SOLUTIONS for Vacuum Pressure Powder Handling Solutions

Pneumatic Conveying

VACUUM PRESSURE

Palamatic
Process machines engineering
Powder Handling Solutions
PNEUMATIC CONVEYING: TECHNOLOGIC CHOICE

02

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Pneumatic Conveying

A TECHNOLOGY ADAPTED TO EACH PROCESS

Pneumatic conveying is an alternative to the mechanical conveying of 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.

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 DENSE PHASE PRESSURE CONVEYING SYSTEM

[+] Advantages
- High convey rates
- A reduced abrasiveness

STANDARD INSTALLATIONS WITH DILUTE PHASE PRESSURE CONVEYING SYSTEM - BLOWER

[+] Advantages
- Reduced cost
- Multiple arrival points
- Easy to install

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.

Pneumatic conveying systems have 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.

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## Characteristics of the solutions

<table>
<thead>
<tr>
<th></th>
<th>Vacuum dense phase</th>
<th>Pressure dense phase</th>
<th>Pressure dilute phase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max. Flow rates</strong></td>
<td>6 to 8 t./h.</td>
<td>100 t./h.</td>
<td>40 t./h.</td>
</tr>
<tr>
<td><strong>Convey velocity</strong></td>
<td>Low, Negligible</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Convey rates</strong></td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Piping abrasion</strong></td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Risk of damage of the mixing quality</strong></td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Amortization: Investment</strong></td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Energetic cost</strong></td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td><strong>Operating cost</strong></td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Hygienic application</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Multiple arrival points</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Multiple start points</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>ATEX application</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Integration of weighing device at the start</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Integration of weighing device on arrival</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>C.I.P. (Clean In Place)</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

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

### System Overview

<table>
<thead>
<tr>
<th>Part n°</th>
<th>Denomination</th>
<th>Manufacturing</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Stainless steel 304L</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Cover</td>
<td>Stainless steel 304L</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Removable filtering cartridge</td>
<td>Height 350 mm - Ø 325mm</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>DN65 Inlet product valve</td>
<td>Pitch valve</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>DN250 Outlet product valve</td>
<td>Butterfly valve - Cast iron body - Stainless steel disc</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Unclipping tank</td>
<td>Painted steel cylinder - Aluminum solenoid valve</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Unclipping nozzle</td>
<td>ABS</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>DN65 Valve for venting</td>
<td>Butterfly valve - Cast iron body - Stainless steel disc</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>DN85 Vacuum valve</td>
<td>Butterfly valve - Cast iron body - Stainless steel disc</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>High level probe</td>
<td>Capacitive technology</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Spring clips for cover closing</td>
<td>Zinc plated steel - B material plastic handle</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Vacuum hose</td>
<td>Food quality polyethylene tube</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Pneumatic equipment plate</td>
<td>Stainless steel 304L</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Pneumatic vibrator</td>
<td>Aluminum</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: materials and accessories may differ depending on your configuration.

### Advantages
- Compressed air consumption in m³/h.
- Tare weight (kg)
- Convey rates depend on the density of the conveyed material.

### Cyclones Range

- **VF01**
  - Overall height: 880 mm
  - Convey rate: 0.1 to 1 m³/h
  - O Piping: SMS 38/51
  - Material outlet O: DN 200
  - Compressed air consumption: 0.21 to 0.85 m³/h
  - Tare weight: 95 kg
- **VF02**
  - Overall height: 1,133 mm
  - Convey rate: 1 to 2.5 m³/h
  - O Piping: SMS 51/63
  - Material outlet O: DN 200
  - Compressed air consumption: 0.46 to 1.06 m³/h
  - Tare weight: 115 kg
- **VF03**
  - Overall height: 1,311 mm
  - Convey rate: 2.5 to 4 m³/h
  - O Piping: SMS 63/76
  - Material outlet O: DN 250
  - Compressed air consumption: 0.88 to 1.23 m³/h
  - Tare weight: 145 kg
- **VF04**
  - Overall height: 1,471 mm
  - Convey rate: 4 to 6 m³/h
  - O Piping: SMS 76/88.9
  - Material outlet O: DN 300
  - Compressed air consumption: 0.63 to 0.92 m³/h
  - Tare weight: 170 kg
- **VF05**
  - Overall height: 1,644 mm
  - Convey rate: 5 to 8 m³/h
  - O Piping: ISO 88/104
  - Material outlet O: DN 300
  - Compressed air consumption: 0.57 to 0.92 m³/h
  - Tare weight: 185 kg

### Rates / Distances Ratios

- Convey distance in m.

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

[Download videos & layouts from our website](https://www.palamaticprocess.com/alternative-machine/conveying-system/pneumatic-conveying)
**VFlow® 01**

Dense phase vacuum conveying: powder pump

**Model:** VFlow® 01  
**Rate:** 0 to 3 m³/h  
**Overall height:** 1779 mm  
**Volume of the cyclone:** 15 liters  
**Manufacturing quality:** Ra = 4.2 to 0.8  
**Cyclone body manufacturing:** 304L stainless steel, 316L stainless steel  
**Size of the particules transferred:** from mm. to μm  
**Vacuum pump technology:** without lubrication, with dry paddles or nozzles  
**Tare weight:** 95 kg  
**Maximum vacuum transfer:** 800 Nm³/h  
**Air consumption:** 0.21 to 0.85 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:** 2.6 m²  
**Unclogging tank volume:** 6.5 liters  
**Unloading valve technology:** butterfly Ø DN200  
**Valve body:** cast iron or 316L stainless steel  
**Valve disc:** 304L stainless steel, 316L stainless steel  
**Product valve technology:** pinch  
**Vacuum valve technology:** butterfly with pneumatic actuator  
**Air suction pipe Ø (mm):** DN40  
**Product suction pipe Ø (mm):** 18 - 51  
**Piping typ:** rigid and flexible (reinforced piping with electrical spiral for metallic continuity)  
**Connections:** SMS, clamp, flange  
**Power required:** 2.2 to 3.3 kW  
**Inlet:** 2  
**Outlet:** 5  
**ATEX compatibility:** 20, 21, 22 and 1, 2  
**Pump flow rate m³/h:** 0.140

**VFlow® 02**

Dense phase vacuum conveying: powder pump  

**Model:** VFlow® 02  
**Rate:** 1 to 25 m³/h  
**Overall height:** 1445 mm  
**Volume of the cyclone:** 26 liters  
**Manufacturing quality:** Ra = 4.2 to 0.8  
**Cyclone body manufacturing:** 304L stainless steel, 316L stainless steel  
**Size of the particules transferred:** from mm. to μm  
**Operating temperature:** 10°/40°C  
**Vacuum pump technology:** without lubrication, with dry paddles or nozzles  
**Tare weight:** 135 kg  
**Maximum vacuum transfer:** 800 Nm³/h  
**Air consumption:** 0.45 to 1.06 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:** 4.4 m²  
**Unclogging tank volume:** 6.5 liters  
**Level probe characteristics:** capacitive (on request according to product)  
**Unloading valve technology:** butterfly Ø DN200  
**Valve body:** cast iron or 316L stainless steel  
**Valve disc:** 304L stainless steel, 316L stainless steel  
**Product valve technology:** pinch  
**Vacuum valve technology:** butterfly with pneumatic actuator  
**Air suction pipe Ø (mm):** DN50  
**Product suction pipe Ø (mm):** 51 - 63  
**Piping typ:** rigid and flexible (reinforced piping with electrical spiral for metallic continuity)  
**Connections:** SMS, clamp, flange  
**Power required:** 4 kW  
**Inlet:** 2  
**Outlet:** 5  
**ATEX compatibility:** 20, 21, 22 and 1, 2  
**Pump flow rate m³/h:** 0.20 - 250

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*Plans downloadable on www.palamaticprocess.com*

*Download videos & layouts from our website*

www.palamaticprocess.com/powder-machine/conveying-system

"N" pneumatics conveying, dense phase suction
Model: VFlow® 03
Rate: 2.5 to 4 m³/h.
Overall height: 1,987 mm.
Volume of the cyclone: 40 liters
Manufacturing quality: As ≤ 1.2 to 0.8
Cyclone body manufacturing: 304L stainless steel, 316L stainless steel
Size of the particles transferred: from mm. to μm
Operating temperature: -10°C / +40°C
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: 0.5 liters
Level probe characteristics: contactless (on request according to product)
Unloading valve technology: butterfly Ø DN250
Valve disc: 304L stainless steel, 316L stainless steel
Vacuum valve technology: pinch
Vacuum valve technology: butterfly with pneumatic actuator
Air suction pipe Ø (mm): DN65
Product suction pipe Ø (mm): 63 / 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 and 1, 2
Pump flow rate m³/h: 150

Model: VFlow® 04
Rate: 4 to 6 m³/h.
Overall height: 1,420 mm.
Volume of the cyclone: 55 liters
Manufacturing quality: As ≤ 1.2 to 0.8
Cyclone body manufacturing: 304L stainless steel, 316L stainless steel
Size of the particles transferred: from mm. to μm
Operating temperature: -10°C / +40°C
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: 7.8 m²
Unclogging tank volume: 0.5 liters
Level probe characteristics: contactless (on request according to product)
Unloading valve technology: butterfly Ø DN250
Valve body: cast iron or 314L stainless steel
Valve disc: 304L stainless steel, 316L stainless steel
Product valve technology: pinch
Vacuum valve technology: butterfly with pneumatic actuator
Air suction pipe Ø (mm): DN60
Product suction pipe Ø (mm): 76 / 88.9
Piping type: rigid and flexible reinforced piping with electrical spiral for metallic continuity
Connections: SMS, clamp, flange
Power required: 11 to 15 kW
Inlet: 2
Outlet: 5
ATEX compatibility: 20, 21, 22 and 1, 2
Pump flow rate m³/h: 400

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VFlow® 03
Dense phase vacuum conveying: powder pump

VFlow® 04
Dense phase vacuum conveying: powder pump

Equipment

Available

TEST CENTER

Plans downloadable on www.palamaticprocess.com
Dense phase vacuum conveying: powder pump

**Equipment**

- **Model:** VFlow® 05
- **Rate:** 5 to 10 m³/h
- **Overall height:** 1,583 mm
- **Volume of the cyclone:** 70 liters
- **Manufacturing quality:** K: 0.2 to 0.8
- **Cyclone body manufacturing:** 304L stainless steel, 316L stainless steel
- **Size of the particles transferred:** from mm to 3 μm
- **Vacuum pump technology:** without lubrication, with dry paddles or nozzles
- **Tare weight:** 125 kg
- **Maximum vacuum transfer:** 800 Nm³/h
- **Air consumption:** 0.5 to 0.2 m³/h
- **Flow rate at atmospheric pressure:** maximum and minimum rates
- **Operating pressure:** 5 bars
- **Filter manufacturing:** polyester, PTFE coated, stainless steel deployed inside
- **Filtering area:** 9.5 μm
- **Unclogging tank volume:** 65 liters
- **Level probe characteristics:** explosion isolation and anti-bridging device
- **Unloading valve technology:** butterfly Ø DN300
- **Valve body:** cast iron or 316L stainless steel
- **Valve disc:** 304L stainless steel, 316L stainless steel
- **Product valve technology:** pinch
- **Vacuum valve technology:** butterfly with pneumatic actuator
- **Air suction pipe Ø (mm):** DN100 - DN200
- **Product suction pipe Ø (mm):** BE: 8 - 64
- **Piping type:** rigid and flexible reinforced piping with electrical spiral for metallic continuity
- **Connections:** SMS, clamp, flange
- **Power required:** 25 to 30 kW
- **Inlet:** 2
- **Outlet:** 5
- **ATEX compatibility:** 0, 22 and 1, 2
- **Pump flow rate m³/h:** 550

**POSSIBLE FEATURES**

- Specific and reduced dimensions
- Applications for toxic materials
- Specific industry as nuclear, petrochemistry
- 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 0-20

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.

[See all our options on pages 22-23](www.palamaticprocess.com/powder-machine/conveying-system/pneumatic-conveying/dense-phase-suction-customized)

Download videos & layouts from our website
Examples of Installations

**C.I.P FEATURES FOR PNEUMATIC CONVEYING**

- • Set of washing nozzles
- • Accelerator pump depending on configuration
- • Condensate separator
- • Cyclone and tubing cleaned by pickling
- • Pipe cleaned by scraping

**WASHING NOZZLES MODELS**

**STATIC**
- Pressure: 1.5 to 3 bar
- Consumption: 14 to 460 liters/min.

**FREE ROTATION**
- Pressure: 2 to 3 bar
- Consumption: 8 to 639 liters/min.

**CONTROLLED ROTATION**
- Pressure: 3 to 5 bar
- Consumption: 25 to 193 liters/min.

**WASHING CYCLES**

**Cycle example**

**Type A cleaning process:**
1. Rinse solution 80°C with water
2. Water with soda 80°C, soda at 2/3%
3. Rinse operation with water
4. 1% of nitric acid at 60°C
5. Rinse operation with water
6. Second and final water rinsing
7. Warm air blowing at 130°C

**Type B cleaning process:**
The same as the type A but with an air blowing between each step and the use of a WFI water

Cleaning fluid transfer is about 0 to 300 seconds

**WASHING WATER RECOVERING**

- • Water drainage or shift back to the central through recirculation pump
- • Recycling of rinse waters for the pre-washing of the following cycle

**DRYING SOLUTIONS**

- • Natural drying:
- • Natural evaporation
- • Use of product dewatering
- • Warm air sending:
- • Warm air station
- • Repression of vacuum pump

**C.I.P specific design machine**

Fillet

**Washing plant**

**C.I.P Clean In Place**

**Examples of Installations**

**LOSS-IN-WEIGHT AND DEDICATED LINE**

**Customer:** Dairy, yogurt manufacturing

**Treated product:** Sugar

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

**ONLINE SIFTING**

**Customer:** Spices manufacturer

**Treated product:** Food mixture

**Objectives:** Online mixture sifting and feeding of a FIBC packing unit; Flow rate: 4l/h.

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

**TRANSFER OF COATING GELATIN FOR CAPSULES**

**Customer:** Pharmacist

**Treated product:** Virgin gelatine

**Objectives:** Ensure the feeding of the melter with virgin gelatine (separation of fine and grain) and maximum hygiene

**Advantages:** the pneumatic conveying system provides multiple functions which help to minimize a number of implanted devices

**DEMOTEABILITY OF EQUIPMENT**

**Customer:** Industrial chocolate factory

**Treated product:** Cocoa, hazelnut powder; vanilla powder

**Objectives:** Compact design for easy disassembly and cleaning; ATEX Security: Special design for greasy material with poor flowing

www.palamaticprocess.com/powder-machine/conveying-system

/pneumatic-conveying/dense-phase-suction

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OPTIMIZED CYCLONE EFFICIENCY
- High rate process: optimization of the cyclonic efficiency, reduction of pressure losses, continuous unloading
- Implementation in harsh environments: loading of suction in hazardous areas, protection of the filter against emanation of vapors, gas and dust, also ATEX certification
- Difficult product conveying: protection of the filtering system, no clogging in the filter

MAIN FUNCTIONS
1. Cyclonic: air/product separation
2. Storage: product recovery, conservation of expansion volume
3. Finishes: separation and protection of the vacuum element
4. Reintroduction: into the process line or fines recovery in the dedicated hopper

SEPARATING CYCLONE
- Unclogging set: tank + sequencer
- Storage level with capacitive level sensing probe
- Extraction rotary valve by a continuous and regulated feeding (butterfly valve version available)
- Hopper version to reintroduce fines

RANGE OF CYCLOFILTERS
- Layout of the VF DEP 06

TECHNICAL SPECIFICATIONS
- Particle sizes: 5 – 3 mm
- Average level of vacuum: 500 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 ml EMI)

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

FOR MORE INFORMATION
- Download videos & layouts from our website
**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

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**REACTOR FEEDING**

Customer: Shampoo manufacturer

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: 4 lt./h.

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**DOsing with multi-point discharge: continuous conveying without product loss**

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.

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**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 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 (Infré, LCIE ...).

ASIC PRIMARY 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 analyses on new equipment and new facilities. PALAMATIC PROCESS ensures the safety of operation and full compliance with the standards.

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

The entire risk regarding the transfer, draining and recovery cycles of the transfer is 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.

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**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

- **Manufacturer of seals for automobiles**
  - Product: carbon black
  - Objectives: feeding of 4 high temperature reactors loaded with wax, Dosing accuracy: 500 gr, Flow rate: 4 lt./h

- **Manufacturer of wax**
  - Product: wax
  - Objectives: feeding of 4 high temperature reactors loaded with wax, Dosing accuracy: 500 gr, Flow rate: 4 lt./h

---

**Additional Information:**

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

---

**Website:**

[palamicprocess.com](http://palamicprocess.com)
This option provides transfer and dosing combination. The integrated weigh system allows to control the dosing in masked time and to prepare the batch.

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 automation 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 coincide with the setpoint, the controller stops the transfer; the dose is ready to be inserted.

**TECHNICAL SPECIFICATIONS**

- **Rate from 1 to 10 m³/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 allows technical validation beforehand to secure your invest ment.

More information on our website: www.palamaticprocess.com/pneumatic-conveying/dense-phase-suction

**AVAILABLE CUSTOM MADE**

www.palamaticprocess.com/powder-machine/conveying-system
**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, octobins 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 unclipping, CODAP manufacturing.

**DETACHED FILTER**

It provides air/material 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 demeanor 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.

---

**EXAMPLES OF INSTALLATIONS**

1. **Cyclone transfer system with dosing device**
2. **Multi-line for the feeding of the weighed cyclone; allows the production of the premix during the transfer phase**
3. **Vacuum pneumatic conveying with integrated «weight gain» scale. This pattern is specially designed for the suction of multi-components**

**Customer:** plant for preparation of ready-to-cook 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 weighted 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.

www.palamicprocess.com/powder-machine/conveying-system

/pneumatic-conveying/dense-phase-suction

Download videos & layouts from our website
LINE PURGING SYSTEM
It ensures finishing of the transfer cycle with a clean line thanks to a vacuum blast.

CLEAN IN PLACE (CIP)
Suction of the cleaning fluid by means of 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 material 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 to 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 guarantees:
- Service and evolution continuity
- 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 or wireless.

Download videos & layouts from our website

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

- Individual consultation and on-going support of 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

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

Download videos & layouts from our website
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 sending the product slowly to the pneumatic conveyor piping. This completely patented dense phase conveying system allows to ensure the elbows for 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.

---

**Advantages**

- Limited abrasion and segregation
- Long conveying distances
- Very high convey rates
- Optimized design to meet specific needs

---

**PNEUMATIC CONVEYING RANGE**

**MINIMAXFLO®**

from 15 to 85 liters

**MAXFLO®**

from 114 to 3,500 liters

---

**Dimensions in mm**

<table>
<thead>
<tr>
<th>Models</th>
<th>A</th>
<th>B</th>
<th>C</th>
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**Weight in kg**

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MINIMAXFLO®

MAXFLO®

Electro-pneumatic control panel

Control box

Valve for break in the product stream

Conveying compressed air supply

No baffle, nozzles or fluidization jets

Vent line

Volume of the sas

Low and controlled velocity

Control panel

Volume inlet
Pneumatic Conveying

Pressure - Dense phase

PNEUMATIC CONVEYING RANGE - DENSE PHASE PRESSURE

OPERATING MODE

1. Airlock filling by the dome opening and the vent line (pinch valve)
2. End of filling controlled by temporization. Valve closure in the material column. The airlock is 100% filled
3. The airlock is sealed by the vent line closure and the pressurization of the dome seat
4. Pressure rising of the airlock and starting time for the material evacuation
5. Degassing of the airlock by vent line and cycle reset

TECHNICAL SPECIFICATIONS

- Particle size: from 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 Nm³/min.
- Maximum conveying distance: 700 m.
- ATEX Certification: zone II 1D GA (EMI less than 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
- Stainless steel construction for sanitation or corrosion resistance

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

www.palamaticprocess.com/powder-machine/conveying-system
/pneumatic-conveying/dense-phase-pressure
Download videos & layouts from our website
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.

**ADVANTAGES**

- The Inflatek® valve was specially developed for pneumatic transfer tanks.
- No abrasion
- Tight and sealed closing thanks to a inflatable seal
- Tight and sealed closing thanks to a static or moving product column
- Pressure: 43 bar
- Temperature: 280°C
- Size: 50 - 600 mm

**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 inflatable 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

Removal of a poorly designed pneumatic conveying system for run-off of mine coal fuel size 56 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 l/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.
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 particle 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.

Objectives:
- Operating reliability
- Accurate weighing
- Low operating cost

A loss-in-weight batch weighing control is provided at each transfer unit. Any of six different materials is introduced to the system for pre-weight 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.
**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.
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 into 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.

### Operating Principle

- 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.
- Rotary valve with speed-up box for material conveying.
- Advantages:
  - Limits pressure rising
  - Reduces abrasion
  - Loading capacity: from 2.5 to 58 liters/rev.
- The material is directly blown into the blow-through rotary valve.
- Advantages:
  - Economical solution
  - Space saving
  - Loading capacity: from 2.5 to 58 liters/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.
- 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.

### CYCLOFILTER

- Connection on extraction fan impeller
- Filters
- High level probe (in material jam)
- Cyclonic body
- Extraction device
- Filtration
- Unclugging unit
- Connection on extraction fan impeller
- Filters

### 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 TECHNOLOGIES TO INSERT THE POWDERS

1. Rotary valve with speed-up box for material conveying.
2. The material is directly blown into the blow-through rotary valve.
3. 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.

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<table>
<thead>
<tr>
<th>Models</th>
<th>Flow rate in m³/h</th>
<th>Press. in mbar</th>
<th>Dimensions in mm</th>
<th>Power in Kw</th>
<th>Weight in kg</th>
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</table>
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 ones.
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.

Multimedia Conveying
Feeding of several receipt points
Pipeline cleaner
Ease in modifying the circuits

### DIMENSIONS

<table>
<thead>
<tr>
<th>Models</th>
<th>Rate in m³/h</th>
<th>Filtering area in m²</th>
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<th>Weight in kg</th>
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<td>CYS 02</td>
<td>2</td>
<td>3</td>
<td>800</td>
<td>40</td>
<td>1,980</td>
</tr>
<tr>
<td>CYS 04</td>
<td>4</td>
<td>6</td>
<td>1,200</td>
<td>65</td>
<td>2,350</td>
</tr>
<tr>
<td>CYS 08</td>
<td>8</td>
<td>6</td>
<td>1,200</td>
<td>80</td>
<td>2,350</td>
</tr>
<tr>
<td>CYS 15</td>
<td>15</td>
<td>15</td>
<td>1,800</td>
<td>125</td>
<td>3,030</td>
</tr>
<tr>
<td>CYS 30</td>
<td>30</td>
<td>25</td>
<td>1,800</td>
<td>150</td>
<td>3,600</td>
</tr>
<tr>
<td>CYS 60</td>
<td>60</td>
<td>60</td>
<td>2,000</td>
<td>250</td>
<td>5,190</td>
</tr>
</tbody>
</table>

www.palamaticprocess.com/powder-machine/conveying-system/pneumatic-conveying
Dilute Phase Pressure
Download videos & layouts from our website
Pneumatic Conveying

The PALAMATIC PROCESS engineering office puts at your disposal its skills and experience to design powders handling solutions completely custom-made, which will meet your specifications. Our engineers help and support you at every stage of the project through the feasibility study, the 3D designing with SolidWorks, the mounting and tests in our workshop and setting up on your production plant. Because your satisfaction is our priority, you can benefit from our after-sales service which is the guarantee of the quality and the reliability of our equipment.

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

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

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 particles (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

**FOOD ADDITIVES**

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 m³ 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

Download videos & layouts from our website
Peripheral Accessories

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 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 is ensured by metal spiral
- FDA: food finish
- Reinforced for abrasive products
- Material: polyurethane
- Transparent to see 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 cyclotifiers and various starting points.
- Automatic by-pass by rotating drum with inflatable gasket ensuring sealing. Suction and vacuum operation. DN80 300

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
DN25 to 250

BENDS
- "Cushion of material" abrasion resistant bend
- Abrasion resistant bend with reinforced extrados
- .010 bends

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

Download videos & layouts from our website www.palamaticprocess.com/powder-machine/conveying-system
1. 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 machines are adjustable and can be customized according to ATEX zones.

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

There are 3 possible operating principles:

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

2. DENSE PHASE VACUUM PNEUMATIC CONVEYING SYSTEM

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

<table>
<thead>
<tr>
<th>[+ Advantages]</th>
<th>[- Weak points]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>Distance &lt; 80 m.</td>
</tr>
<tr>
<td>Implementation cost</td>
<td>Flow rate &lt; 6 t./h.</td>
</tr>
<tr>
<td>Explosion cost</td>
<td>Low nitrogen consumption (reduced at maximum)</td>
</tr>
<tr>
<td>Low nitrogen consumption (reduced at maximum)</td>
<td>Large filter surface</td>
</tr>
</tbody>
</table>

3. 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
- Distance
- Flow rate
- Easy implementation
- Multi-points feeding

[-] Weak points
- Limited security
- Risk of dust emanation outdoor pressure equipment
- Large filter surface

4. DILUTE PHASE PRESSURE PNEUMATIC CONVEYING SYSTEM

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
- Cyclotracer
- Protection filter
- Compressor
- Chiller
**ATEX**

Guide for design of compliant equipment

### EQUIPMENT FOR SURFACE INDUSTRIES (GROUP II)

<table>
<thead>
<tr>
<th>Zone</th>
<th>0</th>
<th>20</th>
<th>1</th>
<th>21</th>
<th>2</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of atmosphere</td>
<td>Gas</td>
<td>Dust</td>
<td>Gas</td>
<td>Dust</td>
<td>Gas</td>
<td>Dust</td>
</tr>
<tr>
<td>Explosive atmosphere</td>
<td>Permanent presence</td>
<td>Intermittent presence</td>
<td>Episodic presence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category of devices that may be used in accordance with 94/9/CE</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CONFORMANCE ASSESSMENT PROCEDURE*

- **Category 1** (zone 0 / 20)
  - EC type examination by N.O.**
  - Unit EC verification by N.O.
- **Category 2** (zone 1 / 21)
  - For electrical equipment or internal combustion engines
  - EC type examination by N.O.
  - Unit EC verification by N.O.
- **Category 3** (zone 2 / 22)
  - For non-electrical equipment
  - Internal control of production and documents sent to N.O.

* Applicable table for surface industries II
** N.O.: Notified Organism

### DEGREE OF PROTECTION IP «XX»

#### Protection against solid bodies

<table>
<thead>
<tr>
<th>Protection</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>No protection</td>
<td>Protected against solid bodies ≥50 mm (eg accidental contact of the hand)</td>
<td>Protected against solid bodies ≥12 mm (eg fingers of the hand)</td>
<td>Protected against solid bodies ≥2.5mm (eg screw tools...)</td>
<td>Protected against solid bodies ≤1 mm (eg fine tools, small cord)</td>
<td>Protected against dust (no harmful sediment)</td>
<td>Totally protected against dust</td>
</tr>
</tbody>
</table>

#### Protection against liquid bodies

<table>
<thead>
<tr>
<th>Protection</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>No protection</td>
<td>Protected against vertically falling water drops</td>
<td>Protected against water falls inclined at 15 °</td>
<td>Protected against rain water up to 60 ° from the vertical</td>
<td>Protected against water sprayed from all directions</td>
<td>Protected against water jets with lance from all directions</td>
<td>Protected against water splashes comparable to heavy seas</td>
<td>Protected against the effects of immersion</td>
<td>Protected against the effects of prolonged immersion under specified conditions</td>
</tr>
</tbody>
</table>

### GAS GROUPS

<table>
<thead>
<tr>
<th>Group</th>
<th>Reference gas</th>
<th>MESG (mm)</th>
<th>MIC (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Methane</td>
<td>1.14</td>
<td>0.28</td>
</tr>
<tr>
<td>II A</td>
<td>Propane</td>
<td>0.92</td>
<td>0.25</td>
</tr>
<tr>
<td>II B</td>
<td>Ethylene</td>
<td>0.65</td>
<td>0.07</td>
</tr>
<tr>
<td>II C</td>
<td>Hydrogen/acetylethylene</td>
<td>0.37</td>
<td>1.01/0.017</td>
</tr>
</tbody>
</table>

MESG: Maximum Experimental Safe Gap
MIC: Minimum Ignition Current
For same gases, additional subdivisions II B1, II B2 et II B3
II B1: MESG > 0.85
II B2: MESG > 0.75
II B3: MESG > 0.65

### DUST GROUPS

<table>
<thead>
<tr>
<th>Group</th>
<th>Type of dust</th>
<th>Size</th>
<th>Resistivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>II A</td>
<td>Suspended combustible particles</td>
<td>&gt; 500 μm</td>
<td>-</td>
</tr>
<tr>
<td>II B</td>
<td>Non-conductive dust</td>
<td>≤ 500 μm</td>
<td>&gt;10⁷ Ω.m</td>
</tr>
<tr>
<td>II C</td>
<td>Conductive dust</td>
<td>≤ 500 μm</td>
<td>&lt;10⁷ Ω.m</td>
</tr>
</tbody>
</table>

### MAXIMUM SURFACE TEMPERATURES

<table>
<thead>
<tr>
<th>Gas</th>
<th>T1 (450)</th>
<th>T2 (300)</th>
<th>T3 (200)</th>
<th>T4 (135)</th>
<th>T5 (100)</th>
<th>T6 (85)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>450</td>
<td>300</td>
<td>200</td>
<td>135</td>
<td>100</td>
<td>85</td>
</tr>
</tbody>
</table>

Temperature class

- **CE 008**
- **II 2 G et D**
- **T4**
Our expertise:

- **FILLING SOLUTIONS FOR BIG BAG AND OCTABIN**
  - To fill

- **EMPTYING SOLUTIONS FOR BIG BAG AND OCTABIN**
  - To empty, compact and massage

- **SACK, DRUM AND CARDBOARD FILLING SOLUTIONS**
  - To fill, package, handle

- **SACK AND DRUM EMPTYING SOLUTIONS**
  - To empty, compact, handle, discharge

- **SOLUTIONS FOR PNEUMATIC CONVEYING**
  - Vacuum, pressure

- **SOLUTIONS FOR MECHANICAL CONVEYING**
  - To transfer with screw, belt conveyor, bucket elevator, aeromechanical or vibratory conveyor, truck loading spout

- **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