PRODUCT TECHNICAL BULLETIN

SMALL RADIUS OMNI-GRID® 360 WELD 075

Heavy-duty links with 360 degree welds increase carrying capacity for your Spiral/Lotension, turn curve and straight run applications. Small Radius Omni-Grid® 360 Weld 075 is offered with a turn ratio of 1.1 to 1.99 times the belt width, making it an easy retrofit to existing systems.

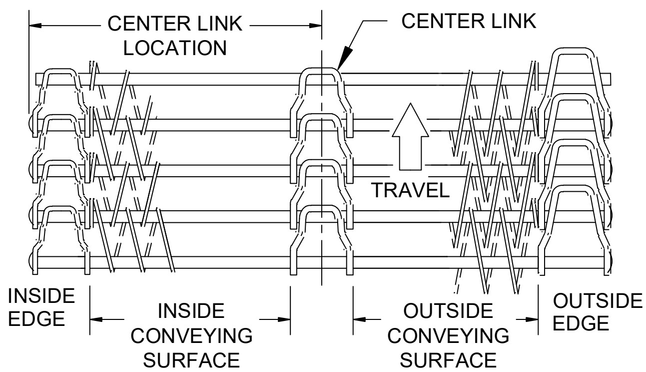
Belt consists of an assembly of rods and links. A center row of heavy duty non-collapsing links forms two product lanes, with 3/4 inch pitch OG360-075 links on inside edge and Omni-Grid 360-100 links on the outside edge. All belts are single welded.

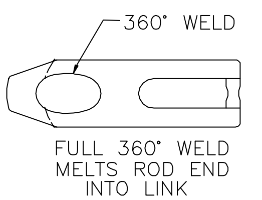
DEFINING CHARACTERISTICS

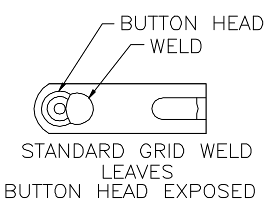
Minimum Turn Ratio:	1.1:1 or greater; not to exceed 1.99:1
Turn Capability:	Unidirectional: Turn direction to be specified with order
Mode of Turning:	Inside edge collapses and outside edge expands in turn
Width Limits:	14 inch [356 mm] through 48 in. [1219 mm]
Maximum Allowable Tension:	150 lbs. [69 kg] through a turn and 300 lbs. [136.1 kg] in straight runs
Longitudinal Pitch:	.75 inch [19.05 mm] (inside and center links)
Link Strip Size:	Inside Link: .44 x .08 inch [11.2 x 2.0 mm] Center Link: .44 x .105 inch [11.2 x 2.7 mm] Outside Link: .50 x .105 inch [12.7 x 2.7 mm]
Rod Diameter:	.192 inch [4.88 mm]
Material:	Stainless Steel
Method of Drive:	Sprocket driven on inside and center links only.
Terminals:	All terminals having 120° wrap or more should be supported by 4 inch [100 mm] minimum diameter rollers or flanged idlers.

DEFINING CHARACTERISTICS (cont'd)

Conveying Surface:	Inside Conveying Surface = Center Link Location – 1.50 inch [38.1 mm] Outside Conveying Surface = Overall Belt Width – Center Link Location – 1.83 inch [46.5 mm]
Mesh Overlay:	Standard mesh configurations available, including Omni-Tough Variable Loop Count
Basic Construction:	T304 Stainless Steel Construction; 6 gauge (.192 in [4.9 mm]) Connector Rod; Wear Resistant® links: Inside Edge: 3/4 Pitch OG360 Link Center: 3/4 Pitch Heavy Duty Non-Collapsing OG Link Outside Edge: 1 Inch Pitch OG360 Link Center link divides conveying surface into two product lanes; Omni-Tough® Mesh Overlay







IMPROVED WELD

The traditional welded construction of Grid belts fail when the weld breaks. Failure of either the inner or the outer weld allows the link to flex inward when subjected to cyclic loading. The flexing of the link causes fatigue failure at the corners of the link.

Some manufacturers have attempted to slow this process down by including additional welds. However, the weakest weld remains on the inside, the size of which is limited due to the rod size. Too large a weld on the inside will cause the rod to bend when the weld cools, which leads to collapse, tracking and tenting problems.

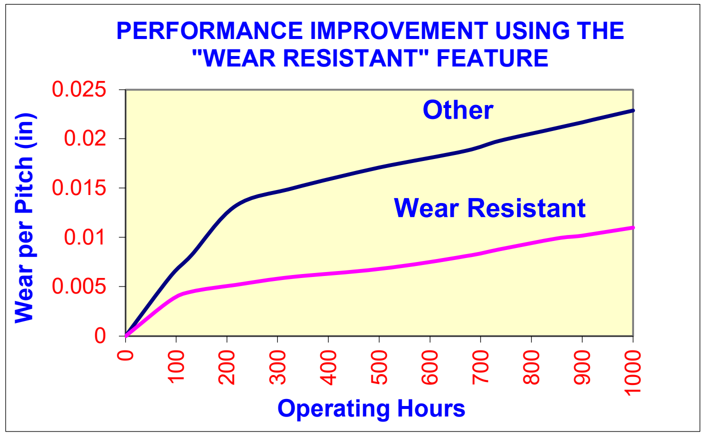
The Ashworth solution is to create a full 360º weld on the outside edge of the link. This prevents stress on the weld during operation even with heavier loads. The design and heavier gage of material used for the Omni-Grid® 360 Weld links eliminates the need for a weld on the inside of the link. By forming the 360° weld, only on the outside of the link, the inside weld is not necessary so the belt will not experience the problem of rod bending caused by excessive inside welds.

WEAR RESISTANT FEATURE

The next mode of failure, once weld and fatigue have been eliminated, is belt elongation due to link face wear. The patented wear resistant feature in the link face, included in the Omni-Grid® 360 Weld belt, now becomes more important than ever. It provides increased bearing surface to reduce belt elongation.

PATENTED "WEAR RESISTANT" FEATURE

- Standard on all tension bearing links.
- Increases belt life by reducing belt elongation.



BELT SPECIFICATIONS

MESH OVERLAY

Designation: B X-Y-Z and **U X-Y-Z**

First Digit: B = Balanced Weave; **U** = Unilateral Weave

X: First Number: No. of Loops per Foot of Width

Y: Second Number(s): No. of Spirals per Foot of Length (inner / outer)

Z: Third Number: Wire gauge of overlay

Examples:B30-12/16-17 and **U42-12/16-16**

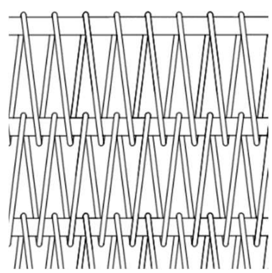
Wire Sizes: 16 and 17 ga.

Material: Stainless Steel high tensile spring wire (Omni-Tough®)

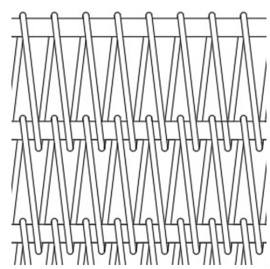
OMNI-TOUGH® MESH OVERLAY

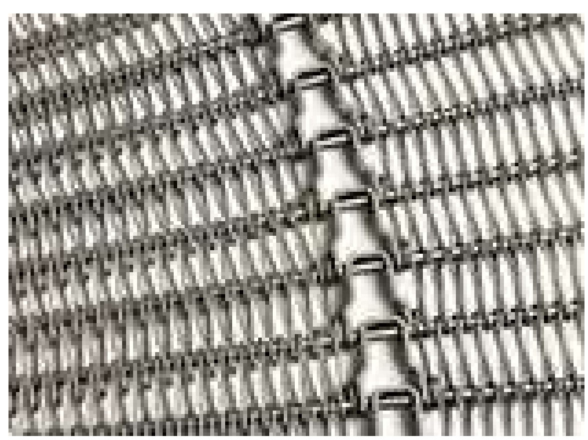
- Provides a flatter mesh surface with a high resilience to impact.
- Not available in all mesh configurations or for all belt widths.
- Available in 16 ga. (.062 inch [1.6 mm]) and 17 ga. (.054 inch [1.4 mm]).

Balanced Weave



Unilateral Weave





SMALL RADIUS OMNI-GRID® 360-075			
Belt Width		Inside Turn Radius (1.1:1 Turn Ratio)	
inches	mm	inches	mm
14	356	15.4	391
16	406	17.6	447
18	457	19.8	503
20	508	22.0	559
22	559	24.2	615
24	610	26.4	671
26	660	28.6	726
28	711	30.8	782
30	762	33.0	838
32	813	35.2	894
34	864	37.4	950
36	914	39.6	1006
38	965	41.8	1062
40	1016	44.0	1118
42	1067	46.2	1173
44	1118	48.4	1229
46	1168	50.6	1285
48	1219	52.8	1341

- *Center link located on belt center if Turn Ratio = 1.1:1*
- *Consult our Product Engineers for approval of wider belt widths and concerns regarding belt strength.*

BELT WEIGHT

SMALL RADIUS OMNI-GRID® 360-075 BELT FRAME WEIGHT			
Belt Width (inches [mm])		Weight (lbs/ft [kg/m] of length)	
inches	mm	lbs/ft	kg/m
14	356	3.29	4.91
16	406	3.56	5.31
18	457	3.83	5.71
20	508	4.09	6.10
22	559	4.36	6.50
24	610	4.62	6.89
26	660	4.89	7.29
28	711	5.16	7.70
30	762	5.42	8.08
32	813	5.69	8.49
34	864	5.95	8.87
36	914	6.22	9.28
38	965	6.48	9.66
40	1016	6.75	10.07
42	1067	7.02	10.47
44	1118	7.28	10.86
46	1168	7.55	11.26
48	1219	7.81	11.65

Belt Weight = (Weight of Grid Frame) + (Weight of Mesh Overlay)

- Determine weight of Base Belt in lb/foot or kg/meter.
- Calculate Conveying Surface (page 2) and convert to units of feet or meters.
- Calculate sq. feet [sq. meter] of inner and outer mesh per foot [meter] of belt length.
- Use the Conveying Surface and Mesh Type chart to determine weight of mesh in lb/foot or kg/meter.
- Add Weight of Base Belt to Weight of Inner and Outer Mesh Overlays per lb/foot or kg/meter.
- Multiply calculated value by belt length (feet or meter) for total belt weight in units of lb or kg.

Sample Calculation:

For a 3/4” Pitch, 36” wide belt with center link position at 18” and an overlay of B36-12/16-16 (reference calculations for conveying surface on page 2),

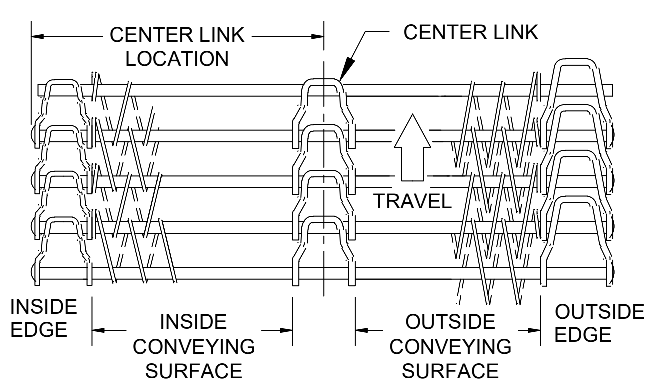
Belt Weight = Frame Wt + Inside Mesh Wt + Outside Mesh Wt

Belt Weight = 6.22 lbs/ft + (16.50 in)(1 ft/12 in)(1.25 lbs/sq. ft) + (16.17 in)(1 ft/12 in)(1.58 lbs/sq. ft)

Belt Weight = 10.07 lbs/ft.

INSIDE MESH				
Mesh Lateral Count	16 ga .062 in [1.6 mm]		17 ga .054 in [1.4 mm]	
	lb/ft²	kg/m²	lbs/ft²	kg/m²
18	0.65	3.17	0.49	2.39
24	0.85	4.15	0.63	3.08
30	1.05	5.13	0.78	3.81
36	1.25	6.10	.94	4.59
42	1.45	7.08	1.09	5.32
48	1.65	8.06	1.24	6.05
54	1.85	9.03	1.39	6.79
60	-	-	1.54	7.52

OUTSIDE MESH				
Mesh Lateral Count	16 ga .062 in [1.6 mm]		17 ga .054 in [1.4 mm]	
	lb/ft²	kg/m²	lbs/ft²	kg/m²
18	0.81	3.95	0.61	2.98
24	1.06	5.18	0.80	3.91
30	1.32	6.44	0.99	4.83
36	1.58	7.71	1.19	5.81
42	1.84	8.98	1.38	6.74
48	2.09	10.20	1.58	7.71
54	2.35	11.47	1.77	8.64
60	-	-	1.96	9.57

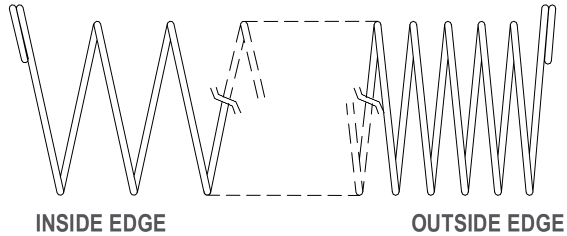


BELT OPTIONS

VARIABLE LOOP COUNT OVERLAY (PATENTED)

Overlay which has varied loop spacing across the width of the belt so that the loops get progressively closer together as the spiral goes from the inside of the belt to the outside of the belt (inside and outside are with respect to a turn).

- Variable Loop Count Overlay is available in 16-gage and 17-gage Omni-Tough® mesh.
- The tightest mesh available is a B42 or a U54 at the outside edge.
- This can progress down to a B18 or a U36 at the inside edge.
- Direction of turn must be specified on the manufacturing order.
- Mesh will be designated, i.e., B42/36-12/16-17 (balanced 42 mesh spacing outside edge progressing to 36 mesh spacing inside edge); or U48/36-12/16-16 (unilateral 48 mesh spacing outside edge progressing to 36 mesh spacing inside edge).



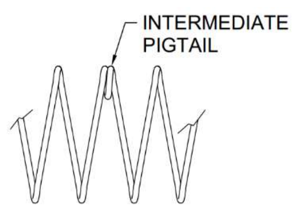
SPECIAL SPIRALS (PATENTED)

- Available in Omni-Tough® only
- Available in 16 ga. and 17 ga. only
- One or more spirals on conveying surface are raised.
- Used as guard edges, lane dividers and flights
- Maximum height:
  - Inside Mesh: 3/4 inch [19.1 mm]
  - Outside Mesh: 1 inch [25.4 mm]
- Available Options: height, spacing, location, shape, and number of lanes in belt
- Direction of turn (clockwise or counterclockwise) must be specified.

ISOSCELES TRIANGLE

INTERMEDIATE PIGTAILS

- Woven into approved Omni-Tough straight and tapered spirals
- Secures rod position within overlay spirals
- Recommended for conveying raw dough & sticky products



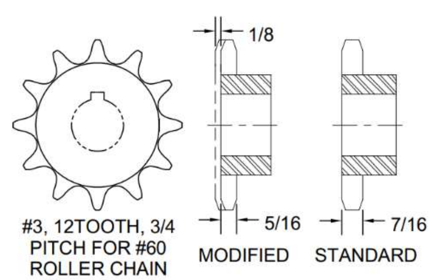
SPROCKETS

STANDARD SPROCKETS

Material	Teeth	Overall Diameter		Pitch Diameter		Hub Diameter		Hub Width		Minimum Bore		Maximum Bore	
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
Hardened Steel	12	3.40	86.4	2.90	73.7	2.25	57.2	1.0	25.4	1	25.4	1.44	36.6
SS T303	12	3.28	83.3	2.90	73.7	2.36	59.9	1.0	25.4	1	25.4	1.44	36.6
UHMW	12	3.34	84.8	2.90	73.7	2.25	57.2	1.0	25.4	1	25.4	1.44	36.6

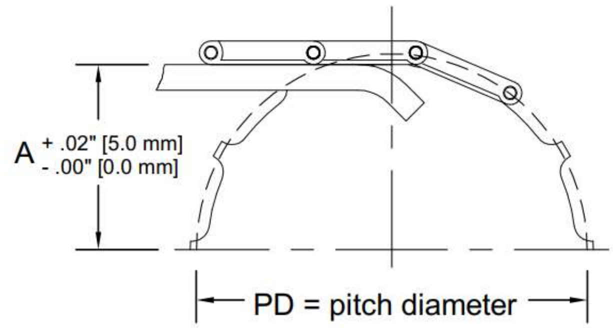
NOTES:

- UHMWPE material type components have a 150°F [66°C] maximum operating temperature.
- Maximum bore sizes listed for UHMWPE material is based on 1/2 inch [12.7 mm] of material above
- keyway.
- Bore, keyway, and set screw(s) per oder
- One sprocket will engage the inside row of links and one sprocket will engage the middle row of links.
- One toothless flanged idler (support roll) supports the outside row of links
- **All three links across belt width must be supported with either sprockets or rollers at all shafts.**
- Additional rollers may be required for heavier loads.
- **Standard #60 roller chain sprockets** may also be used when modified as follows:
  1. Face off sprocket such that the overall tooth width is 5/16 inch [7.94 mm].
  2. Chamfer corners of the newly machined teeth.



SUPPORT RAILS AND ROLLERS

As a rule, support rails are required on a maximum of 18 inches apart on load side and 24 inches maximum on return side. Rollers may also be used. For light loads, support rails may be placed farther apart – consult Ashworth Engineering for your particular application.



WEARSTRIP PLACEMENT

A = ½ X (PD – BELT THICKNESS)

- 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.
- Nominal Belt Pitch = 0.75 inches [19.1 mm]

ENGINEERING CALCULATIONS

TURN RATIO

Used for calculating maximum acceptable belt turn ratio for existing systems

TR = Turn Ratio
ITR = Inside Turn Radius
BW = Belt Width

TR = ITR ÷ BW

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

Inside Turn Radius: (for calculating radius dimensions for new system design)

ITR = TR x BW

Sample Calculation:
For Turn Ratio = 1.1:1, Belt Width = 36 inch
Inside Turn Radius = 1.1 x 36 inch = 39.6 inch

CENTER LINK POSITION

Center link location is based on turn radius and determined by the formula below. **Center Link Location is measured from the inside belt edge (see diagram below).** Failure to properly position the center row of links will result in an unfavorable operating condition.
If the center row of links is positioned too close to the inside edge of the belt, the links along the inside edge will tent (/\). The center link position will be too short to collapse to the inside turn radius.
If the center link is positioned too far from the inside edge, there is incomplete collapse of the inside edge. This condition allows excessive movement of the connector rod in the link slot, which may disturb product orientation.

Center Link Position: (calculate center link position in units of inches; convert to millimeters if necessary)

CENTER LINK POSITION = ITR ÷ 2.2

Sample calculation:
For Inside Turn Radius = 39.6 inch, Belt Width = 36 inch
Center Link Position = 39.6 inch ÷ 2.2 = 18 inch

CONVEYING SURFACE

INSIDE CONVEYING SURFACE = CENTER LINK LOCATION – 1.50" [38.1 mm]

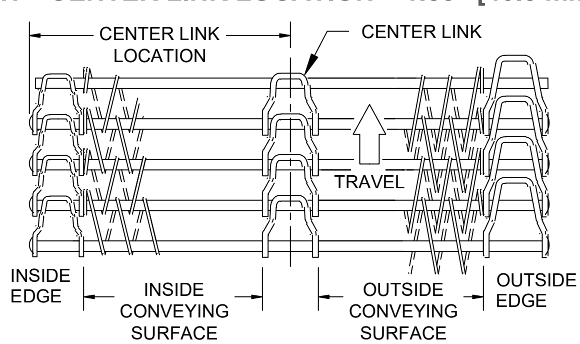
Outside Conveying Surface = OVERALL BELT WIDTH – CENTER LINK LOCATION – 1.83" [46.5 mm].

Conveying surface may be calculated in inches or millimeters.

Sample Calculation:

For a 36 inch wide belt with the center link located 18 inches from the inside edge:

Inside Conveying Surface = 18" – 1.50" = 16.50"
Outside Conveying Surface = 36" - 18" – 1.83" = 16.17"



BELT LENGTH

Belt Length calculation will depend on system layout.
When calculating belt length for Small Radius Omni-Grid® Belt, use the radius to the middle of the center row of links.

BELT WEIGHT

See calculation instructions and sample calculations under 'Belt Weight' on page 4

Belt Weight = (Weight of Base Belt) + (Weight of Inner and Outer Mesh Overlay)

Steps of Calculation:

- Determine weight of Base Belt in lb/foot or kg/meter.
- Calculate Conveying Surface and convert to units of feet or meters.
- Calculate sq. feet [sq. meter] of inner and outer mesh per foot [meter] of belt length.
- Use the Conveying Surface and Mesh Type chart to determine weight of mesh in lb/foot or kg/meter.
- Add Weight of Base Belt to Weight of Inner and Outer Mesh Overlays per lb/foot or kg/meter.
- Multiply calculated value by belt length (feet or meter) for total belt weight in units of lb or kg.

BELT TENSION

FRICTION FACTORS	
For Stainless Belts on UHMW Rails	
Friction Factor	**Product Type**
0.20	Cleaned, packaged
0.27	Breaded, flour based
0.30	Greasy, fried at <32°F
0.35	Sticky, glazed, sugar based

Belt life is affected not only by tension, but also by belt speed and the number of cycles run.

T = (WLFL + WLFR + WH) X C

T Belt Tension in lbs [kg]
W Total Weight = Belt Weight + Product Weight in lbs./linear ft. [kg/linear m]
L Conveyor Length in feet [meter]
w Belt Weight in lbs./linear ft. [kg/linear m]
fl Coefficient of Friction Between Belt and Belt Supports, Load Side dimensionless
fr Coefficient of Friction (Friction Factor) Between Belt and Belt Supports, Return Side dimensionless
H Rise of incline Conveyor (+ if incline, - if decline) in feet [meter]
C Force Conversion Factor: Imperial = 1.0; Metric = 9.8

SYSTEM REQUIREMENTS

CAGE BAR CAPS FOR LO-TENSION SPIRAL SYSTEMS

Ashworth recommends that cage bars have a minimum width of 1" [25 mm] and be spaced no more than 6" [150 mm] apart. Cage bars should also have a minimum edge chamfer or radius of 1/8" [3 mm].

Smooth faced cage bar caps are recommended.
DO NOT use grooved, ridged or beveled cage bar caps with Omni-Grid 360 Weld belting.

STANDARD LOADING RECOMMENDATIONS

All Small Radius Omni-Grid® 360 belts accommodate a turn by collapsing along the inside edge and expanding on the outside edge. Product loading must be adjusted accordingly. The allowable loading per length of belt is determined by the ratio of the inside turn radius and the radius to the tension link. The center link is the tension link for this belt.

Allowable Loading per length of belt = Tension Link Radius ÷ Inside Turn Radius (result in product lengths)

Sample Calculation:
BW = Belt Width = 36 inch [914.4 mm]
CLL = Center (Tension) Link Location = 18 in [457.2 mm]
TLR = Tension Link Radius
IR = Inside Turn Radius = 39.6 inch [1005.8 mm]
Product Piece Length = 6 inch [152.4 mm]

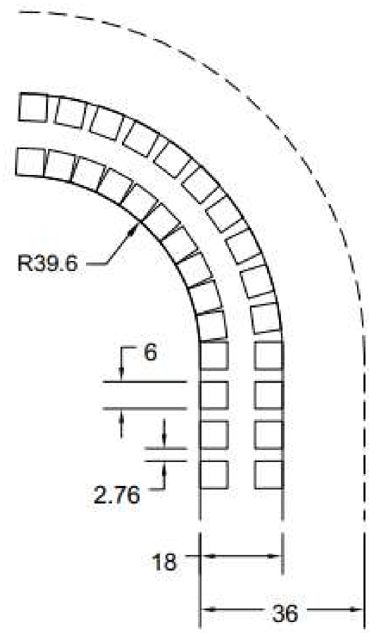
TLR = CLL + IR
= 18 in [457.2 mm] + 39.6 inch [1005.8 mm]
= 57.6 inch [1463 mm]

Allowable Loading = TLR ÷ IR
= 57.6 inch [1463 mm] ÷ 39.6 inch [1005.8 mm]
= 1.455 ≈ 1.46 Product Lengths per piece

1.46 x 6 inches = 8.76 inches of belt length per piece

Spacing between product pieces = 1.46 – 1 = .46 = 46% of piece length

46% of product piece length = .46 x 6 inch [152.4 mm]
= 2.76 inches [70.1 mm] minimum between pieces



Product along inside edge moves closer together in turn, with no effect on product along Tension Link Radius

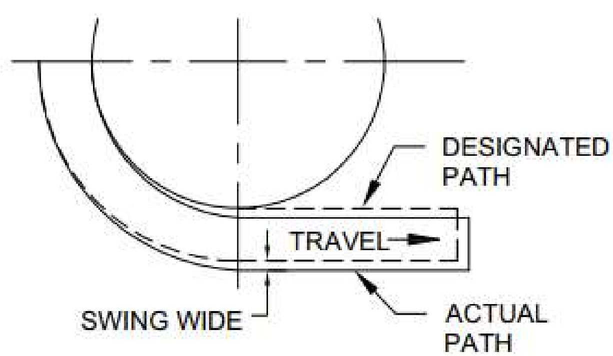
Loading 1 in 1.46 Product Lengths

SWING WIDE

The belt tends to “swing wide” as it exits the spiral cage or turn curve, following a path that is offset but parallel to the normal tangent line to the cage. This phenomena itself does no damage, but often the belt edge contacts framework that does not leave sufficient clearance for this to occur. The usual reaction of the builders or users is to restrict the path of the belt from swinging wide, typically by use of rollers or shoe guides.

Restraining the belt path can have several adverse effects on belt life:

- The belt can wear through a shoe guide, allowing the edge to snag. This will eventually cause an increase in belt tension and damage the belt edge.
- Outside edge restraints can push individual rods inward. The rods can be held in this inward position by belt tension. There is then a potential for the projecting rods to catch on the vertical cage bar capping, causing damage to the belt, damage to the cage bar capping, and high belt tension.
- If the belt is pushed into a straight tangent path, the tension carried in the outside edge of the belt is shifted to the inside edge of the belt, resulting in a pronounced tendency for one edge of the belt to lead the other.



Ashworth recommends a minimum swing wide clearance of 1 inch per foot of width [75 mm per meter of width] be built into all conveyors where the belt enters or exits a turn.

REDUCING BELT TENSION AND WEAR (in LoTension Spiral Systems)

Belt tension increases as the friction between belt and support rails increases. Belt tension decreases as the tension between inside edge of the belt and cage of spiral system increases.

- Clean product debris from support rails.
- Clean ice and product debris from belt, sprockets, and filler rolls to prevent belt damage.
- Observe effect of temperature on coefficient of friction between the supports and the belt. Products may leave a slick residue at room temperature that turns into a tar-like substance as temperature decreases. At freezing temperatures, the debris may become slick again or leave a rough surface depending upon its consistency.
- Lubricate support rails to reduce friction between rails and belt.
- Clean lubricants off inside edge of the belt.
- Replace worn wear strips on supports and inside edge of turns.
- Remove weight from take-up. Use minimum weight necessary to maintain take-up loop.
- Align sprockets properly and insure that they do not walk on shaft.
- Load belt so that belt weight, product loading, friction factors, and belt path do not cause belt tension to exceed maximum allowable limit.
- Decrease belt speed.
- Reference: Product Technical Bulletin "Conveyor Design Guidelines."

CENTER LINK POSITIONING

Center link location is based on turn radius and determined by formula specified previously. Failure to properly position the center row of links will result in an unfavorable operating condition.

- If the center row of links is positioned too close to the inside edge of the belt, the links along the inside edge will tent (/\). The center link position will be too short to collapse to the inside turn radius.
- If the center link is positioned too far from the inside edge there is incomplete collapse of the inside edge. This condition allows excessive movement of the connector rod in the link slot, which may disturb product orientation.
- See page 6 for Center Link Position calculation Instructions.

SPROCKET DRIVE

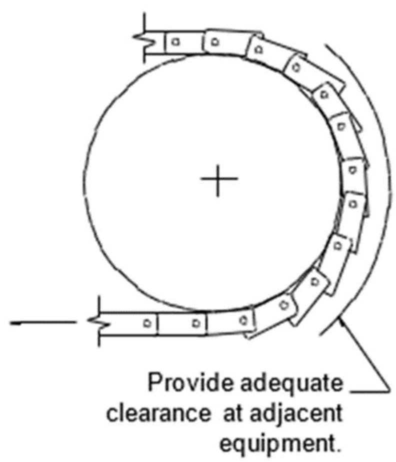
Locate sprockets only in the inside and center link rows. Do not set the sprockets in the outside row of links. Use a simple idler roll of a matching flange diameter under the outside row of links. See page 5 for sprocket and filler roll specifications.

- **All three links across belt width must be supported with either sprockets or rollers at all shafts.**
- Additional rollers may be required for heavier loads.

TRANSFERS

Because the outside section has a longer pitch than the inside section and the links in the outside row are in a collapsed position in straight runs, the forward corners of the links protrude above the belt surface at the terminals.

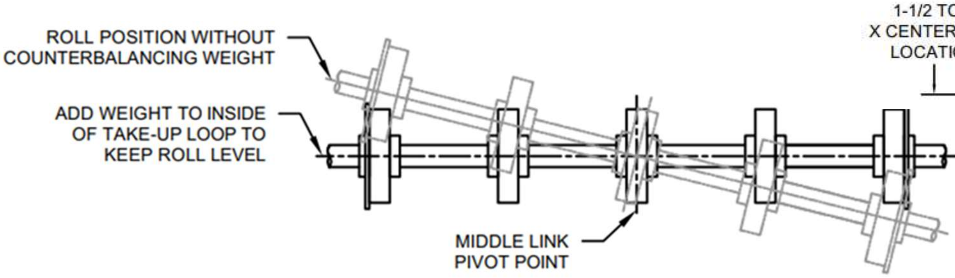
- **To provide a close transfer for the product to the adjacent equipment**, modify the transfer plate or blade in the area of the outside links to provide adequate clearance.



TAKEUP LOOP

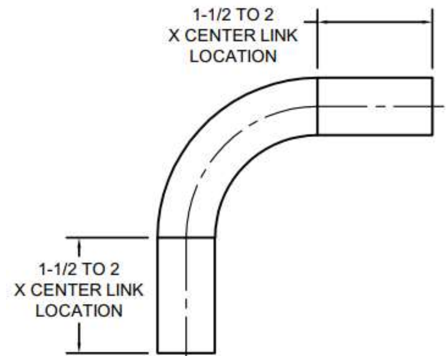
Small Radius belts usually will not hang squarely in a take-up loop because the collapsed outside edge extends due to gravity. The belt will pivot about the center link, causing the inside edge to collapse. This causes the take-up roll to hang at an angle and bind in the take-up frame.

Solution:
To keep the take-up level, add weight to the inside end to counter-balance the weight of the belt's outside section. Use a take-up that exerts minimum force on the belt. For spiral systems, a free-floating take-up system as shown is typical.



BELT EXTENSION AT DRIVE

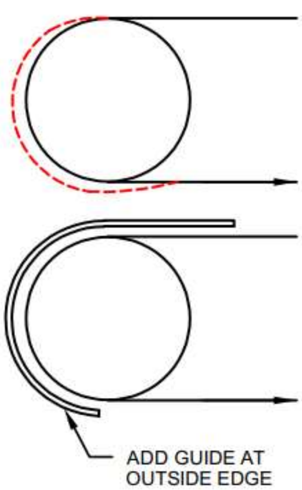
The inside belt section must be fully extended before encountering any sprocket teeth. To insure this, provide a straight run of at least 1-1/2 x (Center Link Position) before and after turns.
For speeds of 60 fpm [18 m/min] and greater, increase straight run to at least 2 x (Center Link Position).



TERMINAL GUIDES FOR SMALL RADIUS BELTS

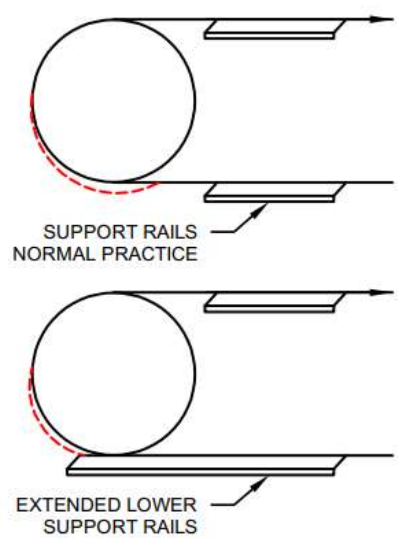
OUTSIDE EDGE GUIDE

- The outside half of the belt may be affected by centrifugal force, causing it to flare out.
- If this occurs, add a guide over the outside edge to limit the flare out.



EXTENDED LOWER SUPPORT RAIL

- The weight of the outside half of the belt causes the outside links to droop at the terminals. While this drooping is not an operating problem, it does not present a good appearance and may interfere with other equipment.
- A simple correction is to extend the return support rails beyond the terminal centerline.



MAINTENANCE

Lower belt tension will improve belt life and reliability. Therefore, proper operation and regular cleaning, lubrication, and maintenance are encouraged. Generally, belt tension increases when product debris (flour, glazing, marinade, etc.) increases the friction between the belt and the support rails. Other factors, such as worn or misaligned components and increased product loading will also increase belt tension. The following guidelines will help lower belt tension and reduce wear.

CLEANING

- Clean product debris from support rails.
- Clean ice and product debris from belt, sprockets, and filler rolls 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 turns into a tar-like substance as temperature decreases. At freezing temperatures, the debris may become slick again or leave a rough surface, depending upon its consistency.

LUBRICATION

- Lubricate system components as needed.

OPERATION

- Replace worn wear strips on support rails.
- Remove weight from take-up. Use minimum weight necessary to maintain take-up loop.
- Align sprockets properly and ensure that they do not walk on the shaft.
- Load belt so that belt weight, product loading, friction factors, and belt path do not cause belt tension to exceed maximum allowable limit.
- Decrease belt speed.

Ashworth

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