



# SOLUTIONS for Pneumatic Conveying

VACUUM  
PRESSURE



**Palamatic**  
PROCESS >>> machines • engineering

Powder Handling Solutions

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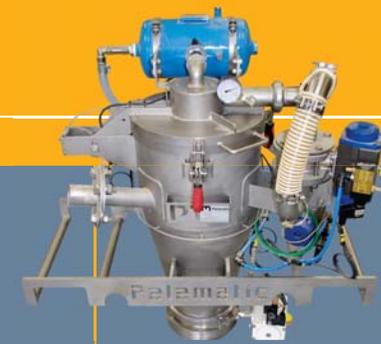
Means that the equipment is available for testing at PALAMATIC PROCESS



Means that the equipment can be installed in ATEX zone



Means that design and options can be customised



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## A TECHNOLOGY ADAPTED TO EACH PROCESS

Pneumatic conveying is as an alternative to the mechanical conveying of the materials. The conveying of the bulk materials operates by known methods of **pressure or suction**.

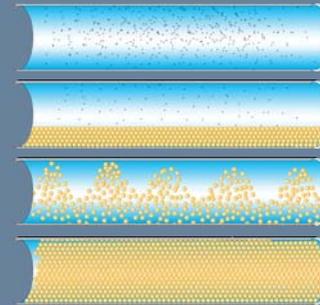
Pressure pneumatic transfer is particularly suitable for the transport of materials having high flow rates (up to 200 t./h.) and for medium to long distances (50 to 150 m.). Our range of dense phase pneumatic conveying systems has been designed to be a simple and effective method of transferring material from a single collection point to either a single or multiple reception points.

Vacuum pneumatic transfer is used to transport over short and medium distances (from 2 to 80 m.) powders or granules that are sensitive to heat, sticky or hygroscopic with a tendency to clog.

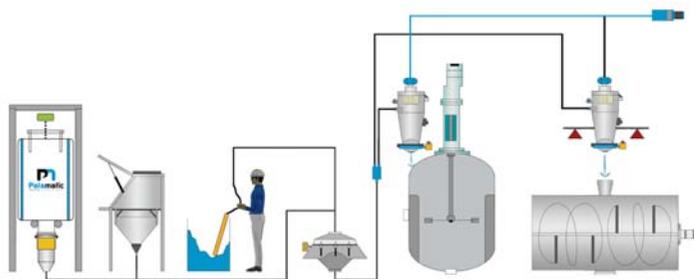
Pneumatic conveying systems are normally divided into two types depending on if the solids-air ratio is high (**dense phase**) or low (**dilute phase**).

**Dilute phase vacuum conveying systems** are particularly suitable for systems which convey materials at low to moderate capacities over medium distances, from multiple points to a single destination. These systems are versatile and adaptable for different materials and the low operating pressures allow lower cost pipelines and fittings.

**Dense phase vacuum conveying systems** are particularly suitable for systems which convey materials at high capacities over short to medium distances, from multiple sources to a single or multiple destinations. The low convey velocities and vacuum method make it suitable for food, dairy and pharmaceutical applications with friable or fragile agglomerated powders.



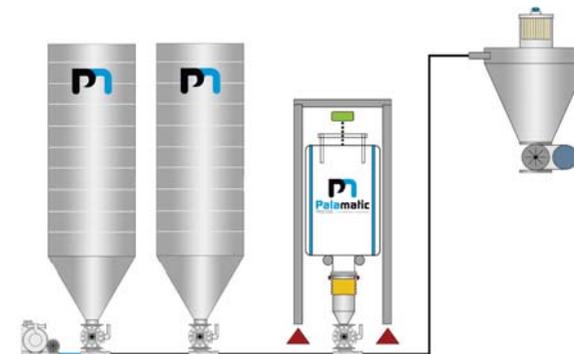
## STANDARD INSTALLATIONS WITH DENSE PHASE VACUUM CONVEYING SYSTEM



### [+] Advantages

- Vacuum of multiple reception points
- ATEX Security
- Integrated weighing equipment (loss-in-weight, weight gain)

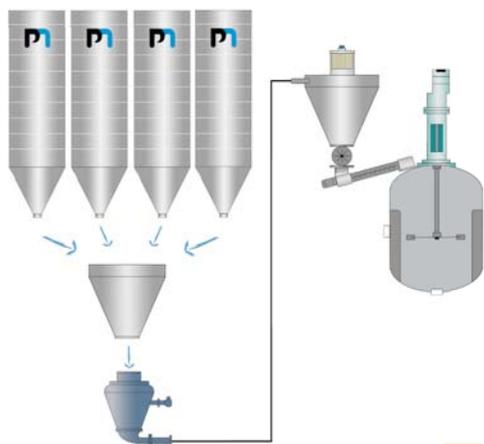
## STANDARD INSTALLATIONS WITH DILUTE PHASE PRESSURE CONVEYING SYSTEM - BLOWER



### [+] Advantages

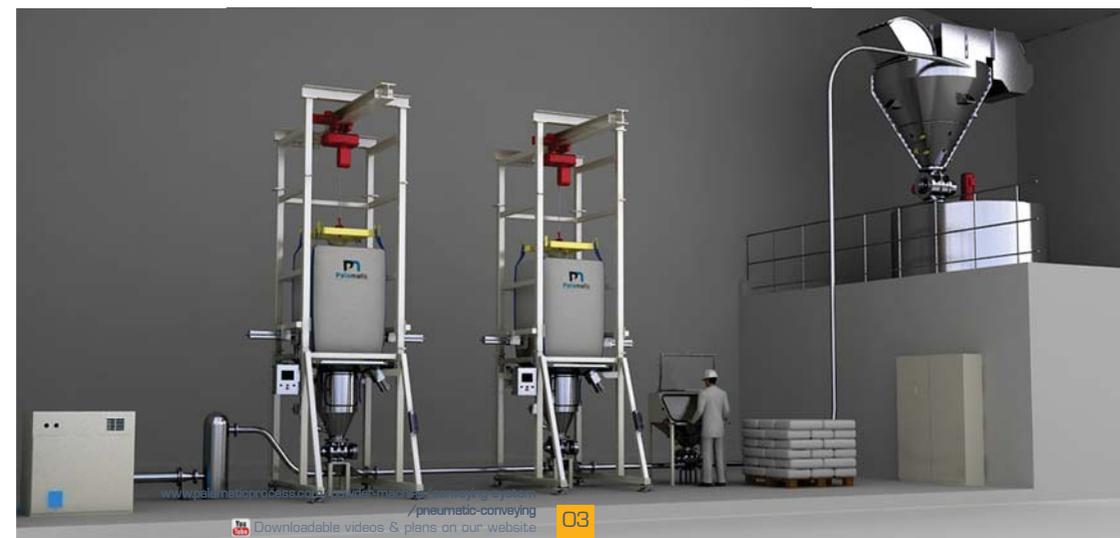
- Reduced cost
- Multiple arrival points
- Easy to install

## STANDARD INSTALLATIONS WITH DENSE PHASE PRESSURE CONVEYING SYSTEM



### [+] Advantages

- High convey rates
- A reduced abrasiveness



# Technological choice



★★★★★  
Equipment  
**TEST CENTER**  
Available



## Dense Phase Vacuum Pneumatic Conveying



CAPTION :   Non applicable ✓ Applicable

### ▶ Characteristics of the solutions

	Vacuum dense phase	Pressure dense phase	Pressure dilute phase	
Maximum Rates*	6 to 8 t./h.	200 t./h.	40 t./h.	
	Maximum conveying distance	70 m.	500 m.	300 m.
Convey velocity	Low	Low	High	
Convey rates	Negative	High	Low	
Piping abrasion	Low	Low	High	
Risk of damage of the mixing quality	Low	Low	High	
Amortization/Investment	Medium	High	Medium	
Energetic cost	Low	Medium	High	
Operating cost	Low	Low	Low	
Hygienic application	✓			
Multiple arrival points	✓	✓	✓	
Multiple start points	✓		✓	
ATEX application	✓	✓	✓	
Integration of weighing device at the start	✓	✓	✓	
Integration of weighing device on arrival	✓		✓	

\*Flow rates are indicative and may vary depending on material type.

# VFlow® Range



## OPERATING PRINCIPLE

Dense phase vacuum conveying systems use high capacity vacuum pumps to convey materials from a feeding hopper or a silo to a receiving vessel (vacuum hopper) where the air and product are separated by a filter. When this vessel is full, the vacuum is isolated and the conveyed product is discharged. Particularly adapted to difficult products, this cyclone can be easily set up in your environment with unlimited extension possibilities. Suction is performed from several feeding points and/or loading several points in your process. Coupled with weighing systems, it allows controlled introduction by weight of raw materials (bulk powders, granules...).

## ADVANTAGES

- Flexibility of the system through time
- Purge of the line
- Clean In Place
- Hygiene
- Loading of pressurized reactor
- Easy operation
- All products (bulk, powder, granules...)
- All rates
- No degradation of the conveyed material

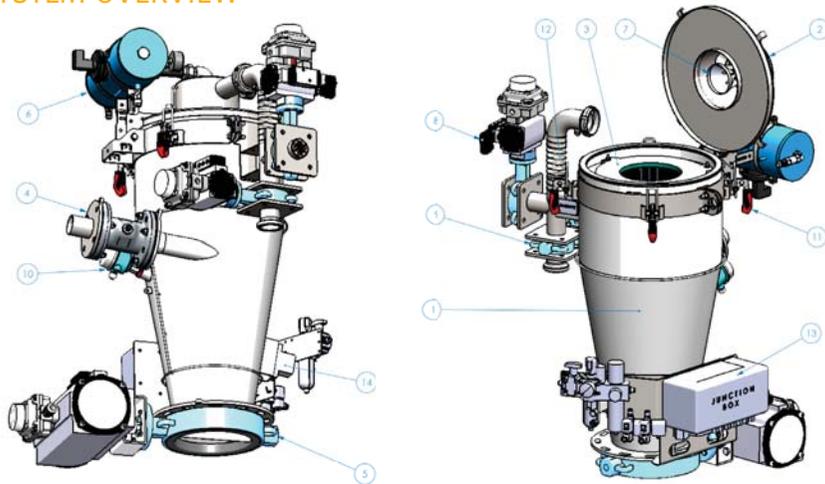
## IDEAL SOLUTION

FOR FEEDING:

- Powder moisteners
- Mixers
- Tanks
- Reactors
- Pressurized reactors
- Dispensers loaded with solvents
- Filling machines...



## SYSTEM OVERVIEW



Part n°	Denomination	Manufacturing	Qty
1	Body	Stainless steel 304L	1
2	Cover	Stainless steel 304L	1
3	Removable filtering cartridge	Height 350 mm - Ø 325mm	1
4	DN65 Inlet product valve	Pinch valve	1
5	DN250 Outlet product valve	Butterfly valve - Cast iron body - Stainless steel disc	1
6	Unclogging tank	Painted steel cylinder - Aluminium solenoid valve	1
7	Unclogging nozzle	ABS	1
8	DN65 Valve for venting	Butterfly valve - Cast iron body - Stainless steel disc	1
9	DN65 Vacuum valve	Butterfly valve - Cast iron body - Stainless steel disc	1
10	High level probe	Capacitive technology	1
11	Spring clips for cover closing	Zinc plated steel - Bi-material plastic handle	4
12	Vacuum hose	Food quality polyurethane tube	1
13	Pneumatic equipment plate	Stainless steel 304L	1
14	Pneumatic vibrator	Aluminium	1

Note: materials and accessories may differ depending on your configuration

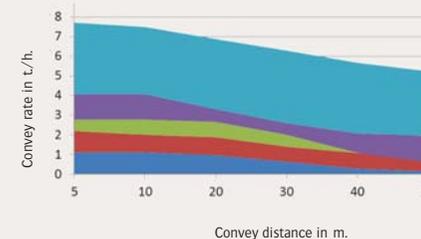
## CYCLONES RANGE



Models	Overall height in mm	Convey rate in m³/h.*	Ø Piping	Material outlet	Material valve Ø	Compressed air consumption in m³/h.*	Tare weight (kg)
VFlow® 01	880	0 to 1	SMS 38	DN 200	DN 40	0,33 to 1,32	95
VFlow® 02	1 133	1 to 2,5	SMS 51	DN 200	DN 50	0,68 to 1,56	115
VFlow® 03	1 311	2,5 to 4	SMS 63	DN 250	DN 65	0,72 to 1,11	145
VFlow® 04	1 477	4 to 6	SMS 76	DN 300	DN 80	0,90 to 1,31	170
VFlow® 05	1 644	5 to 8	ISO 88,9	DN 300	DN 100	0,76 to 1,21	185

\*convey rates depend on the density of the conveyed material.

## RATES / DISTANCES RATIOS



Granules, metallic powders or sticky materials, the VFlow® range ensures the conveying of more than 95% of existing powdered materials!



## 03

Dense phase vacuum conveying: powder pump



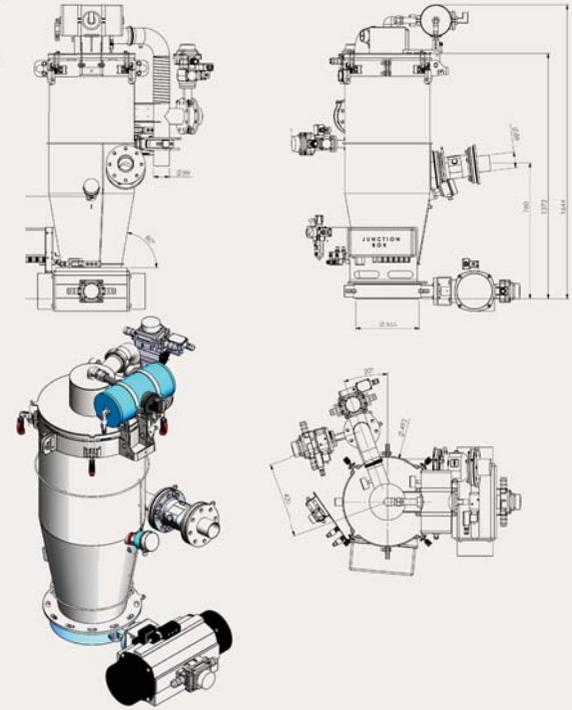
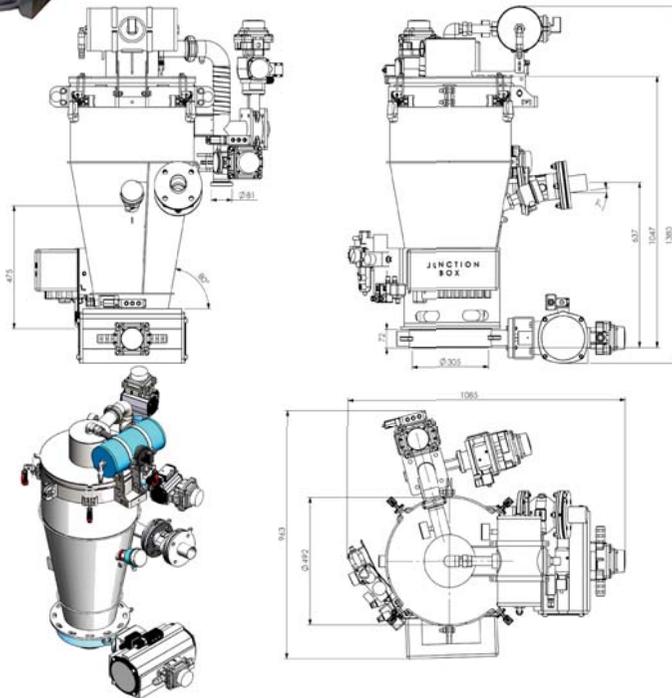
**Model:** VFlow® 03  
**Rate:** 2.5 to 4 m³/h.  
**Overall height:** 1070 mm  
**Volume of the cyclone:** 40 L  
**Manufacturing quality:** Ra < 1.2 to 0.8  
**Cyclone body manufacturing:** 304(L) stainless steel, 316(L) stainless steel  
**Size of the particules transferred:** from mm to 3 µm  
**Operating temperature:** -10°/+ 40°  
**Vacuum pump technology:** without lubrication, with dry paddles or nozzles  
**Tare weight:** 145 kg  
**Maximum vacuum transfer:** 800 Nm³/h.  
**Air consumption\*:** 0.80 to 1.23 m³/h.  
 \*Flow rate at atmospheric pressure, maximum and minimum rates  
**Operating pressure:** 6 bars  
**Filter manufacturing:** polyester, PTFE coated, stainless steel deployed inside  
**Filtering area:** 2.8 m²  
**Unclogging tank volume:** 6.5 l.  
**Level probe characteristics:** capacitive (on request according to product)  
**Unloading valve technology:** butterfly Ø DN250  
**Valve body:** cast iron or 316L stainless steel  
**Valve disc:** 304(L) stainless steel, 316(L) stainless steel  
**Product valve technology:** pinch  
**Vacuum valve technology:** butterfly with pneumatic actuator  
**Air suction pipe Ø (mm):** 63.5  
**Product suction pipe Ø (mm):** 63.5  
**Piping type:** rigid and flexible (reinforced piping with electrical spiral for metallic continuity)  
**Connections:** SMS, clamp, flange  
**Power required:** 4 to 5.5 kW  
**Inlet:** 2  
**Outlet:** 5  
**ATEX compatibility:** 20, 21, 22 et 1, 2

## 04

Dense phase vacuum conveying: powder pump



**Model:** VFlow® 04  
**Rate:** 4 to 6 m³/h.  
**Overall height:** 1070 mm  
**Volume of the cyclone:** 55 L  
**Manufacturing quality:** Ra < 1.2 to 0.8  
**Cyclone body manufacturing:** 304(L) stainless steel, 316(L) stainless steel  
**Size of the particules transferred:** from mm to 3 µm  
**Operating temperature:** -10°/+ 40°  
**Vacuum pump technology:** without lubrication, with dry paddles or nozzles  
**Tare weight:** 170 kg  
**Maximum vacuum transfer:** 800 Nm³/h.  
**Air consumption\*:** 0.63 to 0.92 m³/h.  
 \*Flow rate at atmospheric pressure, maximum and minimum rates  
**Operating pressure:** 6 bars  
**Filter manufacturing:** polyester, PTFE coated, stainless steel deployed inside  
**Filtering area:** 4.2 m²  
**Unclogging tank volume:** 6.5 l.  
**Level probe characteristics:** capacitive (on request according to product)  
**Unloading valve technology:** butterfly Ø DN250  
**Valve body:** cast iron or 316L stainless steel  
**Valve disc:** 304(L) stainless steel, 316(L) stainless steel  
**Product valve technology:** pinch  
**Vacuum valve technology:** butterfly with pneumatic actuator  
**Air suction pipe Ø (mm):** 76  
**Product suction pipe Ø (mm):** 76  
**Piping type:** rigid and flexible (reinforced piping with electrical spiral for metallic continuity)  
**Connections:** SMS, clamp, flange  
**Power required:** 5.5 to 11 kW  
**Inlet:** 2  
**Outlet:** 5  
**ATEX compatibility:** 20, 21, 22 et 1, 2

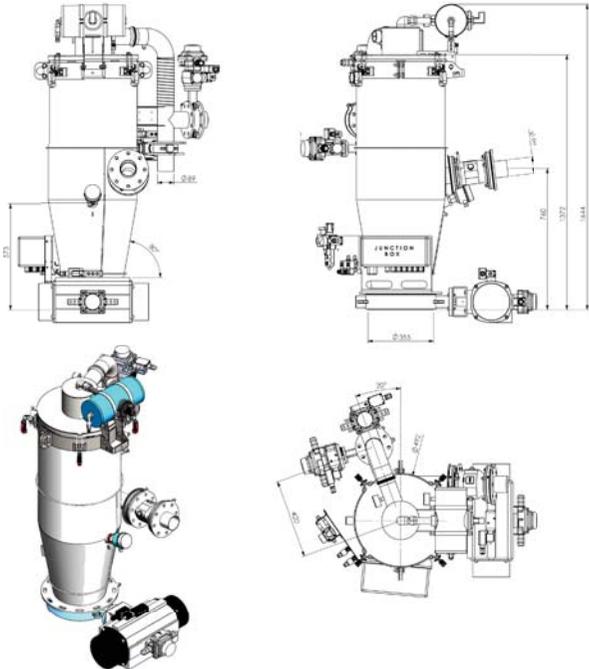


## 05

Dense phase vacuum conveying: powder pump



**Model:** VFlow® 05  
**Rate:** 5 to 8 m³/h.  
**Overall height:** 1100 mm  
**Volume of the cyclone:** 70 L  
**Manufacturing quality:** Ra < 1.2 to 0.8  
**Cyclone body manufacturing:** 304(L) stainless steel, 316(L) stainless steel  
**Size of the particules transferred:** from mm to 3 µm  
**Operating temperature:** -10°/+ 40°  
**Vacuum pump technology:** without lubrication, with dry paddles or nozzles  
**Tare weight:** 185 kg  
**Maximum vacuum transfer:** 800 Nm³/h.  
**Air consumption\*:** 0.57 à 0.92 m³/h.  
\*Flow rate at atmospheric pressure, maximum and minimum rates  
**Operating pressure:** 6 bars  
**Filter manufacturing:** polyester, PTFE coated, stainless steel deployed inside  
**Filtering area:** 5.6 m²  
**Unclogging tank volume:** 6.5 L  
**Level probe characteristics:** capacitive (on request according to product)  
**Unloading valve technology:** butterfly Ø DN300  
**Valve body:** cast iron or 316L stainless steel  
**Valve disc:** 304(L) stainless steel, 316(L) stainless steel  
**Product valve technology:** pinch  
**Vacuum valve technology:** butterfly with pneumatic actuator  
**Air suction pipe Ø (mm):** 104  
**Product suction pipe Ø (mm):** 104  
**Piping type:** rigid and flexible (reinforced piping with electrical spiral for metallic continuity)  
**Connections:** SMS, clamp, flange  
**Power required:** 11 à 13.2 kW  
**Inlet:** 2  
**Outlet:** 5  
**ATEX compatibility:** 20, 21, 22 et 1, 2



## 05

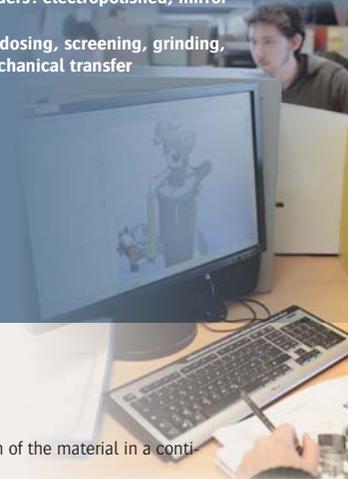
Dense phase vacuum conveying: powder pump



### POSSIBLE FEATURES

- Specific and reduced dimensions
- Applications for toxic materials
- Nuclear industry, containment
- Manufacturing materials adapted to the conveyed material and the working environment: steel, stainless steel, Hastelloy, Uranus B6, Viton, Perbutan, Nitrile...
- Surface treatments adapted to powders: electropolished, mirror polished, vulcanizing, teflon
- Process functionalities integration: dosing, screening, grinding, granulation, anti-bridging device, mechanical transfer
- ATEX...

See all our options on pages 22-23



### Dense phase vacuum conveying

The VFlow® allows a pneumatic **vacuum dense** conveying and prevents the deterioration of the material in a continuously and contained manner in your manufacturing processes.

Particularly adapted to difficult products (poor flow, fragility, abrasiveness or explosiveness of the material), this cyclone can be easily set up in your environment with unlimited extension possibilities.

Suction is performed from multiple feeding points and/or loading several points in your process.

It also allows the feeding of the pressurised reactor and feeding of the material without any addition of air.



## ▶ CONVEYING OF MIXED MATERIALS AND CLEAN IN PLACE PROCESS

**Treated product: raw material and detergent solution mixture**

- ➔ Mixer and packaging line feeding
- ➔ Respect of the mixture during the conveying phase
- ➔ Clean In Place of tall the conveying lines



## ▶ LOSS-IN-WEIGHT AND DEDICATED LINE

**Treated product: sugars**

- ➔ Feeding of a powder disperser from 2 weighed FIBC unloading units
- ➔ Flow rate: 5t./h.
- ➔ Integrated purge of the line to ensure dosing accuracy and no cross-contamination



## ▶ ONLINE SIFTING

**Treated product: food mixture**

- ➔ Online mixture sifting and feeding of a FIBC packing unit
- ➔ Flow rate: 4t./h.

**Advantages:** accessibility to equipment for inspection and cleaning



## ▶ IMPLEMENTATION IN A CONDITIONING AND MIXING PLANT

- ➔ Conveying of raw materials towards the mixer
- ➔ Transfer of the mixings towards the packaging unit
- ➔ Flow rate: 5t./h. and 4t./h.
- ➔ Implementation in ATEX zone
- ➔ Online sifting and integrated dosing of raw materials



## ▶ DEMOUNTABILITY OF EQUIPMENT

**Treated product: chocolate powder**

- ➔ Compact design for easy disassembly and cleaning
- ➔ ATEX Security
- ➔ Special design for greasy material with poor flowing



## ▶ TRANSFER OF COATING GELATIN FOR CAPSULES

**Treated product: virgin gelatine**

- ➔ Ensure the feeding of the melter with virgin gelatine (separation of fine and grain)
- ➔ Maximum hygiene

**Advantages:** the pneumatic conveying system provides multiple function which helps to minimize the number of implanted devices



# VFlow® Detached filter



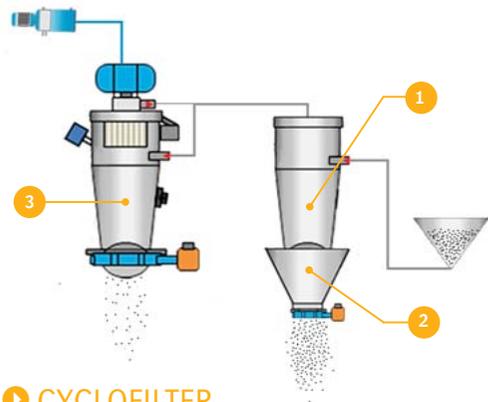
Detached filter

## OPERATING MODE

A separating cyclone (offset filter) is coupled to the pneumatic conveying cyclone. The separating cyclone is fitted with a reintroduction nozzle for collecting aspirated fines continuously and for using them again in the process. From a flow rate point of view, the introduction of a separating filter allows to eliminate filter cleaning cycles (10% of a cycle time on average).

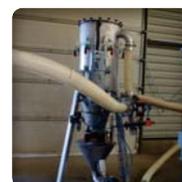
## TECHNICAL SPECIFICATIONS

**Particules sizes:** 50 – 500 µm  
**Average level of vacuum:** 600 mbar absolute  
**Cyclonic efficiency:** > 99,5%  
**Manufacturing materials:** 304L stainless steel, 316L stainless steel  
**Available finishes:** outside microblasting, inside electropolishing, inside mirror polishing  
**Filtering media:** PTFE, antistatic PTFE, FDA certified  
**ATEX certification:** zone II 1.2.3 GD (less than 3 mJ EMI).



## MAIN FUNCTIONS

- Cyclonic:** air/product separation
- Storage:** product recovery, conservation of expansion volume
- Finishes:** separation and protection of the vacuum element



**No product loss:** reintroduction of the powders into the process



**Implementation in harsh environments:** loading of reactors in hazardous areas: protection of the filter against emanation of vapors, gas and dust area ATEX certification



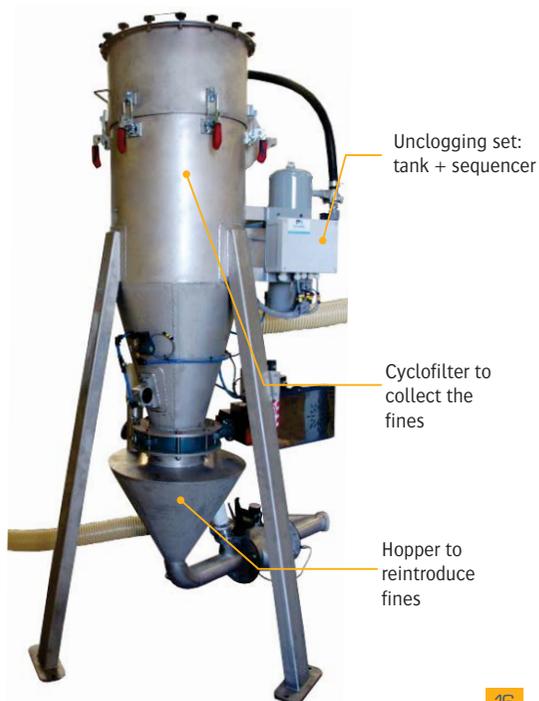
**High rate process:** optimization of the cyclonic efficiency, reduction of pressure losses, continuous unloading



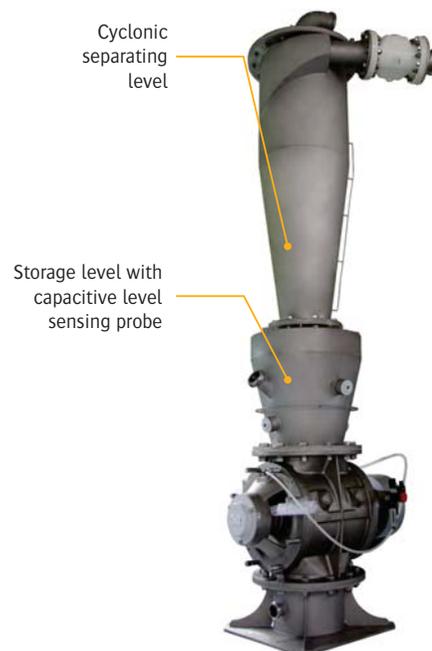
**Difficult product conveying:** protection of the filtering system, no clogging in the filter

## Advantages

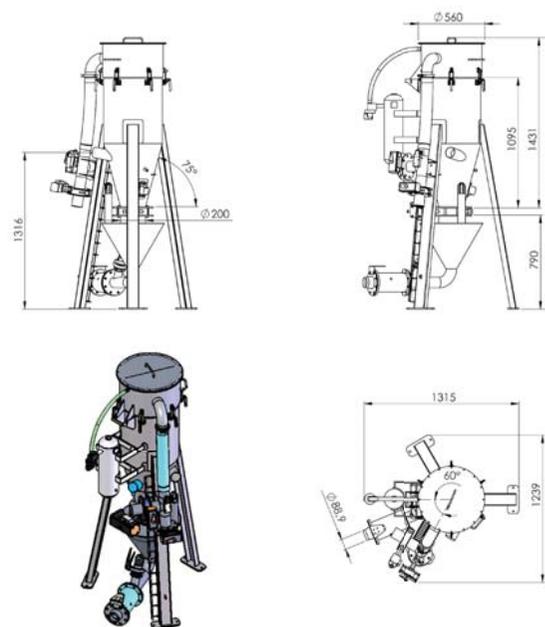
## CYCLOFILTER



## SEPARATING CYCLONE



## RANGE OF CYCLOFILTERS



Models	Rate in m <sup>3</sup> /h.	Piping Ø in mm	Filtering surface in m <sup>2</sup>	Cyclone outlet Ø in mm	Cyclone height in mm
VF DEP 02	2	50	5	100	600
VF DEP 04	4	65	8	150	780
VF DEP 06	6	80	12	150	960
VF DEP 08	8	100	18	200	1 200
VF DEP 10	10	125	26	250	1 500

### Available options

- C.E.P.: Clean In Place
- A SAS for reactor feeding
- Unloading valve with inflating cuff in harsh environments: emanation of vapors

## ATEX SECURITY: SPECIFICATIONS AND ADVANTAGES

### ▶ EXAMPLES OF INSTALLATIONS

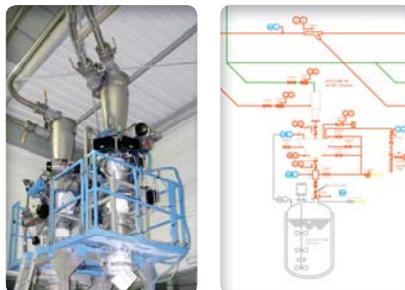
#### ▶ Multiple discharge points

**Customer:** Catalyst manufacturing for the petrochemical industry

**Products:** resins, polymers, talc, silica

**Objectives:**

- Move the operator away from the hazardous area
- Avoid cross contamination
- Ensure weighing



#### ▶ Reactor feeding

**Customer:** L'oreal

**Product:** wax

**Objectives:** feeding of 4 high temperature reactors loaded with wax. The dosing is ensured with the loss-in-weight of the FIBC unloading units.

Dosing accuracy: 500 gr.  
Flow rate: 4t./h.

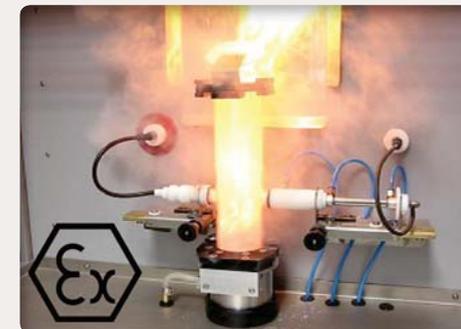


#### ▶ Dosing with multi-point discharge: continuous conveying without product loss: urea dissolution tank - waste water treatment industry

**Customer:** manufacturer of seals for automobiles

**Product:** carbon black

**Objectives:** the detached filter allows a floor layout of the filtering cyclone-filter. Maintenance operations are facilitated and centralized on a single device. Other cyclones are located in height and require no maintenance.



The unique technology of PALAMATIC PROCESS remote filter provides the solution for charging pressurized reactors loaded with solvents.

The entire risk connected to the transfer, draining and recovery cycles of the transfer are completely eliminated by the integration of sensors and additional equipment.

**Our many current applications are strong evidence of our expertise in the field of pneumatic conveying.**

### ▶ THE ATEX REGULATIONS: AUDIT AND COMPLIANCE

In their production processes, our customers are very frequently faced with the explosive nature of several materials used (powder, gas, liquid). Huge accidents prove the consequences that an explosion may have. When the atmosphere is explosive, a small spark (e.g. that of an electric switch or from the mechanical heating of a part of the machine) is enough to cause an accident or a disaster. For many years, authorities and industries have worked on developing safety rules governing work conditions in such dangerous environments: explosive atmospheres.

PALAMATIC PROCESS offers you its expertise to classify areas in hazardous locations depending on the nature or duration of the presence of the ATEX atmosphere.

Today, PALAMATIC PROCESS delivers to its customers ATEX facilities certified by the notified bodies (Inéris, LCIE ...)

PALAMATIC PROCESS has developed standard equipment meeting the ATEX 0-20 / 1-21 / 2-22 regulations. Also, our specialists engineers conduct zoning and the drafting of risk analyzes on new equipment and new facilities. PALAMATIC PROCESS ensures the safety of operation and full compliance with the standards.

# VFlow® Included weighing



Included weighing

This option provides **transfer and dosing** combination. The integrated weigh system allows to control the dosing in masked time and to prepare the batch.



## TECHNICAL SPECIFICATIONS

**Rate** from 1 to 10 m<sup>3</sup>/h.  
**Conveying distance:** from 1 to 100 m.  
**Conveying speed:** < 5 m./s.  
**Products:** powders, grains, granules...

## POSSIBLE TRIALS

Our test station offers you the opportunity to observe, in real conditions, the behavior of your products during the transfer process. This equipment experiment beforehand allows technical validation to secure your investment.

More information on our website:  
[www.palomaticprocess.com/engineering-design-office/test-plant](http://www.palomaticprocess.com/engineering-design-office/test-plant)



The vacuum dense phase conveying technology allows the integration of weighing solutions.

### TWO POSSIBLE SOLUTIONS:

#### 1- Loss-in-weight

Loss-in-weight solution consists in weighing the «starting point» of the powder process (sack dumping unit, fibc unloading unit, drum emptying station...).

The automaton controls the vacuum through the purge system in order to stop the transfer.

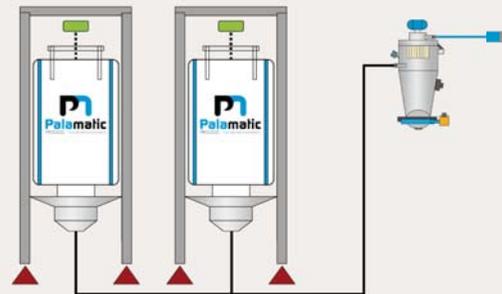
To achieve higher accuracy, a metering element (valve, screw conveyor, rotary valve) can be implemented.

#### 2- Weight gain

The solution for weight gain involves implanting the cyclone on load cells.

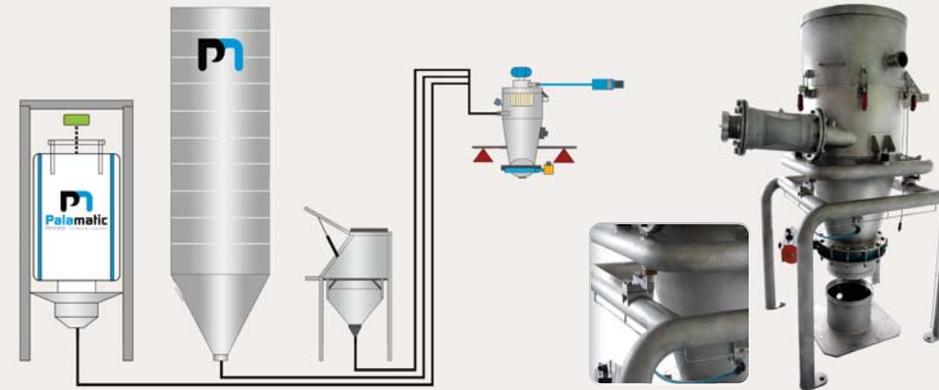
Once the aspirated quantity corresponds to the setpoint, the controller stops the transfer, the dose is ready to be inserted.

### LOSS-IN-WEIGHT

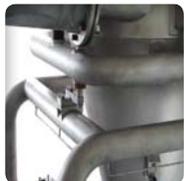


The loss-in-weight of the starting points combined with line purging provides complete dosing for conducting the premix.

### WEIGHT GAIN



The conveying system ensures the «pumping» of the product to reach the target weight. During unloading, return to «zero» ensures total introduction of material into downstream equipment.



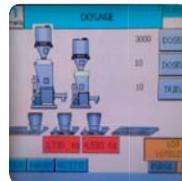
➤ Precision < 1 kg et < 50/100 gr. with a metered feeding



➤ Line venting



➤ Dedicated line: no cross contamination



➤ Display

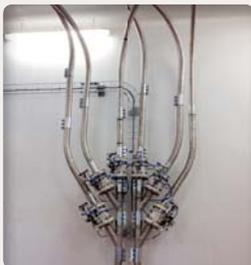
## Advantages



## ▶ EXAMPLES OF INSTALLATIONS



Cyclone transfer system with dosing device



Multi-line for the feeding of the weighed cyclone; allows the production of the pre-mix during the transfer phase



Vacuum pneumatic conveying with integrated «weight gain» scale. This pattern is specially designed for the suction of multi-components

## ▶ CASE STUDIES



**Customer:** plant for preparation of cooked dishes

**Products:** wheat flour, rice flour

**Objectives:** suck a specific batch of flour with respect of the doses of the premix in masked time.

**Characteristics:** the buffer capacity of the cyclone permits the storage of 800 kg for a «snapshot» feeding of the mixer located downstream.



**Customer:** food cooking breaded meat

**Products:** starch, carbonates

**Objectives:** premix production in masked time with respect of the recipes.

The weighed cyclone operates in technical roof spaces to create production space in clean area.

**Flow rates:** 4t./h.



**Customer:** yogurt manufacturing plant

**Products:** sugar and proteins

**Objectives:** buffer storage of raw materials in hoppers. The VFlow® 04 pneumatic conveying directly sucks the raw materials. The loss-in-weight device controls suction to ensure the conveying of the desired doses.



## ▶ SUCTION PIPE

### Effortless suction of the product

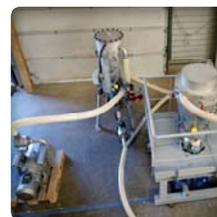
Hand operated device to allow the suction of the product. The suction pipe is the ideal solution for drums, sacks, octabins or buckets unloading.



## ▶ ATEX 20, 21 ET 22

### The ATEX zoning conditions the design of the pneumatic transfer system.

Depending on your ATEX zoning, the pneumatic transfer system is composed of ATEX equipment, nitrogen unclugging, CODAP manufacturing...



## ▶ DETACHED FILTER

**It provides air/materials separation at 99.5% in the separating cyclone located directly on the tanks and reactors (compatibility with the environment not favorable).**

The cyclofilter is then deported to the ground with the possibility of re-introduction of fines in the process for products with high added value.



## ▶ SWITCH

**It ensures the flexibility of pneumatic conveying, with multiple arrivals and departure points.**

**It can be manual or automatic.**



## ▶ ANTI-RISING DAMP SAS

**The introduction of the powders comes with a flow of air, compressed air or nitrogen in order to ensure the downward flow of the material and to block the rising of vapors or solvents.**



## ▶ LINE PURGING SYSTEM

It ensures to finish the transfer cycle with a clean line thanks to a vacuum blast.



## ▶ CLEAN IN PLACE (CIP)

Suction of the cleaning fluid by the transfer system.  
A liquid separator can be added ahead the vacuum group.



## ▶ WEIGHT CELLS ON CYCLONE

Weighing of the cyclone provides control of the transfer to monitor the amount of powder sucked or the amount of powder to be drained.



## ▶ RE-INTRODUCTION OF FINES

When operating remote cyclofilter, the fines from the filtering cyclone are automatically re-introduced into the process by the same transfer system.



## ▶ AIR GUN

The air jet operated by the air gun has the effect of instantly release a large amount of compressed air which facilitates the flow of product.



## ▶ VERTICAL CONCEPTION

A specific conception for materials that tend to stick to the walls.



## ▶ VIBRATING BIN AERATORS

They facilitate the flow and emptying of stored materials.  
These vibrators allow the introduction of air or nitrogen to facilitate the product flow.



## ▶ BUFFER HOPPER

Intermediate storage after transfer phase and before materials introduction.



## ▶ PNEUMATIC VIBRATORS

They facilitate the flow and emptying of stored materials.  
These vibrators generate multidirectional vibrations.  
They are used for emptying silos or chutes leading.



## ▶ LEVEL PROBE

An extra level sensor may be added in the cyclone to have an additional level.

## SERVO-CONTROL, CONTROL, TRACEABILITY

Our automation design office designs and manufactures all of the control cabinet to offer maximum functionality and ergonomics.

The Programmable Logic comes from partnerships with leading market players such as Schneider Electric, Siemens, Omron, Allen Bradley.

The connectivity of our facilities guarantee:

- . Service and evolution continuity
- . A perfect integration into your existing process
- . Flexibility and continuous operation thanks to our remote maintenance service

## REMOTE ACCESS - TELEMaintenance

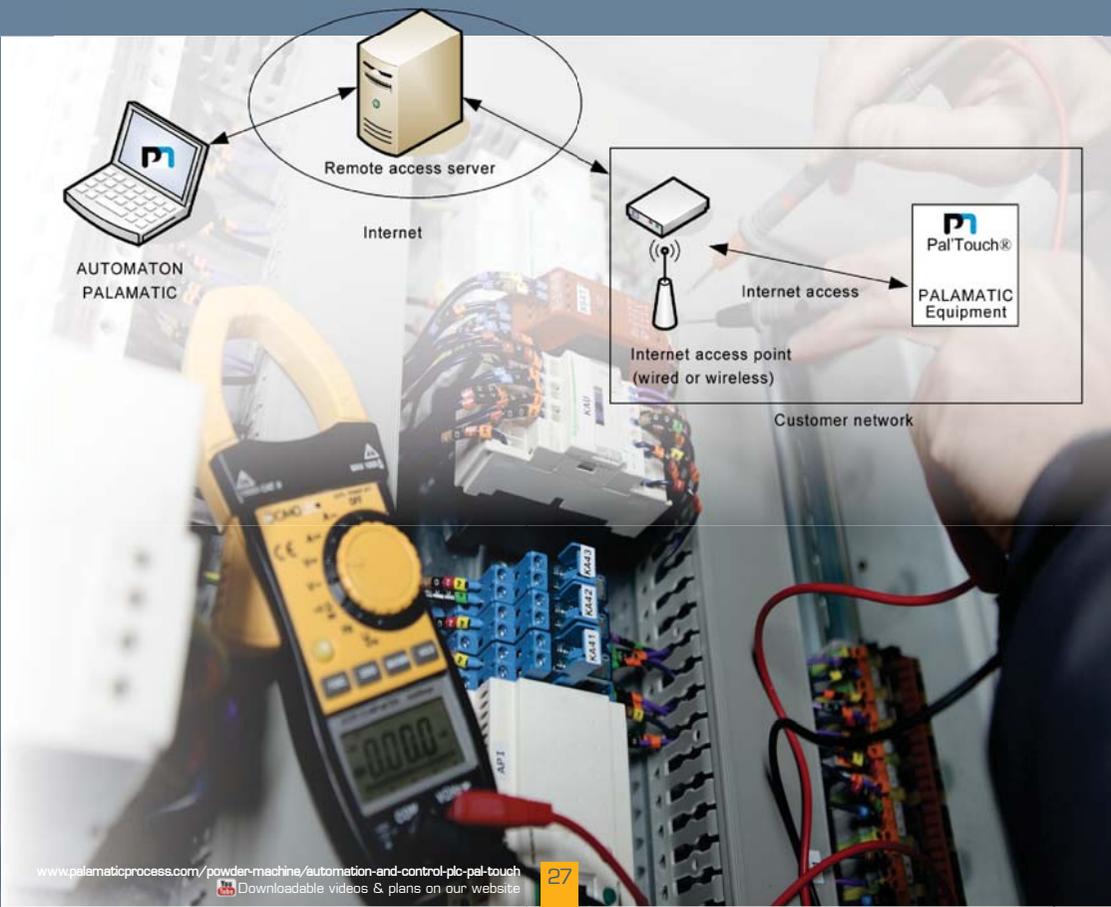
The remote maintenance service allows PALAMATIC PROCESS teams to easily and instantly work on the system without the need to move geographically.

Breakdown assistance provides:

- . Securing the process
- . Reducing stopping time
- . Significant reduction in the cost of interventions
- . Reduced intervention time

This maintenance service of your automation equipment is adaptable over time depending on customer needs.

The implementation of this technical assistance is very simple. All you need is an internet connection, either wired, either wireless.





# Dense Phase Pressure Pneumatic Conveying

The PALAMATIC PROCESS laboratory for powders was built for the attention of all our industrial customers who wish to set up production machines to meet their expectations.

Our test center is made up of the latest machinery in the powder handling sector. Specialist engineers are there to advise you on the industrial processes best suited to your requirements and to guide you at every stage of the decision to design the most efficient installation.

## 3 STEPS TO VALIDATE YOUR PROCESS

### Step 1 - Before Test

- Select the likely optimal machine configuration based on your technical requirements (powders, flow rate, dosing)
- Draft test proposal by our sales-engineers representatives

### Step 2 - During Test

- Process validation for product testing
- Perform testing and sample collection
- Discussion on results after the test with machines (phase diagram, degradation tests, fines content)

### Step 3 - After Test

- Analysis of machine test data and samples
- Write a summary report
- Collaborate on the optimal solution for your requirements
- Submit a quotation

## THE BENEFITS OF MECHANICAL TESTING

- ▶ An individual consultation with and on-going support by our R&D engineers
- ▶ Confirmation of the appropriate machines to conduct a test with your product
- ▶ Tests at various operating conditions to define the most efficient process according to your industrial requirements
- ▶ Evaluation of the profitability of equipment configuration
- ▶ Possibility to test additional options using PALAMATIC PROCESS' range of products
- ▶ Maximize the return of your investment
- ▶ Maximize the optimum selection of the proper machine
- ▶ Capitalize on the wide experience of our experts

- ▶ Come with your materials
- ▶ Participate in selecting the test machines
- ▶ Maximize your productivity

**300**  
+ de **300** configurations

- + than **300** process configurations
- **2,400** sq. feet of surface dedicated to the test
- **35** industrial machines
- **35** feet of ceiling
- Test with **all types of products**
- **2 support engineers**
- **ATEX** configurations



# Pneumatic Conveying

# Dense Phase Pressure



Dense Phase Pressure

Convey rate: 2 to 100 tons/h.

## VERY ABRASIVE MATERIALS CONVEYING

This dense phase pressure conveyor system is suitable for **very abrasive materials**, at all throughput rates and all temperatures.

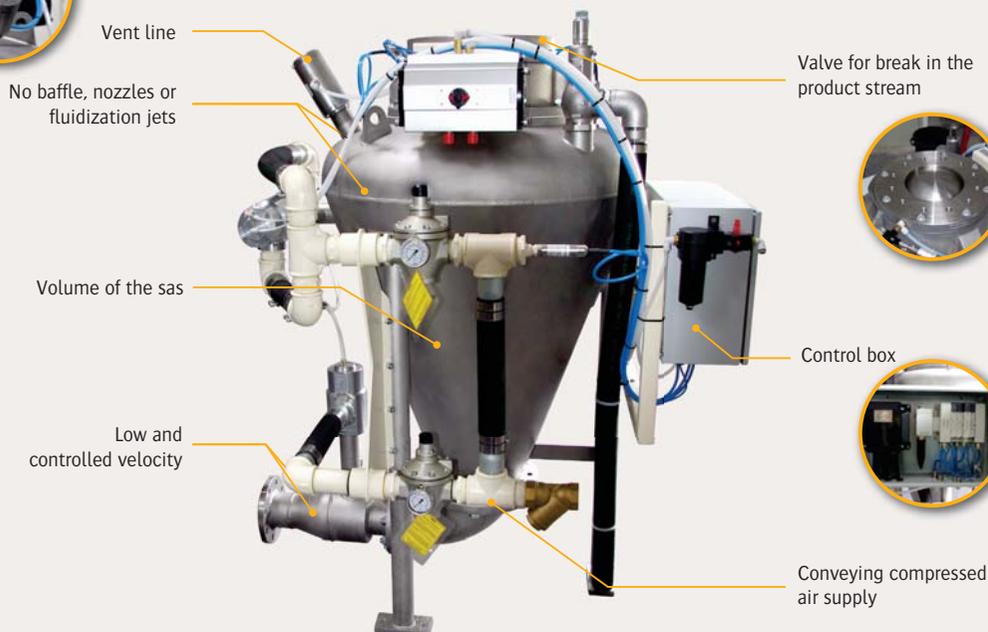
In this type of pneumatic conveyor, the valve cuts the product flow above the transfer tank. This tank is fitted with a double case and a special output elbow that allows to send the product slowly to the pneumatic conveyor piping. This completely patented dense phase conveying system allows to ensure the elbows for up to two years against abrasion, and to provide a guarantee of 1,000,000 operating valve cycles before general revision. Furthermore, the dispatching valve can be cooled by water circulation, which allows to send materials at very high temperature in the process.

## TECHNICAL SPECIFICATIONS

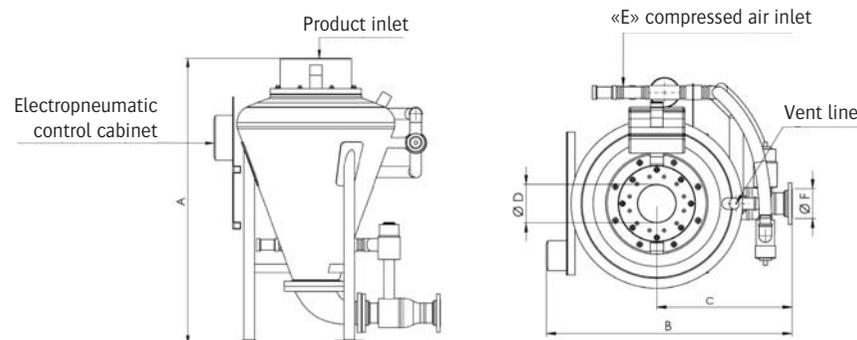
- Particules size:** very fine (ash) to big (peanuts)
- Overpressure average level:** 4 bars
- Manufacturing:** cast iron, 304L and 316L stainless steel
- Compressed air consumption:** 2 to 114 Nm<sup>3</sup>/min.
- Maximum conveying distance:** 700 m.
- ATEX Certification:** zone II 1,2,3 GD (EMI less to 3 mJ)
- Maximum temperature:** 280°C
- Maximum operating temperature:** > 300°C
- Inlet Ø:** 50 to 600 mm.

## ADVANTAGES

- . For granules, powders and mixtures
- . Slow and smooth conveying, with less compressed air and energy consumption
- . A simple system and not contaminating
- . Less wear due to low conveying rate
- . Without mixtures damages
- . Stainless steel construction for sanitation or corrosion resistance



## GENERAL DRAWING



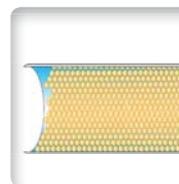
## Advantages



➤ Limited abrasion and segregation



➤ Long conveying distances



➤ Very high convey rates



➤ Optimized design to meet specific needs

DIMENSIONS (MM)	MODELS										
	114/4-4	114/8-4	228/8-5	342/8-6	342/12-6	570/12-8	857/12-10	1428/12-12	2125/16-12	2825/16-12	3500/16-12
SAS volumes (litres)	114	114	228	342	342	570	857	1 428	2 125	2 825	3 500
A	1269	1279	1503	1725	1807	2026	2276	2956	3680	4230	4759
B	1190	1190	1252	1285	1131	1127	1153	1607	1607	1848	2247
C	543	543	535	533	521	435	375	781	781	898	1092
D	200	200	200	200	300	300	300	300	400	400	400
E	50	50	50	63	63	76	76	76	101	127	153
F	102	102	127	152	152	103	254	30	254	305	305
Weight (KG)	335	455	525	555	753	1157	1501	2019	2450	3130	3850

## PROCESS



### PRINCIPLE OF OPERATION

1. During the filling of the tank, both valves in the supply pipe are open
2. The product fills the tank through gravity system until detection of the top level
3. The upper valve is closed to stop the flow of material before the closure of the second valve and the pressurization of the tank
4. The material is discharged through the outlet pipe at the top or at the bottom depending on the layout of pneumatic conveying circuit
5. Fluidizing devices may be included in the tank bottom in order to facilitate the evacuation. The distribution of the gas between the top and bottom of the tank is controlled by orifices in the outside area.

### PNEUMATIC CONVEYING RANGE - DENSE PHASE PRESSURE



### OPERATING MODE



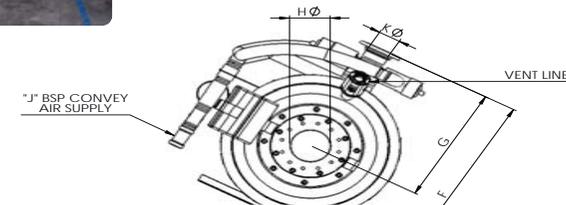
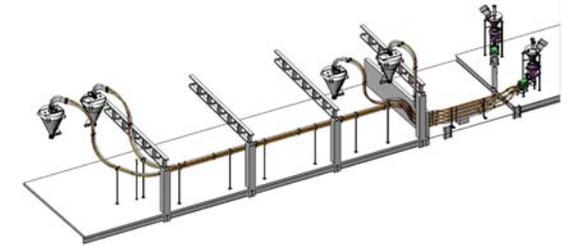
1. Introduction of the material in the sas

2. Closure of the valve in the product = reduced air consumption

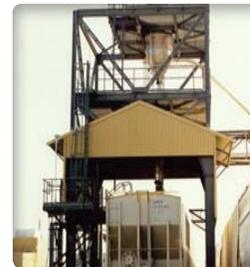
3. Controlled introduction of air

### CASE STUDY

- Realization of an assembly of pneumatic conveying to feed sack filling machines:
- 2 feeding silos
  - 4 packaging lines



### EXAMPLES OF INSTALLATIONS



Loading tank cars



Long convey distances



Dedicated high rate line

# Pneumatic conveying

# Examples of installations

## INFLATEK® VALVE

The Inflatek® valve was specially developed for pneumatic transfer tanks.

Its advantages:

- . No abrasion
- . Tight and sealed closing thanks to an inflatable seal
- . Tight and sealed closing thanks to a static or moving product column
- . Pressure: 43 bar
- . Temperature: 280°C
- . Size: 50 - 600 mm

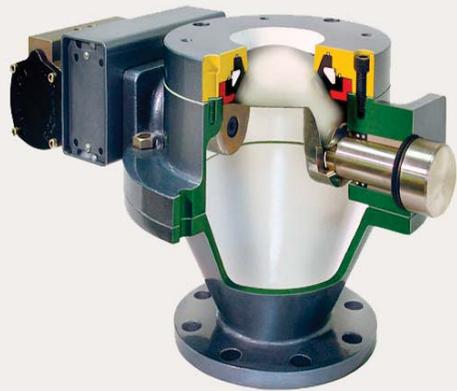


The Inflatek® valve is unique in its ability to close and to ensure sealing in a single action, through a column of static or mobile material. This feature ensures complete filling of the tank. Air consumption is strongly minimized.

Sealing is provided by the inflation of elastomeric sealing gasket which prevents wear from erosion of the seat and of the seal of the valve.

The Inflatek® valve has a nominal capacity of one million cycles between each inspection, which almost eliminates the maintenance operation and costly production downtime.

## TECHNICAL FEATURES



➤ **Abrasive materials:** abrasive slurries, powders, bulk granules and gases loaded with dust cause erosion of the seat and the inefficient closure of classic valves. The inflatable seal and its function of automatic compensation overcomes the problems related to wear because of abrasive materials.

➤ **Differential pressure:** this pressure usually causes the rapid wear of the seat due to non-caught particles and transportation at high speed. The inflatable seal allows to effectively catch particles to prevent their movement and thus the premature wear of the machines.

➤ **Closing and sealing:** the movement of the dome enables complete closure in the bulk material column and the action of the inflating seal allows a perfect sealing.

### Additional information

The inflatable seal is available in different polymer versions according to the material ranges from abrasive dusts to food products.

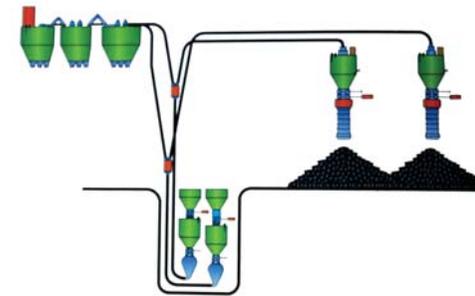
If the material flows into the vacuum or remains static within a column, the valve is designed to stop the transfer and provide a complete sealing.

## U.S. DEPARTMENT OF ENERGY

Objectives :

- . Minimum particle size degradation
- . Low operation cost

Retrofit of a poorly designed pneumatic conveying system for run-of-mine coal fuel size 50 mm. Low velocity, dense phase coal handling for rotary grate coal fired boilers and dust-free yard storage. The coal transfer system has been developed to maintain a low velocity of the coal fuel. In addition to minimizing material degradation, the low velocity ensures very little or no pipe wear.



### Basic data:

- Coal fuel
- 2 X low velocity conveying systems (50 mm)
- 5 reception point
- Ambient temperature
- 40 t./h.

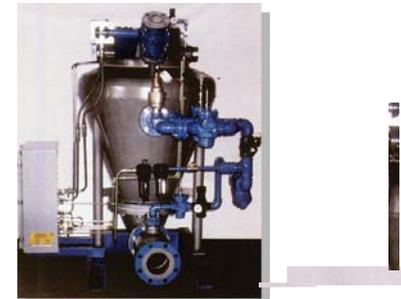
## ALLEN SUGAR

Objectives:

- . Minimum particle size degradation
- . Low operating cost

Allen Sugar required the most modern handling system for fragile granular sugar and dextrose without any change to the product grain size or shape. Exacting degradation limits were established for pre-contact engineering.

The system satisfied all objectives with negligible degradation of the sugar granule or the dextrose material.



### Basic data:

- Sugar, dextrose
- 3 low velocity conveying systems
- 2 to 5 reception points
- Ambient temperature
- 12-30 t./h.

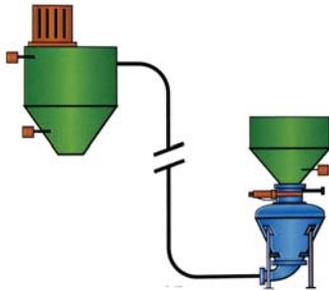
# Examples of installations

## BRUNNER MOND

### Objectives:

- . Minimum particle size degradation
- . Operating reliability

Customer manufactures sodium bicarbonate which is used for a wide range of individual and consumer products. The quality of the product depends upon the consistency of the particule size distribution with a severe limit on fines content. To satisfy these requirements, low material velocity is required, which was achieved by the pneumatic conveying system.



### Basic data:

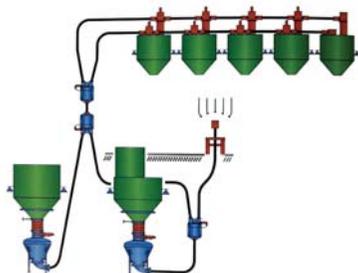
- Sodium bicarbonate
- 1 low velocity conveying system
- 1 reception point
- Ambient temperature
- 22 t./h.

## ACE HARDWARE

### Objectives:

- . Operating reliability
- . Accurate weighment
- . Low operating cost

A loss-in-weight batch weighment control is provided at each transfer unit. Any of six different materials are introduced to the system for pre-weigh and transfer to any of six receiving bins. TiO2 is an unusual material which exhibits cohesive characteristics from its grain shape even when dry and apparently free flowing.



### Basic data:

- Titanium dioxide (TiO2) and other materials
- 2 X low velocity conveying systems (150 mm)
- 6 reception points
- Ambient temperature
- 25 t./h.



# Dilute Phase Pressure Pneumatic Conveying Blower



Convey rate: from 100 kg to 60 t.

## OVERPRESSURE PNEUMATIC CONVEYING

This pressure dilute phase pneumatic conveying allows to **transport bulk products, powders and granules with high flow rates** over long distances.

## TECHNICAL SPECIFICATIONS

Dilute phase pressure conveying systems use positive displacement (roots type) blowers providing air to convey materials through a pipeline to the destination where the air and product are separated by a filter or other system. The product must enter the convey line, which is at higher pressure, via a special feeding device, usually a rotary valve airlock or a venturi. The product is frequently suspended in the air flow, moving at relatively high velocities depending on the particles sizes and densities. Systems generally operate on a continuous basis; product is constantly supplied at the starting point and arrives at the destination without interruption. This allows this type of system to be easily adapted for dosing and continuous weighing applications.

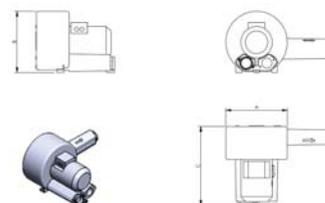


## 2 BLOWING TECHNOLOGIES

### 1 SIDE CHANNEL BLOWERS

Side channel blowers, through their internal compression on several levels, generate low pulsation blown air. Lateral canal blowers generate through their internal compression on several levels air-blown low pulsation.

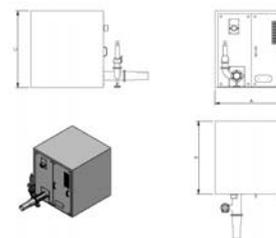
The basic construction of the paddle wheels and the arched shape of its pallets guarantee a better performance. Economical, robust and compact, the blowers with side channel are adapted to continuous operation of pressure pneumatic conveying.



Models	Flow rate in m <sup>3</sup> /h	Pressure in mbar	Dimensions in mm			Power in Kw	Weight in kg
			A	B	C		
BLO-14	140	400	285	337	650	2,2	20
BLO-21	215	475	327	380	755	4	34
BLO-41	416	475	424	487	965	7,5	71
BLO-65	657	575	492	601	995	15	90
BLO-80	804	600	516	613	1 105	18,5	106
BLO-100	1007	475	548	628	1 183	22	112

### 2 «ROOTS» TYPE BOOSTER

This rotary piston blower is particularly suitable for compression and air suction. Used in pressure dilute phase pneumatic transfer, its large flow range, important capabilities of overpressure and ease of maintenance make it a reliable and comprehensive industrial equipment. The booster is integrated in a totally enclosed unit that is equipped with a cooling fan, a soundproofing device, a transmission via pulleys/belt, a silencer and a non-return valve, a pressure switch and a thermostat for a rapid installation of the assembly.



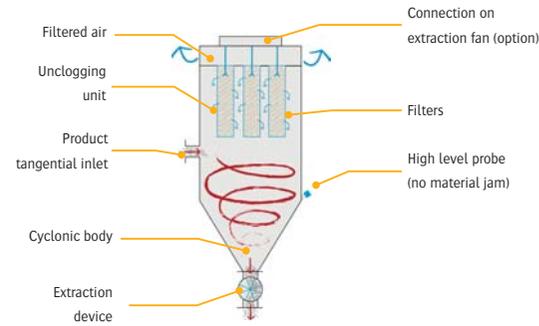
Models	Flow rate in m <sup>3</sup> /h	Pressure in mbar	Dimensions in mm			Power in Kw	Weight in kg
			A	B	C		
LOB-10	220	950	770	720	850	7,5	220
LOB-30	450	1 050	1 200	1 000	1 210	11	440
LOB-65	600	620	1 200	1 000	1 210	15	480
LOB-125	1 480	1 050	1 240	1 400	1 390	45	1 035
LOB-230	2 500	1 000	1 560	1 660	1 410	90	1 640
LOB-600	6 000	1 100	2 660	1 810	2 640	132	2 700

## PROCESS



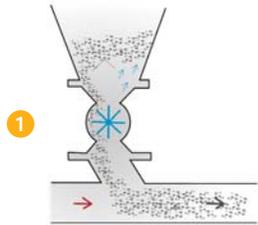
### 3 TECHNOLOGIES TO RECEIVE THE POWDERS

#### 1 CYCLOFILTER



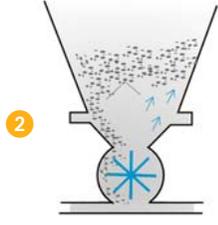
- It ensures the separation of the conveying air and the material.
- The extraction of the material is provided by the rotary valve.
- Filters are unclogged by automatic sequencers.

### 3 TECHNOLOGIES TO INSERT THE POWDERS



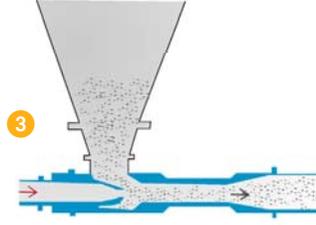
**Rotary valve with speed-up box for material conveying**

- Advantages**
- limits pressure rising
  - reduces abrasion
  - loading capacity: from 2,5 to 58 litres/rev.



The material is directly blown into the **blow-through rotary valve**

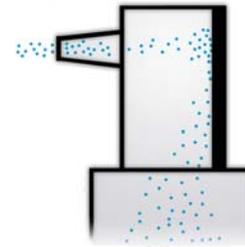
- Advantages**
- economical solution
  - space saving
  - loading capacity: from 2,5 to 58 litres/rev.



**Venturi / Eductor**  
Direct handling of the product create depression below the hopper

- Advantages**
- no rotating equipment
  - ideal for light products on short to medium conveying lines
  - DN 50 to 150 mm

#### 2 EXPANSION CHAMBER



- Set on the hopper, it ensures the stopping of the product thanks to a shield.
- The hoppers are thus protected from abrasion.
- The filling is done with a «shower» of product.
- Removable and replaceable hitting plate.



#### 3 SILO



- The silo ensures the decompression of the conveying air.
- The integrated filters allow the air / product separation.
- The arrival of the product may be tangential or plunging.



## Cyclofilters

### TECHNICAL SPECIFICATIONS

**Particule size:** 1 µm to 3 cm  
**Overpressure average level:** 200 to 600 mbar  
**Manufacturing:** steel, 304L stainless steel, 316L stainless steel  
**Finishes:** RA08, mirror polished, PTFE, antistatic, oleoplastic  
**ATEX Certification:** zone II 1,2,3 GD (EMI below 3 mJ)



Multi-products conveying



Pipeline cleaner



Feeding of several receipt points

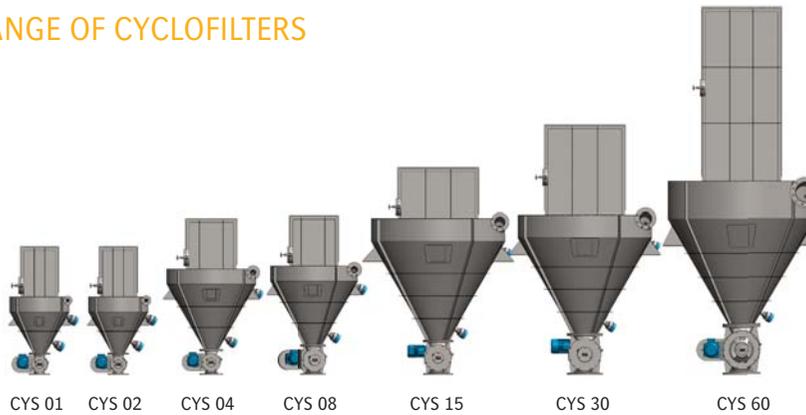


Ease in modifying the circuits

### Advantages



### RANGE OF CYCLOFILTERS



The range of cyclofilters PALAMATIC PROCESS ensures the implementation of all your pneumatic transfer projects.

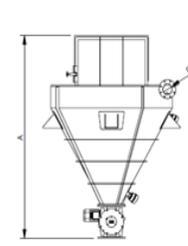
The quality of filtration allows to transfer all types of materials even the finest or explosive products.

Manufacturing: stainless steel 304, 316L

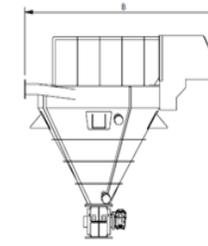
Filters: polyester, PTFE, hydrophobic, oleophobic, antistatic...

The design office PALAMATIC PROCESS insures the choice and design of the most suitable cyclofilter according to your applications.

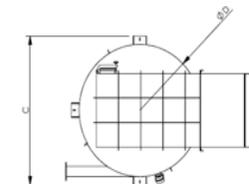
### DIMENSIONS



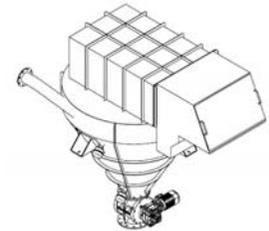
SCALE 1 : 60



SCALE 1 : 60



SCALE 1 : 60



Models	Rate in m <sup>3</sup> /h.	Filtering area in m <sup>2</sup>	Dimensions in mm					Weight in kg
			ØD	DN	A	B	C	
CYS 01	1	3	800	32	1 730	1 840	840	300
CYS 02	2	3	800	40	1 730	1 840	840	300
CYS 04	4	6	1 200	65	2 100	2 300	1 300	445
CYS 08	8	6	1 200	80	2 140	2 340	1 300	515
CYS 15	15	15	1 800	125	2 780	2 950	2 040	905
CYS 30	30	25	1 800	150	3 350	2 950	2 040	1 320
CYS 60	60	60	2 000	250	4 940	3 400	2 140	2 275

## Design Office

Depending on your materials, we size the filtration device and speed transfer to avoid:

- particles segregation
- product breaking
- abrasion

*Pneumatic transfer system dimensioning software*

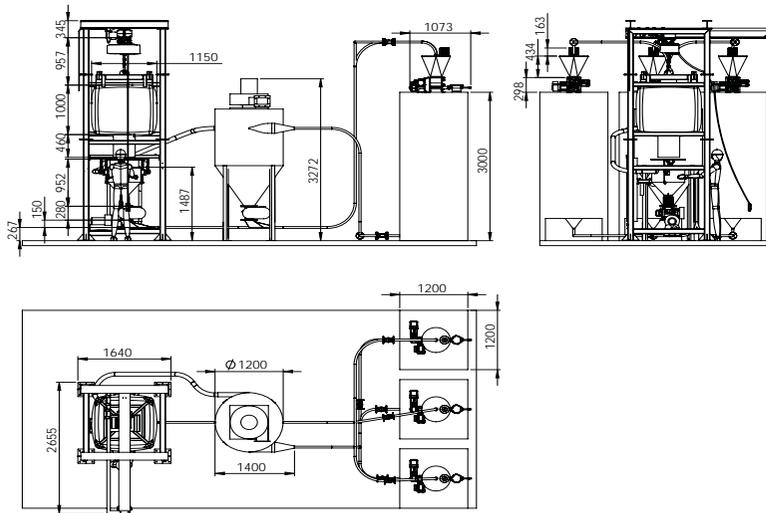
Bulk Material Selection	
velocity, water	particle size 0.09 mm
wheel	particle density 1470 kg/m <sup>3</sup>
wheel type	bulk material 0.40 kg/m <sup>3</sup>
	pressure loss 0.00
	required air flow velocity v <sub>3</sub> related to an air density of 1.2 kg/m <sup>3</sup> 11.23 m/s
	air flow velocity v <sub>3</sub> chosen 12.5 m/s
Conveying System	
<input type="checkbox"/> vacuum conveying	<input checked="" type="checkbox"/> pressure
solid mass flow 4000 kg/h	number of bends 4
total conveying length 100 m	pipe diameter 60 mm
included elevation 10 m	additional 50 mbar
Results	
solid mass load 5.18	Calculate
pressure drop 431 mbar	
Compressor	
Suction Capacity 0.43 m <sup>3</sup> /h	
Overpressure 431 mbar	

## TWO WEIGHING SOLUTIONS

Pressure dilute phase conveying allows the integration of two weighing solutions :

- Loss in weight
- Weight gain

## EXAMPLE OF IMPLEMENTATIONS

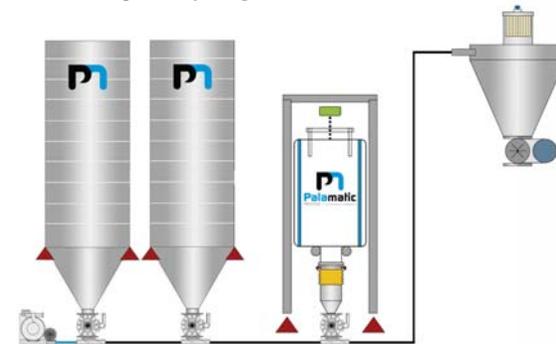


### 1- Loss-in-weight

Loss-in-weight solution consists in weighing the «starting point» of the powder process (sack dumping unit, FIBC unloading unit, drum emptying station...).

The controller controls the vacuum via the rotary valve (frequency inverter) to regulate and stop the transfer.

In accordance with the length of the conveying line, the PLC controls the end of product. Possible dosing accuracy <1 kg



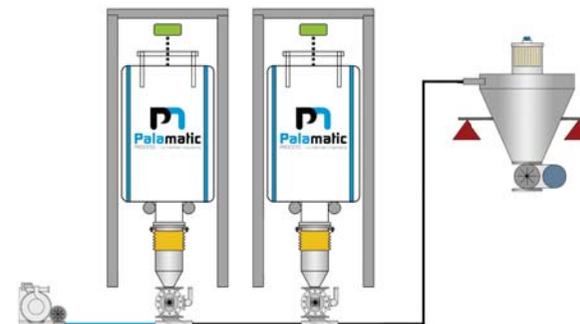
## EXAMPLES OF INSTALLATIONS



### 2- Weight gain

The solution for weight gain involves implanting the cyclone on load cells.

Once the aspirated quantity corresponds to the setpoint, the controller stops the transfer, the dose is ready to be inserted.



# Examples of installations

## ▶ COMPOUND

**Customer:** manufacturing of plastic granules

**Products:** talcum, magnesium, mica

**Objectives:** detached feeding of the extruder from big bags with containment of dust particules (dedusting ring)

**Characteristics:** rate 5 t./h.

Blowing device: side channel blower



## ▶ PETROLEUM INDUSTRY

**Customer:** treatment of drilling muds

**Product:** cement

**Objectives:** feeding a silo from an automatic bag emptying system

**Characteristics:** rate 9 t./h.

Blowing device: blower

Rotary valve with speed-up box

Arrival on silo with expansion chamber



## ▶ ANIMAL FEED

**Customer:** phytosanitary products producer

**Products:** zinc oxide, magnesia, clay

**Objectives:** multiple arrivals pneumatic transfer from a big bag and sack emptying unit.

Consideration of the abrasive nature of the products

**Characteristics:** rate 10 t./h.

Blowing device: rotary piston blower



## ▶ ADDITIFS ALIMENTAIRES

**Customer:** food mixture Manufacturer

**Products:** salt, sugar, dextrose

**Objectives:** supply the mixing line with raw material stored in silos

**Characteristics:** Rate 2,5 t./h.

Blowing device: piston blower

Cyclofilter weighed on arrival



## ▶ CATALYST MANUFACTURING

**Customer:** catalyst manufacturing for the petrochemical industry

**Product:** alumina gel

**Objectives:** loading of 2 silos of a capacity of 340 m<sup>3</sup> with a prior sieving step

**Characteristics:** rate 15 t./h.

Blowing device: piston blower



## ▶ FOOD INDUSTRY

**Customer:** cookies manufacturer

**Product:** sugar

**Objectives:** continuous feeding of a PALAMATIC PROCESS mixer for the manufacturing of ice sugar

**Characteristics:** rate 2,5 t./h.

Fed with a sack dump unit with integrated sifter

Rotary valve with cyclofilter

Atex configuration



# Pipings and switchings

# Peripheral equipment

Complete range of pipes, bends and switches suitable for all applications.  
From Ø 25 to 200 mm for flow rates from a few pounds to several tens of tons per hour.  
Special conception for foodstuffs, abrasive materials...

The piping allows the pneumatic conveying of the products. Depending on the type of material selected, it will ensure compliance with product characteristics and the fixed rates. Each application, from the most vulnerable to the more abrasive products, finds its appropriate elbow and switching.



## FLEXIBLE AND RIGID PIPING



- . Electrical continuity ensured by metal spiral
- . FDA: food finish
- . Reinforced for abrasive products
- . Material: polyuréthane
- . Transparent to see the product passing
- . Piping without internal welding (tarif 10)
- . Steel and 304, 316 stainless steel manufacturing
- . Abrasion resistant coating (PU, steel width)

## FITTINGS



- . Compression fittings for connecting smooth and rigid pipes between them
- . Rapid (Clamp): allow the connection between two rigid tubes. The ends of the tubes must be fitted with smooth flanges.
- . With a flange: allow the connection between two rigid tubes but also between any devices fitted with flanges. Fastening is carried out with a screw and a nut.
- . SMS: quick connector to screw. To be used with SMS rigid tubes but also between any devices fitted with SMS fitting.
- . Clamp and electrical continuity: clamps are used as attachment between the soft and flexible piping.

## SWITCHINGS



Switching with pinch valve for automatic connection to cyclofilters and various starting points.



Automatic by-pass by rotating drum with inflating gasket ensuring sealing. Suction and vacuum operation. DN80 300



Manual switch connected by the operator. Control system ensuring quality. Suction and vacuum operation.

## PRESSURE SWITCH



- . Electronic sensor providing regulation of the powder dosing in the conveying piping.

## PINCH VALVE



- . Solution of control and metering for materials such as aggregates, powders, dusts or liquids containing solids.
- . The manufacturing of the body ensures 100% sealing of the fluid.
- . The maximum pressure is between 2 and 6 bar
- Option: recentering ring for pinch protection

DN 25 to 250

## BENDS



. «Cushion of material» abrasion resistant bend



. Abrasion resistant bend with reinforced extrados



. D10 bends



The piping elements significantly improve the lifetime of conveying transport lines subject to abrasion even in corrosive or high temperatures environments.

# Design Guide of ATEX pneumatic conveying system

## DESIGN AND CHOICE OF ATEX PNEUMATIC CONVEYING SYSTEM

Depending on the particular characteristics of the processed powders (IME, KST, Particle size...) and site constraints, the pneumatic conveying system can be developed in different ways.

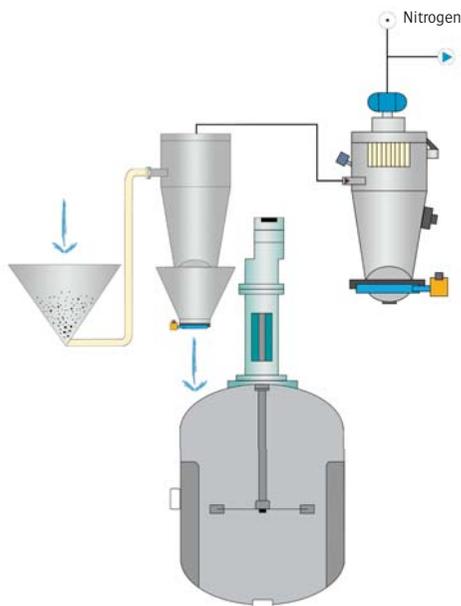
Our technical engineers are at your disposal to design the best pneumatic conveying system. All our equipment are adjustable and can be customized according to ATEX zones.

Numerous transmitters (pressure, temperature, oxygenometer) ensure that the conveying system is operational and safe.

The choice of the operating principle is summarized in the 3 possibilities below:

- 1- Dense phase vacuum pneumatic conveying system
- 2- Dense phase pressure pneumatic conveying system
- 3- Dilute phase pressure pneumatic conveying system

## 1 DENSE PHASE VACUUM PNEUMATIC CONVEYING SYSTEM



Advantages	Weak points
<ul style="list-style-type: none"> <li>. Security</li> <li>. Implementation cost</li> <li>. Exploitation cost</li> <li>. Low nitrogen consumption (reduced at maximum)</li> <li>. Vacuum operation (depleted atmosphere)</li> <li>. Low filter surface</li> </ul>	<ul style="list-style-type: none"> <li>. Distance &lt; 80 m.</li> <li>. Flow rate &lt; 6 t./h.</li> </ul>

The vacuum pneumatic conveying allows a safe and economic environment for all processes with a short or average conveying distance.

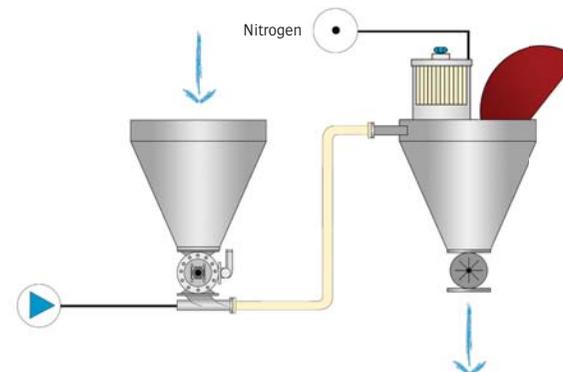
Numerous complementary options can reinforce the level of security:

- Control the electric continuity
- Oxygen meter
- Temperature sensor
- Certification SIL2

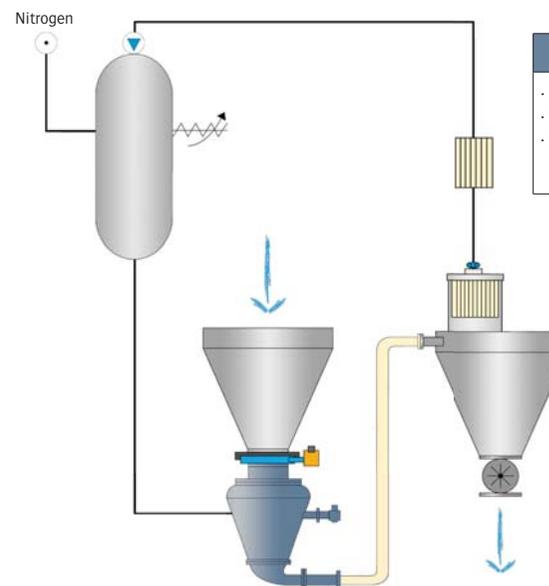
## 2 DENSE PHASE PRESSURE PNEUMATIC CONVEYING SYSTEM

This economical solution ensures the protection of equipment for pneumatic conveying of ATEX powders. When dealing with installations in gas area or on reactor, additional options will have to be implemented.

Advantages	Weak points
<ul style="list-style-type: none"> <li>. Distance</li> <li>. Flow rate</li> <li>. Easy implementation</li> <li>. Multi-points feeding</li> </ul>	<ul style="list-style-type: none"> <li>. Limited security</li> <li>. Risk of dust emanation outdoor, pressure equipment</li> <li>. Large filter surface</li> </ul>



## 3 DILUTE PHASE PRESSURE PNEUMATIC CONVEYING SYSTEM



Advantages	Weak points
<ul style="list-style-type: none"> <li>. Security</li> <li>. High flow rate</li> <li>. High conveying distances</li> </ul>	<ul style="list-style-type: none"> <li>. Implementation cost</li> <li>. Complexity of the re-circulation</li> <li>. Exploitation cost</li> </ul>

Pneumatic conveying operating in closed loop and under nitrogen pressure recycled at each cycle. This configuration ensures complete inerting of the process line.

Devices used:

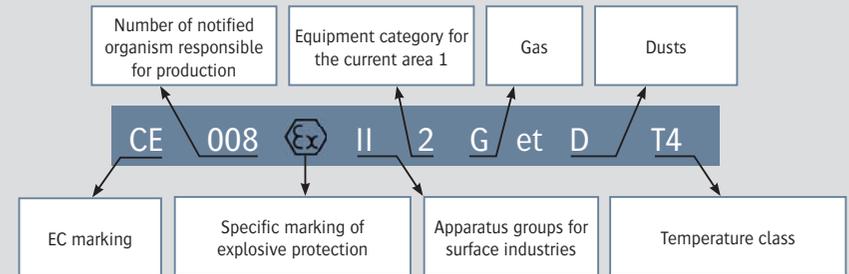
- Sas
- Cyclofilter
- Protection filter
- Compressor
- Chiller

# ATEX Guide for design of compliant equipment

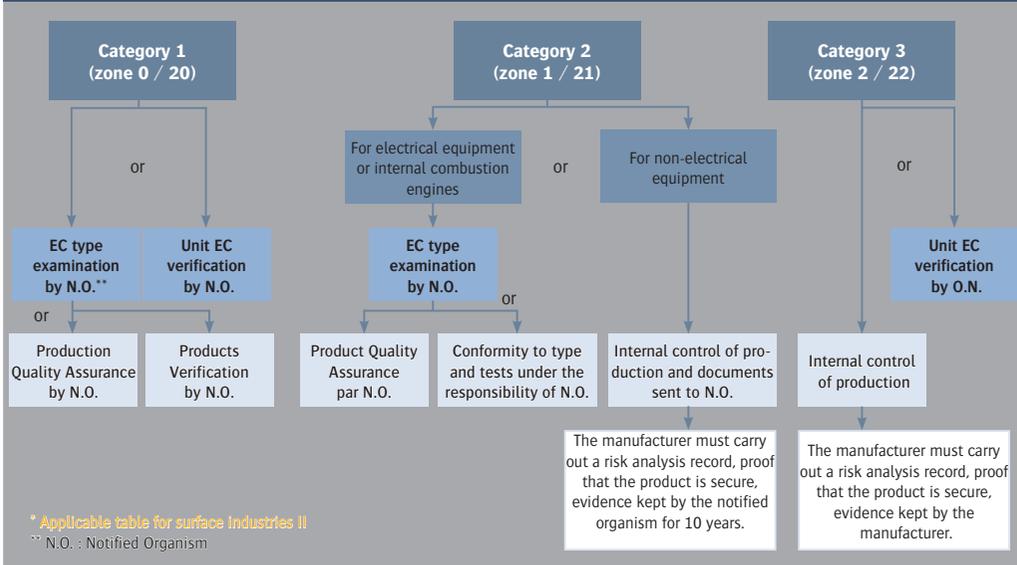
## EQUIPMENT FOR SURFACE INDUSTRIES (GROUP II)

Zone	0	20	1	21	2	22
Type of atmosphere	G gas	D dust	G gas	D dust	G gas	D dust
Explosive atmosphere	Permanent presence		Intermittent presence		Episodic presence	
Category of devices that may be used in accordance with 94/9/CE	1		2		3	

## PRODUCT MARKING



## CONFORMITY ASSESSMENT PROCEDURE\*



## DEGREE OF PROTECTION IP«XX»

Protection against solid bodies	
0	No protection
1	Protected against solid bodies $\geq 50$ mm (eg accidental contact of the hand)
2	Protected against solid bodies $\geq 12$ mm (eg fingers of the hand)
3	Protected against solid bodies $\geq 2,5$ mm (eg screw tools...)
4	Protected against solid bodies $\geq 1$ mm (eg fine tools, small cord)
5	Protected against dust (no harmful sediment)
6	Totally protected against dust

Protection against liquid bodies	
0	No protection
1	Protected against vertically falling water drops
2	Protected against water falls inclined at $15^\circ$
3	Protected against rain water up to $60^\circ$ from the vertical
4	Protected against water sprayed from all directions
5	Protected against water jets with lance from all directions
6	Protected against water splashes comparable to heavy seas
7	Protected against the effects of immersion
8	Protected against the effects of prolonged immersion under specified conditions

## GAS GROUPS

Group	Reference gas	MESG (mm)	MIC (mJ)
I	Methane	1,14	0,28
IIA	Propane	0,92	0,25
IIB	Ethylene	0,65	0,07
IIC	Hydrogen/acetylene	0,37	1,011/0,017

MESG: Maximum Experimental Safe Gap  
 MIC: Minimum Ignition Current  
 For flame arresters, additional subdivisions IIB1, IIB2 et IIB3  
 IIB1: MESG > 0,85  
 IIB2: MESG > 0,75  
 IIB3: MESG > 0,65

## DUST GROUPS

Group	Type of dust	Size	Resistivity
IIIA	Suspended combustible particles	> 500 $\mu\text{m}$	-
IIIB	Non-conductive dusts	$\leq 500 \mu\text{m}$	$>10^3 \Omega\cdot\text{m}$
IIC	Conductive dusts	$< 500 \mu\text{m}$	$<10^3 \Omega\cdot\text{m}$

## MAXIMUM SURFACE TEMPERATURES

Gas	T1 (450)	T2 (300)	T3 (200)	T4 (135)	T5 (100)	T6 (85)
Dust	450	300	200	135	100	85

# Our expertise:

## **FILLING SOLUTIONS FOR BIG BAG AND OCTABIN**

To fill

## **EMPTYING SOLUTIONS FOR BIG BAG AND OCTABIN**

To empty, compact and massage

## **SACK SOLUTIONS**

To empty, compact, handle, fill

## **CARDBOARD AND DRUM SOLUTIONS**

To fill, condition, empty

## **PNEUMATIC TRANSFER EQUIPMENT**

Vacuum, pressure

## **MECHANICAL TRANSFER EQUIPMENT**

To transfer with screw, belt conveyor, bucket elevator, aeromecanic or vibratory conveyor

## **CRUMBLING AND GRINDING EQUIPMENT**

To granulate, crumble, grind, pound, micronise, disagglomerate

## **SIFTING EQUIPMENT**

To sift, segregate, sieve, protect

## **CONTAINERS AND STORAGE SOLUTIONS**

To fill, charge, empty, contain

## **DOSING EQUIPMENT**

To control, regulate, empty, extract

## **MIXING EQUIPMENT**

To homogenise, incorporate, fluidify, stir, mix

## **FLOW AND CONNECTION**

To vibrate, fluidise, unclog, drain, facilitate extraction, control the descent, prevent stacks and vaults, connect

## **INDUSTRIAL DUST COLLECTING EQUIPMENT**

To filter, clean, confine, secure



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