



White Paper

Dust-free Ship-Unloading: Loading Chutes for clean and safe Transfer of Cement

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Cement is a bulk material handled in charges of tens of thousand tons down to bags of a few kilogram. The bulk transport in ships needs a high-performance transfer system, which, if need be, can change between various unloading points.



Sophisticated loading chutes ensure the economic and dustfree transloading of powdery materials.

Ships that are loaded with cement can be unloaded dust-free using a pneumatic loading and unloading installation. Van Aalst Group specializes in both mobile self-unloaders and unloading systems that are installed on cement carriers. The installations are always equipped with TBMA loading chutes to ensure the dust-free transfer of product.

Ship loads of cement can be transferred efficiently and dust-free into silos using a pneumatic loading and unloading facility. These facilities can be equipped also with a loading chute that is able to fill bulk trucks and/or railcars.

If a port only occasionally docks a cement-carrying ship, it will not necessarily be equipped with an onshore pneumatic unloading system with loading chute. In this situation, it is better if the vessel itself is equipped with an unloading installation. These vessels are especially useful as they can sail all over the world, and call at ports that lack the appropriate infrastructure for unloading cement.

Pneumatic unloading systems can be installed on vessels from 2000 dwt, but are of particular interest for cement carriers transporting up to 30.000 tonnes of cement. Unloading capacities can range from 100 tph (tonnes per hour) to 1200 tph.

Companies such as Novalgoma, which rent cement carriers, therefore often equip their (new) ships with installations from Van Aalst. The company has been active in the engineering and construction of pneumatic handling systems for selfunloading cement carriers since the 1970s.

Cement Carriers

In cement carriers, the equipment for pneumatic unloading is placed in an engine room between two cargo spaces of the ship. In both spaces, a suction pipe is placed which ends at the bottom of the hold. A provision is placed in the pipe of the suction nozzle for mixing the cement with air, so that the powder can be easily sucked into the transport vessels. In order to minimize the wear and tear in the suction pipe, the bends are less than seven times the radius of the pipe's diameter, and they maintain the full diameter throughout the whole length.

The length and diameter of the suction nozzle co-determine the required vacuum capacity. The flat bottom is aerated to fluidize the product to ensure that the very last bit of cement flows into the mouthpiece of the suction pipe.

Re-Loader Tanks



Loading chutes can be used for height differences up to seven meters.

The re-loader tanks in the engine room first are filled and then pressed empty. A vacuum pump first empties tank one. Then a valve connected to the suction pipe opens, allowing a mixture of cement and air to be drawn into the vessel. The air escapes at the top of the vessel through a dust filter; the cement remains in the vessel as a result of the force of gravity. The amount of cement in the boiler is monitored by a level probe. Once vessel one is full, the system switches automatically several valves, so that boiler two is filled. During the filling of this boiler, boiler one is being emptied with the aid of a compressor. Thanks to alternately switching from sucking and pressing on both boilers, an almost continuous flow of product is achieved. The cement is forced through a pipe system into a manifold, where a connection can be made to a storage facility such as a silo (or another ship's hold). However, it is also possible to blow the cement silo to a buffer on the ship's deck. From there on, it can be loaded into railcars or silo wagons on shore via TBMA's dustfree loading chute.

TBMA'S Loading Chute

Van Aalst equipped the pneumatic unloading systems of various cement carriers with our loading chutes. The discharge capacity of the unloading system is large enough to activate two loading chutes at the same time. For example, a cement carrier of Novalgoma is provided with a tandem system. Both loading chutes, which are mounted a fixed distance apart, are supplied with so called 'skirts' to be able to load trucks dust-free. The spouts are provided with level sensors to monitor the product level.

Tracking System

This tracking system is fully automated in order to be able to take into account various effects at the same time; the rise of the ship during discharge (because the ship is lighter) and the rise of the product level during loading. This system is also sophisticated enough to compensate for level changes that are due to tidal movement. A height difference up to 7 m can be bridged by the loading chutes, to ensure dust-free transport under all conditions. Each loading chute has its own de-dusting system feeding the dust back into the main product stream to ensure that no product is spoiled.

Offshore Supply Vessels

The principle of pneumatic handling is so interesting that not only cement carriers that are equipped with these installations. The same systems are used for offshore supply vessels (OSVs) that deliver cement to oil rigs at sea. The cement is used to reinforce the holes so that they do not collapse. OSVs have a relatively small capacity so that it is possible to make use of pressure tanks and to blow it dry with the aid of solely an over pressure system (so without the use of vacuum technology). The limited transmission capacity of these ships is no disadvantage. The relatively short distances from the ports to the platforms make it possible to maintain these shuttle services.