SOLUTIONS for Pneumatic Conveying

VACUUM PRESSURE

Palamatic
PROCESS machines • engineering

Powder Handling Solutions
CONTENT

Means that the equipment can be installed in ATEX zone

Means that design and options can be customised

PALAMATIC PROCESS reserves the right to make changes in the design of the facilities listed in this commercial documentation

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A TECHNOLOGY ADAPTED TO EACH PROCESS

Pneumatic conveying is an alternative to the mechanical conveying of materials. The conveying of 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 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 are normally divided into two types depending on if the solids-air ratio is high (dense phase) or low (dilute phase).

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STANDARD INSTALLATIONS WITH DENSE PHASE PRESSURE CONVEYING SYSTEM

+ Advantages
  - High convey rates
  - A reduced abrasiveness
## 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>Maximum 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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td><strong>Convey rates</strong></td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Piping abrasion</strong></td>
<td>Low</td>
<td>Low</td>
<td>High</td>
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<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>High</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Energetic cost</strong></td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
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<tr>
<td><strong>Operating cost</strong></td>
<td>Low</td>
<td>Low</td>
<td>Low</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.
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

System Overview

The VFlow® range ensures the conveying of more than 95% of existing powdered materials!

Convey rates depend on the density of the conveyed material.

<table>
<thead>
<tr>
<th>Model</th>
<th>Overall height</th>
<th>Convey rate</th>
<th>Ø Piping</th>
<th>Material outlet Ø</th>
<th>Compressed air consumption</th>
<th>Tare weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFlow® 01</td>
<td>880</td>
<td>0 to 1</td>
<td>SMS 38/51</td>
<td>DN 200</td>
<td>0.21 to 0.85</td>
<td>95</td>
</tr>
<tr>
<td>VFlow® 02</td>
<td>1,133</td>
<td>1 to 2.5</td>
<td>SMS 51/63</td>
<td>DN 200</td>
<td>0.46 to 1.06</td>
<td>115</td>
</tr>
<tr>
<td>VFlow® 03</td>
<td>1,311</td>
<td>2.5 to 4</td>
<td>SMS 63/76</td>
<td>DN 250</td>
<td>0.88 to 1.23</td>
<td>145</td>
</tr>
<tr>
<td>VFlow® 04</td>
<td>1,477</td>
<td>4 to 6</td>
<td>SMS 76/88.9</td>
<td>DN 300</td>
<td>0.63 to 0.92</td>
<td>170</td>
</tr>
<tr>
<td>VFlow® 05</td>
<td>1,644</td>
<td>5 to 8</td>
<td>ISO R 88/104</td>
<td>DN 300</td>
<td>0.57 to 0.92</td>
<td>185</td>
</tr>
</tbody>
</table>

Models:
- VFlow® 01
- VFlow® 02
- VFlow® 03
- VFlow® 04
- VFlow® 05

Part no. | Denomination | Manufacturing | Qty |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></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>DM65 Inlet product valve</td>
<td>Pich valve</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>DM250 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 - Aluminium 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>DM65 Valve for venting</td>
<td>Butterfly valve - Cast iron body - Stainless steel disc</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>DM65 Vacuum valve</td>
<td>Butterfly valve - Cast iron body - Stainless steel disc</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>High steel pipe</td>
<td>Capactive technology</td>
<td>1</td>
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<tr>
<td>11</td>
<td>Spring clips for cover closing</td>
<td>Zinc plated steel - Br material plastic handle</td>
<td>1</td>
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<tr>
<td>12</td>
<td>Vacuum hose</td>
<td>Food quality polyurethane 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>Aluminium</td>
<td>1</td>
</tr>
</tbody>
</table>

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

Cyclones Range

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www.palamaticprocess.com/powder-machine/conveying-system/pneumatic-conveying
Model: VFlow® 01
Rate: 0 to 2.5 m³/h
Overall height: 1,479 mm
Volume of the cyclone: 15 liters
Manufacturing quality: Ra = 0.8 μm stainless steel
Cyclone body manufacturing: 304(L) stainless steel, 316(L) stainless steel
Size of the particles 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: polytetrafluoroethylene coated, stainless steel deployed inside
Filtering area: 2.6 m²
Unclogging tank volume: 6.3 liters
Level probe characteristics: capacitive (on request according to product)
Unloading valve technology: butterfly Ø DN200
Valve body: cast iron or 316(L) 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): DN40
Product suction pipe Ø (mm): 38 - 51
Piping type: 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: 140

Model: VFlow® 02
Rate: 1 to 25 m³/h
Overall height: 1,445 mm
Volume of the cyclone: 25 liters
Manufacturing quality: Ra = 0.2 μm stainless steel
Cyclone body manufacturing: 304(L) stainless steel, 316(L) stainless steel
Size of the particles transferred: from mm. to μm
Operating temperature: -10°/+40°
Vacuum pump technology: without lubrication, with dry paddles or nozzles
Tare weight: 93.5 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: polytetrafluoroethylene 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 316(L) 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): DN50
Product suction pipe Ø (mm): 51 - 63
Piping type: 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: 200 - 250

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### VFlow® 03

**Model:** VFlow® 03  
**Rate:** 2.5 to 4 m³/h.  
**Height:** 1,897 mm.  
**Volume of the cyclone:** 40 liters.  
**Materials:** 304L stainless steel, 316L stainless steel.  
**Size of the particles:** 0.1 to 0.8 mm.  
**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 1.33 m³/h.

### VFlow® 04

**Model:** VFlow® 04  
**Rate:** 4 to 6 m³/h.  
**Height:** 1,820 mm.  
**Volume of the cyclone:** 55 liters.  
**Materials:** 304L stainless steel, 316L stainless steel.  
**Size of the particles:** 0.1 to 0.8 mm.  
**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.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Test Center</th>
<th>Available</th>
</tr>
</thead>
</table>

**Model:** VFlow® 03  
**Rate:** 2.5 to 4 m³/h.  
**Height:** 1,897 mm.  
**Volume of the cyclone:** 40 liters.  
**Materials:** 304L stainless steel, 316L stainless steel.  
**Size of the particles:** 0.1 to 0.8 mm.  
**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 1.33 m³/h.

**Model:** VFlow® 04  
**Rate:** 4 to 6 m³/h.  
**Height:** 1,820 mm.  
**Volume of the cyclone:** 55 liters.  
**Materials:** 304L stainless steel, 316L stainless steel.  
**Size of the particles:** 0.1 to 0.8 mm.  
**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.
Dense phase vacuum conveying: powder pump

**VFlow® Custom made**

- **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

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**VFlow® 05**

Dense phase vacuum conveying: powder pump

**MODEL:** VFlow® 05

**RATING:** 5 to 10 m³/h

**OVERALL HEIGHT:** 1,883 mm

**VOLUME OF THE CYCLONE:** 70 liters

**MANUFACTURING QUALITY:** 500 to 0.2 mm

**CYCLONE BODY MANUFACTURING:** 304L stainless steel, 316L stainless steel

**SIZE OF THE PARTICLES TRANSFERRED:** from mm to 3 μm

**OPERATING TEMPERATURE:** -10°C to +40°C

**VACUUM PUMP TECHNOLOGY:** without lubrication, with dry paddles or nozzles

**TARE WEIGHT:** 155 kg

**MAXIMUM VACUUM TRANSFER:** 800 Nm³/h

**AIR CONSUMPTION:** 0.55 ± 0.82 m³/min

**FLOW RATE AT ATMOSPHERIC PRESSURE:** maximum and minimum rates

**OPERATING PRESSURE:** 6 bars

**FILTER MANUFACTURING:** polyester, PTFE coated, stainless steel deployed inside

**FILTER AREA:** 9.5 m²

**UNCLAMPING TANK VOLUME:** 6.5 liters

**LEVEL PROBE CHARACTERISTICS:** capacitive ion request according to product

**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):** Ø 88.9 - 104

**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:** 20, 21, 22 and 1, 2

**PUMP FLOW RATE m³/h:** 500

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.

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Available

**Equipment TEST CENTER**

**Available**

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/ pneumatic-conveying/dense-phase-suction-customized

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Plans downloadable on www.palamaticprocess.com
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

<table>
<thead>
<tr>
<th>STATIC</th>
<th>FREE ROTATION</th>
<th>CONTROLLED ROTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure: 1.5 to 3 bar Consumption: 14 to 460 liters/min.</td>
<td>Pressure: 2 to 3 bar Consumption: 8 to 639 liters/min.</td>
<td>Pressure: 3 to 5 bar Consumption: 25 to 193 liters/min.</td>
</tr>
</tbody>
</table>

C.I.P specific design machine

Fillet

Washing plant

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. Rinsing operation with water
  4. 1% of nitric acid at 60°C
  5. Rinsing 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 WI water

Cleaning fluid transfer is about 0 to 300 seconds

DETERGENT TYPE

Control of the detergent titrant concentration and recovering of washing waters. Detergent examples:
- Alkaline
- Disinfectant
- Dewatering: solution enabling the acceleration of the installation drying

WASHING WATER RECOVERING

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

DRYING SOLUTIONS

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

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: 5t/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

DEMONTABLEITY 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

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**OPERATING MODE**

A separating cyclone (offset filter) is coupled with a 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).

**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

**TECHNICAL SPECIFICATIONS**

- **Particle sizes**: 5 – 3 1m
- **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, aramidic PTFE, FDA certified
- **ATEX certification**: zone II 1.2.3 GD (less than 3 ml EMI).

**ADVANTAGES**

- No product loss: reintroduction of the powders into the process line
- Implementation in harsh environments: loading of suction in hazardous areas, protection of the filter against emanation of vapors, gas and dust also ATEX certified
- 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

**RANGE OF CYCLOFILTERS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Rate in m³/h</th>
<th>Piping Ø in mm</th>
<th>Filtering surface in m²</th>
<th>Cyclone outlet Ø in mm</th>
<th>Cyclone height in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF DEP 02</td>
<td>2</td>
<td>50</td>
<td>5</td>
<td>100</td>
<td>600</td>
</tr>
<tr>
<td>VF DEP 04</td>
<td>4</td>
<td>65</td>
<td>8</td>
<td>150</td>
<td>780</td>
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<tr>
<td>VF DEP 06</td>
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<td>80</td>
<td>12</td>
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<td>1,403</td>
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<td>VF DEP 08</td>
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<td>100</td>
<td>16</td>
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<td>1,856</td>
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<td>VF DEP 10</td>
<td>10</td>
<td>125</td>
<td>16</td>
<td>250</td>
<td>2,300</td>
</tr>
</tbody>
</table>

**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

**Detached Filter**


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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: 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: 41./h.

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.
Maintenance operations are facilitated and centralized on a single device.
Other cyclones are located in height and require no maintenance.

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 (themselves, CEIE ...)
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 analyses on new equipment and new facilities.
PALAMATIC PROCESS ensures the safety of operation and full compliance with the standards.
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 investment.

More information on our website: www.palamaticprocess.com/testing-design-
equipment-test-plant

**Advantages**

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.
## EXAMPLES OF INSTALLATIONS

**Cyclone transfer system with dosing device**

- **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.

**Multi-line for the feeding of the weighted cyclone, allows the production of the premix during the transfer phase**

- **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:** 4 t./h.

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

- **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 unlocking, 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 cyclonfilter is then deported to the ground with the possibility of re-introduction of lines 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.

---

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**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 cyclocfilter, 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.
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

- More 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
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 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.
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 1,2,3 GD (EMI less to 3 mA)
- 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

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

EXAMPLES OF INSTALLATIONS

Introduction of the material in the gas
Closure of the valve in the product
Controlled introduction of air

Loading tank cars
Long convey distances
Dedicated high-rate line

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Official representative: M6BEA:HD;>CHI6AA6I>DCH
Official representative: 86H:HIJ9N
EC:JB6I>88DCK:N>C<G6C<:9:CH:E=6H:EG:HHJG:
DE:G6I>C<BD9:

压力 - 密相

密相气力输送范围

操作模式
1. 空气锁通过拱顶开口和通风管（夹箍阀）注料
2. 注料结束由暂存控制。材料在材料柱中的阀闭合。空气锁充满100%。
3. 通过通风管密封空气锁并压气化
4. 空气锁内气压上升并开始材料排空时间
5. 消气空气锁通过通风管并循环复位

技术规格
- 粒度：从非常细（灰）到大花生
- 平均过压水平：4巴
- 制造：铸铁、304L和316L不锈钢
- 压缩空气消耗量：2至114 Nm³/min。
- 最大输送距离：700米。
- ATEX认证：区II 1,2,3 GD（EMI小于3 mA）
- 最高温度：280°C
- 最高操作温度：＞300°C
- 进口直径：50至600毫米。

优势
- 适用于颗粒物、粉末和混合物
- 慢速平滑输送，消耗更少压缩空气和能量
- 简单系统且不污染
- 减少由于低输送率而产生的磨损
- 无混合物损坏
- 不锈钢结构用于卫生或耐腐蚀

案例研究
实现一套气力输送系统用于饲料袋装机填充机：
- 2个供料仓
- 4条包装线

安装示例

材料注入
阀门关闭
控制气流注入

装载罐车
长距离输送
专用高率线

下载视频及布局从我们的网站
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 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

**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.

---

**EXAMPLES OF INSTALLATIONS**

**U.S. DEPARTMENT OF ENERGY**

Objectives:
- Minimum particle size degradation
- Low operation cost

Retrofit of a poorly designed pneumatic conveying system for run-off 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 points
- Ambient temperature
- 40 °C

**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°C
**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 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.

**ACE HARDWARE**

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

A loss-in-weight batch weighment 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.
Dilute Phase Pressure

Dilute phase pressure conveying systems use positive displacement (root 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. It 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Flow rate m³/h</th>
<th>Pressure MPa</th>
<th>Power kW</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>200-01</td>
<td>300</td>
<td>0.4</td>
<td>2.2</td>
<td>30</td>
</tr>
<tr>
<td>200-02</td>
<td>400</td>
<td>0.7</td>
<td>4.0</td>
<td>60</td>
</tr>
<tr>
<td>300-01</td>
<td>500</td>
<td>0.8</td>
<td>6.2</td>
<td>75</td>
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<td>300-02</td>
<td>600</td>
<td>1.0</td>
<td>8.0</td>
<td>100</td>
</tr>
<tr>
<td>500-01</td>
<td>800</td>
<td>1.4</td>
<td>16.0</td>
<td>150</td>
</tr>
</tbody>
</table>
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

**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 unclugged by automatic sequencers.

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.

### 3 TECHNOLOGIES TO INSERT THE POWDERS

1. **Rotary valve with speed-up box**

   - For material conveying
   - Advantages:
     - Limits pressure rising
     - Reduces abrasion
     - Loading capacity: from 2.5 to 58 liters/rev.

2. **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

3. **Connection on extraction fan (option)**

   - High level probe (no material jam)
   - Dimensions in mm.
   - Connection on extraction fan (option)

---

### Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Flow rate in m³/hr</th>
<th>Pressure in bar</th>
<th>Dimensions in mm</th>
<th>Power in Kw</th>
<th>Weight in kg</th>
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<td>220</td>
<td>950</td>
<td>770</td>
<td>720</td>
<td>850</td>
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<td>LOB-30</td>
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<td>1,100</td>
<td>2,060</td>
<td>1,810</td>
<td>2,640</td>
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</tbody>
</table>

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Download videos & layouts from our website.
Pneumatic Conveying

Cyclofilters

Dilute Phase Pressure

Technological Specifications

- Particle size: 1 µm to 3 cm
- Overpressure average level: 200 to 600 mbar
- Manufacturing: steel, 304L stainless steel, 316L stainless steel
- Finishes: R408, mirror polished, PTFE, anti-static, oleoplastic
- ATEX Certification: zone II 1,2,3 GD (EMI below 3 mJ)

Range of Cyclofilters

- CYS 01
- CYS 02
- CYS 04
- CYS 15
- CYS 30
- CYS 60

Advantages

- Multi-products conveying
- Pipeline cleaner
- Feeding of several receipt points
- Ease in modifying the circuits

Dimensions

- ØD
- DN
- A
- B
- C
- Weight

<table>
<thead>
<tr>
<th>Models</th>
<th>Rate in m³/h</th>
<th>Filtering area in m²</th>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYS 01</td>
<td>1</td>
<td>3</td>
<td>800, 32, 1,940</td>
<td>340, 300</td>
</tr>
<tr>
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<td>2</td>
<td>3</td>
<td>800, 40, 1,840</td>
<td>340, 300</td>
</tr>
<tr>
<td>CYS 04</td>
<td>4</td>
<td>6</td>
<td>1,200, 65, 2,350</td>
<td>1,300, 445</td>
</tr>
<tr>
<td>CYS 06</td>
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<td>6</td>
<td>1,200, 80, 2,340</td>
<td>1,300, 515</td>
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<tr>
<td>CYS 15</td>
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<td>1,800, 125, 3,030, 2,950</td>
<td>2,040, 905</td>
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<td>CYS 30</td>
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<td>25</td>
<td>1,800, 150, 3,600, 2,950</td>
<td>2,040, 1,320</td>
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<tr>
<td>CYS 60</td>
<td>60</td>
<td>60</td>
<td>2,000, 250, 5,190, 3,400</td>
<td>2,140, 2,775</td>
</tr>
</tbody>
</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
Finishes: polyester, PTFE, hydrophobic, oleophobic, anti-static...
The design office PALAMATIC PROCESS insures the choice and design of the most suitable cyclofilter according to your applications.

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

Dilute Phase Pressure
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.

Technical questionnaires are available on our Web plateform in order to define your project and offer you the best technical solution which will meet your requirements.

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

**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
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 (tarn 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 cyclotubers 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
DN 25 to 250

**BENDS**
- «Cushion of material» abrasion resistant bend
- Abrasion resistant bend with reinforced extrados
- Ø10 bends

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

# 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.
**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

**DENSE PHASE VACUUM PNEUMATIC CONVEYING SYSTEM**

<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></td>
</tr>
<tr>
<td>Low nitrogen consumption (reduced at maximum)</td>
<td></td>
</tr>
<tr>
<td>Vacuum operation (depleted atmosphere)</td>
<td></td>
</tr>
<tr>
<td>Low filter surface</td>
<td></td>
</tr>
</tbody>
</table>

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

**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

**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.

### [+ ] Advantages
- Security
- High flow rate
- High conveying distances

### [- ] Weak points
- Implementation cost
- Complexity of the re-circulation
- Exploration cost

Devices used:
- Sa
- Cyclofilter
- Protection filter
- Compressor
- Chiller
ATEX
Guide for design of compliant equipment

1. 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>G gas</td>
<td>D dust</td>
<td>G gas</td>
<td>D dust</td>
<td>G gas</td>
<td>D 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>

2. CONFORMITY ASSESSMENT PROCEDURE*

- Category 1 (zone 0 / 20)
  - EC type examination by N.O.
  - Unit EC verification by N.O.

- Category 2 (zone 1 / 21)
  - Production Quality Assurance by N.O.
  - Products Verification by N.O.
  - Conformity to type and tests under the responsibility of N.O.

- Category 3 (zone 2 / 22)
  - Internal control of production and documents sent to N.O.
  - Internal control of production

* Applicable table for surface industries II

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3. PRODUCT MARKING

- Number of notified organism responsible for production
- Equipment category for the current area
- Gas
- Dusts

![Product Marking Diagram]

4. DEGREE OF PROTECTION IP«XX»

<table>
<thead>
<tr>
<th>Protection against solid bodies</th>
<th>Protection against liquid bodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No protection</td>
</tr>
<tr>
<td>1</td>
<td>Protected against solid bodies ≥50 mm (eg accidental contact of the hand)</td>
</tr>
<tr>
<td>2</td>
<td>Protected against solid bodies ≥12 mm (eg fingers of the hand)</td>
</tr>
<tr>
<td>3</td>
<td>Protected against solid bodies ≥2,5mm (eg screw tools..)</td>
</tr>
<tr>
<td>4</td>
<td>Protected against solid bodies ≤1 mm (eg fine tools, small cord)</td>
</tr>
<tr>
<td>5</td>
<td>Protected against dust (no harmful sediment)</td>
</tr>
<tr>
<td>6</td>
<td>Totally protected against dust</td>
</tr>
<tr>
<td>0</td>
<td>No protection</td>
</tr>
<tr>
<td>1</td>
<td>Protected against vertically falling water drops</td>
</tr>
<tr>
<td>2</td>
<td>Protected against water falls inclined at 15 °</td>
</tr>
<tr>
<td>3</td>
<td>Protected against rain water up to 60 ° from the vertical</td>
</tr>
<tr>
<td>4</td>
<td>Protected against water sprayed from all directions</td>
</tr>
<tr>
<td>5</td>
<td>Protected against water jets with lance from all directions</td>
</tr>
<tr>
<td>6</td>
<td>Protected against water splashes comparable to heavy seas</td>
</tr>
<tr>
<td>7</td>
<td>Protected against the effects of immersion</td>
</tr>
<tr>
<td>8</td>
<td>Protected against the effects of prolonged immersion under specified conditions</td>
</tr>
</tbody>
</table>

5. GAS GROUPS

<table>
<thead>
<tr>
<th>Group</th>
<th>Reference gas</th>
<th>MESG (mm)</th>
<th>MIC (mJ)</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>HC</td>
<td>Hydrogen/acetylene</td>
<td>0.37</td>
<td>1.011/0.017</td>
</tr>
</tbody>
</table>

MESG: Maximum Experimental Safe Gap
MIC: Minimum Ignition Current

For Zone aten, additional subdivisions IIB1, IIB2 et IIB3
IIB1: MESG > 0.65
IIB2: MESG > 0.75
IIB3: MESG > 0.65

6. 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 dusts</td>
<td>≤ 500 μm</td>
<td>&gt;10^7 Ω.m</td>
</tr>
<tr>
<td>II C</td>
<td>Conductive dusts</td>
<td>&lt; 500 μm</td>
<td>&lt;10^7 Ω.m</td>
</tr>
</tbody>
</table>

7. MAXIMUM SURFACE TEMPERATURES

<table>
<thead>
<tr>
<th>Group</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>Gas</td>
<td>450</td>
<td>300</td>
<td>200</td>
<td>135</td>
<td>100</td>
<td>85</td>
</tr>
<tr>
<td>Dust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Download videos & layouts from our website
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