

975 Cottonwood Ave., PO Box 20, Hartland, Wisconsin 53029-0020, USA

### 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.



### 2200 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
- Conveyor Widths: 1.75" to 24" wide
- Conveyor Lengths: End Drive = 2' to 18' long, Center Drive = 2' to 24' long
- Belt Speeds: 264 Ft/Min

Reference Full Specification Catalog Pg 8 for Conveyor Details

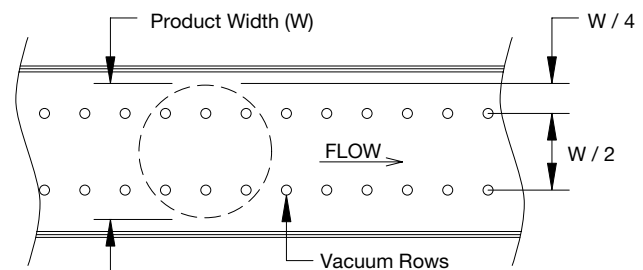
#### Application Notes:

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

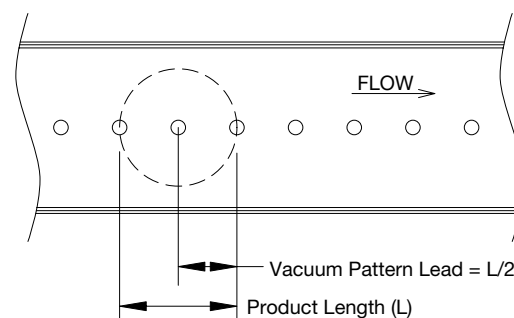
#### • Rows:

Generally (1) Row of vacuum is used for products 2" 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

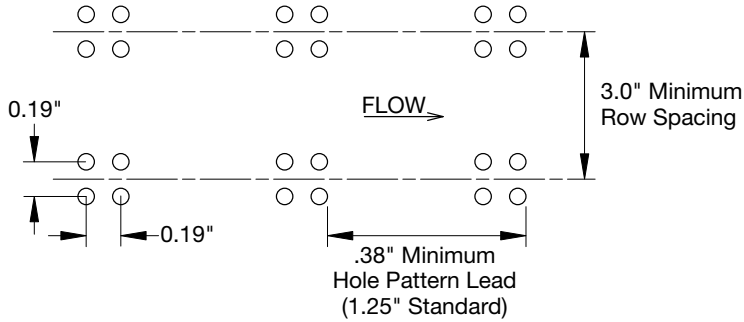


#### • Conveyor Width Limitations:

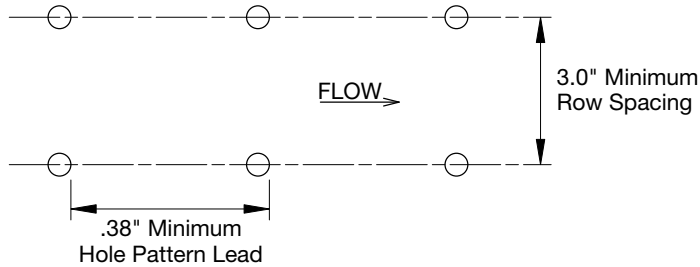
1.75", 2.75" and 3.75" wide conveyors are only available with non v-guided belts.  
1.75", 2.75" and 3.75" wide conveyors are only available with (1) row of vacuum only centered.

- Vacuum Pattern Options**

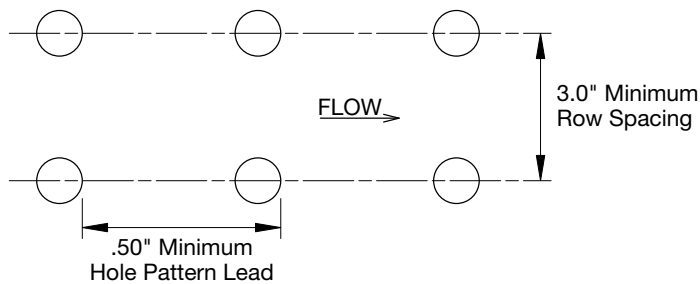
**0.09" DIA - 4 hole pattern**



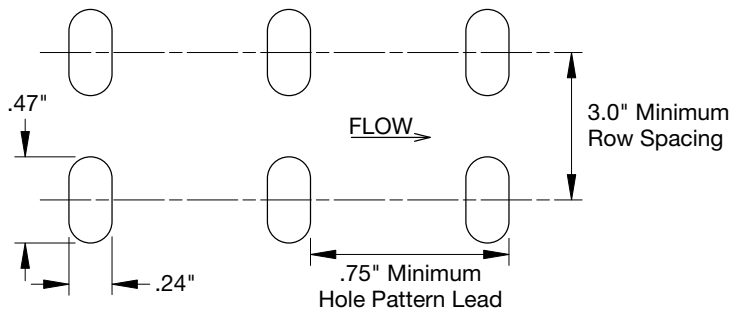
**.12" DIA Hole**



**.25" DIA Hole**



**.24" x .47" Slot**



## 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" O.D. fitting for standard 2" 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

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

Where:

Area = Area of Vacuum holes (in<sup>2</sup>)

.09 (4) Hole Pattern = .025 in<sup>2</sup>

.12" Hole = .012 in<sup>2</sup>

.25" Hole = .049 in<sup>2</sup>

.24" x .47" Slot = .060 in<sup>2</sup> (with a .25" slot in bedplate)

Zone Length = Length of Vacuum Zone (in)

\*See dimensional drawing for details (Pg. 5)

Rows = Number of Vacuum Rows

Lead = Vacuum Hole Pattern Lead (in)

**Example:**

10" wide by 12' Long 2200 Series End Drive Conveyor with (3) rows of .12" DIA holes on 1.0" lead.

$$\text{Number of Ports} = \frac{(.012) (144" - 6.3") (3)}{(3) (1.0)} = \frac{(.012) (137.7) (3)}{(3) (1.0)} = \frac{4.96}{3.0} = 1.7 \text{ (Round Up)}$$

Number of Ports = 2

\* 6.3" = 2200 Series No Vacuum Zones, See Pg. 5 & 6.

## 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.

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

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\* =  
     .09 (4) Hole Pattern = .56 CFM  
     .12" Hole = .56 CFM  
     .25" Hole = 2.2 CFM  
     .24" x .47" Slot = 3.5 CFM (with a .25" slot in bedplate)  
 \* Flow Rate is estimated at 8" of H<sub>2</sub>O Vacuum venting to atmosphere.

Vacuum Blower Size				
Blower CFM (at 15in H <sub>2</sub> O)	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.

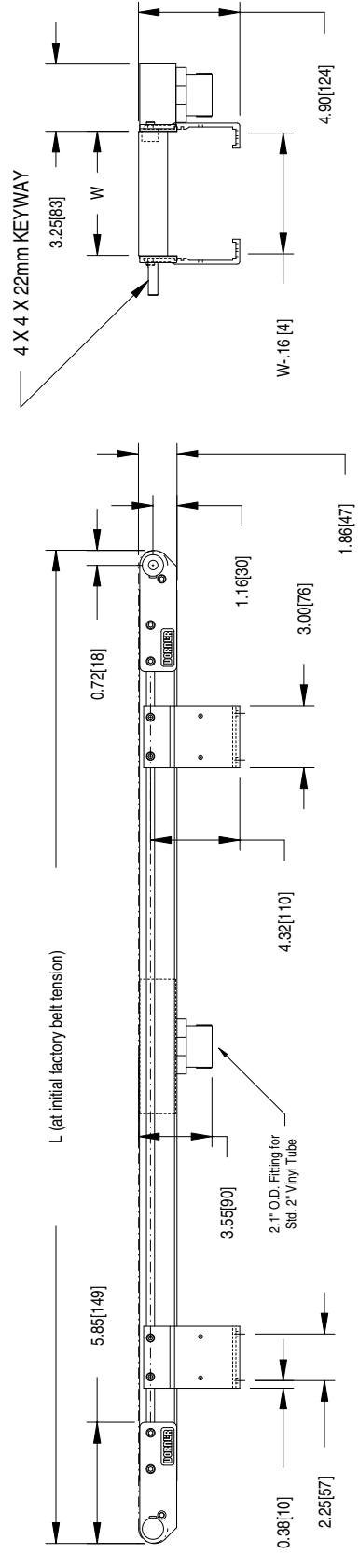
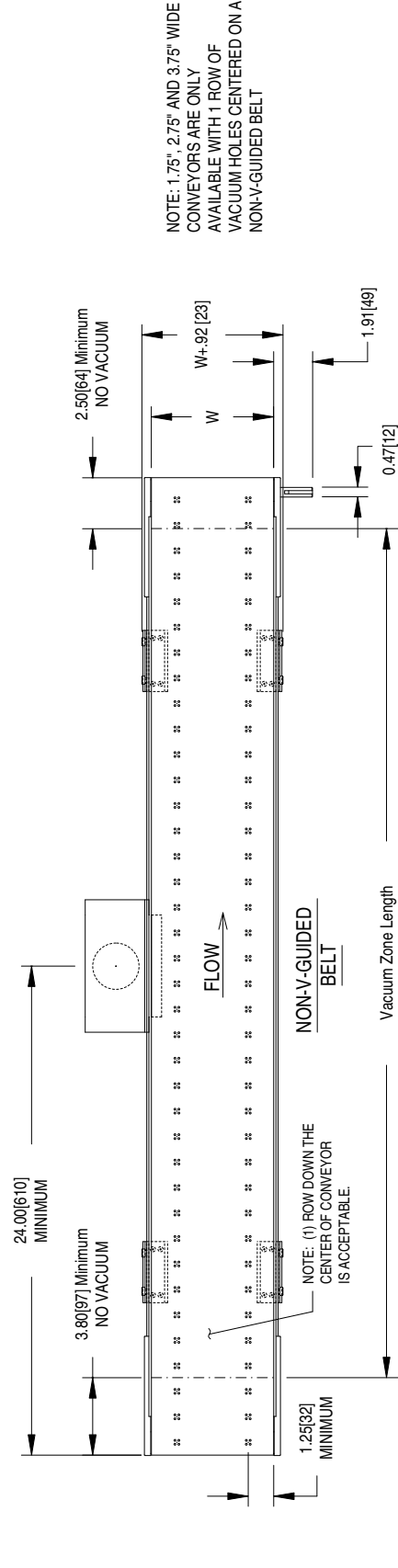
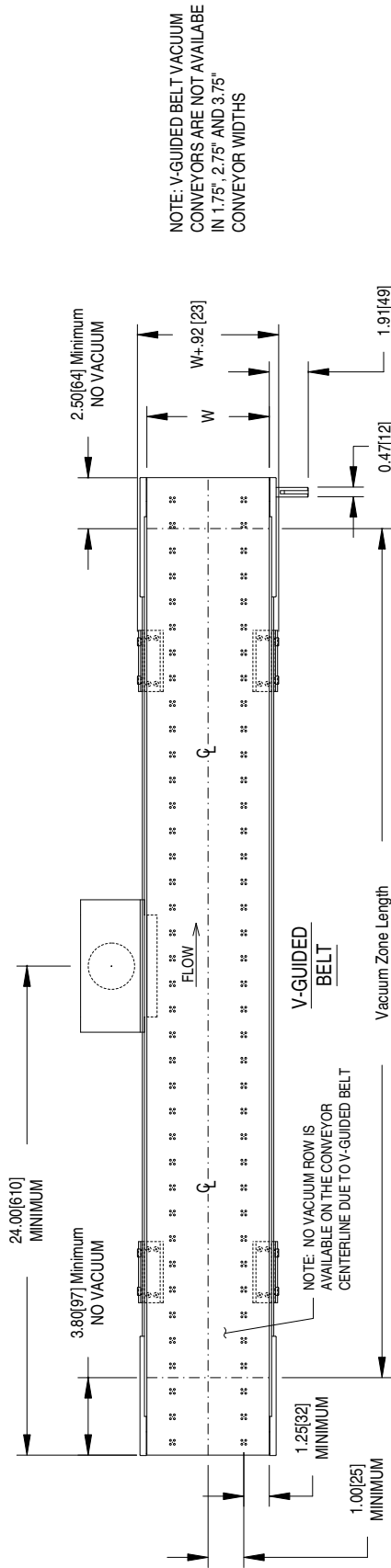
### Example:

10" wide by 12' Long 2200 Series End Drive Conveyor with (3) rows of .12" DIA holes on 1.0" lead, 12" long product, 30 parts/minute rate, and 50 ft/min belt speed.

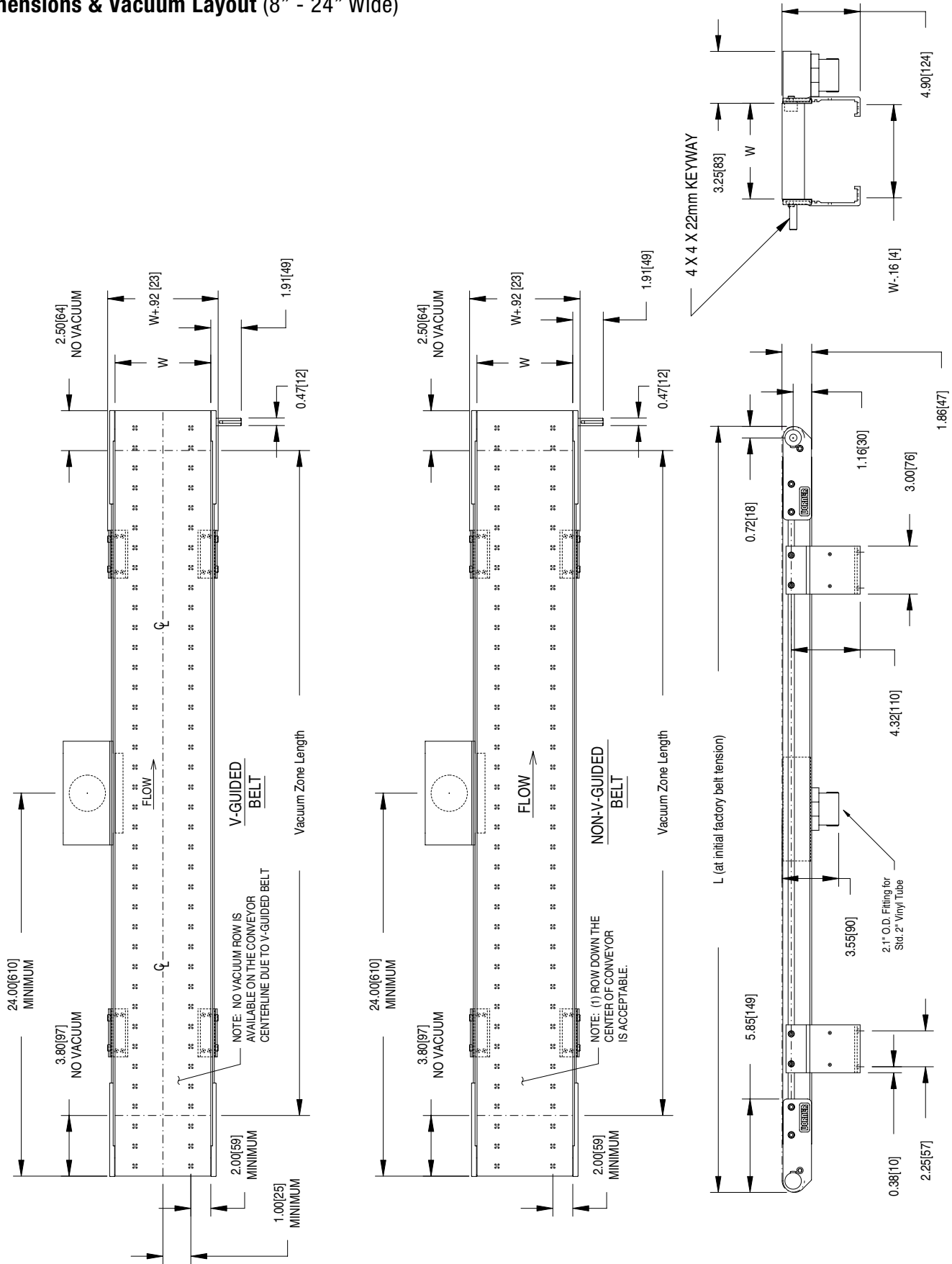
$$\text{Number of Open Vacuum Holes} = \left[ \frac{3}{1.0} \right] \left[ \frac{(137.7) (30)}{50(12)} \left( \frac{50(12)}{30} - 12 \right) \right] = 165.24 = \mathbf{165 \text{ holes}}$$

$$\text{Blower Size (CFM)} = (165 \text{ holes}) (.56 \text{ CFM}) = \mathbf{92.5 \text{ CFM}} \quad \text{Therefore, use a 2.5 hp Blower}$$

## Dimensions & Vacuum Layout (1.75" - 6" Wide)



## Dimensions & Vacuum Layout (8" - 24" Wide)



## Profiles:

- Product guiding is generally not required or recommended
- All 2200 Series profiles are applicable.
- See Full Specifications Catalog Pg. 18 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 Pg. 19 for details.

## Mounting Packages & Gearmotors:

- All 2200 series Mounting Packages and Gearmotors are applicable.
- See Full Specifications Catalog Pg. 22 & 30 for details.

## Support Stands:

- All 2200 Series Support Stands are applicable.
- See Full Specifications Catalog Pg. 38 for details.

## EXPRESS INQUIRY FORM : GENERAL INFORMATION

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

Contact Technical Sales at 1-800-259-1510 (Press 3) or [TechnicalSales@dorner.com](mailto:TechnicalSales@dorner.com) for Application Assistance.

### CONTACT INFORMATION

Company \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ E-Mail \_\_\_\_\_

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*

**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 or 262.367.5827**

**Belt Speed Calculator**

How to calculate minimum conveyor belt speed:

$$\frac{(\text{Part rate in parts per minute}) \times (\text{part size in inches})}{12}$$

**Example:**  $\frac{(30 \text{ parts per minute}) \times (6'' \text{ dia. part})}{12} = \frac{180}{12} = 15 \text{ ft/min. Minimum Belt Speed}$

How to calculate conveyor belt speed incorporating a product spacing:

$$\frac{(\text{Part rate in parts per minute}) \times (\text{desired part spacing in inches} + \text{part size in inches})}{12}$$

**Example:**  $\frac{(30 \text{ parts per minute}) \times (6'' \text{ dia part} + 12'' \text{ spacing between parts})}{12} = \frac{(30) \times (18)}{12} = \frac{540}{12} = 45 \text{ ft/min. Belt Speed}$