PRODUCT TECHNICAL BULLETIN

SMALL RADIUS OMNI-FLEX®

FLAT WIRE TURN CURVE BELTING

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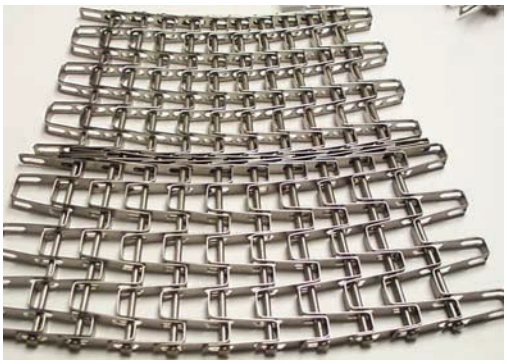


DEFINING CHARACTERISTICS

- **Longitudinal Pitch:** Inside pickets = 1.084 inches [27.53 mm], Outside pickets = 1.500 inches [38.10 mm]
- **Minimum Inside Turn Radius:** 1.0 x belt width
- **Turn Capability:** Turns either left and right
- **Width Limits:** For G1 = 14 inches through 54 inches [355.6 mm through 1371.6mm], for G3 = 12 inches through 54 inches [304.8 mm through 1371.6 mm]
- **Designation:** SROFG1-1 x 1 by 1 x 1-1/2, SROFG2-1/2 x 1 by 1/2 x 1-1/2
- **Edge Construction:** Welded
- **Method of Drive:** Inside pickets are positively driven with matching sprockets, outside pickets are supported with toothless idlers.
- **Pickets:** *Inside* 1/2 x .062 inch ; *Outside* 1/2 x .046 inch Flat wire Round Edge (Connector: #6 gauge .192 inch diameter)
- **Conveying Surface:** Over all belt width - 3/16 inches [4.8 mm]

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

BELT SPECIFICATIONS

Product	Pitch (inches [mm])		Component Sizes (inches [mm])		Material (for all parts)
	Longitudinal	Lateral	Strip	Connectors	
SROF G1 1 x 1 by 1 x 1-1/2	(Inside Belt Portion) 1.084 [27.53]	Varies By Belt Width (VBBW)	(Inside Belt Portion) 1/2 x .062 [12.7 x 1.6] (Outside Belt Portion) 1/2 x .046 [12.7 x 1.2]	6 Ga. = .192 [4.88]	Stainless Steel
SROF G3 1/2 x 1 by 1/2 x 1-1/2	(Outside Belt Portion) 1.500 [38.10]				

MAXIMUM ALLOWABLE TENSION

For Small Radius Omni-Flex belts (SROFG1 and SROFG3), the belt tension is concentrated at the center links of the belt through a turn. It is the construction of the double bar links .090, that determines the maximum allowable tension. The bar links carry the belt tension, relieving the pickets of stress. The Maximum Allowable Tension for Small Radius Omni-Flex belts (SROFG1, and SROFG3) is 300 lbs. [1334 Newtons] entering and exiting a turn.

*Maximum Allowable Tension values based on in-house testing and field experience.

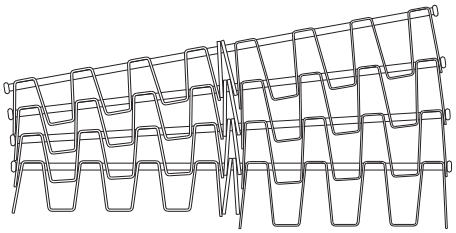
NOTE: Maximum allowable tension is only one factor influencing expected useful life of all Flex belting. Field experience shows that the most common cause of failure in flex belts is caused by repeatedly applying tension onto the belt pickets creating wear. **The rate of wear is dependent upon the environment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

BELT WEIGHT

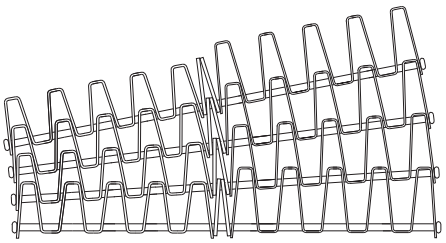
Formula: Belt width/12 * Weight lbs/ft^2 = lbs/linear ft

Standard construction w/double bar links on belt center							
Nominal Width*		Weight per unit of length (SROFG1)		Weight per unit of length (SROFG3)		Minimum Inside Turn Radius	
Inches	*mm*	lb/ft	*kg/m*	lb/ft	*kg/m*	inches	*mm*
12**	305	3.14	4.68	3.49	5.20	26.40	671.0
14	356	3.61	5.37	4.01	5.98	30.80	782.3
16	406	4.07	6.07	4.54	6.76	35.20	894.1
18	457	4.54	6.76	5.06	7.55	39.60	1006.0
20	508	5.01	7.46	5.59	8.33	44.00	1118.0
22	559	5.47	8.15	6.11	9.11	48.40	1229.4
24	610	5.94	8.85	6.64	9.89	52.80	1341.1
26	660	6.41	9.55	7.16	10.68	57.20	1452.9
28	711	6.87	10.24	7.69	11.46	61.60	1564.6
30	762	7.34	10.94	8.21	12.24	66.00	1676.4
32	813	7.81	11.63	8.74	13.02	70.40	1788.2
34	864	8.27	12.33	9.26	13.80	74.80	1900.0
36	914	8.74	13.02	9.79	14.59	79.20	2012.0
38	965	9.21	13.72	10.31	15.37	83.60	2123.4
40	1016	9.67	14.41	10.84	16.15	88.00	2235.2
42	1067	10.14	15.11	11.36	16.93	92.40	2347.0
44	1118	10.61	15.80	11.89	17.72	96.80	2458.7
46	1168	11.07	16.50	12.41	18.50	101.20	2570.5
48	1219	11.54	17.19	12.94	19.28	105.60	2682.2
50	1270	12.01	17.89	13.46	20.06	110.00	2794.0
52	1321	12.47	18.58	13.99	20.84	114.40	2905.8
54	1372	12.94	19.28	14.51	21.63	118.80	3017.5

**Actual belt widths may vary from nominal.*
***Width available in G3 only.*

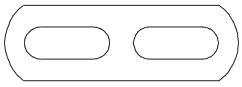
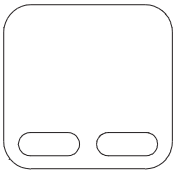
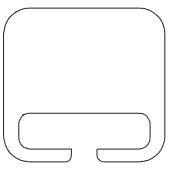


G1 OMNI-FLEX®



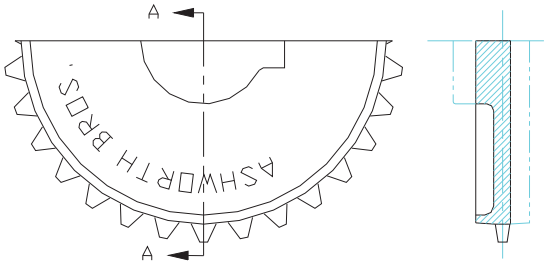
G3 OMNI-FLEX®

BELT OPTIONS

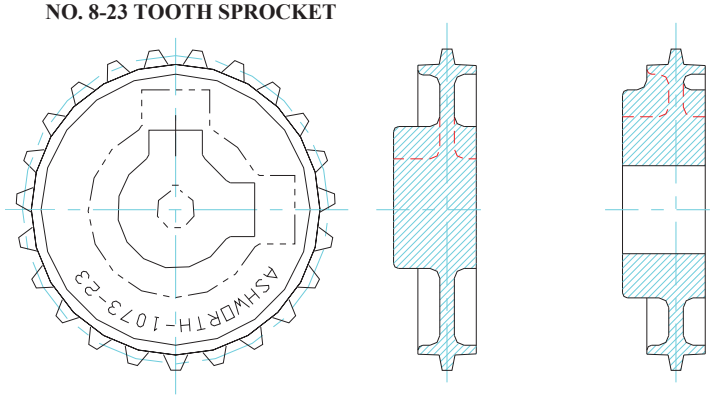
DESCRIPTION	PURPOSE	AVAILABILITY
BAR LINKS 	Assembled into center of belt to carry belt tension. Reduce picket breakage and increase belt life.	Double Heavy Duty standard at center of belt, double row optional at inside edge.
GUARD EDGES 	Plates assembled onto belt edges to prevent product from falling 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*

SPROCKETS

MODIFIED SPROCKET FOR NARROW HUB WIDTH



NO. 8-23 TOOTH SPROCKET



"A" HUB **"B" HUB**

NOTES:

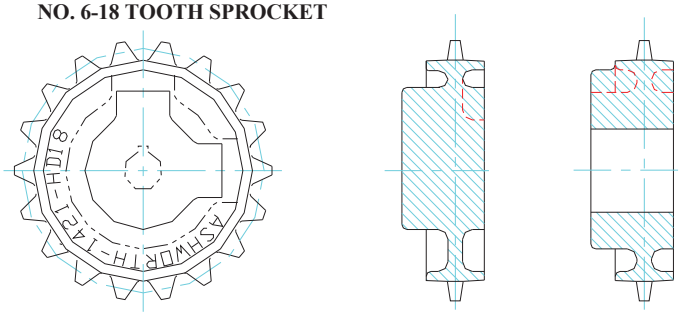
- *Maximum bores listed provide adequate material thickness for standard Keyway. Specify special sizes to be used when necessary.*
- ***Narrow Hub: Available on all sprockets when sprockets are required in every other opening (odd-numbered for drive, even-numbered for idle), sprocket width must be reduced.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

Cast tooth sprockets for heavy duty Omni-Flex 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

NOTES: UHMWPE material type sprockets also available and have a 150°F [66°C] maximum operating temperature.

NO. 6-18 TOOTH SPROCKET

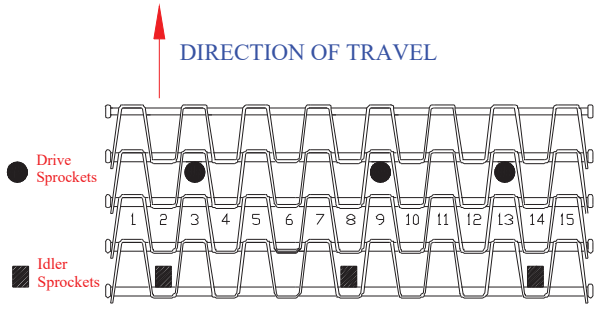


"A" HUB **"B" HUB**

LOCATION OF 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.

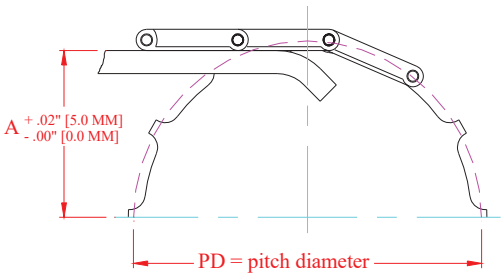
With Small Radius Omni-Flex, the above rules apply to the inside belt portion only. Position the drive and idler sprockets on the inside belt portion only. Space toothless idlers at 6 inch [152.4 mm] intervals on the outside belt portion.



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.

WEARSTRIP PLACEMENT



A = ½ X PD –.250 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 = 1.084 inches [27.5 mm].

ENGINEERING CALCULATIONS

QUANTITY OF DRIVE SPROCKETS
To determine the required number of drive sprockets:

STEP 1. Calculate number of sprockets assuming maximum allowable spacing of 6 inches [152 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 Small Radius Omni-Flex belts, the recommended number of sprockets:
BW (belt width) = width from inside edge to center links.
(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.

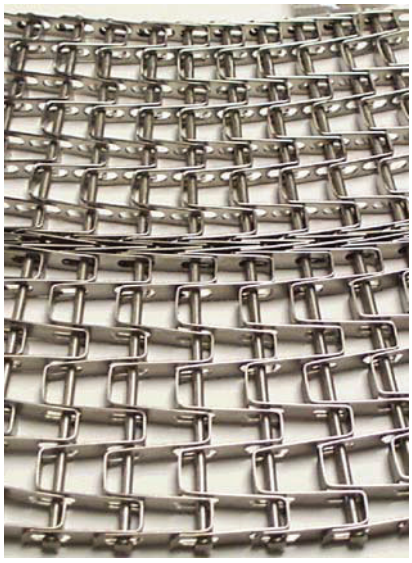
For all Small Radius Omni-Flex belts, the minimum recommended number of sprockets:
(BW/6) + 1, or [(BW/152 mm) + 1]

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

TURN RATIO
Turn Ratio = (Inside Turn Radius)/(Overall Belt Width)
Turn Ratio is dimensionless. Inside Turn Radius and Overall Belt Width must be expressed in the same units of measurement.
CENTER LINK POSITION
The Center Link Position is based on the turn radius of the system = minimum 1.0 to 1.7
With Inside Bar Links = Inside Turn Radius/2.0
Without Inside Bar Links = Inside Turn Radius/1.8
Round up to nearest 1/16” [1.6 mm], then round down to nearest 1/4 inch [6.4 mm].
Above rules are overridden if the center link position is customer specified.
Center link position can not be located closer than 6” [152.4 mm] to either edge.
CONVEYING SURFACE
Conveying Surface = Overall Belt Width - 1/4 inch [6.4 mm]
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 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



SYSTEM REQUIREMENTS

To Reduce Belt Tension and Wear:

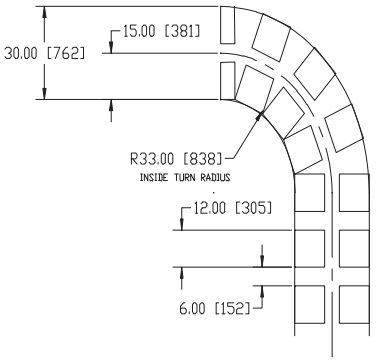
- Clean product debris from support rails.
- Clean ice and product debris from belt, sprockets, and filler rolls to prevent belt damage.
- Observe effect of temperature on coefficient of friction between the supports and the belt. Products may leave a slick residue at room temperature that turns into 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.

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] with center link at 15" [381 mm]
Let IR = Inside Turn Radius = 33 in [838 mm]

Radius to Tension Link = IR + Center Link Position
= 33 [838] + 15 [381 mm]
= 48 in [1600 mm]



Allowable Loading = 48 in/33 in [1600/838] = 1.45 meaning, one product length per 1.45 lengths of belt for 1.1:1 Inside Turn Radius.

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 and sprockets for standard weight are rated for 35 lbs [156 N] maximum pull each.

Example:

Heavy duty sprockets for 36 inch [914 mm] wide belt (C2), 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

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. Teeth of the sprockets should ***always*** drive against the round connector. This condition is fulfilled by placement of the *Drive* and *Idler* sprockets. Drive in odd numbered openings insuring outside sprockets is located in the third openings from each belt edge. (Assists belt in resisting fatigue fractures by providing two load-carrying legs.) Idle in even numbered openings insuring outside sprockets are located in the second openings from each belt edge.
Reference Technical Bulletin "032 Sprockets" for sprocket type and location.

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.

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

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