



ASHWORTH ENGINEERING

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PRODUCT TECHNICAL BULLETIN

Omni-Grid³⁶⁰ Weld 075

Patented with International Patents Pending

Standard links with 360 degree welds for increased carrying capacity for your Spiral/Lotension, turn curve and straight run applications. Omni-Grid³⁶⁰ Weld is offered with a minimum turn ratio of 2.2 times the belt width, making it an easy retrofit to existing systems.

Omni-Grid³⁶⁰ Weld 075



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DEFINING CHARACTERISTICS

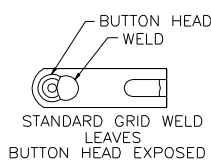
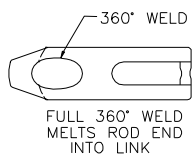
- Minimum Turn Ratio:** 2.2:1 up to straight run
- Turn Capability:** Turns both left and right
- Mode of Turning:** Inside edge collapses in turn
- Width Limits:** 12 inch [305 mm] through 60 in. [1524 mm] in straight run applications
12 inch [305 mm] through 40 in. [1016 mm] in turn curve applications
- Maximum Allowable Tension:** 150 lbs. [68 kg] through a turn and 300 lbs. [136 kg] in straight run applications
- Longitudinal Pitch:** .75 inch [19.05 mm]
- Link Strip Size:** .438 inch x .080 inch [11.1 mm x 2.0 mm]
- Rod Diameter:** .192 inch [4.88 mm]
- Material:** Stainless Steel
- Method of Drive:** Sprocket driven on links.
- Terminals:** All terminals having 120° wrap or more should be supported by 3 inch [75 mm] minimum diameter rollers or flanged idlers.
- Conveying Surface:** 2-1/8 inch [54 mm] less than nominal width
- Mesh Overlay:** Standard mesh configurations available, including Omni-Tough[®] Variable Loop Count.

Improved Weld

The traditional welded construction of Grid belts fails 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 360° weld on the outside edge of the link. This prevents stress on the weld during operation, even with heavier loads. The design and heavier gauge 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.

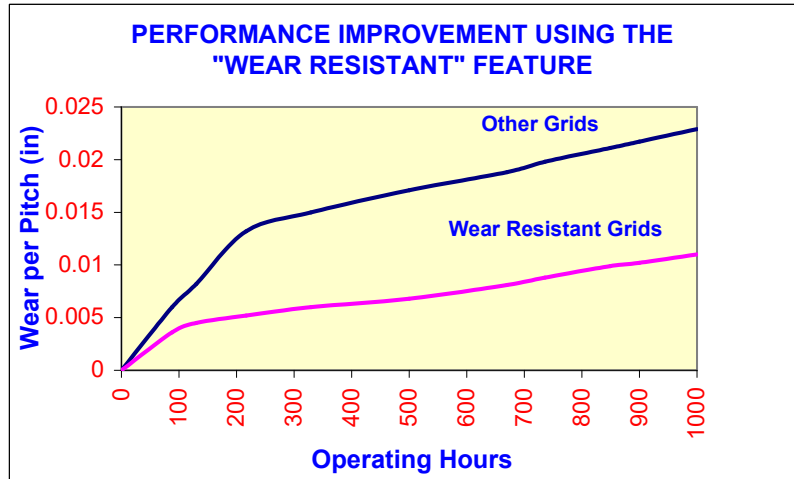


Wear Resistant Feature

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
 (12 for 1.08 in. pitch)

Z: Third Number: Wire gauge of overlay

Examples:

B30-16-17

U42-16-16

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 16 ga. (.062 inch [*1.6 mm*]) and 17 ga. (.054 inch [*1.4 mm*]).

Wire Sizes: 16 and 17 ga.

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

BELT WEIGHT

Omni-Grid 360 Weld 075 Belts (3/4" Nominal Pitch)					
OA Belt Width		2.2:1 Turn Radius		Base Belt Weight	
inch	mm	inch	mm	lb/ft	kg/m
12	305	26.4	671	2.27	3.39
14	356	30.8	782	2.54	3.79
16	406	35.2	894	2.80	4.18
18	457	39.6	1006	3.07	4.58
20	508	44.0	1118	3.34	4.98
22	559	48.4	1229	3.60	5.37
24	610	52.8	1341	3.87	5.77
26	660	57.2	1453	4.13	6.16
28	711	61.6	1565	4.40	6.56
30	762	66.0	1676	4.66	6.95
32	813	70.4	1788	4.93	7.35
34	864	74.8	1900	5.20	7.75
36	914	79.2	2012	5.46	8.14
38	965	83.6	2123	5.73	8.55
40	1016	88.0	2235	5.99	8.93
42**	1067			6.26	9.34
44**	1118			6.53	9.74
46**	1168			6.79	10.13
48**	1219			7.06	10.53
50**	1270			7.32	10.92
52**	1321			7.59	11.32
54**	1372			7.86	11.72
56**	1422			8.12	12.11
58**	1473			8.39	12.51
60**	1524			8.65	12.90

**Recommended for straight running belts only

Mesh Lateral Count	16 ga.		17 ga.	
	lb/ft ²	kg/m ²	lb/ft ²	kg/m ²
18	.65	.97	.49	.73
24	.85	1.26	.63	.95
30	1.05	1.56	.78	1.17
36	1.25	1.86	.94	1.40
42	1.45	2.16	1.09	1.62
48	1.65	2.46	1.24	1.85
54	1.85	2.77	1.39	2.08

Turn Ratio:

$$TR = ITR \div BW$$

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.

$$\text{Inside turn radius} = (\text{Turn Ratio}) \times (\text{Belt Width})$$

$$\text{Belt Weight} = (\text{Weight of Base Belt}) + (\text{Weight of Mesh Overlay})$$

Steps of Calculation:

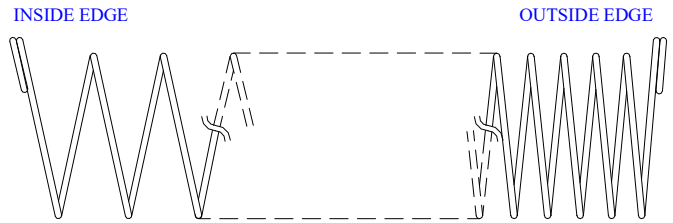
- ◆ Determine weight of Base Belt in lb/foot or kg/meter.
- ◆ Calculate Conveying Surface and convert to units of feet or meters. (Conveying Surface = Belt Width – 2-1/8 inch [54 mm])
- ◆ Calculate sq. feet [sq. meter] of mesh/foot [meter] of belt length.
- ◆ Use the Conveying Surface and Mesh Type to 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.

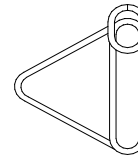
BELT OPTIONS**VARIABLE LOOP COUNT OVERLAY (PATENTED)**

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 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., B42/36-16-17 (balanced 42 mesh spacing outside edge progressing to 36 mesh spacing inside edge); or U48/36-16-16 (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 3/4 inch [19 mm].
- ◆ Available Options: height, spacing, location, shape, and number of lanes in belt.



Isosceles
Triangle

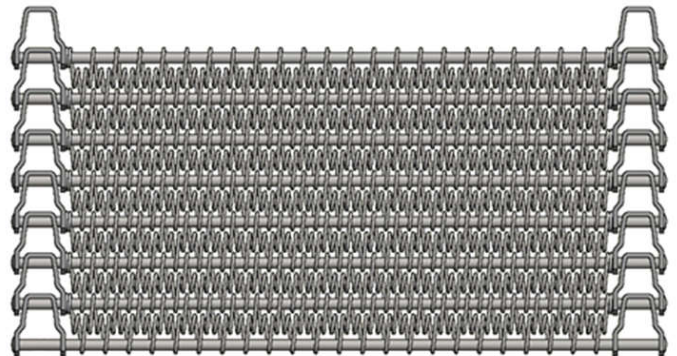
GUARD EDGES**Guard Edge Plates**

- Guard edge plates are assembled onto belt every pitch on either or both belt edges in a Shingle Style arrangement unless specified otherwise by customer.
- Height dimensions are inches [millimeters] above belt surface.
- Available in heights ranging from 1/2 in [12.7 mm] to 3 in [76.2 mm]

**HIGH DENSITY (TIGHT) MESH OVERLAY:**

This mesh consists of special spirals with intermediate, round loops added to allow for a tight mesh with minimally sized openings without adding substantial weight to the belt.

- **Used for straight run belts only.**
- Prefix 'H' for High Density Mesh.
Example: H60-16-16
- Unilateral weave construction – specify right or left hand spirals (right hand spirals by default)
- Available in 60, 72, 84, 96, and 106 lateral count meshes
- Available in Omni-Tough® and half-hard 16g and 17g wire
- Maximum belt width of 50 in [1270 mm]; minimum belt width of 18 in [457 mm]
- If woven guard edges, flights, or lane dividers are necessary, contact Ashworth Engineering.



SPROCKETS

Available Sprockets

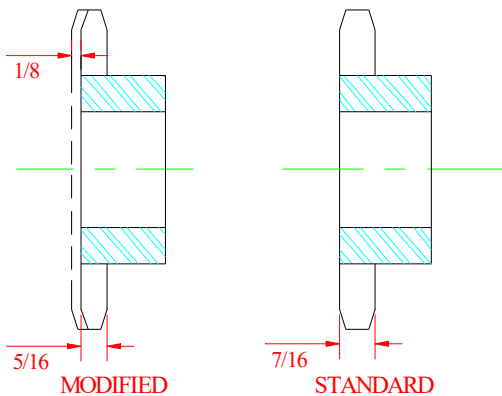
Size	Teeth	Material	Overall Diameter		Pitch Diameter		Hub Width		Hub Diameter		Bore			
			inch	mm	inch	mm	inch	mm	inch	mm	Minimum	Maximum*	inch	mm
#3	12	UHMW PE	3.34	84.8	2.90	73.6	1.00	25.4	2.25	57.2	1.00	25.4	1.00	25.4
#3	12	Stainless Steel T303	3.28	83.3	2.90	73.6	1.00	25.4	2.36	59.9	1.00	25.4	1.44	36.5
#3	12	C1141 Hardened Steel	3.40	86.4	2.90	73.6	1.00	25.4	2.25	57.2	1.00	25.4	1.38	35.0

NOTES:

- UHMWPE material type components have a 150°F [66°C] maximum operating temperature.
- Sprockets are available in stainless steel, plain steel, and UHMW PE.
- *Maximum bore sizes listed for each sprocket are based on minimum material above keyway as follows:
 UHMW: 1/2 inch [12.7 mm]
 Steel: 1/4 inch [6.4 mm]

#60 roller chain sprockets can be used with 3/4 Inch Pitch Omni-Grid 360 Weld belt 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.



#3-12 Tooth Stainless Steel Sprocket



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.

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

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

- 16 gage mesh thickness is .344 inches
- 17 gage mesh thickness is .314 inches
- For rod only use .192 inches

Example:
 Filler roll diameter for use with #3-12 tooth sprocket (mesh overlay B36-16-16)
 PD = 2.898 inches
 # = 12 teeth
 MT = .374 inches

$$\varnothing = 2.898 \times \cosine (180/12) - .374 = 2.456 \text{ inches}$$

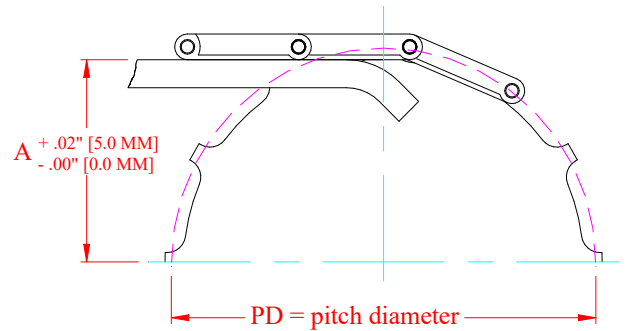
SUPPORT RAILS

As a rule, support rails are required, with maximum spacings of 18 inches [457.2 mm] on the load side and 24 inches [609.6 mm] on the 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

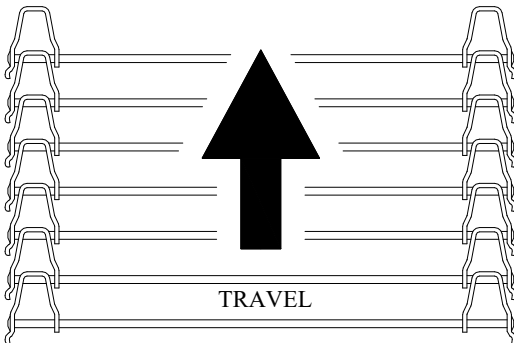
$A = \frac{1}{2} \times PD - 0.25 \text{ inch [6.4 mm]}$

- 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 = 1.08 inches [27.4 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 – 2-1/8 inch [54 mm]

Sample Calculation:

For a 36 inch wide belt

Total Conveying Surface = 36" – 2-1/8" = 33-7/8"

For a 920 mm wide belt

Total Conveying Surface = 920 – 54 = 866 mm

BELT TENSION

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

- 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; it is also affected by the speed or number of cycles it is exposed.

SYSTEM REQUIREMENTS

Cage bar spacing 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.**

PRODUCT LOADING REQUIREMENTS

All Omni-Grid 360 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:

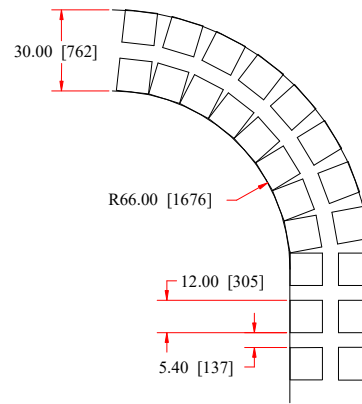
Let BW = Belt Width = 30 inch [762 mm]

Let IR = Inside Turn Radius = 66 inch [1676 mm]

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

Allowable Loading = $96/66 = 1.45$

Which means a minimum space of 45% of the product length is required between products.



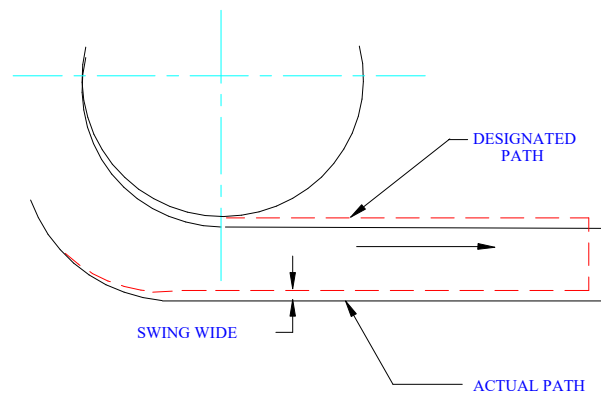
Product along inside edge moves closer together; no effect is observed on the product along outside edge.
Loading: 1 in 1.45 product lengths

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 phenomenon 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 that 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 prevent belt damage.
- Observe 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.
- 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 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.
- **Reference:** Product Technical Bulletin “Conveyor Design Guidelines.”

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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@ashwortheurope.co.uk