

ASHWORTH ENGINEERING

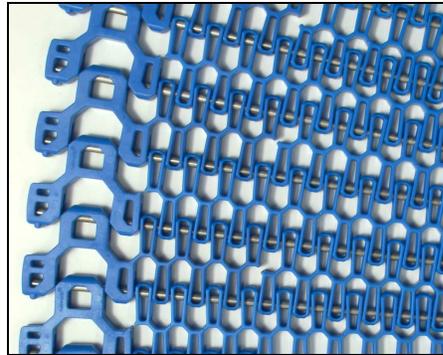
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PRODUCT TECHNICAL BULLETIN

THE ADVANTAGE 200 (US Patent 7,073,662)

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DESCRIPTION

The Advantage 200 is a 2 inch (50.8 mm) pitch hybrid belt for straight runs or turn-curve and spiral applications with turn ratios from 1.5 to 2.8. The belt is constructed with plastic links, plastic body modules, and stainless steel rods. The Advantage 200 features an open area of up to 67% for excellent airflow and sanitation. Heavy duty links at both belt edges handle tension loads up to 1500 lbs for extra product capacity. Operating temperatures up to 180°F (82°C) make the Advantage 200 suitable for a wide range of applications. The unique rod retaining system eliminates the need for clips or fasteners and makes it possible to assemble or disassemble the belt in seconds with a small screwdriver. Compared to competitive all-plastic spiral belting, The Advantage 200 is designed to provide superior product support, open area, sanitation, and strength for freezing, proofing, and general conveying applications.

SPECIFICATIONS

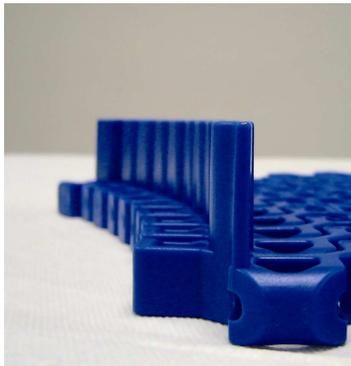
Material	Acetal (POM) links and modules standard, stainless steel rods		
Color	Blue		
Standard Widths	10" (254 mm) to 48" (1219 mm) in 1" (25.4 mm) increments 10" (254 mm) to 60" (1524 mm) in 1" (25.4 mm) increments		
Thickness	9/16" (14.3 mm)		
Rods	0.236" (6 mm) stainless steel		
Pitch	2" (50.8 mm)		
Turn Ratio	1.6, 1.9 and 2.2 turn ratio standard, 1.5 and 2.5 available, integrally molded limiter		
Turn Radius	Inside Turn Radius = Turn Ratio x Belt Width		
Weight	1.8 lbs /ft ² (8.8 kg/m ²)		
Turn Direction	Bi-directional (Left and right)		
Turning Mode	Inside edge collapses		
Open Area	<u>Straight</u>	<u>Collapsed</u>	<u>2.2 Turn</u>
Product Contact	67%	47%	61%

Airflow	60%	35%	47%
Guard Edge	1/2" (12 mm) and 1" (25 mm) high available, integrally molded		
Conveying Surface			
Standard	Full belt width		
Guard Edge	Subtract 1 1/4" (31.8 mm) from belt width for each side with guard edge		

OPERATING RATINGS

Allowable Tension	<u>Operating (100K cycles)</u>	<u>Maximum (40% of Breaking Strength)</u>
Straight Run	600 lbs (272 kg)	1500 lbs (680 kg)
Curve/Spiral	300 lbs (136 kg)	750 lbs (340 kg)
Temperature		
100% Strength	-50°F (-46°C) to 110°F (43°C)	
90% Strength	up to 170°F (77°C)	
80% Strength	up to 180°F (82°C)	
50% Strength	up to 200°F (93°C) - not recommended for temperatures in this range.	
Belt Speed	Consult Ashworth engineering	

BELT OPTIONS



All optional components are assembled into the belt, and therefore **must be specified at the time of the order** before the belt is manufactured.

GUARD EDGE

Guard Edge is available in ½" (13 mm) and 1" (25 mm) heights and can be installed on one or both belt edges. The correct belt edge can be specified in two ways:

1. Specify LEFT or RIGHT as seen facing in the direction of belt travel (belt moving away from you). **Example:** In the photo at **left**,

the guard edge is on the LEFT side.

2. Specify INSIDE or OUTSIDE EDGE and CLOCKWISE or COUNTER-CLOCKWISE rotation.

Example: In the photo at **left**, the guard edge is on the INSIDE EDGE and the rotation is COUNTER-CLOCKWISE.

TURN RATIO

Turn ratios available are 1.5, 1.6, 1.9, 2.2, and 2.5. To find the correct turn ratio, divide the inside radius of the system by the belt width ($TR = IR \div BW$). If the turn ratio of the system does not exactly match one of the available belt ratios, specify the next smaller belt turn ratio. (**Example:** If the system turn ratio is 2.1, specify a belt turn ratio of 1.9 rather than 2.2). A belt with a given turn ratio will work on a system with a larger turn ratio, but not on a system with a smaller turn ratio. Typically there is sufficient tolerance in the belt to accommodate system imperfections, such as a spiral cage that is slightly out-of-round.



FRICITION TOP

Friction modules are similar in size and shape to standard center modules, but are molded from a FDA approved thermoplastic elastomer which provides a high coefficient of friction. The top surface of the friction module is raised

approximately 3/32" (2 mm) above the belt surface to ensure contact with the product. The bottom surface of the friction module is recessed approximately 1/16" (1.5 mm) from the lower belt surface to avoid contact with the support rails.

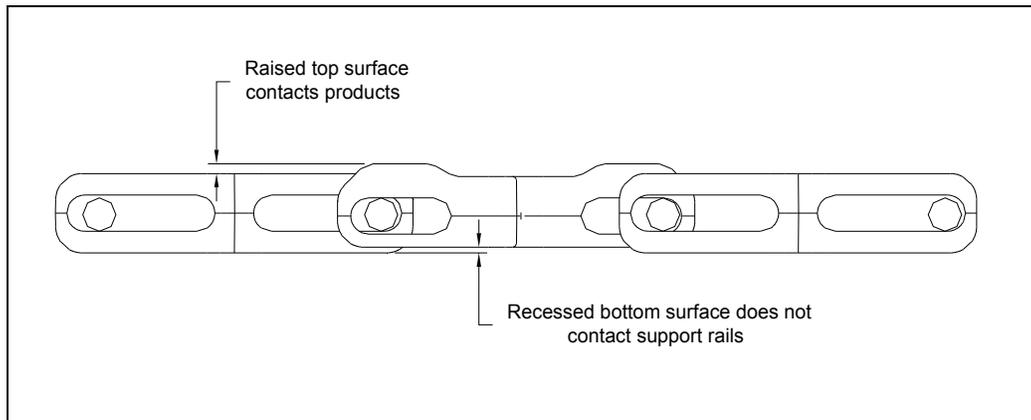


Figure 1. Cross-section of belt with friction module

Installation: Friction top belt is not flippable since the friction surface is raised on one side of the belt only. Support rails in the return path are typically positioned to contact the belt only on the edge links (within three inches [75 mm] of the belt edge). Edge guidance is recommended to maintain proper alignment. Alternately, center support rails can be used by omitting sections of the friction modules where the support rail contacts the belt.

Configuration: Pitches with friction modules are spaced 3 or more pitches apart (6 inches). In a standard friction pitch, the friction modules end 3.25" from one edge and 6.75" from the opposite edge. Odd-numbered pitch spacing (i.e. friction modules every 3rd or 5th pitch) will create a staggered pattern with adjacent friction pitches offset toward opposite sides of the belt. Even numbered pitch spacing (i.e. every 4th or 6th pitch) will cause all friction pitches to be offset to the same side of the belt (they can be either to the inside edge or the outside edge.)

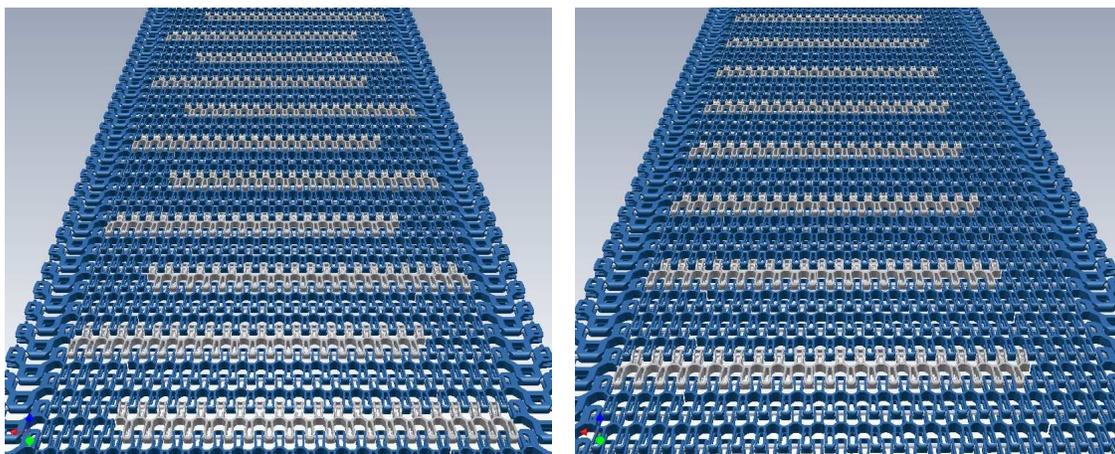


Figure 2. Odd and even pitch spacing (every 3rd-pitch on left and 4th-pitch on the right)

- Friction modules can be made as narrow as 2” wide, and any practical combination of friction modules and standard modules can be used in a friction pitch. For instance, standard modules may be placed in the center of a friction pitch to allow the use of a center support rail in the return path.
- Belts up to 48 inches (1220 mm) require only two support rails on the return path. However, if the system has three or more support rails the friction modules must be assembled with appropriate gaps to avoid adding tension to the system.
- Friction modules have a raised surface so it is important to specify the exact location of the support rails on the return path so that standard (non-friction) modules can be assembled at the appropriate spacing to prevent high belt tension in the return path. Unless otherwise specified, a standard four inch module will be used between friction modules when required.

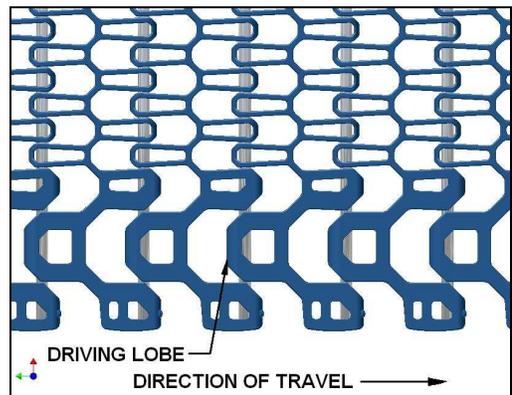
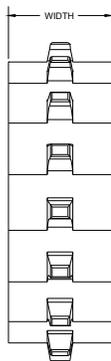
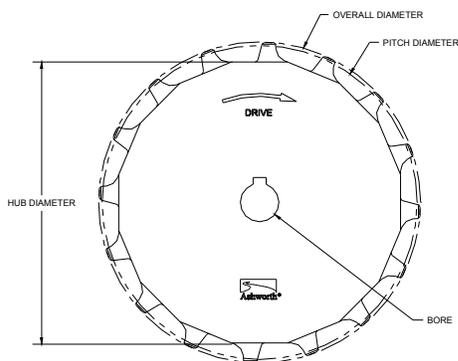
SPROCKETS AND IDLERS

DRIVE SPROCKETS

- Use two sprockets on the drive shaft to engage the links at each belt edge. The drive direction is indicated on the sprocket. Both sprockets should be aligned and keyed to the shaft. Support idlers should be spaced evenly every 8 to 16 inches (200 to 400 mm) along the shaft between the sprockets. Make sure to use sprockets and idlers that have the same hub diameter.
- To transfer sufficient driving force to the belt, a minimum of 180° of belt wrap is recommended on the drive sprockets.
- In heating or cooling applications, the outside drive sprocket needs to float along the shaft to allow for the contracting and expanding body modules. Place set collars on each side of the sprocket. If cooling, provide space between the inside set collar and sprocket. If heating, provide space between the outside set collar and sprocket.

Nominal Size	No. of Teeth	Overall Diameter		Pitch Diameter		Hub Diameter		Hub Width		Bore			
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
#6	10	6.61	167.8	6.47	164.3	5.59	142	3	76.2	0.75	19.1	3.75	82.6
#8	13	8.54	214.7	8.36	212.3	7.55	191.8	3	76.2	0.75	19.1	3.75	82.6

**Maximum bores provide adequate material thickness for standard Keyway. Specify special sizes to be used when necessary.*
 Standard material: UHMWPE
 Range: -50°F [-46°C] to 180°F [82°C]



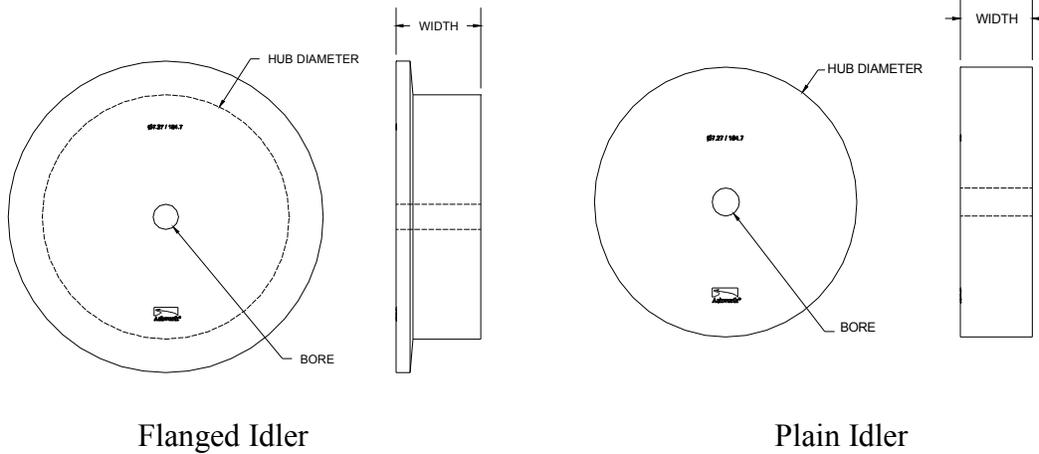
SUPPORT IDLERS

- Flanged idlers are recommended to guide the belt edges at all shafts other than the drive shaft, with support idlers spaced every 8 to 16 inches (200 to 400 mm) between the flanged idlers. Make sure to use idlers that have the same hub diameter.
- Do not use flanged idlers for reverse bends with guard edge belt. Position plain idlers to the inside of the guard edges.
- Place set collars at the outside of the flanged idlers, making sure to adjust for thermal expansion in heating applications.

Nominal Size and Type	Overall Diameter		Hub Diameter		Width		Bore			
	inch	mm	inch	mm	inch	mm	Minimum inch	mm	Maximum* inch	mm
#6 Plain	5.59	142.0	5.59	142.0	3.00	76.2	.75	19.1	3.75	82.6
#6 Flanged	7.59	192.8	5.59	142.0	3.50	88.9	.75	19.1	3.75	82.6
#8 Plain	7.55	191.8	7.55	191.8	3.00	76.2	.75	19.1	3.75	82.6
#8 Flanged	9.55	242.6	7.55	191.8	3.50	88.9	.75	19.1	3.75	82.6

**Maximum bores provide adequate material thickness for standard Keyway. Specify special sizes to be used when necessary.*

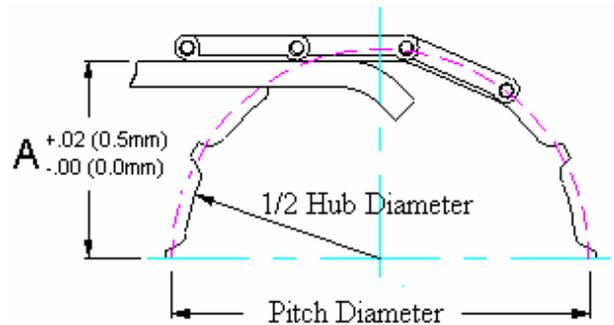
Standard material: UHMWPE
 Range: -50°F [-46°C] to 180°F [82°C]



WEARSTRIP PLACEMENT

$$A = \frac{1}{2} \text{ Sprocket Hub Diameter}$$

- This is only a guideline; it does not take into account the influence of speed. At speeds above 75 ft/min [23 m/min], Ashworth recommends increasing the distance A and shortening the wear strips as much as one belt pitch in length.

**BELT SUPPORT RAILS**

- For standard acetal (POM) Advantage 200 belt, use UHMW capped or stainless steel support rails. Eliminate any sharp corners or rough surfaces that might gouge or prematurely wear the belt. Surface finish should be smooth to the touch.
- Support rail spacing should be selected based on the product weight and how evenly the weight is distributed on the belt surface. On the return path, rails can be spaced up to 40 inches (1000 mm) apart.

ENGINEERING CALCULATIONS**TURN RATIO**

$$\text{Turn Ratio} = \frac{\text{Inside Turn Radius}}{\text{Belt Width}}$$

Turn Ratio is dimensionless. Inside Turn Radius and Belt Width must both be in the same unit of measurement, either both in inches or both in millimeters.

RADIUS WEIGHT (Belt Tension) – Spiral applications only

$$RW = R(WB+WL)(fr / fc)$$

where:

- RW** = Radius Weight or Belt Tension
- R** = System Radius (i.e. radius to outside edge of belt)
- WB** = Weight of Belt per unit of length
- WL** = Weight of Product per unit of length
- fr** = Friction coefficient between belt and support rails
- fc** = Friction coefficient between belt and cage bars

Calculation: (Convert all units to **feet (ft) and pounds (lbs)** or **meters (m) and kilograms (kg)**).

- Calculate the system radius (**R**) by measuring the inside turn radius and adding the belt width.
- Calculate the belt weight (**WB**) based on the weight per unit area given on page 1.
- Determine the weight of product (**WL**) that will be loaded on one foot (or meter) of belt length.
- Determine the friction coefficient (**fr**) between the belt and support rails (see chart below).
- Determine the friction coefficient (**fc**) between the belt and cage bars (see chart below).
- Substitute the values into the equation and calculate.

Friction Coefficients Between Belt and Wear Strip Material		
Module Material	Stainless Steel	
	Wet	Dry
UHMW	Wet	Dry
	Acetal (POM)	0.20
	0.13	[0.15]

To Reduce Belt Tension and Wear:

- Clean product debris from the support rails.
- Clean ice and product debris from the belt, sprockets, and idlers to prevent belt damage.
- Observe the effect of temperature on the coefficient of friction between the supports and the belt. Products may leave a slick residue at room temperature that can become viscous or sticky as the temperature decreases. At freezing temperatures the debris may become slick again or leave a rough surface depending upon its consistency.
- Lubricate the support rails to reduce friction between the belt and rails.
- Clean lubricants off the belts inside edge to increase driving friction (spiral systems only).
- Lubricate the inside edge wear strip (fixed turns only).
- Replace worn wear strips on supports and on the inside edge of turns.
- Remove weight from the take-up loop.
- Align sprockets properly and insure that they do not migrate on the shaft.
- Do not overload the belt.
- Decrease belt speed.

STANDARD LOADING – Turn curve applications

The allowable loading per length of belt is determined by the ratio of the inside turn radius and the radius to the tension link.

Allowable Loading per length of belt =
Radius to Tension Link / Inside Turn Radius

Sample Calculation:

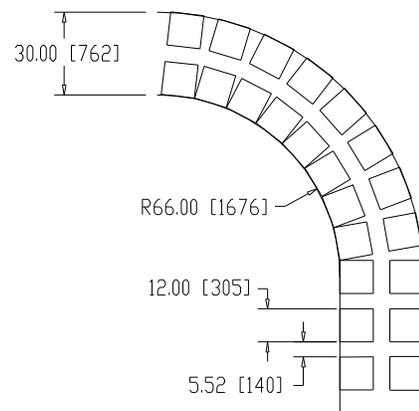
Let BW = Belt Width = 30 in [762 mm]

IR = Inside Turn Radius = 66 in [1676 mm]

Radius to Tension Link = IR + BW
= 66 [1676] + 30 [762]
= 96 in [2438 mm]

Allowable Loading = 96 in / 66 in [2438/1676] = 1.46

Allowable loading is therefore one product length per 1.46 lengths of belt.



ADJUSTMENT FOR ROUND PRODUCT

Allowable loading per length of belt is determined by the ratio of the radius to the tension link to the radius to the product center.

Allowable Loading per length of belt =
 Radius to Tension Link / Radius to Product Center

Sample Calculation:

Let BW = Belt Width = 30 in [762 mm]

IR = Inside Turn Radius = 66 in [1676 mm]

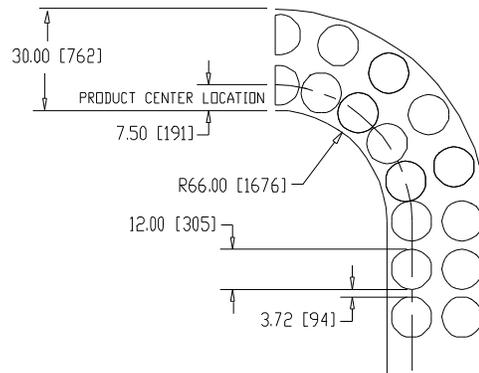
Let PC = Product Center = 7.5 in [191 mm]

$$\begin{aligned} \text{Radius to Tension Link} &= \text{IR} + \text{BW} \\ &= 30 [762] + 66 [1676] \\ &= 96 \text{ in } [2438 \text{ mm}] \end{aligned}$$

$$\begin{aligned} \text{Radius to Product Center} &= \text{IR} + \text{PC} \\ &= 66 [1676] + 7.5 [191] \\ &= 73.5 \text{ in } [1867 \text{ mm}] \end{aligned}$$

$$\text{Allowable Loading} = 96 \text{ in} / 73.5 \text{ in } [2438/1867] = 1.31$$

Allowable loading is therefore one product length per 1.31 lengths of belt.



SYSTEM REQUIREMENTS

STRAIGHT RUNS

Minimum straight run before and after every turn must be at least 1.5 x belt width.

Minimum straight run between two opposite curves is at least 2 x belt width.

SPIRAL CAGE BAR CAPS / INSIDE TURN RAILS

Spiral Cage Applications

A stainless steel drum, stainless steel cage bars, or UHMW capped cage bars are recommended. Stainless steel may increase the driving force against the belts inside edge.

Eliminate any sharp corners or rough surfaces that might gouge or prematurely wear the belt.

Surface finish should be smooth to the touch.

Turn Curve Applications

UHMW is recommended for the inside turn rails on conveyors.

FLIP UP DETECTORS

- During a retrofit or new installation be sure flip up detectors are acceptable for use on a plastic belt. Electrical or mechanical switches are recommended on every tier of an up cage or every other tier of a down cage and positioned to detect a change in belt position.

TAKE-UP

- Typically, a catenary sag following the drive sprockets is satisfactory for straight run or fixed turn conveyors.
- In the case of a spiral cage, a double loop take up with free hanging weight is recommended due to the fact that plastic belting can require twice as much take-up travel as all-metal belting. A rule of thumb is that the take-up should be able to accommodate 2.5% of the total belt length. This value however depends on the temperature differences in the spiral.

GROUND STRAP

Plastic belts operating on plastic wear strips will generate and hold a mild static electrical charge. To prevent electrical shock, a grounding device should be installed. A metal cable attached to the conveyor framework and contacting the belt is usually sufficient. This is typically installed in the return path. Metal rollers are also an alternative.

LUBRICATION

Lubrication is not required under normal operating conditions. However, lubrication will enhance belt performance, particularly at higher belt speeds or when conveying heavy product loads. Make sure any lubricant used is compatible with your belt material and product. On spiral systems, avoid lubricating the inside belt edge to prevent loss of driving force.

Suggested Lubricants

- General Electric GE-SF-18-350.
 - Dow Corning 200 Fluid
- Both are acceptable to -60° F [-51° C] and are FDA compliant.

Application Method

- Brush, fed from a drip reservoir, applied onto the belt's underside in the return path so that the belt coats the loaded path rails with the lubricant.
- Install and activate lubricator for either a predetermined application interval or when drive motor amperage indicates excessive belt tension.

FREEZERS AND CHILLERS

Clearance between modules and cross rods must be maintained to prevent the modules from taking load. Periodic belt stoppage allows frost to melt and upon reentry into the freezer, the water will become ice. Accumulation between the cross rod and body module will reduce the designed clearance. In addition, ice accumulation at the belts inside edge may prevent required collapse. Therefore, it is imperative to minimize belt stoppage in freezing applications.

OVERDRIVE (Spiral Cage, Ref. Technical Bulletin # “009 Measuring Overdrive”)

- Allow 4 to 6 tier pitches of overdrive with UHMW capped cage bars.
- Allow 2 to 4 tier pitches of overdrive with stainless steel cage bars or a stainless steel drum.
- If the belt “surges,” reduce the overdrive setting until the belt surge just stops. Note the motor amperage and take-up roll location.

BELT CLEANING AND WASHERS

- 150° F [66° C] maximum wash water temperature.
- Maximum module temperature change (thermal shock) of 160° F [71° C].
- In freezing applications, insure water is removed from belt prior to chamber entry.

- In order to insure proper operating belt tension, it is important to clean the belt support rails. Rails can be cleaned by attaching non-abrasive towels to the belt's underside and running these through the system on the rails. Remember to remove these towels before they go over the drive sprockets. Observing the drive amperage and/or take-up roll location will indicate when cleaning is required.
- Use of caustic washes with plastic belting is not recommended. Mild dish soap and water is the preferred method of wash down. If stronger detergents are used, the cleaner may be corrosive to the plastic; therefore belts should be rinsed with clear water immediately following use of detergents.

NOTE: All chemicals used on this belt should be reviewed by the chemical supplier for compatibility.

FLIPPING BELT EDGE FOR EDGE

Ashworth recommends the belt be flipped when one belt edge measures 0.5% longer than the opposite edge (1/16" per foot or 5mm per meter of belt).

FIRE WARNING *Safety Precautions for Plastic Belting*

Most plastic belting, including some Ashworth belts, contains thermoplastic components that can burn. If exposed to an open flame or to temperatures above stated specifications, belts may decompose and emit toxic fumes. Do not expose plastic belts to extreme temperatures or to an open flame. Additionally, these belts should not be used following any process, such as an oven, where products could be ignited before being placed on the belt. Refer to the appropriate MSDS (Material Safety Data Sheet) for other precautions and emergency response information.

Reference: Product Technical Bulletin "Conveyor Design Guidelines".

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