ASHWORTH ENGINEERING

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

PRODUCT TECHNICAL BULLETIN

REDUCED RADIUS OMNI-GRID®

Turn Curve belting consisting of assembly of links and rods capable of accommodating turns in a conveyor system. Mesh overlays are available to give greater product support.

TABLE OF CONTENTS	Page

DEFINING CHARACTERISTICS

Inside Turning Radius: 1.6 x Belt Width
Longitudinal Pitch: 1.08 inches [27.4 mm]
Turn Capability: Capable of turning either right or left
Standard Belt Widths: 6 inches [152 mm] through 40 inches [1016 mm]
Maximum Allowable Tension: 150 lbs [667 N] entering and exiting a turn, 300 lbs. in straight run.
Conveying Surface: Belt width - 2.6 inches [66 mm] less than nominal width
Method of Drive: Sprocket driven on both links
Basic Construction:

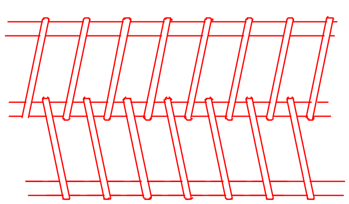
- Stainless Steel Materials
- 6 ga (0.192 inch [4.8 mm]) Connector Rod
- Wear Resistant® Links
- Heavy Duty Collapsing Links, Outside Edge
- Heavy Duty Reduced Radius Links, Inside Edge
- Omni-Tough® Mesh for Overlay

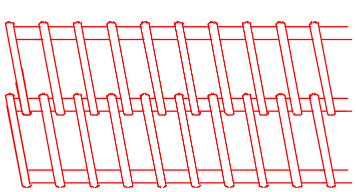
BELT SPECIFICATIONS

MESH OVERLAYS AVAILABLE

Omni-ToughÒ Wire: (Standard overlay for this product.)

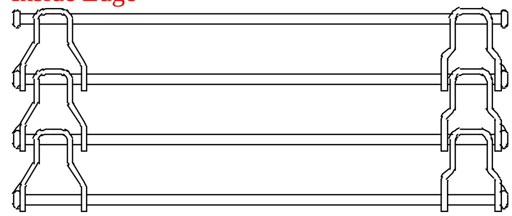
Overlay Type	Mesh Designation	Minimum Belt Width in [mm]	Maximum Belt Width in [mm]
BALANCED WEAVE	*B12-12-16[H]	12 [305]	40 [1016]
	*B18-12-16[H]	12 [305]	40 [1016]
	*B18-12-16	12 [305]	40 [1016]
	*B18-12-17	12 [305]	40 [1016]
	B24-12-16	6 [152]	40 [1016]
	B24-12-17	6 [152]	40 [1016]
	B30-12-16	6 [152]	40 [1016]
	B30-12-17	6 [152]	40 [1016]
	B36-12-16	6 [152]	40 [1016]
	B36-12-17	6 [152]	40 [1016]
	B42-12-16	6 [152]	40 [1016]
	B42-12-17	6 [152]	40 [1016]
	B48-12-16[H]	6 [152]	40 [1016]
	B48-12-17[H]	6 [152]	40 [1016]
UNILATERAL WEAVE	U36-12-16	6 [152]	40 [1016]
	U36-12-17	6 [152]	40 [1016]
	U42-12-17	6 [152]	40 [1016]
	U48-12-17	6 [152]	40 [1016]



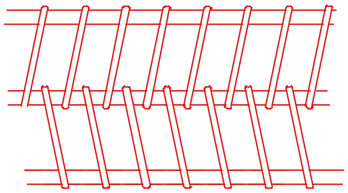
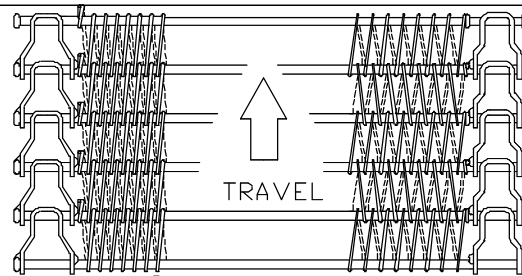


MESH OVERLAY:
Designation:
B X-Y-Z and U X-Y-Z
First Digit: B = Balanced Weave; U = Unilateral Weave
X: First Number: No. of Loops per Foot of Width
Y: Second Number(s): No. of Spirals per Foot of Length (12 for 1in. pitch)
Z: Third Number: Wire Gauge
Examples:
B30-12-17
U42-12-16

Sizes: 14 through 18 ga. (.080 in. [2.0 mm]) through .048 in. [1.2 mm] diameter) **Material:** annealed or high tensile spring wire (Omni-Tough®)



REDUCED RADIUS OMNI-GRID®

MESH OVERLAYS AVAILABLE				
Omni-ToughÒ Wire: (Standard overlay for this product.)				
Annealed Wire				
BALANCED WEAVE 	*B18-12-14	12 [305]	40 [1016]	
	*B18-12-18	12 [305]	40 [1016]	
	B30-12-18	6 [152]	40 [1016]	
	B36-12-14	6 [152]	40 [1016]	
	B48-12-14	6 [152]	40 [1016]	
	B48-12-18	6 [152]	40 [1016]	
	B60-12-18	6 [152]	40 [1016]	
				Omni-Tough® Overlay/Annealed Wire Overlay

NOTES:
*Minimum width of 12 inches (304.8mm), overall.
[H] Available in half hard wire only not Omni-Tough.

- The first set of numbers in the mesh designation indicates the number of spiral loops per foot of width.
- The second number specifies the number of pitches per linear foot.
- The last number is the wire gauge of the mesh.

BELT WEIGHT

MESH WEIGHTS

Mesh Lateral Count	**18 ga .0475 in. [*1.2 mm*]**		**17 ga .054 in. [*1.4 mm*]**		**16 ga .0625 in. [*1.6 mm*]**		**14 ga .080 in. [*2.0 mm*]**	
	lbs/ft²	***kgs/m²***	**lbs/ft²**	***kgs/m²***	**lbs/ft²**	***kgs/m²***	**lbs/ft²**	***kgs/m²***
12	--	--	--	--	.38	*1.9*	--	--
18	.31	*1.5*	.42	*2.1*	.55	*2.7*	.94	*4.6*
24	--	--	.56	*2.7*	.74	*3.6*	--	--
30	.51	*2.5*	.68	*3.3*	.93	*4.5*	--	--
36	--	--	.82	*4.0*	1.08	*5.3*	1.84	*9.0*
42	--	--	.95	*4.6*	1.26	*6.2*	--	--
48	.82	*4.0*	1.08	*5.3*	1.44	*7.0*	2.44	*11.9*
60	1.02	*5.0*	--	--	--	--	--	--

OMNI-GRID BELT DATA

BELT WIDTH		**TURN RADIUS**		**BELT BASE WEIGHT**	
in.	***mm***	**in.**	***mm***	**lbs/ft**	***kgs/m***
6	*152*	9.6	*244*	1.37	*2.04*
8	*203*	12.8	*325*	1.56	*2.32*
10	*254*	16.0	*406*	1.74	*2.60*
12	*305*	19.2	*488*	1.93	*2.88*
14	*356*	22.4	*569*	2.12	*3.15*
16	*406*	25.6	*650*	2.30	*3.43*
18	*457*	28.8	*732*	2.49	*3.71*
20	*508*	32.0	*813*	2.68	*3.99*
22	*559*	35.2	*894*	2.86	*4.27*
24	*610*	38.4	*975*	3.05	*4.54*
26	*660*	41.6	*1057*	3.24	*4.82*
28	*711*	44.8	*1138*	3.42	*5.10*
30	*762*	48.0	*1219*	3.61	*5.38*
32	*813*	51.2	*1301*	3.79	*5.65*
34	*864*	54.4	*1382*	3.98	*5.93*
36	*914*	57.6	*1463*	4.17	*6.21*
38	*965*	60.8	*1544*	4.35	*6.49*
40	*1016*	64.0	*1626*	4.54	*6.77*

Consult out Product Engineers for approval of wider belt widths and concerns regarding belt tension or turn ratio.

Calculating total belt weight:

Conveying Surface = belt width – 2.60 inches [66 mm]

Belt Weight = (Weight of Base Belt) + (Weight of Mesh Overlay)

Steps of Calculation:

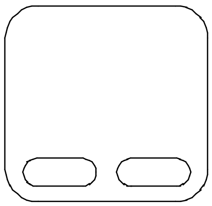
- Calculate in units of weight per unit length – lbs/feet or kgs/meter.
- Determine weight of base belt from chart at left
- If belt has a mesh overlay, Calculate Conveying Surface of Inside Section and Conveying Surface of Outside Section. Convert to units of feet or meters.
- If applicable, determine weight of mesh on inside section and weight of mesh on outside section see mesh chart under standard options.
- Sum the above weights to obtain the total belt weight.
- Multiply calculated value by belt length for total belt weight.

Sample Calculation:
For a 36" wide belt with and an overlay of B36-12-16 (reference above calculations for conveying surface),

Belt Weight = 4.17 lbs/ft + (16.117 in)(1 ft/12 in)(1.12 lbs/sq.ft)
+ (16.195 in)(1 ft/12 in)(1.49 lbs/sq. ft)
Belt Weight = 7.21 lbs/ft.

BELT OPTIONS

DESCRIPTION
GUARD EDGE PLATE

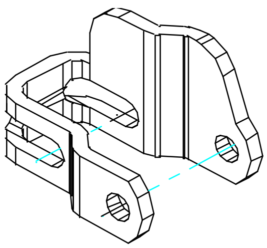


PURPOSE
Plates assembled between links and mesh to prevent product from falling off belt. Guard edge plates are tack welded to links as needed to secure position.

AVAILABILITY
Outside belt edge only.

Height Above Conveying Surface:
0.50 inch [12.7 mm]
0.75 inch [19.1 mm]
1.00 inch [25.4 mm]

INTEGRAL GUARD EDGE

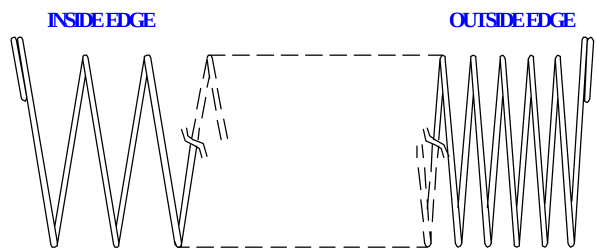


Edge of link raised to prevent product from falling off of belt. Integral guard edge links offer improved cleanup and sanitation over guard edge plates. ***Outside belt edge only.***

Height Above Conveying Surface
0.75 inch [19.1 mm]
1.00 inch [25.4 mm]
1.50 inches [38.1 mm]
2.00 inches [50.8 mm]

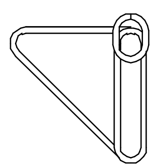
Raised edge may be on the inside or outside edge of the link.

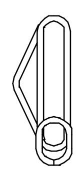
OMNI-TOUGH®
- Provides a flatter mesh surface with a high resilience to impact.
- Available for most belt widths in most mesh configurations. Available in 16 and 17 ga. only.

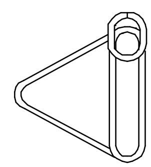


VARIABLE LOOP COUNT
(Patent No. 6,129,205)
- When belt collapses on inside edge to accommodate a turn, product support is maximized and wire overlay does not overlap.
- Mesh count is more open on the inside belt edge and progressively gets tighter across the width of the belt.
- Available in Omni-Tough® only
- Turn direction must be specified.
- Mesh designated as follows: B42/24-12-17 where belt has an inside mesh of 24 progressing to 42 spirals/foot.

SPECIAL SPIRALS
- Available in Omni-Tough® only
- One or more spirals on conveying surface is raised
- Used as guard edges, lane dividers and flights
- Maximum height equal to belt pitch
- Available Options: height, spacing, location, shape and number of lanes in belt.


Right Triangle


Isosceles Triangle


Equilateral Triangle

SPROCKETS

Standard UHMW sprockets for 1.08 inch pitch belts.

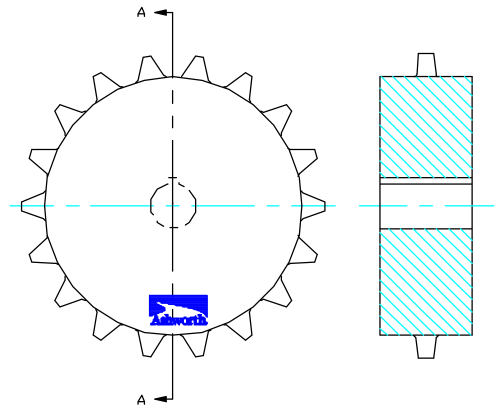
No. of Teeth	Overall Diameter		Pitch Diameter		Flange Diameter		Flange Width		Hub Width		Hub Diameter & Type		Bore Minimum		Bore Maximum	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	Mm
9	3.53	89.7	3.16	80.2	--	--	--	--	2.00	51.0	2.53	64.3	.813	20.6	1.44	36.5
13	4.90	124.5	4.53	115.1	--	--	--	--	2.00	50.8	3.90	99.1	1.00	25.4	2.19	55.6
18	6.65	168.9	6.24	158.5	--	--	--	--	2.00	50.8	5.65	143.5	1.00	25.4	3.75	95.3
23	8.39	213.0	7.96	202.2	--	--	--	--	2.00	50.8	7.39	187.6	1.00	25.4	4.00	101.6
31	11.16	283.5	10.72	272.3	--	--	--	--	2.00	50.8	101.6	258.1	1.00	25.4	7.13	183.0
37	13.24	336.2	12.73	323.5	--	--	--	--	2.00	50.8	12.24	310.8	1.00	25.4	8.94	277.0

Steel sprockets for 1.08 inch pitch belts.

No. of Teeth	Overall Diameter		Pitch Diameter		Flange Diameter		Flange Width		Hub Width		Hub Diameter & Type		Bore Minimum		Bore Maximum	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	Mm
13	4.80	124.5	4.53	115.1	--	--	--	--	2.00	51.0	3.90	99.1	1.00	25.4	2.19	55.6

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.

18 TOOTH UHMW PE SPROCKET



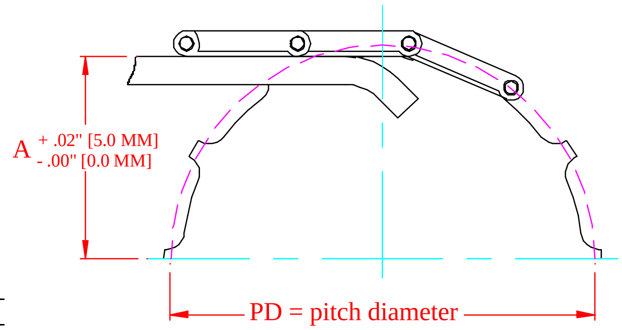
SUPPORT

Supports are required on a maximum of 6 inches apart on load side and 12 inches maximum on return side. Rollers may also be used.
NOTE: For heavier load applications, additional support rollers may be required.

WEARSTRIP PLACEMENT

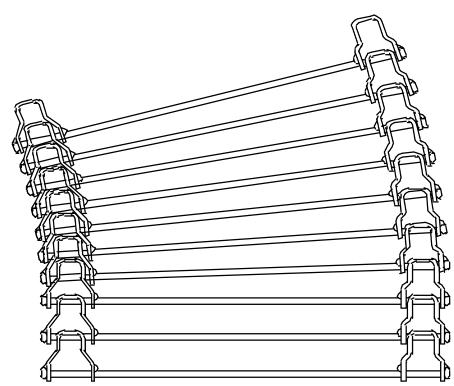
A = ½ X PD – 0.25 inch [6.4 mm]

- 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

Coefficient of Friction	Type of Support Structure
.15	Nylon-12 under overlay (unlubricated)
.15	Acetal under overlay (unlubricated)
.10	Acetal under overlay (lubricated)
.15	Steel support rails (lubricated)
.20	Steel support rails (unlubricated)
.20	UHMW under links (unlubricated)



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.

Belt Type	Tension Link	Turn Radius to Tension Link
1 inch Pitch Omni-Grid	Outside Link	ITR + Belt Width

BELT WEIGHT

Belt Weight = (Weight of Base Belt) + (Weight of Mesh Overlay)

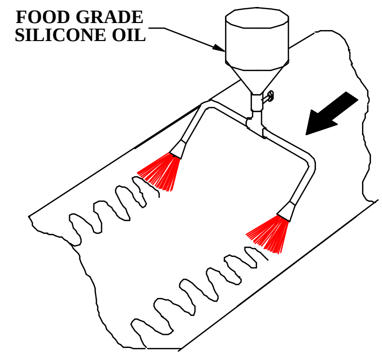
STEPS OF CALCULATION:
- Determine weight of base belt in lbs./feet or kgs/meter.
- Calculate conveying surface and convert to units of feet or meters.
- Use the conveying surface and mesh type to determine weight of mesh in lbs./feet or kgs/meter.
- Add weight of base belt to weight of mesh overlay, lbs./feet or kgs/meter
- Multiply calculated value by belt length (feet or meters) for total belt weight in units of lbs. or kgs.

BELT TENSION

Estimated belt tension in a straight run:

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

Where		Metric Units:
	T = Belt Tension (lbs. force/linear ft of belt width)	[newtons]
	W = Belt Weight (lbs./linear ft.)	[kg/linear meter]
	W = Total Weight = Belt Weight + Product Weight (lbs./linear ft)	[kg/linear meter]
	L = Conveyor Length or center to center of terminals (feet)	[meters]
	H = Rise of incline Conveyor {+ if incline, - if decline} (feet)	[meters]
	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
	C = Force Conversion Factor Imperial: 1.0 Metric: 9.8	



POSSIBLE SYSTEM TENSION INDICATORS
1. DRIVE MOTOR AMP. READING
2. TAKE-UP ROLL POSITION
3. DIRECT MEASUREMENT

SYSTEM REQUIREMENTS

LUBRICATION

Lubrication with silicone may be necessary on the belt support rails in some cases. The best method of application is by brush, fed from a drip reservoir, brushed onto the bottom in the return so that the belt applies the lubricant to the rails on the load side. Apply lubricant until the take-up rises or the drive amp reading drops to set values determined by testing.

Typically a customer uses 8 ounces per week on a system employing 1500 feet of belt in a 24 hour a day operation. As you can see, this is a very small amount of oil and dripping should not be a problem.

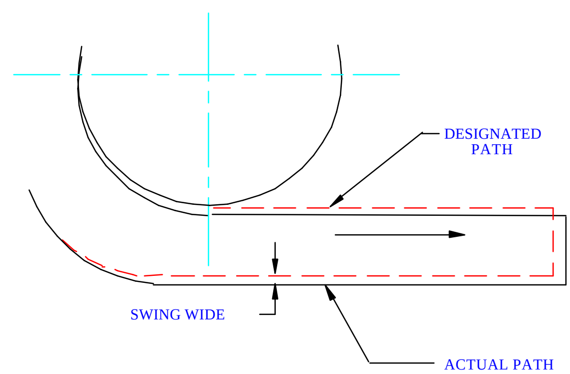
SWING WIDE

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.



Reference: *Product Technical Bulletin "Conveyor Design Guidelines".*

Ashworth Jonge Poerink bv
Borne, The Netherlands
Tel: +31-74-265-6565
Fax: +31-74-266-1134
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.
Kingswinford, United Kingdom
Tel: +44-1384-355000
Fax: +44-1384-355001
Email: ashworth.europe@ukgateway.net