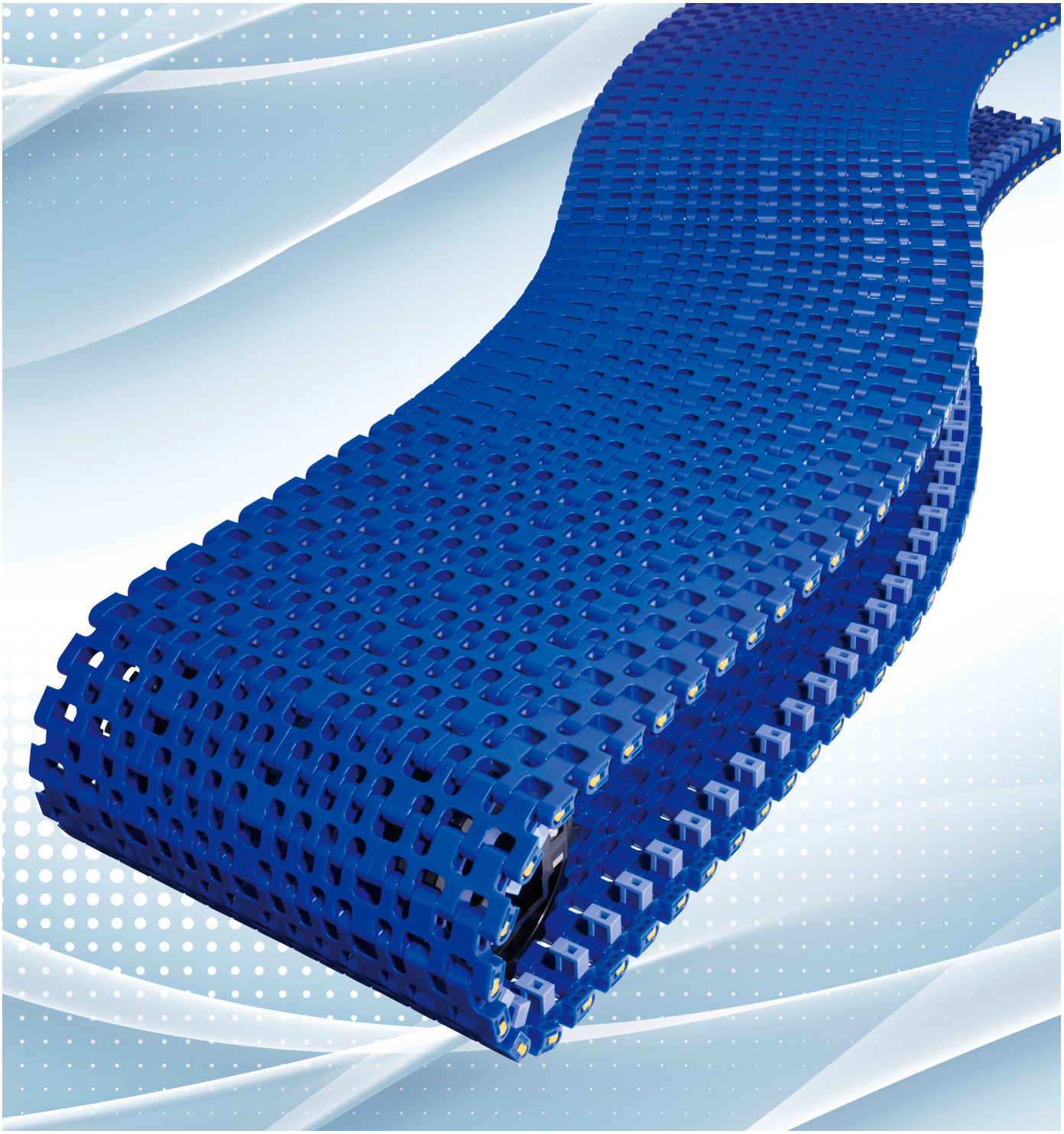
Innovation in Motion
TSUBAKI

NEW

TSUBAKI
PLASTIC MODULAR CHAIN
WTU3015T-K

Top Chains



A new lineup of Plastic Modular

WTU3015T-K makes a variety of layout possible, including 90-degree, 180-degree and S-shaped curves. It also conveys products conveniently and efficiently thanks to its easy-maintenance feature and smooth surface which reduces risk of damage during conveyance. Plastic modular chain WTU3015T-K series improve conditions for side-flexing conveyance, offering solutions to problems such as fraying on the sides and the difficulty of the maintenance of curved rubber belt, metal chipping from wire mesh belt and metal contact.

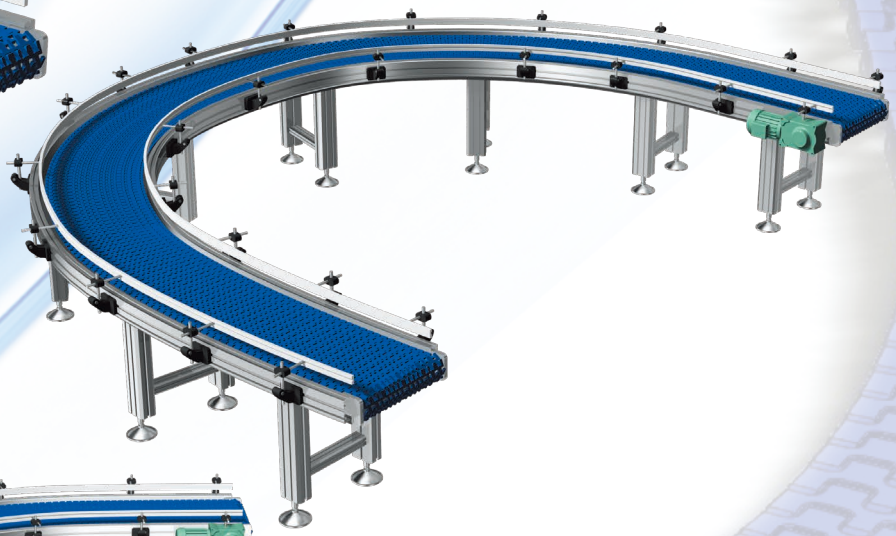
Features

1 A variety of layout possible with Plastic Modular Chain.

Note: Not available with conveyor frames.

90-degree curve

180-degree curve



S-shaped curve

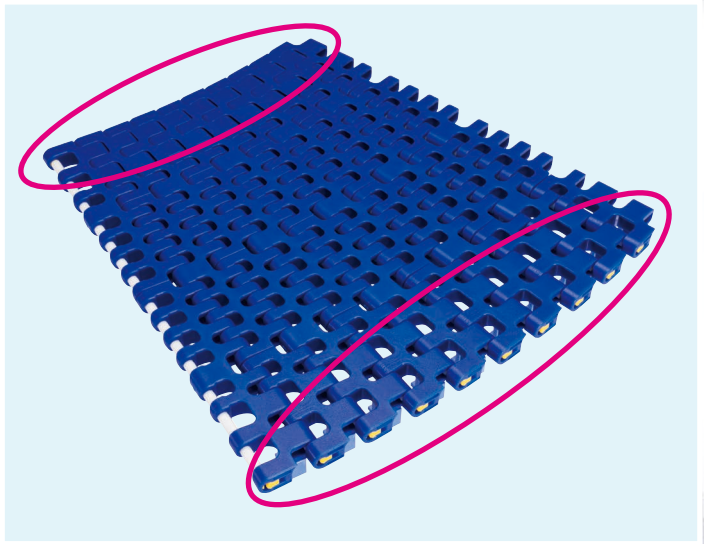
Chains for sideflexing conveyance

Features 2

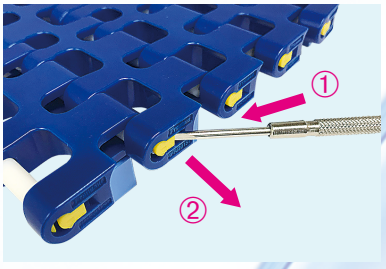
Easy to connect and disconnect chain and to repair partially.

Adopts plugs which is easy to handle to prevent pins to come out.

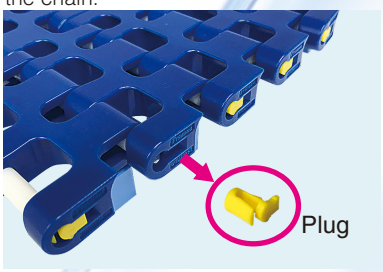
Easier to maintain compared to wire mesh conveyor and rubber belt conveyor.



Insert a small flathead screwdriver or similar tool on the plug on the side of the chain.



Using leverage, remove the plug from the chain.



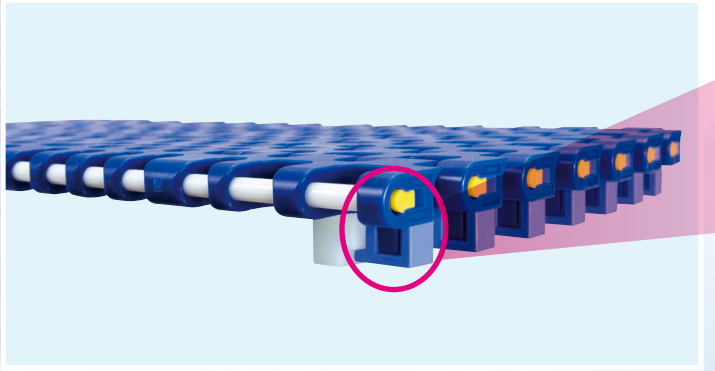
Features 3

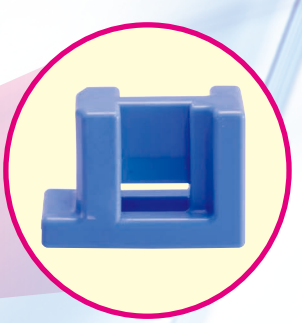
Adopts ALF material for Tab which prevents chain from floating.

ALF reduces coefficient of friction between chain and wearstrip.

Possible to reduce chain tension and energy consumption.

It also minimizes the generation of wear-induced particles.





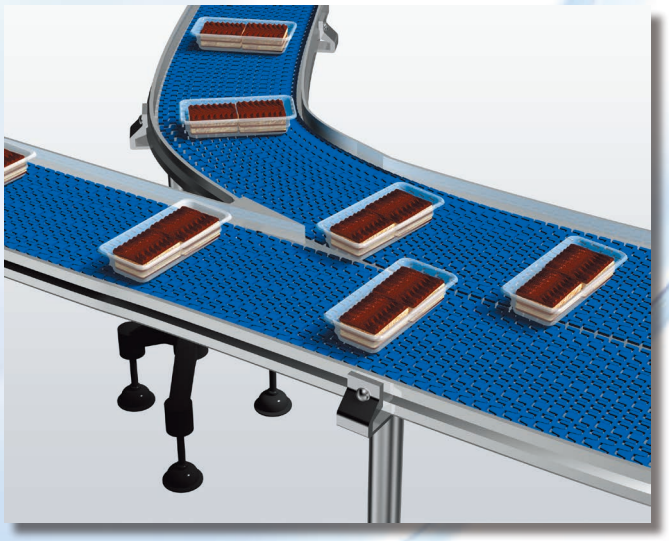
Tab which prevents chain from floating

Applications

Conveying of cardboard boxes

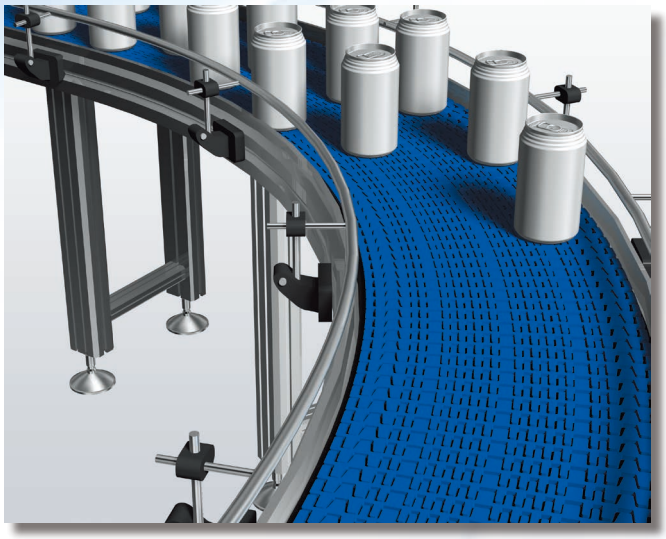
Conveying of suitscases

Conveying of trays ①



Conveying of trays ②

Conveying beverage containers



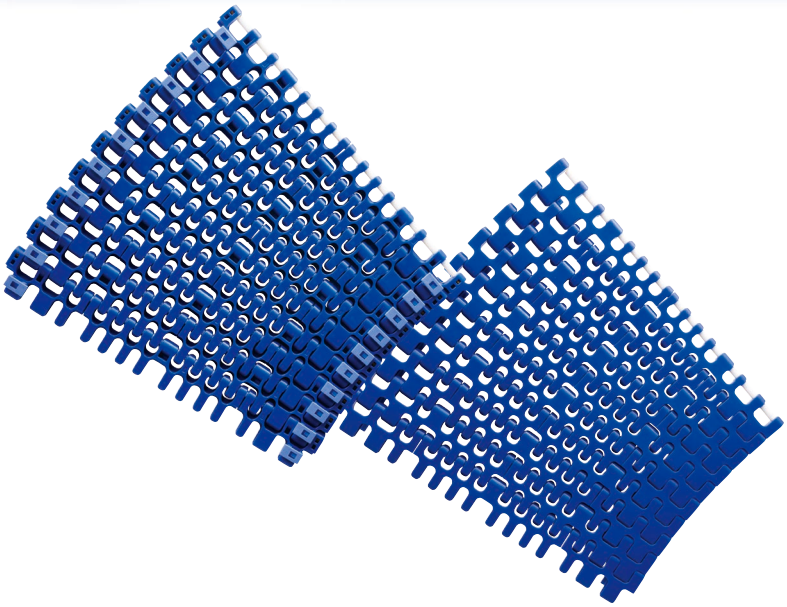
Conveying shrink packed beverage containers

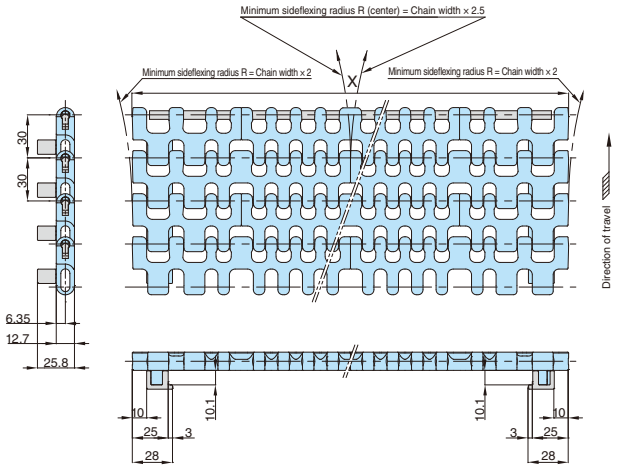
Industry Icons

Logistics | Bakery/ Food | Beverage | Canning

This model may not be applicable due to speed, conveyed items, mass, environmental conditions, purpose, or other requirements. Contact a Tsubaki representative for other applications or requirements.

Plastic Modular Chains for Sideflexing Conveyance WTU3015T-K Series





Chain Pitch mm	Open Area %	Backflex Radius mm
30	27	20

● Chain Material Table

Chain Type	Chain Material	Material Mark	Link Color	Max. Allowable Load kN/m {kgf/m}	Max. Allowable Load kN {kgf}	Chain Mass kg/m²	Max. Allowable Speed m/min		Operating Temperature Range °C	Pin Material
				Straight Running	Sideflexing		With Lube	No Lube		
WTU3015T	Standard	B	Blue	25 {2549}	1.3 {133}	8.5	50		–20 to (60) 80 -4 to (140)176°F	Special engineering plastic
WTU3015T-SUSP				30 {3059}	2.3 {235}	12.8			–20 to 80 -4 to 176°F	Stainless steel

Note 1. Made-to-order products.
2. Values for max. allowable load are for when tension acts uniformly over the entire chain width under room temperature (20°C) (68°F) and will vary according to operating conditions (temperature and speed). Please refer to the max. allowable load in the table, which is for one-meter (1 m) wide chain. To calculate values for required chain widths, multiply the chain width *X* by the max. allowable load for one-meter (1 m) wide chain.
3. Operating temperature of the number in brackets is for wet conditions.
4. The material of the float-preventive tab guide attachments (tab) is advanced low friction and wear resistant (ALF).
5. The color of the plug is yellow (Material: polyacetal).
6. Standard chain links (widths): 80 (K09 to K18), 40 (K21 to K30)

● Tsubaki Model Table

Chain width *X*	Standard B	Standard B (Stainless steel pin type)
	Chain Type	Chain Type
228.6	WTU3015T-K09-B	WTU3015T-K09-B-SUSP
304.8	WTU3015T-K12-B	WTU3015T-K12-B-SUSP
381.0	WTU3015T-K15-B	WTU3015T-K15-B-SUSP
457.2	WTU3015T-K18-B	WTU3015T-K18-B-SUSP
533.4	WTU3015T-K21-B	WTU3015T-K21-B-SUSP
609.6	WTU3015T-K24-B	WTU3015T-K24-B-SUSP
685.8	WTU3015T-K27-B	WTU3015T-K27-B-SUSP
762.0	WTU3015T-K30-B	WTU3015T-K30-B-SUSP

Note 1. Standard nominal widths of these chains begin at 3 inches (76.2 mm) with 3 inches (76.2 mm) increments.
2. Chain width *X* shown is a nominal width. Actual width range is $X^{+0}_{-0.7}$% at 20°C operating temperature.
Chain width is subject to expansion or contraction with changes in temperature.
Expansion/contraction rate is 0.00012/°C based on reference temperature of 20°C (68°F).
3. The maximum chain width is 30 inches (762 mm).

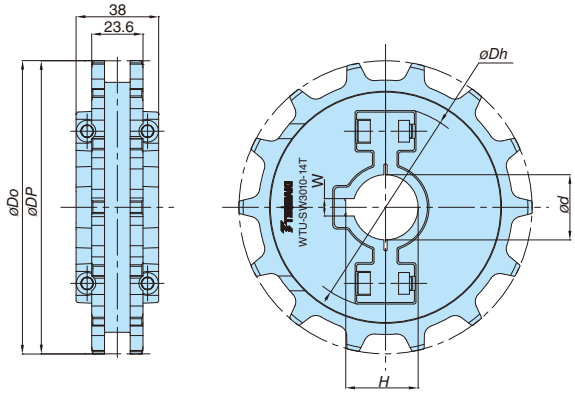
● Model Numbering

Chain Type	Chain Pitch	Link Shape	Tab		Chain Width		Material Mark		Pin Material
WTU	30	15	T	—	K09	—	B	—	SUSP
	30: 30 mm	5: Closed type			Note 2				None: Plastic pin type SUSP: Stainless steel pin type

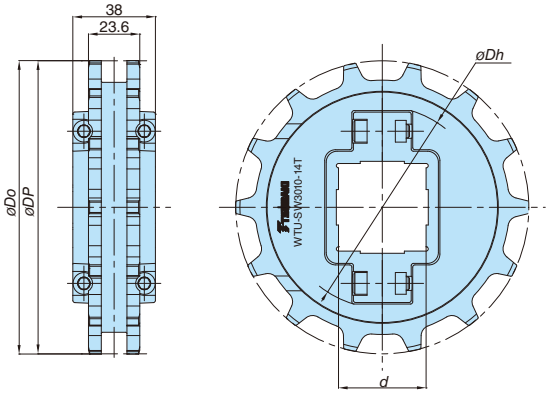
Note 1. Do not leave space between letters and symbols.
2. Refer to the Tsubaki Model Table above for Chain Widths.

● Split Sprocket

WTU-SW3010-14T



WTU-SW3010-14T40S

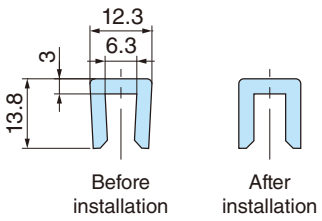


Tsubaki Model No.	Teeth	Pitch Diameter *DP*	Outside Diameter *Do*	Bore Shape	Bore Diameter *d*	Keyway *W*	Keyway *H*	Hub Diameter *Dh*	Approx. Mass kg	Material Body	Material Bolt/Nut	Bolt Tightening Torque N·m {kgf·m}
WTU-SW3010-14T30	14	134.82	135	Round	ø30	8	33.3	93	0.24	Reinforced polyamide (Black)	Stainless steel	5.7 {0.58}
WTU-SW3010-14T40					ø40	12	43.3		0.23			
WTU-SW3010-14T40S				Square	40.3	-	-					

Note 1. Standard products.
2. Operating temperature range: –20 to 80°C (-4 to 176°F).
3. Do not pair a half of split idler wheels with the half of a different pair.
4. Square-bore sprockets are loosely fitted to the shaft to accommodate the thermal expansion between the chain and conveyor, as well as chain-sprocket installation errors. Round-bore sprockets are tightly fitted to the shaft.
5. Sprocket with other no. of teeth or material is also available.
6. Use a cold rolled steel shaft.

● Plastic Guide Rails

■ V-6S rail

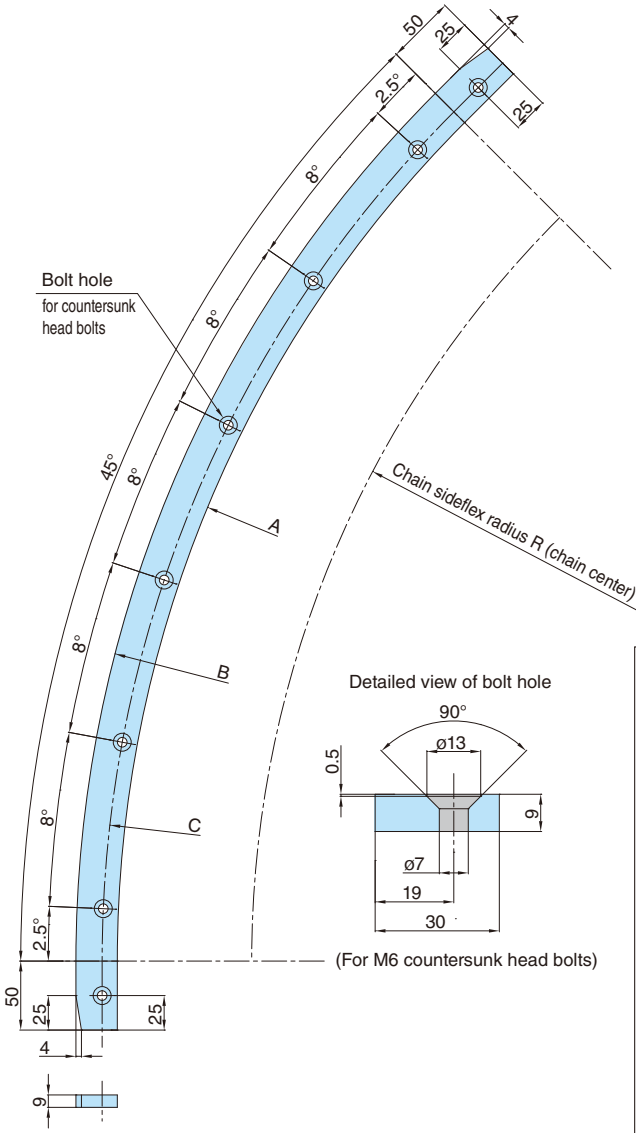


Tsubaki Model No.	Material Grade	Color	Length (m)	Operating Temperature Range °C
PR-V6S-W-30M	10-100EX	White	30	–20 to 60 -4 to 140°F

Note 1. Standard products.
2. Dimension is for reference because of the extrusion molding.

Curved Plastic Rail (supporting outside Tab)

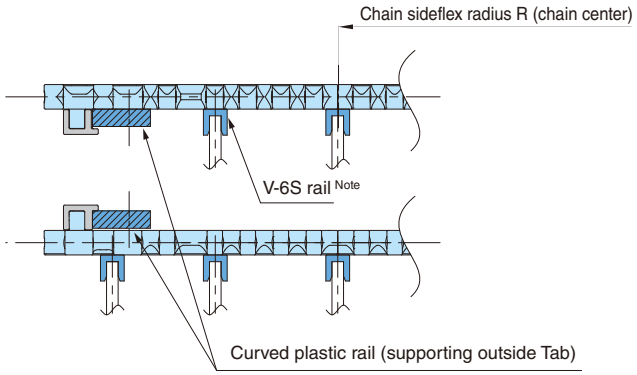
Curved plastic rail (for both carry-way and return-way)



Detailed view of bolt hole

(For M6 countersunk head bolts)

■ Rail Installation Example



Note: Fix V-6S rail at the upstream side of the chain travel direction using spring pin.

Material Grade	Color	Operating Temperature Range °C
PLF	White	–20 to 60 -4 to 140°F

Tsubaki Model No.	Carry-Way/Return-Way Rail	Chain Width (in.)	Chain Sideflex Radius R Note 2 (Chain Center)	A	B	C
PR-WTU3015T-K09R571.5PLF-S	PR-WTU3015T-K09R571.5PLF-R	228.6 (K09)	R571.5	R630.8	R660.8	R641.8
PR-WTU3015T-K12R762PLF-S	PR-WTU3015T-K12R762PLF-R	304.8 (K12)	R762.0	R859.4	R889.4	R870.4
PR-WTU3015T-K15R952.5PLF-S	PR-WTU3015T-K15R952.5PLF-R	381.0 (K15)	R952.5	R1088.0	R1118.0	R1099.0
PR-WTU3015T-K18R1143PLF-S	PR-WTU3015T-K18R1143PLF-R	457.2 (K18)	R1143.0	R1316.6	R1346.6	R1327.6
PR-WTU3015T-K21R1333.5PLF-S	PR-WTU3015T-K21R1333.5PLF-R	533.4 (K21)	R1333.5	R1545.2	R1575.2	R1556.2
PR-WTU3015T-K24R1524PLF-S	PR-WTU3015T-K24R1524PLF-R	609.6 (K24)	R1524.0	R1773.8	R1803.8	R1784.8
PR-WTU3015T-K27R1714.5PLF-S	PR-WTU3015T-K27R1714.5PLF-R	685.8 (K27)	R1714.5	R2002.4	R2032.4	R2013.4
PR-WTU3015T-K30R1905PLF-S	PR-WTU3015T-K30R1905PLF-R	762.0 (K30)	R1905.0	R2231.0	R2261.0	R2242.0

Note 1. Made-to-order products.
2. Rails are made with the chain's min. sideflex radius as reference.
3. Curved plastic rail only supports outside tabs. Do not use for any other purpose.
4. Other plastic rails with other angle and chain sideflex radius are also available upon request.
Please contact a Tsubaki representative for further information.
5. Set: A combination indicates 2 rails.
6. Material grades of low friction and wear resistant (PLF) are recommended for corner plastic rails of WTU3015T-K.

Precautions for Selection

- Plastic Top Chains are not recommended for use in operating conditions where they may be subject to impact or catch foreign material as this may damage or break the chains. Consider using a metal chain. Also, use inverter control, etc. to slowly start and stop the conveyor.
- Plastic Top Chains may suffer premature wear when used in operating conditions where they may contact abrasive material. Consider using a metal chain.
- Contact a Tsubaki representative before using Plastic Top Chains in contact with special liquids (acidic or alkaline chemicals or solutions) or in special environments (UV rays, etc.)
- Using plastic top chains where they are exposed to water may shorten their service life due to reduced self-lubrication of the plastic. This tends to be the case particularly with stainless steel pin types. Plastic pin types are recommended for applications with exposure to water.
- The operating temperature range for accessories, sprockets, and idler wheels made of UHMW-PE (ultra-high molecular weight polyethylene) is -20°C to 60°C (-4 to 140°F). Also, do not use in contact with steam.
- Plastic chains are flammable. Do not use above the maximum allowable temperature or near open flame, as they may catch fire and generate dangerous toxic gasses.

Corrosion Resistance against Various Liquids

When selecting a chain, refer to Table 1 to check whether the material is appropriate for the intended application. The table shows results obtained at 20°C and does not guarantee usability in all conditions. Consider the overall operating conditions (including humidity) with actual use. Reagents with no concentration indicated are saturated or a 100% solution. Use caution when mixing solutions as their conditions differ.

Table 1. Corrosion resistance against different liquids

Liquid	B-spec special engineering plastic pin	B-spec stainless steel pin	Liquid	B-spec special engineering plastic pin	B-spec stainless steel pin
Acetone	○	○	Sodium hypochlorite	×	×
Oil (vegetable, mineral)	○	○	Nitric acid (5%)	×	×
Alcohol	○	○	Vinegar	△	△
Ammonia solution	△	○	Potassium hydroxide	×	×
Whiskey	○	○	Water/Coffee	○	○
Sodium chloride	○	○	Soap water	○	○
Hydrochloric acid (2%)	×	×	Lactic acid	△	○
Seawater	△	△	Paraffin	○	○
Hydrogen peroxide solution (3%)	×	×	Beer	○	○
Sodium hydroxide (Caustic soda 25%)	×	○	Fruit juice	○	○
Gasoline	○	○	Benzene	○	○
Formic acid (25%)	×	×	Water	○	○
Formic aldehyde	×	○	Vegetable juice	○	○
Milk/Butter	○	○	Iodine	×	×
Citric acid	×	×	Sulfuric acid (5%)	×	×
Chromic acid (5%)	×	×	Phosphoric acid (10%)	×	×
Acetic acid (10%)	×	×	Wine	○	○
Carbon tetrachloride	○	○	Xylene	-	△

○: Totally resistant
△: Partially resistant (depending on operating conditions)
×: Not resistant
- : Unknown

Note 1. The table considers the corrosion resistance of the body, special engineering plastic, and stainless steel.
2. For sprockets and plastic guide rails, refer to the Tsubaki Top Chain Catalog.

Step 1: Check Conveyance Conditions

1) Conveyed goods
   1. Material used in container or conveyed goods
   2. Weight per conveyed object
   3. Shape and dimensions

2) Conveyor arrangement
   1. Straight-running or side-flexing conveyance
   2. Conveyor length and width
   3. Layout
   4. Space

3) Conveyance conditions
   1. Conveyance amount
   2. Conveyance interval
   3. Conveyor speed
   4. Lubrication
   5. Goods kept in accumulation or not

4) Conveyance environment
   1. Temperature
   2. Chemicals, water, humidity and other corrosive conditions (See Table 1)
   3. Glass shards, paint chips, metal chips, sand and other abrasive material
   4. Exposure to ultraviolet light

Step 2: Select Wearstrip Material

Select an appropriate wearstrip material based on the chain specifications.

Table 2. Wearstrip material selection chart

Wearstrip material	No lub		With lub	
	Abrasive material			
	No	Yes	No	Yes
Stainless steel	B	D	A	A
Steel	A	C	B	B
Plastic rail (P rail)	D	×	A	×
PMW rail PLF rail	B	×	A	×
M rail SJ-CNO rail	A	×	×	×

A: Strongly recommended
B: Recommended
C: Very usable
D: Usable
×: Not appropriate

1. Recommended metal rail material is cold-rolled metal.
2. Steel rail assumes oil lubrication.

	Material/Color	Features
Plastic rail (P rail)	● Ultra-high molecular weight polyethylene (Color: white or green)	● Most common rail ● Machined or extruded product ● When using a plastic chain, this rail is recommended for wet conditions ● Low water absorption; excellent chemical and impact resistance
PMW rail PLF rail	● Low-friction, wear-resistant UHMW-PE (Color: white)	● Lower friction compared to P plastic rail; wear-resistant rail ● Machined or extruded product
M rail SJ-CNO rail	● Special polyamide (M rail color: blue) (SJ-CNO color: purple)	● Rail for dry conditions only ● Wear-resistant rail ● Machined product

Note: Operating temperature range
Plastic rail (P rail), PLF rail, PMW rail : –20 to 60°C (-4 to 140°F)
M rail, SJ-CNO rail : –20 to 80°C (-4 to 176°F)

Step 3: Calculate Chain Tension

■ Determine coefficient friction factor

Table 3. Coefficient of dynamic friction between chain and wearstrip (μ_1)

Specifications	Lubrication	Stainless steel	Steel	P plastic M plastic	PMW SJ-CNO	PLF
B	No lubrication/Water lubrication	0.25			0.20	0.18
	Soap water lubrication	–	–	0.15	0.12	

Table 4. Coefficient of dynamic friction between chain and conveyed items (μ_2)

Specifications	Lubrication	Metal can	Glass bottle	Plastic container	Carton
B	No lubrication/Water lubrication	0.25	0.22	0.25	0.31
	Soap water lubrication	0.14		0.15	0.20

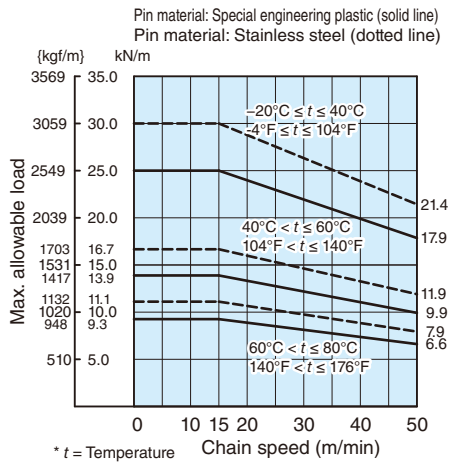
Note
1. The dynamic friction coefficients listed are for room temperature (50°C or below). Under temperature conditions that exceed 50°C (122°F), use the dynamic friction coefficient 0.35.
2. The dynamic friction coefficient data here is based on Tsubaki's experiments. The dynamic friction coefficient values can slightly vary due to residue on the chains, the shape of the contact surface of the objects being conveyed, and other conditions. In particular, paper containers can have significant differences in dynamic friction coefficients based on the contact surface shape and the material used. For this reason, dynamic friction coefficient measurement is recommended for each object type. Use the figures in Tables 3 and 4 for tension calculation.
3. M rails and SJ-CNO are only for dry use conditions. (See Table 2)
4. In the case of water lubrication, depending on the type of object being conveyed, the dynamic friction coefficient can be greater than the values in Tables 3 and 4, which can result in adsorption.

Table 5. Angle and length factors when using curved rails (α_L, α_S)

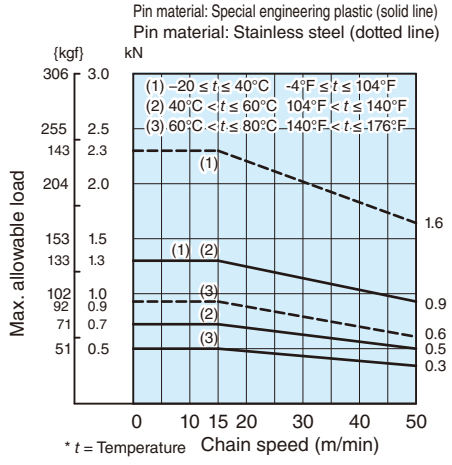
	Top plate material	Lubrication state	Horizontal bend angle					
			30°	60°	90°	120°	150°	180°
Angle factor (α_L)	B	No lubrication/Water lubrication	1.15	1.30	1.50	1.70	1.90	2.20
		Soap water lubrication	1.10	1.15	1.25	1.35	1.50	1.60
Length factor (α_S)			0.5	1	1.6	2.1	2.6	3.1

■ Allowable load graphs

WTU3015T (Straight running)

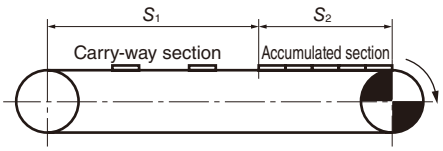


WTU3015T (Sideflexing)



■ Straight conveyance

1) Calculate Chain Tension and Power Required (Standard conveyors)



Note: SI units and gravimetric units
The formulas are given for both SI units and gravimetric units. When calculating tension F with gravimetric units, the weight (kgf) in gravimetric units is the same value as the mass (kg) in SI units.

F = Chain tension kN {kgf}
m_1 = Chain mass (kg/m)
Chain mass calculation method
Calculate the Chain mass for a length of 1 m.
If the preferred chain width is A mm:
m_1 = Chain mass (Catalog value (kg/m²)) × A/1000
S_1 = Length of conveyance section (m)
m_2 = Weight of conveyed goods in carry-way section (kg/m)
S_2 = Length of accumulation section (m)
m_3 = Weight of carried goods in accumulation section (kg/m)
μ_1 = Coefficient of dynamic friction between chain and wearstrip (See Table 3)
μ_2 = Coefficient of dynamic friction between conveyed goods and chain in accumulation section (See Table 4)
P = Power required (kW)
V = Chain speed (m/min)
η Note = Mechanical transmission efficiency for drive unit

Note: For the mechanical transmission efficiency, check the drive unit used.

SI unit (kN)

Chain tension

$$F = 9.80665 \times 10^{-3} \{(2.1\, m_1 + m_2)\, S_1 \cdot \mu_1 + (2.1\, m_1 + m_3)\, S_2 \cdot \mu_1 + m_3 \cdot S_2 \cdot \mu_2\} \quad \text{.....(1)}$$

Power required

$$P = \frac{F \cdot V}{60\, \eta}$$

Gravimetric unit (kgf)

Chain tension

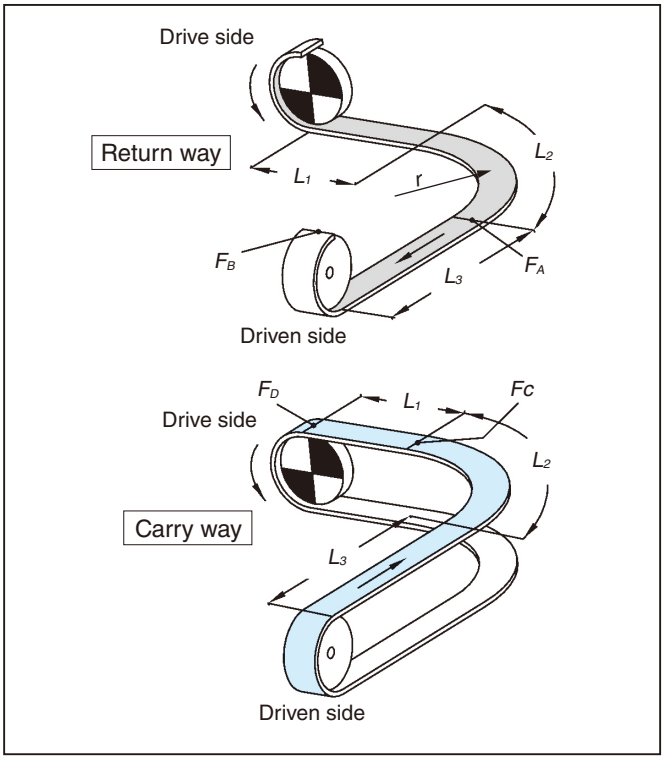
$$F = (2.1\, m_1 + m_2)\, S_1 \cdot \mu_1 + (2.1\, m_1 + m_3)\, S_2 \cdot \mu_1 + m_3 \cdot S_2 \cdot \mu_2 \quad \text{.....(1)}$$

Power required

$$P = \frac{F \cdot V}{6120\, \eta}$$

Calculation of sideflexing conveyance (with one curved section)

The calculation is basically the same as for linear conveyance. The tension acting on the corner part is corrected using the angle coefficient.
A calculation example is shown for the conveyor route below.
For sideflexing conveyance, calculate both tension *F*, acting on the chain in straight section.
Lubrication is recommended for curved conveyance where the chain and rail slide against each other. Particularly in parts where the sideflex angle exceeds 90°, the chain or rail can partially wear out in relatively short time, causing the chain to lift up.



$$F = 9.80665 \times 10^{-3} \cdot F_D \text{ (kN)} \ldots (1)$$

Return way

[Tension at section A: F_A]

$$F_A = m_1 (L_1 + L_2) \mu_1 \cdot \alpha_L 90°$$

$$L_2 = r \times \alpha_S 90°$$

[Tension at section B: F_B]

$$F_B = 1.1 \times (F_A + m_1 \cdot L_3 \cdot \mu_1)$$

Carry way

[Tension at section C: F_C]

$$F_C = \{F_B + (m_1 + m_2) (L_2 + L_3) \mu_1 + m_3 (L_2 + L_3) \mu_2\} \cdot \alpha_L 90°$$

$$L_2 = r \times \alpha_S 90°$$

[Chain tension at curved section: F_α]

$$F_\alpha = F_C \times 2$$

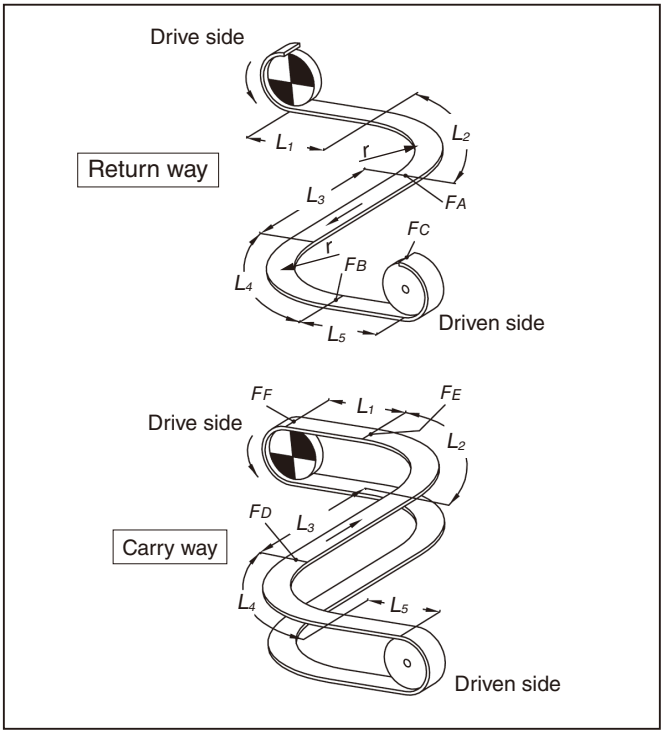
If F_α is below the maximum allowable load of the chain at curved section, the chain can be used for the application. The maximum allowable load of the curved section should be calculated referring to the allowable load graph for sideflexing conveyance and considering the conveyor speed and ambient atmosphere temperature. See page 8 for chain allowable load graph.

[Tension at section D: F_D]

$$F_D = F_C + \{(m_1 + m_2) L_1 \cdot \mu_1 + m_3 \cdot L_1 \cdot \mu_2\}$$

Calculation of sideflexing conveyance (with two curved sections)

Sliding the chain against the rail in curved parts should be limited to up to two 90-degree curves. Otherwise it may cause pulsation of the chain movement.
Consider segmenting the conveyor for installations involving more than two curves.
For curved conveyance, calculate both tension *F* acting on the chain and tension F_α acting on the chain in the curved part.



$$F = 9.80665 \times 10^{-3} \cdot F_F \text{ (kN)} \ldots (1)$$

Return way

[Tension at section A: F_A]

$$F_A = m_1 (L_1 + L_2) \mu_1 \cdot \alpha_L 90°$$

$$L_2 = r \times \alpha_S 90°$$

[Tension at section B: F_B]

$$F_B = \{F_A + m_1 (L_3 + L_4) \mu_1\} \alpha_L 90°$$

$$L_4 = r \times \alpha_S 90°$$

[Tension at section C: F_C]

$$F_C = 1.1 \times (F_B + m_1 \cdot L_5 \cdot \mu_1)$$

Carry way

[Tension at section D: F_D]

$$F_D = \{F_C + (m_1 + m_2) (L_4 + L_5) \mu_1 + m_3 (L_4 + L_5) \mu_2\} \cdot \alpha_L 90°$$

$$L_4 = r \times \alpha_S 90°$$

[Tension at section E: F_E]

$$F_E = \{F_D + (m_1 + m_2) (L_2 + L_3) \mu_1 + m_3 (L_2 + L_3) \mu_2\} \cdot \alpha_L 90°$$

$$L_2 = r \times \alpha_S 90°$$

[Chain tension at curved section: F_α]

$$F_\alpha = F_E \times 2$$

If F_α is below the maximum allowable load of the chain at curved section, the chain can be used for the application. The maximum allowable load of the curved section should be calculated referring to the allowable load graph for sideflexing conveyance and considering the conveyor speed and ambient atmosphere temperature. See page 8 for chain allowable load graph.

[Tension at section F: F_F]

$$F_F = F_E + (m_1 + m_2) L_1 \mu_1 + m_3 \cdot L_1 \cdot \mu_2$$

Step 4: Determine Chain Width

Determine chain width

(1) The maximum tension applied to the chain (F) derived using formula (1) is converted into chain tension per one meter of chain width by the following formula.

$$F' = \frac{1000F}{\text{Chain width (mm)}} \quad \ldots(2)$$

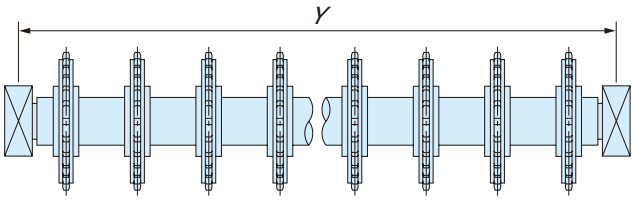
(2) If the chain tension per one meter of chain width calculated using the formula F' is below the maximum allowable load of the chain, the chain can be used for the application.
The maximum allowable load at the straight section should be calculated by referring to the chain allowable load graph for straight conveyance and taking into consideration the conveyor speed and ambient atmosphere temperature. See page 8 for chain allowable load graph.

Step 5: Select Sprockets, Shafts, and Bearing Units

Select a shaft, bearing, and sprocket that satisfy requirements based on WTU3015T-K/the Shaft Capacity Graph and Type of Shafts and Corresponding Bearing Units.
Note: Some types of bearings (according to the internal diameter of the bearing) impose limits on the chain tension rate F' (%).

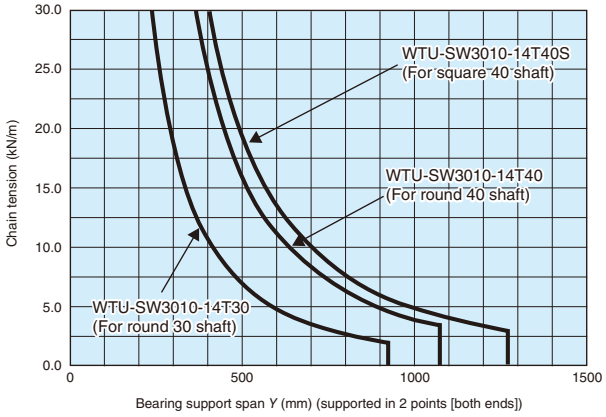
■ Relation between chain tension rate and bearing support span

Select a value that stays in the left area of the appropriate maximum allowable load graph.



Relation between bearing support span Y and chain width X
For square 40 shaft; Approximately $Y = X + 150$ (mm).
Note: Operating temperature range: –20 to 80°C (-4 to 176°F).

Shaft capacity graph: WTU3015T-K



■ Type of shaft and corresponding bearing units

Note 1. For diamond and square flanges, the numbers following TP-C indicate the code for Tsubaki Top Chain Accessories.
2. Operating temperature range: –20 to 80°C (-4 to 176°F).

Table 6. WTU-SW3010-14T30

Shaft type	Bearing unit				Limitation on chain tension rate (F')
	Bearing ID	Pillow	Diamond flange	Square flange	
304SS Round 30 Cold rolled steel	ø20	UCP204	TP-C54204, 59204 UCFL204	UCF204	Applies only when 1.0 kN/m or less
	ø25	UCP205	TP-C54205, 59205 UCFL205	TP-C50205, 55205 UCF205	Applies only when 3.0 kN/m or less
	ø30	UCP206	UCFL206	TP-C50206, 55206 UCF206	Applies only when 9.0 kN/m or less

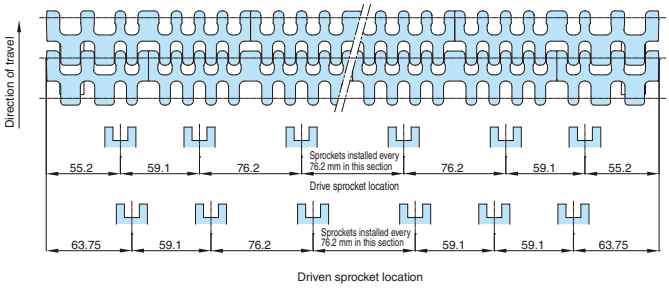
Table 7. WTU-SW3010-14T40

Shaft type	Bearing unit				Limitation on chain tension rate (F')
	Bearing ID	Pillow	Diamond flange	Square flange	
304SS Round 40 Cold rolled steel	ø25	UCP205	TP-C54205, 59205 UCFL205	TP-C50205, 55205 UCF205	Applies only when 2.0 kN/m or less
	ø30	UCP206	UCFL206	TP-C50206, 55206 UCF206	Applies only when 3.5 kN/m or less
	ø35	UCP207	UCFL207	TP-C50207, 55207 UCF207	Applies only when 10.0 kN/m or less
	ø40	UCP208	UCFL208	TP-C50208, 55208 UCF208	Applies only when 22.0 kN/m or less

Table 8. WTU-SW3010-14T40S

Shaft type	Bearing unit				Limitation on chain tension rate (F')
	Bearing ID	Pillow	Diamond flange	Square flange	
304SS Square 40 Cold rolled steel	ø25	UCP205	TP-C54205, 59205 UCFL205	TP-C50205, 55205 UCF205	Applies only when 1.5 kN/m or less
	ø30	UCP206	UCFL206	TP-C50206, 55206 UCF206	Applies only when 3.0 kN/m or less
	ø35	UCP207	UCFL207	TP-C50207, 55207 UCF207	Applies only when 8.0 kN/m or less
	ø40	UCP208	UCFL208	TP-C50208, 55208 UCF208	Applies only when 18.5 kN/m or less

Step 6: Determine Sprocket Locations



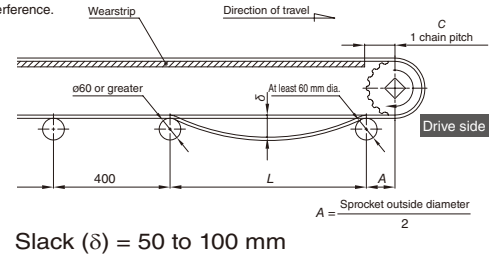
Note: Drive sprockets and driven sprockets are placed differently.

Conveyor Design

1) Guide rail arrangement

Guide rail arrangement depends on the installation space and other factors. An example is shown in the figure below.

* The wearstrips and conveyor flame near the drive end should be chamfered to prevent chain from interference.



Slack (δ) = 50 to 100 mm

2) Amount of chain slack

The first return roller should be placed 600 to 900 mm from the drive. The amount of slack in the chain between return rollers should be 50 to 100 mm. The slack prevents the chain skipping. Using different intervals or amounts of slack may result in chain skipping.

3) Engagement angle

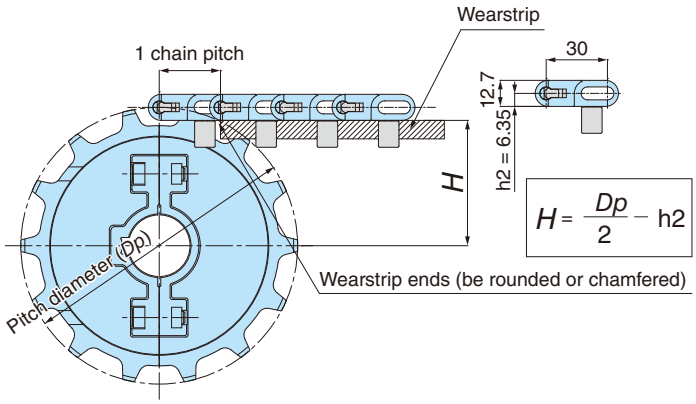
The engagement angle of the chain on the drive sprocket should be at least 180°. If the engagement angle is too small, teeth jumping may occur.

4) Wearstrip ends

Keep the length of one pitch of the chain between the shaft center and the wearstrip end on the drive and driven sides. Also the wearstrip end of the driven unit must be rounded or chamfered to prevent the wearstrip from catching or snagging the chain.

5) Height of wearstrip on carry way

See figure below.



6) Guide clearance

Leave a clearance between the chain and the wearstrip (guide clearance) as indicated below to allow for thermal expansion.

Conveyor guide width (*G*) = Chain width (*X*) + Guide clearance (*Gc*)

Chain width (mm) \ Temperature (°C)	Guide clearance (*Gc*)		
	–20 to 40	40 to 60	60 to 80
X ≤ 300	5.0	6.0	7.0
300 < X ≤ 500	6.0	7.0	9.0
500 < X ≤ 1000	8.0	11.0	15.0

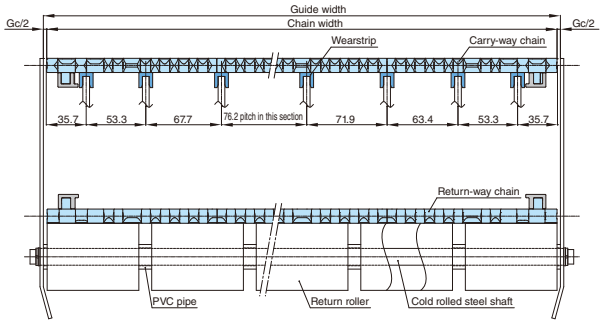
<Reference> Coefficient of linear expansion of chain with B specification: 12 × 10^{-5}/°C

Conveyor Layout

■ Layout of straight section

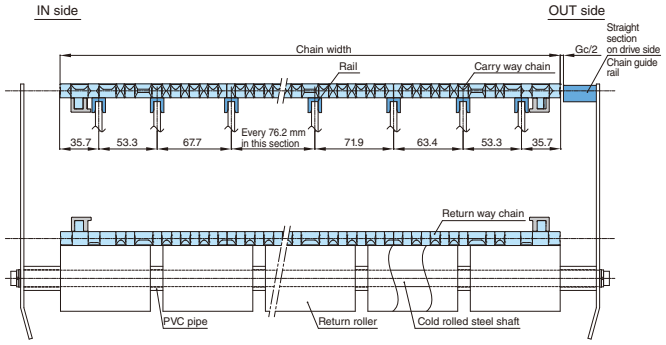
Wearstrip should be located at equal intervals alternating with sprockets.

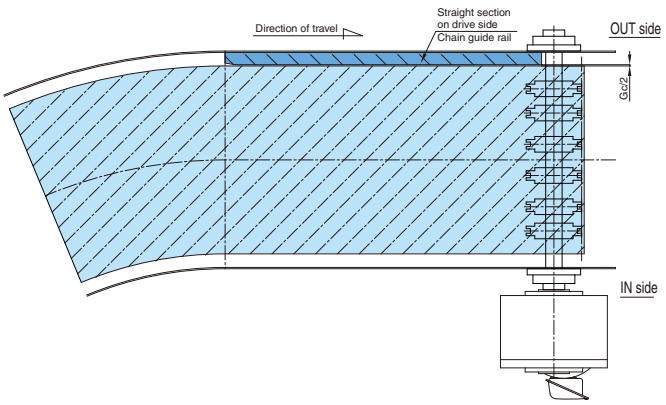
1) Example of wearstrip installation



2) Layout of the straight section on carry-way

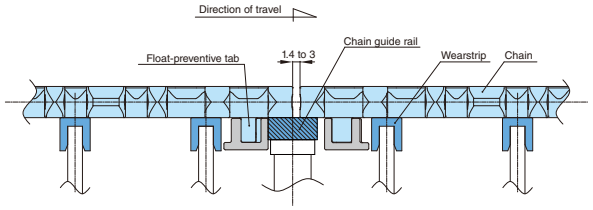
Install a chain guide rail on the OUT side of the straight section on the drive side of conveyors with curve(s).





3) Layout of parallel conveyance (wrapping)

Install guide rails to follow the side of float-preventive tab at the upstream side if it conveys in parallel at straight section.



■ Layout of the straight section on return-way

There are two methods of supporting the return way: the return roller system, and the wearstrip system. Examples are shown below.

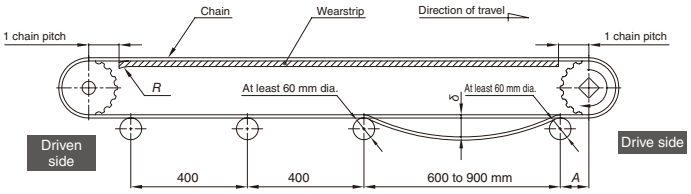
* Precautions:

Cut the chain so that the catenary section will have an appropriate amount of slack to compensate for expansion and contraction caused by temperature changes. A tensioner or similar device should be used to adjust the chain take-up.

1) Support system using return rollers

Return rollers receive the top side of the returning chain. Check the chain back bend radius when using return rollers. It is generally recommended that the chain back bend radius is equal to or smaller than the radius of the return rollers.

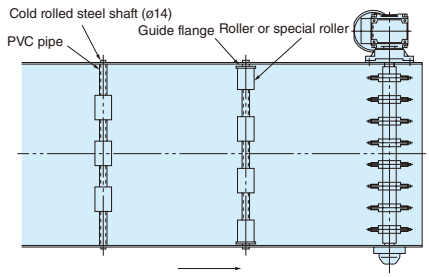
(Conveyor side view)



Slack (δ) = 50 to 100 mm

$$A = \frac{\text{Sprocket outside diameter}}{2}$$

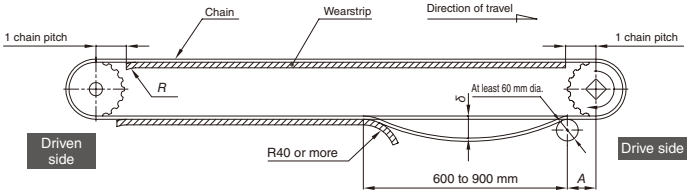
(Conveyor plan view)



2) Support system using wearstrips

The infeed section of the return wearstrip should be made with a large radius of at least R40.

(Conveyor side view)



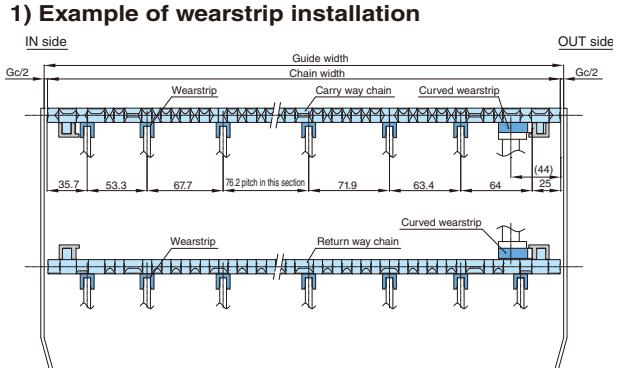
Slack (δ) = 50 to 100 mm

$$A = \frac{\text{Sprocket outside diameter}}{2}$$

■ Layout at curved section

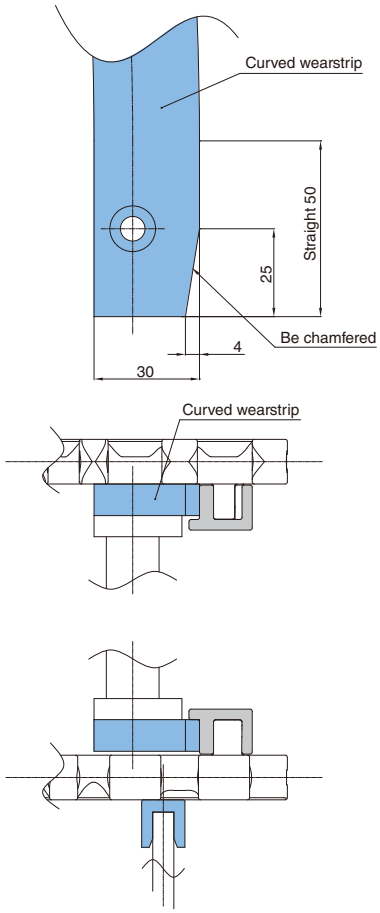
For sideflexing conveyance, the straight section must be at least 800 mm long between the drive section and curve in order to ensure appropriate catenary on the return side.

1) Example of wearstrip installation



2) Rail entry and exit finish

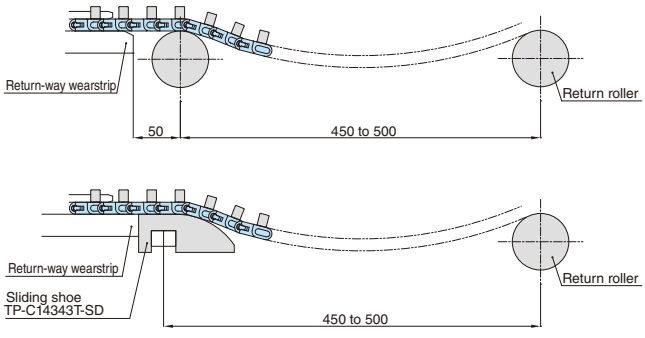
Use chamfering to prevent the chain from catching in the areas where the curved travel rail connects to the straight travel rail (entry and exit).



■ Layout of the curved section on return-way

Position return rollers or sliding shoe (TP-C14343T-SD) under both ends of the curved wearstrip to guide the chain. Location of the return rollers should be 50 mm away from the base.

Cross-section of conveyor

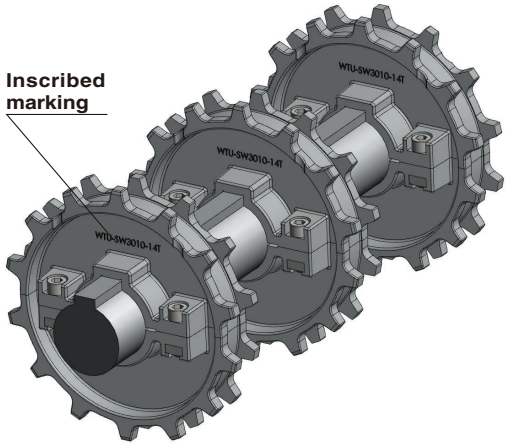


Handling Sprockets

In general, square shafts are recommended for the drive and driven shafts used with plastic modular chain. Because changes in temperature will cause the chain to expand and contract, sprockets must be mounted so that they are free to move laterally across the width. However, to prevent meandering (snaking) of the chain, one (or two) sprocket(s) should be locked in position in the center of both the drive and driven shafts using setscrews or set-collars and hexagonal socket head cap screws. When installing the sprockets on the square shaft, the inscribed marking or identification marks should be used to orient the sprockets so that they all face the same direction and to keep the position of the teeth aligned.

■ Phase matching of sprockets

Install the sprockets on the shaft in such a manner that the direction and the position of all the inscribed markings or identification marks on the sprockets are aligned.



■ Chain expansion/contraction

Plastic Modular Chain is made of polymer resin and will expand and contract with changes in temperature. A rough estimate for straight-running chain expansion is 12×10^{-5} (/°C) using 20°C as the reference temperature. The expansion per nominal width (ΔW) is found using the following formula:

ΔW = Chain nominal width × (operating ambient temperature – 20) × 12×10^{-5}

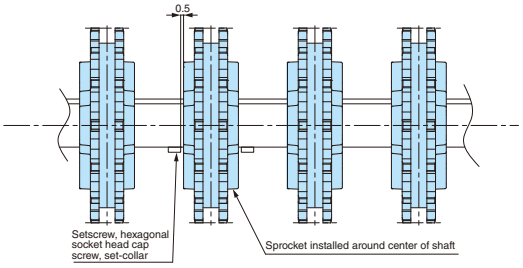
<Example>

For K30 chain (762 mm wide) used in an environment where the temperature rises from 20°C to 60°C (-4 to 140°F):

$$\Delta W = 762 \times (60 - 20) \times 12 \times 10^{-5} = 3.7 \text{ mm}$$

■ Locking sprockets

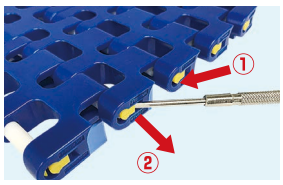
The sprockets and the shaft are loosely fitted in order to absorb differences in thermal expansion between the chain and the conveyor and also installation errors of the chain and the sprockets. However, a setscrew, a hexagonal socket head cap screw, or a set-collar should be mounted on each side of a sprocket installed around the center with about 0.5 mm clearance with the sprocket in order to prevent winding motion in the chain.



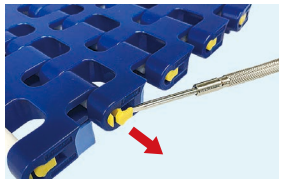
Disconnecting and Connecting

● Disconnecting

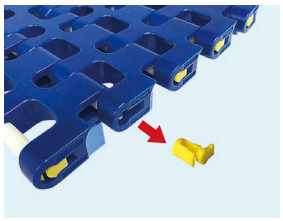
1) Insert a small flathead screwdriver or similar tool between the chain and the plug-clip on the side of the chain.



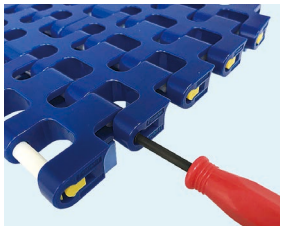
2) Using leverage, remove the plug-clip from the chain. Make sure that the plug-clip does not fly out when removed.



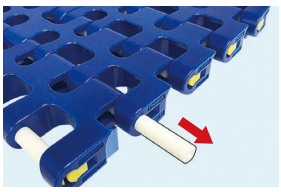
3) Remove the plug-clip on the opposite side of the chain using the same process.



4) Insert a bar into the pin hole on the side of the chain from the opposite side to push out the pin.

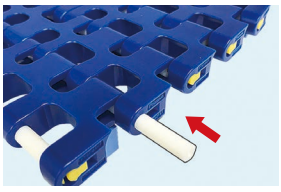


5) Hold the pin and pull it out to disconnect the chain.

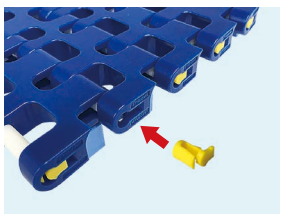


● Reconnecting

1) To connect chains, insert a plug into the opposite side. Combine both ends of the chain and insert pin from side where plug has slid.



2) Insert a plug-clip to close up the pin hole.



3) Check the orientation of the plug-clip, and seat the plug-clip by pushing in until you hear it click into place.

4) Check that the plug-clip is properly installed.

Note: Use the supplied or dedicated pins to connect the chains.

For Your Safety When Using the Chain

Warning To avoid danger, observe the following rules.

General

- Do not use chain or chain accessories for any purpose other than their originally intended use.
- Never perform additional work on chain (including machining, grinding, annealing, cleaning with acids or alkalis, electroplating, or welding or cutting with a torch which will cause heat effects). These processes may cause the chain to break during operation, leading to a risk of severe injury.
- When replacing a worn or damaged part, do not replace just the worn or damaged part. Replace all parts with new parts. The chain may break during operation, leading to a risk of severe injury.
- When using chain in a lifting device, set up a safety barrier and do not allow anyone to go under the equipment. Also, when jigs or tools are connected to the edges of the chain, be sure to adequately lubricate the connecting parts. Detachment of the chain or unexpected chain breakage may lead to severe injury from flying or falling parts.
- Strictly observe the general guidelines listed in Section 1, Chapter 1, 2nd Edition of the Japanese Occupational Safety and Health Regulations as well as rules and regulations concerning occupational safety and health in your region/country. Always install safety equipment (safety covers, etc.) on chain and sprockets. There is a risk of severe injury from conveyed items or the chain as a result of becoming caught in the chain or from unexpected chain breakage.
- Chain and sprockets must be inspected on a regular basis. Damaged parts, or parts that have reached the end of their service life, should be replaced with new parts. There is a risk not only of the chain not functioning properly, but also of severe injury from chain breakage or abnormal operation. Perform the work as instructed in the manual, catalog or other documentation that was provided with the product.
- If using chain for people conveyors (moving walkways), install protective equipment on the conveyor for safety. There is a risk of bodily injury or damage to the conveyor if the conveyor runs out of control.

During Installation

- Before starting work, turn off the power switch and take measures to prevent it from being turned on accidentally. There is a risk of severe injury from becoming caught in the chain.
- Always wear safety goggles when using hammers while working to connect chains. There is a risk of severe injury from flying metal fragments or splinters.
- Secure the chain and parts to prevent them from moving freely. There is a risk of severe injury from chain components moving under their own weight, or from falling and body parts becoming pinched in the chain.

Caution To prevent accidents, observe the following rules.

- Understand the structure and specifications of the chain that you are handling.
- Before installing chain, inspect it to make sure no damage occurred during delivery.
- Inspect and maintain chain and sprockets at regular intervals.
- Chain strength varies by manufacturer. Only Tsubaki products should be used when chain is selected using Tsubaki catalogs.
- Start and stop the chain gradually, and do not subject it to sudden impact.
- Do not apply initial tension to the chain.
- Consult with a Tsubaki representative before using the chain in cases where it will be in contact with special liquids or used under special environments.
- When using chains with engineering plastic pins under wet conditions, make sure that the temperature does not exceed 60°C.
- The link material for ALF advanced low friction/wear resistant series contains silicone-based lubricant. Therefore, do not use this chain for printing processes, or in cases where silicone will have a harmful effect.
- Using a plastic top chain in a wet environment will decrease the resin's self-lubricating ability and thus shorten the life of the chain. Recommend to use plastic pins because especially using stainless pins are more likely to the case.
- The operating temperature range for accessories, sprockets, and idlers made of UHMW-PE (ultra-high molecular weight polyethylene) is –20°C to 60°C. Also, do not use in environments where such components will be exposed to steam.
- Plastic chain is flammable. Do not use at temperatures above the maximum allowable temperature or use near open flame. Combustion may generate dangerous toxic gases.

Warranty

1. LIMITED WARRANTY

Products manufactured by Seller: (a) conform to the design and specifi cations, if any, expressly agreed to in writing by Seller; and (b) are free of defects in workmanship and materials at the time of shipment. The warranties set forth in the preceding sentence are exclusive of all other warranties, express or implied, and extend only to Buyer and to no other person. ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXCLUDED.

2. NON-RELIANCE

Buyer is not relying upon any advice, representations or warranties (except the warranties expressly set forth above) of Seller, or upon Seller's skill or judgment regarding the Seller's products.

Buyer is solely responsible for the design and specifi cations of the products, including without limitation, the determination of suitability for Buyer's application of the products.

3. CLAIMS

(a) Any claim relating to quantity or type shall be made to Seller in writing within 7 days after receipt of the products; any such claim made thereafter shall be barred.

(b) Any claim under the above-stated Limited Warranty shall be made to Seller in writing within three (3) months after receipt of the products; any such claim made thereafter shall be barred.

(c) Seller's liability for breach of warranty or otherwise is limited to repair or replacement, at Seller's option, of non-conforming or defective products. Buyer waives all other remedies, including, but not limited to, all rights to consequential, special or incidental damages, including, but not limited to, damages resulting from personal injury, death or damage to or loss of use of property.

(d) Repair, alteration, neglect or misuse of the products shall void all applicable warranties.

4. INDEMNIFICATION

Buyer will indemnify, defend and hold Seller harmless from all loss, liability, damage and expense, including attorneys' fees, arising out of any claim (a) for infringement of any patent, trademark, copyright, misappropriation of trade secrets, unfair competition or similar charge by any products supplied by Seller in accordance with the design or specifi cations furnished by Buyer, or (b) arising out of or connected with the products or any items into which the products are incorporated, including, but not limited to, any claim for product liability (whether or not based on negligence or strict liability of Seller), breach of warranty, breach of contract or otherwise.

5. ENTIRE AGREEMENT

These terms and conditions constitute the entire agreement between Buyer and Seller and supersede any inconsistent terms and conditions, whether contained in Buyer's purchase order or otherwise, and whether made heretofore or hereafter. No statement or writing subsequent to the date hereof which purports to modify or add to the terms and conditions hereof shall be binding unless consented to in writing, which makes specifi c reference hereto, and which has been signed by the party against which enforcement thereof is sought.

Seller reserves the right to change these terms and conditions without prior notice.

TSUBAKIMOTO CHAIN CO.

Japan	Tsubakimoto Chain Co.	https://tsubakimoto.com/

Global Group Companies

AMERICAS

United States	U.S. Tsubaki Power Transmission, LLC	https://www.ustsubaki.com/
Brazil	Tsubaki Brasil Equipamentos Industriais Ltda.	https://tsubaki.ind.br/
Canada	Tsubaki of Canada Limited	https://tsubaki.ca/

EUROPE

Netherlands	Tsubakimoto Europe B.V.	https://tsubaki.eu/
France	Kabelschlepp France S.A.R.L.	https://tsubaki-kabelschlepp.com/fr-fr/
Germany	Tsubaki Deutschland GmbH	https://tsubaki.de/
	Tsubaki Kabelschlepp GmbH	https://tsubaki-kabelschlepp.com/de-de/
Italy	Kabelschlepp Italia S.R.L.	https://tsubaki-kabelschlepp.com/it-it/
Spain	Tsubaki Ibérica Power Transmission S.L.	https://tsubaki.es/
United Kingdom	Tsubakimoto UK Ltd.	https://tsubaki.eu/
Slovakia	Kabelschlepp-Systemtechnik, spol. s.r.o.	https://tsubaki-kabelschlepp.com/sk-sk/
Poland	Kabelschlepp Sp. z o.o.	https://kabelschlepp.pl/

INDIAN OCEAN RIM

Singapore	Tsubakimoto Singapore Pte. Ltd.	https://tsubaki.sg/
Australia	Tsubaki Australia Pty. Limited	https://tsubaki.com.au/
India	Tsubaki India Power Transmission Private Limited	https://en.tsubaki.in/
Indonesia	PT. Tsubaki Indonesia Trading	https://tsubaki.id/
Malaysia	Tsubaki Power Transmission (Malaysia) Sdn. Bhd.	https://en.tsubaki.my/
New Zealand	Tsubaki Australia Pty. Limited - New Zealand Branch	https://tsubaki.com.au/
Philippines	Tsubakimoto Philippines Corporation	https://en.tsubaki.ph/
Thailand	Tsubakimoto (Thailand) Co., Ltd.	https://tsubaki.co.th/
Vietnam	Tsubakimoto Vietnam Co., Ltd.	https://tsubaki.net.vn/

EAST ASIA

Republic of Korea	Tsubakimoto Korea Co., Ltd.	https://tsubakimoto-tck.co.kr/
Taiwan	Taiwan Tsubakimoto Trading Co., Ltd.	https://tsubakimoto.tw/

CHINA

China	Tsubakimoto Chain (Shanghai) Co., Ltd.	https://www.tsubaki-sh.cn/

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