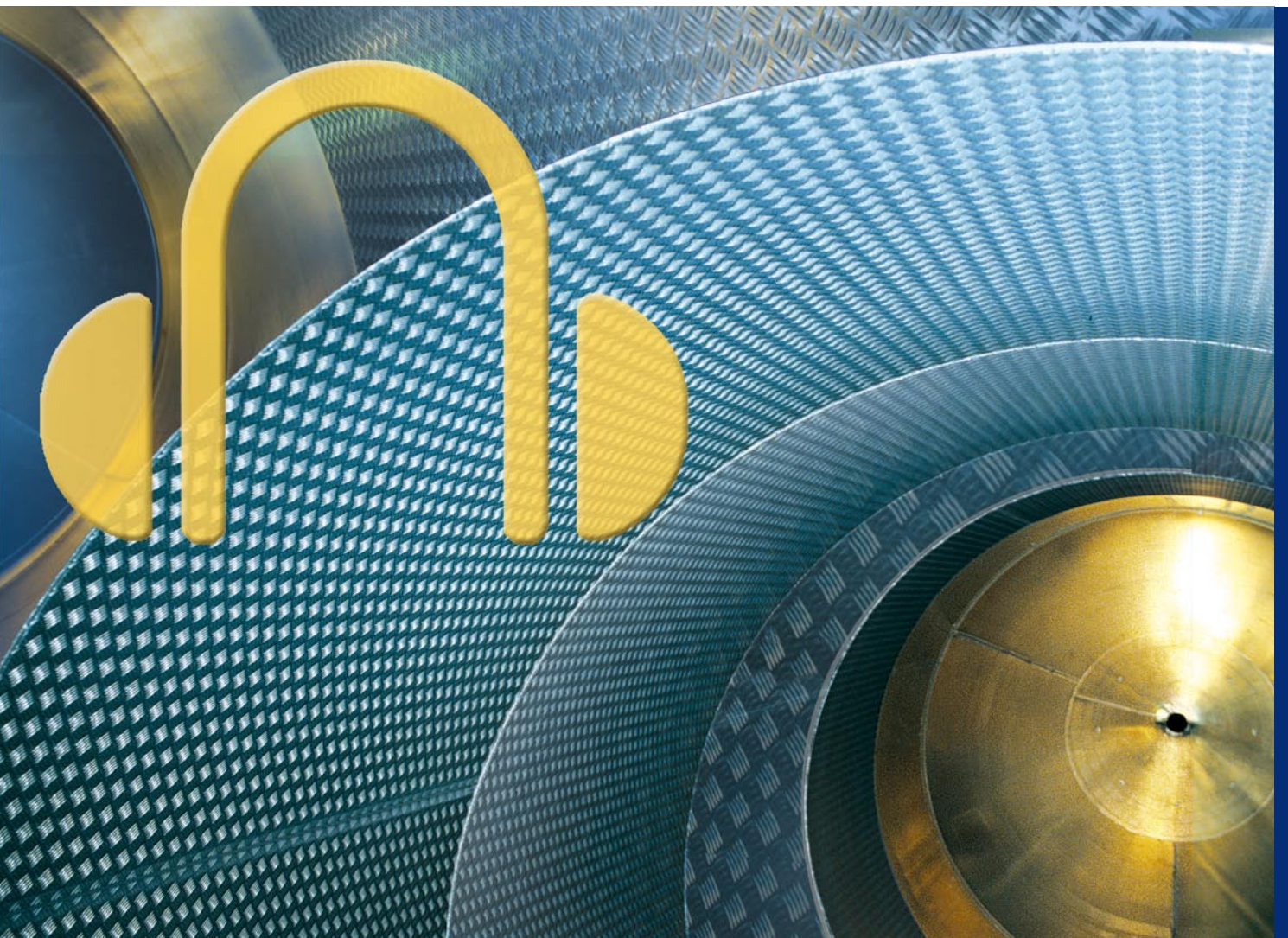


Sounds of Silence:

The Patented Anti-Honking Systems Invented by Zeppelin.



We solve complex challenges with flying colours.

We always did. Ever since the development of the legendary airships, the name Zeppelin has been associated throughout the world with technical perfection. The task then was to find the optimum method of processing aluminium in order to conquer the skies with ease. Then a pioneer of modern aviation, now a trend-setter in the construction of silo systems in aluminium or stainless steel – Zeppelin stands for innovation based on tradition.

Zeppelin – your powerful partner

... if it's a question of storage, conveying or blending.

The success of companies which process high-quality polymers rises and falls by the quality of the raw material handling. Those seeking profitable solutions put their trust in Zeppelin – and in the experience of an internationally successful industrial corporation. As a system supplier, Zeppelin covers a wide range of bulk handling requirements, from storage and blending silos to handling systems and all the relevant components.



Components and conveying systems made by Zeppelin: from diverter valves via rotary feeders up to elutriators and pipelines.

Research and development for your success: In the world's largest test center for testing bulk solids future is planned – in your own interest.

Optimum functionality to fulfill your individual requirements: Turnkey silo plants – for storage or blending purposes – complete with all accessories fit smoothly into your overall concept.

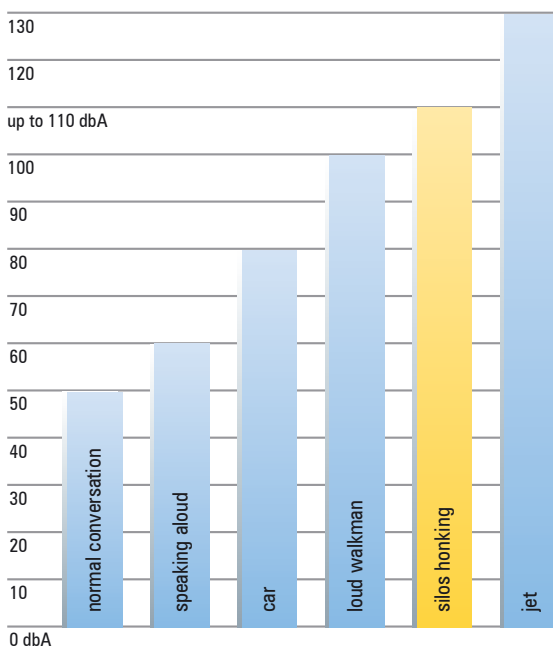


Honking silos can become a problem.

The phenomenon of honking silos has driven quite a few plant operators to despair. Silo plants which are located close to inhabitants or in an industrial area with strict environmental and noise protection regulations and which are not equipped with an anti-honking system might be shut down by the authorities.

Another problem is the so-called quaking of silos during discharge of bulk solids. The shocks which arise in intervals of 5 - 30 seconds may have fatal effects on the silo, the foundation or on the steel structure.

The following diagram gives you an impression of the extreme annoyance due to noise caused by honking silos:



Good for you if you have not heard anything about it!

Honking of silos is a phenomenon which depends on the bulk solids and not on the silo. This means: depending on the flow characteristics of the bulk solids and the corresponding wall friction angle, vibrations or even honking may develop. In general, bulk solids which generate dynamic loads during discharge from the silo may lead to development of noise. And the bigger the silo and, thus, the higher the loads – the higher the risk of honking.

Anti-honking system required	PET	PA	PBT	PP	PE	PVC	TiO ₂
recommended	X	X	X			X	X
not necessary				X	X		

The above table shows an extract of bulk solids bearing the risk of development of noise. Certainly, the risk depends on several factors, e. g. the silo capacity, its material and surface and on the kind/composition, type, and the temperature of the bulk solids (subject to change).



Intelligent silo technology

Patented solutions by the silo specialist:

For anti-honking systems a general distinction must be made between silos for the storage of powders and those for the storage of pellets as well as between new silos and those which need to be retrofitted. Zeppelin being the specialist when it comes to silos provides solutions for all requirements which are both: economic and corresponding to the requirements of chemical engineering.

Certainly, it is most economic to prevent the problem before it develops. Therefore, Zeppelin has developed a patented system especially for new silos which are designed for the storage of problematic bulk solids.

Wall plates with structure:

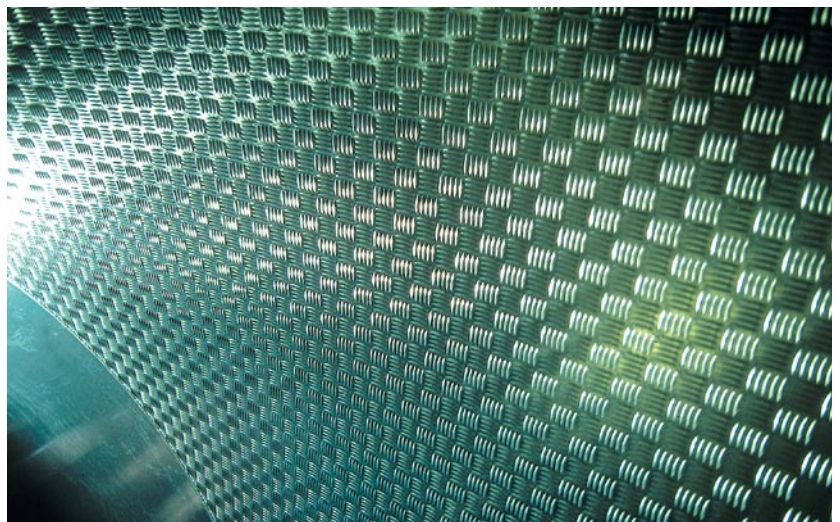
For new silos the cylindrical silo shell is partly manufactured from checkered plate or structured plate to avoid honking. The checkered surface showing to the interior of the silo alters the flow characteristics of the bulk solids during discharge – a so-called shear zone will develop near the silo wall. For retrofitting existing silos, plates will be mounted internally to the silo wall, which also results in the formation of a shear zone. This solution is appropriate for free-flowing pellets as well as for powders.



Also suitable for retrofitting:
Honking silos can even subsequently be equipped with goffered plate.

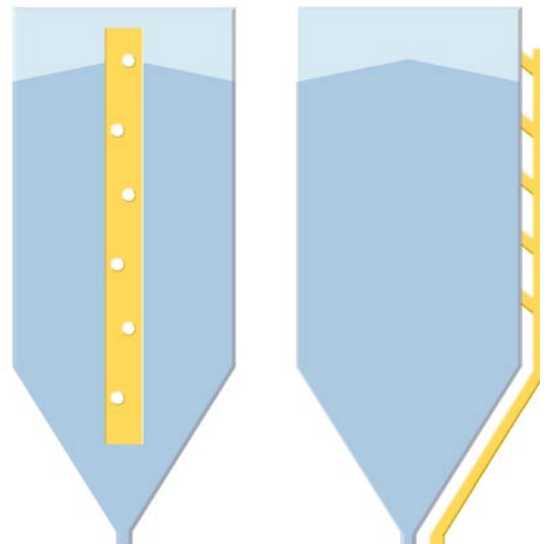


Thanks to the structured surface of the plate the wall friction coefficient will be changed.



Looking into the interior of a silo: By the installation of checkered plates a shear zone near the silo wall will develop – and honking will be avoided.

The possibilities for the use of discharge pipes are numerous. The decisive factor is the precise knowledge of the flow characteristics of the bulk solids in order to choose the optimum solution for the individual case.



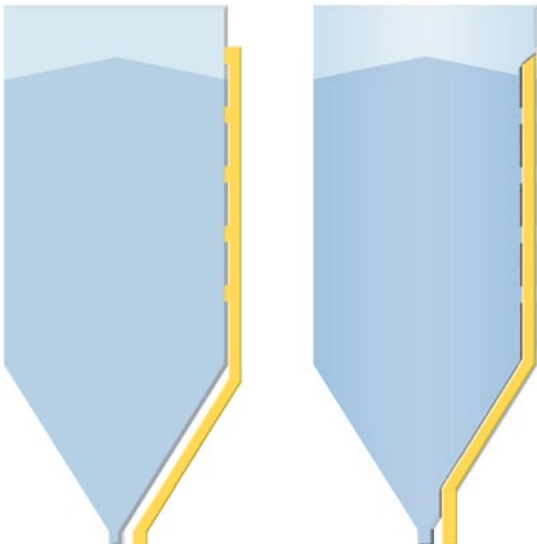
Nothing is impossible!

Discharge pipes – suitable for subsequent installation

Another possibility for restoring the silo's functionality is the installation of discharge pipes – a solution which is very expensive. This alternative, however, is only appropriate for free-flowing bulk solids. For all cohesive products – and, thus, for nearly all fine-grained powders – the product cannot be discharged via the discharge pipes.

The discharge pipes will be mounted centrally or peripherally to the silo wall, either at the interior or at the exterior. The product will be drawn off in the upper section of the silo, thus, reducing the pressure on the flowing bulk solids significantly.

However, by drawing off the bulk solids from the upper part, the bulk solids which have been fed into the silo at last will be drawn off first – funnel flow will develop. Consequently, this solution is not adequate for bulk solids which age quickly. Furthermore, this solution requires sufficient clearance beneath the silo to combine the flow from various outlets.



Count on our experience!

It does not make any difference which bulk solids and which requirements you will have – in case of honking problems only talk to the true specialists. Based on their experience collected for decades Zeppelin will always provide the optimum solution for your individual case. Thanks to the combination of economy and reliability you can always rely on Zeppelin, guaranteed among others by our full service program. See for yourself!



Research and development

From explosion protection via ageing of bulk solids, protection against abrasion up to the degassing behavior of bulk solids and tests of the flow behavior: in our Test Center and our laboratories you will have future under control.



Advice for logistics

Whether concepts for outsourcing, logistic systems for forwarders or optimizing of existing silo plants is required – we always plan for the long term. And you are prepared for tomorrow's markets.



Complete service from the very beginning to the end

We take care of the complete organization – starting with the architect via the foundation works up to the authorities. Or – from supply of the static calculation up to the training of your staff.



Range of services

Development of concepts – advice on the economy – modification of silos. Complete satisfaction of our clients at long term is our motto – up to interesting conditions for financing and leasing.

The Zeppelin group of companies: All specialists under one roof.

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