

TSUBAKI HEAT RESISTANT LAMBDA CHAIN LUBE-FREE CHAIN

(Patent Pending)

Heat Resistant

Lambda
Lambda



Lube-Free, Long Life. TSUBAKI Lambda Chain - now more eco-friendly.

TSUBAKI Lambda Chain® is an eco-friendly chain with a long wear life that requires no lubrication. It is extremely effective in reducing greenhouse gas emissions.

Lambda Chain advantages

Lower maintenance costs

Cleaner working environment

Increased productivity

Greater savings on chain replacement costs

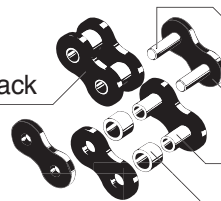
Increased equipment reliability

Basic Construction

Lambda Chain (Standard)
Inner, outer plate coated black

Lambda Chain (Nickel Plated)
All special nickel plating (except for bushing)

Inner plate coated black



Specially coated pin

Outer plate coated black

Special Oil Impregnated Bush

Solid Roller

Development

Usage

**CO₂ Emissions
Reduced 89.4%[※]**

Disposal
Reuse

Manufacturing

LCA (Life Cycle Assessment) and TSUBAKI

LCA

A tool for the systematic evaluation of the environmental aspects of a product through all stages of its life cycle, from raw materials to waste management, including recycling and final disposal.

[※] The difference in CO₂ output between RS80-LMD-1 (Lambda Chain) and RS80-1 (Roller Chain.)



Introducing Tsubaki's New Heat Resistant Lambda Chain[®] (Patent Pending)

TSUBAKI Heat Resistant Lambda Chain[®] advantages

Outstanding performance at high temperatures

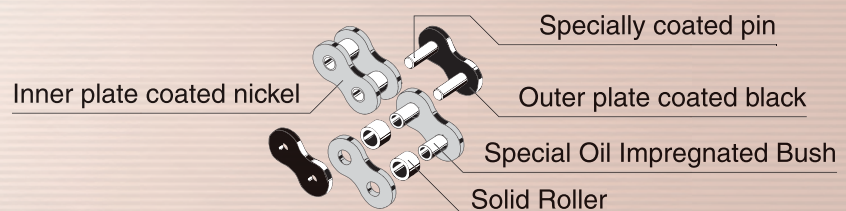
Ambient temperature range: 150°C to 230°C

Stable lubrication and anti-wear properties in high temperatures

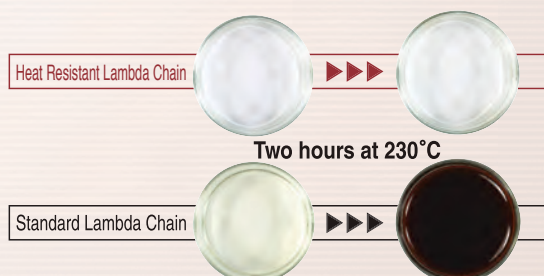
Uses NSF H-1 (Food Grade) certified oil and is environmentally friendly

Basic Construction

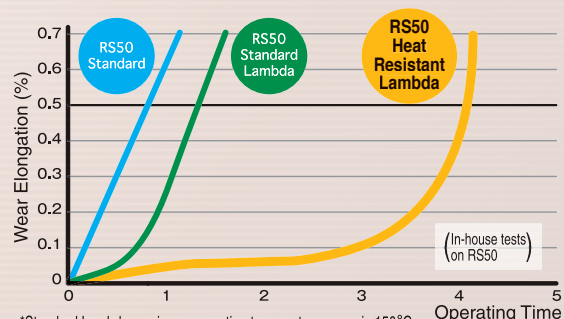
Lambda Chain (Heat Resistant)
Inner plate coated with a nickel plating,
outer plate coated black.



No degradation at high temperatures



Wear Life in 230°C Environment (Results of In-house Bench Tests)

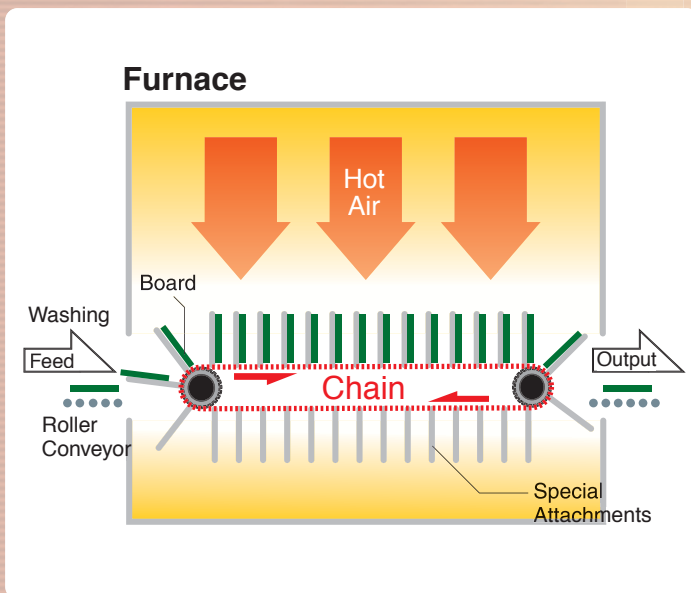


Great performance in high temperature environment with less maintenance costs.

Applications

Semiconductor Industry

Ambient Temperature: ~170°C



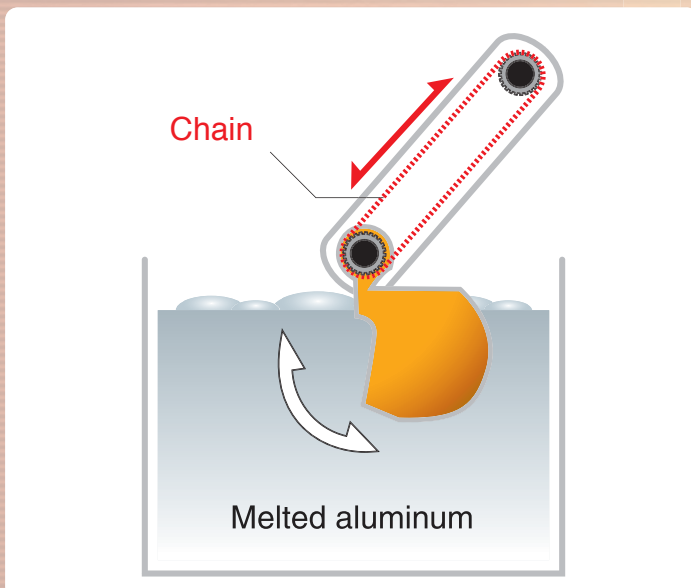
The board is washed in a previous process and is dried in a furnace. (Hot air is blown from above to dry the board.) The dried board is next sent to be packed.

Industry/Application/Chain Used

Industry: Semiconductor manufacturing industry
Application: Semiconductor board conveyance through furnace
Chain Used: Small Pitch Conveyor Chain

Automotive Industry

Ambient Temperature: ~230°C



Used in ladling operation that supply aluminum material to engine cylinder block casting machines. The chain rotates around and supplies melted aluminum by buckets to a die casting machine.

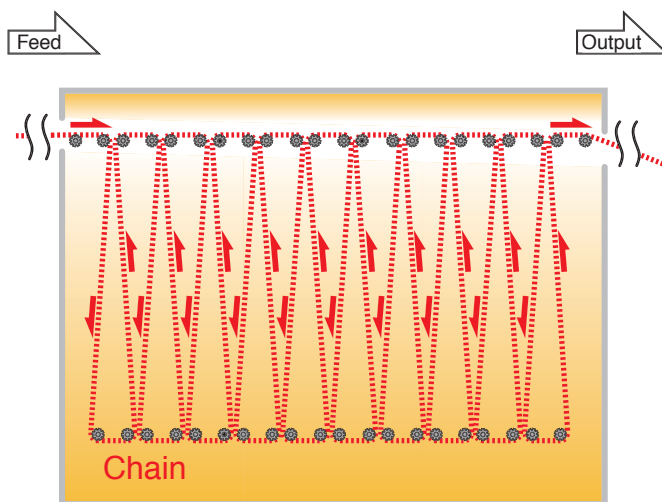
Industry/Application/Chain Used

Industry: Automotive manufacturing industry
Application: Cylinder block casting
Chain Used: Drive Chain

TSUBAKI Heat Resistant Lambda Chain meets the needs of the semiconductor, automotive, and a wide range of other industries. Here are just a few sample applications.

Dry Furnace Industry

Ambient Temperature: ~200°C



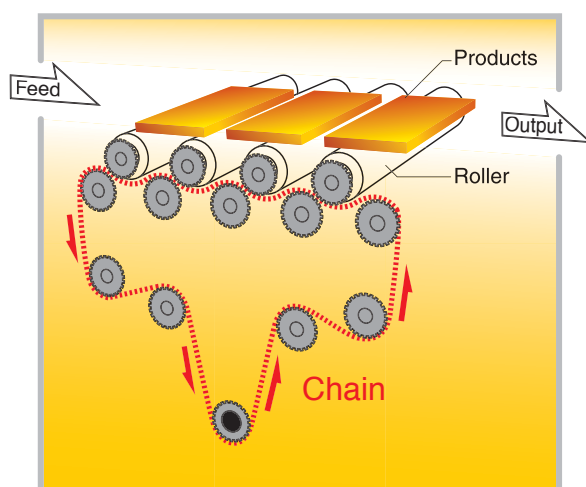
In order to keep products in the furnace for longer periods, the chain is stretched up and down across the length of the furnace.

Industry/Application/Chain Used

Industry: Various manufacturing industries
Application: Product conveyance in furnaces
Chain Used: Small Pitch Conveyor Chain

Steel Furnace Industry

Ambient Temperature: ~230°C



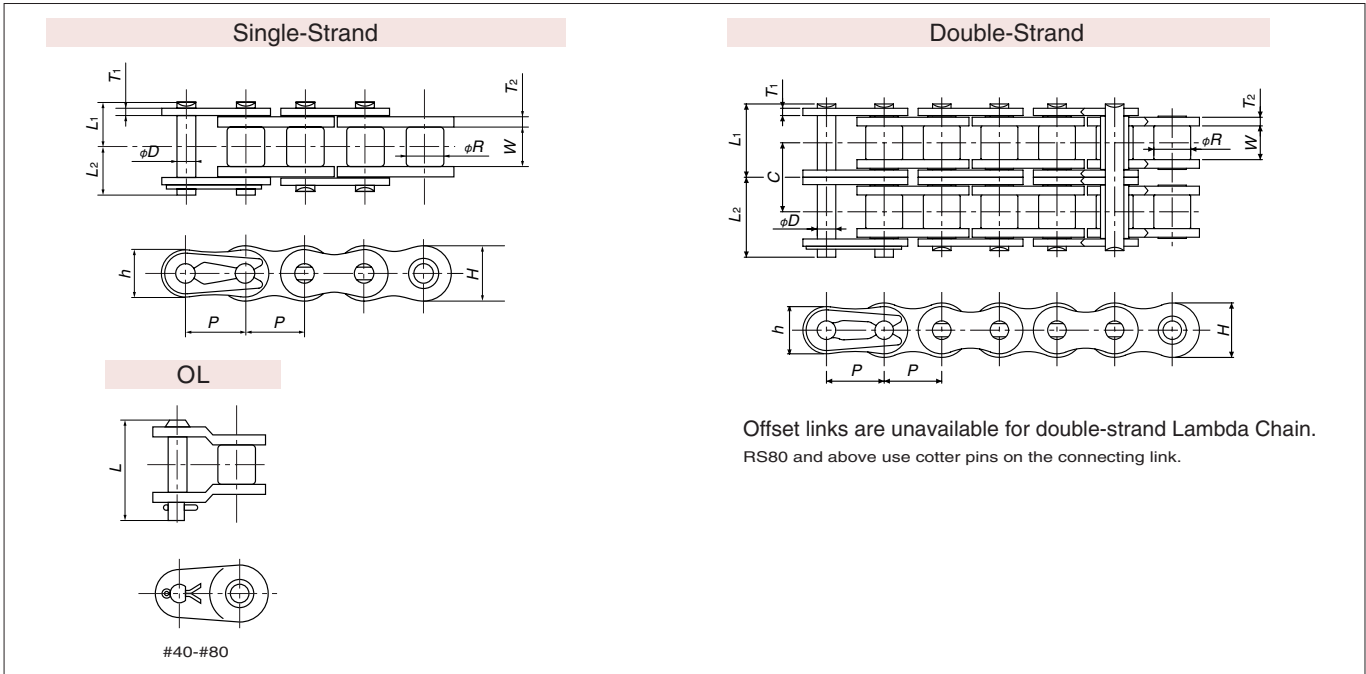
This chain is used to drive roller conveyors in furnaces. One chain is used to drive multiple rollers and convey the products through the furnace.

Industry/Application/Chain Used

Industry: Various manufacturing industries
Application: Product conveyance in furnaces
Chain Used: Drive chain



Heat Resistant Lambda Chain



TSUBAKI Chain Number		Pitch <i>P</i>	Roller Diameter <i>R</i>	Inner Width of Inner Link <i>W</i>	Plate				Pin			Offset Pin Length <i>L</i>
Single-Strand	Double-Strand				Thickness <i>T</i> ₁	Thickness <i>T</i> ₂	Height <i>H</i>	Height <i>h</i>	Diameter <i>D</i>	<i>L</i> ₁ 2-strand value in ()	<i>L</i> ₂ 2-strand value in ()	
RS40-LMDK-1	RS40-LMDK-2	12.70	7.92	7.55	1.5	2.0	12.0	10.4	3.97	8.75 (16.5)	10.45 (18.1)	20.0
RS50-LMDK-1	RS50-LMDK-2	15.875	10.16	9.26	2.0	2.4	15.0	13.0	5.09	10.75 (20.2)	12.45 (22.0)	24.0
RS60-LMDK-1	RS60-LMDK-2	19.05	11.91	12.28	2.4	3.2	18.1	15.6	5.96	13.70 (26.05)	15.75 (28.05)	32.0
RS80-LMDK-1	RS80-LMDK-2	25.40	15.88	15.48	3.2	4.0	24.1	20.8	7.94	17.15 (32.7)	20.25 (35.9)	39.9

TSUBAKI Chain Number		Average Tensile Strength kN{kgf} 2-strand value in ()	Approximate Mass kg/m 2-strand value in ()	Links Per Unit	Allowable Speed m/min	Transverse Pitch <i>C</i>
Single-Strand	Double-Strand					
RS40-LMDK-1	RS40-LMDK-2	19.1{1950} (38.2{3900})	0.70 (1.4)	240	150	15.4
RS50-LMDK-1	RS50-LMDK-2	31.4{3200} (62.8{6400})	1.11 (2.2)	192	135	19.0
RS60-LMDK-1	RS60-LMDK-2	44.1{4500} (88.3{9000})	1.72 (3.4)	160	120	24.52
RS80-LMDK-1	RS80-LMDK-2	78.5{8000} (157{16000})	2.77 (5.5)	120	90	31.1

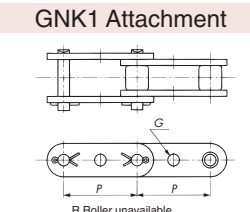
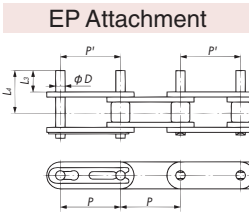
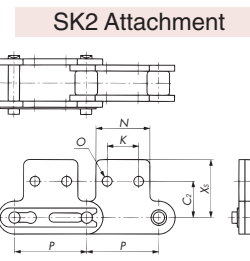
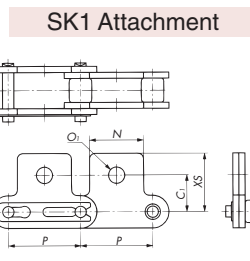
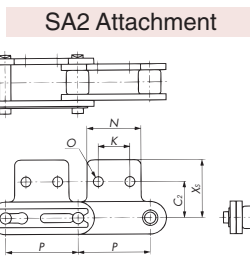
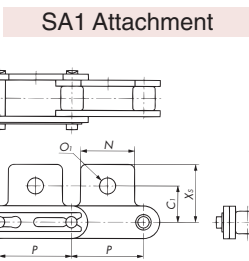
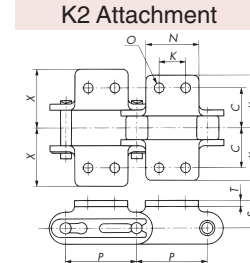
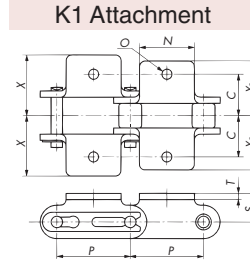
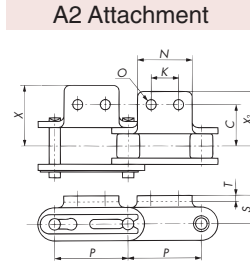
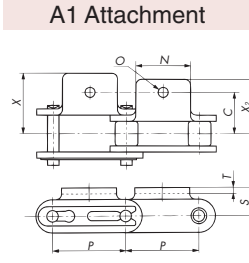
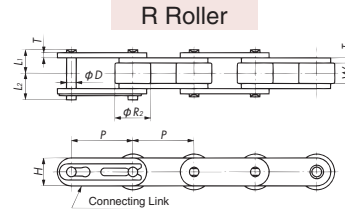
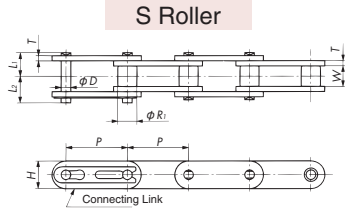
Note: Offset links are unavailable for double-strand chain. Use an even number of links.

Precautions on Use

- Double-strand Lambda Chain kilowatt ratings (Multi-strand factor)
The multi-strand factor of a double-strand chain with the same part dimensions as a single-strand chain is 1.4.
Sprockets must be customized — double-strand RS type sprockets cannot be used.
- Double-strand Lambda Chain pin length
Because the inner plate is thicker than that of an RS Roller Chain, the pin is longer by an equal amount (*L*₁, *L*₂).
Check for machine interference.
- Delivery: Made-to-order
- BS/DIN is available. Please contact TSUBAKI representative.



Heat Resistant Lambda Double Pitch Chain



■ Connecting Link: Spring clip = RF2040-LMCK - RF2060LMCK
Cotter pin = RF2080LMCK

GNK1 Attachment (all sizes)

■ All pins besides connecting link pins are riveted, regardless of whether attachment is present or not.
■ Attachment drawings are for S roller type, but similar attachment dimensions apply to R roller types as well.
Drawings will show when attachment is on every link.

- Pin head diameter for EP attachments is marginally larger than body diameter.
- Actual dimensions of P' differ from P. Contact a Tsubaki representative for more details.

Chain Size and Type	Roller Type	Pitch P	P'	Inner Width of Inner Link W	Roller Diameter		Pin			Plate	
					S Roller R1	R Roller R2	Diameter D	L1	L2	Thickness T	Height H
RF2040-LMCK	S/R	25.40	Contact Tsubaki	7.95	7.92	15.88	3.97	8.25	9.95	1.5	12.0
RF2050-LMCK		31.75		9.53	10.16	19.05	5.09	10.30	12.0	2.0	15.0
RF2060-LMCK		38.10		12.70	11.91	22.23	5.96	14.55	16.55	3.2	17.2
RF2080-LMCK		50.80		15.88	15.88	28.58	7.94	18.30	20.90	4.0	23.0

Chain Size and Type	Attachment															
	C	C1	C2	K	N	O	O1	S	T	X	X2	Xs	D	L3	L4	G
RF2040-LMCK	12.7	11.1	13.6	9.5	19.1	3.6	5.2	9.1	1.5	19.3	17.6	19.8	3.97	9.5	16.75	4.1
RF2050-LMCK	15.9	14.3	15.9	11.9	23.8	5.2	6.8	11.1	2.0	24.2	22.0	24.6	5.09	11.9	21.0	5.1
RF2060-LMCK	21.45	17.5	19.1	14.3	28.6	5.2	8.7	14.7	3.2	31.5	28.2	30.6	5.96	14.3	27.45	6.1
RF2080-LMCK	27.8	22.2	25.4	19.1	38.1	6.8	10.3	19.1	4.0	40.7	36.6	40.5	7.94	19.1	35.5	8.1

Chain Size and Type	Maximum Allowable Load kN{kgf}	Approximate Mass kg/m		Load Mass Per Attachment kg			Links Per Unit
		S S Roller	R R Roller	A, SA A/SA Attachment	K, SK K/SK Attachment	EP EP Attachment	
RF2040-LMCK	2.65{ 270}	0.51	0.87	0.003	0.006	0.001	120
RF2050-LMCK	4.31{ 440}	0.84	1.30	0.006	0.012	0.002	96
RF2060-LMCK	6.28{ 640}	1.51	2.19	0.017	0.034	0.003	80
RF2080-LMCK	10.7 {1090}	2.41	3.52	0.032	0.064	0.007	60

■ Delivery: Made-to-order

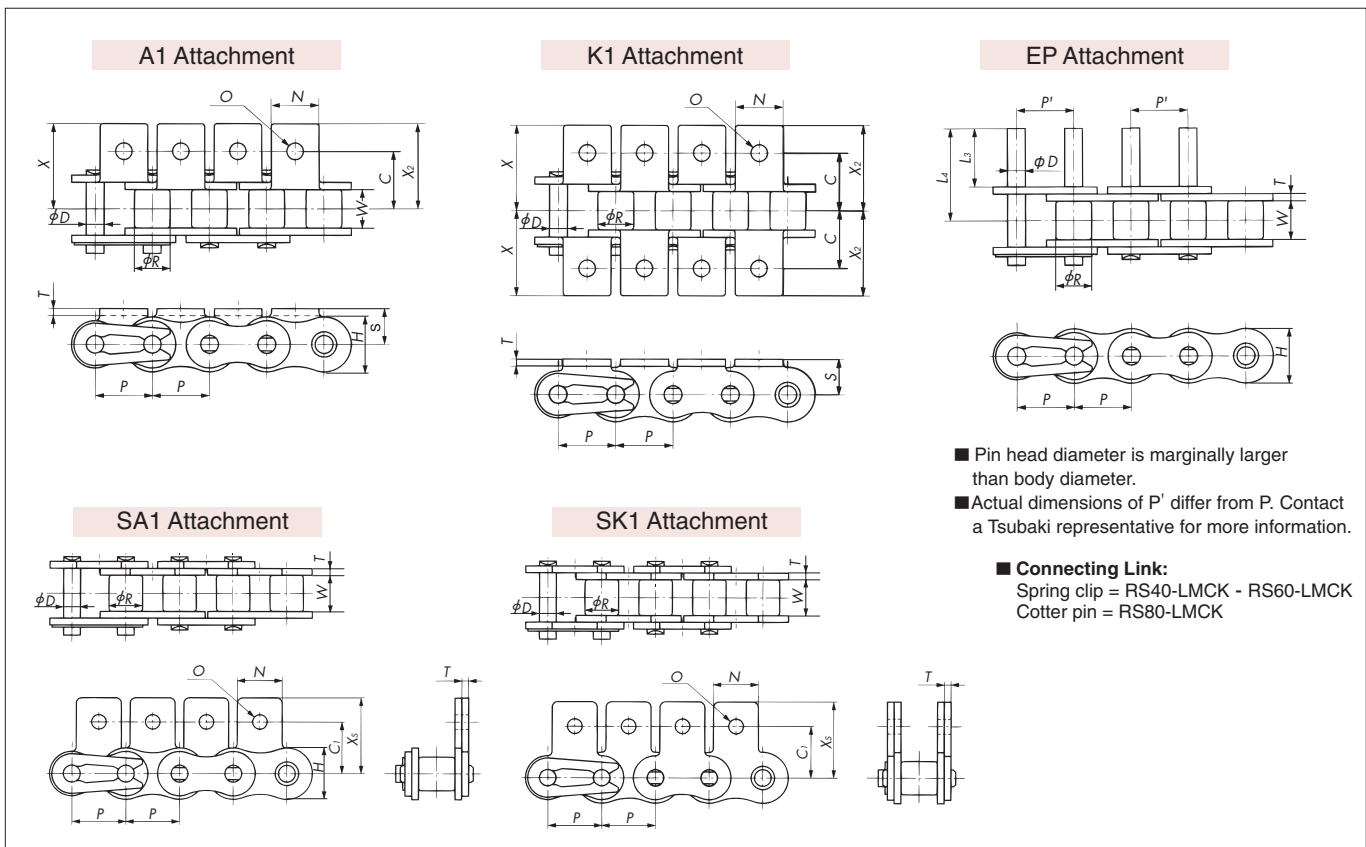
Chain Numbering Example

RF2040S-LMCK-1LA2





Heat Resistant RS Lambda Chain w/ Attachments



bushu

Chain Size and Type	Pitch P	P'	Inner Width of Inner Link W	Roller (Bushing) R	Pin			Plate		Maximum Allowable Load kN{kgf}	Approximate Mass kg/m	Links Per Unit
					Diameter D	L ₁	L ₂	Thickness T	Height H			
RS40-LMCK	12.70	Contact Tsubaki	7.95	7.92	3.97	8.25	9.95	1.5	12.0	2.65{ 270}	0.64	240
RS50-LMCK	15.875		9.53	10.16	5.09	10.3	12.0	2.0	15.0	4.31{ 440}	1.04	192
RS60-LMCK	19.05		12.70	11.91	5.96	12.85	14.75	2.4	18.1	6.28{ 640}	1.53	160
RS80-LMCK	25.40		15.88	15.88	7.94	16.25	19.25	3.2	24.1	10.7 {1090}	2.66	120

Chain Size and Type	Attachment										Load Mass Per Attachment kg		
	C	C ₁	N	O	S	X	X ₂	X _s	L ₃	L ₄	A, SA A/SA Attachment	K, SK K/SK Attachment	EP EP Attachment
RS40-LMCK	12.7	12.7	9.5	3.6	8.0	17.8	17.8	17.40	9.5	16.75	0.002	0.004	0.001
RS50-LMCK	15.9	15.9	12.7	5.2	10.3	23.4	23.4	23.05	11.9	21.0	0.003	0.006	0.002
RS60-LMCK	19.05	18.3	15.9	5.2	11.9	28.2	28.2	26.85	14.3	25.75	0.007	0.014	0.003
RS80-LMCK	25.4	24.6	19.1	6.8	15.9	36.6	36.6	35.45	19.1	33.85	0.013	0.026	0.007

Chain Numbering Example

RS40-LMCK-2LK1



- Delivery: Made-to-order
- BS/DIN is available. Please contact TSUBAKI representative.



Chain Selection

1. Lube-Free ANSI Drive Series Chain Temperature Selection Method

- Use the General Selection Method using the kW ratings tables. (Refer to Page 6)
- This selection method allows for a strength reduction due to temperature.
- Multiply the kW ratings table values by the coefficient below. (Refer to Page 6)
- Refer to the selection pages of the Drive Chain Catalog for more information.

Table 1 Kilowatt ratings indicators for lube-free drive chains by temperature

Temperature	RS40 – RS80
150°C - 200°C	kW rating table values x 0.75
200°C - 230°C	kW rating table values x 0.5

Table 2 Maximum allowable load for Heat Resistant Lambda Chain (-10°C - +150°C: reference values)

	Max. Allowable Load kN{kgf}	
	Single-Strand	Double-Strand
RS40-LMDK	3.04{310}	4.26{430}
RS50-LMDK	5.39{550}	7.55{770}
RS60-LMDK	7.26{740}	10.2{1040}
RS80-LMDK	12.7{1300}	17.8{1820}

Note: These values are for reference only. Consult the kW ratings tables when making a selection.

2. Lube-Free ANSI Conveyor Series Chain Temperature Selection Method

- This selection method allows for a strength reduction due to temperature.
- Multiply the maximum allowable load by the coefficient below.
- Use a chain speed with an allowable speed lower than catalog values.

Table 3 Kilowatt ratings indicators for lube-free Small Pitch Conveyor Chains by temperature

Temperature	RS40-RS80 RF2040-RF2080
150°C - 200°C	maximum allowable load x 0.75
200°C - 230°C	maximum allowable load x 0.5

3. Precautions on Use

- Exposure to dust may lead to accelerated wear. Exposure to wet environments can cause the impregnated oil in the bush to leak, leading to accelerated wear.

Lambda Chain is coated with a lighter rust preventative oil, which may cause early rusting.

- Impregnated bushing oil can leak in a vacuum, decreasing wear resistance. Do not use in a vacuum.
- The life of the chain will decrease dramatically if oil in oil impregnated bushing is depleted.
- Use in temperatures above 230°C will reduce wear life considerably.

Further, there is a possibility of toxic gases being emitted if used in temperatures exceeding 280°C.

Do not use above 280°C.

For Safe Use

WARNING Obey the following points in order to prevent hazardous situations.

- Do not use chains and accessories (accessories and parts) for anything other than their original purpose.
- Never perform additional processing on the chain.
 - Do not anneal the various parts of the chain.
 - Do not clean the chain with either acid or alkali, as they may cause cracking.
 - Do not electroplate the chain or its parts, as they may cause cracking due to hydrogen embrittlement.
 - Do not weld the chain, as the heat may cause cracking or a reduction in strength.
 - When heating or cutting the chain with a torch, remove the links immediately adjacent and do not use them again.
- When there is need to replace a lost or damaged portion of a chain, always replace the whole chain with a new product rather than replacing only the lost or damaged portion.
- When using a chain on suspension equipment, establish a safety manual, etc., and strictly prevent entry to the area directly below the suspended object.
- Always employ hazard protection devices for the chain and sprocket (safety cover, etc.).
- If a substance that can cause embrittlement cracking (acid, strong alkali, battery fluid, etc.) adheres to the chain, stop using the chain immediately and replace it with a new one.
- During installation, removal, maintenance inspection and lubrication of the chain:
 - Perform the operation according to the instruction manual or this catalog.
 - Always turn off the power switch to the device and make sure that it cannot be turned on accidentally.
 - Anchor the chain and parts so that they cannot move freely.
 - Perform cutting and connecting procedures properly using a press or other special tool.
 - Wear clothing and employ protective devices that are appropriate to the job (safety glasses, gloves, safety shoes, etc.).
 - Only allow experienced personnel to perform chain replacement procedures.
- In order to prevent hazards, damage, or injury when cutting a Leaf Chain, always install hazard protection devices (safety device, etc.) on the suspension equipment employing the Leaf Chain.

CAUTION Obey the following points in order to prevent accidents.

- Only handle the chain after thoroughly understanding its structure and specifications.
- When installing a chain, inspect it in advance to confirm that it has not been damaged in transport.
- Be sure to perform regular maintenance inspections on the chain and sprocket.
- Chain strength varies according to manufacturer. When selecting a chain based on a Tsubaki catalog, always use the corresponding Tsubaki product.
- Minimum tensile strength refers to the failure point when the corresponding load is applied to the chain once and does not refer to the allowable operational load.

Warranty

1. LIMITED WARRANTY

Products manufactured by Seller: (a) conform to the design and specifications, 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 specifications 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 specifications 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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Kyotanabe Plant

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