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.
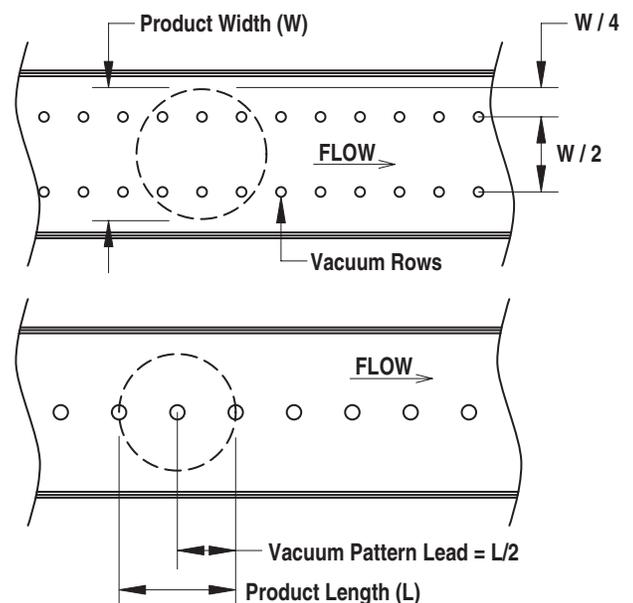3. Do not use in an application with powder or liquid.

VACUUM SPECIFICATIONS

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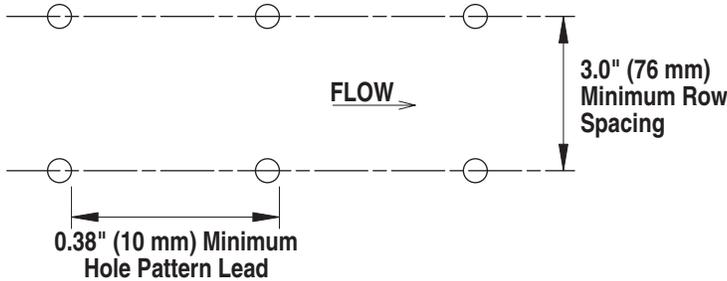 (2) rows or more should be used for larger width product row spacing

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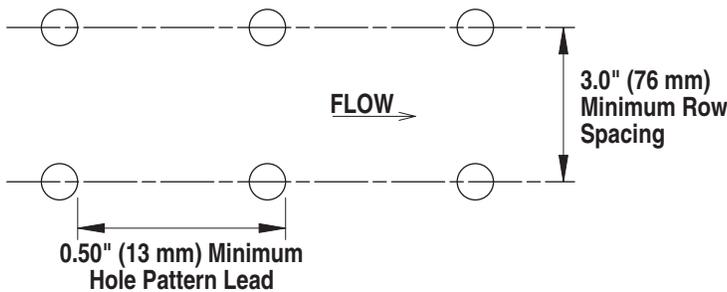 (2) hole patterns are on the product at all times
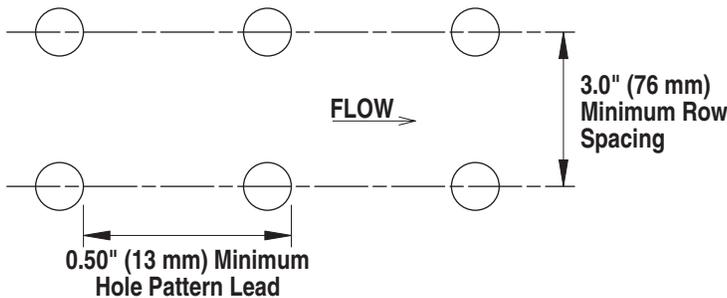
• Vacuum Pattern Options

0.12" (3 mm) DIA Hole

FLOW

3.0" (76 mm) Minimum Row Spacing

0.38" (10 mm) Minimum Hole Pattern Lead

0.19" (5 mm) DIA Hole

FLOW

3.0" (76 mm) Minimum Row Spacing

0.50" (13 mm) Minimum Hole Pattern Lead

0.25" (6 mm) DIA Hole

FLOW

3.0" (76 mm) Minimum Row Spacing

0.50" (13 mm) Minimum Hole Pattern Lead

0.38" (10 mm) DIA Hole

FLOW

3.0" (76 mm) Minimum Row Spacing

0.75" (19 mm) Minimum Hole Pattern Lead
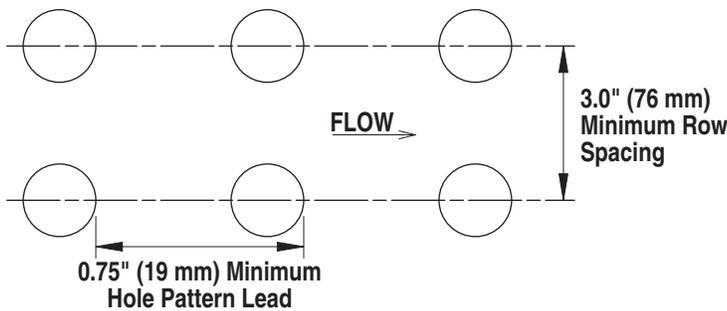
Recommended Belt Types

Type 03   FDA High Friction
For rigid parts like plastic caps, plastic bottles, ceramic wafers, glass ware, etc.
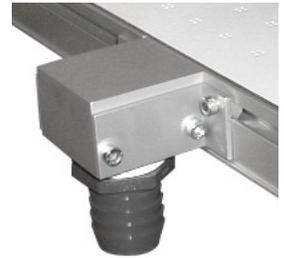
Type 06   Electrically Conductive Belt
For thin product like paper, light cardboard, cloth, plastic film, etc.

- ## 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

$$\text{Number of Ports} = \left[\frac{(Area)\ (Zone\ Length)\ (Rows)}{(3)\ (Lead)} \right] \textit{(Round Up)}$$

Where:

Area = Area of Vacuum holes (in^2)

0.12" (3 mm) Hole Pattern = 0.012 in^2
0.19" (5 mm) Hole Pattern = 0.028 in^2
0.25" (6 mm) Hole Pattern = 0.049 in^2
0.38" (10 mm) Hole Pattern = 0.110 in^2

Zone Length = Length of Vacuum Zone (in)
See dimensional drawing for details (page 5)

Rows = Number of Vacuum Rows

Lead = 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.

$$\text{Number of Ports} = \frac{(.012)\ (144" - 10.3")\ (3)}{(3)\ (1.0)} = \frac{(.012)\ (133.7)\ (3)}{(3)\ (1.0)} = \frac{4.81}{3.0} = 1.6 \ \textit{(Round Up)}$$

Number of Ports = 2

* 10.4" (264 mm) = 3200 Series No Vacuum Zones, see page 5

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

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

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)

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

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_2O Vacuum venting to atmosphere.

Vacuum Blower Size

Blower CFM (at 15" (381 mm) H_2O)	Blower hp	Blower Volts	Blower Phase/Hz	Blower Amps
68	1.0	230 / 460	3 / 60	3.2 / 1.6
125	2.5	230 / 460	3 / 60	6.9 / 3.45
180	3.5	230 / 460	3 / 60	8.8 / 4.4

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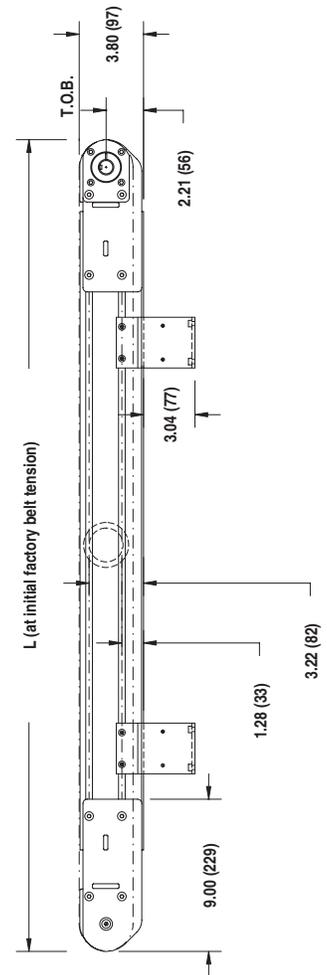
Example:

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

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

$$\text{Blower Size (CFM)} = (160\ holes)(.56\ CFM) = \textbf{89.6 CFM} \qquad \textbf{Therefore, use a 2.5 hp Blower}$$

Dimensions & Vacuum Layout
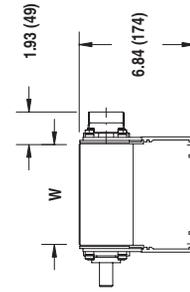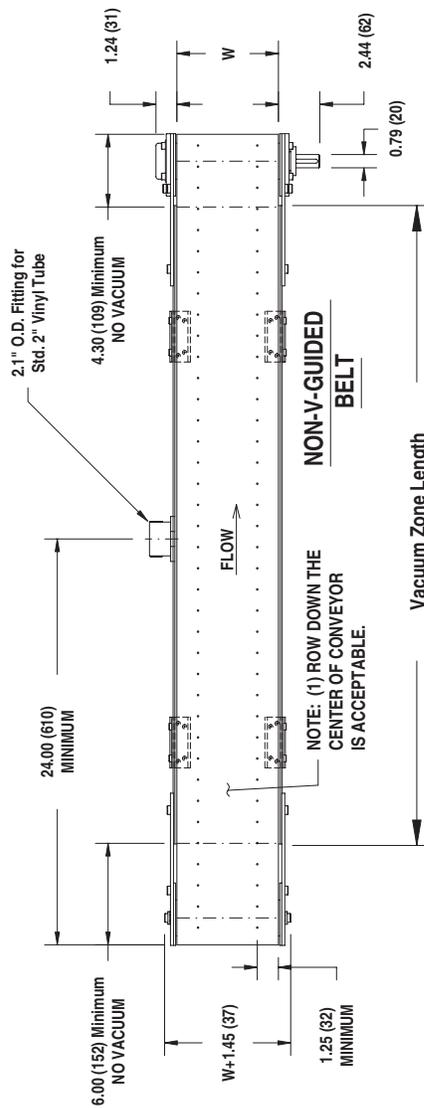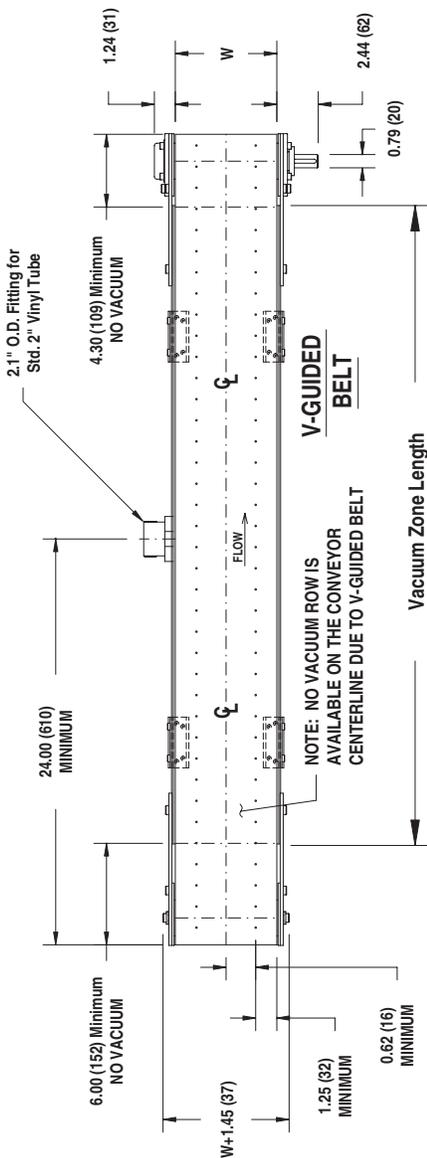
W = Conveyor Belt Width   **Dim** = in (mm)

1.93 (49)

6.84 (174)

W

1.24 (31)

W

2.44 (62)

0.79 (20)

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

4.30 (109) Minimum
NO VACUUM

V-GUIDED
BELT

℄

FLOW

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

Vacuum Zone Length

24.00 (610)
MINIMUM

℄

6.00 (152) Minimum
NO VACUUM

W+1.45 (37)

0.62 (16)
MINIMUM

1.25 (32)
MINIMUM

1.24 (31)

W

2.44 (62)

0.79 (20)

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

4.30 (109) Minimum
NO VACUUM

NON-V-GUIDED
BELT

FLOW

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

Vacuum Zone Length

24.00 (610)
MINIMUM

6.00 (152) Minimum
NO VACUUM

W+1.45 (37)

1.25 (32)
MINIMUM

3.80 (97)

T.O.B.

2.21 (56)

3.04 (77)

L (at initial factory belt tension)

1.28 (33)

3.22 (82)

9.00 (229)

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

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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: _____

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

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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:

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

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

How to calculate conveyor belt speed incorporating a product spacing:

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

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