ASHWORTH ENGINEERING

Committed to on-time delivery of defect-free products and services, fit for use, exactly as promised, every time.

PRODUCT TECHNICAL BULLETIN

Omni-Pro™ 120

USA and International Patents Pending

Omni-Grid® belt design with protrusion leg. Heavy-duty links with larger diameter rods for increased carrying capacity for your Spiral/Lotension turn curve and straight run applications. Omni-Pro is offered with a turn ratio of 1.7 up to 2.5 times the belt width making it an easy retrofit to existing systems.

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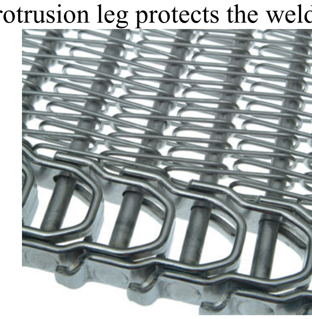
Protrusion leg protects the welds



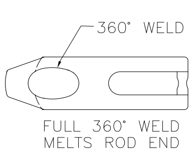
DEFINING CHARACTERISTICS

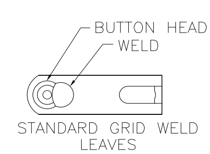
Minimum Turn Ratio:	1.7:1 up to 2.5:1
Turn Capability:	Turns both left and right
Mode of Turning:	Inside edge collapses in turn
Width Limits:	12 inch [*305 mm*] through 60 in. [*1524 mm*] in straight run applications 12 inch [*305 mm*] through 54 in. [*1372 mm*] in turn curve applications
Maximum Allowable Tension:	400 lbs. *[181 kg]* through a turn and 800 lbs. [*364 kg*] in straight run applications
Longitudinal Pitch:	1.2 inch [*30.5 mm*]
Link Size:	.590 inch x .118 inch [*15.0 mm x 3.0 mm*]
Rod Diameter:	.236 inch [*6.0 mm*]
Material:	Stainless Steel
Method of Drive:	Sprocket driven on links.
Terminals:	All terminals having 120° wrap or more should be supported by 6 inch [*152 mm*] minimum diameter rollers or flanged idlers.
Conveying Surface:	3-1/8" inch [*79.4 mm*] less than nominal width
Mesh Overlay:	Standard mesh configurations available, including Omni-Tough® Variable Loop Count.

Protrusion Leg

A patented link developed by Ashworth is utilized in the construction of the Omni-Pro belting. The extended leg design prevents the welds from contacting the wear material on the inside belt edge. The protrusion leg provides a larger bearing surface and thus minimizes wear of both the belt edge and inside wear surfaces on your conveyor, such as the UHMW used on the inside edge of a fixed turn or the rotating surface of a Lotension spiral. The larger bearing surface also provides a smoother running belt.

The protrusion leg has been designed for standard 2.2:1 systems, as well as 1.7:1 reduced radius systems, allowing for easy retrofits. The design of the protrusion link allows the belt to be flipped side for side to extend the service life of your belting





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-Pro links eliminates the need for a weld on the inside of the link. By forming the 360º 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-Pro' belt, now becomes more important than ever. It provides increased bearing surface to reduce belt elongation.

BELT SPECIFICATIONS

MESH OVERLAY:
Designation:
B X-Y-Z and U X-Y-Z

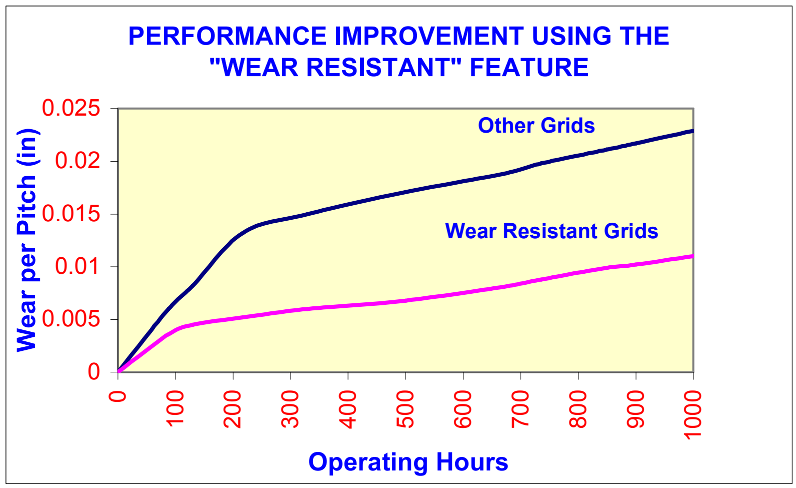
First Digit: B = Balanced Weave; U = Unilateral Weave
X: First Number: No. of Loops per Foot of Width
Y: Second Number(s): No. of Spirals per Foot of Length (10 for 1.2 in. pitch)
Z: Third Number: Wire gauge of overlay

Examples:
B30-10-17
U42-10-16

OMNI-TOUGH®:
- Provides a flatter mesh surface with a high resilience to impact.
- Not available in all mesh configurations or for all belt widths.
- Available in 15 ga. (.072 inch [*1.8 mm*]), 16 ga. (.062 inch [*1.6 mm*]) and 17 ga. (.054 inch [*1.4 mm*]).

Wire Sizes: 15, 16 and 17 ga.
Material: Stainless Steel high tensile spring wire (Omni-Tough®)

PATENTED "WEAR RESISTANT" FEATURE
- Standard on all tension bearing links.
- Increases belt life by reducing belt elongation.



BELT WEIGHT

Omni-Pro Belts 1.2" Pitch							
OA Belt Width		**1.7:1 Turn Radius**		**2.2:1 Turn Radius**		**Base Belt Weight**	
inch	**mm**	**inch**	**mm**	**inch**	**mm**	**lb/ft**	**kg/m**
12	305	20.4	518	26.4	671	2.60	3.87
14	356	23.8	605	30.8	782	2.84	4.24
16	406	27.2	691	35.2	894	3.09	4.60
18	457	30.6	777	39.6	1006	3.33	4.97
20	508	34.0	864	44.0	1118	3.58	5.33
22	559	37.4	950	48.4	1229	3.82	5.7
24	610	40.8	1036	52.8	1341	4.07	6.06
26	660	44.2	1123	57.2	1453	4.31	6.43
28	711	47.6	1209	61.6	1565	4.56	6.76
30	762	51.0	1295	66.0	1676	4.80	7.16
32	813	54.4	1382	70.4	1788	5.05	7.52
34	864	57.8	1468	74.8	1900	5.29	7.89
36	914	61.2	1555	79.2	2012	5.54	8.25
38	965	64.6	1641	83.6	2123	5.78	8.62
40	1016	68.0	1727	88.0	2235	6.03	8.98
42	1067	71.4	1814	92.4	2347	6.27	9.35
44	1118	74.8	1900	96.8	2459	6.52	9.72
46	1168	78.2	1986	101.2	2570	6.76	10.08
48	1219	81.6	2073	105.6	2682	7.01	10.45
50	1270	85.0	2159	110.0	2794	7.25	10.81
52	1321	88.4	2245	114.4	2906	7.50	11.18
54	1372	91.8	2332	118.8	3018	7.74	11.54
56	1422	**	**	**	**	7.99	11.91
58	1473	**	**	**	**	8.23	12.27
60	1524	**	**	**	**	8.48	12.64

***Straight run only.*

Mesh Lateral Count	**15 ga.**		**16 ga.**		**17 ga.**	
	lb/ft^2	**kg/m^2**	**lb/ft^2**	**kg/m^2**	**lb/ft^2**	**kg/m^2**
18	.53	2.58	.37	1.81		
24	.70	3.42	.53	2.57		
30	.87	4.26	.65	3.20		
36			.78	3.83	.58	2.85
42			.91	4.46	.68	3.31
48			1.04	5.09	.77	3.78
54			1.17	5.72	.87	4.25

Turn Ratio:

TR = ITR ÷ BW
where ITR = Inside Turn Radius
BW = Belt Width

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 = (Turn Ratio) x (Belt Width)

Belt Weight = (Weight of Base Belt) + (Weight of 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. (Conveying Surface = Belt Width – 3-1/8 inch [*79.4 mm*])
- Calculate sq. feet [*sq. meter*] of mesh/foot [*meter*] of belt length.
- Use the Conveying Surface and Mesh Type to determine weight of mesh in lb/foot or kg/meter.
- Add Weight of Base Belt to Weight of Mesh Overlay, lb/foot or kg/meter.

Multiply calculated value by belt length (feet or meter) for total belt weight in units of lb or kg.

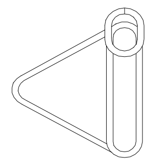
BELT OPTIONS

VARIABLE LOOP COUNT OVERLAY (Patent No. 6,129,205)
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 spring wire.
- ❖ 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., B42/36-10-17 (balanced 42 mesh spacing outside edge progressing to 36 mesh spacing inside edge); or U48/36-10-16 (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 1 inch [*25.4 mm*].
- Available Options: height, spacing, location, shape, and number of lanes in belt.



Isosceles
Triangle

SPROCKETS

#8-21 tooth sprockets recommended with 7-11/16 inch [*195 mm*] diameter filler rolls. #6-16 tooth available with 5-3/4 inch [*146 mm*] diameter filler rolls for retrofitted systems only.

UHMW-PE sprockets

No. of Teeth	Overall Diameter		Pitch Diameter		Hub Width		Hub Diameter		Bore Minimum		Bore Maximum*	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	Mm
16	6.59	167.3	6.11	155.2	2.00	51.0	5.47	138.9	.75	19.05	3.00	76.2
21	8.45	214.7	8.05	204.5	2.00	51.0	7.38	187.4	.70	19.05	4.00	101.6

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.

SUPPORT

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 further apart – consult Ashworth Engineering for your particular application.

FILLER ROLLS

It is recommended that filler rolls be used to support the belt between sprockets. The maximum diameter for filler rolls depends on the size of the sprockets being used. The diameter can be calculated knowing the pitch diameter of the chosen sprocket.

$$\varnothing = PD \times \text{cosine}(180/\#) - MT$$

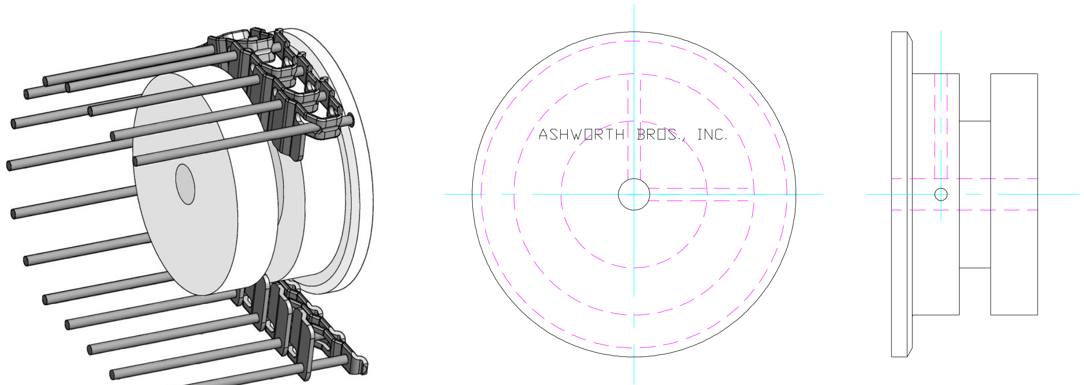
∅ = Maximum Filler Roll Diameter
PD = Pitch Diameter of Sprocket
\# = Number of Teeth on Sprocket
MT = Mesh Thickness

- 15 gage mesh thickness is .435 inches
- 16 gage mesh thickness is .417 inches
- 17 gage mesh thickness is .401 inches
- For rod only use .236 inches

> Example:
> Filler roll diameter for use with 16 tooth sprocket (mesh overlay B36-10-16)
> PD = 6.11 inches
> \# = 16 teeth
> MT = .417 inches
> $\varnothing = 6.11 \times \text{cosine}(180/16) - .417 = 5.576$ inches

TERMINAL ROLLS

It is recommended rollers be used under the links at all terminal rolls not utilizing sprockets. At no time should the belt only be supported under the mesh without supporting the links as well. Mesh damage and wire breakage is probable if the links are not supported. This may pose a challenge on belts having guard edges and operating in a reverse bend, in this situation the belt must be supported on the top product surface – see illustration below. In these circumstances a flanged idler with a notch or relief should be used to support the outside edges of the belting.

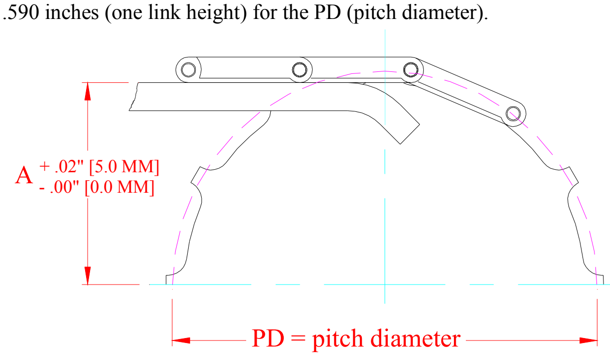


Support rollers are still recommended between flanged idlers. To calculate the maximum diameter of the support rolls, use the formula in the previous section substituting the sum of the hub diameter of the chosen flanged idler + .590 inches (one link height) for the PD (pitch diameter).

WEARSTRIP PLACEMENT

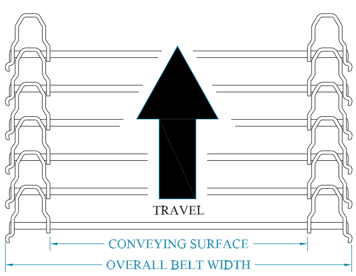
A = ½ X PD – 0.30 inch [*7.6 mm*]

- 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 = 1.20 inches [*30.5 mm*])

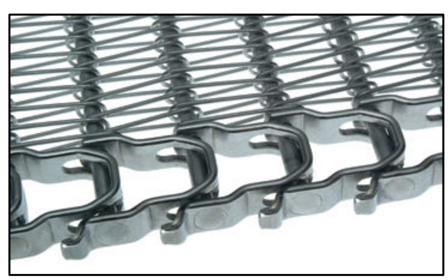


ENGINEERING CALCULATIONS

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



CONVEYING SURFACE
Total Conveying Surface = Belt Width less 3-1/8 inch [*79.4 mm*]
Sample Calculation:
For a 36 inch wide belt
Total Conveying Surface = 36” – 3-1/8” = 32-7/8”
For a 920 mm wide belt
Total Conveying Surface = 920 – 79.4 = 840.6 mm



BELT TENSION IN STRAIGHT RUNNING APPLICATIONS

$T = (WLf_l + wLf_r + WH) \times C$

where
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]*
f_l Coefficient of Friction Between Belt and Belt Supports, Load Side *dimensionless*
f_r Coefficient of Friction 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

Belt life is affected not only by tension, but is also affected by the speed or number of cycles it is exposed.

SYSTEM REQUIREMENTS

Cage bar spacing for Lo-tension Spiral Systems:
Omni-Pro belting has an extended pitch of 1.2" [*30.5 mm*]. To prevent the inside edge of Omni-Pro from straddling cage bars Ashworth recommends that cage bars have a minimum width of 1.5" [*38 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" [*3mm*]

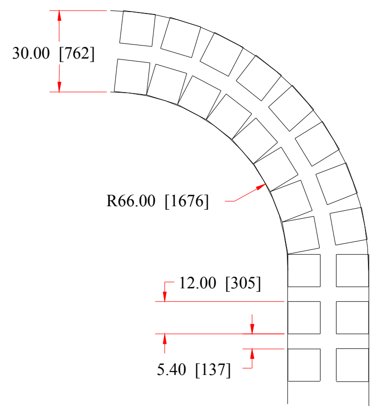
Smooth faced cage bar caps are recommended**. DO NOT use grooved, ridged or beveled cage bar caps with Omni-Pro belting.**

PRODUCT LOADING REQUIREMENTS
All Omni-Grid belts accommodate a turn by collapsing along the inside 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.

STANDARD LOADING RECOMMENDATIONS
Allowable loading per length of belt is determined by the ratio of the radius to the tension link to the inside turn radius.

Allowable Loading per length of belt = Radius to Tension Link/Inside Turn Radius
Sample Calculation:
Let BW = Belt Width = 30 inch [*762 mm*]
Let IR = Inside Turn Radius = 66 inch [*1676 mm*]

Radius to Tension Link = BW + IR
= 30 inch [*762 mm*] + 66 inch [*1676 mm*]
= 96 inch [*2438 mm*]
Allowable Loading = 96/66 = 1.45
Which means a minimum space of 45% of the product length is required between products.

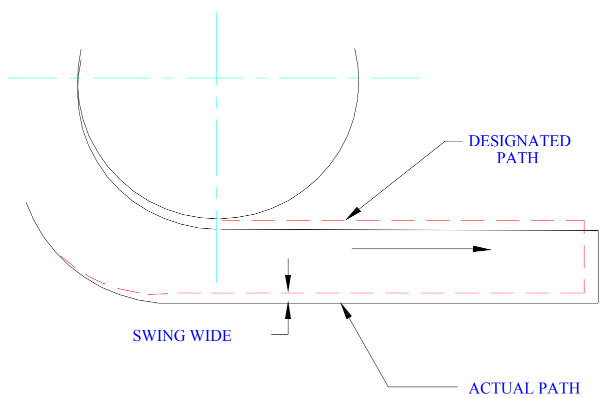


Product along inside edge moves closer together; no effect is observed on the product along outside edge.
Loading: 1 in 1.45 product lengths

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.

To Reduce 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
- Replace worn wear strips on supports and inside edge of turns.
- Remove weight from take-up. Use minimum weight necessary 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.

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".

Ashworth BV
Amsterdam, The Netherlands
Tel: +31.20.581.3220
Fax: +31.20.581.3229
Email: ashworth@ashworth.nl

Ashworth Bros., Inc.
Winchester, VA U.S.A.
Phone: 540-662-3494
Fax: 800-532-1730
Email: ashworth@ashworth.com
Website: www.ashworth.com

Ashworth Europe Ltd.
West Midlands, United Kingdom
Tel: +44-1384-355000
Fax: +44-1384-355001
Email: ashworth.europe@ukgateway.net