REXNORD

CAMBRIDGE
ENGINEERED SOLUTIONS

Low Tension Spiral Cage System

BELT INSTALLATION AND MAINTENANCE MANUAL

Download the most up-to-date version at rexnord.com/documentation

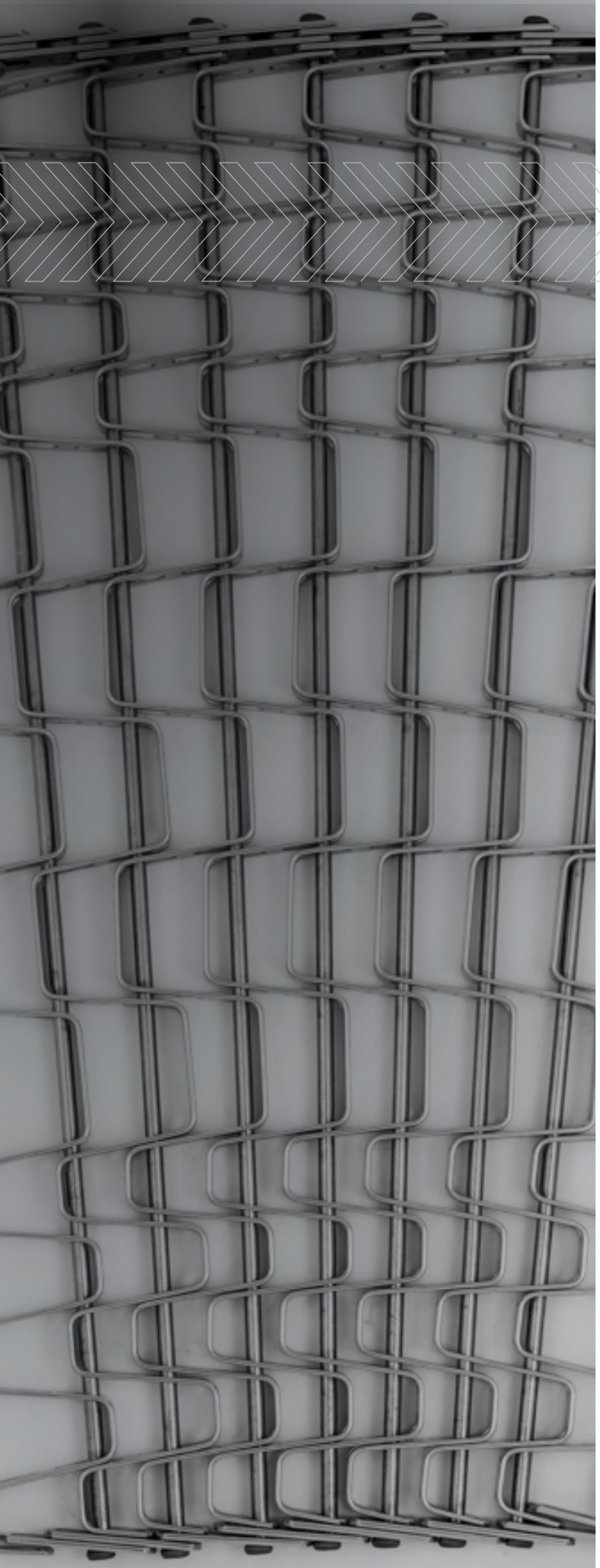


Table of Contents

Introduction

APPLICATIONS SUPPORT

With more than 100 years of experience, we are the industry's most knowledgeable team of conveying experts. In addition to installation and maintenance support for the low tension spiral conveyor belts, our qualified engineering staff is willing and able to assist you on all of your applications' needs, including:

- Belt selection recommendations
- Product performance analysis
- Product handling tests
- Retrofit and interchange information
- Plant surveys

Contact our Application Engineering team for more information at 800-638-9560 or online at rexnord.com

SAFETY INFORMATION

Product safety

Products designed and manufactured by Rexnord are capable of being used in a safe manner; but Rexnord cannot warrant their safety under all circumstances. The purchaser must install and use the products in a safe and lawful manner in compliance with applicable health and safety regulations. Laws and general standards of reasonable care. If the purchaser fails to do so, the purchaser shall indemnify Rexnord from any loss, cost or expense resulting directly or indirectly from such failure.

Products are provided with only safety devices identified herein. It is the responsibility of the purchaser to furnish appropriate guards for machinery parts in compliance with FDA, USDA and OSHA standards, as well as any other safety devices desired by the purchaser and/or required by law. If the purchaser fails to do so, the purchaser shall indemnify Rexnord from any loss, cost or expense resulting directly or indirectly from such failure.

General safety precautions

- To avoid personal injury, all machinery must be turned off and locked out prior to belt installation, inspection, maintenance and removal
- Always use safety glasses to protect eyes. Wear protective clothing, gloves and safety shoes
- Support the belt to prevent uncontrolled movement of the belt and parts
- Maintain tools in proper condition and assure their proper use. Use of belt assembly tools is recommended when applicable
- Do not attempt to connect or disconnect belting unless belt construction is clearly known and understood
- Do not use any sections of damaged belt because they may have been overloaded and yielded no longer operational

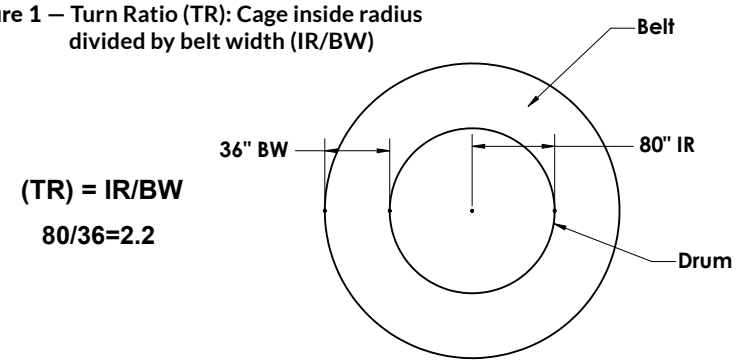
Read and fully understand the instructions contained in this manual prior to installation, operation and maintenance of this product.

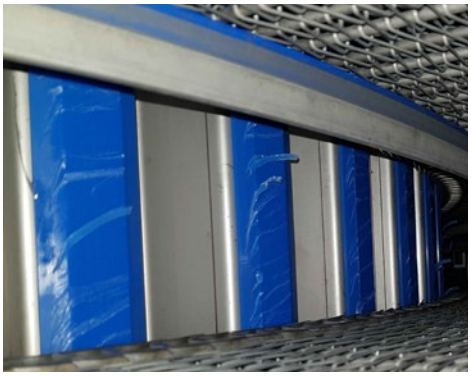
Spiral Cage Pre-Installation

SPIRAL CAGE INSPECTION

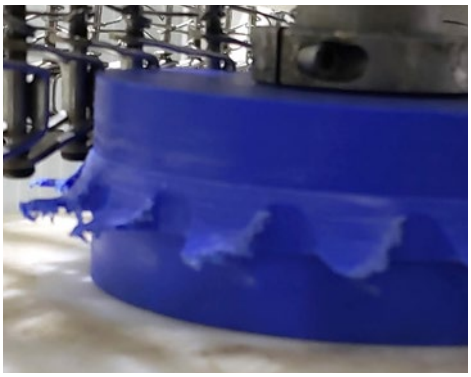
- **Old belt inspection:** When inspecting the cage, be sure to have the old belting removed. Inspect the old belt prior to discarding. Look for any damage to the belt. If there is damage, isolate it, try to determine the cause and correct it.
- **Drum measurement:** Measure the circumference of the drum at the bottom, middle and top. This will tell you what the drum diameter is throughout the cage.
- **New belt inspection:** Examine the new belt. If you're replacing the belt with the same spiral construction, make sure the new belt is to be a different construction from the old, verify the turn ratio (**Figure 1**) and belt width. You should also receive new sprockets. Verify the key and bore size.
- **Drive bar cap inspection:** Examine the condition of the cage's vertical drive bars.
- **Sprocket inspection:** Check sprocket condition and placement.

Figure 1 — Turn Ratio (TR): Cage inside radius divided by belt width (IR/BW)





Example of worn drive bar caps to be replaced.



Example of worn sprocket to be replaced.

Materials and equipment for cleaning the spiral cage system

- Degreasing and sanitizing chemical(s)*
- High pressure washer with long want (to direct spray)
- Hot water**

** Consult with your spiral system OEM for recommended degreasing and sanitizing chemicals.*

***Hot water and pressure washer are required to drive grease out of the drive bar caps and wear strips*

CLEANING THE SYSTEM

The objective when cleaning the spiral cage system is to remove all grease, dirt and product residue from the cage, belt, support rails and structure and drive bar caps.

Procedure

1. The cleaning chemical should be sprayed on the entire system and allowed to set as instructed by the chemical company.
2. A high pressure washer with a long wand is then used first to wash the cage superstructure, then move to the belt support structure.
3. The belt support rails are next to be washed. The support rails should be washed from the top to the bottom. Wash the dirt and grease from the wear strips and the wear strip support.
4. The belt then can be pressure washed as it runs on the unit. Particular attention should be paid to the inside edges of the belt because they are the points of contact with the drive bar caps. Running the belt will help clean the top of the wear strips. A cloth can be tied to the underside of the belt and pulled through the system to further aid in cleaning the wear strip. Care must be given that the cloth does not damage the belt. The cloths must be installed at the in-feed and removed at the discharge. Do not allow cloth to run through the belt drive or take-up.
5. Finally, the drive bar caps should be pressure washed. This is done to keep any grease from getting on them, thus reducing drive friction.

Spiral Cage Pre-Installation

PREPARING FOR INSTALLATION

Install new sprockets

It is recommended that new sprockets be installed at the same time as a new belt. This allows for better tracking and longer operational life of the belt.

New belt uncrating and inspection

Open the crate and remove the rolls of new belting. Inspect the rolls looking for any damage to the wire mesh or any other damage that could have occurred during shipping.

Arrange belt in staging area

Establish an area where the belt will be fed into the spiral system. Remove any surrounding conveyors to make room for the installation. Be sure to position the belt so that it feeds into the system in the proper direction of travel (**Figure 2**).

In the staging area, arrange the belt to feed into the system according to the indicated direction of travel and rotation. Verify that the inner and outer edge of the belt is correct according to how it will feed into the system. Stage the belt on jack stands.

New belt in staging area on jack stands.

Belt pulling

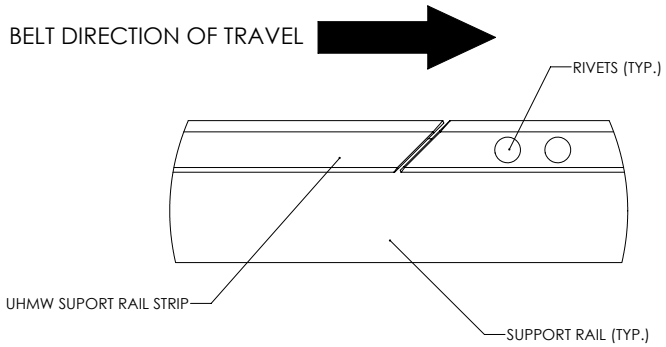
The belt can be pulled with baffles placed between drive bars (closed cage) or without baffles between drive bars (open cage). If you're using the old belt to pull the new belt into the system, splice the new belt to the old belt. As the system is run, pull the old belt out and feed the new belt in (**Figure 3**).

If attaching a rope, make sure the rope's rating is strong enough to pull the belt into the system. It is recommended that the rope be attached to a leader bar connected to the leading edge of the belt. That way, even tension can be placed on the lead edge of the belt without causing issues to the belt or system.

If a leader bar is not used, the rope should be tied to the belt using a bridle. This is typically done after a section of the belt is fed into the system by hand.

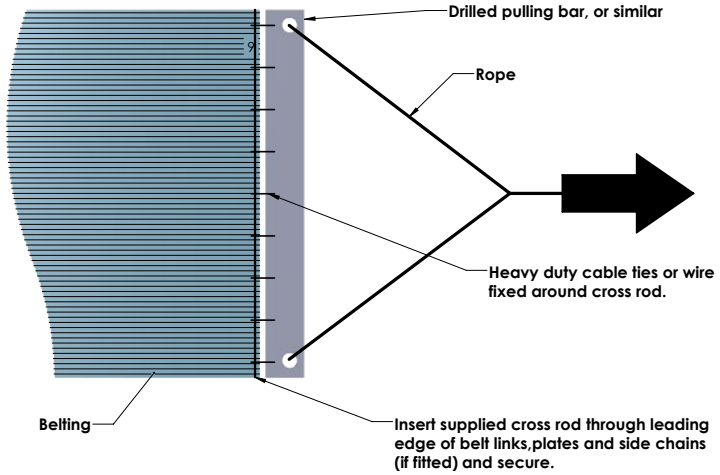
Wrap the rope around the cage at least 1-2 times. If the system is an up-go, feed the rope from the top. If a down-go, the rope should be fed from the bottom. Monitor the rope so the belt doesn't cross it as you're installing the belt. If the belt crosses the rope, stop the system and uncross the belt and rope.

Figure 2 — Spiral cage belt direction of travel



SUPPORT RAIL SPLICE

Figure 3 — Belt pulling bar



Feeding the belt into the spiral

When unrolling the belt off the stands, be sure it unrolls evenly. Do not let the belting free spool onto the floor. As the belt is being paid out the mesh should be watched to make sure no spirals are locked together.

NOTE: *If pressure is placed on the center of the roll and the rods are deflected, this can cause the mesh spirals to lock together. This is usually dependent upon the width of the belt.*

Continue to feed the belting into the system until the belt is completely installed according to the instructions, and made endless.

Cam-Grid Spiral Cage Belt

GENERAL BELT INFORMATION

Cam-Grid® weld application

For a Cam-Grid type belt to function properly, it needs to be somehow fixed on each edge of the belt to the belt cross rods. This keeps the links positioned correctly, allows the links on either edge to act jointly as a pair when the belt articulates, and prevents the belt from "tenting" on one or both edges, especially when the belt is collapsed. For the Cam-Grid type belt, the method for attaching the links to the cross rods is welding. This is accomplished by using a two-step manufacturing process. First, the ends of each of the rods are upset-welded to form a larger diameter buttonhead. This sets the overall belt width and further prevents the belt components from slipping off the ends of the rods during the belt assembly. But the links have not yet been fixed to the rods; that comes with the next weld step. In that step, the buttonheads are welded to the links on both belt edges, and the same links are welded directly to the rods along the inner legs of the Cam-Grid links. These welds are applied using filler material, and the welds along the outer edges can be either single welded or double welded. On a single welded belt, the weld is located on the leading edge of the buttonhead and on the leading edge of the cross rod on the inside of the link. On a double welded belt, the trailing edge of the buttonhead is welded first, then on a secondary pass, the leading edge is welded.

Cam-Grid Series offering

- Cam-Grid 3/4" pitch
- Cam-Grid 1" pitch
- Cam-Grid 1.2" pitch
- Cam-Grid 1-1/2" pitch (Extra)
- Cam-Grid HD 1" pitch tight radius

The reasons for the double welded design are for additional belt strength and fatigue resistance. The double welded belt is capable of handling higher loads and speeds, and this is reflected in the published belt ratings.

Cam-Grid weld appearance

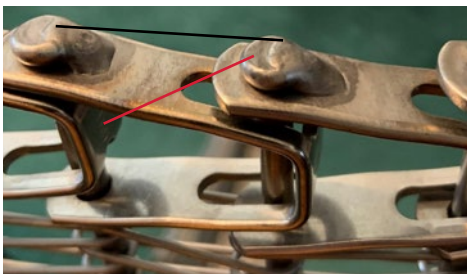
Single weld construction

In the single weld photo, one can see where the secondary weld overlaps the front edge of the buttonhead. The black lines are pointing to the weld overlap. The red line is pointing to the original surface of the buttonhead. The welds must be smooth (free of burrs and other rough surfaces) so not to cause any damage to the drive bar caps as the rotating drum glides past the inside edge of the belt on a spiral conveyor.

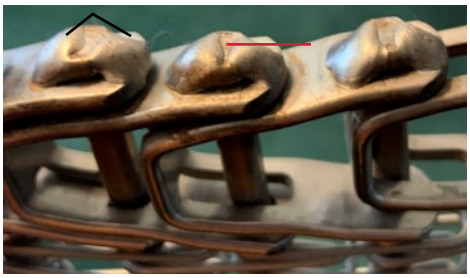
Double weld construction

In the double weld photo, the black arrows show both front and rear welds (double welded). The red arrow shows the original surface of the buttonhead. This is the normal appearance for a double weld belt. The gap between the welds varies depending on the size and shape of the welds. Again, the welds must be smooth so not to cause any issues with the drive bar caps.

Because the procedure for applying the secondary welds to the links and buttonheads on the Cam-Grid style belts, there can be some variation in the appearance of those welds. These welds are produced using weld filler material applied to the belt component surfaces under intense heat. So, the appearances of these welds can vary based on the particular flow of that filler material during the weld process. Above all, it is most important to get good weld penetration, so that becomes the primary focus. Minor variations in overall weld appearances become of a secondary concern and should not necessarily be a proper criterion for judging the quality of the overall product. Obviously, welds that are noticeably too small or those that are excessive in size can be manufacturing defects, but in general a proper range in the size and shape of the secondary welds should be completely acceptable and even expected for this product. It is the proper application of the secondary welds along the edges of the Cam-Grid belts that give the belt its strength to withstand high tension and its longevity to resist fatigue failure.



Cam-Grid single weld construction.



Cam-Grid double weld construction.

CAM-GRID BELT INSTALLATION

Proper installation is critical for avoiding premature belting failures, damage to the belt or conveyor, reduced performance and unnecessary downtime. Never attempt installation or maintenance on a moving conveyor belt. Conveyor must be "off" with the power source locked out. Always wear proper safety equipment when performing installation or maintenance. Keep clear of moving conveyor belts at all times. Support the belt to prevent uncontrolled movement of the belt and parts.

Procedure

Cam-Grid belting is normally shipped in 50-foot rolls. In order to make the belt endless, connect one or more sections of belting together. To obtain optimum performance, it is recommended that the following procedure be used:

1. The belt should be placed on the conveyor with the proper orientation to the direction of travel **(Figure 4)**.
2. Insert the threaded connector through the threaded end on the outside edge of the belt (and mesh when present, ensuring the pig tail and mesh wires of the adjacent spirals alternate). Attach nut. Ensure that the nut does not protrude farther than the adjacent upset welds. Remove excess thread length with a hacksaw or hand grinder.
3. Using filler material recommended for type 304 (306, 308) or solver solder, weld upset head and nut in the same fashion as the other links and weld (or solver solder) the insides of both links attempting to achieve the same weld size and shape as the factory weld. Welds must be made with the belt lying flat on both edges.
4. Deburr welds to button head surface leaving no sharp edges to cut plastic drive bars (nut and threaded edges should be melted smooth with a welding torch).

Drive and shaft sprockets

Sprockets are required on the drive shaft in line with the links. Both sprockets must be keyed. Intermediate support rollers or discs are required to support the belt between sprockets.

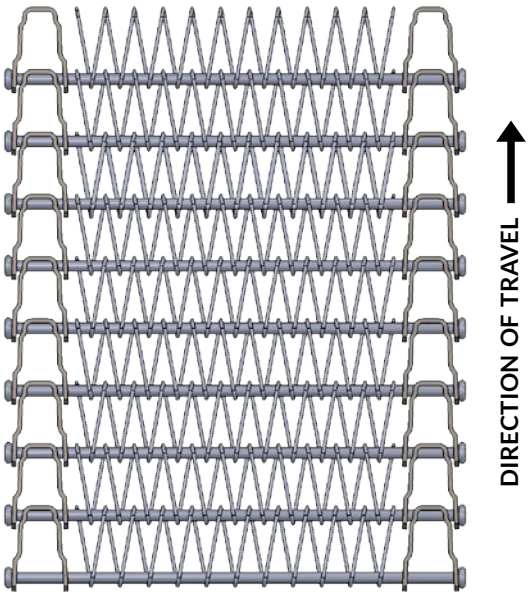
Tail sprockets (if used)

Install key, setscrew and locking collars on one sprocket only. The other tail sprocket should be installed without key or setscrew. Collars should be placed on both sides of each sprocket with 1/32" clearance between collar and sprocket.

Required tools for installation

- Tape measure
- Grinder (cutting wheel, sand disc)
- Vice grips or channel locks
- Tig welder
- Lifting straps
- Stainless steel wire wheel (brush welds)
- Bolt cutters
- Stands to hold rolls of belting
- Pipe to go through roll of belting
- 100 3/8" Ø multi-braid rope (375 lb. rating)
- Tension testing device

Figure 4 — Cam-Grid belt direction of travel



Cambri-Link and DuraLite Spiral Cage Belts

GENERAL BELT INFORMATION

Cambri-Link® Series offering

- Cambri-Link 1" pitch leading edge performance link

DuraLite Series offering

- DuraLite 1.33" pitch leading edge DuraLite

Required tools for installation

- Tape measure
- Grinder (cutting wheel, sand disc)
- Vice grips or channel locks
- Tig welder
- Lifting straps
- Stainless steel wire wheel (brush welds)
- Bolt cutters
- Stands to hold rolls of belting
- Pipe to go through roll of belting
- 100 3/8" Ø multi-braid rope (375 lb. rating)
- Tension testing device

CAMBRI-LINK AND DURALITE BELT INSTALLATION

Proper installation is critical for avoiding premature belting failures, damage to the belt or conveyor, reduced performance and unnecessary downtime. Never attempt installation or maintenance on a moving conveyor belt. Conveyor must be "off" with the power source locked out. Always wear proper safety equipment when performing installation or maintenance. Keep clear of moving conveyor belts at all times. Support the belt to prevent uncontrolled movement of the belt and parts.

Procedure

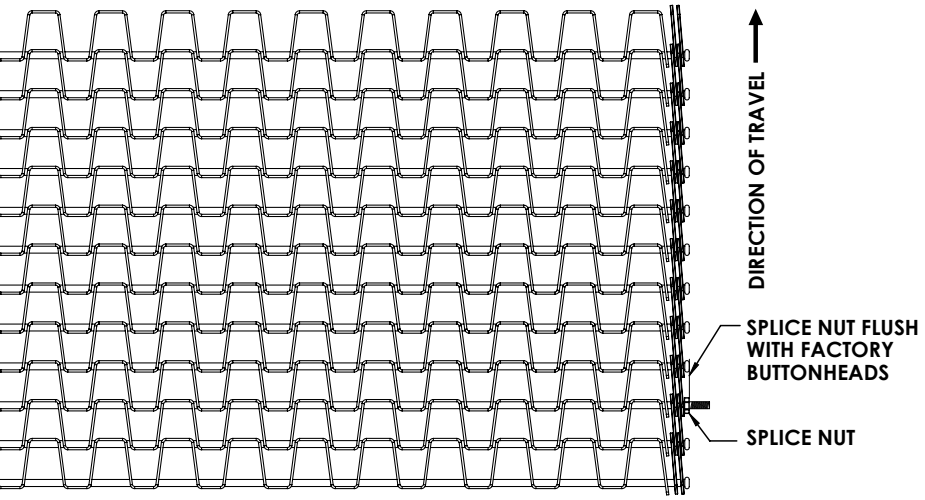
Cambri-Link belting is normally shipped in 50-foot rolls. In order to make the belt endless, connect one or more sections of belting together. Connecting rods and nuts are supplied.

1. The belt should be placed on the conveyor with proper orientation to the direction of travel (**Figure 5)**.
2. The threaded connector rods must be installed with the nuts located on the outside belt edge to prevent damage to the conveyor inside radius wear surface.
3. Insert threaded connector rod and attach nut. Ensure the nut does not protrude farther than adjacent rod buttonheads (**Figure 5**).
4. Fix nut from rotating by very lightly tack welding or soldering nut to rod. Do not weld nut or rod to reinforcing bars.
5. Deburr sharp protrusions so that the result is smooth and uniform with the adjacent rod welds.

Drive shaft sprockets

The first sprocket from each edge should be located at the third wicket opening. Sprockets should be placed no more than 6" apart and engaging the rod at odd numbered openings. Sprockets should be placed in the center of the opening with teeth engaging the rod. All drive sprockets are to be keyed and fixed to the shaft with a setscrew.

Figure 5 — Cambri-Link belt direction of travel and splice detail



Tail sprockets (if used)

The first sprocket from each edge should be located at the second wicket opening. Only one sprocket should be keyed. Sprockets should be spaced no more than 6" apart and engaged in the even numbered openings.

Install key, setscrew and locking collars on one sprocket only. Other tail sprockets should be installed without keys or setscrews. Collars should be placed on both sides of each sprocket with 1/32" clearance between collar and sprocket.

Before running the belt after installation, verify that all safety guards are back in place, all edge guides are in place and that the belt is properly engaging the sprockets.

Post-Installation Procedure

SYSTEM CLEANING

Follow the previously-described sanitation guidelines and thoroughly clean the system prior to running any test

BELT TESTING PROCEDURE

1. **Empty ambient test:** Run the system at the slowest speed possible, posting people at several locations to watch the belt (take-up, infeed, discharge and around the cage). Determine the tightness of the belt by pulling it off the cage at first. Adjust overdrive accordingly, allowing several revolutions between any overdrive adjustments. Use a tension tester device through the system to get tension data throughout the process.
2. **At temperature test without product:** repeat the process done with the ambient test, but now at operating temperature. Continue to utilize the tension tester device throughout the process and adjust overdrive as needed.
3. **At temperature test with product:** Repeat the process at operating temperature and with product on the belt. Use the tension tester device throughout the process and adjust overdrive as needed.

BELT BREAK-IN PROCEDURE

Cam-Grid belt break-in

Cam-Grid typically generates little to no dust even on break-in as the links are tumbled. Therefore, no hard requirements are published related to break-in period. If there is significant dust it is usually a link defect or over tensioning above the Cam-Grid belt's rating. That said, a general estimate to detect any dust or defects is approximately 300-400 duty cycles.

Cambri-Link and DuraLite break-in

Cambri-Link and DuraLite break in cycles: 1300-1500 duty cycles. For these belts, the duty cycle is defined as when the belt collapses on the inside edge. For example, a straight through system has 1 duty cycle per revolution. A system with an offset (infeed offset from discharge) has 2 duty cycles per revolution.

- Duty cycles: Duty cycle calculates the break in period for the belt, giving you the number of hours before the belt is broken in. In other words, it is an approximate amount of time for the belt to begin operation without wear debris.

  NOTE: *If you see wear debris after the appropriate break-in period, check the belt's tension.*

((Belt speed [fpm] *60) / actual belt footage in system) * offset multiplier * system hours = Duty Cycles
Example straight thru system: 50 fpm, 400 system hours, total footage 1500'
((50*60)/1500) *1*400 = 800 Duty Cycles

System offset multiplier
straight thru = 1
90-270° offset = 2

Maintenance and Troubleshooting Guide

COMMON PROBLEMS, SYMPTOMS AND REMEDIES

The following is a summary of common problems and solutions for low tension spiral cage systems. For support in these areas, contact Rexnord Application Engineering.

Contact our Application Engineering team for more information at 800-638-9560 or online at rexnord.com

Problem	Symptoms	Possible Causes	Remedies
Outside belt edge "lifting up" on upper tiers (or possibly inside edge lifting up)	• Excessive tension	• Overdrive not set correctly • Contamination from product on belt or belt contact surfaces	• Increase drum speed (overdrive) • Clean belt • Clean rails (rags) • Lubricate outer rails • Clean drive bars • Contact Application Engineering
Excessive mesh or wicket wear	• Broken wickets/ spirals • Excessive wear in one or two specific areas of the belt	• Missing wear strip on rails • Product contamination on support rails • Metal impregnated in UHMW support rails	• Replace wear strip • Clean belt and system
Rods breaking sporadically	• Belt deflection at discharge, infeed or breakover shafts • Broken rods	• Misplaced roller supports and/or sprockets • Frozen or jammed sprockets or rollers	• Sprocket and/or rollers spaced no more than 4-6" apart on all shafts • Replace sprockets and/or rollers • Replace broken and damaged rods
Worn sprockets on take-up drive	• Teeth of sprockets are worn and/or "grooved-out" • High tension • Excessive elongation of belt	• Improper overdrive • Improper synchronization of take-up drive and cage drive • Sprockets placed in wrong belt openings • Excessive tension/hours	• Replace sprockets • Adjust take-up speed • Re-position sprockets • Flip belt (if within flipping requirements) or replace belt
Belt "crash"	• Bet "bunching" or "tenting" on inside edge near the drum • Damaged belt in specific location • Belt pulled tight on drum	• Product caught or wedged between belt and drive bars of drum • Broken welds, links or reinforcing bars which weaken the belt • Repeated tension spikes in the system • Belt caught/snapped on edge guides	• Inspect cage and belt path for obstacles • Contact Application Engineering • Upgrade belt to a Leading Edge product • Replace belt
Belt wear, black debris	• Black wear residue on belt	• Missing wear strips on rails • "Break-in" debris • Worn/contaminated edge guides • Worn/contaminated wear strips	• Break belt in for the recommended hours or duty cycles (whichever is greater). ***NOTE:*** *The system should be frequently washed during this time frame*

Maintenance and Troubleshooting Guide

BELT FLIPPING GUIDELINES

When applicable, flipping the belt is useful for extending the life of a belt in spiral applications. Below summarizes whether or not a belt can be flipped by belt product type. **Belt flipping is recommended every 4,000-6,000 hours.**

Notes on belt flipping

- Tight radius belts cannot be flipped
- Belts that have lane dividers, extended reinforcing bars or combo links cannot be flipped
- Leading edge construction can only be flipped if the leading edge is on both sides
- The pitch difference between the inside and outside edges must be within 1/8" of each other
  - Cam-Grid Xtra: 8 pitches
  - Cam-Grid 1.2: 10 pitches
  - Heavy Duty Tight Radius Cam-Grid: 12 pitches
  - Cam-Grid ¾": 16 pitches
  - Cambri-Link: 12 pitches
  - DuraLite: 9 pitches

Belt construction	Inside edge	Outside edge	Flippable
Standard Radius Cam-Grid			
Standard duty links	Yes	Yes	Yes
Heavy duty links	Yes	Yes	Yes
Heavy duty non-collapsing links	No	Yes	No
Reduced Radius Cam-Grid			
1" pitch standard duty reduced radius links	Yes	Yes	Yes
1" pitch heavy duty links	No	Yes	No
Cam-Grid Extra			
Standard radius links	Yes	Yes	Yes
Reduced radius links	Yes	Yes	Yes
Cambri-Link			
STD radius EHD double reinforcing bars	Yes	Yes	Yes
Reduced radius Cambri-Link (1.7 turn ratio)	Yes	Yes	No
Reduced radius Cambri-Link (1.5 turn ratio)	No	Yes	No
DuraLite			
Oversized radius	Yes	Yes	Yes
Standard radius	Yes	Yes	Yes
Reduced radius	Yes	Yes	No
Tight radius	Yes	Yes	No
Super tight radius	No	Yes	No

MEASURING ELONGATION FOR BELT REPLACEMENT

After a certain amount of elongation, belting will no longer effectively engage with the sprocket, increasing risk of failure. Below is a summary of common belt pitches with their elongation measurements indicating a belt replacement is necessary.

Belt pitch	Nominal section measurement	Length for replacement
3/4" pitch Cam-Grid	16-pitch sections measure 12" in length	12-3/8"
1" pitch Cam-Grid	12-pitch sections measure 12-15/16" in length	13-3/8"
1” pitch Cambri-Link	12-pitch sections measure 12-15/16" in length	12-7/16"
1.2" pitch Cam-Grid	10-pitch sections measure 12" in length	12-3/8"
1.33" pitch DuraLite	9-pitch sections measure 11-31/32" in length	12-13/32"
1.5" pitch Cam-Grid	12-pitch sections measure 18-1/2" in length	19-1/16"

REXNORD

CAMBRIDGE
ENGINEERED SOLUTIONS

800-638-9560
rexnord.com

ALL AROUND THE GLOBE,

CUSTOMERS TRUST OUR PROVEN BRANDS.

WHY CHOOSE REXNORD?

When it comes to providing highly engineered products that improve productivity and efficiency for industrial applications worldwide, Rexnord is the most reliable in the industry. Commitment to customer satisfaction and superior value extend across every business function.

Delivering Lowest Total Cost of Ownership

The highest quality products are designed to help prevent equipment downtime and increase productivity and dependable operation.

Valuable Expertise

An extensive product offering is accompanied by global sales specialists, customer service and maintenance support teams, available anytime.

Solutions to Enhance Ease of Doing Business

Commitment to operational excellence ensures the right products at the right place at the right time.

FT3-008 01/21