siegling prolink
modular belts

FITTING AND MAINTENANCE INSTRUCTIONS

for Prolink modular belting in drum-driven spiral systems

Content

Siegling – total belting solutions

Forbo MOVEMENT SYSTEMS

PRIOR TO BELT FITTING

The customer ultimately remains responsible for the overall safety of the work environment and work crews throughout the installation and start-up process. This includes training installation and work crews on all company safety rules and procedures as well as insuring that appropriate safety lock-out discipline is maintained.

Inspect the spiral system to insure it is ready before proceeding with the installation of the new belt.

Inspect the unit's support rail wear strips and cage bar cap material. Replace worn, broken and damaged material as necessary. Forbo-Siegling strongly recommends new wear strip and cage bar cap material be installed when using new Prolink Series 5 or Series 9 belt for the first time.

Before any work is started, it is assumed that;

- A full engineering evaluation of the system has been undertaken and that the design have been made in order that the spiral is suitable for use with a Forbo Siegling Prolink modular belt.
- A physical check on the belt and sprockets has been undertaken to ensure that the products are as ordered.
- The spiral system has been checked thoroughly for possible snagging or binding points and all snagging and binding points have been eliminated.

It is of the utmost importance that belts are allowed to run free without binding or snagging on any part of the fabrication

Note: All belt widths quoted are nominal and are subject to manufacturing tolerances and material shrinkage (details of tolerances are available on request).

Fire warning for Prolink plastic modular belts

Prolink belts are made of various high-quality plastic materials that can burn. If ignited, products made from POM material, will emit toxic fumes. During operation, storage and installation **never** expose Prolink belts to an ignition source, such as flames, sparks, burning or very hot objects, or excessive heat. Special care should be taken when undertaking repair work particularly when welding on or near a conveyor if the conveyor is equipped with a Prolink plastic modular belts.

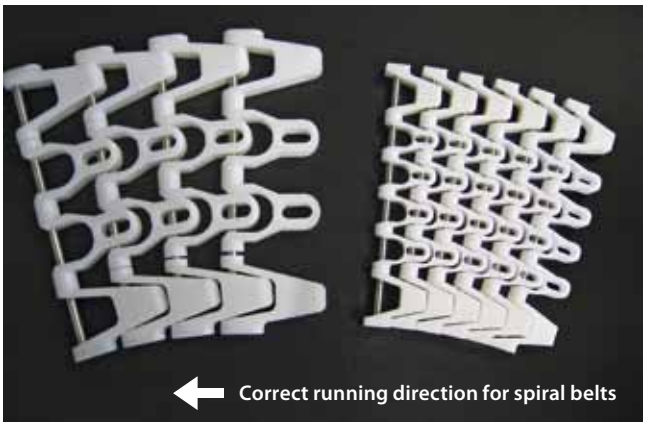
Hazards from burning Prolink belts vary depending on material composition and environmental conditions such as temperature and oxygen availability. Hazards may include dense smoke, toxic gases or fumes, a flame that is difficult to detect, and spreading of fire due to movement of the burning belt and/or dripping, burning, molten plastic.
Suitable fire extinguishing media include: water spray, foam, and dry chemical.

FITTING OF BELTS TO A DRUM-DRIVEN SPIRAL

If fabrication work has taken place that would cause contaminates to imbed into the UHMW wear strips then care needs to be taken to washout this foreign matter prior to pulling the belt round the system.
Ensure all plastic guides have tapered leading edges so as not to snag the belt.

Before the belt is installed, the belt path should be checked for snagging and binding points. Clearance should be confirmed by pulling approx. one metre of belt through the system. This belt needs to move freely through both support and return sections to ensure optimum performance.
Prior to fitting the belt, ensure that the Belt is fed onto the Spiral the correct way up and in the correct running direction (see below). Ensure that the belt when fed through the system will locate correctly onto the sprockets.

Use a rope or cable to attach to the spiral belt to the cage for installation.



Cleaning and lubrication of wearstrips during installation

Attach two rows of clean shop rags to the underside of the belt directly over the area wear the belt support rails. The first row of rags should be dampened with clean water. The second row of rags should be spaced approx. 1 – 2 m directly behind the first row of rags. This second row of rags should be lightly dampened with food grade mineral oil. These rags should ride the belt completely through the spiral system during the installation process only.

This "ragging" procedure serves two purposes:

1) the water dampened rags will clean the support surface of the support rails, and
2) the mineral oil will lubricate the belt as it slides through the system, easing the installation process. The food grade mineral oil will evaporate within a few hours after the installation of the belt.

Each section of belt should be added by using the pins provided. Pins are held in correct position by two clips that snap over a groove in the pin at each side. When fitting pins ensure that the clips are correctly installed by verifying that they are flush with the belt module.

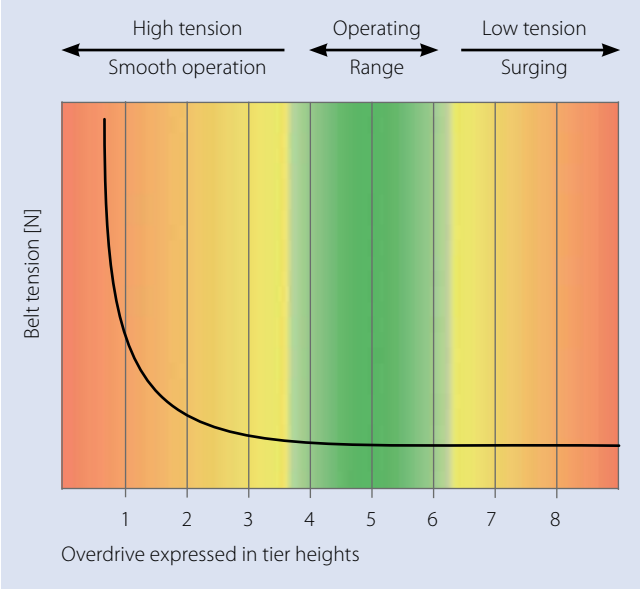
Final belt length adjustment is generally undertaken at the tension roller. The change in belt length due to belt tension and temperature changes must be allowed for. The initial belt length will "grow" during the first few days or weeks as the pins and modules seat together.

Insure that the inner edge hold down rail in down go spirals is not pinching the belt, nor should it be more than approx. 6 mm above the belt.

Check that the belt has enough clearance on leaving the drum for the swing effect. Leave approx. 25mm for every 300 mm of belt width

INITIAL START-UP AND MAINTENANCE INSTRUCTIONS

Insure that **all** Safety Equipment is in working order (emergency stops, etc.) for spiral belt.
It is of the utmost importance that the admissible belt pull during operation and at rest is not exceeded, (Refer to Prolink data sheets).
In a low tension spiral the drum (or cage) is always turning faster than the inside edge of the belt and is therefore always in overdrive. The aim is to set the amount of overdrive relative to the desired belt speed in order to achieve the least amount of pull needed to move the belt.



It is important that the optimum overdrive be set for a particular spiral, as each unit will vary slightly in respect to the friction coefficients in the system. Too little overdrive will result in high belt tension that will cause the belt to flip up (Christmas tree) and result in greatly reduced belt life. Too much overdrive will cause the belt to surge and result in excess product movement.

Measuring overdrive

This can easily be accomplished with the following four steps;

1) Face the spiral at a convenient point and identify a particular cage bar or a point on the solid drum with a marker pen.
2) When the spiral is rotating, place an object on the inside edge of the belt in line with the mark on the cage bar or drum.
3) After one revolution of the "mark" (on cage bar or drum) note how far the "mark" is in front of the product (product will appear on the next tier) previously placed on the belt. This distance can be expressed in equivalent of drum bars passed or measured in mm.
4) The number of cage bars times their pitch or the measured distance has to be divided by the Tier pitch. This ratio equates to the amount of overdrive.

What is the correct overdrive?

This always has to be adjusted to each particular spiral, but as a general rule a plastic belt using smooth plastic cage bars will require an overdrive of 4 – 5 tiers.

It is better to initially have high overdrive for the reasons previously discussed. It is suggested that the overdrive is "fine-tuned" when the system is fully loaded and operating at the usual speed and temperature. When setting up the user should try for overdrive of 4 to 5. If the belt does not surge that is probably a good setting. If the belt surges, reduce the overdrive a little and the surging should stop.

Extremely high overdrive will cause the cage bars to wear very quickly and in the event of an emergency, the system will be much harder to stop. However, plastic belts do not give any appreciable cage bar wear.

Remember: Too little overdrive creates too much tension and ruins belts; too much overdrive will not significantly lower belt tension compared to the ideal settings.

BELT TENSION

The modular spiral belt is like a stiff rubber band and will therefore stretch as the tension increases. As the belt stretches, it will accumulate in the take up loop.

The increased tension will be apparent as the take up roller drops in the take up loop.

The following conditions are some causes of increased tension in a belt.

1) System previously running empty but now full of product (Higher loads).
2) The systems originally clean but as the support, wear strips and belt become contaminated tension increases (Friction between wear strips and belt increases).
3) Overdrive reduced (for example to eliminate unacceptable belt surging).
4) In freezers as the temperature increases the friction due to contaminates increases (Cooking oils and fats that are hard on wear strips and belt at -35 °C become very sticky and increase friction at -5 °C)

Note: A dropping take up roller in normal operations correlates to higher belt tension, which correlates to higher motor current.

By noting the position of the take up roller over a period of time it can be seen whether the tension in the belt has increased or decreased. It is suggested that after the controls have been set a reference mark be made on the frame to indicate the centre line of the take up roller. Any movement up by the roller signifies a drop in tension whilst a drop in the tension roller will indicate an increase in belt tension (Readings should be taken when the belt is at the same environmental temperature).
After all installations carried out the belt tension can be checked with the Forbo Siegling belt tension device and a graph of results provided.

Take up tension roller

The tension take up roller must be of a weight just sufficient to counter balance the weight of the belt (remember the belt length will vary). Any excess weight in the take up roller will result in over-loading the belt with unnecessary tension.

Cage and take up/tension motors

The Cage motor speeds must be adjusted to produce the lowest belt tension possible without belt surging.

Belt lubricators

With Forbo Siegling modular spiral belts, it is generally not necessary to use a lubricant. If however in unusual situations where a lubricant is felt necessary, the lubricant must be checked to ensure it is compatible with the belt material. The lubricant must not get on to the inside edge of the belt or the cage bars as this would reduce friction and lower the cage drive.

Safeties

Before starting the spiral, it must be verified that all belt-lifting detectors and other safeties switches are installed and fully functional.

Cage bars/wear strips

Cage bars and wear strips should be checked periodically for damage and wear. Damaged, worn or missing cage bars or wear strips may cause the belt to bind or snag therefore they should be replaced.
It is important to check all return wear strips for wear as this will cause extreme tension if worn through to metal.

Belt damage

The belt should be periodically checked for damage. Any damaged modules or pins should be replaced and the cause of damaged determined and rectified.
The above points to be checked at all spiral start up to ensure that the Prolink modular belt is run at the lowest tension and this will give the optimum belt life for the system.
The most common form of belt damage is caused by objects left on the spiral belt, which cause a blockage in the spiral system.

BELT WASHING GENERAL INSTRUCTIONS

Introduction

Hygiene standards for food production are constantly improving. For Forbo Siegling, being a major supplier in this market segment, hygiene has always been a key factor. A plastic spiral belt is a big step forwards in hygiene and in the implementation of HACCP. Compared with stainless steel the main advantages are **no** black wear debris caused by the metal components and the clean top surface.
However, for a proper functioning spiral, the belt underside, support rails and cage drum/bars are important.

Why clean the belt and cage

To maintain the spiral belt at the lowest system tension possible it is required that the friction between the rail wear strip and belt is kept to a minimum.
It is also required to maintain a high friction drive between the cage and the belt so the friction of the cage bars is kept as high as possible.
Both rails and cage must be kept clean.

What happens if the installation is not cleaned?

If the rails are not cleaned, the friction will increase between belt and wear strip and the system tension will increase.
The effect will be seen in several ways;

1) The cage drive will begin to use more power to overcome the frictional forces; in extreme cases, the cage motor could trip on overload.
2) As tension increases the take up weight will lower, and could activate take up low switches.
3) At points of highest tension on the spiral, which is on either the first tier on up drums, top tier on down drums or the first tier of the second drum on double drum systems the belt may lift, known as a Christmas tree. This will result in possible damage to the belt but certainly a loss of production, as the tier lift detectors will stop the spiral.
4) It has to be remembered also that excessive tension will cause excessive belt wear, which will shorten belt life.
5) If a belt is not cleaned on a regular basis hygiene considerations could become an issue.

When should the belt be cleaned?

This will depend on the types of product fed through the spiral; the more spillage on the belt will result in more frequent cleaning times.
The less contamination on the belt will extend times between cleaning.
A product in a sealed carton will offer little contamination to the belt but a flour-covered product may require daily belt cleaning.

The best indicators of a contaminated belt are, dropping take up weight and increased current on the cage drive.
With regard to wear strips which are also a good indicator of contamination within the system. The spiral is first stopped and if a clean white cloth is wiped over the wear strip shows black contamination this indicates the wear strip requires cleaning.
The above indicators will eventually show the frequency for cleaning.

General points with regard to keeping a spiral belt clean

1) Ensure that the product is fed into the spiral in a regular way, if product touches due to incorrect speed it may damage and produce contamination on the belt. It could also cause a blockage on the spiral tiers.
2) Any conveyor feed to the spiral must be synchronised to the spiral controls, i.e. when the spiral stops feed systems must not carry on feeding
3) Transfers on and off the spiral must not cause product build-ups, which may damage or spill product on to the spiral belt.
4) When a product, which is coated with flour or other coatings, is fed into a spiral it is advised to remove any excess coatings by use of an initial transfer conveyor to the spiral. The removal can be done by the use of compressed air or vacuum systems.

Contamination increases friction and hygiene problems.

Ways of cleaning spiral belts

There are several methods presently used for the cleaning of spiral belts.

1) In line belt washers- these generally use high-pressure sprays combined with an air knife system for drying the belt. Can incorporate hot and cold water plus detergents, plus a mechanical rotating brush. Used on both ambient and freezers
2) C.I.P. systems these are generally total system cleaners, which try to clean all the surfaces of the spiral belt, rails and cage. Use hot and cold water plus detergents. Only used in an enclosed spiral system such as a freezer.
3) Manual system incorporating a high-pressure hose and operator.

Whichever system is used the aim is to clean the belt modules, rail wear strip and cage.

The cleaning of the Spiral Modular plastic belt

1) The first stage of any cleaning process is to find out what the belt material is, as this will affect the temperatures of water to use and what types of detergents which can be used. Also check on wear strip and cage bar materials as these too will be affected by cleaning, some wear strips may have lubrication impregnated in them and some detergents can wash it away.
2) Consider the type of contamination to decide on which method of cleaning is appropriate and also what detergent is most suitable. Suppliers of detergents will give direction on detergent types if the above information is given.
   a. Plastic belts are resistant to most forms of chemical attack see the attached chemical resistance list.
3) As cleaning is also a hygiene requirement it may be that the spiral belt is to be disinfected, a real clean surface is the result.
4) When using hot water check on the allowable temperatures the plastic belt can withstand generally do not use water temperatures in excess of 80 °C.
5) First Stage – Remove excess contamination and carry out a pre-rinse with water to soften any contamination.
6) Second stage – Dose the belt with the approved detergent, it is advisable to leave this on for a period to aid the breakdown of contaminates.
7) Third stage – Wash the belt with hot water to remove all the contaminates,
8) Final Stage – Rinse with cold water, to remove all trace of detergent.
   a. If the belt is not clean, repeat the last three stages.

After the belt is clean, which may be checked by eye or swab tested the spiral may be disinfected.

It is important that any detergents used are not too viscous or applied too much as they could create a tension problem, also detergents must not smear or leave deposits on the rails or belt as this will cause tension build up on spiral start up.

9) With most systems an air knife can be used to ensure the belt is dry before use, this is a priority with belts on freezer spirals as any free water could freeze the belt and damage modules when the refrigeration plant is switched on. In extreme cases the belt could freeze to the rail wear strip.

Rail and Cage cleaning

The above methods have mainly concerned cleaning the belt but it is important as mentioned to ensure clean rail wear strip and cage.
There will be partial cleaning of the rails and cage by the action of the belt but for extra cleaning there are two other methods.

1) The rail wear strip can be cleaned by hand by the use of a cloth soaked in a cleaning agent. This will involve lifting the belt off the rails with the belt stopped and rubbing the wear strip clean. In some cases on wide belts this it may not be possible to reach the inner wear strip.
2) Where the belt is too wide for rail cleaning it is possible to place a piece of cloth between the belts and wear strip and the belt weight will keep the two in contact. The spiral is then operated and the action of the belt will move the cloth around the system cleaning the rails. This may have to be repeated several times to ensure the rail is clean.

It is very important to remove the cloth before it can tangle on sprockets.
Collect all used cloths (count the number before you start) when one is left in the spiral it could cause a possible blockage of the system when the spiral is in operation with product.

Cleaning of the cage is usually carried out with the cage stopped as the use of water and detergents lowers the friction of the cage to belt to such a limit that little drive is imparted to the belt and can cause tension increases and belt lift.
The usual method is to spray the drum with the use of a high-pressure hose plus the use of detergent. The cage is usually not required to be cleaned very often unless the product is in constant contact with the drum and is of an oily nature.

Important!

- Never use an acid cleaning agent in combination with a chlorine-containing agent: Dangerous chlorine gasses will develop.
- Chlorine can affect process equipment such as stainless steel and rubber parts.
- Acid agents can affect aluminum and galvanized steel parts.
- Temperatures above 70 °C must be avoided to prevent proteins sticking to the surface. Fats can be removed at lower temperatures, if proper cleaning agents are used.

Manufacturer notification

Please consult local suppliers in your area for their recommendation on cleaning detergents/chemicals based on the belt material.

Recommendations:

- Never exceed the concentration, temperature, and dwell time indicated of the cleaning agent's directions for use.
- Wash-off cleaning agent thoroughly to prevent agent residuals from affecting the conveyor.
- Keep safe and sufficient distance between high-pressure nozzle and belt surface.
- To avoid bacterial resistance against the used disinfectant, a regular disinfection with another disinfection agent (like a chlorine containing disinfectant or a different disinfectant) is advised.

If the above cleaning recommendations are carried out, the Forbo Siegling Prolink modular spiral belt will operate correctly.

Should you have any questions with regard to the operation of Prolink belts on spirals please contact your local Forbo sales representative.

TROUBLE SHOOTING ON SPIRAL SYSTEMS

Take up roller is low or dropping

The spiral belt is in tension so check the following. Remember if the take up roller drops there is less belt in the system and the belt is tight, if it goes up the system is taking in belt, and having lower tension.

- Is there a product block?
- Check product fed into spiral evenly, check for product gap at infeed.
- Is product too high, check product height.
- Is product moving on the spiral belt?
- Foreign body on spiral, causing blockage against arms.
- If freezer or cooler is air velocity moving product on the spiral belt, check at mezzanine floor levels.
- Is product spillage causing contamination of belt and hence high friction, which will increase belt tension?
- Check for belt snag on returns.
- Worn wear strip, exposing steel, which causes high friction.
- Damaged belt guides.
- Check operation of cage.
- Is cage motor overloaded, not large enough drive motor?
- Seized cage support bearings, top or bottom.
- If a freezer, check that the belt is not frozen to rails, if the spiral has been stopped.
- Spiral stopped for more than 10 mins could cause belt to freeze to rails especially if product has high water content.
- Check if spiral stopped at meal times.

Belt lifts (Christmas tree) on spiral

- If bottom tiers check return for snagging of belt. Look for belt catching on bearing bolt heads.
- If on top of spiral check for product blockage or dirt on wear strips.
- Check for worn or damaged belt guides.
- If none of above check cage drive not tripping or the cage is slowing down.
- If central drive check the gearbox.
- On chain-drive systems check for chain break.
- If sprockets fitted check for alignment. The belt must not rub against any metal side plates.
- Ensure all rollers turning and that bearings are all OK.

Belt lift (Christmas tree) not on top or bottom of spiral

- Check for product blockage.
- Check for damaged cage bars.
- Check for rail wear strip damage.
- Check for raised rail wear strip
- Check for damaged module.
- Check for elongated or loose joining pins catching on cage bars.
- If freezer check that, the belt is not frozen to rails, if the spiral has been stopped.
- Check operation of belt lift sensors.

Belt stops moving

– Overdrive gearbox stopped, or tripped.
– Snapped belt.
– Check electrical controls.

Belt surges

– Too much overdrive.
– Possible blockage occurring.
– Check operation of any variable speed drive invertors.

Belt damage

– Broken outer modules caused by high tension.
– Check for belt snagging on guides, bolt heads.
– Over feeding of product, causing high tension.
– Wear on underside of belt, check for missing rail wear strip.
– Wear on belt edge, check for missing cage bars or snagging on belt guides.
– Check belt returns for missing wear strip.

Double drum systems

On these systems, the same principals as mentioned above apply but the most common place for a belt lift is as the belt leaves the up drum and enters the down drum. This is usually the point of highest tension.
If this occurs, any of the above points are factors but they are increased as the belt has a length of crossover to pull the belt over after leaving the up drum so increasing tension.

Other points to consider are if the up drum is feeding belt at the correct speed to the down drum.

– Check that the up drum cage is revolving faster than down drum, usually about 10 % more rpm.
– Ensure the crosses over guides are not snagging the belt.
– No product blockages at this point.
– Check product alignment as it leaves up go cage.

Please note the single biggest reason for belt lifts is usually an increase on system tension caused by the wear strips or belt been dirty.

As a rule always, check backwards from a tier lift to find the problem.

If a problem persists contact Forbo Siegling.

Siegling – total belting solutions

Committed staff, quality-orientated organisation and production processes ensure the constantly high standards of our products and services. The Forbo Siegling Quality Management System is certified in accordance with ISO 9001.

In addition to product quality, environmental protection is an important corporate goal. Early on we also introduced an environmental management system, certified in accordance with ISO 14001.

Forbo Siegling service – anytime, anywhere

The Forbo Siegling Group employs more than 2,200 people. Our products are manufactured in nine production facilities across the world. You can find companies and agencies with warehouses and workshops in over 80 countries.
Forbo Siegling service points are located in more than 300 places worldwide.

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