Innovation in Motion

TSUBAKI

SKS SWEDEN

PC Chain

Engineering plastic combination chain

The chain of many applications

- Lube free operation
- Longer wear life
- Easy maintenance

PC Chain

Benefits

Improved performance
Tsubaki PC chain offers a **cleaner and longer lasting alternative to stainless steel chain,** for applications where corrosion and a lack of lubrication are a problem. Being **far lighter than stainless-steel chains an additional benefit is lower noise.**

Lower maintenance costs
Dimensionally Interchangeable with BS and ANSI chain sizes, Tsubaki PC chain benefits from reduced chain wear and the good news for customers - less maintenance.

Wide range of applications
Available with a wide range of configurations, and with a full compliment of attachments (A-1, K-1, SA-1, SK-1, D-1 and D-3) there is a PC chain for virtually any application.

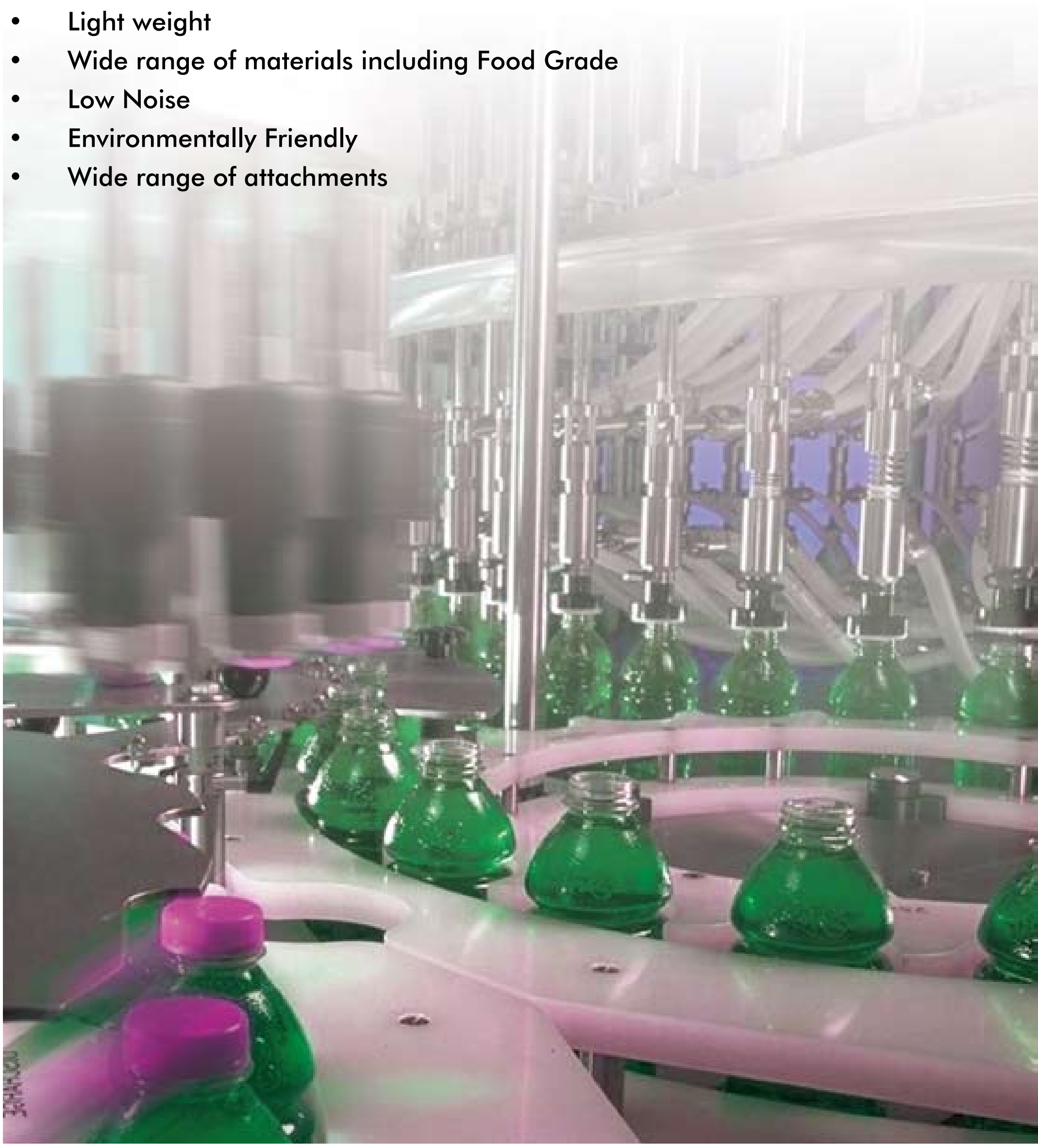
Industry Applications:

- Food processing
- Packaging
- Pharmaceutical
- Healthcare
- Light electronics
- Small conveyors
- ...and many more besides

Lube-Free

Long wear life - without lubrication

Features
- Lube Free operation
- Longer wear life
- Light weight
- Wide range of materials including Food Grade
- Low Noise
- Environmentally Friendly
- Wide range of attachments



Light weight

Suitable for clean environments

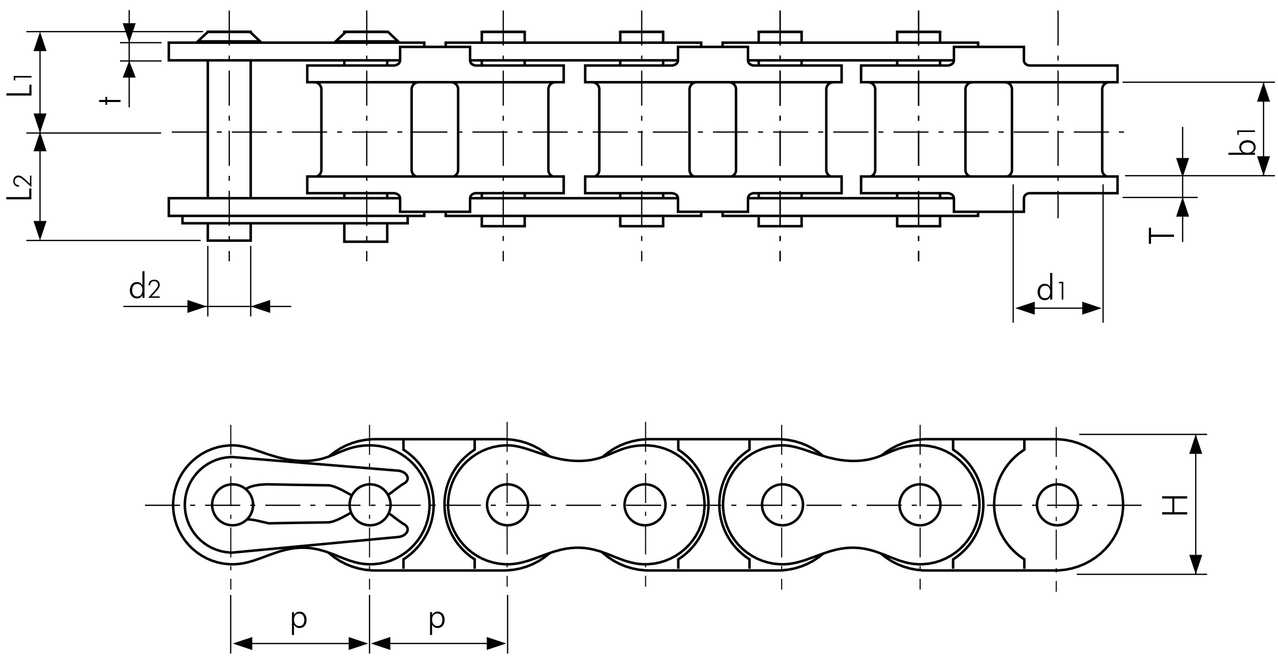
Tsubaki ANSI & BS standard PC chain

Engineering Plastic Combination Chain (PC) uses stainless steel outer link plates and pins for strength, it also employs resilient engineering plastic inner links to reduce weight and improve wear life, **without lubrication**. Tsubaki is the pioneer of this chain specification having first launched the ANSI series over ten years ago with it often being referred to as Poly Steel chain by many satisfied customers.
Resilient to outdoor conditions, detergents and steam as well as food ingredients such as oils and lactic acid, this product can provide an ideal solution for avoiding corrosion in a wide variety of machinery applications.

PC Drive, Conveyor & Attachment chain

PC Chain

DRIVE CHAINS



BS/DIN drive chain — All dimensions are in mm

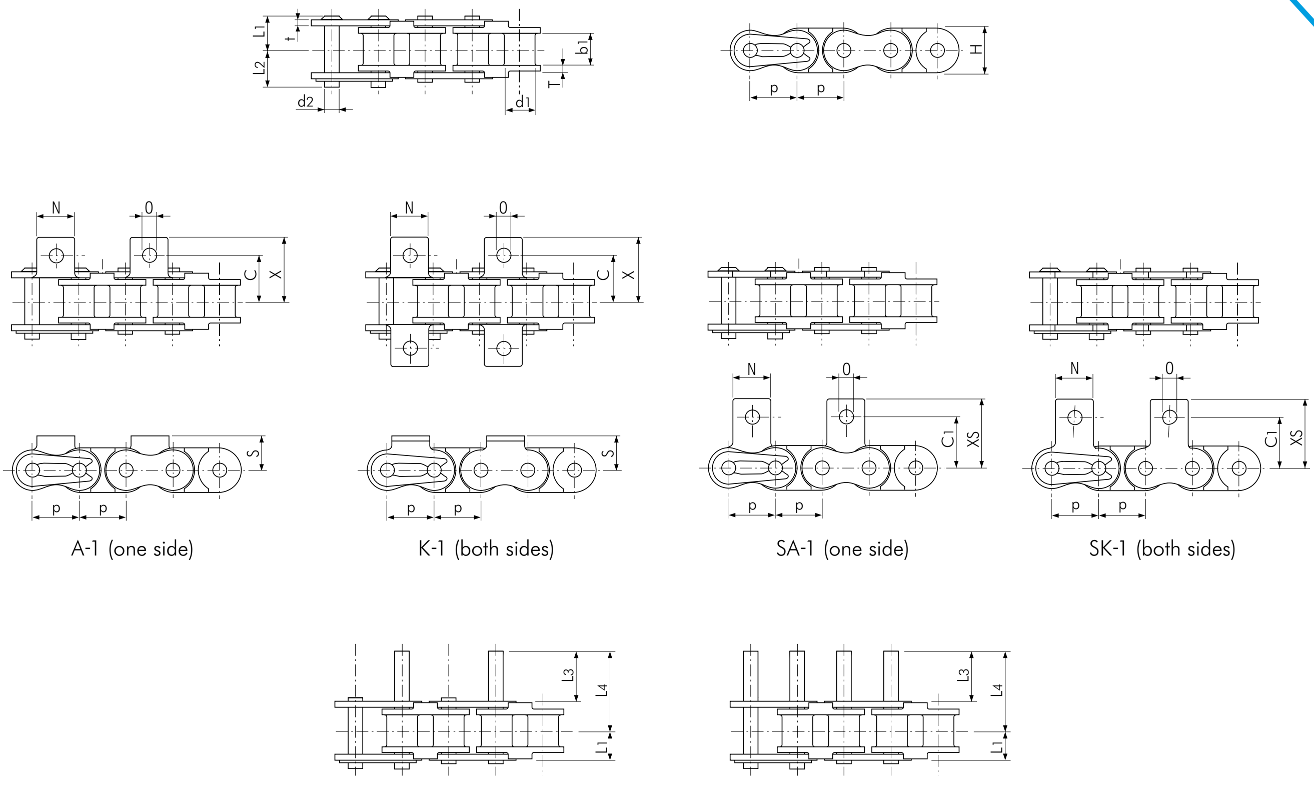
Chain number	Pitch		Bush diameter	Inner width	Pin			Link plate			Maximum allowable load	Approx. mass
					Dia-meter	Length	Length	Thickness	Thickness	Height		
	p		d1	b1	d2	L1	L2	T	t	H (max)	kN	kg/m
RF06B-PC-1	9.525	(3/8")	6.35	5.72	3.28	6.50	7.25	1.30	1.00	8.60	0.20	0.23
RF08B-PC-1	12.70	(1/2")	8.51	7.75	4.45	8.35	10.05	1.60	1.50	12.00	0.46	0.40
RF10B-PC-1	15.875	(5/8")	10.16	9.65	5.08	9.55	11.25	1.50	1.50	14.70	0.53	0.51
RF12B-PC-1	19.05	(3/4")	12.07	11.68	5.72	11.10	13.00	1.80	1.80	16.10	0.70	0.67

ANSI drive chain — All dimensions are in mm

Chain number	Pitch		Bush diameter	Inner width	Pin			Link plate			Maximum allowable load	Approx. mass
					Dia-meter	Length	Length	Thickness	Thickness	Height		
	p		d1	b1	d2	L1	L2	T	t	H (max)	kN	kg/m
RF25-PC-1	6.35	(1/4")	3.30	3.18	2.31	4.50	5.50	1.30	0.75	6.00	0.08	0.10
RF35-PC-1	9.525	(3/8")	5.08	4.78	3.59	6.85	7.85	2.20	1.25	9.00	0.18	0.22
RF40-PC-1	12.70	(1/2")	7.92	7.95	3.97	8.25	9.95	1.50	1.50	12.00	0.44	0.39
RF50-PC-1	15.875	(5/8")	10.16	9.53	5.09	10.30	12.00	2.00	2.00	15.00	0.69	0.58
RF60-PC-1	19.05	(3/4")	11.91	12.70	5.96	12.85	14.75	2.40	2.40	18.10	0.88	0.82

PC Chain

BS/DIN ATTACHMENT CHAINS



A-1 (one side) K-1 (both sides) SA-1 (one side) SK-1 (both sides)

D-1 D-3

BS/DIN conveyor chain with attachment — All dimensions are in mm

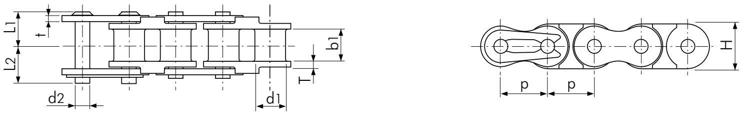
Chain number	Pitch		Bush diameter	Inner width	Pin					Link plate			Maximum allowable load	Approx. mass
					Diameter	Length	Length	Length	Length	Thickness	Thickness	Height		
	p		d1	b1	d2	L1	L2	L3	L4	T	t	H (max.)	kN	kg/m
RF06B-PC	9.525	(3/8")	6.35	5.72	3.28	6.50	7.25	11.30	16.65	1.30	1.00	8.60	0.20	0.23
RF08B-PC	12.70	(1/2")	8.51	7.75	4.45	8.35	10.05	14.90	22.25	1.60	1.50	12.00	0.46	0.40
RF10B-PC	15.875	(5/8")	10.16	9.65	5.08	9.55	11.25	17.80	26.15	1.50	1.50	14.70	0.53	0.51
RF12B-PC	19.05	(3/4")	12.07	11.68	5.72	11.10	13.00	20.90	30.70	1.80	1.80	16.10	0.70	0.67

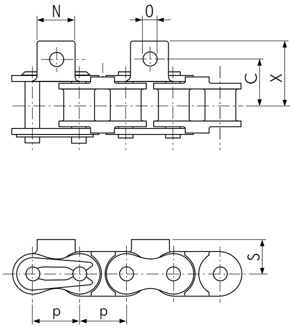
Chain number	Dimensions							Approx. mass		
								A SA	K SK	D
	C	C1	N	O	S	X	XS	kg/p	kg/p	kg/p
RF06B-PC	9.50	9.50	8.50	3.50	6.50	14.10	14.30	0.002	0.004	0.001
RF08B-PC	11.90	12.70	11.40	4.20	8.90	19.05	19.30	0.002	0.004	0.001
RF10B-PC	15.90	15.90	12.70	5.00	10.20	22.25	22.90	0.003	0.006	0.002
RF12B-PC	19.05	22.20	16.50	7.10	13.50	29.85	32.05	0.006	0.012	0.003

Note:
1. Make sure to check the chain tension again when replacing Stainless Steel Chain with PC Chain.
2. Offset links are not available.
3. For details on corrosion resistance selection, please consult our Corrosion Resistance Guide in this brochure.

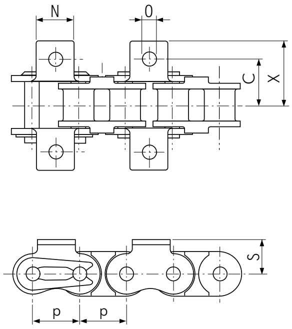
PC Chain

ANSI ATTACHMENT CHAINS

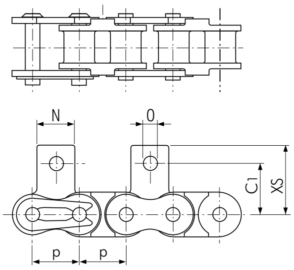




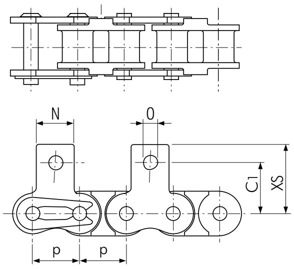
A-1 (one side)



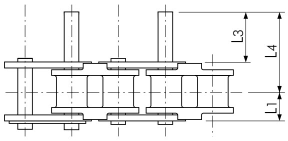
K-1 (both sides)



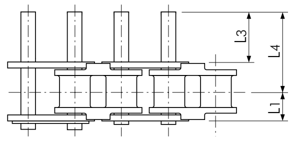
SA-1 (one side)



SK-1 (both sides)



D-1



D-3

ANSI conveyor chain with attachment — All dimensions are in mm

Chain number	Pitch p		Bush diameter d1	Inner width b1	Pin Diameter d2	Pin Length L1	Pin Length L2	Pin Length L3	Pin Length L4	Link plate Thickness T	Link plate Thickness t	Link plate Height H (max.)	Maximum allowable load kN	Approx. mass kg/m
RF25-PC	6.35	(1/4")	3.30	3.18	2.31	4.50	5.50	-	-	1.30	0.75	6.00	0.08	0.95
RF35-PC	9.525	(3/8")	5.08	4.78	3.59	6.85	7.85	-	-	2.20	1.25	9.00	0.18	0.22
RF40-PC	12.70	(1/2")	7.92	7.95	3.97	8.25	9.95	15.45	22.65	1.50	1.50	12.00	0.44	0.39
RF50-PC	15.875	(5/8")	10.16	9.53	5.09	10.30	12.00	19.35	28.40	2.00	2.00	15.00	0.69	0.58
RF60-PC	19.05	(3/4")	11.91	12.70	5.96	12.85	14.75	24.25	35.65	2.40	2.40	18.10	0.88	0.82

Chain number	Dimensions C	C1	N	O	S	X	XS	Approx. mass A SA kg/p	K SK kg/p	D kg/p
RF25-PC	7.95	7.95	5.60	3.40	4.75	11.45	11.65	0.0006	0.0012	-
RF35-PC	10.50	9.50	7.90	3.40	6.35	15.35	14.55	0.0008	0.0016	-
RF40-PC	12.75	12.70	9.50	3.60	8.00	17.80	17.40	0.002	0.004	0.001
RF50-PC	16.00	15.90	12.70	5.20	10.30	23.55	23.05	0.003	0.006	0.002
RF60-PC	19.15	18.30	15.90	5.20	11.90	28.35	26.85	0.007	0.014	0.003

Note:
1. Make sure to check the chain tension again when replacing Stainless Steel Chain with PC Chain.
2. Offset links are not available.
3. For details on corrosion resistance selection, please consult our Corrosion Resistance Guide in this brochure.

PC Chain

Solution providing

Innovations in plastic have created the perfect line-up of Tsubaki plastic chains and now solve problems such as friction, static electricity build-up, chemical corrosion, hygiene problems and others.

Environmentally friendly

Environmental protection is one of the most important issues within the Tsubakimoto Chain group. Therefore this new line-up of plastic chains addresses the needs of the 21st century, providing for energy saving, easy recycling and lower demands on nature's materials.

Problem:
- Bacteria and mould in humid areas
- Short wear life

Our solution:
MWS Chain

Problem:
- Unstable conveying due to poor sliding
- Excessive line pressure
- Toppling bottles
- Short wear life
- High running cost
- Expensive lubricant

Our solution:
UMW Chain

Problem:
- Damage by hot water and high temperature
- Damage by sterilizing
- Wear from high speed conveying

Our solution:
KV Chain

Problem:
- Corrosion in acid and alkaline environment

Our solution:
SY Chain

Problem:
- Operation under UV light

Our solution:
UVR Chain

Problem:
- Inclined conveying in dry environment
- Damage by impact
- Damage by high temperature

Our solution:
DIA Chain

Problem:
- Moist environment
- Damage by impact
- Corrosion in chemical environment
- Operation under UV light

Our solution:
DIY Chain

These are just a few examples of product suitability.
Please consult Tsubaki for more details.

Selection procedure

Chain selection for Drive application

1. Determining the size
Select a chain size that satisfies the following equation.

Calculate design chain tension Fd(kN)

Fd = Maximum Working Load on the chain x Service factor, Ks x Speed factor, Kv x Sprocket teeth factor, Kc

Fd ≦ Maximum Allowable Load of the chain

Service factor: Ks (Table 1-1)

Type of impact	Machine example	Electric motor or turbine	Internal combustion engine	
			With hydraulic drive	Without hydraulic drive
Smooth	Belt conveyor Chain conveyor Centrifugal blowers Ordinary textile machines	1.0	1.0	1.2

Speed factor: Kv (Table 1-2)

Chain speed	Factor
0 ~ 15 m/min	1.0
15 ~ 30 m/min	1.2
30 ~ 50 m/min	1.4
50 ~ 70 m/min	1.6

Sprocket teeth factor: Kc (Table 1-3)

Number of teeth sprocket	Factor
9 ~ 14	1.16
15 ~ 23	1.12
24 ~ 37	1.08
38 ~ 59	1.04
> 60	1.00

Chain selection for Conveyor application

1. Confirming the conveying conditions
   Type of conveyor (i.e. Slat conveyor, Bucket conveyor etc.)
   Conveying Angle (i.e. Horizontal, Inclined, Perpendicular)
   Type, dimensions and mass of conveyed materials/objects
   Conveyor Speed
   Conveyor length
   Atmosphere in which conveyor is operated (i.e. temperature, corrosive factors etc.)
   (Presence or absence of lubrication)

2. Tentative selection of a chain size

$$F\,(kN) = w \times f_1 \times Kv \times \frac{g}{1000}$$

   w: Mass of conveyed objects (excluding chain) kg
   f_1: Coefficient of sliding friction (Table 3-1)
   Kv: Speed factor (Table 1-2)

* If 2 parallel strands are used, chain type and size should be determined using F/2 such that chain tension is less than the maximum allowed.

3. Confirmation of the maximum base chain allowable roller load

Maximum base chain allowable roller load (Table 2-1) Unit: N

Chain size BS/DIN	Maximum allowable load	Chain size ANSI	Maximum allowable load
		RF25-PC	5
RF06B-PC	20	RF35-PC	15
RF08B-PC	35	RF40-PC	20
RF10B-PC	40	RF50-PC	40
RF12B-PC	60	RF60-PC	60

PC Chain

Symbol key

F= Maximum static tension applied to chain (kN)

v= Conveying speed (m/min)

H= Vertical distance between sprockets (m)

L= Horizontal distance between sprockets (m)

C= Straight distance between sprockets (m)

m= mass of moving parts (kg/m)

w= Total mass of objects transported on conveyor (Maximum) (kg)

When conveying:

$$w = \frac{C}{\text{loading interval}} \times \text{mass of conveyed material (kg/unit)}$$

η= Transmission ratio of driving parts

f_1= Coefficient of sliding friction between chain and guide rail (Table 3-1)

P= Necessary power (kW)

g= Standard acceleration from gravity = 9.8 m/s²

Ks= Service factor (Table 1-1)

Kv= Speed factor (Table 1-2)

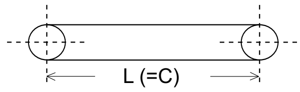
Kc= Sprocket teeth factor (Table 1-3)

4. Calculation of the maximum tension applied on the chain

Horizontal Conveying

$$F = (w + 2.1m \cdot C) f_1 \frac{g}{1000}$$

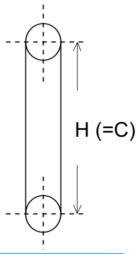
$$P = \frac{F \cdot v}{60} \cdot 1.1 \cdot \frac{1}{\eta}$$



Vertical Conveying

$$F = (w + m \cdot C) \frac{g}{1000}$$

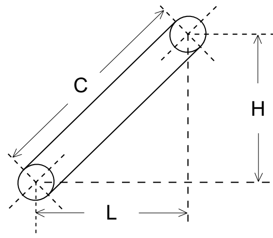
$$P = \frac{w \cdot v}{60} \cdot 1.1 \cdot \frac{g}{1000} \cdot \frac{1}{\eta}$$



Inclined Conveying

$$F = \{(w + m \cdot C) \frac{L \cdot f_1 + H}{C} + 1.1m(L \cdot f_1 - H)\} \frac{g}{1000}$$

$$P = \frac{v}{60} \cdot 1.1\{F - m(H - L \cdot f_1) \frac{g}{1000}\} \frac{1}{\eta}$$

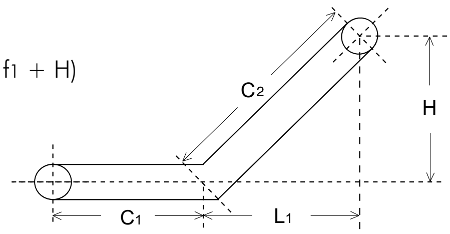


Horizontal + Inclined Conveying

$$F = \{(\frac{w}{C_1+C_2} + 2.1m) C_1 \cdot f_1 + (\frac{w}{C_1+C_2} + m)(L_1 \cdot f_1 + H)$$

$$+ 1.1m(L_1 \cdot f_1 - H)\} \frac{g}{1000}$$

$$P = \frac{v}{60} \cdot 1.1\{F - m(H - L_1 \cdot f_1)\} \frac{g}{1000}\} \frac{1}{\eta}$$



Coefficient of Sliding Friction: f_1 (Table 3-1)

PC Chain
0.25

5. Determination of actual chain speed
Multiply the maximum tension (F) applied to the chain by the appropriate chain speed factor (Kv) from Table 1-2. Next select a suitable chain using this formula:

$$F \times Kv \leqq \text{Maximum allowable load of the chain}$$

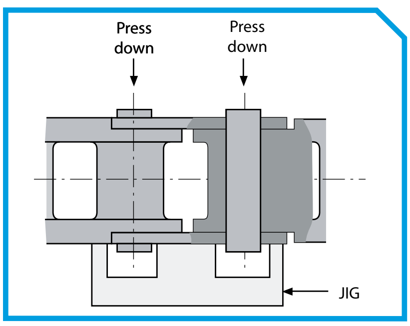
(If however, 2 parallel strands of chain are to be used, maximum chain tension = F/2)

Once chain tension Td and T have been established please refer to page 3 (for Drive application), page 4 (for BS/DIN Conveyor application) and page 5 (for ANSI Conveyor application) and select the appropriate chain size from the maximum allowable load column.

Note: Available chain speed up to 70 m/min - Applicable temperature -20°C ~ +80°C.

Assembly and Disassembly

1. For disassembly, position the jig under a pin link plate, as shown in the diagram, and press down on the pin heads. Please take care not to strike the engineering plastic portion of the chain which may result in fracture.
2. Please consult Tsubaki concerning the special poly steel chain disassembly jig.
3. Please use a connecting link when assembling.



PC Chain

Corrosion Resistance Guide

When selecting an appropriate chain for your application, please consult the guide below to ensure that your chain is sufficiently resistant to the corrosion induced by substances with which it will be in contact. The results in this guide were observed during tests in an environment of 20° C. As actual substance reactivity is subject to a wide variety of factors (ie ambient temperature, exposure time, etc.) This guide is offered no guarantee, but as an aid in selecting the most suitable chain for your operating conditions.

☆☆= Highly resistant ☆= Partially resistant × = Not recommended - = Not tested

Substance \ Chain spec.	Temp. (°C)	PC	PC-SY	MW / MWS	UMW	KV	UVR	DIA	DIY	SS
Acetic Acid (10%)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	×	☆☆	☆☆
Acetone	20	☆☆	×	☆☆	☆☆	☆☆	☆☆	☆☆	×	☆☆
Alcohol	-	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Aluminium Sulfate (sat.)	20	-	-	-	-	-	-	-	-	☆☆
Ammonia Water	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆	☆☆	☆☆
Ammonia Sulfate (sat.)	20	-	-	-	-	-	-	-	-	☆☆
Ammonium Chloride (50%)	boiling	-	-	-	-	-	-	-	-	☆
Ammonium Nitrate (sat.)	boiling	☆	☆☆	☆	☆	-	☆	☆☆	☆☆	☆☆
Beer	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Benzene	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Boric Acid (50%)	100	-	-	-	-	-	-	-	-	☆☆
Butyric Acid	20	☆☆	-	☆☆	☆☆	-	☆☆	☆☆	-	☆☆
Carbolic Acid	20	×	☆☆	×	×	-	×	×	☆☆	☆☆
Calcium Chloride (sat.)	20	☆	☆☆	☆	☆	☆	☆	☆	☆	☆
Carbon Tetrachloride (dry)	20	☆☆	☆☆	☆☆	☆☆	☆	☆☆	☆☆	☆☆	☆☆
Carbonated Water	-	-	-	-	-	-	-	-	-	☆☆
Chromic Acid (5%)	20	×	☆☆	×	×	☆☆	×	×	☆☆	☆☆
Chlorine Gas (dry)	20	-	☆☆	-	-	-	-	×	☆	☆
Chlorine Gas	-	×	-	×	×	×	×	×	×	×
Citric Acid (50%)	20	☆	☆☆	☆	☆	☆☆	☆	☆	☆☆	☆☆
Coffee	boiling	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Coca Cork Syrup	-	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Creosote	20	-	-	-	-	-	-	-	-	☆☆
Detergent	-	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Ethyl Ether	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Ferric Chloride (5%)	20	-	-	-	-	-	-	-	-	☆
Formaldehyde (40%)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆	☆☆	☆☆
Formic Acid (50%)	20	×	☆☆	×	×	×	×	×	☆☆	☆☆
Fruit Juice	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆	☆☆	☆☆
Gasoline	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Glycerine	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Honey	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Hydrochloric Acid (2%)	20	×	☆☆	×	×	×	×	×	×	×
Hydrogen Peroxide (30%)	20	×	☆☆	×	×	☆☆	×	×	☆☆	☆☆
Hypochlorite Soda (10%)	20	×	☆☆	×	×	×	×	×	×	×
Hydrogen Sulfide (dry)	-	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Hydrogen Sulfide (wet)	-	×	-	×	×	×	×	×	×	×
Iodine	20	×	☆☆	×	×	×	×	-	×	×
Kerosene	20	-	☆☆	-	-	-	-	-	☆☆	☆☆
Ketchup	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Lactic Acid (10%)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆	☆☆	☆☆

PC Chain

☆☆ = Highly resistant   ☆ = Partially resistant   × = Not recommended   - = Not tested

Substance / Chain spec.	Temp. (°C)	PC	PC-SY	MW / MWS	UMW	KV	UVR	DIA	DIY	SS
Malic Acid (50%)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Mayonnaise	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Milk	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Nitric Acid (5%)	20	×	☆☆	×	×	☆☆	×	×	☆☆	☆☆
Nitric Acid (65%)	20	×	☆☆	×	×	-	×	×	☆☆	☆☆
Nitric Acid (65%)	boiling	×	×	×	×	-	×	×	×	☆
Oxalic Acid (10%)	20	-	☆☆	-	-	-	-	☆☆	☆☆	☆☆
Oil (Plant, Mineral)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Paraffin	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Picric Acid (sat.)	20	-	-	-	-	-	-	-	-	☆☆
Potassium Permanganate (sat.)	20	-	☆☆	-	-	-	-	×	☆☆	☆☆
Phosphoric Acid (5%)	20	×	☆☆	×	×	☆	×	×	☆	☆
Photo Developer	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Petroleum	20	☆☆	-	☆☆	☆☆	☆☆	☆☆	☆☆	-	☆☆
Potassium Chloride (sat.)	20	-	-	-	-	-	-	-	-	☆☆
Potassium Dichromate (10%)	20	☆☆	-	☆☆	☆☆	☆☆	☆☆	☆☆	-	☆☆
Potassium Nitrate (25%)	20	☆☆	-	☆☆	☆☆	☆☆	☆☆	☆☆	-	☆☆
Potassium Nitrate (25%)	boiling	-	-	-	-	-	-	-	-	☆☆
Potassium Hydroxide (20%)	boiling	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	×	☆☆	☆☆
Sea Water	20	☆	☆☆	☆	☆	☆	☆	☆	☆	☆
Soap & Water Solution	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Sodium Chloride (5%)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Sodium Cyanide	20	-	-	-	-	-	-	-	-	☆☆
Sodium Perchlorate (10%)	boiling	-	-	-	-	-	-	-	-	☆☆
Sodium Hydroxide (25%)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	×	☆☆	☆☆
Sodium Hydrogen Carbonate	20	☆☆	-	☆☆	☆☆	-	☆☆	-	-	☆☆
Sodium Thiosulfate (25%)	boiling	-	-	-	-	-	-	-	-	☆☆
Sodium Sulfate (sat.)	20	-	-	-	-	-	-	-	-	☆☆
Sodium Carbonate (sat.)	boiling	-	☆☆	-	-	-	-	-	☆☆	☆☆
Soft Drinks	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Stearic Acid (100%)	20	×	-	×	×	×	×	×	×	×
Sugar Solution	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Sulfur Dioxide	20	-	-	-	-	-	-	-	-	☆☆
Sulphuric Acid (5%)	20	×	☆☆	×	×	×	×	×	×	×
Turpentine Oil	35	-	-	-	-	-	-	-	-	☆☆
Tartaric Acid (10%)	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Varnish	-	-	-	-	-	-	-	-	-	☆☆
Vegetable Juice	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Vinegar	20	☆	☆☆	☆	☆	☆	☆	×	☆	☆
Water	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Whiskey	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Wine	20	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Zinc Chloride (50%)	20	☆	☆☆	☆	☆	☆	☆	×	☆	☆
Zinc Sulfate (25%)	20	-	☆☆	-	-	-	-	-	☆☆	☆☆

SKS SWEDEN

Tsubakimoto Europe B.V.
Aventurijn 1200
3316 LB, Dordrecht
The Netherlands

Phone: +31 (0)78 620 4000
Fax: +31 (0)78 620 4001
E-mail: info@tsubaki.nl
Internet: http://tsubaki.eu

Tsubakimoto UK Ltd.
Osier Drive, Sherwood Park
Annesley, Nottingham NG15 0DX
United Kingdom

Phone: +44 (0)1623 68 87 00
Fax: +44 (0)1623 68 87 89
E-mail: sales@tsubaki.co.uk
Internet: http://tsubaki.eu

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