

## **Schwappen und Schwallen; Sicherheitsaspekte “Don’t be Sloshed, don’t be Baffled; Secure your Bulk Liquid Cargo”**

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### **Abstract**

Road tank trucks and trailers are often used for the transportation of petroleum-related liquids. Liquids will often only partially fill the mobile liquid-cargo tank. The reasons for this may be that the total weight of the truck and cargo exceeds the statutory maximum authorized weight when full loaded or that several partial loads must be unloaded or loaded during any one transport.

Liquid, which only partially fills a mobile tank, sloshes while driving unless such liquid cargo is secured. Bulk liquids can be secured in several ways. Liquid load securing products such as the “Cairbag<sup>®</sup>”, which use inflatable components, are well suited for this purpose. These products also make the tanks emission-free, as was presented by the “Deutsche Erdöl Aktiengesellschaft” in the “DGMK / ÖGEW Frühjahrsstagung” of 18/19 April 2018.

The safety advantages of load securing of bulk liquid cargoes are twofold. Firstly, they consist of keeping the centre of gravity of the liquid load in a stable manner at the lowest point. The reduction of the chance of overturning of the truck was supported by theoretical research and practical tests. In addition, the securing of the liquid load makes (emergency) braking of the truck controllable and manageable for the truck driver and thus reduces the braking distance.

Secondly, the elimination of risks of exposure of tank components, especially the overpressure relief valves, to very short lasting high peak pressures, which can (and will) occur locally in the fluid. The very brief opening of the pressure relief valve is particularly undesirable in accident situations whereby liquefied gas is transported under pressure by a road tank truck. The opening of any of the relief valves allows gas to flow out of the tank, which gas flows directly into an accident related fire outside the tank and burns immediately. Essential parts of the valve (like the seats) break down, the valve can and will not close anymore. The gas continues to flow out of the tank unstoppable. The liquid remaining in the tank get heated by the fire, starts to boil, expands and the tank explodes catastrophically (“BLEVE”). Fires at truck accidents often start because of the failing of the (lightweight, single hull) diesel-fuel tank of the truck.

The securing of liquid cargoes in tank trucks improves the stability of tank trucks and avoids catastrophic developments in tank truck accidents. Securing the liquid cargoes in tank trucks is therefore not only desirable for environmental and economic, but also for safety reasons.