inSIGHTS™
Belt Conveyor Maintenance
TECHNICAL SOLUTIONS FOR BELT CONVEYOR PRODUCTIVITY

Choosing a Mechanical Fastener

Why does fastener selection matter?

Choosing the proper mechanical belt fastener is one of the most important steps in splicing a belt. Using an inappropriate fastener can lead to premature splice wear or even a catastrophic failure of the belt splice, both of which lead to increased downtime of the conveyor line. That's why the selection of the correct mechanical belt fastener is crucial to the system. The correct fastener will decrease downtime and increase productivity at your conveying operation.

While there are many factors to take into consideration, the proper fastener selection relies heavily on what is often called "the big three" – belt tension, belt thickness, and pulley diameters.

Belt tension

Each belt comes with a tension rating from the belt manufacturer, which is a measurement of the tension required to overcome the friction of the conveyor components. These components consist of the weight of the material being conveyed; the angle of the belt; and resistance from idlers, skirt board, and other system components. Each belt is rated to its operating strength and is classified in terms of Pounds Per Inch of Width (P.I.W.). Each mechanical fastener is also rated in terms of P.I.W. It is important that both the belt and the fasteners are operated within the range of their capabilities or the splice may fail prematurely.

Determining belt thickness

Calculating belt thickness doesn't involve simply measuring the belt thickness at any point. The key is to measure it at the point where the splice will be installed. As the belt runs, it comes into contact with any number of items – pulleys, idlers, lagging, and the material that is being conveyed. Contact with these items wears both the top and bottom cover of the belt. This is why it is important to know the belt thickness in the area where the splicing will take place since belts generally don't wear evenly.

The next step in determining the thickness is whether or not you will be skiving the belt. Skiving the belt enables you to countersink the fasteners into the belt by removing some of the top cover of the belt. This allows better interaction with other components of the belt without affecting the strength of the belt. If you have a top cover of at least 3/16" (4.5 mm), it is recommended that you skive the belt. While skive depth can range from 1/16" (1.5 mm) to 3/8" (10 mm), the average skive is 1/8" (3 mm). Make sure you keep this depth in mind when determining the thickness of the belt because you will need to measure the belt and then subtract the amount of belt that you intend to skive.

Each fastener is engineered to handle a different range of belt thicknesses and it is important that you pick the fastener that is suited to that range. Otherwise, premature belt wear and splice failure become real possibilities with your system.

Pulley Diameters

The final factor to take into consideration when choosing a fastener is pulley diameter. Take note of all of your pulley diameters on your system where the belt wraps at least 90 degrees. If you have a self-cleaning wing-type pulley, factor in a 25% larger diameter dimension. Pulley diameter is an integral part of deciding between the two different types of fasteners – solid plate and hinged style. Hinged style fasteners, for example, are more popular for smaller pulley diameters, because of their ability to bend around a tighter turn in the system. When either style is appropriate for your belt and pulleys, solid plate styles are preferred for longer life and to prevent sifting. Hinged fasteners are preferred on smaller diameter pulleys, portable conveyors, and any situation where the belt length may be adjusted.

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Selecting Your Fastener

Once you have the critical pieces of information, you can consult a selection chart to help make your decision.

Flexco® *Bolt Hinged* Fastener Selection Chart

Fastener Size	For Belts With Mechanical Fastener Ratings Up To:		Belt Thickness Range		Recommended Min. Pulley Diameter			
					Operating Tension 100% of Belt Rating		Operating Tension Under 75% of Belt Rating	
	kN/m	P.I.W.	mm	in.	mm	in.	mm	in.
375X	33	190	6-11	1/4-13/32	152	6	102	4
550	52	300	6-16	1/4-5/8	230	9	178	7

Flexco® *Rivet Hinged* Fastener Selection Chart

Fastener Size	For Belts With Mechanical Fastener Ratings Up To:		Belt Thickness Range		Recommended Min. Pulley Diameter	
					Operating Tension Under 100% of Belt Rating	
	kN/m	P.I.W.	mm	in.	mm	in.
R2	60	330	3-10	1/8-3/8	230	5
R5	79	450	6-11	7/32-7/16	230	9
R5-1/2	114	650	8-15	5/16-19/32	300	12
R6	140	800	10.5-17	13/32-11/16	450	18
R6LP	140	800	8-18	5/16-23/32	450	3-1018
R8	263	1500	10.5-17	13/32-11/16	450	18
R9	350	2000	16-25.5	5/8-1	1050	42

Flexco® *Bolt Solid Plate* Fastener Selection Chart

Fastener Size	For Belts With Mechanical Fastener Ratings Up To:		Belt Thickness Range		Recommended Min. Pulley Diameter (90˚)					
					Operating Tension 75-100% of Belt Rating		Operating Tension 50-75% of Belt Rating		Operating Tension Under 50% of Belt Rating	
	kN/m	P.I.W.	mm	in.	mm	in.	mm	in.	mm	in.
1	30	150	5-11	3/16-7/16	300	12	260	10	200	8
140*, 140VP	40	225	5-11	3/16-7/16	360	14	300	12	250	10
190,190VP	65	375	8-14	5/16-9/16	460	18	410	16	360	14
1-1/2	50	300	11-17	7/16-11/16	460	18	410	16	360	14
2,2VP	75	440	14-21	9/16-13/16	760	30	710	28	610	24
2-1/4	105	620	14-30	9/16-1-3/16	920	36	860	34	860	34
2-1/2	75	450	19-25	3/4-1	1070	42	1070	42	1070	42
3	100	560	24 & over	15-16 & over	1220	48	1220	48	1220	48

Flexco® *Rivet Solid Plate* Fastener Selection Chart

Fastener Size	For Belts With Mechanical Fastener Ratings Up To:		Belt Thickness Range		Recommended Min. Pulley Diameter					
					Operating Tension 75-100% of Belt Rating		Operating Tension 50-75% of Belt Rating		Operating Tension Under 50% of Belt Rating	
	kN/m	P.I.W.	mm	in.	mm	in.	mm	in.	mm	in.
BR6	70*	400*	6.5-17	1/4-21/32	350	14				
BR10	114	650	6-17	7/32-11/16	450	18	400	16	350	14
BR14	140	800	10-24	13/32-15/16	900	36	860	34	860	34

* Contact Flexco Engineering for applications greater than 70kN/m (400 P.I.W.).

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