VACUUM CONVEYORS

Vacuum conveyors are made by perforating the belt and drawing air through grooves in the bed of a standard conveyor.

- Holds flat parts of any material fast to the belt
- Ideal for elevation changes or part holding
- Can be used in upside down applications
- Vacuum area required is designed per application
- A variety of vacuum sources can be used

3200 Series Conveyor Specifications

- Aluminum extruded frame with T-Slot construction
- Sealed ball bearings
- V-Guided and Non-V-Guided belt compatible
- Rack and pinion belt tensioning
- End and Center drive compatible
- Optional 1" (25 mm) DIA roller interface tail section
- Conveyor Widths: 3.75" (95 mm) to 48" (1,219 mm) wide
- Conveyor Lengths: End Drive = 3' (914 mm) to 40' (12,192 mm) Center Drive = 4' (1,219 mm) to 99' (30,175 mm)
- Belt Speeds: 421 ft/min (128 m/min)

Reference Full Specification Catalog or www.dorner.com for conveyor details.

Application Notes:
1. Products being conveyed on a vacuum conveyor must be placed in physical contact with the belt to create a seal.
2. Do not attempt to accumulate product on a vacuum conveyor.
3. Do not use in an application with powder or liquid.

VACUUM SPECIFICATIONS

- **Rows:**
  Generally (1) row of vacuum is used for products 2" (51 mm) wide or less (2) rows or more should be used for larger width product row spacing

- **Vacuum Pattern Lead:**
  The lead on the vacuum holes should be placed so a minimum of (2) hole patterns are on the product at all times
• **Vacuum Pattern Options**

**0.12” (3 mm) DIA Hole**

- Flow
- 0.38” (10 mm) Minimum Hole Pattern Lead
- 3.0” (76 mm) Minimum Row Spacing

**0.19” (5 mm) DIA Hole**

- Flow
- 0.50” (13 mm) Minimum Hole Pattern Lead
- 3.0” (76 mm) Minimum Row Spacing

**0.25” (6 mm) DIA Hole**

- Flow
- 0.50” (13 mm) Minimum Hole Pattern Lead
- 3.0” (76 mm) Minimum Row Spacing

**0.38” (10 mm) DIA Hole**

- Flow
- 0.75” (19 mm) Minimum Hole Pattern Lead
- 3.0” (76 mm) Minimum Row Spacing

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**Recommended Belt Types**

**Type 03 FDA High Friction**

For rigid parts like plastic caps, plastic bottles, ceramic wafers, glass ware, etc.

**Type 06 Electrically Conductive Belt**

For thin product like paper, light cardboard, cloth, plastic film, etc.
3200 SERIES VACUUM CONVEYOR

• **Vacuum Ports:**
  Vacuum is drawn through the side frame of the conveyor
  2.1” (53 mm) O.D. fitting for standard 2” (51 mm) vinyl tubing

• **Number of Vacuum Ports:**
  The number of vacuum ports is determined by the vacuum hole selected,
  the hole pattern and the number of vacuum rows

  \[
  \text{Number of Ports} = \frac{(\text{Area}) \cdot (\text{Zone Length}) \cdot (\text{Rows})}{(3) \cdot (\text{Lead})} \quad \text{(Round Up)}
  \]

  Where:
  \( \text{Area} = \text{Area of Vacuum holes (in}^2) \)
  \( 0.12” (3 \text{ mm}) \text{ Hole Pattern} = 0.012 \text{ in}^2 \)
  \( 0.19” (5 \text{ mm}) \text{ Hole Pattern} = 0.028 \text{ in}^2 \)
  \( 0.25” (6 \text{ mm}) \text{ Hole Pattern} = 0.049 \text{ in}^2 \)
  \( 0.38” (10 \text{ mm}) \text{ Hole Pattern} = 0.110 \text{ in}^2 \)
  \( \text{Zone Length} = \text{Length of Vacuum Zone (in)} \)
  *See dimensional drawing for details (page 5)*
  \( \text{Rows} = \text{Number of Vacuum Rows} \)
  \( \text{Lead} = \text{Vacuum Hole Pattern Lead (in)} \)

**Example:**
10” (254 mm) wide by 12’ (3,658 mm) Long 3200 Series End Drive Conveyor with (3) rows of 0.12” (3 mm) DIA holes with a 1.0” (25 mm) lead.

\[
\text{Number of Ports} = \frac{(0.012) \cdot (144” - 10.3”) \cdot (3)}{(3) \cdot (1.0)} = \frac{(0.012) \cdot (133.7) \cdot (3)}{(3) \cdot (1.0)} = \frac{4.81}{3.0} = 1.6 \quad \text{(Round Up)}
\]

\[
\text{Number of Ports} = 2
\]

* 10.4” (264 mm) = 3200 Series No Vacuum Zones, see page 5
3200 SERIES VACUUM CONVEYOR

Vacuum Source

- Vacuum source is provided by a regenerative vacuum blower
- An inlet filter, muffler and exit relief valve is recommended
- Plumbing is done thru vinyl tubing
- The size of the vacuum blower is determined by the total area of vacuum holes open during product running, pressure required to hold the product and the seal of the product to the conveyor belt

\[
\text{Number of Open Vacuum Holes} = \left( \frac{\text{(Rows)}}{\text{(Lead)}} \right) \left[ \frac{\text{(Zone Length)}}{\text{(Rate)}} \right] \left( \frac{\text{(Speed)}}{\text{(Rate)}} \right) \left( \frac{\text{Product Length}}{\text{(Rate)}} \right)
\]

Where:
- Rows = Number of Vacuum Rows
- Lead = Vacuum Hole Pattern Lead (in)
- Zone Length = Length of vacuum zone (in)  
  *See dimensional drawing for details
- Speed = Belt Speed (in/min)
- Rate = Product Rate (parts/min)
- Product Length = Length of product in the direction of flow (in)

\[
\text{Blower Size (CFM)} = \left( \frac{\text{Number of Open Vacuum Holes}}{\text{Flow Rate Per Hole}} \right)
\]

Where:
- Number of Open Vacuum Holes = From Above
- Flow Rate Per Hole* =
  - 0.12" Hole Pattern = 0.56 CFM
  - 0.19" Hole Pattern = 1.00 CFM
  - 0.25" Hole Pattern = 2.20 CFM
  - 0.38" Hole Pattern = 10.00 CFM

*Flow Rate is estimated at 8" (203 mm) of H\textsubscript{2}O Vacuum venting to atmosphere.

<table>
<thead>
<tr>
<th>Vacuum Blower Size</th>
<th>Blower CMF (at 15° (381 mm) H\textsubscript{2}O)</th>
<th>Blower hp</th>
<th>Blower Volts</th>
<th>Blower Phase/Hz</th>
<th>Blower Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>1.0</td>
<td>230 / 460</td>
<td>3 / 60</td>
<td>3.2 / 1.6</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>2.5</td>
<td>230 / 460</td>
<td>3 / 60</td>
<td>6.9 / 3.45</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>3.5</td>
<td>230 / 460</td>
<td>3 / 60</td>
<td>8.8 / 4.4</td>
<td></td>
</tr>
</tbody>
</table>

Note: Multiple blowers may be required for large applications. Testing of product is recommended to verify Vacuum pressure required and blower size.

Example:

10" (254 mm) wide by 12' (3,658 mm) long 3200 Series End Drive Conveyor with (3) rows of 0.12" (3 mm) DIA holes on 1.0" (21 mm) lead, 12" (305 mm) long product, 30 parts/minute rate, and 50 ft/min (15 m/min) belt speed

\[
\text{Number of Open Vacuum Holes} = \left( \frac{3}{1.0} \right) \left[ \frac{(133.7)(30)}{50(12)} \left( \frac{50(12)}{30} - 12 \right) \right] = 160.44 = 160 \text{ holes}
\]

\[
\text{Blower Size (CFM)} = (160 \text{ holes}) (0.56 \text{ CFM}) = 89.6 \text{ CFM}
\]

Therefore, use a 2.5 hp Blower
Dimensions & Vacuum Layout

NOTE: NO VACUUM ROW IS AVAILABLE ON THE CONVEYOR CENTERLINE DUE TO V-GUIDED BELT NON-V-GUIDED BELT

NOTE: (1) ROW DOWN THE CENTER OF CONVEYOR IS ACCEPTABLE.

V-GUIDED BELT

W = Conveyor Belt Width
Dim = in (mm)

V-GUIDED BELT

FLOW

Vacuum Zone Length

Vacuum Zone Length

L (at initial factory belt tension)

2.1" O.D. Fitting for Std. 2" Vinyl Tube

2.1" O.D. Fitting for Std. 2" Vinyl Tube

4.30 (109) Minimum NO VACUUM 4.30 (109) Minimum NO VACUUM

W = Conveyor Belt Width
Dim = in (mm)

W

1.93 (49)

W = Conveyor Belt Width
Dim = in (mm)

W

1.93 (49)
3200 SERIES VACUUM CONVEYOR

Profiles:
- Product guiding is generally not required or recommended
- All 3200 Series profiles are applicable
- See Full Specifications Catalog or www.dorner.com for details

Belting:
- Standard Belting: Type 06 or Type 03 Belt is recommended
  - **Type 03** FDA High Friction
    For rigid parts like plastic caps, plastic bottles, ceramic wafers, glass ware, etc.
  - **Type 06** Electrically Conductive Belt
    For thin product like paper, light cardboard, cloth, plastic film, etc.
- Belt must be finger spliced
- See Full Specifications Catalog or www.dorner.com for details

Mounting Packages & Gearmotors:
- All 3200 series Mounting Packages and Gearmotors are applicable
- See Full Specifications Catalog or www.dorner.com for details

Support Stands:
- All 3200 Series Support Stands are applicable
- See Full Specifications Catalog or www.dorner.com for details
EXPRESS INQUIRY FORM : GENERAL INFORMATION

Along with completing the form below, please complete the specific 2200 Series Vacuum Conveyor application questions on the next page to the best of your ability.

Customer Care: 800-397-8664 | Applications Hotline: 800-351-8712 | info@dorner.com

**CONTACT INFORMATION:**

Company ___________________________________________ Date __________________  
Name ________________________________________________  
Phone ______________________ Fax ______________________ Email __________________  
Address ______________________________________________________________________________________  
____________________________________________________________________________________________  

**PRODUCT:**

Description/material: ________________________________________________________________  
Dimensions: ___________________________________________________________________________  
Weight: ___________________ Total Weight To Be Placed On Conveyor: ____________________  
Temperature: ___________________ Leading Edge Dimension: ____________________________  

**ENVIRONMENT:**

Chemicals or fluids present: ____________________________________________________________________________________________  
Unusual ambient temperature conditions: ____________________________________________________________________________  
Other concerns: ________________________________________________________________________________________________  

**CONVEYOR:**

Belt Width: ___________________ Conveyor Length: __________________________  
Belt Speed: ___________________ □Fixed □Variable See example on next page for calculating belt speed.  
Infeed Height: ___________________ Discharge Height: _____________________________  
Belt Direction & Motor Position: ____________________________________________________________________________________  

**ELECTRICAL:**

Voltage: ___________________ Phase: __________________  
Hz: ___________________ For Variable Speed: □DC □AC  
Controls Required: _______________________________________________________________________________________________  

(continued on page 9)
EXPRESS INQUIRY FORM: VACUUM INFORMATION

Page may need to be copied to communicate multiple conveyors

Customer Care: 800-397-8664  |  Applications Hotline: 800-351-8712  |  info@dorner.com

DESCRIBE EACH VACUUM CONVEYOR:
Describe the product being conveyed
________________________________________________________________________

What do you want the vacuum to do?
________________________________________________________________________

________________________________________________________________________

How is the part being introduced onto conveyor?
________________________________________________________________________

What is the product feed rate? (Parts per minute)
________________________________________________________________________

Is part orientation critical? □ No  □ Yes  Explain: ________________________________

Where does the part go upon discharging from the conveyor?
________________________________________________________________________

CONVEYOR(s):
Number of Conveyors: __________________________
Number of Vacuum Rows: _______________________

PRODUCT SAMPLES:
Samples of actual products can be critical to the successful design and application of a vacuum conveyor.
Will sample products be provided to Dorner? □ No  □ Yes

FAX COMPLETED FORMS TO 800.369.2440 (INSIDE THE USA) or 262.367.5827 (OUTSIDE THE USA)

Belt Speed Calculator

How to calculate minimum conveyor belt speed:

Minimum Conveyor Belt Speed = \( \frac{(\text{Part rate in parts per minute}) \times (\text{Part size in inches})}{12} \)

Example = \( \frac{(30 \text{ parts per minute}) \times (6\text{" DIA part})}{12} = \frac{180}{12} = 15 \text{ ft/min minimum belt spacing} \)

How to calculate conveyor belt speed incorporating a product spacing:

Conveyor Belt Speed = \( \frac{(\text{Part rate in parts per minute}) \times (\text{Desired part spacing in inches} + \text{part size in inches})}{12} \)

Example = \( \frac{(30 \text{ parts per minute}) \times (6\text{" DIA part} + 12\text{" spacing between parts})}{12} = \frac{(30 \times (18)}{12} = \frac{540}{12} = 45 \text{ ft/min belt speed} \)