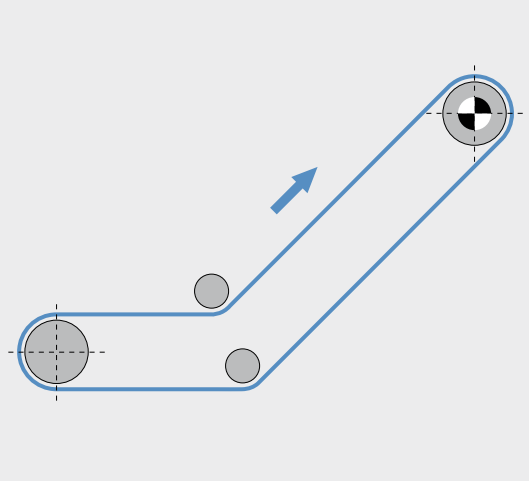
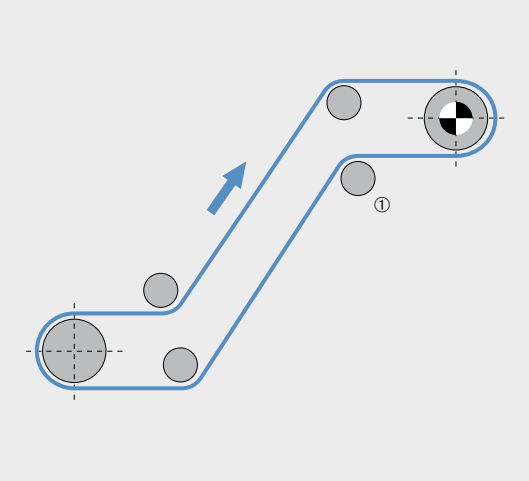
siegling transilon
conveyor and processing belts

INCLINE- AND SWAN-NECK CONVEYORS
RECOMMENDATIONS FOR CONVEYOR DESIGN





Incline conveyors
An incline conveyor has a horizontal belt segment at the bottom of the conveyor and a belt segment rising at an angle. Goods are conveyed upwards. It is usual to provide a head drive. However, a tail drive can be provided instead should there be insufficient space around the head drum.
The belt incorporates at least one counter-bend due to the belt guides being in contact with the top face.

Swan-neck conveyors
A swan-neck conveyor has a horizontal belt segment at the bottom of the conveyor, a belt segment rising at an angle and a further horizontal belt segment at the top of the conveyor. Goods are always conveyed upwards. A tail drive can be provided should there be insufficient space around the head drum. The tension in the belt should be kept low, as the concave change of direction on the return side (1) is critical.
The belt incorporates at least two counter-bends due to the belt guides being in contact with the top face.

RECOMMENDATIONS FOR CONVEYOR DESIGN

Drive and endless splicing

In the case of incline and swan-neck conveyors, head drives are used almost exclusively. The upper drum functions as the drive drum and is provided with a friction lagging. The motor should be designed for low acceleration because otherwise many system components can be heavily loaded. To achieve sufficient stiffness, stepped Z-splices or stepped overlap splices should be used to create an endless belt.

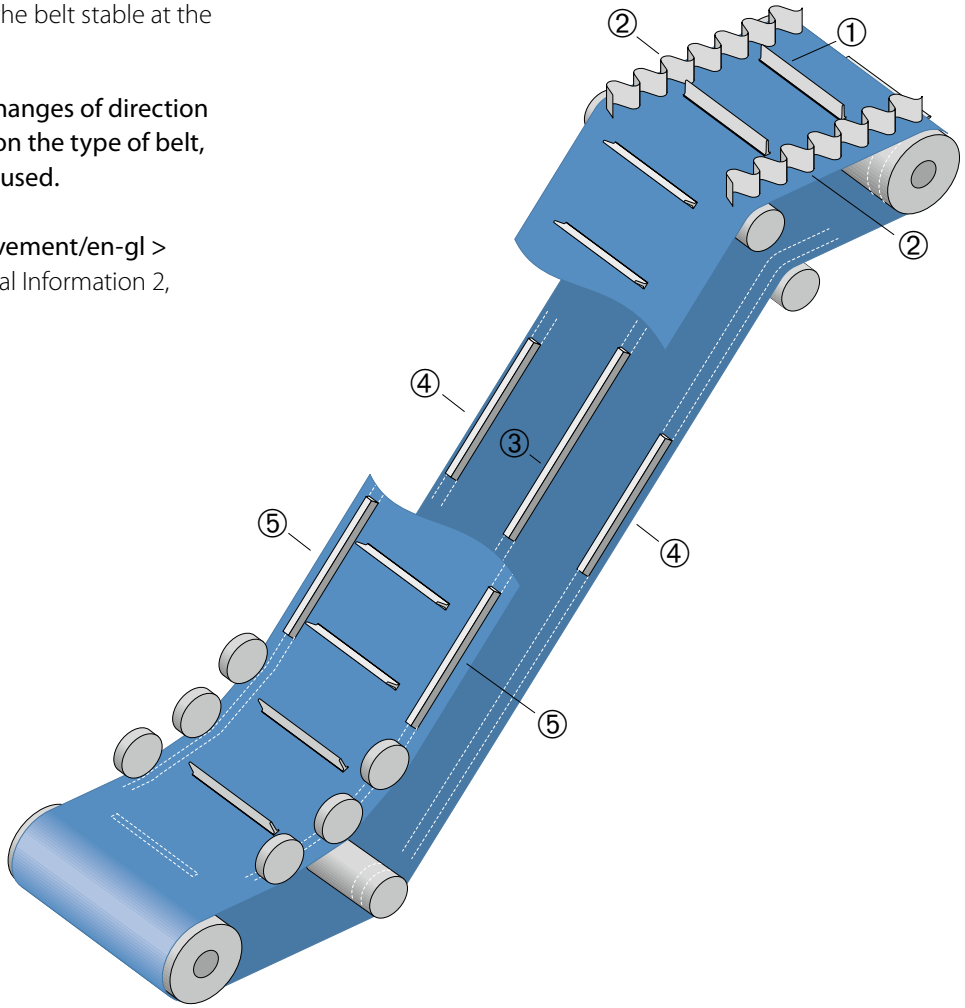
Profiles and corner radii

It is often advisable to fit profiles to rising conveyor belts.

- **Lateral profiles** (1) ensure that goods do not slip downwards.
- **Sidewalls** (2) ensure that goods do not slip off sideways.
- **Central longitudinal profiles on the underside** (3) ensure that the belt does not run off-centre.
- **Longitudinal profiles along the belt edges** on underside (4) or top face (5) are necessary to maintain the width if the lateral stiffness of the belt, including any welded lateral profiles, is insufficient to keep the belt stable at the convex bend.

In these cases the minimum radii at changes of direction and counter-bends depend not only on the type of belt, but also on the profiles and sidewalls used.

(For details go to **www.forbo.com/movement/en-gl > Downloads** Siegling Transilon · Technical Information 2, Ref. no. 318-2.)



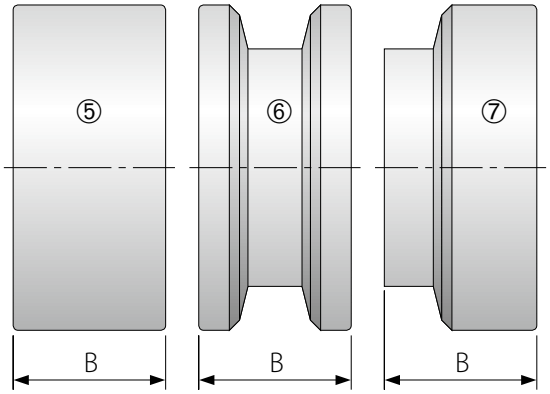
Belt guides at concave bends

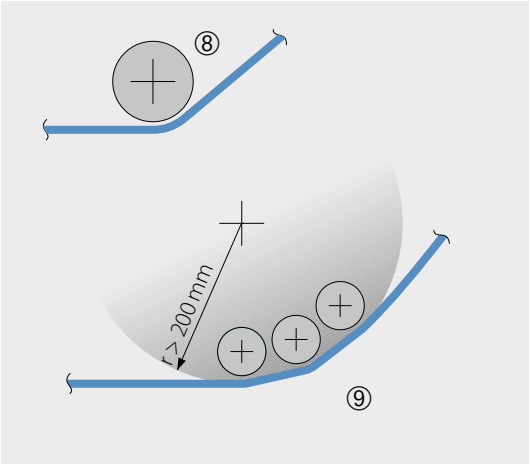
Idler rollers with various geometries are required to hold down the belt edges at concave bends. The minimum width B is 30 mm in each case:

- Cylindrical rollers (5) for belts without longitudinal profiles on the top face.
- Pulleys (6) or guide rollers (7) for belts with longitudinal (guide) profiles on the top face.

For shallow or fixed conveyor angles, it is sufficient to install one idler roller (8) on each side of the belt (for counter-bending radius see previous page).

For greater or variable conveyor angles, several (at least three) idler rollers (9) can be installed on each side of the belt. Their diameter may be less than that of a single roller per side. A total change-of-direction radius > 200 mm must be maintained, however, because the arc of contact at the individual rollers can otherwise lead to splice failures.





RECOMMENDATIONS FOR CONVEYOR DESIGN

Special recommendations when using guide profiles

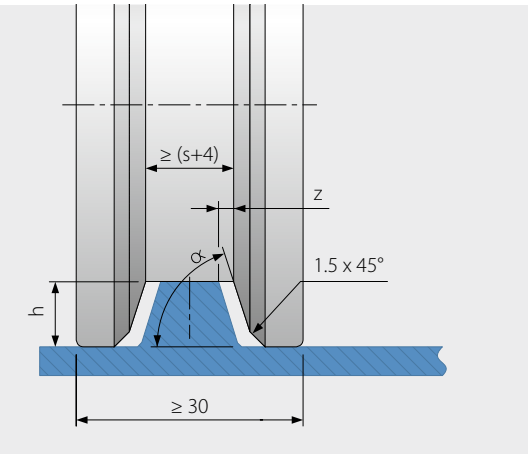
One of the K profiles shown in the table (or, alternatively, a rectangular profile) will be welded to the belt depending on the dimensions of the conveyor.

Generally, a total tolerance of ± 2 mm transverse to the conveying direction must be assumed for the clearance between the internal flanks of the guide profiles.

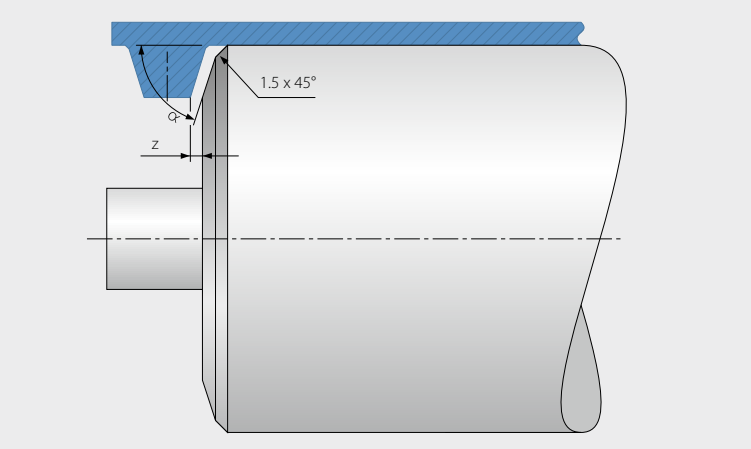
Furthermore, as the belt extends in the longitudinal direction, a transverse contraction takes place. This corresponds to approx. 30 % of the extension in the longitudinal direction and must absolutely be taken into account as well for belts > 1.5 m wide.

In these cases the lateral play z should be increased to 5 + 0.3 % of the belt width [mm]. Where the centre-to-centre spacing of the guide grooves is fixed due to the construction of the conveyor, the centre-to-centre spacing of the profiles (i.e. the order size) can be increased.

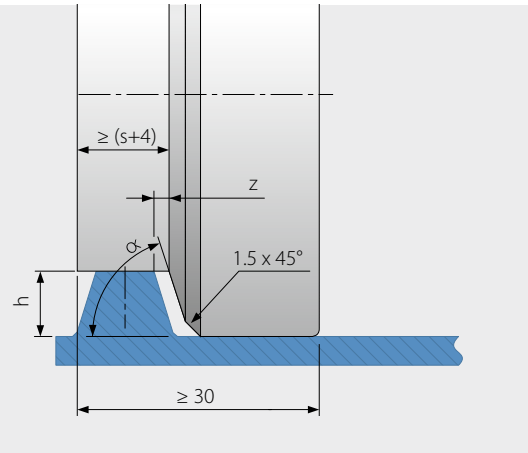
Dimensions in mm



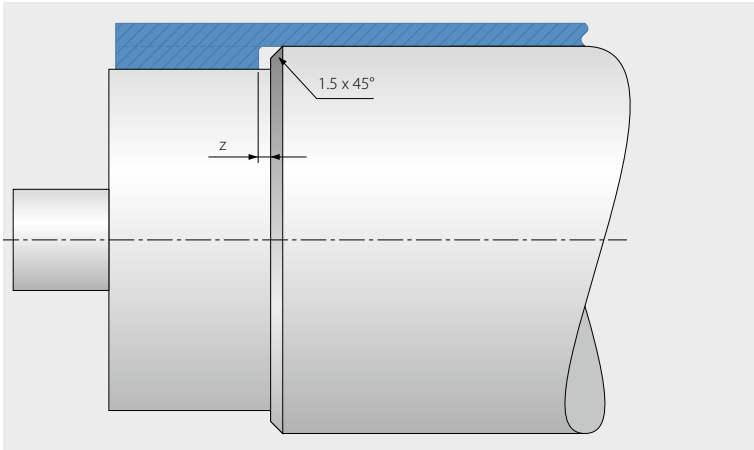
K profile on top face, belt guided by pulley



K profile on underside, belt guided by drive/reversing drum



K profile on top face, belt guided by guide roller

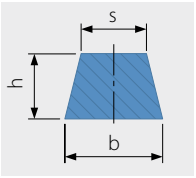


F profile on underside, belt guided by drive/reversing drum

Squeezing the profiles leads to greater running resistance during operation and possibly to profiles being torn off the belt. Therefore, the following details are crucial for the geometry and positioning of idler rollers, drive and reversing drums:

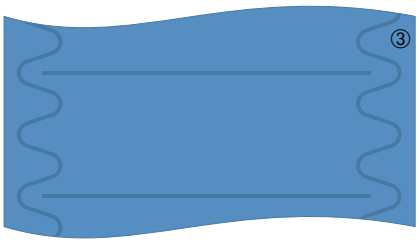
– The flank angle α of pulleys and guide rollers (for profiles on the top face) and drive and reversing drums (for profiles on the underside) must match that of the profile (see table). The outer edges facing the profile must be chamfered 1.5 x 45° in order to clear the welt. The width of a pulley groove must be ≥ s + 4 mm. The groove depth should match the height of the profile.
– Pulleys and guide rollers must include a lateral fine adjustment option. When the conveyor is idling, the clearance between the roller flank pointing towards the middle of the conveyor and the side of the profile must be set to 1 – 2 mm. There should be no contact between roller flank and profile, and hence squeezing, when the conveyor is idling.

	b x h x s [mm]	Flank angle α of idler roller [°]
K 6	6 x 4 x 4	75.5
K 10	10 x 6 x 6	70
K 13	13 x 8 x 7.5	70
K 15	15 x 8 x 9.5	70
K 17	17 x 11 x 9.5	70
K 30	30 x 16 x 18	68

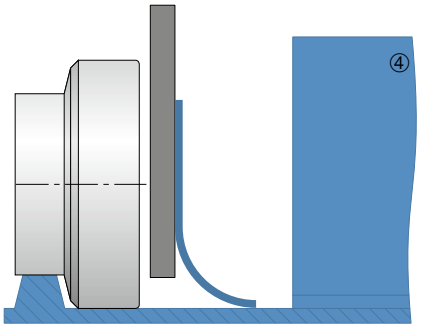


Belt side details

With sidewall ③
Sidewalls can be used to close off the sides of a belt completely.
Sufficient play is necessary to prevent contact with idler rollers. It is important to realise that the top edges of the sidewall corrugations are squeezed together at a concave bend and hence become wider transverse to the conveying direction.



Without sidewall ④
As an alternative to sidewalls, static guards with trailing side skirts can be fitted either side of, but not in contact with, the belt. However, the side skirts can cause increased wear on the top face of the belt. At bends, each side skirt should be fitted in several narrow strips as it is inadvisable to bend the material in two directions. Profiles might have to be moved inwards to provide space for the side skirts.



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