PRODUCT TECHNICAL BULLETIN

OMNI-FLEX® & MEGA-FLEX® 125

FLAT WIRE TURN CURVE BELTING

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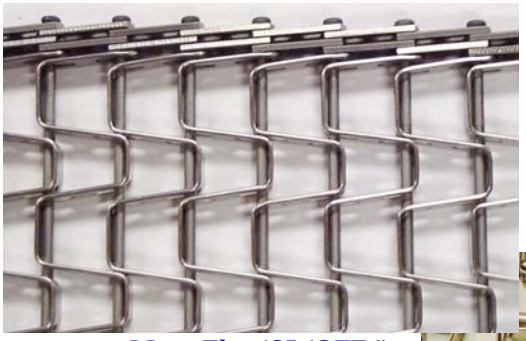
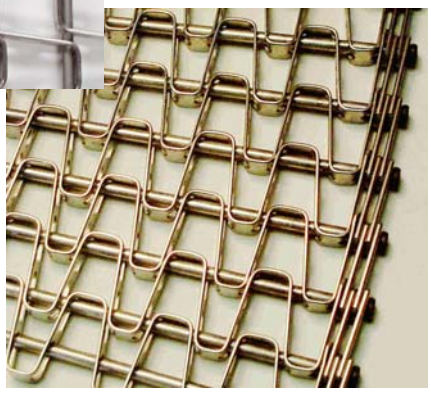


Mega-Flex 125 (OFE4)



Omni-Flex (OFE1)

DEFINING CHARACTERISTICS

Flat wire strip is:

- Punched with slotted openings
- Formed into pickets with designated opening size
- Pickets are assembled together with connector rods
- Assembly is finished with smooth hot upset
- Capable of both left and right turns

- **Designation:** OFE1-1 x 1, OFE2-1/2 x 1, OFE3-1/3 x 1, OFE4-1 x 1-1/4
- **Longitudinal Pitch:** 1.084 inches [27.53 mm], for OFE4 1.244 inches [31.6 mm]
- **Minimum Inside Turn Radius:** Without bar links 1.8 x belt width (exception OFE3), with bar links 2.0 x belt, for OFE4 2.2 x belt width
- **Belt Widths:** For OFE1, OFE2, OFE3 6 inches through 48 inches [152 mm through 1219 mm], for OFE4 12 inches [305 mm] through 54 inches [1350 mm]. Consult our Product Engineers for approval of wider belt widths and concerns regarding belt strength.
- **Conveying Surface:** Overall belt width minus 1/4 inch [6.4 mm]
- **Basic Construction:** Stainless Steel construction

  Omni-Flex
  Rods: 6 gauge (.192 in [4.9 mm]) high tensile
  Bar Links: heavy duty collapsing .090 inch [2.3 mm] thick on inside and outside edge
  Pickets: for OFE1 & OFE2 1/2 [12.7 mm] x .062 [1.58 mm] flat wire strip, for OFE3 1/2 [12.7 mm] x .046 [1.17 mm] flat wire strip
  Mega-Flex 125
  Rods: 5 gauge (.207 in [5.3 mm]) high tensile
  Bar Links: heavy duty collapsing .125 inch [3.2 mm] thick on inside and outside edge
  Pickets: 5/8 [15.9 mm] x .072 [1.83 mm] flat wire strip

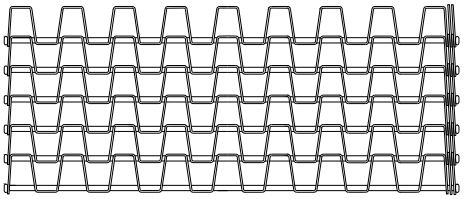
BELT SPECIFICATIONS

- **Maximum Allowable Tension:** For OFE1, OFE2, OFE3 300 lb [1330 Newtons] entering and exiting a turn, for OFE4 500 lbs [2224 N] entering and exiting a turn, or 450 lbs. [2002N] for belts greater than 48 inches [1219 mm]. For all Flex belts (OFE1, OFE2, OFE3, OFE4) the belt tension is concentrated at the outer edge of the belt through a turn. The construction of the belt's outer edge determines the maximum allowable tension. Reinforcing bar links are standard to provide for higher tension. The bar links carry the belt tension, relieving the pickets of stress.
  Allowable tension per foot of belt width for drum driven belt applications. When sprocket drive is used, the number of sprockets and other factors must be considered in the determination of the maximum allowable tension, consult our Engineering Department.

  NOTE: Maximum allowable tension is only one factor influencing expected useful life of all Flex belting. Field experience shows that the most common cause of failure in Flex belts is caused by repeatedly applying tension onto the belt pickets creating wear. **The rate of wear is dependent upon the environment (cleanliness, temperature, etc.), speed of the conveyor, and the belt tension.**

- **Method of Drive:** For OFE1, OFE2, OFE3 positive drive with matching sprockets spaced at a maximum of 6 inch [125 mm] apart or friction driven with 12 inch [305mm] diameter flat faced drum; for OFE4 Positive drive with matching sprockets spaced at a maximum of 5 inches [127 mm] apart or friction driven with a minimum 14 inches [356 mm] diameter flat faced drum

- **Edge Support:** Drive tensions greater than 300 lbs. require that both edges be supported with toothless idlers
- **Swing Wide:** Allowance 1 inch [25.4 mm] for OFE1, OFE2, OFE3 and 1-3/4 inch [44.5 mm] for OFE4 per foot of belt width should be made for swing-wide



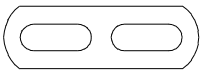
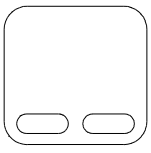
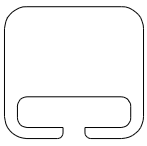
E1 DOUBLE BAR LINKS ONE EDGE

BELT WEIGHT

Standard construction w/double bar links on both edges													
Nominal Width		Weight per unit of length (OFE1)		Weight per unit of length (OFE2)		Weight per unit of length (OFE3)		Inside Turn Radius (OFE1, OFE2, OFE3)		Weight per unit of length (OFE4)		Inside Turn Radius (OFE4)	
Inches	*mm*	lb/ft	*kg/m*	lb/ft	*kg/m*	lb/ft	*kg/m*	Inches	*mm*	lb/ft	*kg/m*	inches	*mm*
6	*152*	1.94	*2.89*	2.04	*3.04*	2.03	*3.03*	12	*305*				
8	*203*	2.46	*3.66*	2.60	*3.88*	2.58	*3.85*	16	*406*				
10	*254*	2.97	*4.43*	3.16	*4.71*	3.14	*4.68*	20	*508*				
12	*305*	3.49	*5.20*	3.72	*5.54*	3.69	*5.50*	24	*588*	4.44	*6.61*	26.40	*671.0*
14	*356*	4.01	*5.97*	4.28	*6.37*	4.24	*6.32*	28	*686*	5.10	*7.60*	30.80	*782.3*
16	*406*	4.52	*6.74*	4.84	*7.20*	4.80	*7.15*	32	*813*	5.77	*8.60*	35.20	*894.1*
18	*457*	5.04	*7.51*	5.39	*8.04*	5.35	*7.97*	36	*882*	6.44	*9.59*	39.60	*1006.0*
20	*508*	5.56	*8.28*	5.95	*8.87*	5.90	*8.80*	40	*980*	7.10	*10.58*	44.00	*1118.0*
22	*559*	6.07	*9.05*	6.51	*9.70*	6.46	*9.62*	44	*1078*	7.77	*11.58*	48.40	*1229.4*
24	*610*	6.59	*8.82*	7.07	*10.53*	7.01	*10.45*	48	*1176*	8.44	*12.57*	52.80	*1341.1*
26	*660*	7.11	*10.59*	7.63	*11.36*	7.56	*11.27*	52	*1274*	9.10	*13.56*	57.20	*1452.9*
28	*711*	7.62	*11.36*	8.19	*12.20*	8.12	*12.10*	56	*1372*	9.77	*14.56*	61.60	*1564.6*
30	*762*	8.14	*12.13*	8.74	*13.03*	8.67	*12.92*	60	*1470*	10.44	*15.55*	66.00	*1676.4*
32	*813*	8.66	*12.90*	9.30	*13.86*	9.22	*13.74*	64	*1568*	11.10	*16.54*	70.40	*1788.2*
34	*864*	9.17	*13.67*	9.86	*14.69*	9.78	*14.57*	68	*1666*	11.77	*17.54*	74.80	*1900.0*
36	*914*	9.69	*14.44*	10.42	*15.52*	10.33	*15.39*	72	*1764*	12.44	*18.53*	79.20	*2012.0*
38	*965*	10.21	*15.21*	10.98	*16.36*	10.88	*16.22*	76	*1862*	13.10	*19.52*	83.60	*2123.4*
40	*1016*	10.72	*15.98*	11.54	*17.19*	11.44	*17.04*	80	*2032*	13.77	*20.52*	88.00	*2235.2*
42	*1067*	11.24	*16.75*	12.09	*18.02*	11.99	*17.87*	84	*2058*	14.44	*21.51*	92.40	*2347.0*
44	*1118*	11.76	*17.52*	12.65	*18.85*	12.54	*18.69*	88	*2156*	15.10	*22.50*	96.80	*2458.7*
46	*1168*	12.27	*18.29*	13.21	*19.68*	13.10	*19.52*	92	*2254*	15.77	*23.50*	101.20	*2570.5*
48	*1219*	12.79	*19.06*	13.77	*20.52*	13.65	*20.34*	96	*2352*	16.44	*24.99*	105.60	*2682.2*
50	*1270*	13.31	*19.83*	14.33	*21.35*	14.20	*21.16*	**Straight Run Only**		17.10	*25.48*	110.00	*2794.0*
52	*1321*	13.82	*20.60*	14.89	*22.18*	14.76	*21.99*			17.77	*26.48*	114.40	*2905.8*
54	*1372*	14.34	*21.36*	15.44	*23.01*	15.31	*22.81*			18.44	*27.47*	118.80	*3017.5*

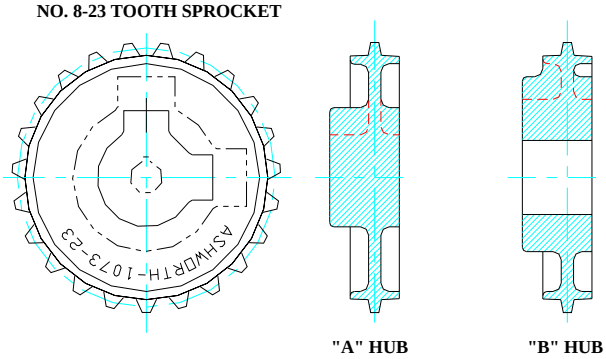
Consult our Product Engineers for approval of wider belt widths and concerns regarding belt or turn ratio

BELT OPTIONS

DESCRIPTION	PURPOSE	AVAILABILITY
BAR LINKS 	Assembled onto belt edges to carry belt tension. Reduce picket breakage and increase belt life	◆ Heavy duty ◆ Double row ◆ One or both edges of belt
GUARD EDGES 	Plates assembled onto belt edges to prevent product from falling off. Replaces one bar link, if present.	Height above conveying surface: 0.50 inch [12.7 mm] 0.75 inch [19.1 mm] 1.00 inch [25.4 mm] 1.50 inch [38.1 mm] 2.00 inch [50.8 mm]
LANE DIVIDERS 	Detachable plates assembled onto belt's width to locate product.	Height above conveying surface: 0.50 inch [12.7 mm] 0.75 inch [19.1 mm] 1.00 inch [25.4 mm] 1.50 inch [38.1 mm] 2.00 inch [50.8 mm] Maximum number of lane dividers = Belt Width/9 inches [228.6 mm]. *Consult our Product Engineers for approval of more lane dividers.* ***Available for OFE1 and OFE2 only.***

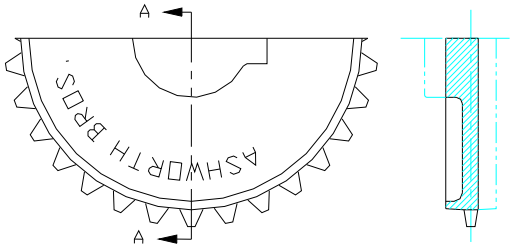
SPROCKETS

NO. 8-23 TOOTH SPROCKET

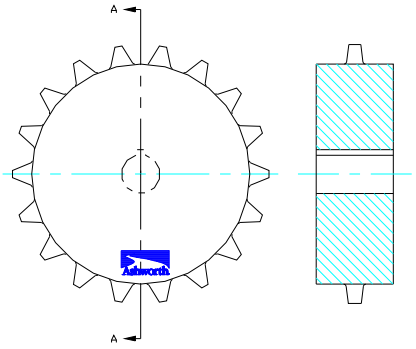


"A" HUB "B" HUB

MODIFIED SPROCKET FOR NARROW HUB WIDTH



18 TOOTH UHMW PE SPROCKET



NOTES:

- *Maximum bores listed provide adequate material thickness for standard Keyway. Specify special sizes to be used when necessary.*
- ***Narrow Hub: Available on all sprockets when sprockets are required in every other opening (odd-numbered for drive, even-numbered for idle), sprocket width must be reduced. Standard width is 1-1/16 inch [27.0 mm] unless otherwise requested.***

Cast tooth sprockets for heavy duty Omni-Flex (OFE1, OFE2, and OFE3) 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
18	6.65	168.9	6.24	158.6	5.64	143.3	1.50	38.1	2.13	54.0	3.63 – A	92.1	.75	19.1	2.50	63.5
											4.06 – B	103.2	2.50	63.5	3.50	88.9
23	8.39	213.1	7.97	202.4	7.39	187.7	1.50	38.1	2.13	54.1	3.00 – A	76.2	1.00	25.4	2.50	63.5
											5.00 – B	127.0	2.50	63.5	4.50	114.3

UHMWPE sprockets for Omni-Flex (OFE1, OFE2, and OFE3) 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	4.90	124.5	4.53	115.1	3.90	99.1	2.00	50.8	--	--	--	--	1.00	25.4	2.19	55.6
18	6.65	168.9	6.24	158.5	5.65	143.5	2.00	50.8	--	--	--	--	1.00	25.4	3.75	95.3
23	8.39	213.0	7.96	202.2	7.39	187.6	2.00	50.8	--	--	--	--	1.00	25.4	4.94	125.4
31	11.16	283.5	10.72	272.3	10.16	258.1	2.00	50.8	--	--	--	--	1.00	25.4	7.13	183.0
37	12.97	329.4	12.68	322.1	12.22	310.4	2.00	50.8	--	--	--	--	1.00	25.4	8.94	277.0

UHMWPE sprockets for Mega-Flex 125 (OFE4) belts.

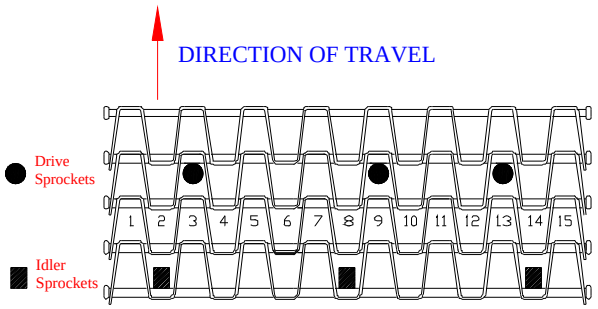
No. of Teeth	Overall Diameter		Pitch Diameter		Flange Diameter		Flange Width		Hub Width		Hub Diameter & Type		Bore Minimum		Bore Maximum	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
18	7.73	196.4	7.16	182.0	6.48	164.6	2.0	51.0	--	--	--	--	1.00	25.4	4.23	107.5

NOTES:

- *UHMWPE material type components have a 150°F [66°C] maximum operating temperature..*
- *Maximum bore sizes listed for UHMW material is based on 1/2 inch [12.7 mm] of material above keyway.*

LOCATION OF DRIVE AND IDLER SPROCKETS

Proper location and placement of the sprockets is important as it results in smoother belt operation, reduced wear on the sprockets and better distribution of belt wear. Space sprockets evenly along drive and idler shafts insuring that the outside drive sprockets are located exactly three mesh openings from each belt edge. (Assists belt in resisting fatigue fractures by providing two load-carrying legs.) Drive sprockets are located in odd numbered mesh openings. Idler sprockets are located in even numbered mesh openings insuring outside sprockets are located in the second openings from each belt edge. The hubs of all sprockets should be facing in the same direction on the same shaft. Teeth of the sprockets should always drive against the round connector. This will insure that each drive sprocket tooth will be contacting the round connecting wire and sharing in its part of the load.



SPROCKET DRIVE

Sprockets provide Positive drive of the flat wire belt design. Sprockets will, to some extent, tend to keep the belt properly aligned; however, sprocket drive should not be selected as a "cure all" for belt control problems. True belt travel for all belt designs is a combination of belt manufacture to close tolerances plus correct conveyor design and proper belt installation.

QUANTITY OF DRIVE SPROCKETS

To determine the required number of drive sprockets:

#6, 18 tooth for Omni-Flex

STEP 1. Calculate number of sprockets assuming maximum allowable spacing of 6 inches [152 mm]. for E4 5 inches [127 mm].

Round up to nearest whole number. If sprockets are spaced greater than 6 inches [152.4 mm] on the crankshaft, the round connectors and may render the belt unserviceable.

For all Omni-Flex belts, the recommended number of sprockets:

(BW/6) + 1, or [(BW/152 mm) + 1]

STEP 2. Calculate number of sprockets to carry belt tension. Round up to nearest whole number.

Let BS = Belt Speed, feet per minute [meters per minute]
BT = Belt Tension at drive shaft, pounds [Newtons]

STEP 3. Larger of the two calculated values is the recommended number of drive sprockets.

QUANTITY OF TAKE UP AND IDLER SPROCKETS

Calculate number of sprockets using the maximum allowable spacing. Round up to nearest whole number. If sprockets are not spaced correctly on the crankshaft and positioned correctly on the round connectors, this may render the belt unserviceable.

NOTE: Consult our Product Engineers for approval of sprocket spacing according to belt width and belt tension.

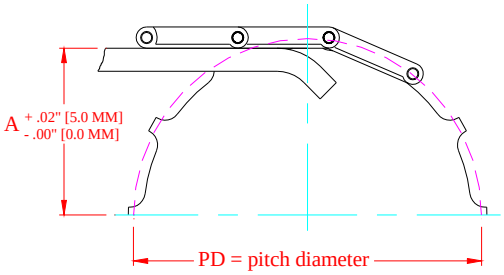
For all Omni-Flex the minimum recommended number of sprockets:

(BW/6) + 1, or [(BW/152 mm) + 1]

	Belt Speed (BS)		
Belt Type (BT)	BS<20 [6.1]	20<BS<75 [6.1]<BS<[22.9]	BS>75 [22.9]
Heavy Duty Omni-Flex	BT/100 [BT/445]	BT/50 [BT/222]	BT/50 [BT/222]

WEARSTRIP PLACEMENT

A = ½ X PD – {.313 inch [8.0 mm] Mega-Flex 125 or .250 inch [6.4 mm] Heavy Duty}



- 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 = 1.084 inches [27.5 mm] for Omni-Flex
  = 1.244 inches [31.6 mm] for Mega-Flex

ENGINEERING CALCULATIONS

TURN RATIO

Turn Ratio = Inside Turn Radius ÷ Belt Width

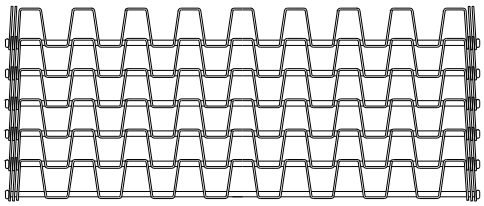
Turn Ratio is dimensionless. Inside Turn Radius and Belt Width must both be in same unit of measurement, either both in units of inches or both in units of millimeters.

RADIUS WEIGHT – Spiral Applications only (Belt Tension)

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

where:

RW	= Radius Weight or Belt Tension
R	= system radius (i.e. radius to tension link)
WB	= weight of belt per unit of length
WL	= weight of product per unit of length
fr	= friction between belt and support rails
fc	= friction between belt and cage bars



E1 WITH DOUBLE BAR LINKS BOTH EDGES

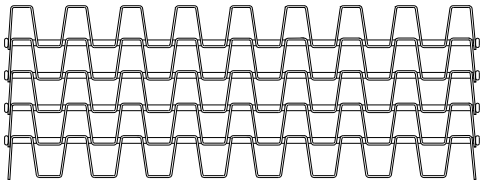
Steps of Calculation: (Calculate in units of lb.-force or Newtons)

- Measure Inside Turn Radius. Convert to units of feet or meters.
- Note Belt Weight. Unit of measure is lb./ft or kgs/meter.
- Measure Product Weight. Unit of measure is lb./ft or kgs/meter.
- Determine friction between belt and support rails.
- Determine friction between belt and cage bars.
- Substitute values into equation and calculate.

Friction Factors By Product Type and UHMW Wear Strips	
PRODUCT	***fr***
Clean and/or Packaged Product	0.20
Breaded or Flour Based Product	0.27
Greasy, Fried Product below 32°F	0.30
Sticky, Glazed, Sugar Based Product	0.35

- Coefficient of Friction (*fr*) with Stainless Steel Belt Supports = 0.40
- Coefficient of Friction (*fr*) with Free Turning Rollers Belt Supports = 0.10

Friction Factors By Temperature and Mild Steel Belt Supports	
TEMPERATURE °F [°C]	***fr***
to 1000 [538]	0.35
1001 to 1200 [538 to 649]	0.37
1201 to 1400 [649 to 760]	0.40
1401 to 1600 [760 to 871]	0.44



E1 OMNI-FLEX® WITHOUT BAR LINKS
For straight run applications only.

SYSTEM REQUIREMENTS

To Reduce Belt Tension and Wear:

- 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 belts inside edge. (This applies to spirals not fixed turns.)
- Replace worn wear strips on supports and on inside edge of turns.
- Remove weight from take-up loop. Align sprockets properly and insure that they do not migrate on shaft.
- Load belt so that belt weight, product loading, friction factors, and belt path does not cause belt tension to exceed maximum allowable limit.
- Decrease belt speed.

Consult our Product Engineers for other options specific for your application and system design.

PRODUCT LOADING REQUIREMENTS

All Omni-Flex 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.

FRICTION DRIVE

A friction drive over lagged flat-faced pulleys is recommended for heavy loads and long belt lengths. Under these conditions, the use of a lagged drum drive permits the full utilization of the allowable working tension of the belt. This condition, with sprocket drive is attainable only the use of a specially designed sprocket having teeth engaging every mesh of the belt across the full belt width.
The idler pulley should provide support for the full belt width. Terminal pulleys should be adjustable.

- GEOMETRY - Use flat faced circular drums, crowned are unacceptable.
- SIZE - Use a minimum 12 in. [305 mm] diameter for 1 in. [25 mm] pitch belts and a 7.50 in. [190.5 mm] for True ½ x ½ pitch belts.
- LAGGING - Sometimes drums are covered with urethane to increase friction between belt and drum. This covering is lagging.

POSITIVE DRIVE – TYPICAL

- **TYPES**
  1) Sprockets
  2) Waffle Roll - a continuous across belt width toothed member - special order.
- **SIZE** - Overall diameters range from 4-1/8 in. [104.8 mm] to 14-11/16 [373.1 mm].
- **HUBS** - Must be oriented in the same direction to keep teeth perfectly lined up and distribute stress evenly across belt width.
- **QUANTITY** - Determined for belt tension, but always a maximum spacing of 6 inches. [152 mm].
  Sprockets for heavy duty belts are rated for 50 lbs [222 N] maximum pull each.

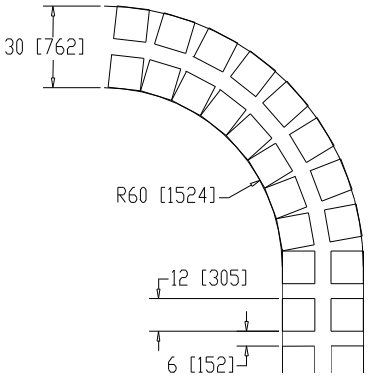
  Example:

  Heavy duty sprockets for 36 inch [914 mm] wide belt (E2), having a calculated tension of 450 lbs [2002 N].
  450/50 = 9 or 36 /6 maximum spacing = 6
  Use the larger of the two.
  ∴ 9 sprockets recommended

Omni-Flex Belts

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.



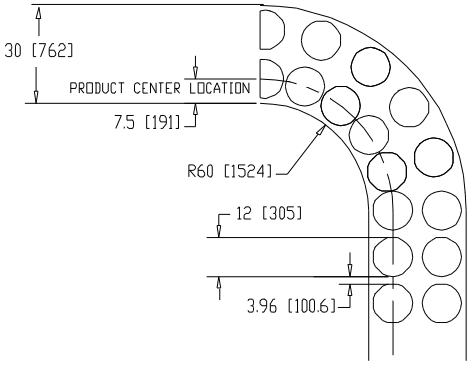
Allowable Loading per length of belt = Radius to Tension Link/Inside Turn Radius
Sample Calculation:
Let BW = Belt Width = 30 in. [762 mm]
Let IR = Inside Turn Radius = 60 in [1524mm]

Radius to Tension Link = IR + BW
= 30[762 mm] + 60[1524]
= 90 in [2286 mm]

Allowable Loading = 90 in/60 in [2286/1524] = 1.50
meaning, one product length per 1.50 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.



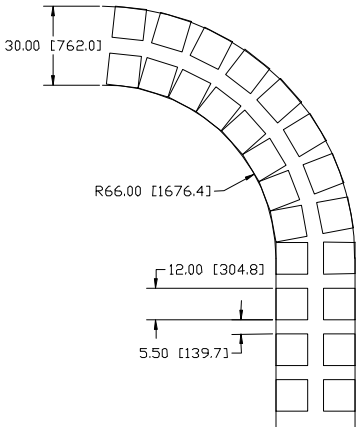
Allowable Loading per length of belt = Radius to Tension Link/Radius to Product Center
Sample Calculation:
Let BW = Belt Width = 30 in. [762 mm]
Let IR = Inside Turn Radius = 60 inches [1524 mm]
Let PC = Product Center = 7.5 inches [191 mm]
Radius to Tension Link = IR + BW
= 30 [762] + 60 [1524]
= 90 in [2286 mm]
Radius to Product Center = IR + PC
= 60 [1524] + 7.5 [191]
= 67.5 in [1715 mm]

Allowable Loading = 90 in/67.5 in [2286/1715] = 1.33
meaning, one product length per 1.33 lengths of belt.

Mega-Flex 125

STANDARD LOADING RECOMMENDATIONS

Mega-Flex 125 belts accommodate a turn by collapsing along the inside edge. Product loading must be adjusted accordingly. 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 in. [762 mm]
Let IR = Inside Turn Radius = 66 in [1676 mm]

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

Allowable Loading = 96 inches/66 inches [2438mm/1676mm] = 1.45;
meaning, one product length per 1.45 lengths of belt.

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

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