

POWDER TANKERS



FOREWORD

In this leaflet we will be aiming to give the reader a brief insight into the basic workings of Powder Tankers. Due to the wide variety of goods suitable for transportation in this manner, it would be an impossible task to include all makes of powder tanker but as the basic configuration tends to be approximately the same this will not put you at any disadvantage.

Due to the fact that powder tankers operate with a pressurised air system there is a certain amount of danger involved if the correct operating procedures and basic rules or guidelines are not strictly adhered to.

Remember if you are ever in any doubt what so ever don't be afraid to ask. An operating incident can result in customers premises being covered in the product or result in the whole vehicle tipping over as the tank is raised so the importance of following the correct procedures cannot be sufficiently

emphasised. But don't worry, as there is no company that will let you use one of these without some kind of practical training.

LOADING

This is basically the easiest part of working with a powder tank although the operation is basically the same wherever you may go. Some companies do more to assist the driver than others; you are always loaded through the top hatches and the only difficult part is ensuring that the appropriate hatch is directly under the loading nozzle. You may have to get out several times to check this visibly before getting it right. Some companies have installed mirrors that enable the driver to see the position of the nozzle in relation to the hatch from the cabin without having to leave the vehicle.

Apart from the above the rest is quite easy first you check whether or not you need to place the vibrating mat in the rear access hatch (this is usually only necessary when loading fine powder products such as talcum powder). Check that the access hatches are secure (these are either at the back or underneath depending on whether the tank tips or not) and that all unloading valves are closed. Depending on the product that you wish to load you may also have to connect the earthing cable (this is especially necessary when loading plastic as static electricity is produced during the loading process). Lastly close the top hatches by hand. Do not use hammers or any form of metal tube to tighten the retaining screws, hand tight is sufficient. Ensure that the air release valve on top of the tank is in the open position, as most products tend to be warm when loaded. If the outside temperature is

less than that of the load then this will produce a vacuum inside the tank which in turn will cause the tank to buckle and crumple within itself as the product cools.



Here the air release valve can be seen on the right at the top of the ladder in the closed position. To open, push the lever towards the rear of the trailer.

With most tipping tankers due to their length it may be advisable to start loading from the second top hatch from the front so as to stay within legal axle weight limits.

UNLOADING

The first thing that you should do after positioning the vehicle is immobilise it using the handbrake and chocks. This will prevent any unwanted movement during the operation of the air suspension system. This should immediately be followed by unravelling the earthing cable from the trailer chassis and connecting it to the earthing point on the silo of which you are about to unload into so as to prevent any static electricity discharges. This may not be necessary in a non-flammable environment, but you should beware of painful electrical shocks.



The supporting legs can be seen wound down.

After doing this proceed to the rear of the vehicle and wind down the two rear supporting legs ensuring at the same time that the trailer is laterally level (do not overwind the supporting legs). Now completely lower the air suspension until the air bags are empty (the air pressure gauge will show zero).



Air suspension valve in the down position with the pressure gauge showing 0 indicating that there is no more pressure in the air bags.

The next step is to ensure that the rear hatch (or bottom hatch in the case of non-tipping tanks) is still secure and has not come loose during the journey. After this, climb on to the top of the trailer raising and securing the safety railing as you go, check that none of the top hatches have come loose and close the top air release valve which can usually be found at the rear of the trailer next to the top of the ladder.

Now you can attach the unloading nozzle to the unloading valve and screw it tight, with the exit point facing the silo into which you

wish to unload. If the diameters of the hoses are different to the diameters of the unloading nozzle and/or the feeder pipe to the silo you may have to affix an adapter coupling to the unloading nozzle. Then attach the hose(s) followed by attaching the hose(s) to the silo feeder pipe again using an adapter coupling should this be necessary. You may also need to use 45° or 90° bend adapters to get the pipe onto the delivery point without kinking it.



Unloading nozzle hose attached to silo feeder pipe using an adapter between the hose and the pipe.

Now you attach the air feed hose from the air distribution valve at the rear of the trailer to the unloading nozzle. If the vibrating mat is being used then you will need to place another air feed hose from the multivalve point to the appropriate connection point. This is usually on the lower side of the rear access hatch. Ensure that two valves for these hoses are closed and that the valve for the air feeder hose that goes to the top of the tank is

open.

Connect the air feed hose from the compressor to the trailer and ensure that it is secure, if necessary connect the hydraulic hose from the tractor unit to the trailer (some trailers have an electric tipping system so it may be necessary to connect an electric cable instead).



Air distribution valve during unloading.

Here you can see that the air pressure is at 1.5 Bar and that the temperature is 55 degrees. The uppermost valve controls the amount of air, which enters the tank from the top. To the left of this you have an extra air release valve, the two valves below are to control the airflow to the unloading nozzle and to the vibrating mat. To the right of the temperature gauge you can see a further connection point which can be used to attach the hose from the customers own air compressor if so required. Below this is the entrance point for the air from the vehicle compressor. Assuming now that permission has been given to proceed you can do one of the following:

Engage the PTO for the compressor and the tipping hydraulics (unless it is a non-tipping tank) and start to tip the tank to approximately the halfway point. You can check whether or not the product has moved to the rear of the tank by tapping the rear with a rubber hammer. At the same time keeping a watchful eye on the air pressure gauge. At no point must the air pressure

exceed the trailer manufacturer recommendations. This is usually 2 Bar although the silo into which you wish to unload may have a lower limitation. You will either be advised of this by factory personnel or by means of a notice at the unloading point.



Typical compressor connected to the trailer



Controls for electrical tipping system

If you are unloading an exceptionally fine powder such as talcum powder it is advisable to only engage the tipping equipment and tip the trailer as far as may be necessary to enable the product to settle in the rear of the trailer. You can check this by tapping the rear of the trailer with a rubber hammer (when the hollow sound ceases the product has moved to the rear). This may be necessary due to the fact that it has been known for the air pressure to cause that part of the product stays in the front of the trailer. If it doesn't move to the rear, you will be left with an only partially unloaded trailer.

When the appropriate pressure level has been reached open the valve for the air hose to the unloading nozzle about halfway. Open the valve for the air hose that leads to vibrating mat about a quarter of the way. Any more may cause air pockets to form at the rear of the trailer and unloading will take a lot longer. With plastic you can immediately open the valve completely.



A view of the rear of the tank during the unloading process you can see the hoses connecting the air pressure to the nozzle and to the vibrating mat, which is situated in the lower part of the access hatch.

Now open the valve for the unloading nozzle about a quarter of the way. You will notice how the unloading hose begins to move slightly as the product begins to move through it at this point. Once more check both visually and manually that all hose connections are still tight and have not begun to work loose (repeat these checks sporadically during the unloading process). As the product moves towards the bottom of the tank, it may cause the trailer to shake. This is most marked with heavy substances like cement. It is possible that if the tank is too close to a structure, it may strike it. This WILL damage the tank, and may cause venting of the product if the tank is pierced. *(I know of at least one case where this occurred – Editor's note)*



In the photo above you can see how during the unloading operation the valve is only partially open.

Once the product is flowing smoothly you may open the unloading a bit more although with some exceptionally fine powder products such as talcum powder you should leave it as it is so as to avoid blocking the silo feeder pipe and the hose(s). After opening the valve a bit more you will notice that the air pressure may have risen slightly. If this is the case, and it has risen close to the limit. you can reduce the air pressure by opening the valve for the air feeder hose that leads to the unloading nozzle even further until reaching the point where the air pressure remains constant at the required level. During the unloading operation occasionally tap the side of the trailer with a rubber hammer. This will encourage any product that may have stuck to the inside to move downwards and also by doing this you will eventually notice that as the tank empties the sound will become hollower. (Never use a metal hammer).

At intervals of about 15-20 minutes you can tip the tank a little bit more until it is nearly completely extended. If you find that the trailer has tipped to its maximum point, lower

it a few inches while there is still product inside, as the weight will help to bring it back down from its critical point. It has been known for fully extended trailers to refuse to lower once empty.

During the unloading operation keep an eye on both the temperature gauge at the rear of the trailer and also on the compressor as high temperatures may damage heat sensitive products such as PVC or plastic.

Should a problem arise at any stage during the unloading operation firstly immediately close the valve for the unloading nozzle and shut down the air compressor and inform the factory personnel of the problem. Remember: first the unloading nozzle or you will end up with blocked pipes and hoses.

When the trailer is nearly empty increase the force and frequency of the tapping on the side of the trailer so as to ensure that remaining product slides to the bottom.

You will notice when the trailer is empty by the sound of rushing air or by the rapid drop in gauge pressure. Close the valve for the unloading nozzle, open the air feed fully, *(this blows product left in the pipe into the silo – Ed.)* switch off the compressor and begin to lower the tank. Once the tank is back down on the chassis, climb up the ladder and open the air release valve on top of the trailer so as to release the remaining air pressure. Now disconnect the hoses and all couplings and stow them away, raise the air suspension and wind up the supporting legs (reel in the earthing cable if it has been used).

WARNING

Under no circumstances what so ever climb on top of a pressurised tank and ensure that all air pressure has been released before attempting to open any hatches.

Never try to move the vehicle once the tank has tipped.

If any thing goes wrong first close the product valve on the unloading nozzle and then stop the air compressor.

WIND

If there should be a hard wind use common sense. In some cases you can still unload and there are a few tips to help increase the stability of the vehicle during the unloading process.

a.) Position the vehicle with either the front or the rear of the vehicle facing into the wind and lower the air suspension on the tractor unit, lower the legs and suspension and complete all connections as above and begin to raise the tank. As the tank begins to rise you will notice that the trailer chassis bends. Once the chassis has straightened itself again stop raising the tank and lower the front supporting legs of the trailer. When this is done begin to raise the tank, while at the same time keeping a careful eye on the tank for any lateral movement that may be caused by the wind. If any movement appears to be excessive lower the tank and do not unload.

GRAVITY UNLOADING

Unloading with out using air pressure is generally known as gravity unloading and is carried out as follows, firstly open the front top hatch so as to avoid creating a vacuum inside during the unloading process.

Now position the vehicle with the rear end just over the edge of the unloading pit, immobilise the vehicle, lower the rear supporting legs and the air suspension as above.

Open the unloading valve at the rear of the tank and wait until the flow of product has stopped. When the flow has stopped, partially open the retaining screws for the rear hatch and once again wait for the flow of product to stop. Then completely open the rear hatch and secure it in the open position.

Now begin to raise the tank until the product begins to flow again and stop raising the tank until the flow of product begins to diminish. As it does so, raise the tank a little bit more

to increase the rate of flow of the product, carry on repeating this process until the tank is empty.

Lower the tank, raise the air suspension and wind up the supporting legs.

CONTAINER TANKS

Container tanks are nothing more than tipping tanks with slight alterations to them so as to enable everything to be contained within the normal dimensions of a basic 40ft sea container.

To achieve this certain controls such as the airflow valves may be in a slightly different position, and the configuration of the opening system for the rear access hatch will be slightly different.

WARNING

Before tipping a container tank check that all twist locks are well tightened otherwise you will lose the container!



Above you can see an example of a container tank from the side and rear showing the reason why some controls may be situated differently so as to stay within the measurements of a normal container. You will find that due to the configuration of the container tank that most of them cannot really be used for gravity unloading.

NON-TIPPING (BELLY) POWDER TANKS

This type of tanker is mainly used for carrying cement but obviously can be used for other products as well. The basic operation of these tankers is much the same as for the tipping tanker although this may well differ depending on the configuration of the tanker. Access to the tank interior for cleaning purposes is also more complicated due to the fact that there is no rear access hatch and can entail having to enter the tank from underneath.

These tanks can have one or more compartments and these in turn may each have their own unloading valve. The controls for these may be situated either on one side or at the rear of the vehicle once again depending on the configuration of the tank in question. *When unloading a belly tank with more than one compartment, or cone, try to unload the rear one first. Especially with cement, a customer may not have room for the full load. If you have to take away a part-load, it is not desirable to have it all sitting at the rear of the trailer, inviting bad handling and accidents. –Ed.*



An example of the air control valves being situated on the side of the vehicle.

TANK CLEANING

Although the cleaning of the tankers is generally carried in specialised cleaning installations, you may on occasion depending upon the requirements of the customer to enter the tank and sweep it out or to assist in the cleaning. In this case you must pay special attention to the cleanliness of the unloading valve and also of the rubbers situated in the top hatches and the rear access hatch as well as ensuring that the hoses and couplings are clean.



Above you can see a typical tanker cleaning installation.



Here you can see a tanker being steam cleaned on the inside

It may sometimes be necessary to use acid based substances or shampoo and scrubbing brushes depending on the type of product previously carried.

GENERAL MAINTENANCE

Apart from always ensuring that the tanker interior, hoses and couplings are clean prior to loading, you must also periodically inspect the rubbers inside the hatches and the hose couplings and replace if necessary. At the same time check the hose couplings and hatches etc. for obvious signs of deterioration caused by damage and general wear and tear. Also regularly check the condition of the supporting legs and other hydraulic hoses for signs of leakage and check the level of the hydraulic fluid tank.

BASIC EQUIPMENT

Basic equipment is once again something that will vary from company to company. It will normally consist of spanners for tightening hose couplings and unloading nozzles, apart from this there will also be various types of couplings, adapters, hoses and a vibrating mat should this be deemed necessary. Many companies also supply clamps which fit over

the hose connections and can be screwed down in order to prevent the hoses coming apart these are quite self explanatory in their method of use.



Above can be seen two examples of coupling adapters that are used when the hose diameter and the diameter of the silo feeder pipe differ.



Here is an example of the kind of adapter that may be necessary when unloading at silos that have the French type of coupling.



Above can be seen a vibrating mat with hoses, unloading nozzle and various couplings.

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