



TSUBAKI PLASTIC TOP CHAIN TTUPM-H / WT2515G-M



A New Solution from Tsubaki – Plastic Top



"Bevedolphin" – Beverage + Dolphin "Bevedolphin" is the name of Tsubaki's new plastic chain series for the beverage industry. Bevedolphin quickly and smoothly conveys your beverage containers, just like a dolphin quickly and smoothly swims through the sea. Our Bevedolphin Series is our solution for the beverage industry.



Prevents chain floating on curved sections when used in combination with magnet-embedded rails

TTUPM-H Type



Plug-less structure prevents plug drop-out

WT2515G-M Type



TTUPM-H Type



TTUPM-H Type uses the world's first special double layer D-type plastic pin combining both plastic and metal. It possesses all the features of plastic while preventing floating through magnetism.



Bevelophin[™] is pending trademark in Japan, U.S.A., Europe, Singapore, Australia, India, Indonesia, Philippines, Thailand, Vietnam, Korea, Taiwan, and China.

Chains Ideal for Beverage Container Conveyance



All-metal pins wear when exposed to water, causing significant wear elongation. However, special double layer D-type plastic pins use special engineering plastic where they slide against the links to further minimize wear elongation in contact with water and prolong the life of the chain.







Special double layer D-type plastic pins are much lighter than conventional pins. They are 15% lighter than all-metal pins, and thus can reduce chain attraction to magnet-embedded rails in curved sections to optimum levels and reduce capacitance.







WT2515G-M Type



WT2515G-M Type uses special stepped plastic connecting pins. While plugged types (with plugs to prevent pin drop-out) have a risk of foreign matter entering when plugs drop out, there is no risk with special stepped plastic pins, which combine pins and a pin drop-out prevention structure. The simple structure of only links and pins also makes handling easy.



Combining TTUPM-H and WT2515G-M Types



The curved TTUPM838H type and straight WT2515G-M type can both be installed on the same structural frame, so multi-row conveyor design is a snap. An example of installation can be seen on the right.



WT2515G-M Type TTUPM-H Type

 Same shaft for straight and side-flexing lanes

Plastic Top Chain TTUPM-H Type

Side-flexing

Plastic Chain



Combination of magnet-embedded plastic rail and chain



Plan view





Connecting pin

Special double layer D-type plastic pin (Outside: Special engineering plastic (orange)) (Core: metal)

Model no.: TTUPM-H-PLA-TK-JPD

Special engineering plastic



Special double layer D-type plastic pin

* When connecting or disconnecting the chain, use punches with a 6 to 7.5mm diameter. Smaller punch diameters may knock out the core metal pins.

Chain (plastic pins)

Product code	Model no.	Top plate	Pin	Max. allowable load	Approx. mass	Back bend radius	
		Material	Color		kN{kgf}	kgt/m	mm
K11	TTUPM838H-CB	Low-friction polyacetal (carbon black filled)	Blue	Special double layer D-type plastic pin	1.9{190}	1.5	70

Notes) 1. A chain consists of the required number of units of links and a fraction less than one unit. 1 unit = 120 links

2. Made-to-order product.

3. The chain material is low friction polyacetal with carbon black (CB).

4. Only connecting pins are orange. Base chain pins are white.

5. Operating temperature range is -20°C to (60) 80°C. (60)°C is for wet conditions.

6. Allowable chain speed: 100 m/min (with lubrication) and 50 m/min (without lubrication)



• Other Chain Materials

ULF: Ultra Low Friction

- (Color: Blue)
- HG: Low Friction & abrasion resistance (Color: Navy Blue)

For chain materials other than the above, please contact us.



		_	Pitch	Outer	Bore	Bore	Ke	yway	Hub	Approx.		Mat	erial	
Product code	Model no.	Teeth	diameter DP	diameter	shape	diameter d	w	Н	diameter D _H	mass kg	Туре	Body	Bolts/ Nuts	
K151111	WT-SW2500-16T25					ø25	8	28.3	3.3 3.3	0.26				Natas) 1. Madala in haldfaas are staak itama
K151112	WT-SW2500-16T30	16	120.0	1210		ø30	8	33.3		0.25				Notes) 1. Models III boldiace are stock items
K151113	WT-SW2500-16T35	- 16	130.2	131.9		ø35	10	38.3		0.24				(standard products) while models in normal
K151114	WT-SW2500-16T40					ø40	12	43.3		0.24				ace are made-to-order products.
K151115	WT-SW2500-18T25				1	ø25	8	28.3		0.30		Reinforced		 Doit tightening torque. 5.7 Non {0.56 kg/mi} Any half of a split sprocket pair should not
K151116	WT-SW2500-18T30	10	146.0	140.0	Dound	ø30	8	8 33.3	0.0	0.29	9 8 Split	lit polyamide (Exterior	Stainless steel	 Any hair of a spin sprotect pair should not be paired with a half of a different pair. Operating tomperature range is -20°C to
K151117	WT-SW2500-18T35	10	140.3	140.3	nouriu	ø35	10	38.3	02	0.28				
K151118	WT-SW2500-18T40					ø40	12	43.3	1	0.28		color: Black)		80°C
K15	WT-SW2500-21T25	ø25 8 28.3 0.36	5 Machined solid sprockets (steel 8	5 Machined solid sprockets (steel &										
K15	WT-SW2500-21T30	0.1	170.4	170.7		ø30	8	33.3	1	0.35				engineering plastic) are also available upon
K15	WT-SW2500-21T35	21	170.4	1/2./		ø35	10	38.3		0.34				request.
K15	WT-SW2500-21T40					ø40	12	43.3	1	0.33	1			·

ØB

Idler Wheel



Broduct			Dime	ensions		Approx.	Mat	Material	
code	st Model no.		В	С	d	mass kg	Body	Bolts/ Nuts	
K151167	TP-IW1221-25		.0 100		25.3	0.4	Polyacetal (Exterior color: Green)		
K151168	TP-IW1221-30	130.0		45	30.3			Stainless	
K151169	TP-IW1221-40				40.3				
K151170	TP-IW1223-30	140 5	100	40.5	30.3	0.4			
K151171	TP-IW1223-40	142.5	109	43.5	40.3				
K151172	TP-IW1225-30	154 0	105	45	30.3	0.5			
K151173	TP-IW1225-40	134.0	125	45	40.3				

Notes) 1. Standard product.

2. Operating temperature range is -20°C to 80°C.

3. Bolt tightening torque: 9.8 N·m {1 kgf·m}

4. A half of a split idler wheel should not be combined with a half of a different idler wheel.

5. Idler wheels rotate on the shaft; do not use an unfinished shaft.

6. Only use a finished shaft.

Magnet-embedded Plastic Rail







Model no.	Installation location	Chain side-flex radius	Material		
PR-TTUPMHR500P1R1	Carry way wearstrip				
PR-TTUPMHR500P1R2	Return way wearstrip	500	UHMW-PE (white)		
PR-TTUPMHR500P1B	Return way base				

Notes) 1. Made-to-order product. Please contact a Tsubaki representative for further information.

2. Other plastic rails (with different shapes, bend radius, and materials) are also available upon request. Please contact a Tsubaki representative for further information.

f of a split sprocket pair should not ed with a half of a different pair. ng temperature range is -20°C to

Plastic Modular Chain WT2515G-M Type

Straight

Plastic Chain





Plan view



Connecting pin

Special stepped plastic pins / Orange (Material: Special engineering plastic) Model no.: WT2515G-PLA-JPD



Special stepped plastic pins (special engineering plastic) * Note that pins are to be removed from a certain direction. (See page 9)

Chain (plastic pins)

Product code	Model no.	Top plate		Pin	Max. allowable load	Approx. mass	Back bend radius
		Material	Color		kN{kgf}	Kgi/III	mm
K13	WT2515G-M330-CB	Low-friction polyacetal (carbon black filled)	Blue	Special stepped plastic pin	1.9{190}	0.8	25

Notes) 1. A chain consists of the required number of units of links and a fraction less than one unit. 1 unit = 120 links

- 2. Made-to-order product.
- 3. The chain material is low friction polyacetal with carbon black (CB).
- 4. Only connecting pins are orange. Base chain pins are white.
- 5. Operating temperature range is -20°C to (60) 80°C. (60)°C is for wet conditions.
- 6. Allowable chain speed: 100 m/min. (with lubrication) and 50 m/min (without lubrication)

Chain model numbering



Other Chain Materials

ULF: Ultra Low Friction

- (Color: Blue) HG: Low Friction & abrasion resistance
- (Color: Navy Blue)

For chain materials other than the above, please contact us.

Sprocket



Draduat aada	Madalusa	Tooth	Pitch diameter	diameter Outer diameter		Keyway		Bore	Choff	Matarial	Tupo		
Product code	woder no.	reeur	Dp	Do	d	W	Н	shape	Shan	Material	туре		
K151202	WT-SW2250-16T30				ø30	8 33.3		Devined hale	Round 30 polished steel bar				
K151203	WT-SW2250-16T40	16	130.2 130		ø40	12	43.3	Hound noie	Round 40 polished steel bar				
K15	WT-SW2250-16T40S]			40	—	—	Square hole	Square 40 polished steel bar	Reinforced	Colit		
K151204	WT-SW2250-18T30					ø30	8	33.3		Deveral hada	Round 30 polished steel bar	(Black)	Spiit
K151205	WT-SW2250-18T40	18	146.3	146	ø40	12	43.3		Round 40 polished steel bar				
K15	WT-SW2250-18T40S				40	— —		Square hole	Square 40 polished steel bar				

Notes) 1. Operating temperature range is -20°C to 80°C.

2. Square-hole sprockets are loosely fitted to the shaft to accommodate the thermal expansion between the chain and conveyor, as well as chain-sprocket installation errors.

3. Use round-hole sprockets only when the chain width is 680 mm or shorter and temperature variations are within 30°C. 4. Models in boldface are stock items (standard products) while models in normal face are made-to-order products.

Idler Wheel







WT-SW2250-18T-IW-M



Product code	Model no.	Teeth	Pitch diameter <i>Dp</i>	Outer diameter <i>DO</i>	Bore diameter <i>d</i>	Shaft	Material	Туре
K151206	WT-SW2250-16T30IW-M	16	130.2	130	ø30	Round 30 polished steel bar		Split
K151207	WT-SW2250-16T40IW-M	10	150.2	130	ø40	Round 40 polished steel bar	Polyamida (Whita)	
K151208	WT-SW2250-18T30IW-M	19	1/6 3	146	ø30	Round 30 polished steel bar	Folyamide (Winte)	
K151209	WT-SW2250-18T40IW-M	10	140.5	140	ø40	Round 40 polished steel bar		

Notes) 1. Operating temperature range is -20°C to 80°C.

2. Use only as an idler wheel.

3. Standard product.

1. Selection

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.).
- 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. Also, do not use in contact with steam.
- Toxic gases may be generated if Chemical Resistant Series (including Super Chemical Resistant Series) chains are exposed directly to open flame or temperatures above 150°C. Do not expose these series to excessive heat or open flame.
- 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 gases.

Corrosion Resistance against Different Liquids

When selecting a chain, refer to Table 1 to check whether the material is appropriate for the intended application. You can also use this corrosion resistance data to check the material of the rail used with the Top Chain. The table shows results obtained in a laboratory at 20° C and does not guarantee usability in all conditions. Consider the overall operating conditions (including humidity) with actual use. The table shows the material of the constituent components used in the top plates and chain individually, so be sure to check them the material in combination. 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	TTUPM-H Type	WT2515G-M Type	Liquid	TTUPM-H Type	WT2515G-M Type
Acetic acid (10%)	×	×	Milk / Butter	0	0
Acetone	×	0	Nitric acid (5%)	×	×
Alcohol	0	0	Oil (vegetable, mineral)	0	0
Ammonia solution	Δ	\triangle	Paraffin	0	0
Beer	0	0	Phosphoric acid (10%)	×	×
Benzene	0	0	Potassium hydroxide	×	×
Carbon tetrachloride	\triangle	0	Seawater	×	\triangle
Chromic acid (5%)	×	×	Soap water	0	0
Citric acid	×	×	Sodium chloride	×	0
Drinking water / Coffee	0	0	Sodium hydroxide (25% caustic soda)	×	×
Formic acid (50%)	×	×	Sodium hypochlorite	Х	×
Fruit juice	0	0	Sulfuric acid (5%)	×	×
Gasoline	0	0	Vegetable juice	0	0
Hydrochloric acid (2%)	×	×	Vinegar	×	\triangle
Hydrogen peroxide solution (3%)	×	×	Water	0	0
lodine	×	×	Whiskey	0	0
Lactic acid	×		Wine	0	0

🔿: Sufficient corrosion resistance 🛆: Corrosion resistance under certain operating conditions 🛛 ×: No corrosion resistance

3) Conveyance conditions

A. Conveyance amount

B. Conveyance interval

4) Conveyance atmosphere

humidity, and other

corrosive conditions (See

C. Glass shards, paint chips,

metal chips, sand, and

other abrasive material

D. Exposure to ultraviolet

A. Temperature

Table 1)

light

B. Chemicals, water,

Step 1. Check Conveyance Conditions

- 1) Conveyed material
- A. Material used in container or conveyed material
- B. Weight per unit
- C. Shape/dimensions
- C. Conveyor speed D. Lubrication
 - E. Item stacking (accumulation, ratio)
- 2) Conveyance route A. Linear or curved
- conveyance
- B. Conveyor length/width
- C. Layout
- D. Space

Step 2. Selection of Rail Material

Select the appropriate rail material.

Table 2. Rail material selection chart

	Without I	ubrication	With lubrication		
Rail material	Ab	rasive	mate		
	No	Yes	No	Yes	
Stainless steel	В	D	A	Α	
Steel	Α	С	D	D	A: Strongly
Solidur (P rail)	D	×	А	×	recommended B: Recommended
PMW rail PLF rail	В	×	А	×	C: Very usable
M rail SJ-CNO	А	×	×	×	D: Usable X: Not appropriate
	Rail material Stainless steel Steel Solidur (P rail) PMW rail PLF rail M rail SJ-CNO	Wthout Rail material Ab No Stainless steel B Steel A Solidur (P rail) D PMW rail PLF rail B M rail SJ-CNO A	Without lubrication Name View Name View Stainless steel B D Steel A C Solidur (P rail) D × PMW rail PLF rail B × M rail SJ-CNO A ×	Without lubrication With lub Rail material Abrasive material No Yes No Stainless steel B D A Steel A C D Solidur (P rail) D × A PMW rail PLF rail B × A M rail SJ-CNO A × ×	Without lubrication With lubrication With lubrication Abrasive material No Yes No Yes No Yes Stainless steel B D A Steel A C D Solidur (Prail) D × A PMW rail PLF rail B × A SJ-CNO A × ×

		Material/Color	Feature		
	Solidur (P rail)	 Ultrahigh molecular weight polyethylene White or green 	 Most common rail Machine-cut or extruded product When using a plastic chain, this rail is recommended for wet conditions Low water absorption; chemical- resistant and shock-proof. 		
	PMW rail PLF rail	 Low-friction, wear-resistant ultrahigh molecular weight polyethylene White 	 Lower friction compared to P rail; wear-resistant rail Machine-cut product 		
	M rail SJ-CNO	 Special polyamide Blue (M rail) Purple (SJ-CNO) 	 Dry-only rail Wear-resistant rail Machine-cut product 		
1	Note: Operating tem	nerature range: Solidur (P rail)	M rail / SLCNO : -20°C to 80°C		

Note: Operating temperature range: Solidur (P rail) PMW rail / PLF rail - -20°C to 60°C M rail / SJ-CNO : -20°C to 80°C

Step 3. Calculating Chain Load and Required Power

3-1. Calculating F in linear conveyance



-kN

1) Description of symbols

- F = Chain load
- m_1 = Chain weight kg/m
- L = Length of carry-way section m
- $m_2 =$ Conveyed item weight in carry-way section-kg/m
- L' = Length of accumulation part -m
- $m_3 =$ Weight of carried item in accumulation part -kg/m
- μ_1 = Dynamic coefficient of friction of chain/rail (See Table 3)
- μ_2 = Dynamic coefficient of friction of the chain and conveyed item in accumulation section – (See Table 4)
- $\mu_3 = \text{Coefficient of magnetism} (\text{See Table 5})$
- $\alpha_L = \text{Coefficient of angle when}$
- using a side-flex rail (See Table 6) α_s = Coefficient of length — (See Table 6)
- r = Side-flex radius m
- P = Required power kw
- V =Chain speed m/min
- η = Power transmission device
- efficiency in drive section

SI units (kN)

Chain load

$$F = 9.80665 \times 10^{-3} \{ (2.1 \, m_1 + m_2) \, \mathbf{L} \cdot \boldsymbol{\mu}_1 \\ + (2.1 \, m_1 + m_3) \, \boldsymbol{L'} \cdot \boldsymbol{\mu}_1 + m_3 \cdot \boldsymbol{L'} \cdot \boldsymbol{\mu}_2 \}$$

Required power



3-2. Calculating F in curved conveyance (with one curved section)



[Load of B part : $F_{\rm B}$]

 $F_{\rm B}=1.1\times(F_{\rm A}+m_1\cdot L_3\cdot\mu_1)$

Carry-way load

[Load of C part : F_{C}]

$$\begin{split} F_{\rm C} &= |F_{\rm B} + (m_1 + m_2) \, L_2 \boldsymbol{\cdot} (\mu_1 + \mu_3) + (m_1 + m_2) \boldsymbol{\cdot} L_3 \boldsymbol{\cdot} \mu_1 + m_3 \boldsymbol{\cdot} (L_2 + L_3) \boldsymbol{\cdot} \mu_2 | \times \alpha_L 90^\circ \\ L_2 &= r \times \alpha_S 90^\circ \end{split}$$
 (Load of D part : $F_{\rm D}$)

 $F_{\rm D} = F_{\rm C} + \{(m_1 + m_2)L_1 \cdot \mu_1 + m_3 \cdot L_1 \cdot \mu_2\}$

The coefficients shown in Tables 3 through 6 are based on in-house test data. Actual coefficients may differ depending on the operation conditions, atmosphere, shape of the conveyed items, chain grime, and other conditions. Use the coefficients given to calculate chain load.

Table 3. Dynamic coefficient of friction of chain/rail μ_1

Top plate material	Condition	UHMW-PE		
СВ	No lubrication or water-lubricated	0.2		

Table 4. Dynamic coefficient of friction of chain/conveyed items μ_2

Tan plata		Material of carried item							
material	Condition	Aluminum can Steel can	Glass bottle	Plastic container	Carton				
СВ	No lubrication or	0.19	0.12	0.16	0.29				

Table 5. Magnet factor μ_3

Top plate material	Condition	Magnet factor
СВ	No lubrication or water-lubricated	0.47

Table 6. Angle and length factors when using curved rails $\alpha_L \alpha_S$

Top plate material	Condition	Horizo	ontal bend angle $ lpha_L $		
		30°	60°	90°	
СВ	No lubrication or water-lubricated	1.1	1.25	1.35	
Length factor α_S		0.5	1.0	1.6	
Top plate	-	Horizo	ontal bend an	igle $lpha_L$	
Top plate material	Condition	Horizo 120°	ntal bend an 150°	gle α_L 180°	
Top plate material CB	Condition No lubrication or water-lubricated	Horizc 120° 1.50	ontal bend an 150° 1.70	gle α _L 180° 1.85	

Step 4. Selecting a Chain Size

Select a Top Chain with a maximum allowable load greater than the maximum load (F) applied to the chain.

Also, take the conveyor speed and ambient temperature into consideration, referencing the allowable load graphs in Tables 7 and 8.

 $F \leq$ Max. allowable chain load (depending on speed and temperature)

Table 7. Allowable load graph for WT2515G-M330-CB



Table 8. Allowable load graph for TTUPM838H-CB



Allowable chain speed With lubrication: 100 m/min. Without lubrication: 50 m/min

2. Conveyor Design

1. Conveyor Parts Arrangement

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



1) Chain slack

The first return roller should be placed 500 to 900 mm from the drive. The amount of slack in the chain between return rollers should be 50 to 100 mm. Using different intervals or amounts of slack may result in chain skipping.

2) Return roller intervals

Place the return rollers at even intervals after the first return roller just after the drive. (Recommended roller interval is about 400 to 600)

3) Engagement angle

The engagement angle between the drive sprocket and the chain must be greater than 150° .

 Height of wearstrip on carry way (H) See figure below.

1)WT2515G-M Type



②TTUPM-H Type



* Keep the length of one pitch on both the drive and driven sides.

5) Return rollers

Return rollers receive the top side of the chain on the return way. Use return rollers taking into consideration the chain back bend radius. As a general rule, the chain back bend radius should not be greater than the radius of the return rollers.

Chain back bend radius (unit: mm)

Chain	Back bend radius R
WT2515G-M	25
TTUPM838H	70

6) 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.

2. Installing Wearstrips

See below for guide clearances for the chain, as well as chain alignment pitch when using multiple lanes.

Single lane



TTUPM838H



Multi-lane

For multi-lane applications, the lateral pitch should be 85 mm. An example is shown in the figure below, but note that it depends on the installation space.



3. Assembly and Disassembly of the Chain

Assembly and Disassembly of TTUPM838H

The D-pin type connecting pins can be inserted/removed from either side. Use a punch with an outer diameter of 6 to 7.5 mm. Ensure that the pins are fully but not excessively inserted.



* Do not use a punch with an outer diameter smaller than 6 mm or greater than 7.5 mm as they may damage the chain and/or pin.

Assembly and Disassembly of WT2515G-M330

Disassembly

Apply the punch (with max. diameter of 4.5 mm) to the side of the pin without a cutout, and punch out the pin by tapping the punch with a hammer.



* Note that pins need to be removed from the correct direction.

Assembly

Use the dedicated connecting pins (special stepped plastic pin (orange)). Insert the pin from the side without cutout into the link.

Connect the chain by applying a punch to the side with cutout and tapping the pin into the link.

Pins can be inserted from either side of the link.



Re-assembly

Do not reuse a previously inserted connecting pin (special stepped plastic pin (orange)) to connect chains.

Connecting pin (special stepped plastic pin)

Use the dedicated connecting pin (special stepped plastic pin) to assemble the chain.

The special stepped plastic pins are colored orange so they can be distinguished from the base chain pins (white).

One connecting pin is provided for each chain.



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 iniury.
- 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 fl ying 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.

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 fl ying 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 specifi cations 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 disconnecting chains that have engineering plastic pins, do not reuse a pin once removed since it may not engage properly or it may even come loose.
 When using chains with engineering plastic pins under wet conditions. make sure that the temperature does not exceed 60°C.
- When using chains with engineering plastic pins under wet conditions, make sure that the temperature does not exceed 60°C.
- The link material for ULF ultra low friction series contains silicone-based lubricant. Therefore, do not use this chain for printing processes, or in cases where silicone will have a harmful effect.
- The TP-IR18/IR60/RR55 (return rollers), PR520-M (M plastic rail), and SJ-CNO are dry conveyor parts (lube-free, no water adhesion). DIA, MPD, MF, HS, and KV150 chains are specific ally for dry environments. Do not use these on a conveyor under wet conditions (environments where they will come into contact with water, soapy water or other liquids), since this may cause the chain to malfunction. Bearing corner discs are also designed for use in dry environments.
- 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. Since this is especially true with stainless steel pins, we recommend using plastic pins or KV series chain.
- 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. Also, do not use in environments where such components will be exposed to steam.
- Toxic gases may be generated if the Chemical Resistant series (including Super Chemical Resistant) is exposed directly to open fl ame, or to temperatures above 150°C. Do not expose to excessive heat or to open fl ame.
- Plastic chain is fl ammable. Do not use at temperatures above the maximum allowable temperature or use near open fl ame. 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 specific 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.

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