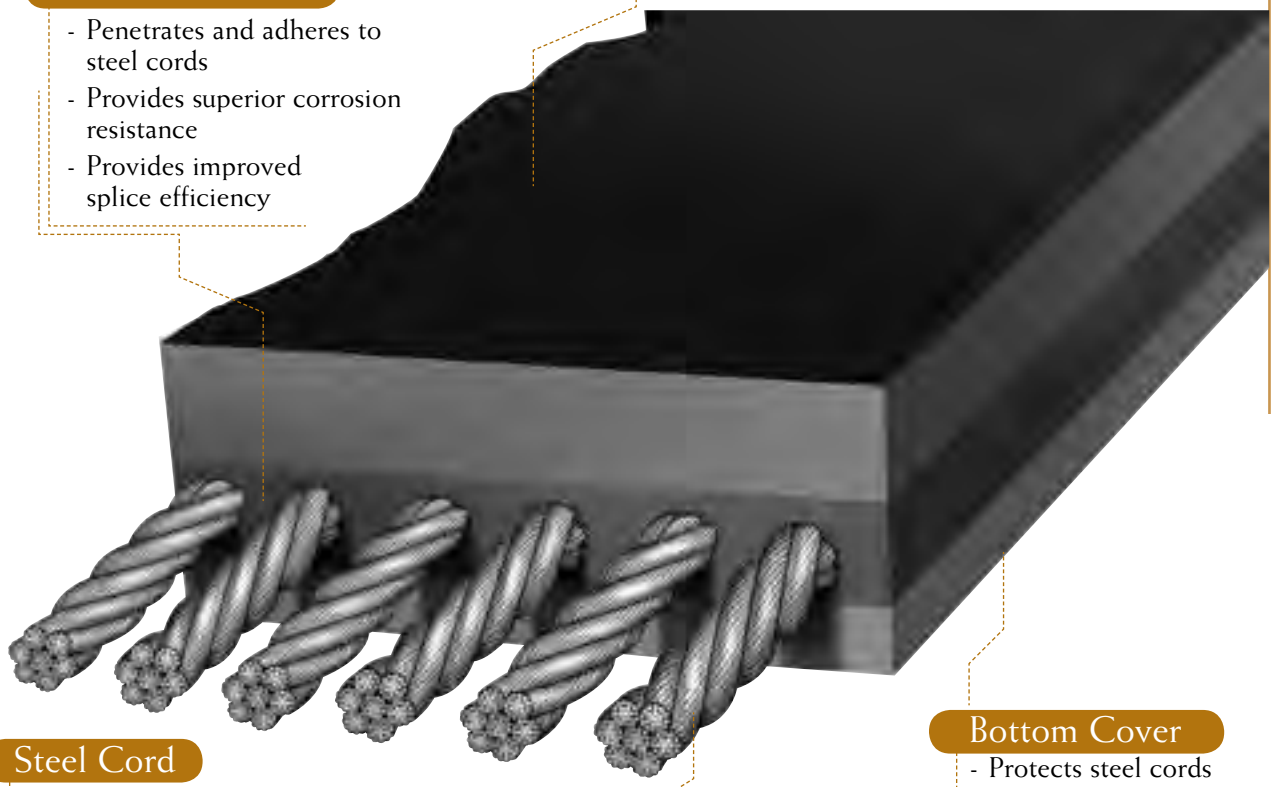
BELT CONSTRUCTION

Goodyear Engineered Products Flexsteel® belts are custom designed to meet the specific needs of the given application, providing superior protection against the abuse of conveying virtually any material. The steel cord provides superior impact resistance, with the number and size being selected to meet the desired operating tension and application needs. The insulation gum is specifically designed to encapsulate each steel cord filament to reduce internal friction while providing enhanced adhesion to the cover rubbers. Top and bottom covers provide maximum protection to the steel cord. The cover compounds are specifically designed to meet the demands of the application, and are available in a wide variety of rubber types and gauges.

Conveyor Belt Components



Top Cover
- Protects steel cords
- Various compounds available

Insulation Gum
- Penetrates and adheres to steel cords
- Provides superior corrosion resistance
- Provides improved splice efficiency

Steel Cord
- Provides superior bonding to covers and insulation gum
- Allows high flexibility and low elongation
- Galvanized to provide barrier against corrosion

Bottom Cover
- Protects steel cords
- Various compounds available
- Helps determine power consumption

BELT CONSTRUCTION NOMENCLATURE EXAMPLE:

Flexsteel® Stacker® ST3500/48 3/4" x 1/4"

- Flexsteel®: Belt Construction
- Stacker®: Rubber Compound
- ST3500/48: Belt breaking strength in kilonewtons per meter width
- 48: Belt Width Inches
- 3/4": Top Cover Gauge
- 1/4": Bottom or Pulley Cover Gauge

FLEXSTEEL®

FLEXSTEEL

Since we introduced the world's first steel reinforced belt to the material handling industry in 1942, we have continued to advance the technology to satisfy the most demanding and abusive conveyor applications. Using state-of-the-art technology, we ensure superior product design and maximum performance for our customers. Shipping from six production plants on five continents, Flexsteel® remains our premium global product. Our worldwide engineering group continues to design Flexsteel specifications that will provide a lower cost-per-ton of material conveyed for each customer's unique system.

Markets

- Aggregate
- Cement
- Coal
- Hard Rock
- Power Generation
- Steel Production

Applications

- Mainlines
- Overland Belts
- Pit Belts
- Ship Loaders
- Slope Belts
- Any high abuse application

Cover Compounds

- 6740A
- ARMA® II
- ARMA®-SBR
- Compound P
- Easyrider®
- FRAS-C
- Global X®
- Omega®
- Solar-Shield®
- Stacker®
- Style BLE
- Style B II
- Survivor®
- Other compounds available on request

Tension Range

ST500 to over ST10,000

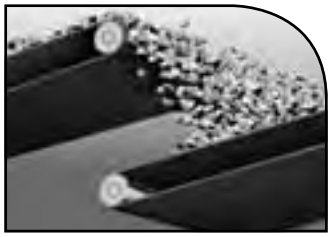
GET A LOWER
COST-PER-TON CONVEYED.

GOODYEAR
ENGINEERED PRODUCTS

Features & Benefits

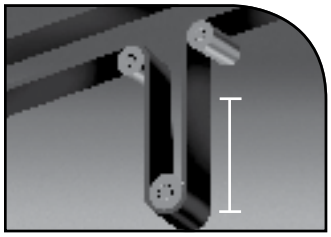
High Tension Capabilities

Flexsteel belts handle the most demanding applications. We continue to lead the industry in designing the strongest belts to meet the growing demand for long overland systems.



Fewer Transfer Points

Flexsteel's high-tension capabilities permit extremely long centers, exceptionally high lifts, and multiple horizontal curves. This allows the designer to reduce the number of transfer points to minimize a major source of maintenance headaches and downtime.

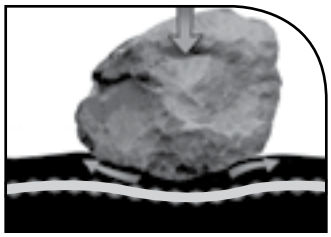


Limited Take-up Travel

Flexsteel belts elongate a maximum of 0.25% at rated tension. This allows lower cost take-up systems on many applications, and makes Flexsteel the preferred choice for long overland and short stacker/reclaiming systems, where minimum elongation is critical.

Life-long Splices

Our proven splicing methods, validated on our Two-Pulley Splice Tester, result in dynamic splice efficiencies in excess of the 50% rating defined in DIN 22110 Part 3. With proper technique, splices on Flexsteel belts should last the life of the belt. And when your belt is expected to last 20 years, that's a long time.



High Impact Resistance

Our advanced cover compounds and our insulation gum's superior adhesion combine to provide the impact, tear, and abuse resistance your applications demand.

Superior Troughing Characteristics

Because Flexsteel belts are not interwoven in the transverse direction, they offer superior troughability. Even the highest strength Flexsteel belts on steep angle idlers will trough perfectly, leading to easy belt training and full load capacity.

Features & Benefits

Exceptional Belt Training

Flexsteel belts are built in a "uniplane" construction, where cords are laid in precisely the same plane with tension carefully controlled and equalized under cure. Belts run straight and true because cords are laid with alternating left and right hand twist. Flexsteel's superior troughing characteristics help ensure that the belt is in constant contact with idlers, which further enhances its ability to run straight.

Lower Cost-per-Ton

Fewer conveyors and splices, shorter take-ups, and reduced belt inventory add up to significant cost savings right up front. Longer belt life, life-long splices, excellent belt training, and reduced downtime save you even more down the road. It all adds up to the a lower cost-per-ton of material conveyed, which can make a major improvement in your bottom line.

Sensor Guard® with RFID Technology

Perhaps the most important feature of a Flexsteel belt is that it is available with Sensor Guard. The most widely known and most field-proven rip detection system in the world, Sensor Guard has saved companies millions of dollars in potential production losses, downtime, and spare belting.

See page 90 for details.

Packaging The Way You Want It

Packaging options include keeper bars, round steel reels, oblong reels, and cassette reels. All are designed to protect your investment and minimize the number of belt splices to lower installation costs, facilitate field installation, and reduce downtime and shipping costs.

Keeper Bar

Round Reel

Oblong Reel

SUPERIOR STRENGTH, DURABILITY, EASE OF INSTALLATION

Goodyear Engineered Products Flexsteel conveyor belting has provided maximum protection against pounding and abuse in some of the world's largest and most demanding applications. Flexsteel belting is the only choice when extremely high tensions are present, having proven itself on copper and oil sands system operations at 6000 PIW (ST7000) tension.

Flexsteel is also the preferred belt on long overlands and short Stacker systems where minimum belt elongation is a critical design consideration. Flexsteel's steel cord reinforcement elongates a maximum of .25% at rated tension, allowing for acceptable take-up travel design on long overlands, as well as short Stacker/Reclaimer systems.

We have the capability to manufacture Flexsteel belts in long lengths up to 168" (4.2m) roll diameters, or 50 short ton (45.4 M.T.) rolls at some production locations. This allows for the minimum number of splices or joints in a conveyor system, which facilitates faster installation while providing a more reliable system. Specialized oblong packaging is available to further maximize belt lengths.

Additional time can be saved during installation by using another Flexsteel innovation, Preform™ Splice kits. Preform is a pre-grooved form that simplifies splicing by allowing you to "sandwich" the cables coming from either side between the formed rubber. Not only is the process of splicing made easier, but the belt itself is made stronger.

You can depend on Flexsteel steel cord belts to be precisely engineered to meet rigorous manufacturing standards. Rely on Flexsteel for strength, durability and ease of installation.

FLEXSTEEL: A TECHNICALLY SUPERIOR PRODUCT

Generations of our engineers have been involved for over 65 years in the design and application of Flexsteel conveyor belting. This cumulative experience translates into state-of-the-art technology, assuring superior product design, and maximum performance for our customers.

There are three component parts to Flexsteel belting, each one critical to belt performance:

ZINC GALVANIZED STEEL CORD:

Flexsteel belts are designed by selecting cord construction to provide the best specification for a particular application. The cords, made up of many wire filaments, are constructed to provide high flexibility, low elongation, and to permit efficient and high strength splice designs. The galvanized zinc coating produces a bonding agent between the cord and insulation gum and provides an important barrier against corrosion.

INSULATION GUM (CORE RUBBER):

Extensive rubber compounding technology has enabled Flexsteel engineers to develop a superior insulation gum bonding rubber, which penetrates and adheres to the steel cords. The result is excellent adhesions, corrosion resistance and splice efficiencies.

OUTER RUBBER COVERS:

The advanced compounds in Flexsteel's top and bottom covers are designed to protect the steel cord strength member against the abusive environmental conditions prevalent in most conveying applications. Compounds are available to withstand abrasion, jagged cutting and gouging, high impact, sub-zero temperatures, moderate heat, hardening effects of ozone attack and fire propagation. Special service compounds are available for unique applications, such as the oil sands in Canada, which require a compound that withstands both low temperatures and oil.

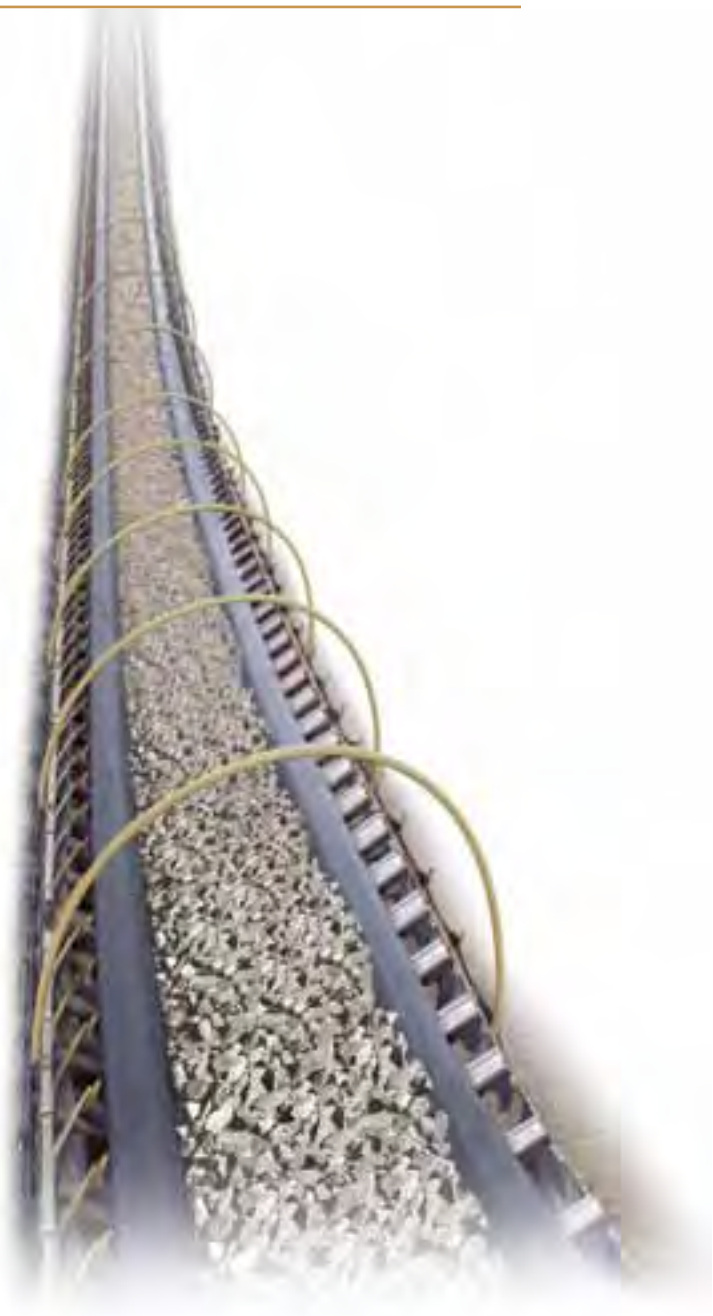
Easyrider™

There has been significant technical progress in the transport of bulk materials in the last several years. The next step to improved conveyor efficiency is the reduction of power required to operate these high performance systems. Just as some tires provide lower rolling resistance, depending upon their construction and compounds, a conveyor belt can also be designed to provide lower resistance as it rolls over the support idlers.

The power required to operate a typical conveyor belt has been studied, both theoretically and dynamically. As the belt passes over an idler, the pulley cover rubber passes through a compression/rebound cycle that absorbs power. It has been determined that on long center horizontal conveyors, the rolling resistance power loss due to the indentation effect can reach 61% of the total system power.

Using specialized pulley cover compounds, like Goodyear Engineered Products Easyrider, will help reduce total system power. Based on field measurement tests, Easyrider pulley covers will reduce the power consumption by up to 12%. This savings is realized year after year, resulting in an overall reduction to operating costs.

As an example, if your energy costs are $1 million per year, a 12% savings available with Easyrider represents a savings of $120,000 compared to other compounds! Over ten years, this can add up to savings of $1.2 million or more depending on your operation.



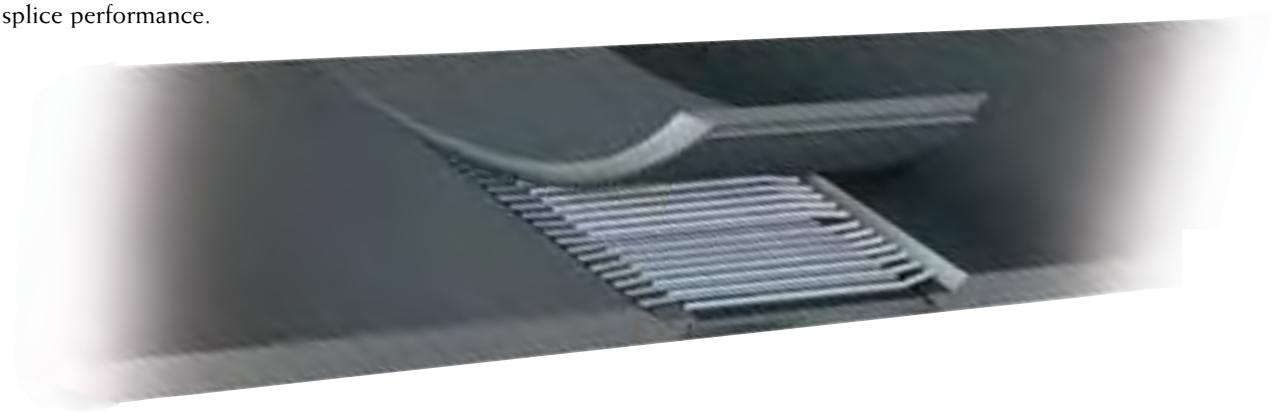
With Easyrider, there's reduced indentation energy loss.

Preform™

Preform Patented Splice Technology Improves Splice Strength, and Saves Time!

There have been significant technical advancements in steel cord belt splicing in the past several years. Our patented Preform splices provide improved splice efficiency, along with reduced splice time, and improved performance. This means more dollars in your pocket.

Conventional splice methods involve the use of cements and rubber noodles. Cement drying time extends the overall splicing time, while providing the opportunity for increased contamination. The alternative laying of cord and noodle, further extends splice time, as constant chalk line checking, and adjustment to the noodle width is necessary to maintain cord alignment. Cord mis-alignment and contamination are critical factors in the resultant splice performance.



Preform Panel

This illustration shows how the top and bottom multi-groove panels encase each cord, eliminating the need for noodles and ensuring cord alignment.

Preform Splice Method

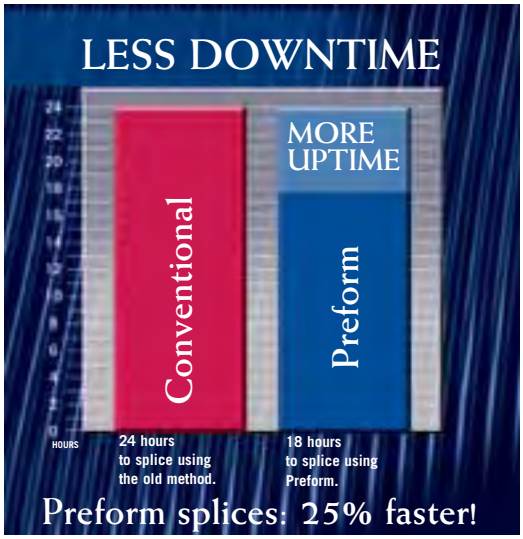
Preform splices utilize preformed, multi-grooved top and bottom cover panels, eliminating the need for cements and noodles. Cement drying times are eliminated, reducing the possibility of splice contamination from dust infiltration. Cord laying time is significantly reduced, and the correct cord spacing and alignment is virtually guaranteed. The result is a stronger splice, with improved performance and life.

Improved Performance

Testing on the 2-Pulley Dynamic splice tester at our Technical Center in Marysville, Ohio, shows the results of two identical belts, one spliced using Preform, and one spliced using conventional splicing methods. This one test shows the Preform splice to withstand 33% more load cycles, or a theoretical 33% longer service life, than the conventional splice. Static pull splice strength tests conducted at an independent laboratory showed the Preform splice to be at least 10% stronger than a conventional splice.

Savings

Preform splices have been made successfully in many countries around the world. Savings of 16% to 25% were based on actual field measurements, comparing one splice technique versus the other, on the same belt, at the same time. Reduced splicing time, means more uptime and increased productivity.



FLEXSTEEL STANDARD SPECIFICATIONS - Imperial

Belt Tension Rating	Minimum Ultimate Tension	Operating Tension	Cable Diameter (nominal)	Cable Pitch (approximate)	Belt Modulus
	PIW	PIW	inches	inches	PIW
ST800	4568	685	0.142	0.688	329000
ST1000	5710	856	0.142	0.547	411000
ST1250	7138	1070	0.205	0.855	514000
ST1600	9136	1370	0.205	0.666	657000
ST2000	11420	1712	0.205	0.533	822000
ST2500	14275	2140	0.205	0.450	1030000
ST3150	17987	2697	0.315	0.768	1290000
ST3500	19985	2996	0.315	0.690	1440000
ST4000	22840	3424	0.362	0.792	1640000
ST4500	25695	3852	0.394	0.805	1850000
ST5000	28550	4280	0.433	1.098	2050000
ST5400	30835	4623	0.433	1.023	2220000

Tension ratings are available in addition to those shown above. Other cable diameters may be substituted according to individual requirements.
Operating tensions are based on a 6.67:1 safety factor. Cable pitch based on 48" wide belts.
Contact your local GTM for belt tension ratings higher than 4623 PIW.

FLEXSTEEL BELT THICKNESS - Imperial

Belt Tension Rating	PIW	600-1000	1001-2250	2251-3200	3201-3700	3701-4200	4201-4623
Cable Diameter	Inches	0.14	0.21	0.32	0.36	0.39	0.43

APPROXIMATE BELT THICKNESS = CABLE DIAMETER + COVER GAUGES

FLEXSTEEL BELT WEIGHT - Imperial

Belt Tension Rating	PIW	685	856	1070	1370	1712	2140	2697	2996	3424	3852	4280	4623
Carcass Weight	(lb/ft²)	1.5	1.6	2.2	2.4	2.7	3.0	4.2	4.4	5.0	5.5	6.4	6.7

Cover Compound	Stacker	Premarc	Style B	ARMA SBR	Compound P
Cover Weight per 1/32" (lb/ft²)	0.18	0.19	0.19	0.2	0.19

APPROXIMATE BELT WEIGHT = CARCASS WEIGHT + COVER WEIGHT.
Minimum pulley cover requirements for belts with Sensor Guard® 3/16"; contact your GTM for minimum pulley cover that applies to your application. Minimum cover guage is dependent on the belt rating.

RECOMMENDED PULLY DIAMETERS - Imperial

Belt Tension Rating	Minimum Recommended Pulley Diameters (Percent of Rated Tension)			
PIW	75-100%	50-75%	<50%	Snubs
600-1000	30"	24"	18"	16"
1001-2250	42"	36"	24"	20"
2251-3200	54"	42"	36"	30"
3201-3700	60"	48"	42"	36"
3701-4200	66"	54"	48"	42"
4201-4623	72"	60"	54"	48"

Snubs are defined as having 6" or less belt contact and tension less than 50% of belt rating. Pulley sizes for Flexsteel belts are determined by face pressure on the pulley and/or the pulley-to-cable diameter ratio.
All pulleys must be flat as crowned pulleys will cause excessive center tension in the high modulus steel cable product.

RECOMMENDED MINIMUM TRANSITION DISTANCES AT HALF THROUGH DEPTH

Percent of rated tension	Minimum transition distance (W = Belt Width) by Idler Angle		
	20 deg	35 deg	45 deg
More than 90%	2.0W	3.4W	4.0W
60% to 90%	1.6W	2.6W	3.2W
Less than 60%	1.0W	1.8W	2.2W

FLEXSTEEL STANDARD SPECIFICATIONS - Metric

Belt Tension Rating	Minimum Ultimate Tension	Operating Tension	Cable Diameter (nominal)	Cable Pitch (approximate)	Belt Modulus
	kN/m	kN/m	mm	mm	kN/m
ST800	800	120	3.6	17.5	58000
ST1000	1000	150	3.6	13.9	72000
ST1250	1250	187	5.2	21.7	90000
ST1600	1600	240	5.2	16.9	115000
ST2000	2000	300	5.2	13.5	144000
ST2500	2500	375	5.2	11.4	180000
ST3150	3150	472	8.0	19.5	227000
ST3500	3500	525	8.0	17.5	252000
ST4000	4000	600	9.2	20.1	288000
ST4500	4500	675	10.0	20.4	324000
ST5000	5000	750	11.0	27.9	360000
ST5400	5400	810	11.0	26.0	389000

Tension ratings are available in addition to those shown above. Other cable diameters may be substituted according to individual requirements.
Operating tensions are based on a 6.67:1 safety factor. Cable pitch based on 1220mm wide belts.
Contact your local GTM for belt tension ratings higher than 810 kN/m.

FLEXSTEEL BELT THICKNESS - Metric

Belt Tension Rating	kN/m	ST701-ST1168	ST1169	ST2629-ST3738	ST3739-ST4322	ST3739-ST4906	ST4907-ST5400
Cable Diameter	mm	3.6	5.2	8.0	9.2	10.0	11.0

APPROXIMATE BELT THICKNESS = CABLE DIAMETER + COVER GAUGES

FLEXSTEEL BELT WEIGHT - Metric

Belt Tension Rating	kN/m	ST800	ST1000	ST1250	ST1600	ST2000	ST2500	ST3150	ST3500	ST4000	ST4500	ST5000	ST5400
Carcass Weight	(kg/m²)	7.3	7.8	10.7	11.7	13.2	14.6	20.5	21.5	24.4	26.9	31.2	32.7

Cover Compound	Stacker	Premarc	Style B	ARMA SBR	Compound P
Cover Weight per 1 mm (kg/m²)	1.13	1.17	1.17	1.25	1.17

APPROXIMATE BELT WEIGHT = CARCASS WEIGHT + COVER WEIGHT.
Minimum pulley cover requirements for belts with Sensor Guard® 5mm, contact your GTM for minimum pulley cover that applies to your application. Minimum cover guage is dependent on the belt rating.

RECOMMENDED PULLY DIAMETERS - Metric

Belt Tension Rating	Minimum Recommended Pulley Diameters (Percent of Rated Tension)			
kN/m	75-100%	50-75%	<50%	Snubs
ST701-ST1168	762 mm	610 mm	457 mm	406 mm
ST1169-ST2628	1067 mm	914 mm	610 mm	508 mm
ST2629-ST3738	1372 mm	1067 mm	914 mm	762 mm
ST3739-ST4322	1542 mm	1219 mm	1067 mm	914 mm
ST4323-ST4906	1676 mm	1372 mm	1219 mm	1067 mm
ST4907-ST5400	1829 mm	1524 mm	1372 mm	1219 mm

Snubs are defined as having 6" or less belt contact and tension less than 50% of belt rating. Pulley sizes for Flexsteel belts are determined by face pressure on the pulley and/or the pulley-to-cable diameter ratio. All pulleys must be flat as crowned pulleys will cause excessive center tension in the high modulus steel cable product.

RECOMMENDED MINIMUM TRANSITION DISTANCES AT FULL TROUGH DEPTH

Percent of rated tension	Minimum transition distance (W = Belt Width) by Idler Angle		
	20 deg	35 deg	45 deg
More than 90%	4.0W	6.8W	8.0W
60% to 90%	3.2W	5.2W	6.4W
Less than 60%	2.0W	3.6W	4.4W