

# Silo Plants for the Plastics Processing Industry

Innovative Technology – Economic Benefits





## A century of experience gained through your tasks

**The industry sector of the Zeppelin Group is among the leading manufacturers of plants for storing, conveying, blending, and dosing of premium bulk solids. Thanks to our world-wide activities and locations in all important industrial centers we can always provide our clients with the latest, most innovative and reliable technology to ensure maximum economic success.**

As the direct successor of Count Ferdinand von Zeppelin who turned the human dream of flying into reality by building his legendary airships over a century ago, we are used to looking ahead. Constantly innovating, striving for perfection and maximum functionality in our products has turned us into the company that Zeppelin is known as today: the technology leader for handling premium bulk solids.



On site world-wide – always near our customers. Production plants in Germany, Belgium and Brazil, production partners in Saudi Arabia, Thailand and China as well as subsidiaries and representations all over the world enable Zeppelin to serve its customers with speed, flexibility and the utmost closeness to them. More than 200 engineers – including specialists in chemical engineering – guarantee innovative and economic construction of plants.





Zeppelin has been the leader in the international market of silo construction for decades. Thanks to our own modern manufacturing and the international experience of our assembly staff and service engineers we guarantee quality of the highest level.

## Competence in bulk solids handling – you can rely on Zeppelin

**The industrial Zeppelin Group and its various divisions are focused on the requirements of their customer groups. All activities have, however, one thing in common: the economic handling of premium bulk solids.**

**Silo plants** for the plastic, food, and chemical industries integrated in one logistics concept: from consultation and design to manufacture, assembly and after-sales service.

**Turn-key plants** for the plastics processing and chemical industry as well as for rubber producers and tiremakers.

**Conveying components** for any application: for powders or pellets, for high or low pressures, for products with good or poor flowability, for standard or special applications.

**Silogistic:** turn-key plants for plastics producers, engineering companies and forwarders. Zeppelin is the world-wide leader in the planning and construction of logistic centers and manufacturing plants.



Pulling all the strings: the central office for the industry sector is located in Friedrichshafen, Germany. Here, in the world's largest Technology Center for pellets and powders, tests are carried out on an industrial scale. The test results are available to all subsidiaries, therefore allowing our clients to always be on the safe side – no matter where their plant is located.



## A full range of products for every application

All Zeppelin welders are TÜV-certified to ensure the unconditional quality standards required in our demanding business and which form the basis of our renowned long-term Zeppelin quality.



### Aluminium storage silos

The solution for most fields of application requiring economical, safe, and reliable storage of high-quality bulk solids (pellets, powders, etc.)

- available in shell diameters from 2,400 to 4,200 mm standardized for your bulk solids
- with long or short silo skirt, pipe feet or brackets
- for silo anchoring on concrete foundation or steel structure
- special accessories available on request

### Small aluminium or stainless steel bins

For use as temporary or daily silo.

### Stainless steel silos

The optimum solution for extreme requirements: minimum wear and maximum product purity.

### Multi-chamber silos

The ingenious alternative for limited space conditions – suitable for a wide range of products, small batch quantities or separation of batches.

### Explosion-proof silos for explosive bulk materials

With explosion-proof design according to VDI 3673 / VDI 2263 and equipped with rupture disks for maximum explosion protection.



## Predefined standard or customized product

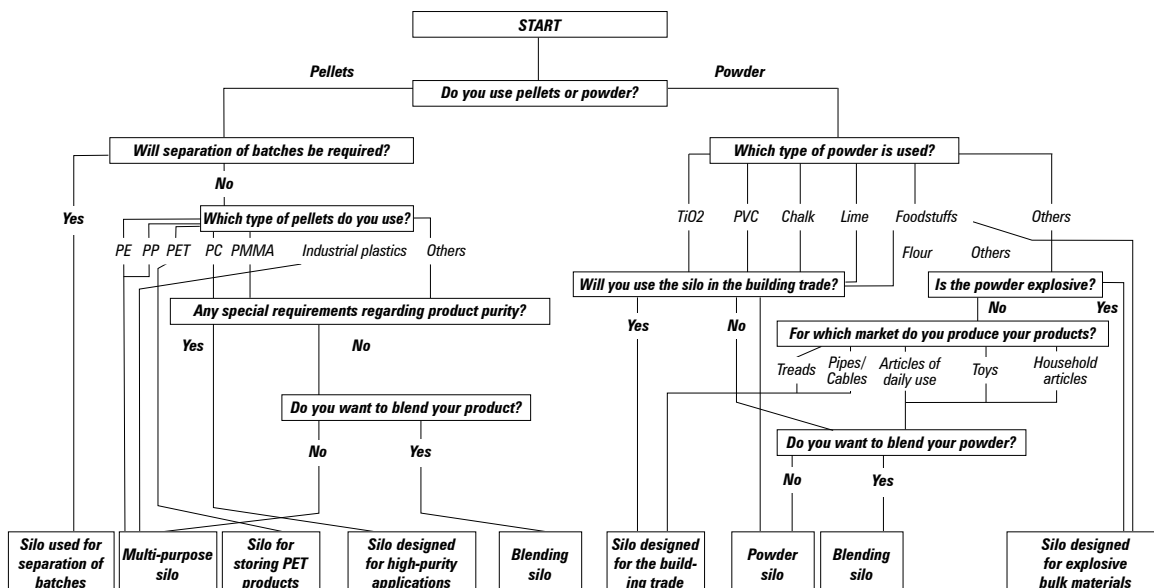
**The Zeppelin silo model range for plastics processors consists of two basic production series.**

Our model range of predefined silos for standard applications is tailored to each customer group's requirements (e.g. batch silos for automotive industry suppliers, silos for PET, silos for plastic pellets for the production of plastic film).

Because of this acquired knowledge, we can provide you quickly and at a competitive price with a fully equipped turn-key standard silo which can be integrated easily and smoothly into your process.

For more demanding tasks we rely on individual solutions. Benefit from our experience and competent advice. We design your silo in perfect accordance with your requirements, thus ensuring maximum performance reliability and highest functionality in the daily use.

By taking advantage of the know-how of the international silo technology leader, you will benefit from a first-class product and all advantages of the Zeppelin network – from consultation via design to production and assembly on site.



## With Zeppelin, premium bulk solids are in safe hands

The success of companies which process high-quality polymers fluctuates with the quality level of raw material handling. Those seeking profitable solutions put their trust in Zeppelin and in the experience of an internationally successful industrial group. As system supplier, Zeppelin provides turn-key silo plants in particular for the plastics processing industry. Services include consultation and engineering, manufacture and commissioning.

## Research and Development

Knowing everything there is to know about bulk solids is the key to today and tomorrow's success. Therefore, Zeppelin owns one of the world's largest bulk solids library and the Technology Center where tests are carried out on a 1:1 scale. With Zeppelin, your company's future is assured:

- research on flow properties, product ageing, contamination, and wear protection
- optimization of silo filling and discharge
- water accumulation and condensation, degassing behavior
- explosion protection

## Consulting

We think in the long term – and advise you accordingly. After all, your plant performance has a direct influence on your productivity. Besides all the process engineering details, our silo plant concepts also allow for future developments, preparing you optimally for the markets of tomorrow:

- advice on new products with different flow properties
- modification and optimization of existing plants
- development of concepts
- advice on profitability
- logistic consulting



## Zeppelin's know-how to your advantage!

The quality of our systems is the basis for your productivity. That's why Zeppelin offers not only silo plants, but also competent support, first-class service and an impressive service package – not to mention our top-quality products. This means lasting quality from a good source – and hence an excellent return on your investment.

### Service program

A global company should naturally score particularly high in terms of customer service. We promise all-round, long-term customer satisfaction – right from the start. Zeppelin quality also stands for:

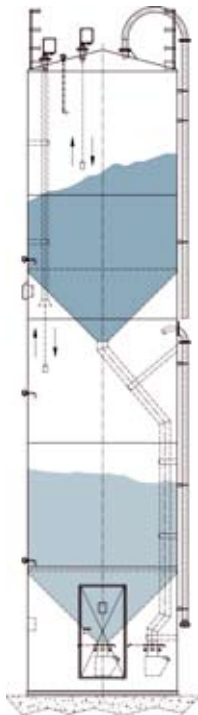
- optimization or adaptation even after several years
- modification / repair of silos
- relocation of individual silos or complete plants
- spare parts service

### Service

Close contact with the customer means you can expect high quality on the service side, too. The concept is simple: you leave the entire project in our hands and therefore free up your time for more important business!

- installation service
- full project management – beginning with the architect via the foundation constructor to the official authorities
- supply of structural design calculations (verifiable or verified)
- instruction and training of your personnel
- maintenance service

## The Zeppelin model range: As versatile as your requirements



### Multi-chamber silos – also suitable for separation of batches

The economical alternative for limited space conditions – suitable for a wide range of products or small batch quantities. An increasing number of double chamber silos is used for separation of batches by automotive industry suppliers whose customers insist on the clearly defined separation of production batches.

The capacity of the silo chambers equals that of the silo truck in order to ensure secure loading and unloading. These measures fulfill the high requirements necessary to be certified DIN ISO.

### The Transilo – a transportable storage system

The Transilo offers maximum flexibility and is ideal for frequently changing locations. The silos are equipped with base plate and therefore require no foundations. Moreover, they are easy to handle, reliable in the daily use and offer quick return on investment.

The Transilo can be transported by truck (no special vehicle required) and installed using a small crane. The silos are then bolted onto a plate. For the installation of the silo, only an even surface – no foundation – is required. The silo is then ready for use in no time.



## Manufacturing and transport methods

### **Zeppelin emboxable silos – the ingenious alternative for reducing freight charges**

In order to reduce freight charges, silos are emboxed in each other. This method requires highest precision but also offers the customer significant volume, thus cost, reductions: saving up to 45% of the normally required shipping volume for two emboxable silos and as much as 80% for six silos!

Emboxable silos are manufactured with a slight difference in diameter and equipped with a flange connection at the transition between the cylinder and the hopper. Cylinders, hoppers, and possibly the skirts of a silo group can, thus, be emboxed in each other for transportation.

### **Prefabricated silos for assembly on site**

Saving costs for long-distance transportation while maintaining the Zeppelin quality. Silo segments are prefabricated according to the modular design, transported at reasonable freight charges to the site where they are welded according to the renowned Zeppelin quality. Problems which may be caused e.g. by bad weather conditions, an especially tight schedule or impaired access to the construction site can, thus, be avoided.

Emboxable silos (photo on the left):  
Transport at low prices – easy and rapid assembly of silos on site.



## The Zeppelin blender model range: innovative technology ensuring highest product quality

**As demand for high-quality plastic pellets is increasing, blending and homogenization are becoming more and more important. Zeppelin has developed various blender designs to prevent quality variations (e.g. during the production of Masterbatch or recycling of plastic materials) and therefore be able to offer an economical and reliable solution for virtually any application.**

Zeppelin aluminium or stainless steel blenders can be integrated into your process easily. You can really rely on Zeppelin as technology and market leader to guarantee maximum process reliability, optimum blending results, and first-class consulting services right from the beginning.

### **Advantages of the Zeppelin blending and homogenization silos at a glance:**

#### **Reduced energy input – lower operating expenses**

Intelligent blender design and optimum dimensioning help minimizing the energy consumption of the blenders integrated in your production process.

#### **Reduced expenditure of time – accelerated overall processes**

Zeppelin blenders often only require a single mixing cycle to obtain the blending quality desired. Recirculations, by using an external conveying system, can normally be avoided.

#### **Lower investment – optimum blending quality**

Thanks to innovative concepts and more than 20 years of experience as technological leader in the construction of blending silos, Zeppelin's high-quality blending is ensured. It is therefore not uncommon that less or smaller blenders than in conventional systems are needed.





**Multi-Flow®**

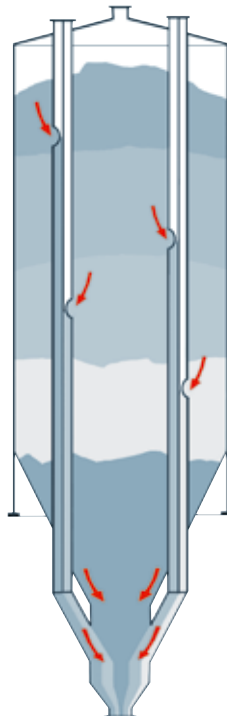
**Applications:**

For bulk solids having easy to poor flowability (e.g. powders, pellets, dryblends, compounds or recycling materials).

**Description of apparatus:**

The blending hopper generates various flow velocities of the bulk solids in the hopper and cylindrical blender section. The different residence times provide the blending effect. Multi-Flow Blending Hoppers can be welded into silos during fabrication or flange connected or welded onto existing silos.

The blenders are dimensioned in the Zeppelin Technology Center according to the customer's requirements.



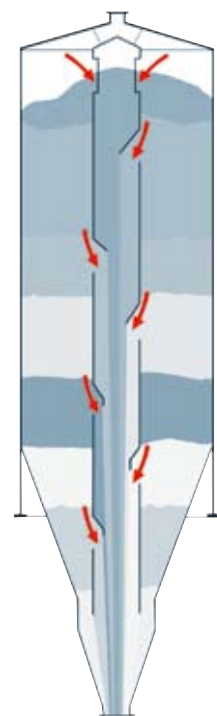
**Multi-Pipe®**

**Applications:**

The universal blender for all free flowing powders and pellets. Several blending pipes ensure an effective blending.

**Description of apparatus:**

Bulk solids enter the blending pipes at various intakes and flow to the central hopper outlet. Different residence times support the blending.



**Centro-Blend®**

**Applications:**

Equipped with a large central blending pipe for poor flowability materials such as powders, pellets and recycling materials, dryblends and compounds.

**Description of apparatus:**

Bulk solids are simultaneously withdrawn through intakes at various levels in the silo and directed to the central blending pipe. The number and size of the intake openings are selected according to the blender geometry and flow properties of the bulk solids.



**Optimum product quality**

The silo interior is free of edges and corners thanks to low-scratch manufacturing work of our certified welders.

**Optimum design** – also in accordance with your specifications

**Detailed drawings** and static calculations required for the building permit, drafts in the planning phase, assistance during the project realization – supporting the architect, the foundation constructor or the local authorities.

**Free on-site delivery** – completely assembled

**Assembly service**

**Instruction and training of your personnel**

**Smooth integration of the silo plant into your material flow concept**

**Electrical system:** All electrical connections are in the junction box in the silo skirt **3**

**Silo binvent filters (for powders)**

High-quality filters **4** to fit your product specifications, designed to fill tank trucks (appropriate for the final sloshing of product), complete with pneumatic cleaning, compressed air supply tank, and brand filter elements.

**Safety pressure relief valve according to BGV C 12** **5**

**Aluminium or stainless steel silos** **2**

**Standard silos are available in volumes of up to 350 m<sup>3</sup>. Other dimensions available upon request.**

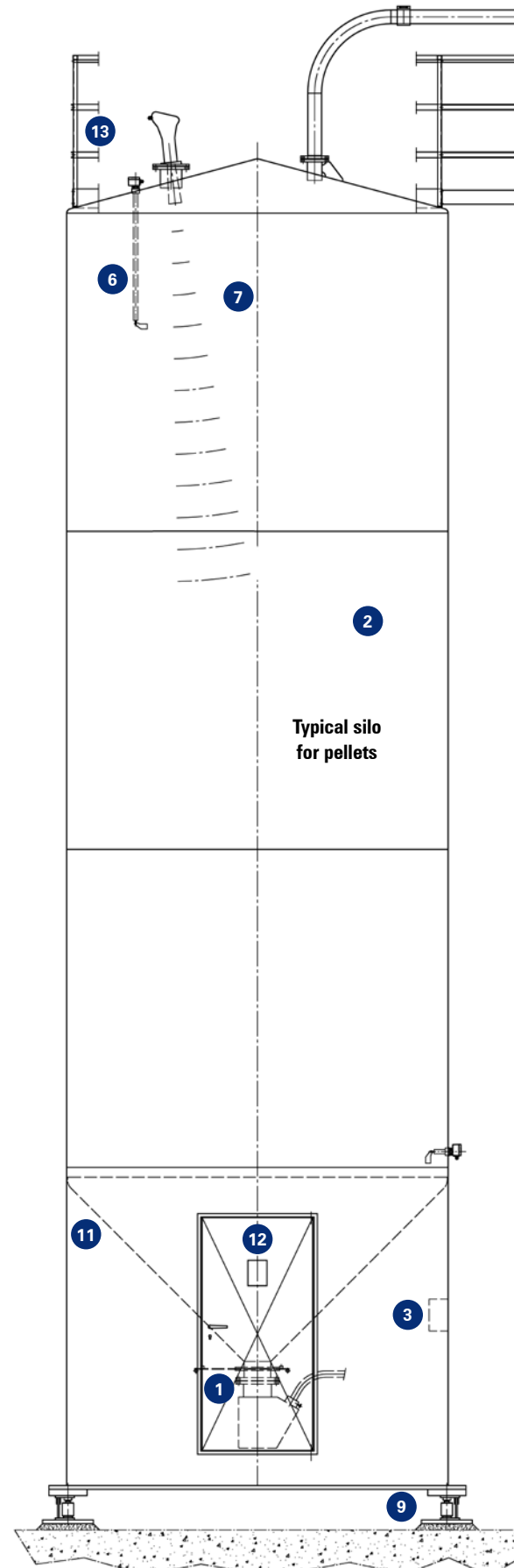
**For any bulk density**

**Silo anchoring on concrete foundation or steel structure** **9**

**Mass flow if required**

**With explosion protection in accordance with VDI 3673 / VDI 2263 if necessary**

**Safety device against faults during filling**



**Anti-slip coating**

Anti-slip coating or checkered plates offer additional safety for your personnel

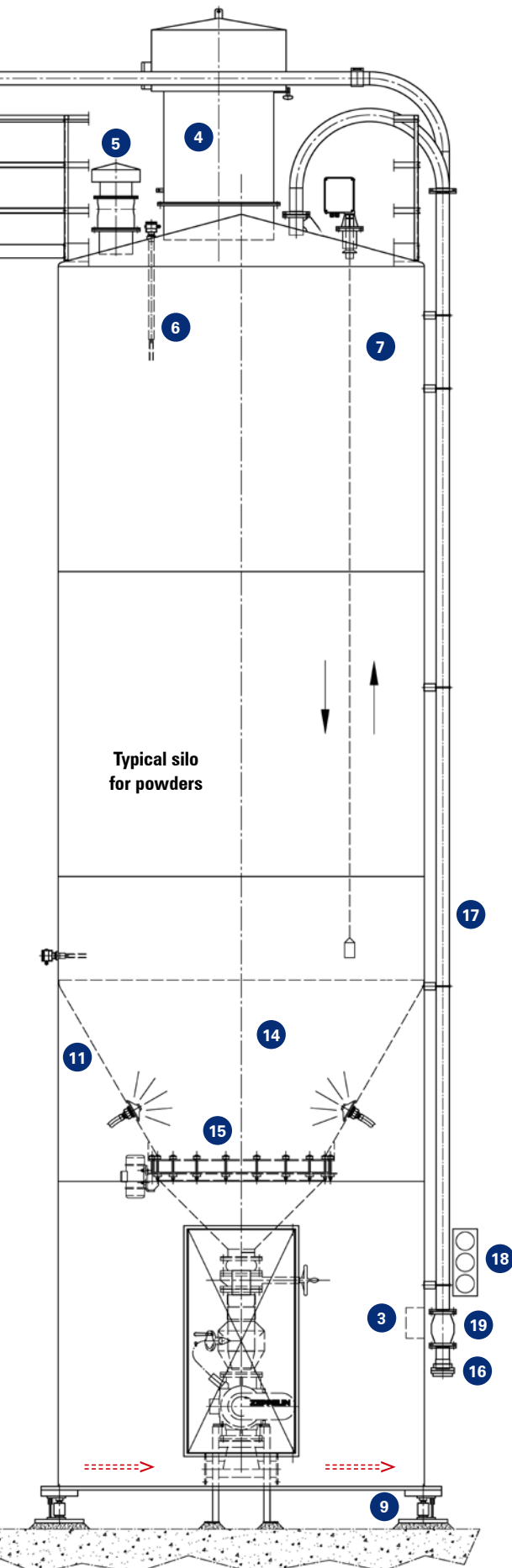


**Filling pipe elbow**

We recommend filling pipe elbows made of stainless steel, a particularly high strength material



**Daily bins**



**Inerting or blanketing for bulk solids** to reduce the moisture content or prevent water condensation

**Outlet flange 1** complete with emergency slide valve

**Silo measuring technology**  
With the reliable measuring technology from leading manufacturers (completely cabled in the junction box located in the silo skirt) you will always have a good overview. The device includes minimum and maximum level indicators 6 (alarm in option), continuous filling level measurement 7, silo weighing systems 9, control cabinets 8 and silo control systems. For visualization of the silo filling levels, a silo management system, which transfers the data to internal and external systems 10, can also be used.

**Illumination of the silo skirt 11**

**Lockable door in the silo skirt 12**

**Safe access equipment 13**  
Roof edge railing, ladder and connecting walkways in accordance with the regulations for the prevention of accidents and maintenance platform or anti-slip coating.

**Product discharge 14**  
On request, Zeppelin can also design your silo for mass flow to constantly discharge the bulk solids (first-in / first-out principle).

**Vibrating bottom / auxiliary discharge equipment 15**  
For bulk materials with poor flowability

**Filling of silos**  
Coupling 16 for the filling pipe 17, low-wear filling pipe DN 100 made from aluminium or stainless steel, operating panel 18 at the filling pipe, pinch valve 19.

**Foundation ring**  
For safe anchoring. Standard foundation rings are galvanized and delivered in advance.

8

17500 kg 17500 kg

● Full ● Full  
○ Empty ○ Empty  
- Quit

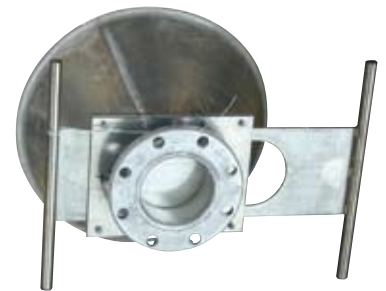
10



Pressure relief safety valve



Silo binvent filter



Emergency slide valve



Suction box

## Zeppelin long-term quality means money well spent

**Smart investors opt for quality right from the start – because investments have to pay off in the long run**

In other words: the better the system design, the more professional the logistics service, and the higher the fabrication quality, the more profitable the silo system – and the higher your profits! In short: the sooner you get in touch with Zeppelin, the better!



Patented technology, e.g. special cone forming machines means a competitive advantage for us and first-class products for you. Innovative welding techniques (such as simultaneous double-sided welding) speed up the fabrication of your product and guarantee a minimum of weld seams in lasting Zeppelin quality.



Zeppelin uses only high-caliber professionals for its production, too. Our TÜV-certified welders undergo extensive in-house training in the interests of long-term product quality. This means an optimum surface finish of your silo for optimum flow properties and maximum strength.



Water jet cutting machine: Fast, precise, powerful. The water jet cuts aluminium plates of up to 200 mm and steel plates of up to 150 mm with a pump pressure of 4100 bar.





## Quality management

# With Zeppelin your company's future is assured

Quality management at Zeppelin is everything you would expect from such a first-class supplier. Not only does the customer benefit from it, but the entire industry as well: for example, it was our engineers who assisted the TÜV authorities in defining the DIN calculation regulations.

As an internationally active and successful industrial group, Zeppelin has all important and relevant licenses for welding and manufacturing techniques.



All quality tests (whether destructive or non-destructive) are carried out in the Zeppelin laboratories.



Vertical assembly of Zeppelin silos: a further guarantee for extreme precision and hence maximum stability. In the long term, this means satisfied and successful customers.



## The Zeppelin Group of companies: All specialists under one roof

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