



**RENOLD** | Tooth Chain

# Conveying Systems 输送系统





*Our inverted tooth chains transport and convey products, workpieces, and materials securely and reliably, whether processed or unprocessed, large or small, light or heavy, bulky or round. Renold inverted tooth conveyor chains guarantee success in every area.*

我们的齿形链安全和可靠地运输和输送产品、工件和材料, 无论加工或不加工, 大型或小型、轻型或重型, 笨重或轻巧, Renold齿形输送链在每个领域确保成功。

## Inverted tooth chains from Renold

The safe and profitable solution for conveying different goods

齿形链: 安全和有益地输送不同产品

### The flexible solution for your conveying applications

The technical variety of inverted tooth conveyor chains covers a wide range of applications. Whether for heavy-duty, robust operation, or to convey parts with small or large dimensions, processed or unprocessed workpieces, or even fragile items: An inverted tooth chain is the profitable solution for all types of use.

The variable construction of an inverted tooth chain guarantees the optimal execution of the respective conveying task. Thanks to the multitude of available link plate forms, in many cases it's possible to fix the goods to be conveyed right onto the inverted tooth chain – without additional mechanisms.

Various pitches, link plate forms, and materials are available in order to make the right chain selection in terms of weight and ambient conditions.

- ➔ Space-saving and variable in type, design, and width
- ➔ Slip-free and silent
- ➔ Functional reliability and extended service-life
- ➔ Robustness, simple assembly/disassembly

By significantly lengthening your replacement intervals, Renold can also reduce your costs when it comes to the purchase of spare parts. Substantially extended equipment life and significantly reduced downtime – Renold inverted tooth conveyor chains assure cost-effective production.

### 您输送应用的灵活解决方案

齿形输送链技术多样性涵盖了一系列的应用。无论是为了重载, 稳健运行, 或者输送小型或大型尺寸零件, 加工或非加工工件, 或甚至易碎产品: 齿形链是对所有应用类型有益的解决方案。

齿形链结构的多样性确保能够最优化地执行各自的输送任务, 在许多情况下货物能够直接固定在齿形链进行运输-无需额外的媒介。可以根据种类和周围环境选择各式节距, 链板形状和材料从而选取正确的链条。

- ➔ 节约空间而且提供各式类型, 设计和宽度
- ➔ 自由滑动和无声
- ➔ 功能可靠性和使用寿命延长
- ➔ 坚固, 简易装配/拆卸

Renold通过显著延长你的更换频率, 从而减少你购买备件的成本。实质上延长设备寿命而且显著减少停机时间-Renold齿形输送链确保成本效应生产。

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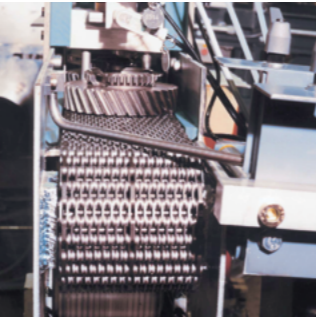
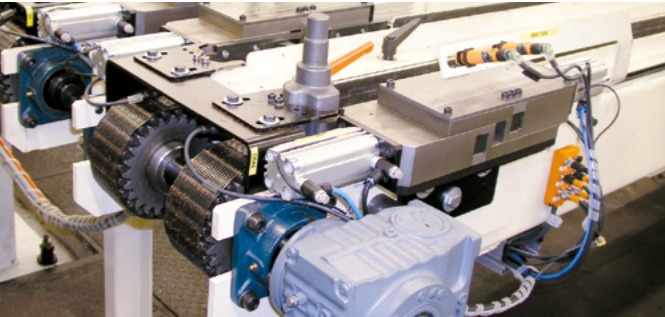
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# A distinguished conveying system

## 杰出的输送系统

Inverted tooth chains for conveying and linkage systems provide optimum conveyor-belt systems.  
齿形链输送和连接系统提供最佳的输送带系统

*Renold has extensive experience in this area. Economical, user-friendly solutions are the main priority for our conveying technology, which is unsurpassed in terms of service life and availability.*

Renold在此领域有着丰富经验。经济, 便于使用是我们输送技术的首要解决方案, 这可以提供无与伦比的使用寿命和可用性。

**Inverted tooth conveyor chains from Renold work slip-free and bring every part to the right location at the prescribed time**  
Depending on their type and shape, the workpieces sit either directly on the chains, on pallets, or on carrier devices that have been specially integrated into the chain. More than 500 different driver link plates are also available to help accomplish this task.

If required, additional link plates for workpiece transport can easily be attached to the conveyor. Depending on their type and shape, products are transported directly on the inverted tooth chain that are designed according to the specific requirements. For special needs, inverted tooth chains are also available with smoothed surfaces. With the help of product carriers or pallets, bulky items are brought to the required position by two narrow inverted tooth chains. The inverted tooth chain features smooth and even running, a special advantage in case of difficult geometry, e.g. a high center of gravity.

**Renold齿形输送链无滑移而且将每一零件在规定时间内输送到正确的位置。**  
根据类型和尺寸, 工件要不直接在链条上, 在托盘上, 或者链条特殊一体上的载体设备。可以提供超过500个不同驱动连接链板来完成这个任务。  
运输工件如果需要额外的链板, 可以轻松地附加在输送机上。根据他们的类型和尺寸, 产品可以根据特定需要设计成直接在齿形链上运输。对于特殊需要, 齿形链也可以提供光滑表面。通过产品载体或托盘, 笨重产品通过两条窄型齿形链运输到需要的位置。齿形链光滑运行特性使他能够在特殊环境下有着特别优势, 比如说: 高重心。

- ➔ Space-saving and variable in both form and width due to the chain's lamellar construction
- ➔ Operate slip-free and quietly with the help of involute-toothing
- ➔ Ensure functional reliability and a long service life with low wear and tear
- ➔ Provide versatility through application-specific design
- ➔ Promote large bearing surfaces and low surface pressure through special link plate forms
- ➔ Use premium materials for high resistance to temperature and ambient conditions
- ➔ Offer easy assembly and disassembly due to the chain's specific design
- ➔ Reduce wear on transported goods through top-quality surfaces
- ➔ Feature interlocking driving through link plate forms or special drivers

- ➔ 链条其薄片型结构能够节约空间, 同时提供不同形式和宽度
- ➔ 渐开线啮合使得运行无滑移且安静
- ➔ 低磨损情况下功能的可靠性和长使用寿命
- ➔ 根据应用特定设计提供多功能
- ➔ 通过特殊链接板形式促成较大轴承表面和较低的表面压力
- ➔ 使用顶级材料适应温度和周围环境
- ➔ 基于链条特定设计提供简单装配和拆装
- ➔ 通过质量上乘的表面材料减少运输物品的磨损
- ➔ 通过连接板形式或特殊驱动实现联锁功能

### Avoidable problems of various conveyor systems with ...

#### 可避免的各种输送机系统的问题...

#### ... belts

- ➔Damage due to sharp-edged parts
- ➔High degree of wear
- ➔Lack of thermal and chemical resistance
- ➔Difficult to repair
- ➔Complex assembly
- ➔Large roller diameter
- ➔Large in width
- ➔High pre-load forces

#### ... 皮带

- ➔锋利边缘零件使其损坏
- ➔磨损高
- ➔缺乏抗热和抗化学性
- ➔维修复杂
- ➔安装复杂
- ➔滚子直径大
- ➔宽度宽
- ➔高预载力

#### ... roller conveyors

- ➔Loud running noises
- ➔Low accuracy
- ➔Changing conveyance height
- ➔Many individual drives
- ➔Lack of interlocking driving
- ➔Limited accessibility
- ➔Small bearing surface
- ➔Missing design variants

#### ... 滚柱输送机

- ➔运行噪音大
- ➔精度低
- ➔改变输送高度
- ➔许多单独驱动
- ➔缺乏联锁驱动
- ➔可用范围窄
- ➔承载表面小
- ➔缺乏设计款式

#### ... roller chains

- ➔Limited width adjustment
- ➔Small bearing surface
- ➔High surface pressure
- ➔High wear with accumulation operation
- ➔No immediate driving with accumulation roller chains
- ➔Uneven or high elongation
- ➔Unbalanced running
- ➔Large wheel diameters

#### ... 滚子链

- ➔宽度调整有限
- ➔承载表面小
- ➔表面压力大
- ➔累加运行磨损高
- ➔累加滚子链无直接驱动
- ➔不平坦或高伸长率
- ➔运行不平衡
- ➔链轮直径大

Inverted tooth chains from Renold – maximum versatility as a modular system.

Renold齿形链 – 以其最大多样性成为模块化系统

Advantages | Inverted tooth conveyor chains

优势 | 齿形输送链

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The extended pitch version TRILEG

节距加长类型 TRILEG

#### New link plate forms for the extended pitch version TRILEG – inverted tooth conveyor chains

- ➔ Reduced vertical wear caused by abrasion on the teeth across the entire chain
- ➔ 30% reduction in pressure and sliding loads
- ➔ Advantage of lower chain elongation for inverted tooth conveyor chains with extended pitch due to minimizing the number of joints is not impaired

#### 节距加长类型TRILEG新链板模式

- ➔ 减少链齿在整个链条上的垂直摩擦
- ➔ 降低30%压力和滑动载荷
- ➔ 节距加长型的齿形输送链因其减少了关节磨损从而降低链条伸长率

#### Length behavior of inverted tooth chains, one- and two-pins versions

齿形链长度表现, 单销和双销形式

Hours of operation (运行小时)	1-pin system = other make (Elongation %)	2-pin system = Renold (Elongation %)
0	0.0	0.0
500	0.4	0.1
1000	0.5	0.15
1500	0.6	0.2
2000	0.7	0.25
2500	0.8	0.28
3000	0.9	0.3
3500	1.0	0.32
4000	1.0	0.35

Laser-welded

激光焊接

Riveted

铆接

#### The axle pivots in Renold inverted tooth conveyor chains are laser-welded to the outer link plates

- ➔ Smooth contact surfaces on both sides. Since the rivet heads no longer protrude, inverted tooth conveyor chains may be routed directly along the guide rails
- ➔ Increase in service life. What doesn't protrude cannot be damaged!
- ➔ Pivot pins do not drift laterally
- ➔ Substantially larger side surfaces without sharp-edged rivet heads prevent side wear on tooth chains and guide rails
- ➔ These new inverted tooth chains are fully compatible with existing models. No modifications or sprocket reworking is necessary

#### Renold齿形输送链枢轴焊接到外连接链板

- ➔ 双面光滑接触表面。因为铆头头部不突出, 齿形输送链直接跟随导轨移动
- ➔ 提高链条寿命。没有什么突出就不能损坏
- ➔ 枢轴不横向漂移
- ➔ 没有锋利的铆接头实质上以防止齿形链侧边和导轨磨损
- ➔ 这些新的齿形链完全符合现有模式。无需进行更改或链轮返工

### Renold joint systems

All one-pin systems experience up to three times as much elongation due to sliding friction. This leads to increased pivot wear. Renold 2-pin rolling pivot joint with its hardened pivot and axle pivots creates only rolling friction and thus substantially reduces wear.

### 接头系统

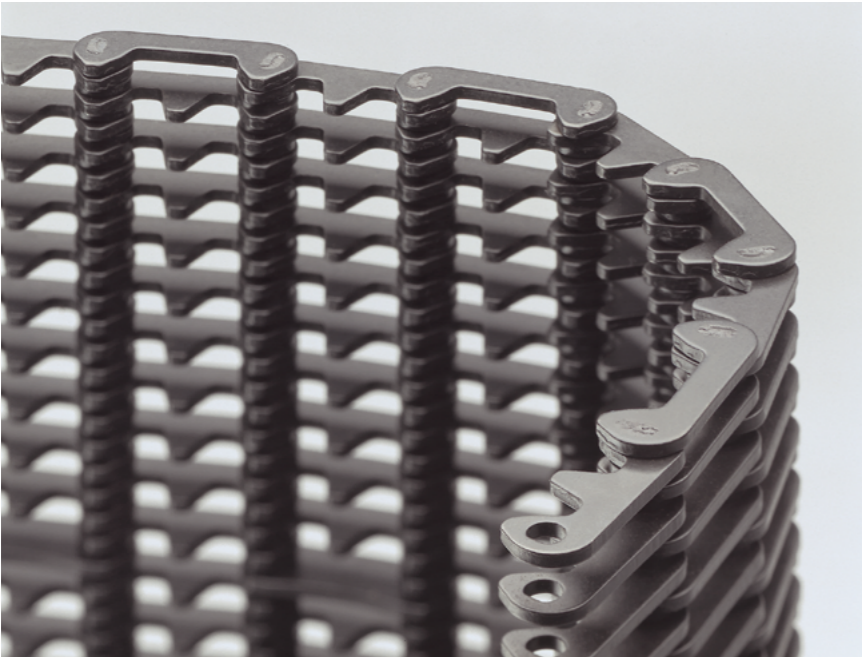
所有单销系统由于滑动摩擦都会经历三倍拉长, 这将会增加枢轴磨损。Renold双销滚动硬化枢轴只产生滚动摩擦,从而大大减少磨损

# Design characteristics

## 设计特点

Varying pitches, constructions, materials and models

多种节距、结构、材料和模型



Inverted tooth chains with a 2-part rolling pivot joint constitute the inverted tooth conveyor chains with the least amount of wear due to elongation. Thanks to optimized link plate forms, they also provide an enlarged sliding area.

All models are available in the following standard variations

- ➔ Tight link construction
- ➔ Loose link construction with spacer disks or bushings

Additional versions for special applications

- ➔ Inverted tooth chains with smoothed backs for fragile surfaces, for use in accumulation operation and for improved stability (smoothed on both sides upon request)
- ➔ Inverted tooth chains made from stainless steel for demanding ambient conditions
- ➔ Inverted tooth chains with galvanized or nickel-plated links
- ➔ Inverted tooth chains with drivers or special link plates to fit individual conveying needs

齿形链带两部分滚动枢轴关节因其较小的伸长带来较低磨损。由于链接板形式优化,他们还提供一个扩展的滑动区域。

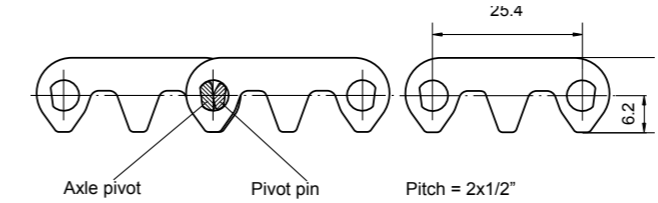
所有模型都可以按照以下标准进行变化

- ➔ 紧节结构
- ➔ 带垫片或轴衬松节结构

特殊应用的额外形式

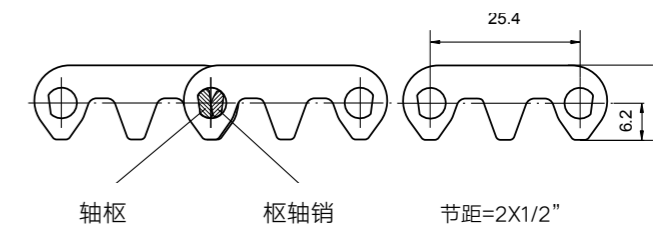
- ➔ 齿形链带易碎表面的光滑背面,用于积放操作和提高稳定性(双面平滑需要咨询)
- ➔ 按照周围环境定制不锈钢齿形链
- ➔ 镀锌或镀镍链节齿形链
- ➔ 带驱动器齿形链或特殊链节链板来匹配个别输送需要

### Extended pitch 2 x 1/2" TRILEG



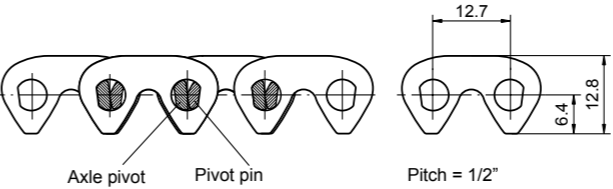
- ➔ Less elongation due to wear
- ➔ Less vertical wear in the TRILEG version
- ➔ Reduced weight allows for easier assembly and less drive energy
- ➔ Improved oil and chip removal

### 加长节距 2X1/2"TRILEG



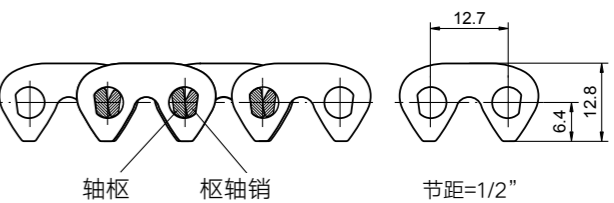
- ➔ 磨损少从而减少拉长
- ➔ TRILEG结构能减少垂直磨损
- ➔ 减轻重量从而能够更轻松装配和减少驱动能量
- ➔ 改进的油品和链片拆卸方式

### Regular pitch 1/2"



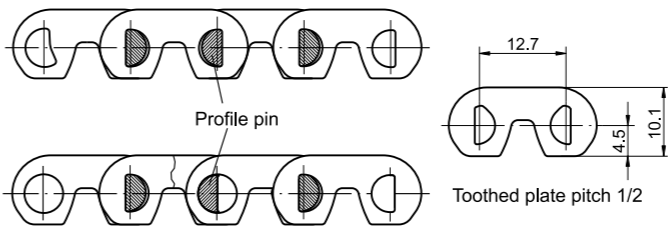
- ➔ Can be used for smaller parts
- ➔ Universally applicable, especially for smaller return diameters
- ➔ Compact, durable, and stable under load

### 普通节距 1/2"



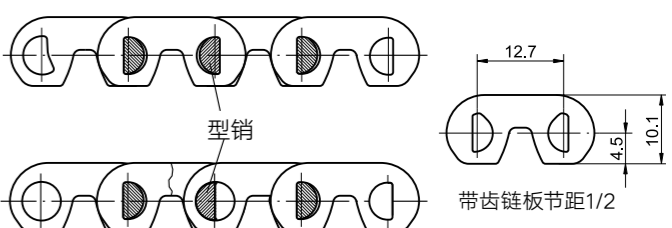
- ➔ 可以用于更小零件
- ➔ 普遍应用, 特别是更小回转直径
- ➔ 紧凑, 耐用而且在载荷下坚固

### Low model 1/2"



- ➔ Extremely large bearing area on the tooth side
- ➔ Robust version with a profile pin
- ➔ Reduced link height
- ➔ Special version without rigid backing available

### 低模式 1/2"



- ➔ 齿面特别大的承载区域
- ➔ 带型销坚固版本
- ➔ 链节高度降低
- ➔ 特殊版本没有刚性的支持

# Types of standard guides

## 标准导轨种类

We have all types of guides in our programme  
在我们程序中有各种种类的导轨

Inverted tooth chains are usually centered on the chain wheel with unmeshed link plates, also known as guide plates. In general, all types of guides have their advantages, and in some circumstances, the guide plates in inverted tooth conveyor chains may be dispensed with completely. Please ask us for more information!

It goes without saying that all of our standard guide types are available at the same conditions. For all external guide variants, please indicate the meshing width!

齿形链通常集中在链轮非网格化链接板块,也称为导片。总的来说,各种导片都有自己的优势,在某些应用中,可以完全摒弃齿形输送链导片,需要时请咨询我们!

毫无疑问,我们所有的标准导片类型在相同条件下是可用的。对于所有外导片种类,请告知我们网宽度。



TRILEG with internal guide  
TRILEG内导片

### External guide



- The inverted tooth chain displays a row of guide plates which enclose the cogs and center the chain
- A completely homogenous link plate formation in the chain's middle is possible
- Adjustment to wheel width necessary

### 外导片



- 齿形链显示一排导片封闭齿轮和链条中心
- 链条中间可以是同质的连接链板
- 需要按照链轮宽度调整

### Internal guide



- The middle of the inverted tooth chain contains a row of guide plates which run into a guideway in the wheel and thus center the chain
- All-purpose, independent of the existing wheel width

### 内导片



- 齿形链中间包含一排导片使其运行到链轮导位从而到链条的中心
- 通用, 独立于现有链轮宽度

### A brief overview of the variety of standard designs

End version	Link plate type	Construction	Guide
Inverted tooth conveyor chains in machine-specific widths, lengths, material type and with special modifications	Extended pitch TRILEG with two-pin system	tight	internal external
		loose	internal external
	Regular pitch with two-pin system	tight	internal external
		loose	internal external
	Low model with one-pin system	tight	internal external
		loose	internal external

### 标准设计类型的简要概述

尾端类型	连接链板类型	结构	导片
齿形输送链 在特定机器的宽度、长度、材料类型和特殊的调整	双销加长节距TRILEG类型	紧	内 外
		松	内 外
	双销普通节距类型	紧	内 外
		松	内 外
	单销低模式类型	紧	内 外
		松	内 外

# The correct design of inverted tooth chains

## 齿形链正确设计

Traction and effective power requirement, chain width and required surface length

牵引力和有效动力需求, 链条宽度和所需表面长度

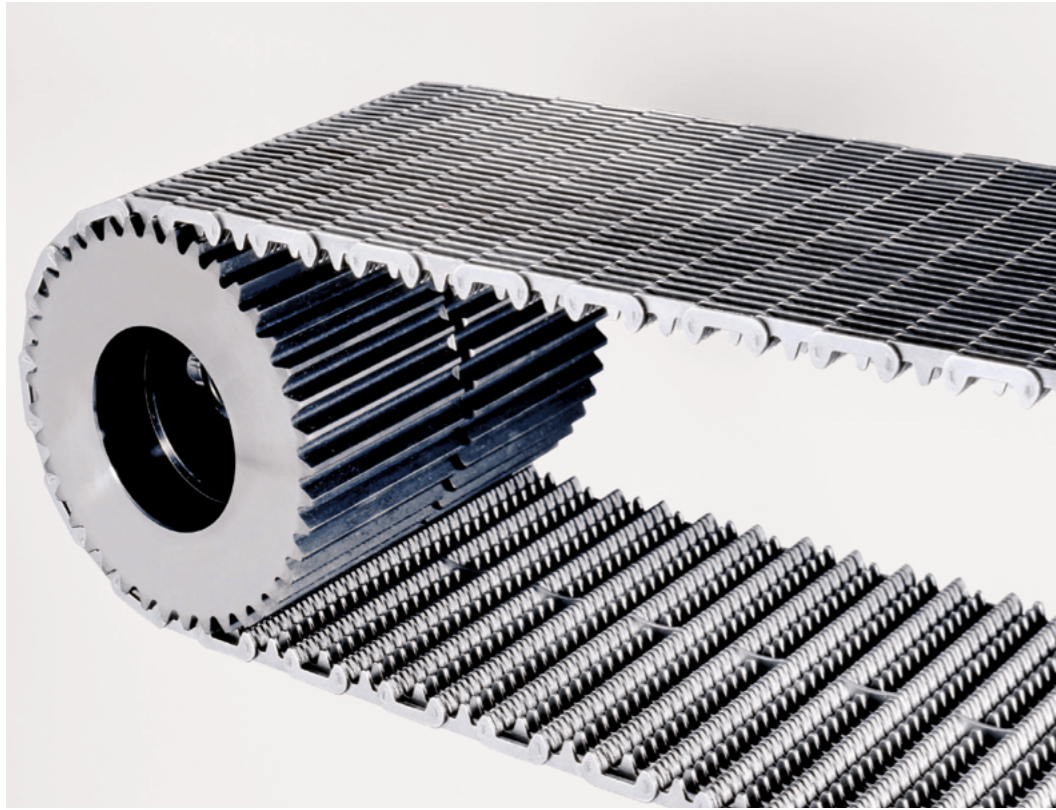
### The right layout is a pre-requisite for a long service life

The chain width is measured according to the traction necessary to overcome friction. This friction may be doubled in accumulation zones. The collapse load of an inverted tooth chain should also be considered when extremely heavy weight loads are involved. In case of doubt, please send us your layout. We're happy to assist you!

The actual power requirement can also be determined for a specified conveying speed. In order to prevent an overload caused by oversized motors, the final chain selection is recommended based on the existing drive torque.

### 正确的布局是使用寿命长的一个先决条件

链条宽度的测量取决于克服摩擦的牵引力。在累加区域内会加倍。齿形链极限载荷也应该考虑非常沉重的重量负担。如有疑问, 请发给我们您的设计布局, 我们很乐意为您服务。实际所需动力同时也取决于特定输送速度。为了防止过大发动机造成的过大载荷, 最终链条选择基于现有驱动扭矩



### Traction and effective power requirement:

$$F_1 = 9,81 \cdot G \cdot \mu \cdot N_R$$
$$P_{\text{eff}} = F_1 \cdot v \cdot 10^{-3}$$
$$F_2 = \frac{2 \cdot M_d}{d_K} \cdot 10^3 \geq F_1$$

- F<sub>1</sub>

=

traction [N]
- G

=

conveyed weight [kg]
- μ

=

friction factor, dry sliding friction up to 0.15 adhesion/ synthetics up to 0.4
- N<sub>R</sub>

=

number of normal friction surface pairs: N<sub>R</sub> = 1 loaded chains in accumulation zones: N<sub>R</sub> = 2
- P<sub>eff</sub>

=

effective power requirement [kW]
- v

=

conveying speed [m/s]
- M<sub>d</sub>

=

torque [Nm]
- d<sub>K</sub>

=

tip diameter [mm]

**Explanations:**  
The chains slide along rails. Metal or synthetic materials are customarily used as wear surfaces and should be accounted for when determining the value μ. A distortion of the bearing area (e.g. placed under pressure during longer downtimes) could result in an increased breaking torque (μ = 0.4) when synthetic materials are involved. (See page 26 for more details on slide rails.)

### Chain width:

The selection of an inverted tooth conveyor chain is based on the calculation of the chain's width, which follows the formula:

$$b_a = \frac{F_{1,2} \cdot y}{10 \cdot p \cdot N_z}$$

- b<sub>a</sub>

=

chain width [mm]
- F<sub>1,2</sub>

=

traction force [N]
- p

=

chain pitch 12.7 [mm]\*
- N<sub>z</sub>

=

number of chains
- y

=

length factor for A = 5 m and above according to the formula: y = 1.0 + (A - 5) · 0.06 with shaft distance [m] Max. value 2.0!

\*Must also be used for an extended pitch of 2 x 1/2".  
**Explanations:**  
Factor y: Extra lengths are necessary to prevent the "stick-slip" effect on longer stretches, which may occur as a jerky slide at the end of the conveyor. The calculated width should first be rounded up to an existing working width b<sub>a</sub> (taken from the table), depending on type and pitch. For laser-welded inverted tooth conveyor chains, the total width b<sub>g</sub> corresponds to the working width.

Important: The calculated chain width only applies to chains with a tight link plate construction. If choosing an inverted tooth conveyor chain with a loose construction, e.g. with disks or bushings, please ask for a consultation first. In general, special link plates do not affect the width and are described in further detail on page 23. The determined working width b<sub>a</sub> must be doubled for rustproof inverted tooth conveyor chains.

### 所需牵引力和有效动力:

$$F_1 = 9,81 \cdot G \cdot \mu \cdot N_R$$
$$P_{\text{eff}} = F_1 \cdot v \cdot 10^{-3}$$
$$F_2 = \frac{2 \cdot M_d}{d_K} \cdot 10^3 \geq F_1$$

- F<sub>1</sub>

=

牵引力 [N]
- G

=

输送重量 [kg]
- μ

=

摩擦系数  
干滑动摩擦0.15  
合成纤维粘附到0.4
- N<sub>R</sub>

=

正常的摩擦表面对数量:  
N<sub>R</sub> = 1  
在累加区域加载链:  
N<sub>R</sub> = 2
- P<sub>eff</sub>

=

所需有效动力 [kW]
- v

=

输送速度 [m/s]
- M<sub>d</sub>

=

扭矩 [Nm]
- d<sub>K</sub>

=

齿顶圆直径 [mm]

**解释:**  
链条沿着铁轨滑动。通常金属或合成材料用作磨损表面,在确定μ的值时需要考虑此因素。当涉及合成材料轴承的变形区域(如在长时间停机下的压力)可能导致扭矩破坏增加(μ= 0.4)。(具体滑动轨道参考第26页)

### 链条宽度:

齿形输送链的选择基于链条宽度的计算, 这需要根据下列公式:

$$b_a = \frac{F_{1,2} \cdot y}{10 \cdot p \cdot N_z}$$

- b<sub>a</sub>

=

链条宽度 [mm]
- F<sub>1,2</sub>

=

牵引力 [N]
- p

=

链条节距12.7 [mm]\*
- N<sub>z</sub>

=

链条数量
- y

=

当 A = 5 及以上时根据下面的公式计算长度因素: y = 1.0 + (A - 5) · 0.06 with A = 轴距 [m] 最大为2.0!

\*必须也用于延长节距2X1/2".  
**解释:**  
y因素: 额外的长度以防止 "粘滑运动" 效应所造成的延伸,这可能会发生在输送机。宽度计算应该首先按照现有工作宽度根据类型和节距对b<sub>a</sub>四舍五入(从表上取),对激光焊接齿形输送链,总宽度b<sub>g</sub>对应工作宽度。

重要: 链条宽度计算只用于链条紧配链板结构. 如果选择松配齿形输送链, 比如夹片或者衬套, 请先咨询我们. 总的来说, 特殊链片不影响宽度且具体信息详见第23页. 防水齿形链就必须工作宽度b<sub>a</sub>乘以2.

Required surface length:

$$L_{\text{req}} = \frac{100 \cdot G}{b_a \cdot N_z \cdot G_{\text{spec}}}$$

$L_{\text{req}}$  = required surface length [mm]

$G$  = conveyed weight [kg]

$b_a$  = required chain width [mm]  
(from calculations on page 13)

$N_z$  = number of chains

$G_{\text{spec}}$  = specific surface load [kg/mm²]  
(from the diagram)

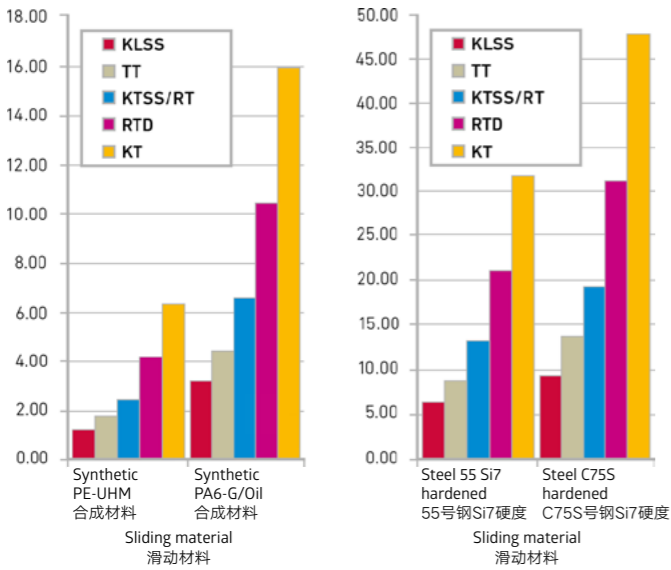
Please keep in mind that both the diagram and the calculation formula contain type-specific data which CANNOT be applied to other models. Only tight inverted tooth chain widths are regarded here. Please contact us concerning versions with spacer disks or bushings.

The smaller the permissible pressure load, respectively as well the choice of the specific surface load  $G_{\text{spec}}$ , the longer is the service life of the sliding material.

请记住：图表和计算公式包含特定类型数据其不能应用于其他模型。仅代表紧配齿形链的宽度。关于版本间隔夹片或衬套请联系我们。

分别选择特定的表面负载 $G_{\text{spec}}$ ，允许的压力负荷越小,滑动材料的使用寿命越长。

Specific surface load  $G_{\text{spec}}$  [kg/mm²]  
表面载荷 $G_{\text{spec}}$  [kg/mm2]



所需表面长度

$$L_{\text{req}} = \frac{100 \cdot G}{b_a \cdot N_z \cdot G_{\text{spec}}}$$

$L_{\text{req}}$  = 所需表面长度 [mm]

$G$  = 输送重量 [kg]

$b_a$  = 所需链条宽度  
(按第13页计算)

$N_z$  = 链条数量

$G_{\text{spec}}$  = 特定表面载荷 [kg/mm2]  
(从图中)

Selecting sliding materials

The permissible specific pressure load plays a key role when it comes to selecting sliding materials. Ambient conditions such as temperature, humidity, dust, etc. greatly influence this choice.

The following materials are used:

- ➔ PE and PA synthetic materials similar to DIN 7728
- ➔ Spring band steel 55 or 65 Si7 or C75S (hardened and tempered)

For these most frequently used or recommended materials, the required bearing length is roughly determined in the following. It depends on the inverted tooth chain type and may not exceed the permissible pressure load that has been determined for the working width.

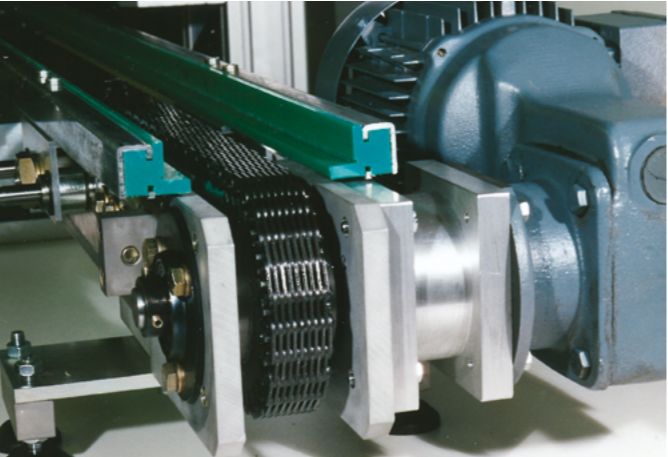
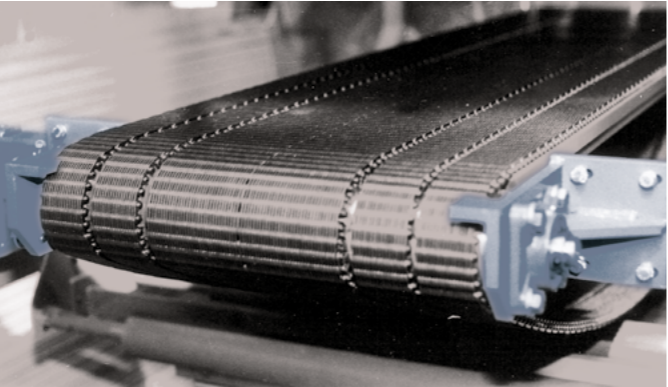
滑动材料选择

在允许特定的压力负荷上滑动材料选择起着关键作用。环境条件如温度、湿度、尘埃等极大地影响这个选择。

使用下列材料：

- ➔ 类似于DIN7728 PE和PA合成材料
- ➔ 弹簧带钢55或者65Si7或者C75S(淬火和回火)

对于这些最常用或推荐材料,按照下面决定所需轴承长度。这取决于工作宽度所确定的齿形链类型和不得超过允许的压力负荷。



2 x 1/2" with two-pin system

2 x 1/2" 双销系统

Laser-welded – 2 mm link plates 激光焊接 – 2mm链板			Riveted – 1.5 mm link plates 铆头 – 1.5mm链板				General 普通	
Designation 代称	Max. width b <sub>g</sub> 最大宽度	Weight [kg/m] 重量	Designation 代称	Max. working width b <sub>a</sub> 最大宽度	Max. total width b <sub>g</sub> 最大总宽	Weight [kg/m] 重量	Nom. width 普通宽度	Wheel width b 链轮宽度
TT-12-SL	14.5	0.7	KLSS 312 A	9.4	18.1	0.6	12	9.5/8.5
TT-15-SL	18.6	0.9	KLSS 315 A	12.5	21.3	0.7	15	13.5/11.5
TT-20-SL	22.7	1.1	KLSS 320 A	18.8	27.5	0.9	20	17.5
TT-25-CL	26.8	1.2	KLSS 325	26.6	32.2	1.1	25	30
TT-30-CL	31.0	1.4	KLSS 330	29.7	35.3	1.2	30	35
TT-35-CL	35.1	1.6	KLSS 335	36.0	41.6	1.4	35	40
TT-40-CL	39.2	1.8	KLSS 340	42.3	47.9	1.7	40	45
TT-45-CL	43.4	2.0	KLSS 345	45.4	51.0	1.8	45	50
TT-50-CL	51.6	2.3	KLSS 350	51.6	57.2	2.0	50	55
TT-55-CL	55.8	2.5	KLSS 355	54.8	60.4	2.2	55	60
TT-60-CL	59.9	2.7	KLSS 360	61.0	66.6	2.4	60	65
TT-65-CL	64.0	2.9	KLSS 365	64.2	69.8	2.5	65	70
TT-70-CL	68.1	3.1	KLSS 370	70.4	76.0	2.8	70	75
TT-75-CL	76.4	3.4	KLSS 375	76.7	82.3	3.0	75	80
TT-80-CL	80.5	3.6	KLSS 380	79.8	85.4	3.1	80	85
TT-85-CL	84.7	3.8	KLSS 385	86.1	91.7	3.4	85	90
TT-90-CL	88.8	4.1	KLSS 390	89.2	94.8	3.5	90	95
TT-95-CL	97.1	4.3	KLSS 395	95.5	101.1	3.7	95	100
TT-100-CL	101.2	4.5	KLSS 3100	101.7	107.3	4.0	100	105
TT-115-CL	117.7	5.2	KLSS 3115	114.2	119.8	4.4	115	120
TT-125-CL	126.0	5.6	KLSS 3125	126.8	132.4	4.9	125	130
TT-140-CL	138.4	6.2	KLSS 3140	139.3	144.9	5.4	140	145
TT-150-CL	150.7	6.7	KLSS 3150	151.8	157.4	5.9	150	155
TT-175-CL	175.5	7.8	KLSS 3175	176.8	182.4	6.8	175	180
TT-200-CL	200.3	8.9	KLSS 3200	201.9	207.5	7.8	200	205
TT-250-CL	249.9	11.1	KLSS 3250	252.0	257.6	9.7	250	255
TT-300-CL	299.4	13.3	KLSS 3300	302.0	307.6	11.7	300	305

Measurements are in millimeters – for sprocket specifications, please see pages 24 and 25.

**Modifications:** ■ Loose construction with spacer disks or spacer bushings ■ With smoothed surface or smooth on both sides ■ Slip-smoothed ■ Integration of driver plates ■ Additional widths available upon request

Use only even link numbers. Number of links equals number of pitches. The manufacturing tolerance for the working width and total width is -1%.

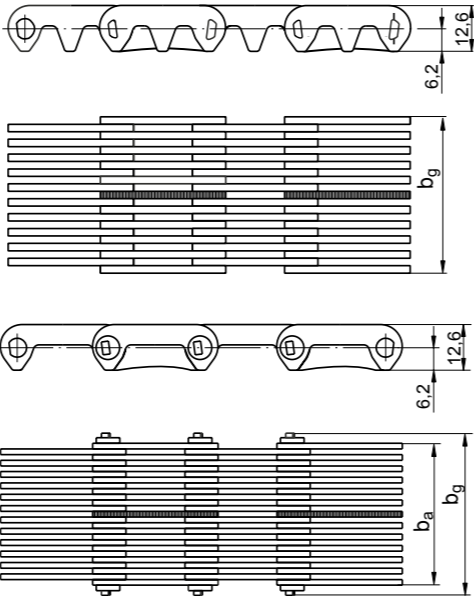
**Note:** Inverted tooth chains are delivered with a riveted closure. When using split pin fasteners, bear in mind the protruding pin head on one side.

尺寸为毫米 – 链轮规格, 请查看第24页和25页。。

变形: ■ 松配带夹片或间隔衬套 ■ 光滑表面或两边光滑 ■ 光滑 ■ 整合驱动链板 ■ 按需要提供额外宽度

只使用偶数链节数量。链节数量等于节距的数量。工作宽度和总宽的生产允许公差是-1%。

**注意:** 齿形链一般呈现铆头闭口。当使用开口销式紧固件时, 请记住一边的出头销。



1/2" with two-pin system

1/2" 双销系统

Laser-welded – 2 mm link plates 激光焊接 – 2mm链板			Riveted – 1.5 mm link plates 铆头 – 1.5mm链板				General 普通	
Designation 代称	Max. width b <sub>g</sub> 最大宽度	Weight [kg/m] 重量	Designation 代称	Max. working width b <sub>a</sub> 最大宽度	Max. total width b <sub>g</sub> 最大总宽	Weight [kg/m] 重量	Nom. width 普通宽度	Wheel width b 链轮宽度
RT-12-SL	14.5	0.9	KTSS 312 A	9.4	18.1	0.8	12	9.5/8.5
RT-15-SL	18.6	1.1	KTSS 315 A	12.5	21.3	1.0	15	13.5/11.5
RT-20-SL	22.7	1.4	KTSS 320 A	18.8	27.5	1.4	20	17.5
RT-25-CL	26.8	1.6	KTSS 325	26.6	32.2	1.6	25	30
RT-30-CL	31.0	1.9	KTSS 330	29.7	35.3	1.8	30	35
RT-35-CL	35.1	2.1	KTSS 335	36.0	41.6	2.2	35	40
RT-40-CL	39.2	2.4	KTSS 340	42.3	47.9	2.5	40	45
RT-45-CL	43.4	2.6	KTSS 345	45.4	51.0	2.7	45	50
RT-50-CL	51.6	3.1	KTSS 350	51.6	57.2	3.1	50	55
RT-55-CL	55.8	3.3	KTSS 355	54.8	60.4	3.3	55	60
RT-60-CL	59.9	3.6	KTSS 360	61.0	66.6	3.6	60	65
RT-65-CL	64.0	3.8	KTSS 365	64.2	69.8	3.8	65	70
RT-70-CL	68.1	4.1	KTSS 370	70.4	76.0	4.2	70	75
RT-75-CL	76.4	4.5	KTSS 375	76.7	82.3	4.5	75	80
RT-80-CL	80.5	4.7	KTSS 380	79.8	85.4	4.7	80	85
RT-85-CL	84.7	5.0	KTSS 385	86.1	91.7	5.1	85	90
RT-90-CL	88.8	5.4	KTSS 390	89.2	94.8	5.2	90	95
RT-95-CL	97.1	5.7	KTSS 395	95.5	101.1	5.6	95	100
RT-100-CL	101.2	5.9	KTSS 3100	101.7	107.3	6.0	100	105
RT-115-CL	117.7	6.9	KTSS 3115	114.2	119.8	6.7	115	120
RT-125-CL	126.0	7.4	KTSS 3125	126.8	132.4	7.4	125	130
RT-140-CL	138.4	8.1	KTSS 3140	139.3	144.9	8.1	140	145
RT-150-CL	150.7	8.8	KTSS 3150	151.8	157.4	8.8	150	155
RT-175-CL	175.5	10.3	KTSS 3175	176.8	182.4	10.3	175	180
RT-200-CL	200.3	11.7	KTSS 3200	201.9	207.5	11.7	200	205
RT-250-CL	249.9	14.6	KTSS 3250	252.0	257.6	14.6	250	255
RT-300-CL	299.4	17.4	KTSS 3300	302.0	307.6	17.5	300	305

Measurements are in millimeters – for sprocket specifications, please see pages 24 and25.

**Modifications:** ■ Loose construction with spacer disks or spacer bushings ■ With smoothed surface or smooth on both sides ■ Slip-smoothed ■ Integration of driver plates ■ Additional widths available upon request

Use only even link numbers. Number of links equals number of pitches. The manufacturing tolerance for the working width and total width is -1%.

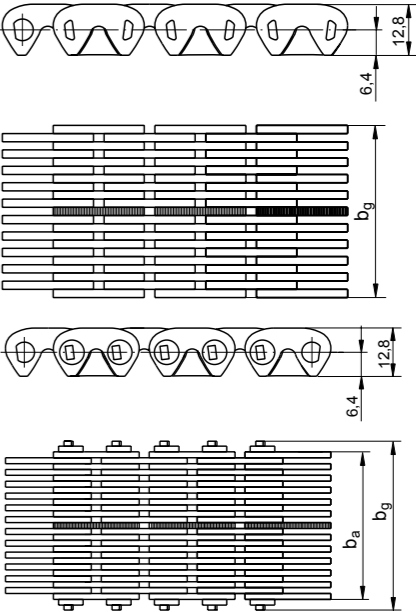
**Note:** Inverted tooth chains are delivered with a riveted closure. When using split pin fasteners, bear in mind the protruding pin head on one side.

尺寸为毫米 – 链轮规格, 请查看第24页和25页。。

变形: ■ 松配带夹片或间隔衬套 ■ 光滑表面或两边光滑 ■ 光滑 ■ 整合驱动链板 ■ 按需要提供额外宽度

只使用偶数链节数量。链节数量等于节距的数量。工作宽度和总宽的生产允许公差是-1%。

**注意:** 齿形链一般呈现铆头闭口。当使用开口销式紧固件时, 请记住一边的出头销。



# 1/2" with one-pin system

## 1/2" 单销系统

Low model – 1.5 mm link plates 低模式 – 链板				Rustproof – 1.5 mm link plates 防锈 – 1.5mm链板				General 普通	
Designation 代称	Max. working width b <sub>a</sub> 最大宽度	Max. total width b <sub>g</sub> 最大总宽	Weight [kg/m] 重量	Designation 代称	Max. working width b <sub>a</sub> 最大宽度	Max. total width b <sub>g</sub> 最大总宽	Weight [kg/m] 重量	Nom. width 普通宽度	Wheel width b 链轮宽度
KT 312 A	9.4	15.1	0.7	RTD 312 A	9.4	18.5	1.2	12	8.5
KT 315 A	12.5	18.3	0.9	RTD 315 A	12.5	21.7	1.4	15	11.5
KT 320 A	17.2	22.9	1.1	RTD 320 A	17.2	26.3	1.7	20	16
KT 325	26.6	29.2	1.1	RTD 325	26.6	32.6	2.0	25	30
KT 330	29.7	32.3	1.6	RTD 330	29.7	35.7	2.2	30	35
KT 335	36	38.6	1.9	RTD 335	36	42	2.6	35	40
KT 340	42.3	44.9	2.2	RTD 340	42.3	48.3	2.9	40	45
KT 345	45.4	48	2.3	RTD 345	45.4	51.4	3.1	45	50
KT 350	51.6	54.2	2.7	RTD 350	51.6	57.6	3.5	50	55
KT 355	54.8	57.4	2.8	RTD 355	54.8	60.8	3.7	55	60
KT 360	61	63.6	3.1	RTD 360	61	67	4.0	60	65
KT 365	67.3	69.9	3.4	RTD 365	67.3	73.3	4.4	65	70
KT 370	70.5	73.1	3.6	RTD 370	70.5	76.5	4.6	70	75
KT 375	75.1	77.7	3.8	RTD 375	75.1	81.1	4.8	75	80
KT 380	79.8	82.4	4.1	RTD 380	79.8	85.8	5.1	80	85
KT 385	86.1	88.7	4.4	RTD 385	86.1	92.1	5.5	85	90
KT 390	89.2	91.8	4.5	RTD 390	89.1	95.1	5.7	90	95
KT 395	95.5	98.1	4.9	RTD 395	95.5	101.5	6.1	95	100
KT 3100	100.2	102.8	5.1	RTD 3100	100.2	106.2	6.2	100	105
KT 3115	114.3	116.9	5.8	RTD 3115	114.3	120.3	7.2	115	120
KT 3125	123.6	126.2	6.3	RTD 3125	123.6	129.6	7.7	125	130
KT 3140	139.3	141.9	7.0	RTD 3140	139.3	145.3	8.6	140	145
KT 3150	148.7	151.3	7.5	RTD 3150	148.7	154.7	9.2	150	155
KT 3175	173.7	176.3	8.8	RTD 3175	173.7	179.7	10.6	175	180
KT 3200	198.8	201.4	10.0	RTD 3200	198.8	204.8	12.1	200	205
KT 3250	248.8	251.4	12.6	RTD 3250	248.8	254.8	15.0	250	255
KT 3300	298.9	301.5	15.0	RTD 3300	298.9	304.9	18.1	300	305

Measurements are in millimeters – for sprocket specifications, please see pages 24 and 25.

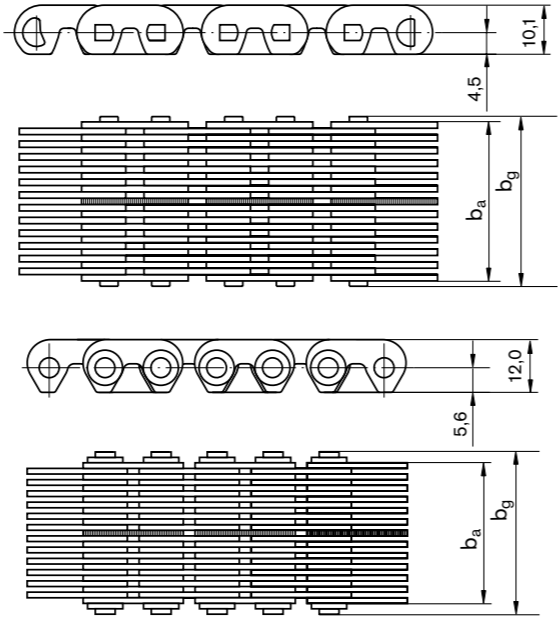
**Modifications:** ■ Loose construction with spacer disks or spacer bushings ■ With smoothed surface or smooth on both sides (Applies only to low model) ■ Slip-smoothed (Applies only to low model) ■ Integration of driver plates ■ Additional widths available upon request

Use only even link numbers. Number of links equals number of pitches. The manufacturing tolerance for the working width and total width is -3%.  
**Note:** Inverted tooth chains are delivered with a riveted closure. When using split pin fasteners, bear in mind the protruding pin head on one side.

尺寸为毫米 – 链轮规格，请查看第24页和25页。

**变形:** ■ 松配带夹片或间隔衬套 ■ 光滑表面或两边光滑 (只适用于低模式) ■ 光滑(只用于低模式)。 ■ 整合驱动链板 ■ 按需要提供额外宽度

只使用偶数链节数量。链节数量等于节距的数量。工作宽度和总宽的生产允许公差是-3%。  
**注意:** 齿形链一般呈现铆头闭口。当使用开口销式紧固件时，请记住一边的出头销。



# 1" with one-pin/two-pin system

## 1" 单销/双销系统

Low model – 3 mm link plates (one-pin system) 低模式 – 3mm链板(单销系统)						Normal model – 3 mm link plates (two-pin system) 普通模式 – 3mm链板(双销系统)					
Designation 代称	Max. working width b <sub>a</sub> 最大宽度	Max. total width b <sub>g</sub> 最大总宽	Weight [kg/m] 重量	Nom. width 普通宽度	Wheel width b 链轮宽度	Designation 代称	Max. working width b <sub>a</sub> 最大宽度	Max. total width b <sub>g</sub> 最大总宽	Weight [kg/m] 重量	Nom. width 普通宽度	Wheel width b 链轮宽度
LCC 6200	198	206	10.0	200	210	KT 630	27.9	35.9	3.4	30	35
LCC 6250	247	255	12.4	250	260	KT 640	40.2	48.2	4.7	40	45
LCC 6300	302	310	15.2	300	310	KT 650	52.6	60.6	6.1	50	55
LCC 6350	351	359	17.6	350	360	KT 675	77.4	85.4	8.8	75	80
LCC 6400	400	408	20.1	400	410	KT 6100	102.1	110.1	11.5	100	105
LCC 6450	449	457	22.5	450	460	KT 6125	126.9	134.9	14.2	125	130
LCC 6500	497	505	25.0	500	510	KT 6150	151.7	159.7	17.3	150	155

Measurements are in millimeters – for sprocket specifications, please see pages 24 and 25.

For especially heavy operation, inverted tooth conveyor chains with 1" pitches are available: type LCC with a low construction and type KT 6..

Due to its robust link geometry, the LCC type is especially well suited for greater widths and its bending capability over the chain back is almost unlimited (no rigid backing).

尺寸为毫米 – 链轮规格，请查看第24页和25页。

特别是重型运行，可以提供 1 英寸节距齿形输送链：低结构的LCC类型和KT6类型。

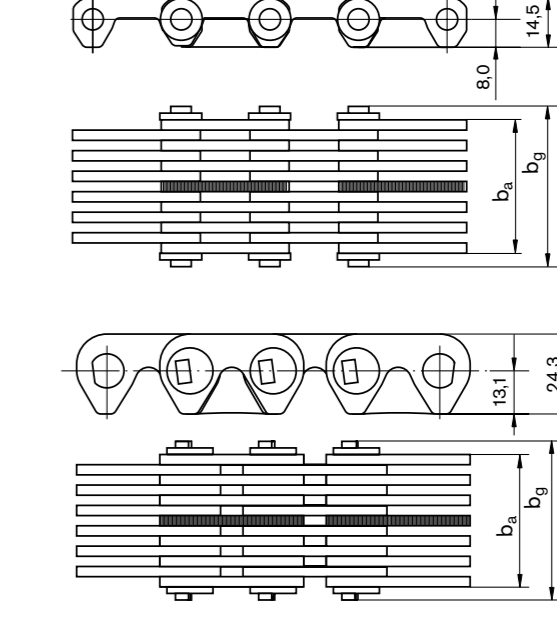
由于其强大的链接几何,LCC类型尤其适合宽度大和其链条刚性抗弯能力几乎是无限的(没有刚性的支持)。

**Modifications:** ■ Loose construction with spacer disks ■ With smoothed surface or smooth on both sides ■ Integration of driver plates or milled driver blocks ■ Additional widths available upon request

Use only even link numbers. Number of links equals number of pitches. The manufacturing tolerance for the working width and total width is -2%.  
**Note:** Inverted tooth chains are delivered with a riveted closure. When using split pin fasteners, bear in mind the protruding pin head on one side.

**变形:** ■ 松配带夹片 ■ 光滑表面或两边光滑 ■ 整合驱动链板 ■ 按需要提供额外宽度

只使用偶数链节数量。链节数量等于节距的数量。工作宽度和总宽的生产允许公差是-2%。  
**注意:** 齿形链一般呈现铆头闭口。当使用开口销式紧固件时，请记住一边的出头销。



# Order codes

## 订单编号

Our system for each easy and correct order code of your individual conveyor tooth chain

您的每条齿形输送链简单而且正确的订单编号

Order codes for 2 mm link plate thickness

2毫米链板厚度订购编号

3. Nom. width

普通宽度

5. Closure type 闭合类型

R = riveted 铆头

L = laser-welded 激光焊接

D = directly riveted 直接铆头

2. Construction 结构

T = tight 紧凑

S = spacer disks 间隔夹片

B = bushings 衬套

C = cleaning disks 清洁夹片

4. Guide type 导片类型

C = internal guide 内部导片

S = external guide 外部导片

M = multiple 多重外部导片

external guide 外部导片

W = without guide 无导片

1. Link plate form 链板形式

R = regular pitch 1/2" 链板形式普通节距 1/2"

E = extended pitch 2 x 1/2" 加长节距 2 x 1/2"

T = TRILEG Version 2 x 1/2" TRILEG版本 2 x 1/2"

Order codes for 1.5 mm link plate thickness

1.5毫米链板厚度订购编号

3

2. Nom. width

普通宽度

4. Guide type

导片类型

Optional: A = external guide

选择: A = 外部导片

1. Version 版本

KTSS = regular pitch 1/2" tight 普通节距 1/2"紧

KTS = regular pitch 1/2" with spacer disks 普通节距 1/2"带间隔夹片

KTB = regular pitch 1/2" with bushing 普通节距 1/2"带衬套

KLSS = extended pitch 2 x 1/2" tight 加长节距 2 X 1/2"紧

KLS = extended pitch 2 x 1/2" with spacer disks 加长节距2X1/2"带间隔夹片

KLB = extended pitch 2 x 1/2" with bushings 加长节距 2X1/2"带衬套

KT = low model 1/2" tight 低模式 1/2"紧

RTD = regular pitch 1/2" stainless steel tight 普通节距 1/2"不锈钢紧

RTS = regular pitch 1/2" stainless steel with spacer disks 普通节距 1/2"不锈钢带间隔夹片

RTB = regular pitch 1/2" stainless steel with bushings 普通节距 1/2"不锈钢带衬套

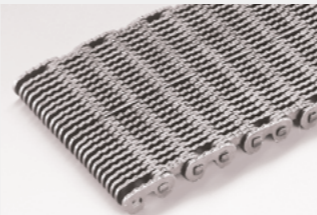
The standard inverted tooth chains contained in the chart present a selection of our product range. Laser-welded inverted tooth conveyor chains include two additional rivet closures for servicing.

在表格中的标准齿形链体现我们产品的生产范围。激光焊接齿形输送链包括两个额外的铆头闭口做维修。

If not explicitly stated, all inverted tooth chains – with the exception of the low model which is riveted directly – are manufactured with riveted disks.

如果不是特别指出, 所有齿形链 - 除了低模式直接铆头以外 - 生产带有铆头夹片

### Different possible chain designs 不同链条设计选择



Ridged surfaces for slip-free wood transport

成脊表面用于无滑移木材运输



Cycle line with massive driver blocks

周期线带大量驱动块



Precision plate chain mounted on an inverted tooth chain base

基于齿形链上安装精密板



Stable driver coupling

稳定驱动耦合



Drag chain to couple transport trolleys

拖引链用于运输手推车



Driver link plates for cross-bars

用于横梁的驱动连接链板



Link plate package with integrated longitudinal profile

整合连接板纵向剖面



Inverted tooth chain in mirrored pairs for packaging lines

为包装线生产的镜像成对齿形链

# Specially designed inverted tooth chains

## 齿形链特殊设计

We are used to the unusual  
我们习惯了不寻常

Special link plates further expand the area of inverted tooth chain applications.

Various possibilities exist:

- ➔ Special inverted tooth chains made entirely from special link plates, e.g. ring or forked plates to take up cross-bars or link plates with ridged backs for woo transport
- ➔ Special link plates only at certain positions, e.g. for fastening mold halves on packaging lines or, on both sides of the chain, fastening link on a support ring to serve as a toothed ring
- ➔ Special inverted tooth chains with extra parts, e.g. massive driver blocks for cycle lines, welded disks for precise plate conveyors, or plastic or ceramic components for the bearingsurface

特殊链板进一步扩大齿形链应用。

存在不同的可能性:

- ➔ 特殊齿形链完全由特殊链接板块制成,如环或分叉链板来运输横梁或链接板块成脊型用于木材运输
- ➔ 特殊链板只存在于特定位置, 比如对包装线的紧固模具部分,链条两边上,紧固连接在支撑环作为齿环
- ➔ 特殊齿形链带额外零件, 比如周期线上的驱动块, 精密链板输送的焊接夹片. 塑料或者轴承表明的合成零件



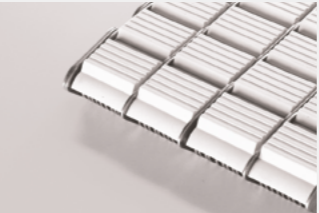
There is a large selection of existing special link plates. Additional forms can be produced quickly through laser cutting.

我们有大量现有特殊链接板块可供选择。可以通过激光切割快速生产额外的形式。



Workpiece supports for light bulb elements

用于灯泡元素的工件支持



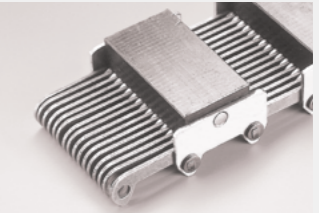
Ceramic items for an inverted tooth chain cover in hot areas

齿形链外部罩着陶瓷件用于加热工位



Improved precision with punched ring links

冲制链节环提高精密度



Plastic carriers for sensitive workpiece surfaces

用于敏感工件表面的塑料载体



Inverted tooth chain in mirrored pairs for outfeed lines

用于出料线镜像成对的齿形链



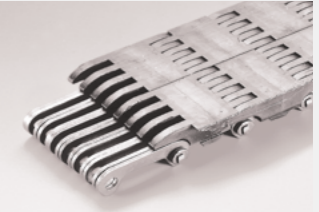
Inverted tooth chain with clamping bolts as toothed ring segment

作为齿圈部分带螺纹端接头的齿形链



Prism inverted tooth chain with plastic link plates for centering profile rods

用于型棒归心带塑料链板的棱柱齿形链



Plastic clips for complete coverage of the inverted tooth chain

塑料夹子完全覆盖齿形链

# The right sprockets

## 正确链轮

Sprocket and tooth chain must be a perfect team

链轮和齿形链必须是一个完美的组合

*Task-specific inverted tooth conveyor chain versions are just as multifaceted as the proper sprockets. Optimal adaptation of all relevant dimensions and profiles to one another results in an accurate toothing, the first step to trouble-free continuous operation.*

特定任务的齿形输送链版本与适当的链轮一样是多层面。最优化的所有相关尺寸和形状形成一个精确的啮合,这是连续操作无故障的第一步。

Whereas regular and extended pitch share an identical tooth-ing profile, the low model has its own toothing profile. Sprock-ets are manufactured according to customer’s visions as far as technically possible. Tooth formation is adjusted to the guide version of the selected inverted tooth chain. When ordering replacement sprockets for existing external guide chains, please indicate the type and current toothing width.

To ensure constant belt height at transfer points, we also offer customer-specific solutions for return rollers without toothing where the external diameter including the chain corresponds to the sprockets currently in use. The chain can then be guided with hardened flanged wheels mounted on both sides. The total width of the inverted tooth chain must be accounted for. When used in laser-welded inverted tooth conveyor chains, return rollers with flanged wheels enjoy a much longer service life thanks to reduced wear.

Usually, C45 steel sprockets with hardened tooth flanks are supplied. Although other materials are possible, steel wheels are preferred for up to 30 teeth.

常规和延长节距有一个相同的啮合轮廓,低模式有自己的啮合轮廓。只要技术上可行可以按照客户的需求生产链轮。齿形根据所选的齿形链的导轨进行调整。在订购替换现有外部导向链轮时,请注明类型和当前啮合宽度

确保皮带传输点高度不变,我们还提供用户特定的没有啮合滚轮的解决方案,其外部直径包括当前使用的链轮相应的链条。链条被硬化带边链轮引导固定在两侧。必须考虑齿形链的总宽度。当使用激光焊接齿形输送链时,带边链轮的滚轮由于磨损少会有更长的寿命。

通常, 可提供C45钢材带硬齿侧翼链轮。尽管也可以选择其他材料, 但是30齿以下的链轮首选钢制。

The reference diameter helps determine the correct external diameter of the sprocket with an attached chain in new condition:

参考直径可以帮助确定正确的外径与附加链链轮:

Pitch diameter:  
节距尺寸:

$$d_o = \frac{p}{\sin (180^\circ / z)}$$

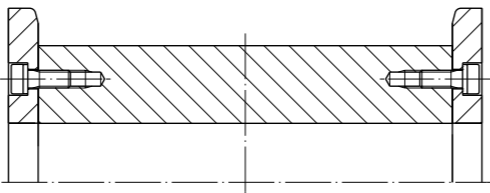
Max. diameter with inverted tooth chain:  
齿形链最大直径:

$$D_{max} = d_o + X$$

Recommended slide rail height:  
推荐滑动轨道高度:

$$h_{slide} \approx (d_o \cdot 1.02) / 2 - o$$

Pitch 节距	Design 设计	Faktor X X因素	Value o 值 O
1/2"	Regular 普通	12.8	6.4
	Extended 延长	12.8	6.2
	Low 低模式	11.2	4.5
1"	Regular 普通	22.4	13.1
	LCC	13.0	8.0

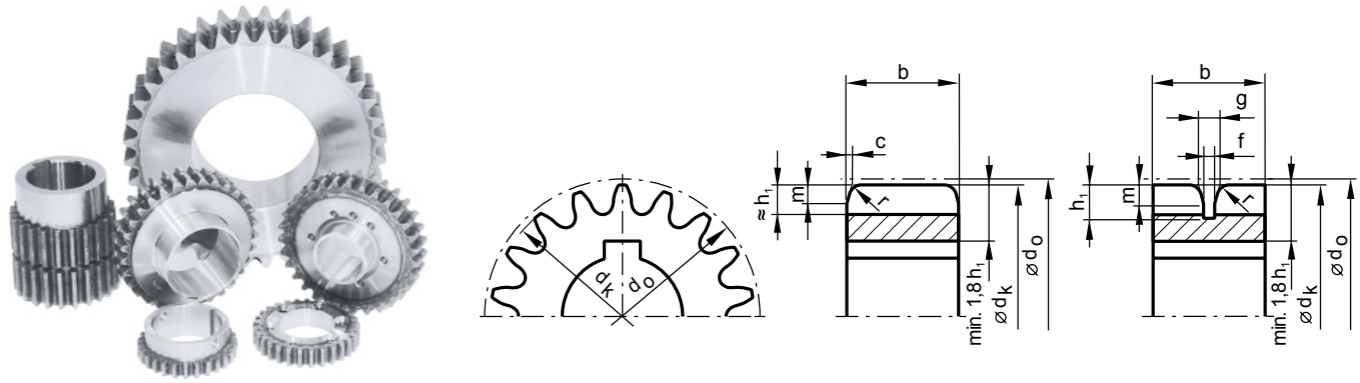


**Slide rail height**  
Raising the rail surface by 2% of the sprocket diameter reduces contact pressure on the teeth and promotes quiet running

滑动轨道高度  
提高轨面链轮直径的2%能够减少接触链齿的压力,从而能够安静运行。

# Sprocket dimensions

## 链轮尺寸



For 1/2" wheels, different tooth widths apply to the two chain pivot constructions. Sprocket orders must specify whether inverted tooth chains will use a one- or two-pin system. Chain width determines sprocket width. Narrower sprocket widths are possible in special cases. Extremely wide chains may make use of a series of narrower disks positioned side by side at a distance.

Sprockets with proper toothing are a pre-requisite for the chain's reliable functioning and long service life. The guarantee for inverted tooth chains does not apply to wheels of foreign make.

对于1/2英寸链轮, 不同齿宽应用于两种链条枢轴结构。链轮订购必须指明齿形链使用单销还是双销系统。链条宽度决定链轮宽度。在一些特殊的应用中也可以使用窄型链轮宽度。特别宽的链条可能会使用一系列并排定位的窄型垫片。链轮的啮合是链条可靠运行和使用寿命长的一个先决条件。齿形链并不一定适用于别家厂商。

### Guide groove and profile 导槽和外形

Pitch 节距	1/2"	1" KT	1" LCC
g	4	8	8
f	3	6	6
h <sub>1</sub>	8	16	12
m	5	10	6
r	2	3	3
c	0,5	1	1

Pitch 节距	Design 设计	Minimum amount of teeth 链齿最小值
1/2"	Regular 普通	17
	Extended 延长	26, pref. 35
	Low 低模式	15
1"	Regular 普通	15
	LCC	12

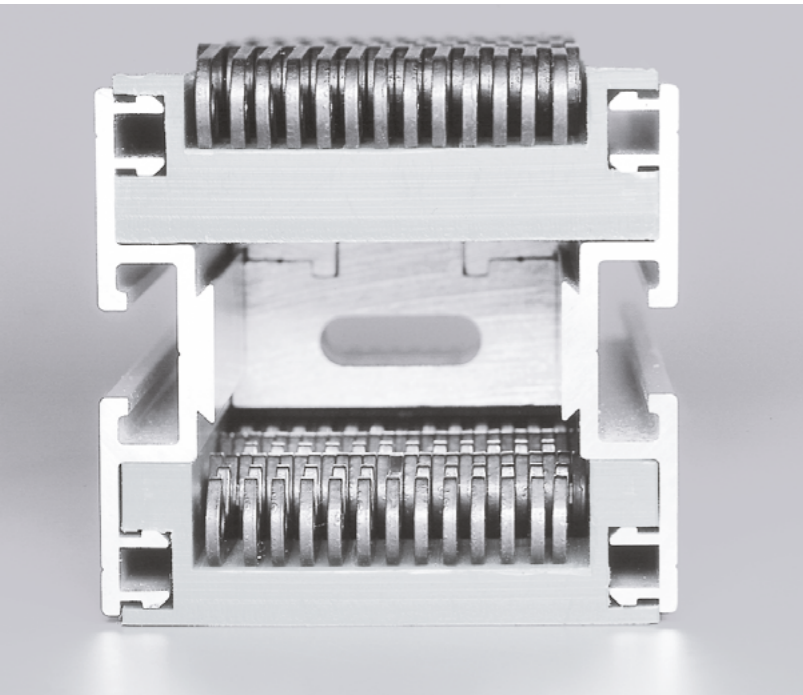
### Sprockets 链轮

Pitch 节距	1/2"		1"	
Design 设计	All 所有		Standard 标准	LCC
No. of teeth	d <sub>o</sub>	d <sub>k</sub>	d <sub>o</sub>	d <sub>k</sub>
12	–	–	98.1	–
13	–	–	106.1	–
14	–	–	114.1	–
15	61.1	59.7	122.2	119.4
16	65.1	63.8	130.2	127.6
17	69.1	67.9	138.2	135.8
18	73.1	72.0	146.3	144.0
19	77.2	76.1	154.3	152.2
20	81.2	80.1	162.4	160.3
21	85.2	84.2	170.4	168.5
22	89.2	88.3	178.5	176.6
23	93.3	92.3	186.5	184.7
24	97.3	96.4	194.6	192.9
25	101.3	100.5	202.7	201.0
26	105.4	104.5	210.7	209.1
27	109.4	108.6	218.8	217.3
28	113.4	112.7	226.9	225.4
29	117.5	116.7	234.9	233.5
30	121.5	120.8	243.0	241.6
31	125.5	124.8	251.1	249.7
32	129.6	128.9	259.1	257.8
33	133.6	133.0	267.2	266.0
34	137.6	137.0	275.3	274.1
35	141.7	141.1	283.4	282.2
36	145.7	145.1	291.4	290.3
37	149.8	149.2	299.5	298.4
38	153.8	153.2	307.6	306.5
39	157.8	157.3	315.7	314.6
49	198.2	197.8	396.4	395.6
59	238.6	238.2	477.2	476.5
69	279.0	278.7	558.1	557.4
79	319.4	319.1	638.9	638.3
89	359.9	359.6	719.7	719.2
99	400.3	400.0	800.6	800.1

Measurements are in mm – Intermediate values should be interpolated  
尺寸为毫米- 需要用内插值替换

# Guiding, installation and maintenance 导向, 安装和维护

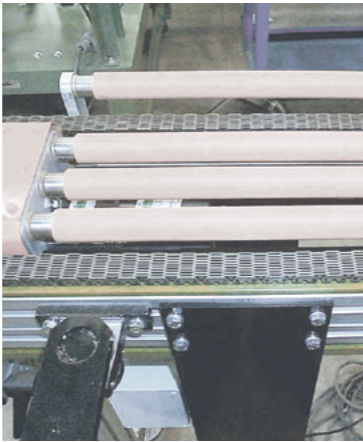
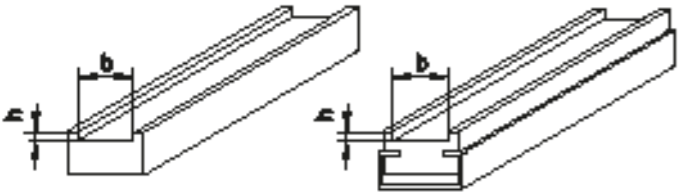
Perfectly guided, correctly tensioned und well lubricated:  
how you guarantee best reliability  
完美导向, 正确张力和润滑到位:  
确保最好的可靠性



**Guiding the inverted tooth chain**  
Chain guiding takes place on both sides through wedge steel with feed slopes or in a U-shape in commercially available plastic profiles. The right material together with the slide surface is selected according to the intended use. The return-chain section must also be supported in case of intervals of one meter or more between axles, e.g. with sliding surfaces in concave profiles, separate slide rails or supporting rollers. The diameter of these rollers is determined by the type of inverted tooth chain.  
The correct selection of sliding material substantially increases reliable operation and service life of the inverted tooth chain. Standard profiles for conveyor belts may also be used.  
**齿形链导向**  
市场上可以买到喂料斜坡的钢楔U型链条导片。按预期用途选择正确的材料和滑动表面。返回链链条也必须与支持的轴之间间隔1米或更多,例如滑动表面的凹型,独立的滑轨或支持辊。这些滚柱的直径取决于齿形链的类型。  
滑动材料的正确选择能够充分增加齿形链的运行和服务寿命,也可以使用标准尺寸的输送带

**Laser-welded inverted tooth conveyor chains from Renold feature the best lateral guide qualities.**  
Renold激光焊接齿形输送链在横向导向质量起重要作用

The following minimum requirements apply to inverted tooth chains with 1/2" pitch, depending on the type of closure:  
1/2英寸节距链条应用的最小需求取决于闭合类型



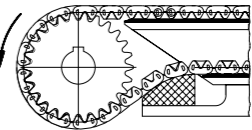
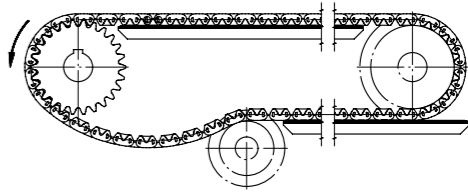
Closure type 闭合类型	h	b
Laser-welded 激光焊接	Link height *)	$b_g + 1 \text{ mm}$
With rivet disk 带铆接夹片	a) 2 mm	a) $b_a + 1 \text{ mm}$
or directly riveted 带铆接夹片	b) Link height *)	b) $b_g + 1 \text{ mm}$

(RTD execution of situation a) is NOT permissible)  
(RTD执行情况)是不允许  
\*) This requires the use of rivet closures. A high lateral guide with-out laser-welded closure generally implies much higher side wear on the slide rails.  
这需要使用铆接闭合. 高侧导型激光焊接闭合通常意味着滑轨上更高的边缘磨损

**The interlocking drive of inverted tooth conveyor chains eliminates the need for pre-tensioning**  
The drive has to be placed in the direction of traction. Retensioning usually occurs by adjusting the distance between the axles. If the end of the re-tensioning stretch has been reached, the inverted tooth chain can easily be shortened. Additionally, a self-tensioning effect (due to the chain's own weight) can be expected when a one-meter-long section of the lower belt sags from the drive wheel.  
As inverted tooth chain drives do not possess much bilateral flexibility, they should only be bent gently over the backs. Depending on the pitch and version, the slack span can be returned with appropriate bending radii (see chart). Belts with S-shaped wraps, e.g. with a center drive, are available with bilaterally flexible inverted tooth chains. Reverse operation is possible in a pre-tensioned inverted tooth chain; however, this requires a special layout.

**Lubrication**  
Additional lubrication should follow in longer intervals based on use and intensity. The lubricant should be applied to the chain teeth from the inside. Also automatic stand-alone lubrication devices could be used for minimized lubrication.

**Inverted tooth chains are delivered only corrosion-proof.**  
**A thorough initial lubrication must take place before installation.**  
**润滑**  
应该根据使用和强度遵循时间间隔使用额外的润滑。应该从里面润滑至链齿,也可以用自动独立润滑设备用于最小化润滑。  
**齿形链交货时有防锈处理。**  
**安装前必须进行彻底初始润滑。**



**联锁驱动的齿形输送链不需要预先预拉**  
驱动必须跟随牵引的方向。通常通过调整轮轴之间的距离再次拉紧。  
如果再次张紧已经达到伸展,齿形链可以很容易地缩短。此外,自我张紧效应(由于链条的重量)皮带1米长部分驱动轮的凹陷  
因为齿形链传动没有了双边的灵活性,他们只能在背后轻轻弯曲。  
根据节距和类型,松弛跨度可以返回适当的弯曲半径(见图表)。可用皮带带s型包装与双边灵活齿形链,如中心传动。  
反向操作预张紧齿形链是可能的;然而,这需要一个特殊的布局。

**Overview of the allowable bending radii for the return unit:**  
概述返回单位的允许弯曲半径:

Inverted tooth chain type 齿形链类型	Bending radius 弯曲半径
1/2" riveted 1/2 " 铆头	> 40 mm
1/2" laser-welded 1/2 " 激光焊接	> 75 mm
2 x 1/2" riveted 2 x 1/2 " 铆头	> 80 mm
2 x 1/2" laser-welded 2 x 1/2 " 激光焊接	> 150 mm
KT (nonrigid backside version),	No limitation 无限
RTD/RTS/RTB, LCC (非刚性背部版本)	



# Assembly and shortening

## 装配和缩短

### Notes for easy assembly and the right shortening of tooth chains

#### 简单装配和正确缩短齿形链的备注

Use only even link numbers. Otherwise, lateral offsets may develop at the junction between both ends. Normal riveted inverted tooth chains are closed with rivets and may be opened at any point by grinding off a rivet head. A new rivet closure is needed to reseal the opening. The following operation applies to inverted tooth chains with direct riveting or laser-welding:  
只使用偶数链节数量。否则可能会在两端之间产生横向偏移量。普通铆接齿形链是铆接闭合而且通过研磨铆钉头可以在任意地方打开。一个新的铆接闭合需要重新密封。以下操作适用于直接铆接或激光焊接齿形链:

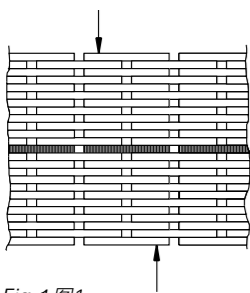


Fig. 1 图1

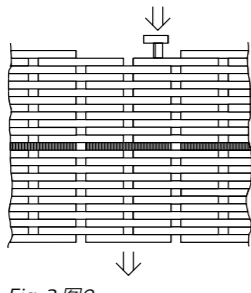


Fig. 2 图2

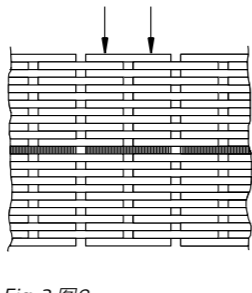


Fig. 3 图3

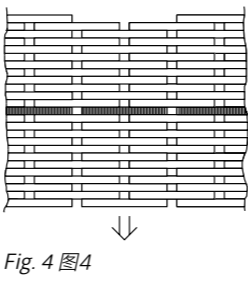


Fig. 4 图4

#### Closing

- ➔ Join both ends and connect them with the accompanying rivet closure
- ➔ For laser-welded inverted tooth chains, grind off any protruding rivet head to the outer link

#### Shortening

Fig. 1:

- ➔ Force open the weld by hitting the pin's front side (if possible, offset on both sides to allow each support pin to remain connected to a welding link)

Fig. 2:

- ➔ Remove the first support pin with the connected welding link and replace it with the rivet closure support pin
- ➔ The pivot pin need not be changed
- ➔ Remove the second support pin likewise with the welding link
- ➔ Rivet

Fig. 3:

- ➔ Measure off the necessary length and disconnect both welds on one side (blasting the link on its front)

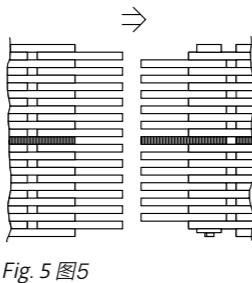


Fig. 5 图5

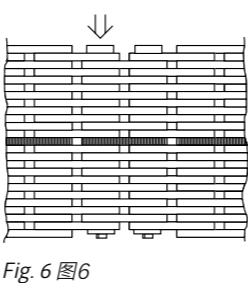


Fig. 6 图6

Fig. 4:

- ➔ Remove welding link with both rolling pivot joints
- ➔ Remove individual parts and single links as well as a chain section

Fig. 5:

- ➔ Push the now inversely arranged ends of the inverted tooth chain into one another as to make the holes congruent

Fig. 6:

- ➔ Insert rivet closure (first the support pin with the disk, then the pivot pin)
- ➔ Rivet and abrade both rivet heads until they are flush with the outer surface of the welding link

#### 闭合

- ➔ 连接两端而且用附随的铆接闭合连接
- ➔ 对于激光焊接齿形链, 研磨任何外链节的突出铆接头。

#### 缩短

图1:

- ➔ 用力敲打销轴前部打开焊接(如果可能,双方的抵消允许每个拉杆保持连接到一个焊接链节)

图2:

- ➔ 移除第一个带连接焊接链节的支撑销轴并且更换成铆接闭合支撑销轴
- ➔ 不需要更换枢轴销
- ➔ 移除第二个带连接焊接链节的支撑销轴
- ➔ 铆头

图3:

- ➔ 量出必要的长度和断开两个焊缝一侧(破坏链节的前部)

图4:

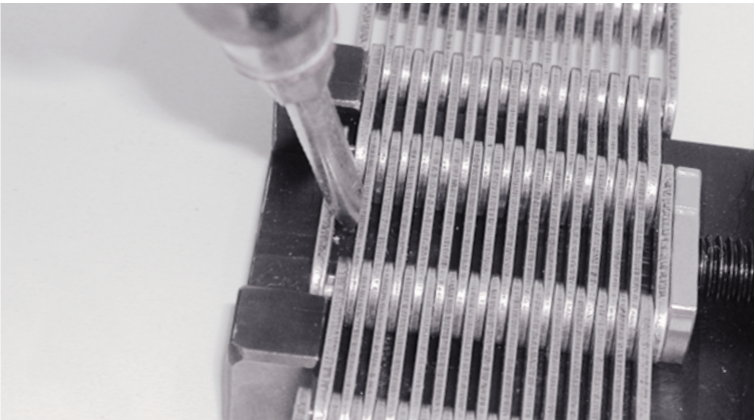
- ➔ 移除两个滚动枢轴销焊接链节
- ➔ 移除链条单一零件和单一链节

图5:

- ➔ 反向推动安排齿形链末端进到另一边从而能使孔等分

图6:

- ➔ 插入铆接闭合(第一个支撑销轴带垫片, 然后是枢轴销)
- ➔ 固定和研磨两个铆接头直到他们与焊接链节的外表面持平



#### Auxiliary tools

In order to facilitate the opening of the laser-welded inverted tooth chain, we have developed a tool to clamp the inverted tooth chain and increase the clearance between the link plates on the side to be opened. Thus, a link plate may be removed with a common screwdriver.

#### 辅助工具

为了方便打开激光焊接齿形链,我们已经开发了一个齿形链的工具夹,增加连接板之间的间隙来打开。因此,连接链板可以用一个共同的螺丝刀移除。

#### Features of inverted tooth chains in a one-pin-system (Type KT)

A weakened structure due to single closures combined with an omission of external link plates is especially undesirable in narrow widths. Therefore, a double-riveted closure is supplied with these versions (e.g. KT 312A).

A pin with an attached but unriveted disk prevents the outer link plates from falling off. The double-riveted closure consists of three individual parts, as shown on the right.

The shortening resembles the laser-welded version, with opening according to Fig. 3. Where necessary, two lower ends must be laid against one another and separated by equal distances. Loose link plates then fill those spaces.

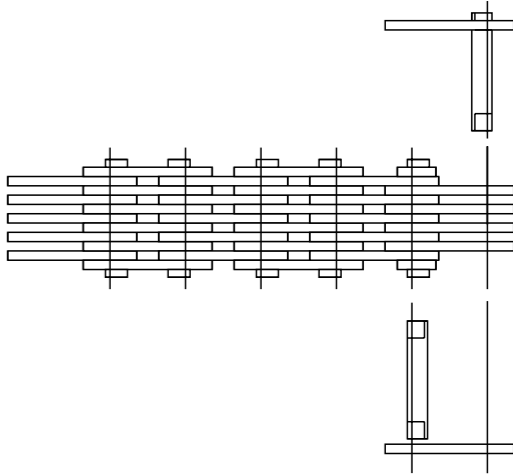
The double-riveted closure is sandwiched in and riveted after insertion of the corresponding outer link plate

#### 单销系统的齿形链特征 (KT类型)

由于单闭合加上不可取狭窄宽度的外部链接板块所以形成薄弱结构。因此,双铆接闭合可以提供这些版本(例如KT 312A)。

附带没有铆接的销轴垫片以防止外链节脱落。双铆接闭合包含三个单独零件, 如下图所示。

根据图3缩短重新组装方式与激光焊接版本相似。可能的话两个低部末端相互重叠且按相同距离分开, 松链节链板填入这些空隙。双铆接闭合是夹层而且插入相应的外部链接后铆接。



## Innovative and accurate 革新和精确

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Advantages you can dig your teeth into  
客户服务, 工程, 设计 – 让您没齿难忘的先进优势

*Using the latest technical methods and field-specific knowledge needed for the customers' tasks, we calculate and develop the most suitable configuration.*

*Inverted tooth chains and sprockets are perfectly adapted to each other.*

使用最新的技术方法和为解决客户的任务所需

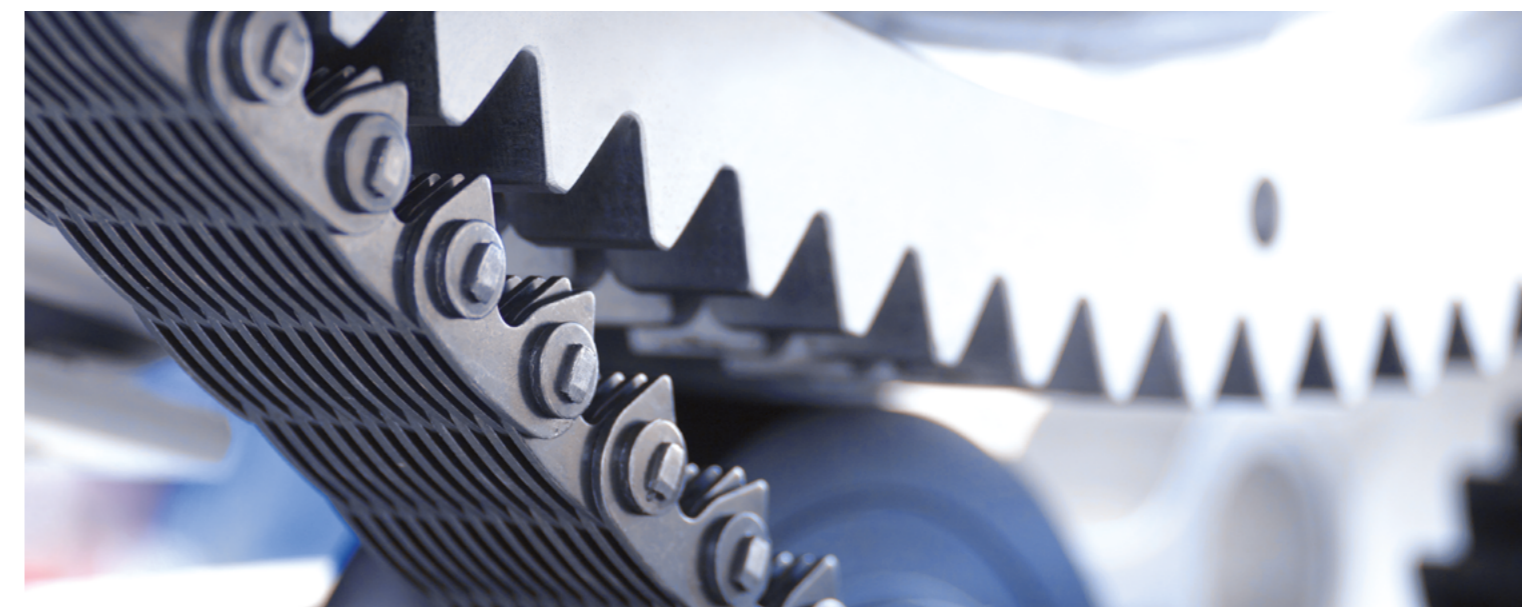
领域的知识,我们计算和开发最合适的配置。

齿形链和链轮是完全适应彼此。



## Inverted tooth chains for drives 驱动所需齿形链

We are not only conveying, we are also driving  
我们不仅仅输送, 也同样驱动



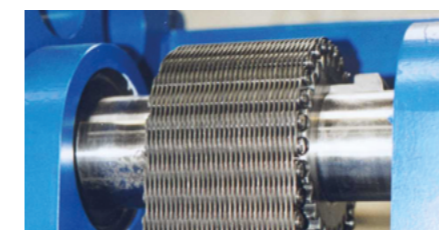
These were designed for the transmission of great traction, torque, and power, even at high rotations and speeds up to 50 m/s as well as slower-running machines at full capacity. In all of these cases, service life and functional reliability are indispensable.

### These factors are met through the following pre-requisites

- Friction-free rolling pivot joints made from case hardened steel and exhibiting a high degree of efficiency, resistance to wear, and durability
- Inverted tooth chain link plates with FE-optimized outlines made from high-resistance heat-treated steel
- Sprockets featuring hardened involute-toothing for smooth, impact-free meshing

### When compared to other wrap drives, steel pivot drives, and belt drives, the advantages shine through

- Optimum use of space due to high power density
- The proverbial quiet running; in a word: silent chain
- Extremely long service life
- Very low lubrication requirements
- High temperature tolerance



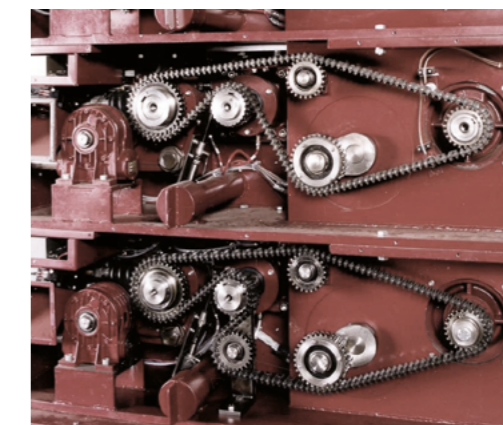
这些都是为非常大的牵引传动, 扭矩和动力而设计,即使在高旋转和50m/s的速度以及满负荷较慢运行机器。在所有这些情况下,使用寿命和功能可靠性是不可或缺的。

### 通过以下先决条件可以满足这些因素

- 渗碳钢的无摩擦滚动枢轴链节, 呈现高效率, 耐磨性和持久性等性能
- 高阻热处理钢材的FE优化外型齿形链
- 链轮以硬化渐开线啮合平稳,无冲击啮合

### 与其他速率, 钢制枢轴和皮带驱动, 我们都是非常有优势

- 由于高功率密度到达空间优化
- 众所周知安静运行; 换句话说: 无声链
- 服务寿命特别长
- 非常低润滑需求
- 耐高温



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