



CONVEYOR SYSTEM WLX

Engineering guideline

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Engineering guidelines

WLX system Easy clean

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1 Modular plastic belt conveyor WLX Easy clean



1.1 System overview

FlexLink's WLX stainless steel conveyor is designed to fit into demanding primary and secondary packaging applications. It addresses important aspects of today's packing processes, such as being easy to clean, smooth handling of products, safe for operators, robust design, long life, and easy to maintain with a low cost of ownership.

The modularized and standardized design ensures fast set up, and facilitates rapid future extensions and changes.

1.2 Separation of larger surfaces

To simplify cleaning and to ensure consistent results, larger surfaces have been separated to improve access between them for cleaning and inspection of results. This separation also improves drainage and speeds up the drying process after cleaning. Also, the bearings are separated 25 mm from the framework with spacers to prevent contamination.



1.3 Small contact surfaces

To make the cleaning process faster and consistent, the small contact surfaces within the frame have been designed in order to eliminate hard-to-reach areas.



1.4 No open threads

Due to the difficulties of keeping open threads clean, all threads in the conveyor are covered from the top down to the floor.



1.5 Reduction of sharp corners

To achieve efficient and consistent cleaning results, it is important to avoid sharp corners that are hard to clean. Both inside and outside of the framework, smooth edges have been added at perpendicular contact surfaces to aid operators when cleaning the conveyor in both wet and dry applications.

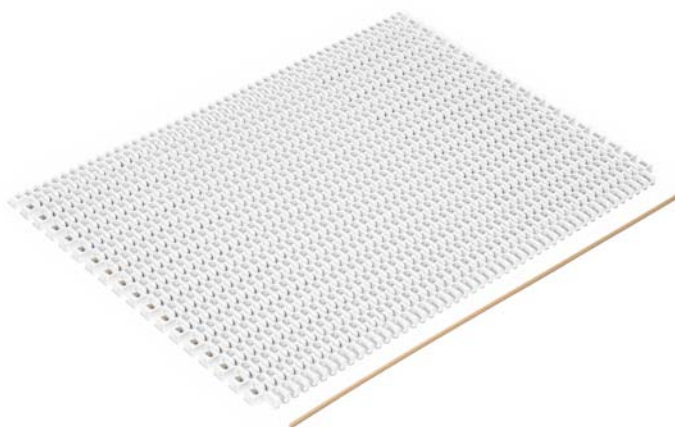


1.6 No flat surfaces for better drainage

In wash-down environments, it is important to have proper drainage of water and other liquids. The WLX design has been optimized in this regard by selecting different manufacturing processes to create shapes that enable efficient drainage. This will also have an important impact on its ability to be cleaned in dry environments in both primary and secondary packaging lines.



1.7 Belt width 152/203/304/456/608 mm



2 Safety

In order to facilitate cleaning, the top belt can be lifted up and the outer slide rails can be folded back. For hygiene reasons, the WLX system is also based on an easy-to-clean, free hanging return belt.



NB: Therefore it is of high importance the design of the line control system will support the cleaning operation process and let the responsible operator be able to set the line in cleaning mode in an easy way.



Warning: The power supply main switch must be possible to turn off and lock before any belts will be lifted up and the cleaning process starts.

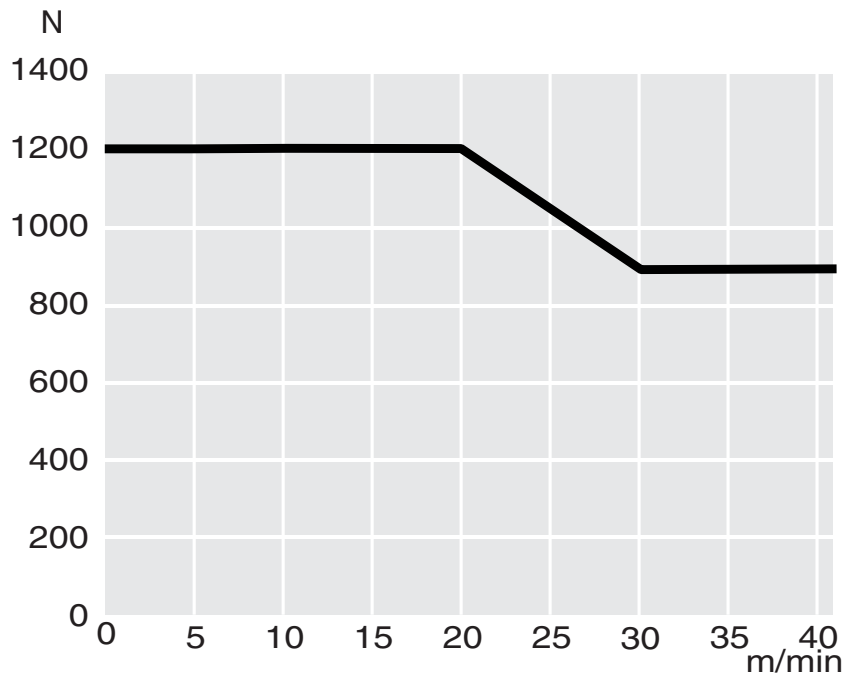
3 Technical Specification WLX

System	WL222X	WL273X	WL374X	WL526X	WL678X
Beam width	222 mm	222 mm	374 mm	526 mm	678 mm
Belt width	152 mm	152 mm	304 mm	456 mm	608 mm
Belt pitch	25,4 mm	25,4 mm	25,4 mm	25,4 mm	25,4 mm
Drive unit capacity	1200 N	1200 N	1200 N	1200 N	1200 N
Maximum belt tension (See Tension/ Speed diagram on <i>page 7</i>)	1200 N	1200 N	1200 N	1200 N	1200 N
Maximum belt tension through a plain bend	500 N	500 N	670 N	1000 N	1000 N
Maximum belt tension through a positive vertical bend	500 N	500 N	500 N	500 N	500 N
Maximum speed	40 m/min	40 m/min	40 m/min	40 m/min	40 m/min
Maximum conveyor length	20 m	20 m	20 m	20 m	20 m
Total load on a conveyor	300 kg	300 kg	300 kg	300 kg	300 kg
Maximum product weight per belt pitch	1500 g/slide rail	1500 g/slide rail	1500 g/slide rail	1500 g/slide rail	1500 g/slide rail
Maximum single item weight, horizontal transport	Up to 30 Kg	Up to 30 Kg	Up to 30 Kg	Up to 30 Kg	Up to 30 Kg
Horizontal plain bends:	30°/45°/60°/90°/180°	30°/45°/60°/90°/180°	30°/45°/60°/90°	30°/45°/60°/90°	30°/45°/60°/90°
Radius mm	412 mm Note! Maximum 180° in total in a conveyor. Avoid more than 2 bends /conveyor	550 mm Note! Maximum 180° in total in a conveyor. Avoid more than 2 bends /conveyor	820 mm Note! Maximum 180° in total in a conveyor. Avoid more than 2 bends /conveyor	1240 mm Note! Maximum 180° in total in a conveyor. Avoid more than 2 bends /conveyor	1650 mm Note! Maximum 180° in total in a conveyor. Avoid more than 2 bends /conveyor
Vertical bends:	3/5° (neg, pos) Note! Avoid more than 2 bends/conveyor	3/5° (neg, pos) Note! Avoid more than 2 bends/conveyor	5° (neg, pos) Note! Avoid more than 2 bends/conveyor	5° (neg, pos) Note! Avoid more than 2 bends/conveyor	5° (neg, pos) Note! Avoid more than 2 bends/conveyor

4 WLX system rules

4.1 Max permissible Belt tension in a WLX Conveyor

Tension / Speed diagram for a WLX End drive unit



4.1.1 Condition to be fulfilled

4.1.1.1 WLX Conveyor

Conveyor beam section minimum 844 mm (see page 12)

4.1.1.2 WLX Conveyor including a Belt tensioner unit

Requires a Conveyor beam section 500 mm or >572 mm (see page 10)

4.1.2 Limitations

4.1.2.1 *WLX Conveyor including a positive Vertical bend*

Maximum permissible pull force through a positive Vertical bend, 500 N

4.1.2.2 *WLX Conveyor including a Plain bend*

Maximum permissible pull force through a Plain bend:

WL222X	500 N
WL273	500 N
WL374X	670 N
WL526X and WL678X	1000 N

4.1.2.3 *Drive end directly mounted on a Plain bend*

Maximum total conveyor length: 5000 mm

Maximum permissible pull force: 500 N

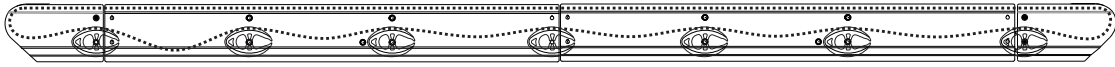
NB: *It's important to match the belt length according to the conveyor length (no slack permitted)*

4.1.3 Drive end unit directly mounted on an Idler end unit

A conveyor beam section length in between a Drive end unit and a Idler end unit can be: 0 mm (no conveyor section) or ≥ 142 mm.

4.2 Return belt handling

Due to hygienic reasons WLX system is based on a free hanging return belt, easy to clean.



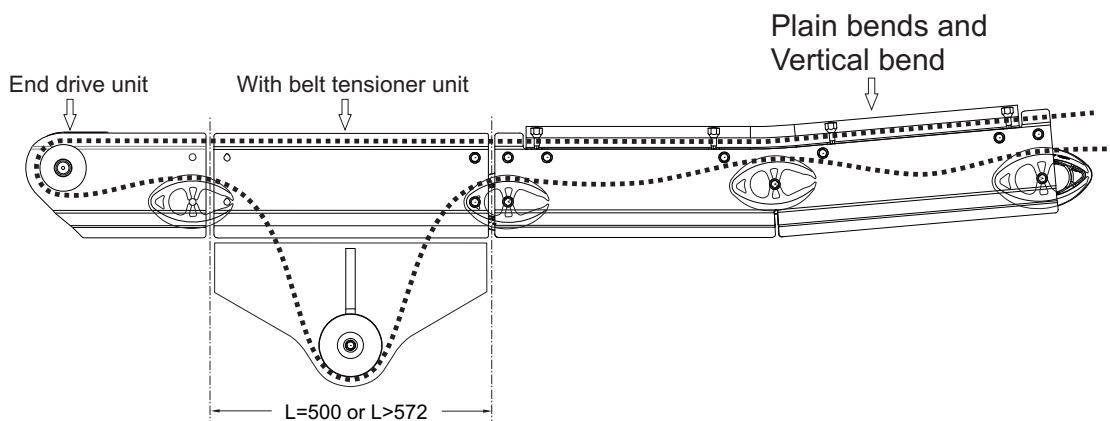
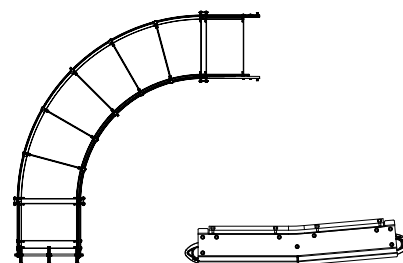
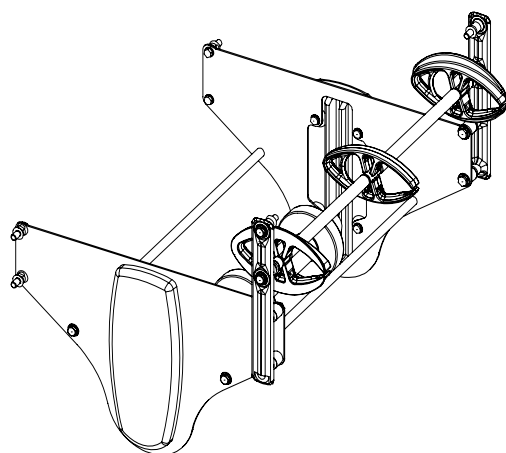
Unlike most FlexLink conveyors where chain elongation results in a slack in the drive unit, the belt elongation in a straight WLX conveyor is evenly distributed on the return side, along the whole conveyor.

Adding plain bends or vertical bends into a conveyor disrupts this evenly distributed elongation on the return side and depending on conveyor configuration, more slack can be found to occur near the end drive unit. Sometimes a separate Belt tensioner unit has to be added.

Horizontal plain bend near an End drive unit: The plain bend acts like a brake and more return belt will be cumulated before the plain bend near the end drive unit.

Vertical bends near an End drive unit: The return belt in the slope falls down and more slack cumulates near the end drive unit.

4.2.1 Belt tensioner unit

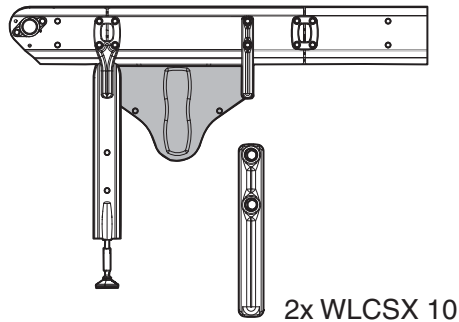


There is always a safety risk if the slack becomes too big and the belt hangs below the conveyor beam side. A separate belt tensioner unit is available and can be added into an existing conveyor beam if this problem is found to occur. Conveyor beam length must be $L=500$ or $L>572$ to fit a Belt tensioner unit.

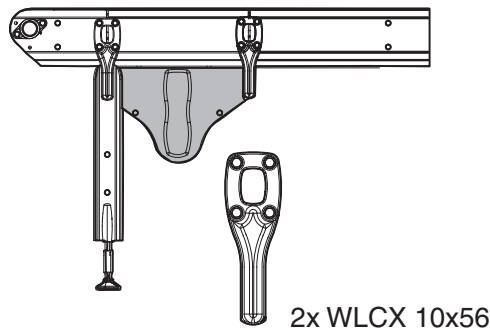
A Belt tensioner unit should always be placed near the End drive unit and is recommended to be used:

- for long conveyors >20 meters
- for long conveyors >15 m and speed >30 m/min
- for conveyors with frequent start/ stops and especially if the load is high
- if an End drive unit needs to be placed close to a plain bend
- if an End drive unit needs to be placed on the lower part after a conveyor slope section.
- for short conveyors where the belt slack length is not enough to be able to lift the top belt for cleaning.

Conveyor beam section > 572 mm



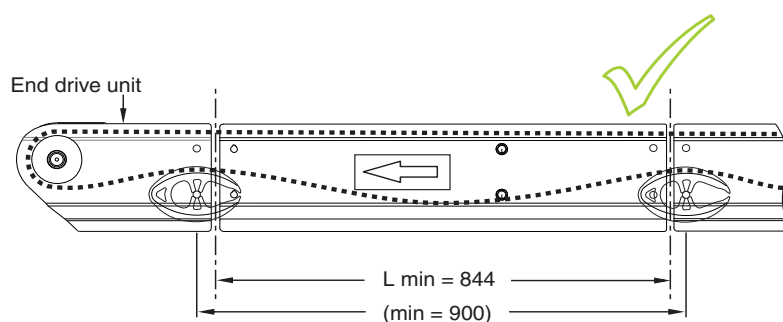
Conveyor beam section = 500 mm



When a conveyor beam section is 500 mm should Beam support bracket WLCX 10 be replaced with WLCX 10x56 (see FlexLink Stainless steel product catalogue chapter CSX)

4.2.2 End drive unit

There are no steering guides for the belt in the End drive unit. However, in the sprocket wheels 180-210° belt operation is a must. Therefore sufficient amount of return belt tension is needed directly after the drive sprocket to avoid slack close to the sprocket wheel. The return belt hanging between the first two belt guides, provide this belt tension (called back tension). The distance between the belt guides and depth of the belt slack influence the result of the back tension. Back tension is increased as the span is increased or as the depth of the slack is decreased. Therefore these two belt guides must never be moved or removed and also the slack depth recommendations must be followed. See section [Installing belt on page 23](#)



Exceptions

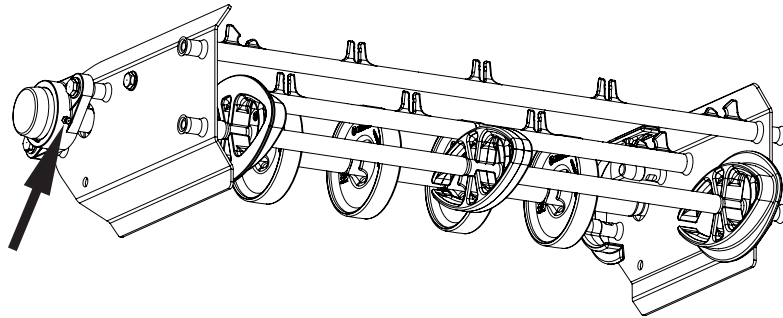
See page 7 and page 8

4.2.3 Soft start recommendation

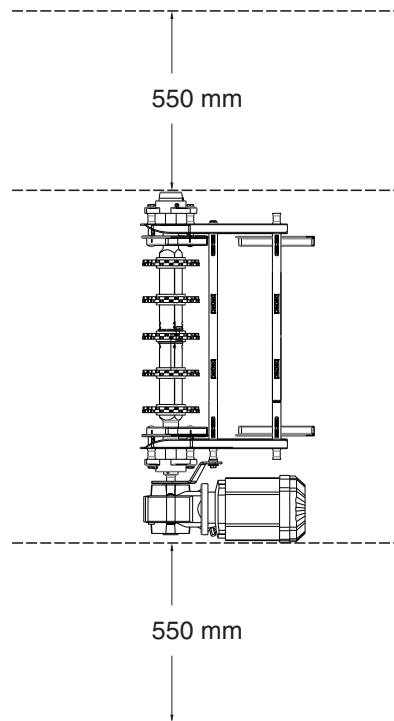
Recommendation is to use soft motor start. Belts are quite heavy and there is always a risk the free hanging return belt will oscillate in the moment of starting. The higher speed and longer conveyors the higher risk.

4.2.4 Grease lubrication

A grease nipple is included in all flange bearings. The bearings are initially filled with FDA approved food grade grease (NSF H1).



4.2.5 Recommended service area

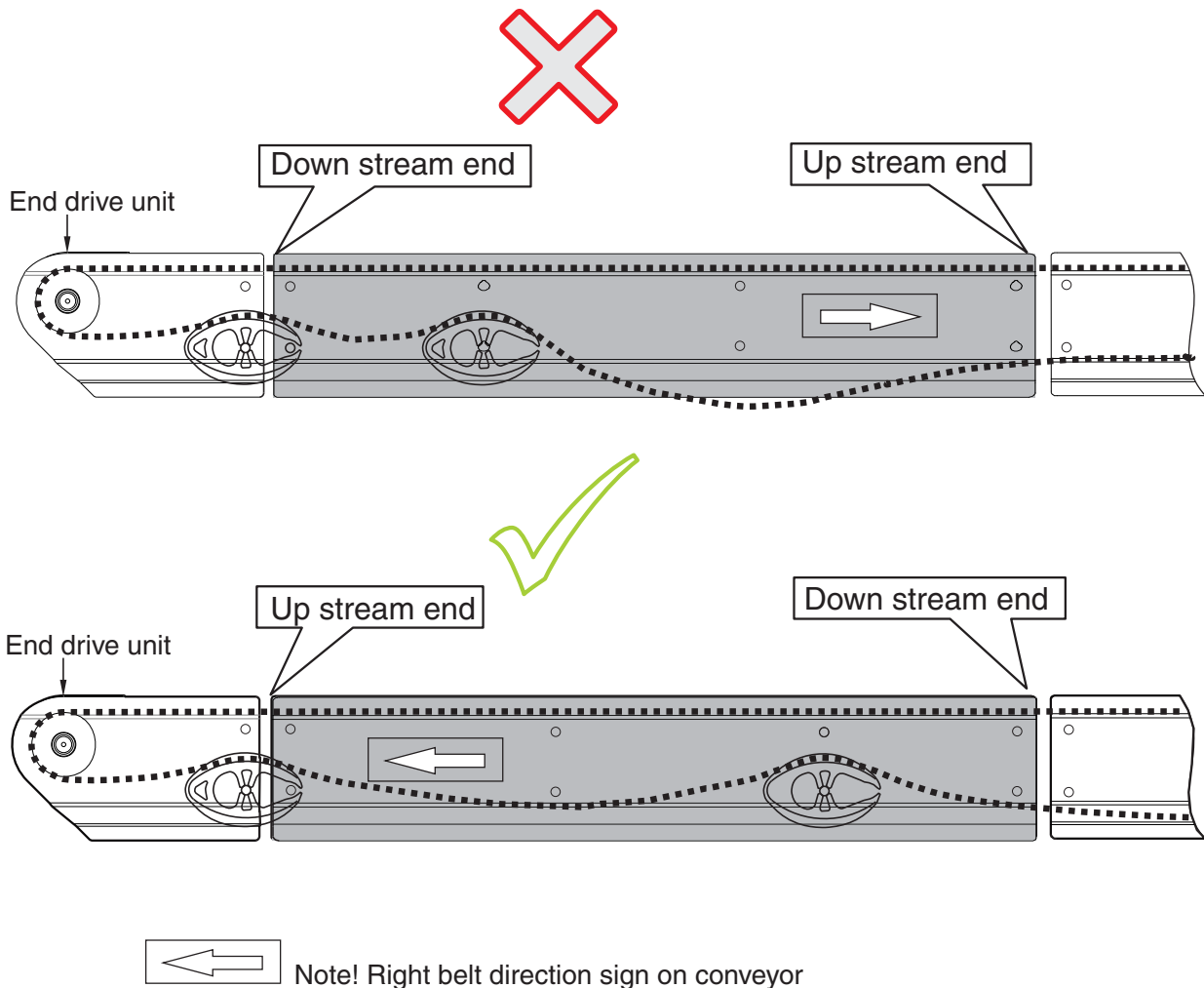


4.2.6 Conveyor beams

The placement of the belt guides for the return belt is very important and critical for a proper performance of the conveyor system. There is also a safety risk if the distance between two belt guides are too long and belt slack is hanging lower than the conveyor beam side. Connecting a conveyor beam into an end drive unit in a correct way, is especially important. See section [End drive unit on page 12](#).

When ordering L-cut conveyor beams these are pre-engineered and are always configured with regards to the rules that must be followed. The L-cut conveyor beams are normally not symmetric and therefore they have an upstream and downstream end. An arrow label on the conveyor beam side displays the intended top belt travel direction to ensure correct assembly.

It is important to check the conveyor beam direction during assembly.



4.2.7 Cut conveyor beam on site

There is normally always a need for customized conveyor beam lengths in a conveyor system. Basic rule is to try to pre-engineer the conveyor system as much as possible and try to order all L-cut conveyor beams pre-cut from the FlexLink production centre. In practice there is sometimes still a need to cut a few conveyor beams at site. When doing this:

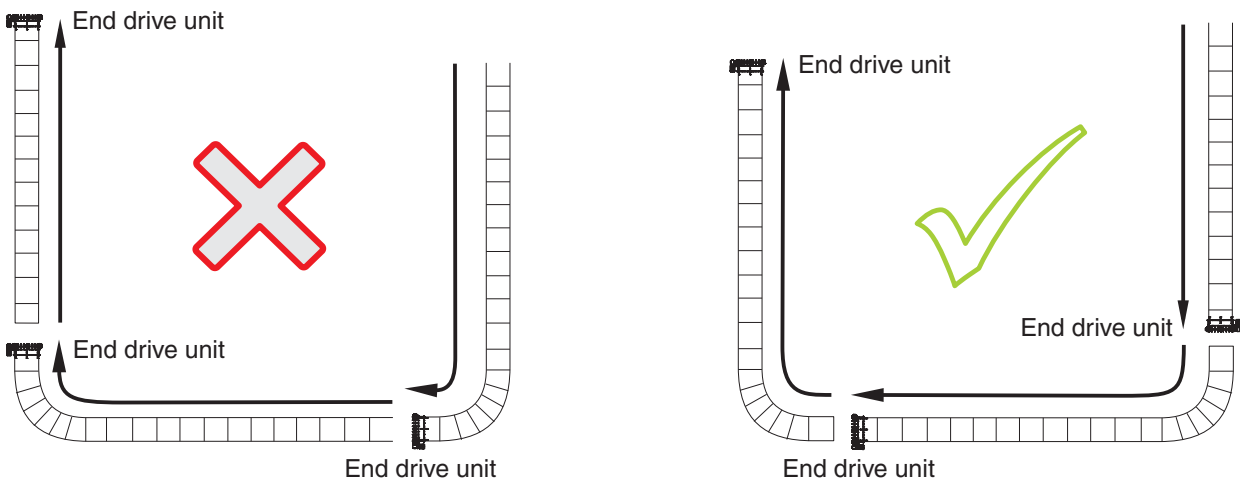
- avoid to cut "hole in hole" due to hygienic aspects.

- avoid to cut the conveyor beam end towards an end drive unit.

If this still has to be done ensure there is a cc distance between two belt guides of 900-1200 mm. See section [End drive unit on page 12](#). A hydraulic tool is available for punching the connecting holes after cutting. Contact FlexLink for more information. See also [Working with stainless steel on page 36](#).

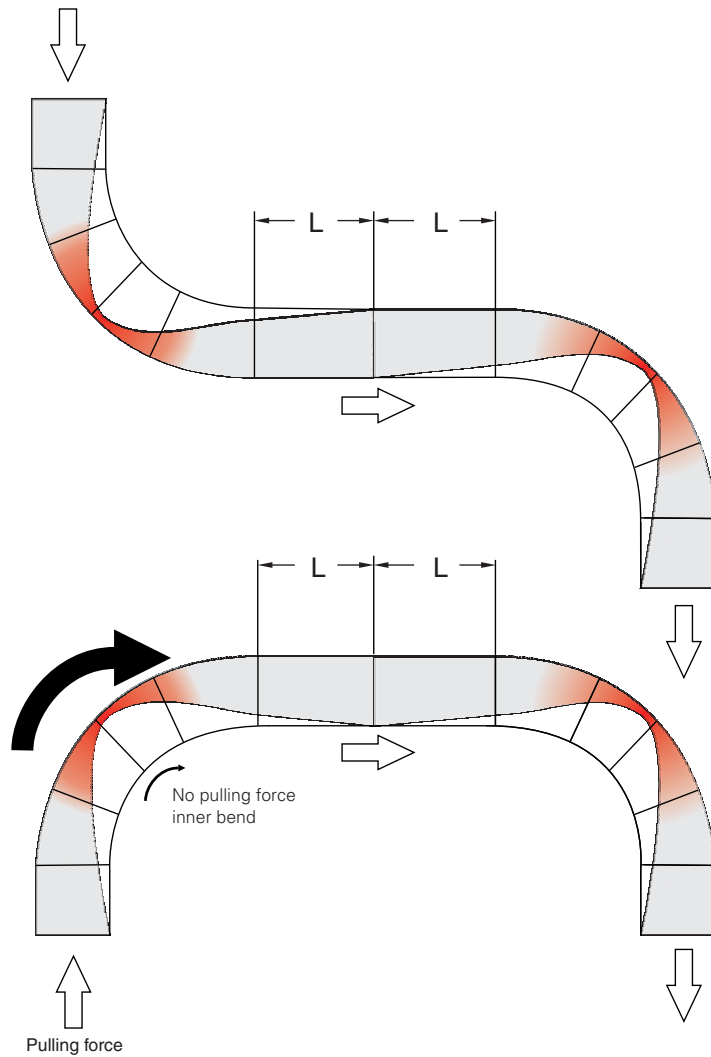
4.2.8 Plain bends

Plain bend placements as for all other FlexLink conveyors, should always be considered. A plain bend placed too far downstream on a conveyor generates unnecessary belt pull. Also the placement of a plain bend too close to an end drive unit can lead to unnecessary slack increase and a separate Belt tensioner unit must be added. See section [Return belt handling on page 9](#). Always use FlexLink calculation tool to calculate resulting pull forces.

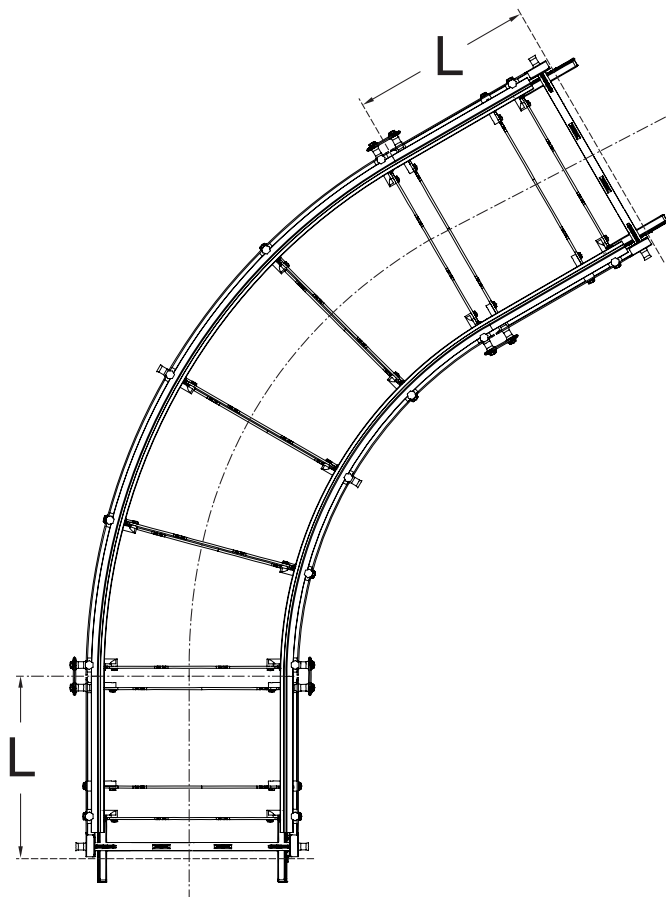


Split conveyors in a favorable way to reduce belt pull and increase belt life.

When using radius flush grid belts in plain bends there are some rules to be followed. In a plain bend the belt pull force will be concentrated to the outer part of the belt. A certain straight section is needed before and after the bend in order to transfer the load between the outer belt part and evenly distributed to the straight going belt.



On the return side the belt tilts a little bit before and after the bend and therefore there is also here a need for a straight section to stabilize the return belt. Therefore these straight section are always integrated in the plain bend component itself.



Integrated straight sections in the plain bends

WL222X L= 250 mm

WL273X L = 250 mm

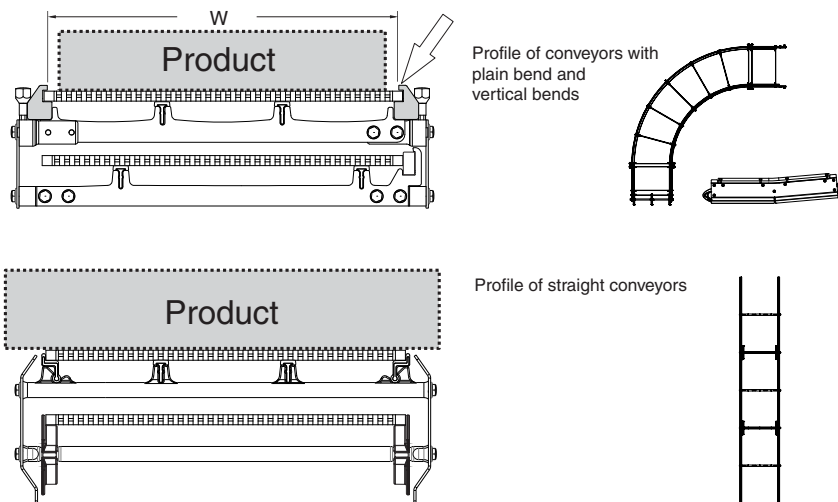
WL374X L = 300 mm

WL526X L = 450 mm

WL678X L = 600 mm

In order to be more compact during transportation some of the biggest plain bends are delivered in sections and have to be assembled at site. For these plain bends an Assembly instruction will be attached in the delivery.

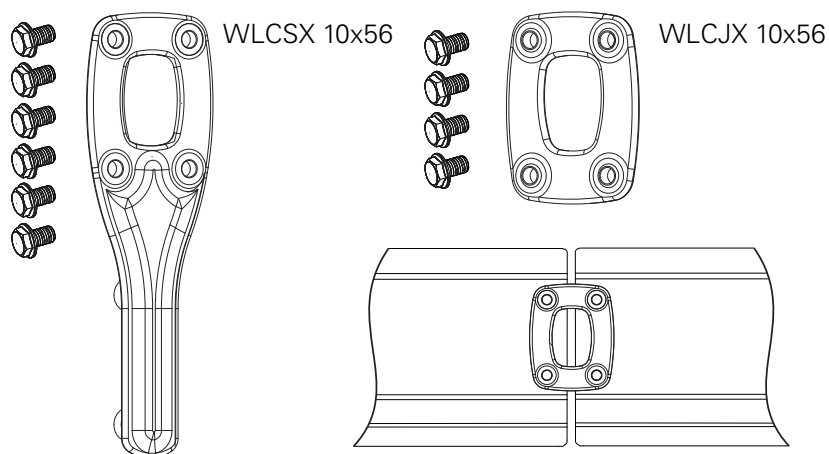
Note! Extra wide products can only be transported on straight conveyors. See figure below.



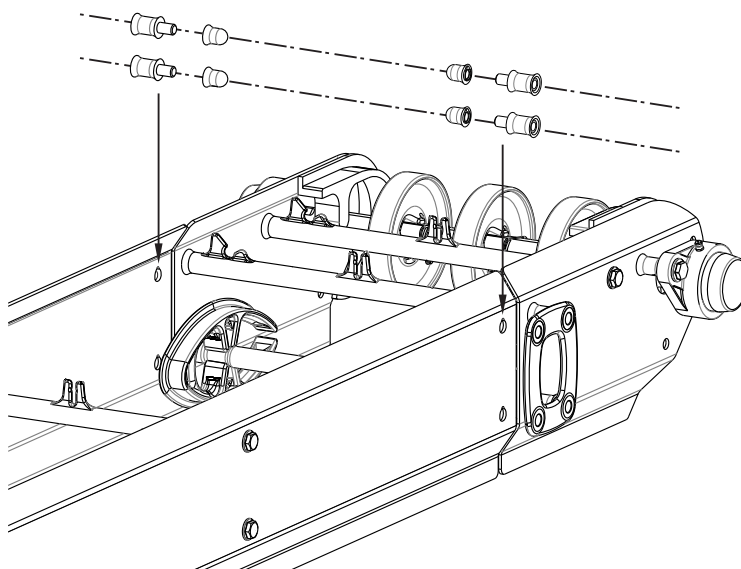
System	Track width	
	Inner Radius	Width
WL222X	337 mm	W=146 mm
WL273X	450 mm	W=197 mm
WL374X	669 mm	W=298 mm
WL526X	1013 mm	W=450 mm
WL678X	1347 mm	W=602 mm

4.2.9 Connecting conveyor components

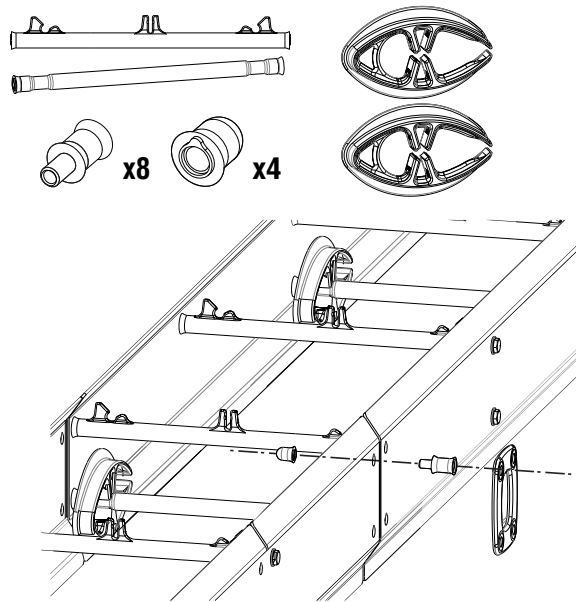
When joining conveyor components together the Connecting brackets have to be ordered separately.



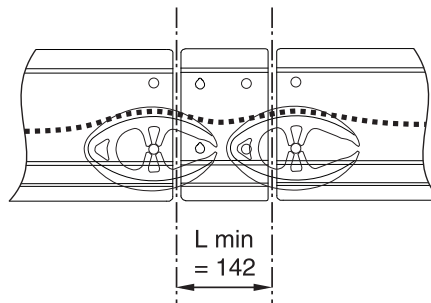
Conveyor beams are delivered without any Spacers or Dome nuts in the beam ends. However, End drive units, Idler ends, Plain bends and Vertical bends, have all necessary fasteners (except the Connecting bracket) for connection to a conveyor beam end.



When joining two conveyor beams a Beam spacer kit must be ordered. Item number WLCEX A374, WLCEX A526 or WLCEX A678



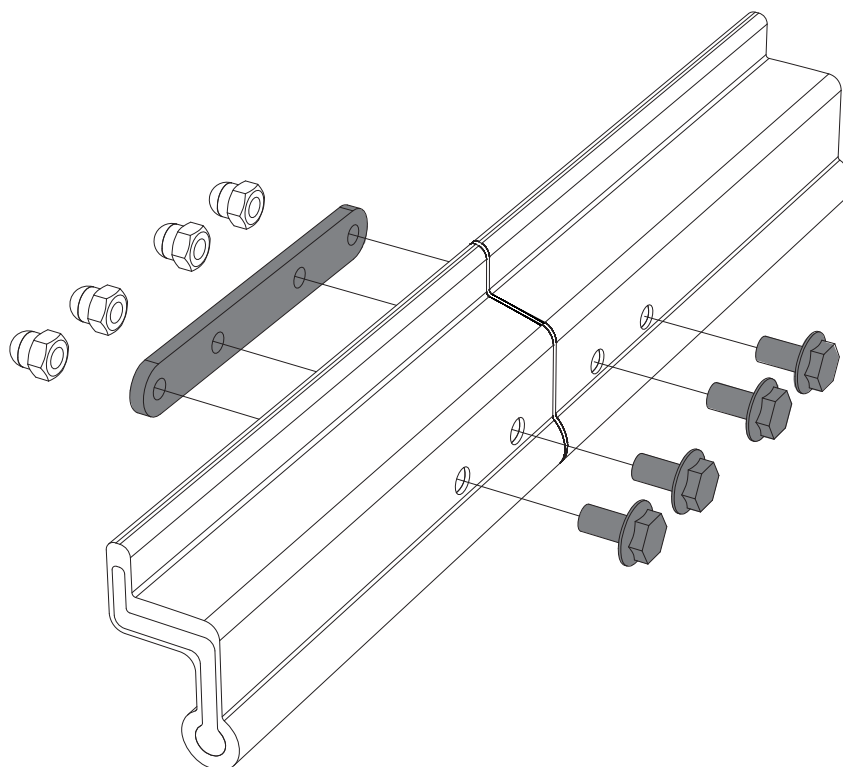
4.2.10 Minimum permissible conveyor beam lengths between components



When connecting for example a plain bend directly to another plain bend, interference will occur between belt guides on the two lower cross bars. One of the cross bars has to be removed and replaced by two dome nuts. These have to be ordered separately.

4.2.11 Slide rail installation

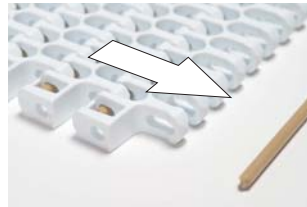
In the catalogue you will find Connecting strips for slide rails, WLAHX 100. See picture below. Use Drill fixture for connecting strip, item number 5118922, for a correct connection.



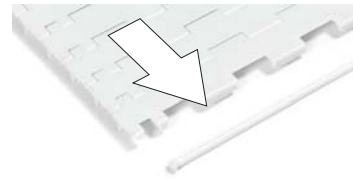
4.2.12 Installing belt

Belts with polyamide pins are available for dry or semi-wet applications. In constant wet applications, belts with acetal pins must be used. This is due to the fact that polyamide pins will absorb water and swell in wet applications, and acetal pins will squeak in dry environments.

Belt is delivered in 1m sections and has to be linked together with the enclosed plastic pin. Travel direction for the belt should be according to pictures below.

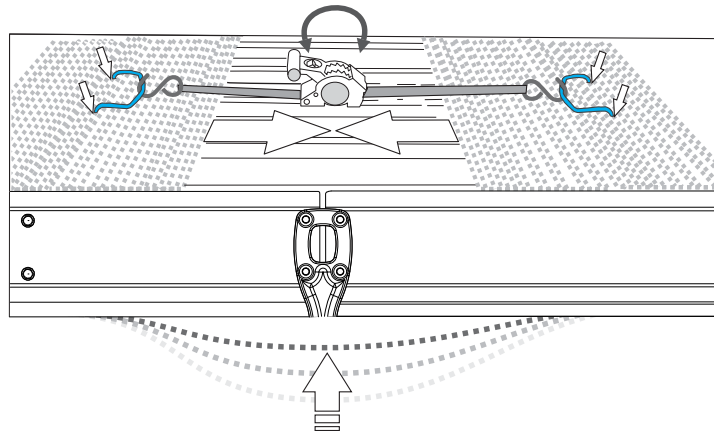


Radius flush grid



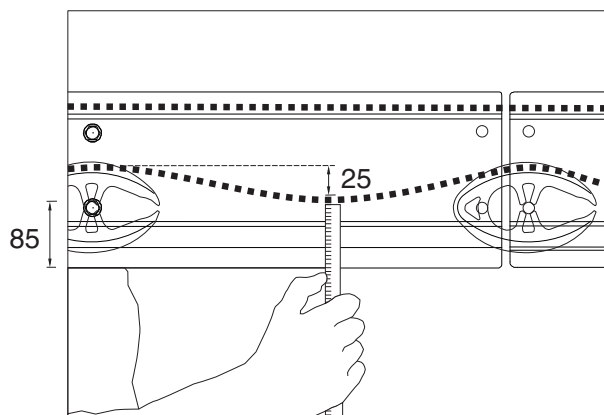
Flat top belt

A belt tensioner tool, item number 5118803, should be used and can be ordered from the catalogue.

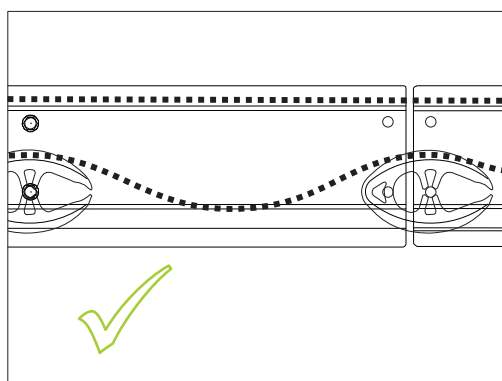
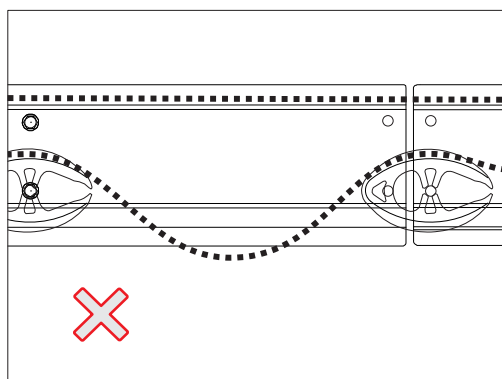


Due to initial elongation the belt has to be shortened after 2 weeks.

The belt should be pre-tensioned for a return slack of about 25 mm between two belt guides. Use corresponding measure 85 mm from bottom of conveyor.



Note! Too much belt slack is a safety risk as the belt can occasionally hang below the conveyor beam side for example during startup of the conveyor or if the conveyor load fluctuates during production. See also section [Belt tensioner unit on page 10](#)



4.2.13 Belt lift arms

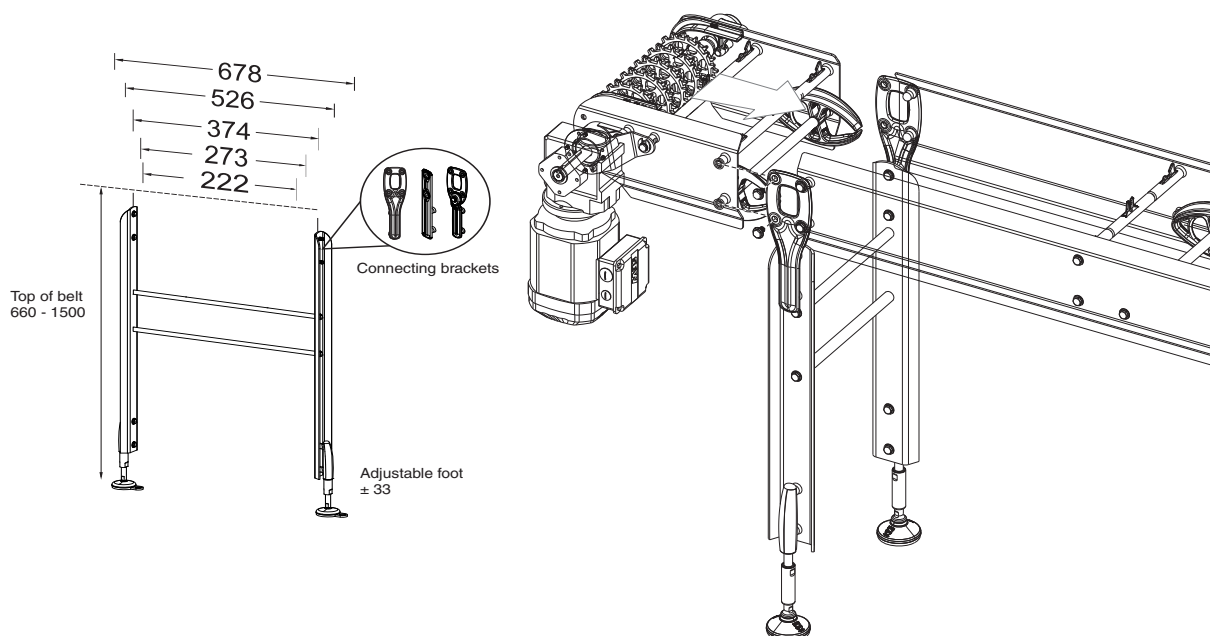
In order to simplify the cleaning process FlexLink can offer belt lift arms for straight conveyors. Contact FlexLink for more information.

Note! Only for WL374X, WL526X, WL678X

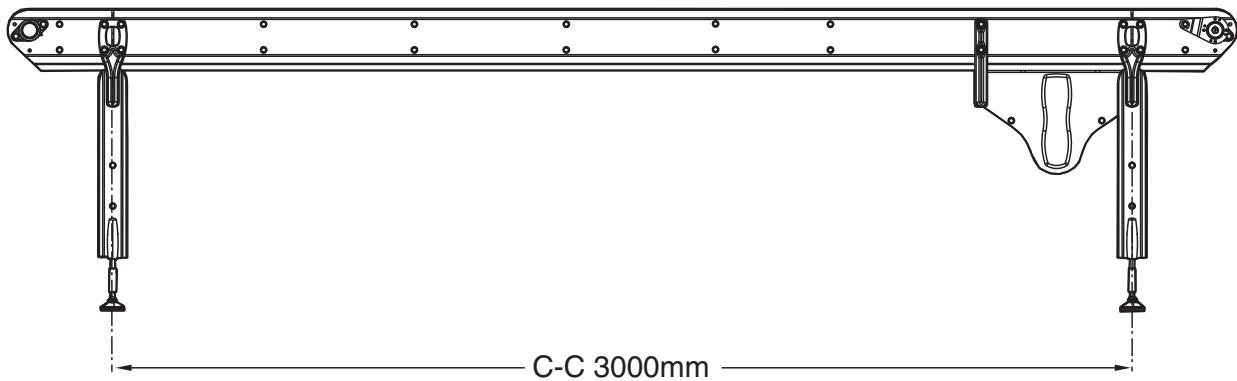


4.2.14 Support legs

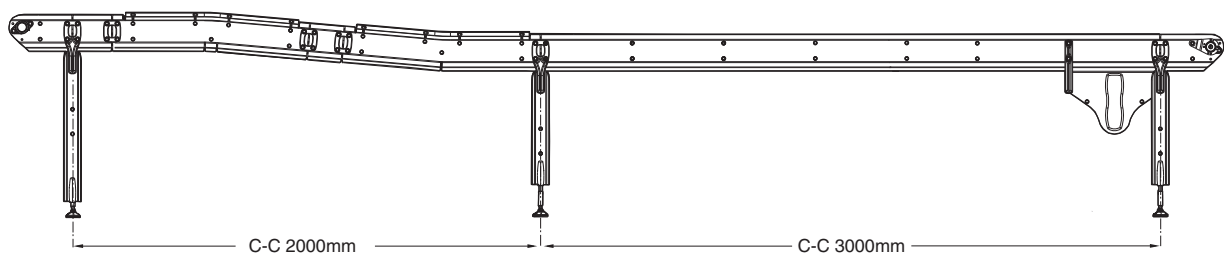
Mount support legs as close to the end drive unit as possible.



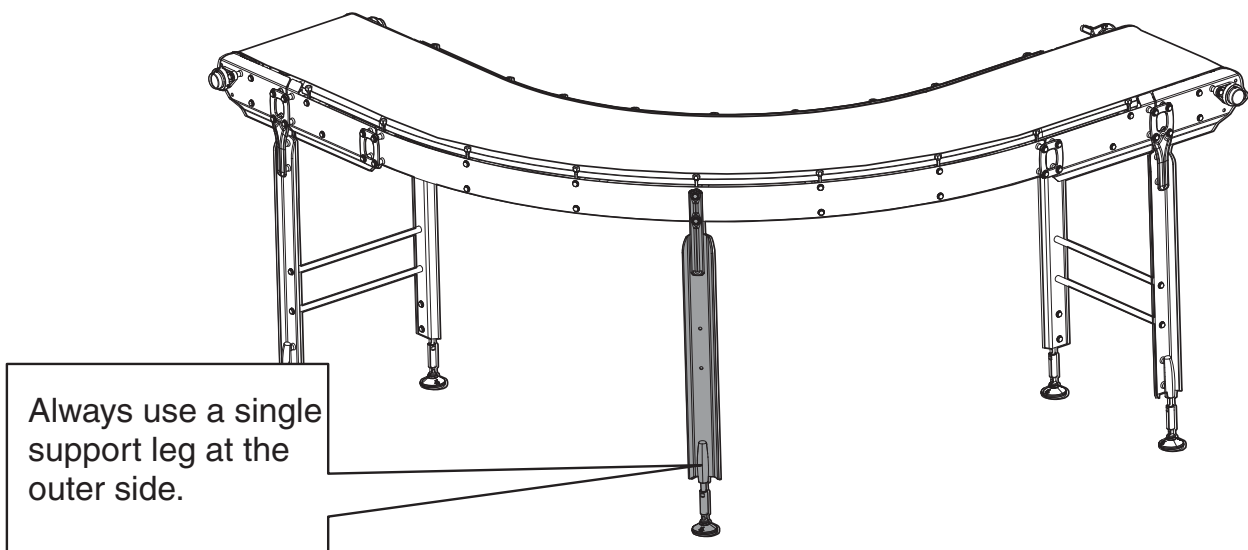
Recommended c-c between support legs on a straight conveyor.



Recommended c-c between support legs on a conveyor including a Vertical bends.

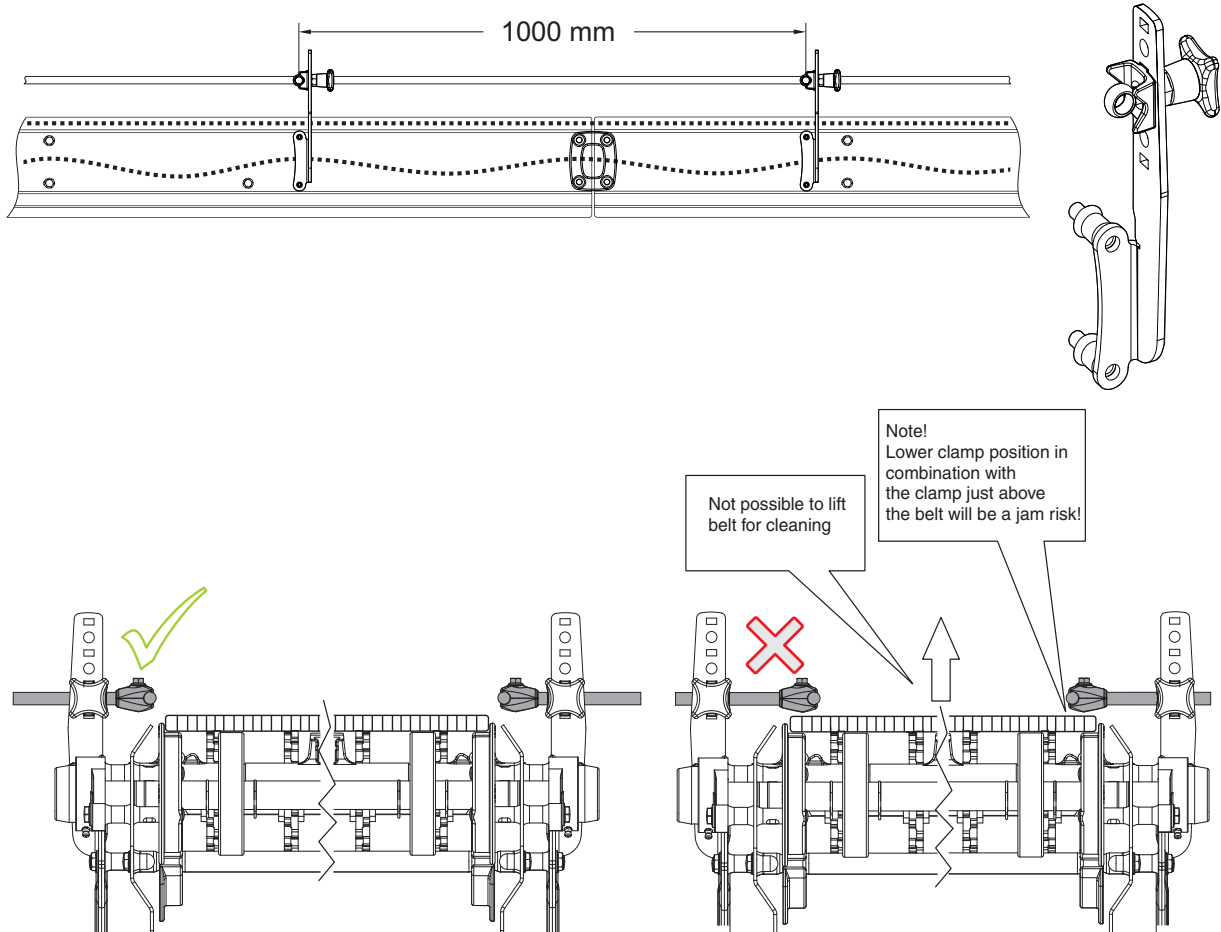


Always use a single Support leg at outer side when using a Plain bend.



4.2.15 Guide rail brackets

In order to be able to lift the belt for cleaning, avoid to place guide rails above the belt. Recommended cc 1000 mm.



4.2.16 Clean in place (CIP)

A CIP system can be an efficient supplement to manual cleaning in order to reduce time for the cleaning process and make the production more efficient.

As an option FlexLink can offer a spray bar including nozzles with a spray pattern customized for a specific application and belt. The system can be mounted within the conveyor frame for example close to an End drive unit.

Operation conditions always differ from application to application. Therefore a CIP system always has to be configured to work in a proper way. In addition to parameters like belt type, conveyor speed, drum motor etc, parameters like degree of debris, CIP placement, water pressure available, water temperature, flow rate available etc, are also essential to succeed. For more information contact FlexLink.

4.2.17 Accessories

When adding photocell brackets etc. along the conveyor beam side always use spacers.

4.3 Electrical

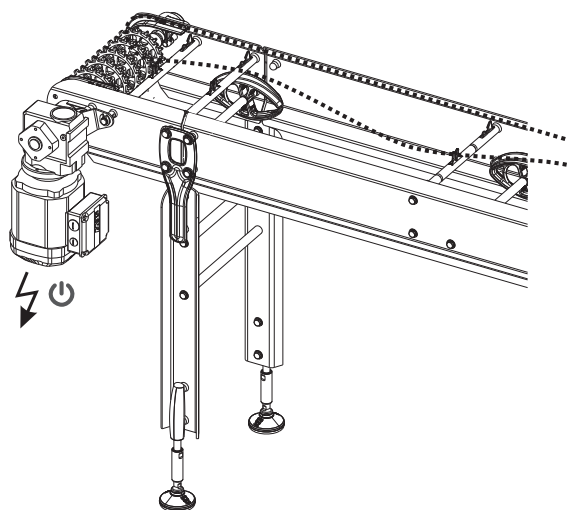
- For long distances, straight line, non-bundled electric cables should be mounted on wire trays, preferably separated from each other.
- Vertical cable trays are less prone to dust accumulation, and are more accessible for inspection and cleaning. The use of horizontal racks for electrical cabling should be minimized, or they should be protected by a removable lid or installed vertically (on their side) to minimize horizontal surfaces
- Conduits should be suitably sealed at both ends with a proprietary cable/sealing gland where a cable does pass through. In the food contact and splash areas, cables can also be protected from dirt, penetrating liquid and damage by encapsulating them in hermetically closed cable housings. However, the use of pipe rather than conduit should be discouraged because of the difficulties in maintaining the integrity of the piping system at cable entries and exits. Cable mounting in pipes still creates a hollow body and hence a hygienic risk.
- Electric components should be enclosed in dust- and water-tight cabinets or field boxes with all connections made at the bottom.
- Connections of cables and wires to housings must be sealed.
- The enclosures should be spaced away from equipment or walls and should be provided with an easily drainable 30° top roof.
- Please be aware, it is easy to underestimate number of hours required for cabling.



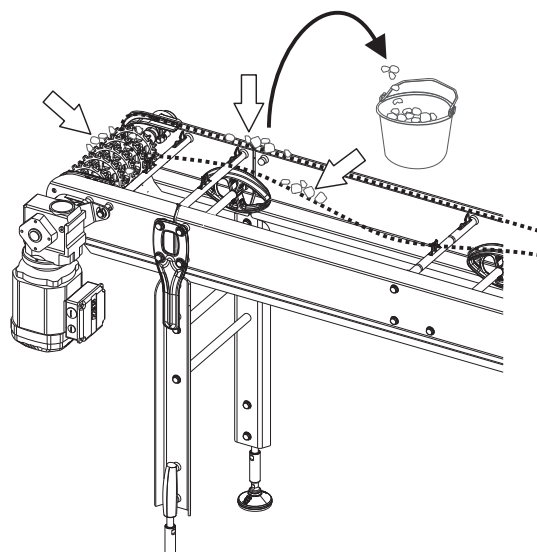
5 Typically cleaning process in wet applications

The cleaning procedure must be performed at least once a day when production has been carried out with the conveyor.

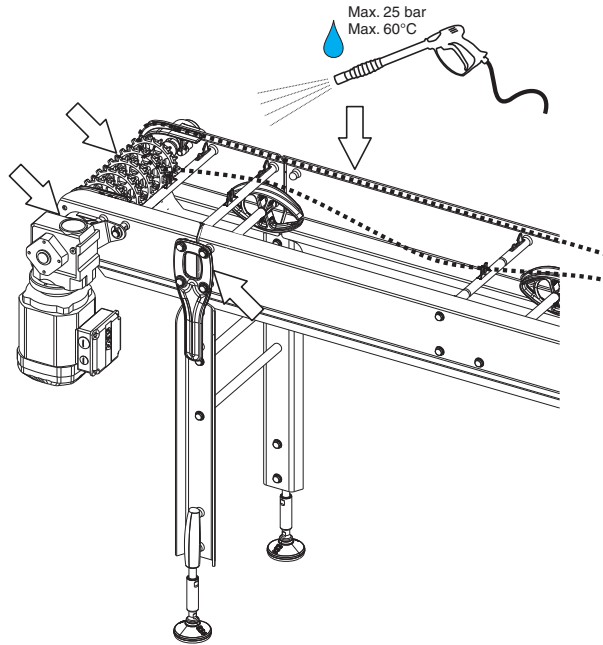
Step 1 – Preparation – switch off power supply.
The control system must support a lockout safety procedure.



Step 2 – Gross solid removal
Remove gross soil by scraping or brushing or other equivalent dry method.



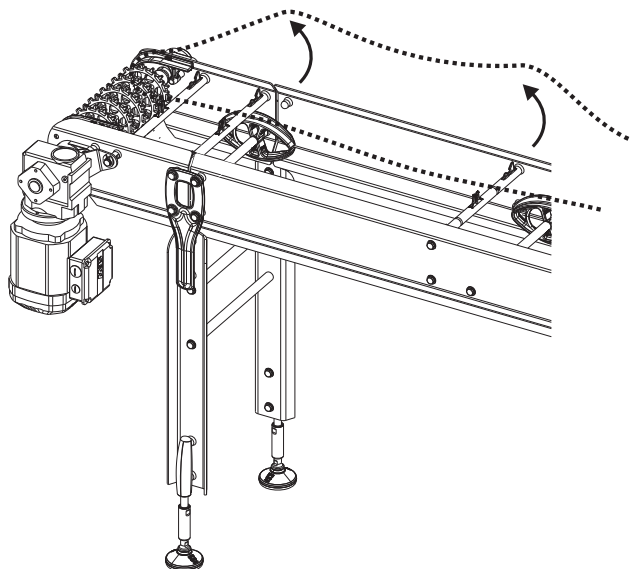
Step 3 – Pre-rinsing



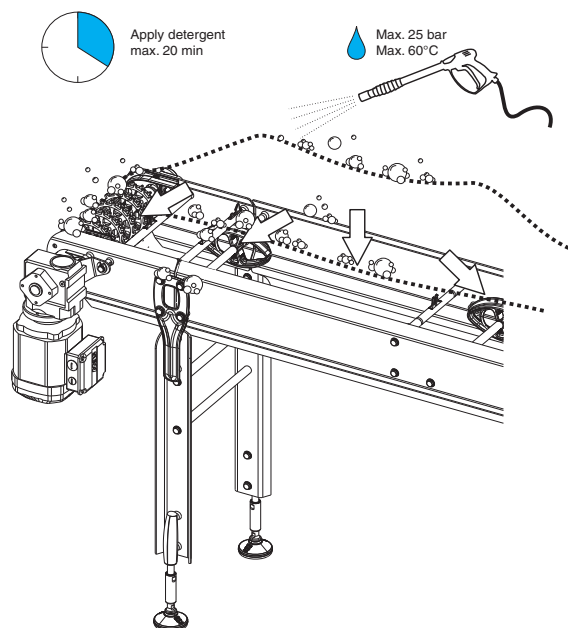
In pre-rinsing, soil is rinsed off or detached using warm water (up to 60°C) at low pressure (max 25 bar).

Note! Material exposed to high pressure is subject to excessive stress. Moreover, high pressure causes increased aerosol formation which leads to recontamination.

Step 4 – Lift belt



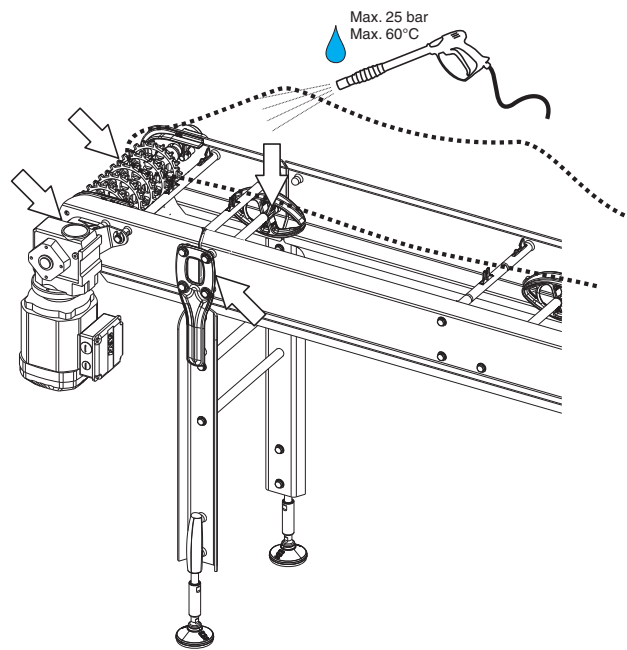
Step 5 – Cleaning



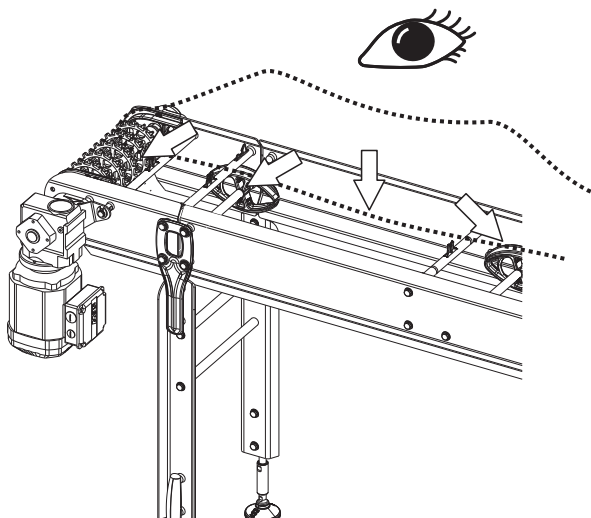
At the actual main cleaning stage, stubborn dirt on the belt (e.g. oils and fats) is dissolved with the aid of chemical cleaning agents. Cleaning agents are generally applied as foam. In practice, however, under certain circumstances the belt is also scrubbed manually.

Step 6 – Rinsing off

In this stage, dirt previously detached or dissolved is rinsed off the belt with the aid of warm water (up to 60 °C/140 °F) and low pressure. It is particularly important not to set the water pressure too high so that when rinsing off the conveyor belt neighboring machinery, plant components, walls or floors are not contaminated again by splashes of material which has just been washed off (cross contamination).

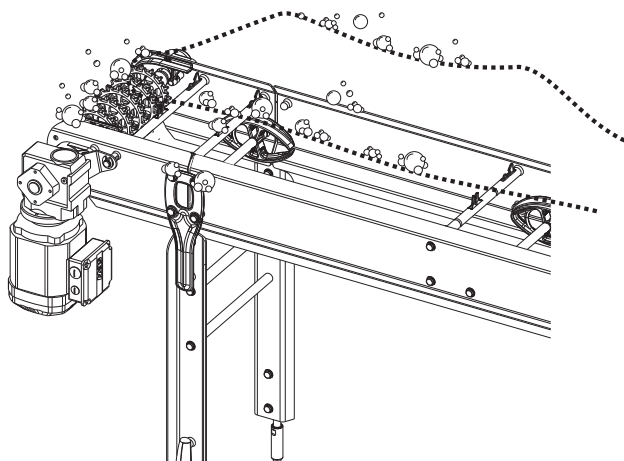


Step 7 – Check cleaning result



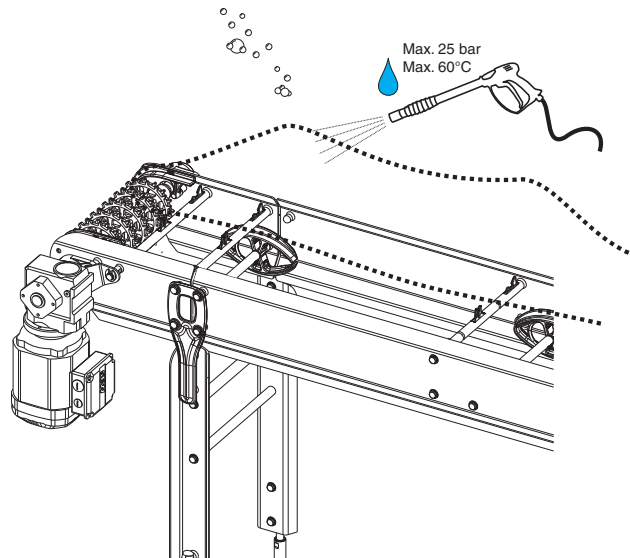
The cleaning result is checked visually and by hands to feel that the soil has been removed. Here an appropriate method e.g. ATP-kit or protein based kit can also be used.

Step 8 – Disinfect



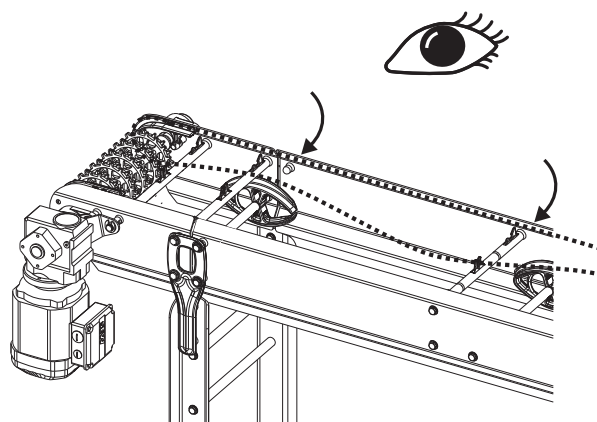
The disinfection should not be applied with pressure but with a specially nozzle for spreading disinfectant solution on all surfaces. Leave on for typically 10-15 min (follow instruction from disinfectant solution supplier).

Step 9 – Final rinse with potable water



No cleaning chemicals residues should be left on surfaces. Therefore the chemicals should be rinsed off with lukewarm potable water. Thereafter the equipment should be left to dry.

Step 10 – Verification of cleaning



The final cleaning and disinfection result is checked before the production is started up again. An appropriate culturing method in accordance to the food producer internal control system should be used (swab, contact plate).

6 Working with stainless steel

6.1 Mechanical

6.1.1 General

- Important not to mix tools for stainless steel with tools used for aluminum and mild steel
- Good saw and tools for cutting is a must
- If you know how to cut you will save a lot of time
- Use sharp tools
- Pre-cuts is preferred
- Drilling is tough and right drills is a must
- If you buy pre-cut the holes will be punched by PC
- Components are heavier

6.1.2 Cuts

- Need a good saw that is only used for stainless steel
- Contamination from mild steel might require passivation
- Keep it clean and make sure that you do not damage the surface when you clamp the beam
- Always use a sharp blade
- Possible to send it for sharpening at least 2-3 times
- Change before is worn out
- Done right you will not build up any heat and there will be no discoloring of the beam

6.1.3 On site cuts

- Need a good portable saw that is only used for stainless steel
- Should have 2-3 blades for stainless steel
- Press gently with constant speed

6.1.4 Drilling

- Do all drilling in a workshop with a rigid drilling machine with clamps
- Contamination from mild steel might require passivation
- Keep it clean and make sure that you do not damage the surface when you clamp the beam
- Run at slow speed
- Use the right type of drills, we have added drills in the catalogue that works very well. See section "Tools for conveyor beams" in X85X product catalogue section.
- Hand held machines are very difficult to use with good result
- There are portable machines available with good framework that can run slow speed and possible to apply enough pressure
- Check with customer if they have a workshop that can be used

6.1.5 Assembly

- One toolbox for stainless steel
- Do not use the tools for anything else than stainless steel
- Select tool drills for stainless steel
- Separate material and work areas
- Do not store stainless steel material in same racks as mild steel and aluminum
- Do not use same work benches for stainless steel as for mild steel and aluminum
- Keep your work surface clean, the surfaces are very sensitive to scratches and chips cause very bad scratches
- Use wax on the screws, especially if they are tightened and un-tightened several times
- Stainless steel is a less forgiving material and the threads will be damaged
- Stainless steel items are heavier, sometimes it is better to use two persons
- Use gloves to protect the hands from sharp edges.

