube) must be checked again to ensure that there are no leakages (visual inspection).	Final (visual) check of all closing devices and valves on both sides of the tank-wagon.	
3.5	The lockable cap (dome cover) must be locked and sealed (when fitted).		
3.6	The outside of the tank is free of dangerous residues.		

Points relevant to leaktightness for filling tank-wagons (bottom filling) for liquids

1. Before filling			
	Check	**Explanation**	**OK**
1.1[3]	Tank and service equipment in technically faultless condition (visual inspection from the ground).	Before clearance for filling, the tank and service equipment must be visually checked to ensure that they do not show any obvious damage. No damage to tank and items of equipment that might endanger the filling. Verification refers e.g. to the valves, closing devices, the manhole cover, damage on the shell, thermal insulation.	
1.2[3]	Verify that the date of the next tank inspection has not expired.	RID requires the next tank inspection date to be shown on every side of the wagon to inform the filler of the date of expiry.	
1.3	Verify that the dangerous goods are authorised for carriage in this tank.	This verification includes the verification of the tank code and the special provisions indicated on the tank, taking into account the tank hierarchy in 4.3.4.1.2.	
1.4	The last load and its compatibility with the new load must be determined.	The last load must be determined from data reported in the transport documents and by comparison of the product name with the UN number on the orange-coloured plates and with the product on the loading order. In case of inconsistencies, clarification is needed, e.g. product analysis. Check the documentation if the tank is filled with nitrogen or oxygen. Note: This check is not relevant if the tank-wagon is empty and cleaned and the cleaning document is available.	
1.5[3]	Bottom valve (internal stop-valve) closed and secured against unintentional opening, no leakages visible (visual inspection).	The shut-off devices (valves) must clearly indicate whether the valve position is “open” or “closed”. There must be no leakage, i.e. there must be no drips on the valves. If drips are found, further measures are necessary. This also applies to observing the closure sequence in accordance with RID when discharging residues.	

[3] Points 1.1, 1.2 and 1.5 to 1.7 may also be carried out upon arrival at the facilities (arrival check) rather than directly before filling.

1. Before filling			
	Check	**Explanation**	**OK**
1.6[3]	Discharge valve (external stop-valve) closed (on opposite side also), no leakages visible (visual inspection).	External shut-off devices and fittings must be checked manually or with suitable tools to ensure that they are closed. Any safety devices to protect against unintentional opening must be used if available. There must be no leakage, i.e. there must be no drips on the valves. If drips are found, further measures are necessary. This also applies to the closure sequence in accordance with RID when discharging residues.	
1.7[3]	Closing device (e.g. screw cap, blank flange) closed on both sides, no leakages visible (visual inspection).	There must be no leakage, i.e. there must be no drips on the outlets. If drips are found, further suitable measures are necessary. To close the cap, only suitable tools may be used.	
1.8	The filling devices are properly connected and the internal and external stop-valves (if present) on the filling side are opened and the closing devices on the opposite side are closed. Before proceeding it must be checked again that there are no leakages at the interface between the tank-wagon and the facility.	The specific operating instructions must be followed.	
1.9	The maximum degree of filling must be determined to ensure that it will not be exceeded.	The filling degree must be determined taking into account the maximum load limit on the wagon panel (load categories) and the maximum degree of filling laid down in 4.3.2.2.1. Note: The residual load (product that is still present in the tank-wagon before loading) must also be taken into account.	

2. During filling			
	Check	**Explanation**	**OK**
2.1	Supervise filling operation to ensure safe operation throughout the process and prevent overfilling.	Permanent supervision will prevent dangerous situations, such as overfilling and will enable rapid emergency response, if necessary.	

3. After filling			
	Check	**Explanation**	**OK**
3.1	Verify that there is no overloading or overfilling.	Immediately after filling, the tank-wagon must be checked again to ensure that it is not overloaded or overfilled, as determined in 1.9. • Overloading means exceeding the maximum load limit of the tank-	

3. After filling			
	Check	**Explanation**	**OK**
		wagon. • Overfilling means exceeding the maximum (product related) filling degree, according to RID 4.3.2.2.1. These checks must be carried out by using calibrated measuring devices (e.g. by weighing on a calibrated weighbridge). The overloading or overfilling must be remedied by immediate discharge of the excessive load in a safe manner. Further measures shall be agreed with the tank-wagon operator (in accordance with the vehicle keeper mark on the wagon), because: • Overfilling of the tank may generate pressure build-up above the maximum calculation pressure. In this case further investigations are needed to identify whether an inspection of the tank-wagon has to be carried out. • An overfilled tank may cause excessive forces on bearings and axles. If overfilling has occurred, it must be checked whether the bearings and axles have been overloaded before the tank-wagon is brought back into service.	
3.2	Closing sequence observed (from inside to outside), internal and external shut-off and closing devices closed in accordance with operating instructions.	To close cap and handwheels for the discharge valves, use only suitable tools.	
3.3	Bottom valve (internal stop-valve) closed and secured (visual inspection).	The bottom valve is in a recognisably closed position and secured against unintentional opening.	
3.4	Closing device (e.g. screw cap, blank flange) opened. Discharge valve (external stop-valve) closed and secured, no leakages visible (visual inspection). Then check closing device (e.g. screw cap, blank flange) closed.	External shut-off devices and fittings must be checked manually or with suitable tools to ensure that they are closed. Any safety devices to protect against unintentional opening must be used, if available.	

3. After filling			
	Check	**Explanation**	**OK**
3.5	Closing device (e.g. screw cap, blank flange) correctly mounted (seals present and checked), closed with suitable tools and leaktight (visual inspection).	There must be no leakage, i.e. there must be no drips on the outlets. If drips are found, further suitable measures are necessary. To close the cap, only suitable tools may be used.	
3.6	Operational openings (e.g. dome cover, pressure pipe, inspection openings, vapour return pipe, dip tube) properly closed with the right gaskets, and must be tightened with suitable tools. There must be no leakages (visual inspection).	If tools are used to close and tighten the closing devices, use only suitable tools. The blank flanges on the closure that have been used must be equipped with suitable gaskets. The gaskets must be in a proper condition and must be replaced, if necessary. Bolts in blank flanges must be of appropriate length.	
3.7	The outside of the tank is free of dangerous residues.		
3.8	The closing devices are leaktight (visual inspection) on both sides of the tank-wagon	If the closing device was only used on one side, it only needs to be checked on this side if the other (unused) device has been sealed or secured and it can thus be ascertained that it has not been used. One component of a final check is to ensure that there are no leaks at all, i.e. there must be no drips on the valves and outlets. If drips are found, further suitable measures are necessary.	

Points relevant to leaktightness for unloading tank-wagons (bottom discharge) for liquids

1. Before unloading			
	Check	**Explanation**	**OK**
1.1[4]	Tank and service equipment in technically faultless condition (visual inspection from the ground).	Before clearance for discharge, the tank and service equipment must be visually checked to ensure that they do not show any obvious damage. No damage to tank and items of equipment that might endanger the unloading. Verification refers e.g. to the valves, closing devices, the manhole cover, damage on the shell, thermal insulation.	1.1[1]
1.2	The stop-valves and the closing device (e.g. screw cap, blank flange) are closed on both sides of the tank-wagon and there are no leakages.	It must be confirmed that the stop-valves are closed. Seals can help to determine that closing devices and valves have not been handled by other parties. In case of own seals, it should be verified that they are in the same proper condition as when they were installed. It can be assumed that valves on tank-wagons returning with original seals are still leaktight.	
1.3	Ascertain that the product in the tank-wagon is the correct one.	The load must be determined from particulars in the transport documents, by comparison with the UN number on the orange-coloured plates, and with the product on the unloading order. In case of inconsistencies, clarification is needed, e.g. product analysis.	
1.4	The discharge devices are properly connected and the stop-valves are opened in the correct order.	The specific operating instructions must be followed. Only use suitable tools.	
1.5	Before proceeding it must be checked again that there are no leakages at the interface between the tank-wagon and the facility.		

[4] Point 1.1 may also be carried out upon arrival at the facilities (arrival check) rather than directly before unloading.

2. During unloading			
	Check	**Explanation**	**OK**
2.1	Supervise the unloading operation to ensure safe operation throughout the process.	For unloading, the operating instructions of the tank-wagon must be complied with. Permanent supervision will prevent dangerous situations, such as overfilling and should enable rapid emergency response, if necessary.	

3. After unloading			
	Check	**Explanation**	**OK**
3.1	Check whether tank is empty and the discharge devices are empty (visual inspection or other suitable measure).	Other suitable measures are, e.g. sight glass, use flow meters in the discharge device pipes, weighing, change in pump noise or product no longer carried.	
3.2	Bottom valve (internal stop-valve) closed and secured (visual inspection).	Lever position closed. The bottom valve is in a recognisably closed position and secured against unintentional opening. If tools are used to close and tighten stop-valves, use only suitable tools.	
3.3	Closing device (e.g. screw cap, blank flange) opened. Discharge valve (external stop-valve) closed and secured, no leakages visible (visual inspection). Then check closing device (e.g. screw cap, blank flange) closed.	Follow the closing sequence according to the operating instructions. External stop-valves and fittings must be checked manually or with suitable tools to ensure that they are closed. Any safety devices to protect against unintentional opening must be used, if available. If tools are used to close and tighten the closing devices, use only suitable tools.	
3.4	Closing devices (e.g. screw cap, blank flange) are correctly mounted (seals present and checked), closed with suitable tools and leaktight on both sides of the tank-wagon (visual inspection).	If the closing device was only used on one side, it only needs to be checked on this side if the other (unused) device has been sealed or secured and it can thus be ascertained that it has not been used. There must be no leakage, i.e. there must be no drips on the outlets. If drips are found, further suitable measures are necessary. The closures must be equipped with suitable gaskets. They must be in a proper condition and must be replaced when necessary. Bolts in blank flanges must be of appropriate length.	

3. After unloading			
	Check	**Explanation**	**OK**
3.5	After unloading, the tank, the service equipment and the opening devices (e.g. pressure pipe, inspection openings, dip tube) must be checked again to ensure that there are no leakages (visual inspection).	Final (visual) check of all closing devices and valves on both sides of the tank-wagon.	
3.6	The lockable cap (dome cover) must be locked and sealed (when fitted).	This only needs to be done if there are facilities present to allow safe checking.	
3.7	The outside of the tank is free of dangerous residues.		