

Conveying Systems Made by Zeppelin:
For Each Application the Right Solution.





100 years of meeting your tasks has helped us gain strength – through experience.

The industry sector of the Zeppelin group is among the leading manufacturers of plants for the storage, conveying, blending, and proportioning of high-quality bulk solids. Thanks to our world-wide activities and locations in all important industrial centres we can always provide our clients with the latest, most innovative and secure process technology – to ensure maximum economic success.

As the direct successor of Earl Ferdinand von Zeppelin who, more than 100 years ago, turned the human dream of flying into reality by building his legendary air ships 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 technological leader for handling high-quality bulk solids.



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





As far as construction of silos is concerned Zeppelin has been the leader in the international market for decades. Thanks to our own modern manufacturing plant 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 the number of divisions belonging to it orient themselves strictly to the requirements of their different groups of clients – all activities have, however, one thing in common: the economic handling of high-quality bulk solids.

Silo plants for the plastic, food, and chemical industry integrated in the general logistics concept – starting with consultation and design up 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 from 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 largest Test Center in the world for pellets and powders tests are carried out on an industrial scale – the results of which are available to the subsidiaries. On this basis our clients are always on the safe side – no matter where their plant is located.

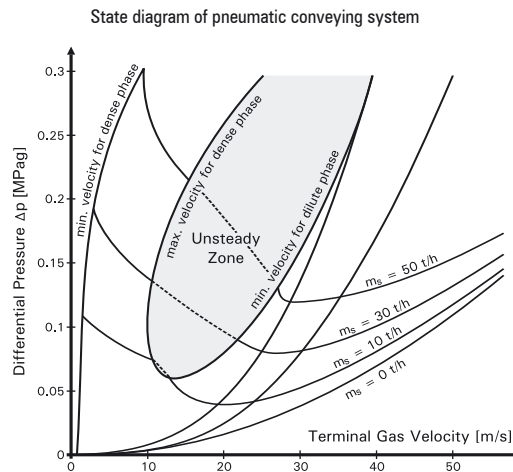


The optimum conveying procedure for your individual requirements.

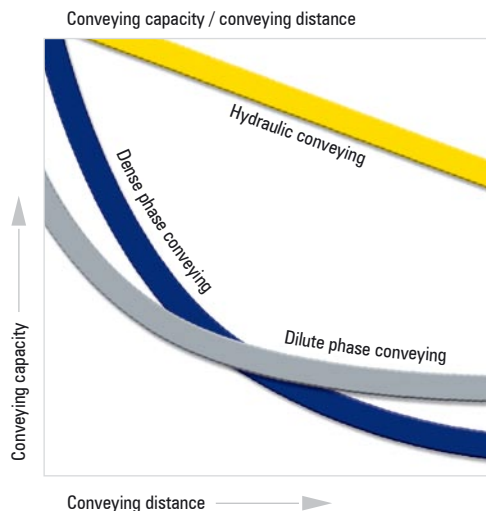
Highest reliability in processes, maximum profitability and achievement of a corresponding product quality for the bulk solids transport are requirements which you have regarding your plant. The staff of Zeppelin is used to offer the highest possible customer profit – and to advise you regarding this matter right from the beginning. For the use of conveying systems – whether in the bulk solids production, logistic terminals, or for feeding processing machines – generally two types of conveying systems are available from which the optimum system is selected in accordance with the client’s specific requirements:

- **Pneumatic conveying (dense phase or dilute phase):** conveying of the product with gas respectively air.
- **Hydraulic conveying:** conveying of the product with water.

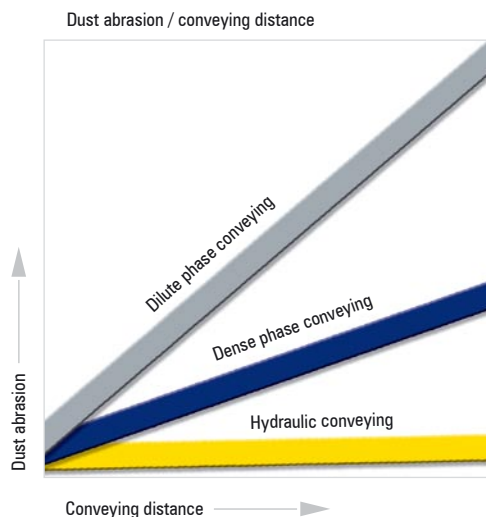
The choice of the conveying system which is most suitable for you depends on many different criteria: the characteristics of your bulk solids have to be considered (such as grain size, abrasion sensitivity), the plant parameters (such as the conveying distances), the concept of the complete plant (such as planning of autonomous silo farms) as well as the costs for investment and operation. Several combinations are also possible e. g. dilute phase conveying for long distances, purification afterwards and finally use of the product gentle dense phase conveying.



The individual state diagrams are used for the design of the respective pneumatic conveying system.



Due to the continuously increasing conveying capacities and the physical limits of the pneumatic conveyance resulting from that hydraulic conveying systems are used for an increasing number of applications.



By choosing the appropriate conveying method large abrasion quantities can be avoided.

Range of application

The table can be used to facilitate your decision for choice criteria. Furthermore, it shows typical values for different conveying methods.

Conveying process	Type of product			Conveying data				
	Fine powder	Grit, coarse grained powders	Pellets	Conveying distance**	Conveying capacity**	Conveying velocity	Loading	Conveying pressures (recommended)
Dilute phase conveying				< 1.5000 m	< 150 t/h	15 – 35 m/s	< 20 kg/kg	< 3,5 bar
Dense phase conveying				< 1.000 m	< 100 t/h	3 – 10 m/s	< 80 kg/kg	< 8 bar
Dense phase conveying with by-pass				< 300 m	< 30 t/h	3 – 10 m/s	< 30 kg/kg	< 8 bar
Hydraulic conveying				< 5.000 m	< 100 t/h	1,5 – 3,0 m/s	< 40 %*	< 8 bar

Preferred process

Appropriate process

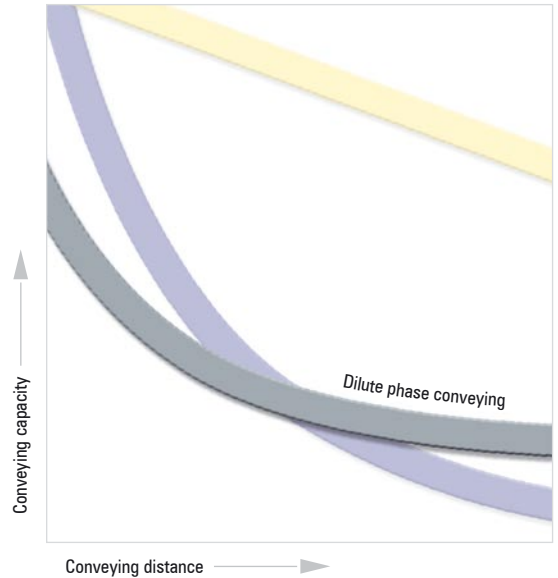
* Data are indicated in solid concentration

** Depending on the conveying capacities or conveying distance

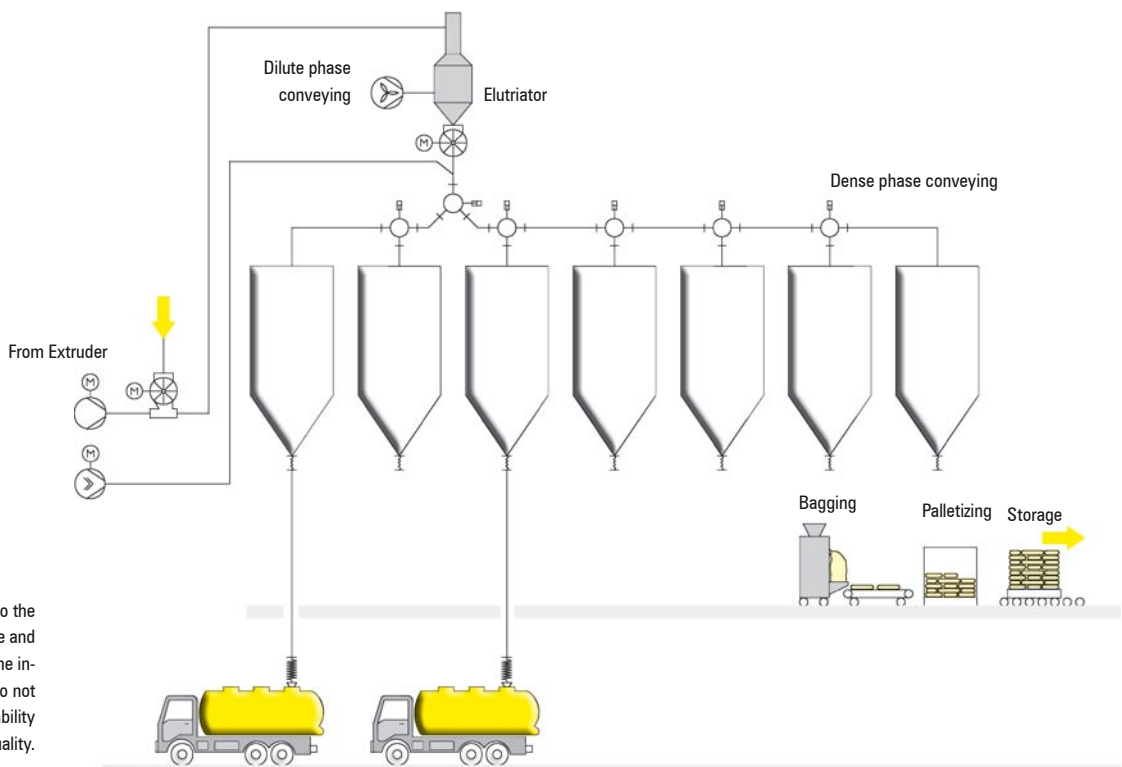
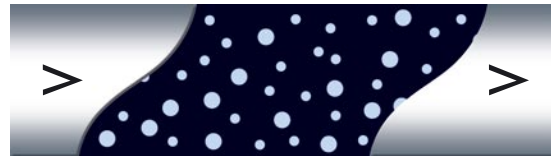


Pneumatic dilute phase conveying: universally applicable – maximum flexibility.

The process of the pneumatic dilute phase conveying (as a standard but also as a high-pressure dilute phase conveying) is mainly distinguished by the high flexibility of the system, e. g. in case of varying conveying quantities. This type of conveying system is very simple compared to the other conveying procedures and can be used for short or long conveying distances. The required components are simple and of low-maintenance. A further advantage of the dilute phase conveying are the low pipe forces and, thus, the reduction of the total investment costs due to cheaper pipe supports.



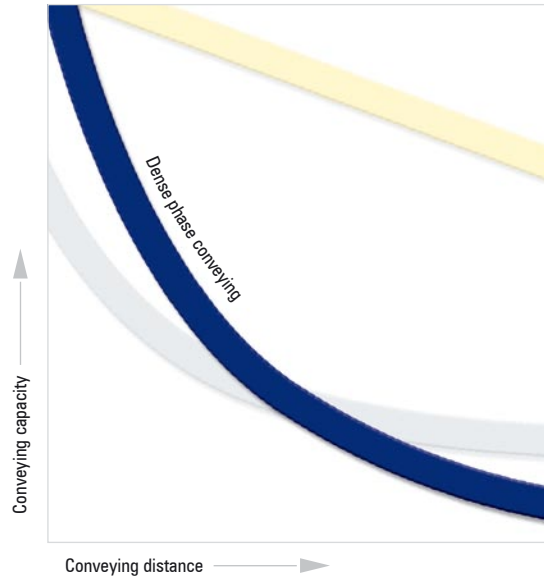
Typical velocity: 15 – 35 m/s
Typical loading: < 20



A clever solution: Due to the combination of dilute phase and dense phase conveying and the integration of an elutriator we do not only achieve maximum profitability but also high product quality.

Pneumatic dense phase conveying: gentle to the product – for high requirements.

If there are high demands regarding the pellet quality normally the pneumatic dense phase conveying is used. Especially for products which are sensitive regarding abrasion we recommend this system. The dense phase conveying is more complex than the dilute phase conveying and it is operated with higher pressures (up to typically 3,5 bar) and it requires more complex components regarding design and layout. However, the dense phase conveying is often the more favourable solution for short conveying distances.



Typical velocity: 3 – 10 m/s
Typical loading: < 80



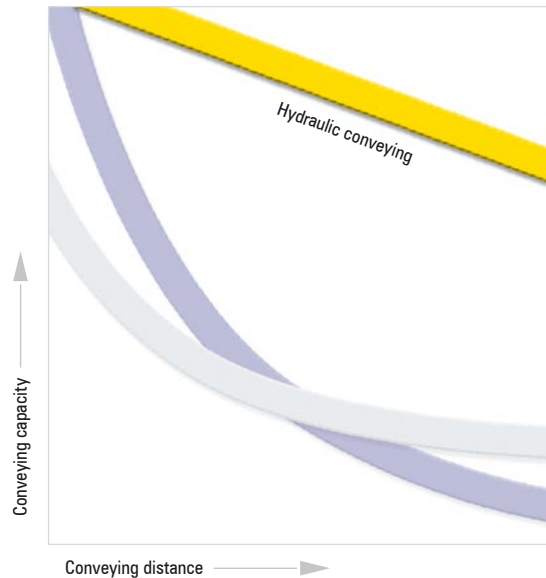
Product gentle conveying where it is necessary. With the dense phase conveying also high requirements regarding the product purity will be fulfilled.



Hydraulic conveying: for long distances – for a maximum product quality.

For the hydraulic conveying we use water as a conveying medium instead of gas. Especially in case of long conveying distances or extremely high purity demands the hydraulic conveying method is advantageous. The complex system has a low energy consumption for the conveying. Furthermore, smaller pipe diameters can be used in case of high conveying capacities. Hardly any forces effect on the pipes and the sound emissions are very low.

Typical velocity: 1,5 – 3 m/s
Solid concentration: < 40 %



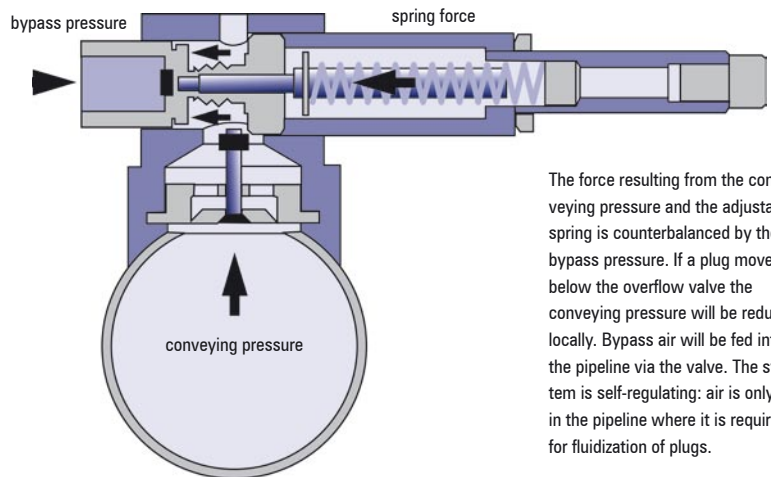
Long conveying distances – an extremely demanding product: a hydraulic conveying system was built for the transport of Polycarbonate.



Bypass systems as an option for powders.

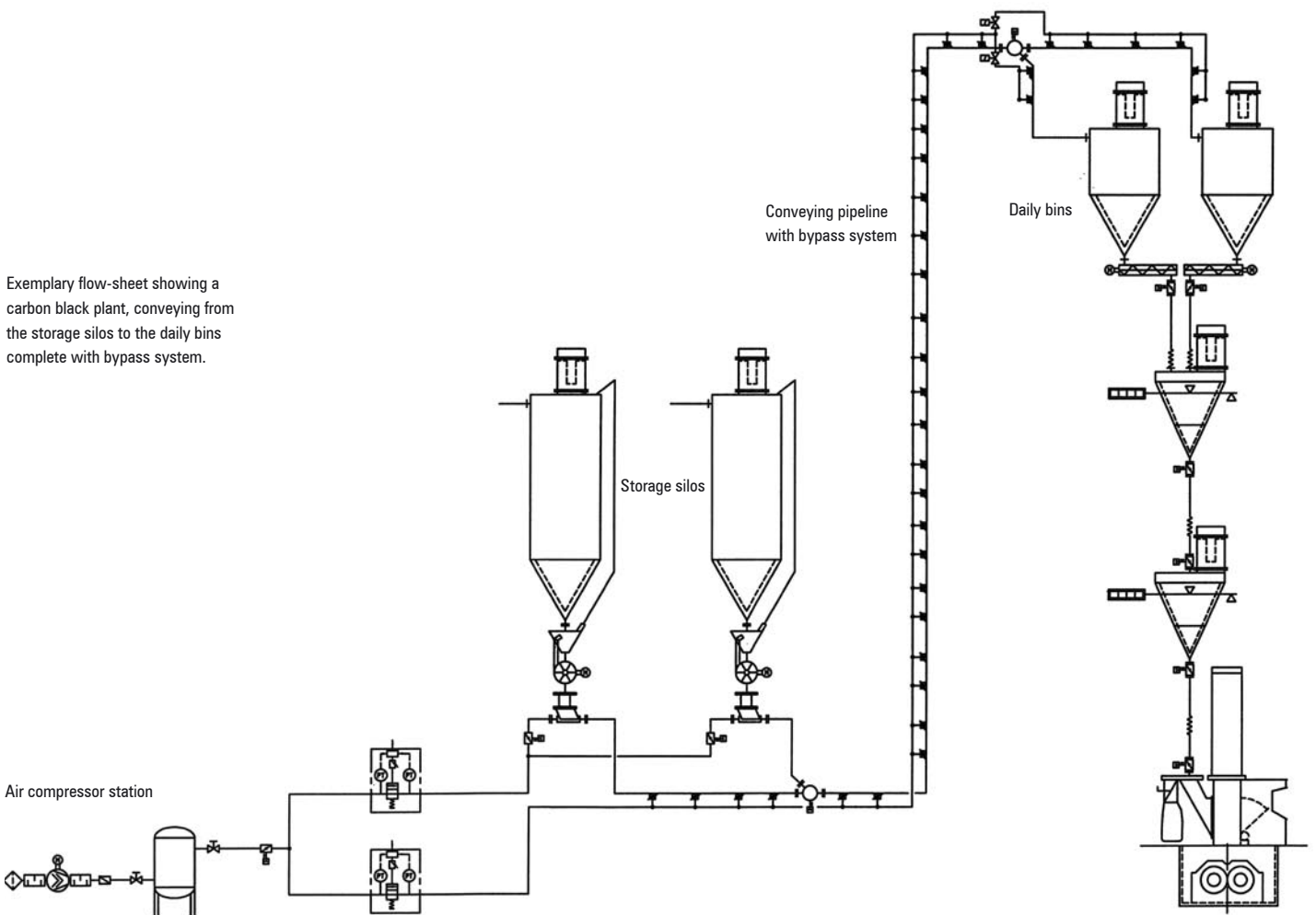
Two special bypass systems (Overflow and Airfloat) allow the use of the product gentle dense phase conveying also for fine powders. The bypass systems which blow secondary air specifically and at exactly defined intervals into the conveying pipeline allow trouble-free dense phase conveying which is mainly used for granulated carbon black or silica thanks to the low destruction of grains.

Typical velocity: 3 – 10 m/s
Solid concentration: < 30 %



The force resulting from the conveying pressure and the adjustable spring is counterbalanced by the bypass pressure. If a plug moves below the overflow valve the conveying pressure will be reduced locally. Bypass air will be fed into the pipeline via the valve. The system is self-regulating: air is only fed in the pipeline where it is required for fluidization of plugs.

Exemplary flow-sheet showing a carbon black plant, conveying from the storage silos to the daily bins complete with bypass system.



First-class components for first-class systems.

Each system is only as good as its single components – therefore, Zeppelin develops and produces the most important components by itself. Only for this reason the process reliability can be guaranteed for the whole plant.

With that you do not only get field-proven products – but also components which perfectly harmonize with each other within the system – for any application: for powders or pellets, for high or low pressures, for products with good or poor flowability, for standard or special applications. A broad range of products full of innovative and economic ideas.



Diverter valves in a modular construction – for simple as well as the most demanding applications.



High and medium pressure rotary feeders for feeding the product into the conveying systems.

Innovative technology for purification of the product: from the drum sieve via the elutriator up to the cyclone.



The Zeppelin Test Center: Research and development for your success.

With our combine of test facilities – which is unique in its size, its possibilities, and performance – we offer another element which will contribute to your success. Secure well-founded information concerning your product for yourself and consequently the optimum design of components or plants.

In order to meet the extremely different requirements of our clients we have deliberately designed our Test Center in a large scale. Two separate test plants are available at present: one for pellets and one for powders. We are prepared for your individual tasks – whether for test runs in an industrial scale or for special installations.

Only by research facilities like the Zeppelin Test Center our clients' lead in the market becomes possible.



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

Zeppelin Silos & Systems GmbH

Leutholdstr. 108
D-88045 Friedrichshafen
Phone: (+49) 75 41 20 2-02
Fax: (+49) 75 41 20 2-491
email: zentral.fn@zeppelin.com

Zeppelin Materials Handling GmbH

Leutholdstr. 108
D-88045 Friedrichshafen
Phone: (+49) 75 41 20 2-02
Fax: (+49) 75 41 20 2-581
email: info.fn@zeppelin.com

Zeppelin Belgium N.V.

Munsterenstraat 9
3600 Genk, Belgium
Phone: (+32) 89 62 94 00
Fax: (+32) 89 61 18 31
e-mail:
zeppelin.belgium@zeppelin.be

Zeppelin Technology Far East Pte, Ltd.

#18-06 Odeon Towers
331 North Bridge Road
Singapore 188720
Phone: (+65) 63 36 33 20
Fax: (+65) 63 39 99 29
e-mail: buero@zeppelin-zfe.com.sg

Zeppelin Systems USA, Inc.

P.O. Box 40501
Houston TX 77240-0501, USA
Phone: (+1) 71 38 49 56 66
Fax: (+1) 71 38 49 56 55
e-mail:
zeppelin-usa@zeppelin-usa.com

JMB Zeppelin Equipamentos Industriais Ltda.

Rua João XXIII, N° 650
CEP 09851-630 Jardim Nazareth
São Bernardo do Campo, SP
São Paulo, Brazil
Phone: (+55) 11 43 93 94 00
Fax: (+55) 11 43 92 23 33
e-mail: diretoria@jmbzeppelin.com.br

Zeppelin Systems India Pvt Ltd.

F411-414, Kailas Industrial Complex
Godrej Park Site Off L.B.S. Marg
Vikhroll (West), Mumbai – 400 079
India
Phone: (+91) 22 25 18 16 14
Fax: (+91) 22 55 97 49 05
e-mail: zeppelin@mtnl.net.in

Zeppelin Solid Technology (Beijing) Co., Ltd.

Rm. B816, Huibin Office Bldg.
No. 8, Beichendong Street
Chaoyang District
Beijing 100101
China
Phone: (+86) 10 84 98 51 56
Fax: (+86) 10 84 98 41 16
e-mail: office@zeppelin-china.com

Zeppelin Plast Tech S.r.l.

Centro Direzionale „Summit“
Palazzo „C“/Via Brescia
20063 Cernusco sul Naviglio
Italy
Phone: (+39) 02 92 10 69 05
Fax: (+39) 02 92 10 42 19
e-mail: info@zeppelin-zi.it

Presented by:

