

Filling and discharging of rail tank-wagons for liquids: 4 checklists help avoiding leaks

Introduction

The **filler** and **unloader** are the undertakings that fill dangerous goods into e.g. tank-wagons or discharge (unload) them. The legal obligations of these legal entities include

- checking that closing devices are leakproof once the tank has been filled (“filler”, see RID 1.4.3.3 [= Regulations concerning the International Carriage of Dangerous Goods by Rail]), and
- ensuring after the tank has been unloaded that the valves and inspection openings are closed (“unloader”, see RID 1.4.3.7.1).

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 **filled** 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.

Checklists

Four checklists have been developed:

- top filling
- top discharge
- bottom filling
- bottom discharge

They are a chronological sequence of the steps necessary for the filling and discharge of tank-wagons. Using them as an aid, users can be sure that they have followed them 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.

As the most frequent cause of leaks is incorrect filling or discharge processes, the main aim behind these 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 (note: **tank-wagons for pressurised gases** are **not** dealt with here). They include the necessary steps (checkpoints) in the procedure to ensure leakproofness in the appropriate sequence which normally have to be observed when filling or emptying liquids into or from tank-wagons. They may need to be supplemented by the user for other specific operational steps/procedures (operating instructions).

The original German version of this document can be found on

<https://www.vci.de/Services/Leitfaeden/Seiten/Kesselwagen-fuer-Fluessigkeiten.aspx#>

Disclaimer

This document is intended for information only and is provided in good faith. While it is accurate as far as the authors are aware, no representations or warranties are made about its completeness. Therefore no responsibility will be assumed in relation to the contents of this document.

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Points relevant to leakproofness for filling rail tank-wagons (top filling) for liquids (for inclusion in checklists) – with explanations/examples

As at: 23.09.2011

1. Before filling			
	Check	Explanation	ok
1.1*	Tank and equipment in technically faultless condition (visual inspection from the ground).	Before clearance for filling, the tank and its items of equipment must be checked to ensure that they are in conformity with RID.	
1.2 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.	
1.3*	Discharge valve (external stop-valve) closed (on opposite side also), no leakages visible (visual inspection).	External shut-off devices must be checked manually or with a suitable tool 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.	
1.4*	Closing device (e.g. screw thread, blank flange) closed on both sides.	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 a suitable tool may be used, with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided.	
1.5	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 threads 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.	

2. During filling			
	Check	Explanation	ok
2.1	Degree of filling observed.		
2.2	Supervise filling procedure.		

¹ Points 1.1 to 1.4 may also be carried out upon arrival at the facilities (arrival check) rather than directly before filling.

Top filling

3. After filling			
	Check	Explanation	ok
3.1	Bottom valve (internal stop-valve) closed and secured (visual inspection).	The bottom valve is in a recognisably closed position and secured against unintentional opening.	
3.2	Closing device (e.g. screw thread, blank flange) opened. Discharge valve (external stop-valve) closed and secured, no leakages visible (visual inspection). Then check closing device (e.g. screw thread, blank flange) closed.	External shut-off devices and fittings must be checked manually or with a suitable tool to ensure they are closed. Any safety devices to protect against unintentional opening must be used if available.	
3.3	Operational openings (e.g. dome cover, pressure pipe, inspection openings, vapour return pipe, dip tube) closed and leakproof (visual inspection).		
3.4	Outside of tank free of dangerous residues.		
3.5	Closing device is leakproof <u>both sides</u> (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. One component of a final check is to ensure that there are no leaks at all, i.e. there must be no drops on the valves and outlets. If drips are found, further suitable measures are necessary.	
3.6	Handover report is signed/clearance.	The proper condition is documented. Effectiveness check is carried out on a random basis and is documented.	

Points relevant to leakproofness for emptying rail tank-wagons (top discharge) for liquids (for inclusion in checklists) – with explanations/examples

As at: 23.09.2011

1. Before unloading			
	Check	Explanation	ok
1.1	Closing device (e.g. screw thread, blank flange) closed both sides.		
1.2	Tank and items of equipment closed in such a way that nothing can escape uncontrolled.		
1.3	No damage to tank and items of equipment (no danger for unloading procedure) ascertained.	Notify damaged tanks and items of equipment/do not clear for transport.	
1.4	Before opening the closing device (e.g. dome cover, blank flange) check that it is leakproof.		
1.5	Closing device (e.g. dome cover, blank flange) opened, discharge device connected.	To open closing devices, only use suitable tool, with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided.	
1.6	Internal and external stop-valves opened.	Opening sequence according to instructions.	
2. During unloading			
	Check	Explanation	ok
2.1	No damage to tank and items of equipment (no danger for unloading procedure) ascertained.	Notify damaged tanks and items of equipment/do not clear for transport.	
3. After unloading			
	Check	Explanation	ok
3.1	Check whether tank emptied.	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	Operational openings (e.g. dome cover, pressure pipe, inspection openings, dip tube) closed and leakproof (visual inspection).		
3.3	Outside of tank free of dangerous residues.		
3.4	Handover report is signed/clearance.	The proper condition is documented. Effectiveness check is carried out on a random basis and is documented.	

Points relevant to leakproofness for filling rail tank-wagons (bottom filling) for liquids (for inclusion in checklists) – with explanations/examples

As at: 23.09.2011

1. Before filling			
	Check	Explanation	ok
1.1*	Tank and equipment in technically faultless condition (visual inspection from the ground).	Before clearance for filling, the tank and its items of equipment must be checked to ensure that they are in conformity with RID.	
1.2 ²	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 a suitable tool 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.	
1.3	Filling device attached and internal and external stop-valve on the filling side open; closing device on opposite side closed.	The specific operating instructions for filling must be observed.	
2. During filling			
	Check	Explanation	ok
2.1	Degree of filling observed.		
2.2	Supervise filling procedure.		

² Points 1.1 and 1.2 may also be carried out upon arrival at the facilities (arrival check) rather than directly before filling.

Bottom filling

3. After filling			
	Check	Explanation	ok
3.1	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 a suitable tool, with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided.	
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 thread, blank flange) opened. Discharge valve (external stop-valve) closed and secured, no leakages visible (visual inspection). Then check closing device (e.g. screw thread, blank flange) closed.	External shut-off devices and fittings must be checked manually or with a suitable tool to ensure that they are closed. Any safety devices to protect against unintentional opening must be used if available.	
3.4	Closing device (e.g. screw thread, blank flange) correctly mounted (seals present and checked), closed with suitable tool and leakproof (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 a suitable tool may be used, with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided.	
3.5	Operational openings (e.g. dome cover, pressure pipe, inspection openings, vapour return pipe, dip tube) closed and leakproof (visual inspection).		
3.6	Outside of tank free of dangerous residues.		
3.7	Closing device is leakproof both sides (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. One component of a final check is to ensure that there are no leaks at all, i.e. there must be no drops on the valves and outlets. If drips are found, further suitable measures are necessary.	
3.8	Handover report is signed/clearance.	The proper condition is documented. Effectiveness check is carried out on a random basis and is documented.	

Bottom discharge

Points relevant to leakproofness for emptying rail tank-wagons (bottom discharge) for liquids (for inclusion in checklists) – with explanations/examples

As at: 23.09.2011

1. Before unloading			
	Check	Explanation	ok
1.1	Closing device (e.g. screw thread, blank flange) closed both sides.		
1.2	Tank and items of equipment closed in such a way that nothing can escape uncontrolled.		
1.3	No damage to tank and items of equipment (no danger for unloading procedure) ascertained.	Notify damaged tanks and items of equipment/do not clear for transport.	
1.4	Before opening the closing device (e.g. screw thread, blank flange) check that it is leakproof.		
1.5	Closing device (e.g. screw thread, blank flange) opened, discharge device connected.	To open cap and release handwheels for the discharge valves, only use suitable tool, with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided.	
1.6	Internal and external stop-valves opened.	Opening sequence according to instructions.	

2. During unloading			
	Check	Explanation	ok
2.1	No damage to tank and items of equipment (no danger for unloading procedure) ascertained.	Notify damaged tanks and items of equipment/do not clear for transport.	

Bottom discharge

3. After unloading			
	Check	Explanation	ok
3.1	Check whether tank is empty, discharge device empty (visual inspection or other suitable measure).	Other 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	Bottom valve (internal stop-valve) closed and secured (visual inspection).	Lever position closed. Closing sequence observed (from inside to outside), internal and external shut-off and closing devices are closed in accordance with the operating instructions. The bottom valve is in a recognisably closed position and secured against unintentional opening.	
3.3	Closing device (e.g. screw thread, blank flange) opened. Discharge valve (external stop-valve) closed and secured, no leakages visible (visual inspection). Then check closing device (e.g. screw thread, blank flange) closed.	Closing sequence observed (from inside to outside), internal and external shut-off and closing devices are closed in accordance with the operating instructions. External shut-off devices and fittings must be checked manually or with a suitable tool to ensure that they are closed. Any safety devices to protect against unintentional opening must be used if available.	
3.4	Closing device (e.g. screw thread, blank flange) correctly mounted (seals present and checked), closed with suitable tool and leakproof on both sides (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. To close cap and release handwheels for the shut-off device, use only a suitable tool, with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided. 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 a suitable tool may be used, with which the necessary force is generated by means of even leverage and damage to the sealing elements is avoided.	
3.5	Operational openings (e.g. vapour return pipe) closed and leakproof (visual inspection).		
3.6	Outside of tank free of dangerous residues.		
3.7	Handover report is signed/clearance issued.	The proper condition is documented. Effectiveness check is carried out on a random basis and is documented.	