

Standard Roller Chains

HOW TO ORDER

Chain number, type: riveted or cottered, length and quantity are the necessary information for us to fill in your order. At the very least, the chain pitch, roller diameter and roller link inside width should be given if the chain number is unknown.

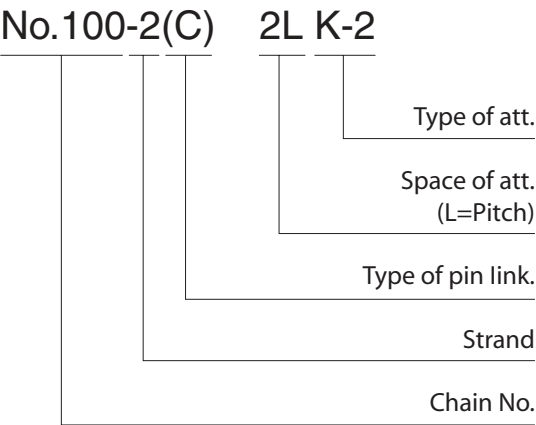
STANDARD PACKING

Uniking roller chains are packed for convenient handling and storing. Each 10 feet length is packed in a carton.



specifically as possible when ordering a cut length of chain.

NOMENCLATURE



CHAIN PARTS

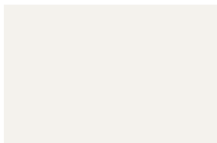
Roller Link
(Type R/L)



Pin Link Riveted
(Type R)



Pin Link Cottered
(Type C)



CHAIN CONNECTION PARTS

Spring Clip
(Type Sp CL)



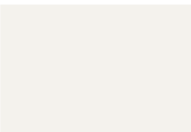
Cottered
(Type C)



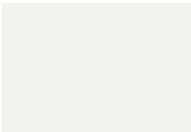
Offset
(Type O/L)



"S" Pin
(Type S)



Roll Pin



CHAIN CONSTRUCTION

RIVETED

Riveted chain is assembled by staking the pin heads on both sides of the chain.



SINGLE AND MULTIPLE

On multiple-strand types, all center plates are slip fitted (clearance-fitted) unless otherwise specified.



COTTERED

Cottered chain is assembled by staking the pin heads on one side of the chain and drilling a hole in the other end to accommodate a cotter pin. This type of chain is easily assembled and disassembled in the field.



Roller chain with connecting link (C/L)

Ordinarily even number of pitches includes a C/L on one end.



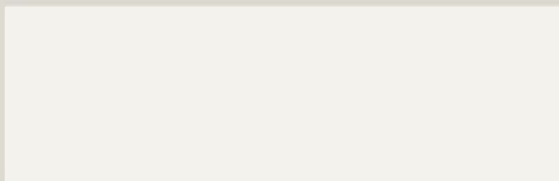
Roller chain with connecting links (C/L's) on both ends.

For odd pitches (not endless), 2C/L's are incorporated on request.



Roller chain with offset link (O/L)

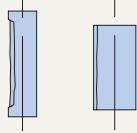
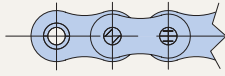
When an odd number of pitches is required, a C/L and an O/L are usually used.

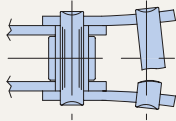
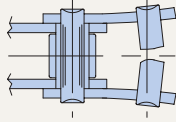
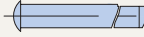
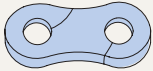
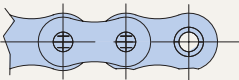
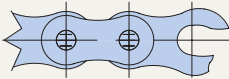


Note : If an endless chain assembly is required, specify whether it is to riveted endless or cotter-connected.

Trouble Shooting Hints

The below chart shows the most common chain failures and causes, but not necessarily the only ones.

Problem	Possible Causes of Problem	Suggested Remedy
 Pin or Bushing Galling	• Overload • Inadequate lubrication	• Properly lubrication • Replace chain when elongation exceed functional limits
 Turned Pins	• Overload • Inadequate lubrication	• Replace chain as soon as possible
Excessive Noise	• Too little or too much slack • Chain obstruction • Loose chain guard or bearing	• Adjust centers or take-up • Inspect & remove obstruction • Tighten bolts and check bearings
Chain Vibration	• Excessive chain slack • Center distance too long • stiff links	• Adjust chain tensioner • Install idler • Lubricate or replace chain
Wear on inside of link plate and one side of sprocket teeth	• Misalignment	• Realign sprockets and shafts • Replace chain and sprockets if necessary
Chain stiffens	• Excessive load • Misalignment • Inadequate lubrication • Corrosion	• Replace chain with one of suitable strength • Inspect alignment • Clean and establish correct lubrication • Replace with corrosion resistant chain
Chain Climbs Sprockets	• Excessive chain wear • Excessive chain slack • Inadequate lubrication • Sprocket tooth wear	• Replace chain • Install tensioner if necessary • Replace sprocket

Problem	Possible Causes of Problem	Suggested Remedy
 Broken Pins	• Extreme overload	• Inspect the drive to determine the cause of high load • Redesign drive using a higher capacity chain
 Broken Pins(center)	• Loading is greater than pins dynamic capacity	• Inspect the drive to determine the cause of high load • Redesign drive using a higher capacity chain
 Broken Offset Links Pins	• Overload	• Onepitch offsetlinks are not recommended • Redesign drive using a higher capacity chain
 Fatigue Failure	• Loading is greater than chain's dynamic capacity	• Inspect the drive to determine the cause of high load • Redesign drive using a higher capacity chain
 Cracking	• Stress corrosion cracking	• Protect the chain from corrosion • Install anti-corrosive chains
 Broken Rollers	• Foreign material between chain and sprocket tooth • Fatigue failure	• Redesign chain speed and load • Shield drive from foreign matter
 Worn Plates	• Bottom of plates worn due to rubbing on guides.	• Chain should be replaced when wear becomes over 5% of the plates height
 Fractured Plate	• Extreme overload	• Inspect the drive to determine the cause of high load • Redesign drive using a higher capacity chain

Selection of Transmission Roller Chains

Coefficients Relevant to Selection

Tables 1 through 5 present the coefficients that are relevant to the selection of chains. All values assume smooth operation, and for this reason, they are not suitable for special operating conditions.

Service Coefficient

The transmission performance of chains requires smooth operation for full realization; accordingly, correction will need to be carried out for loading conditions. The service coefficients from the following table are to be used at this time.

Table 1: Service Condition α_U

Type of loading	Motor type Typical applications	Motor	Internal combustion	
			Fluid combustion	No fluid combustion
Even	Pumps, blowers, generators, mixers, conveyors. Belts with little load variation.	1.0	1.0	1.2
Slight shock	Standard machinery, compressors, automatic furnaces, dryers. Conveyors with small amounts of variation.	1.3	1.2	1.4
Large shock	Crushers, compressors, press equipment, mixers, civil engineering machinery	1.5	1.4	1.7

Multiplex Coefficient

The transmission performance of multiplex chains is determined by applying the multiplex coefficient from the following table to the transmission performance for a single chain.

Table 3: Multiplex Coefficient α_L

Multiplicity	Multiplex coefficient
2	1.7
3	2.5
4	3.3

CAUTION

The multiplex performance cannot be achieved by simply multiplying the single-chain performance by the multiplicity.

Unbalanced Load Coefficient

When using two or four chains in a suspension situation or the like, the load applied to chains does not conform to an average value. For this reason, the unbalanced load coefficient from the following table is to be used to determine the load for each chain.

Table 5: Unbalanced Load Coefficient α_B

Suspensions	Unbalanced load coefficient
2	0.6
4	0.35

Speed Coefficient

As the travel speed of a chain increases, operating conditions become more severe; consequently, the speed coefficient from the following table is used to indicate this severity.

Table 2: Speed Coefficient α_V

Chain speed	Speed coefficient
~15m/min	1.0
15~30m/min	1.2
30~50m/min	1.4

Safety Coefficient

The safety coefficient (or safety factor, SF) is determined using the formula shown below, and it should generally be maintained within the 7 to 10 range. However, it is often necessary to raise the safety coefficient for certain usage conditions (i.e., chain speed, ambient temperature, loading method, etc.). Furthermore, any legal requirements must also be implemented at this time.

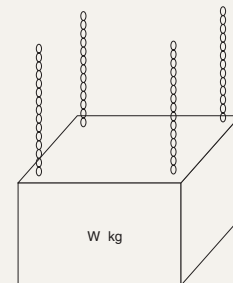
$$SF = \frac{\text{Tensile strength}}{\text{Tensile force in chain (maximum applied load)}}$$

Table 4: Safety Coefficient (SF)

Chain speed	Safety coefficient
~25m/min	7
25~50m/min	8

Example: Load W_1 kgf applied to one of four chains used to suspend an object of weight $W = 3,000$ kgf.

$$\begin{aligned} W_1 &= W \times \alpha_B \\ &= 3000 \times 0.35 \\ &= 1050 \text{ (kgf)} \end{aligned}$$



Selection Formulae

Chain Length: L (no. of links)

$$L = \frac{N_1 + N_2}{2} + 2 \cdot C_p + \frac{(N_2 - N_1)^2}{40 \cdot C_p}$$

where C_p is the inter-shaft distance expressed as a pitch;
 N_1 is the number of teeth on the small sprocket; and
 N_2 is the number of teeth on the large sprocket.

Chain Speed: v (m/min)

$$v = \frac{p \cdot N \cdot r}{1000}$$

where p is the chain pitch (mm);
 N is the number of teeth on the sprocket; and
 r is the sprocket speed (rpm).

Chain Tensile Force for Rated Output: F (kgf)

$$F = \frac{6120 \cdot kW}{v}$$

where kW is the rated output (kW) and
 v is the chain speed (m/min).

Corrected Transmission Performance: kW' (kW)

$$kW' = \alpha u \cdot kW$$

where kW is the rated output (kW) and
 (αu) is the service coefficient (from Table 1 on page 55).

CAUTION

The chain length L found using the formula presented here should be rounded off to an integer. Note that an offset link will be required when the chain length is an odd number; however, the tooth numbers and inter-shaft distance should be adjusted whenever possible to ensure that calculation produces an even number.

Simple Selection Tables

Mode of Use

These tables allow you to select usable chains based on the small sprocket speed and the transmission performance (corrected).
 Example: Selection based on a sprocket speed of 500 rpm and a transmission performance of 5 kW.

(1) Tentatively set the number of teeth on the small sprocket. Here, a value of $N = 15$ will be used.

Chain number (No.)	Number of teeth	Multiplicity	Speed coefficient
60	15	1	Suitable
50	15	2	Not economic
50	17	1	No reserve in terms of performance

(2) The intersection of small-sprocket speed (horizontal axis) and transmission performance (vertical axis) on the Simple Selection Table for 15 gear teeth appears between No. 50 and No. 60; accordingly, No. 60 is selected.

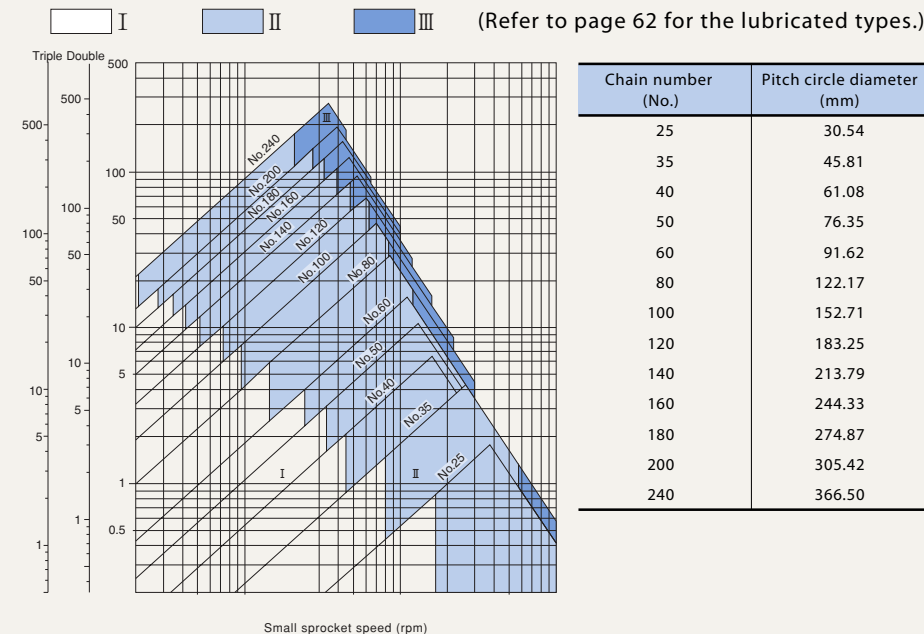
(3) Evaluate situations for other tooth numbers in the same way, and select a suitable combination of tooth number and chain specification.

CAUTION

Selection of chains from the right side of the triangular sections on the Simple Selection Tables should be avoided whenever possible.

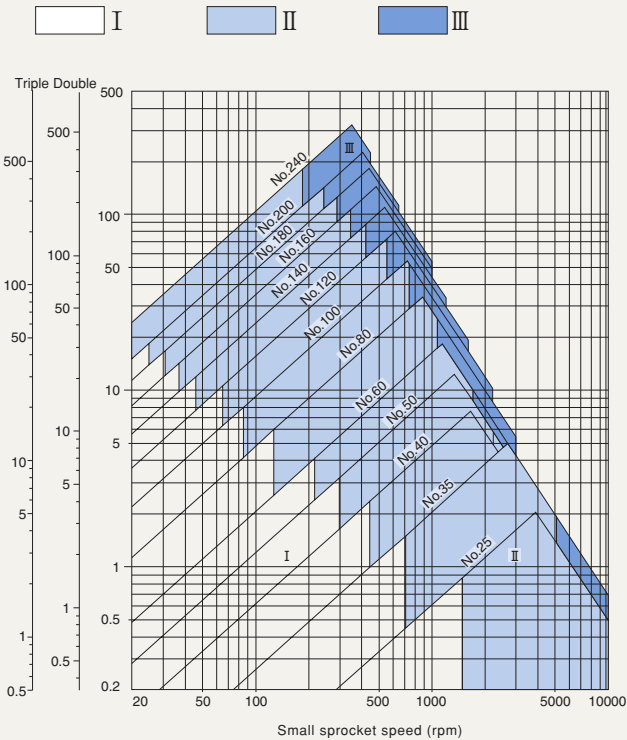
Standard Roller Chains

Number of teeth = 15



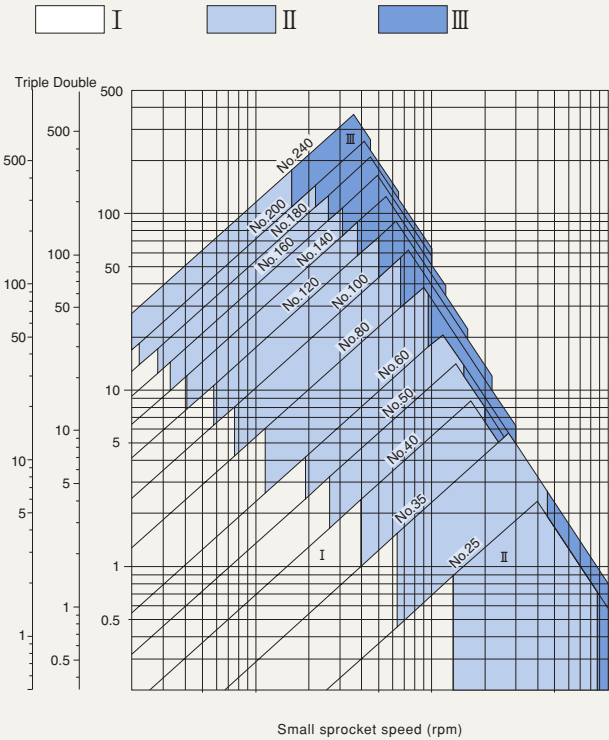
Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
25	30.54	34
35	45.81	51
40	61.08	67
50	76.35	84
60	91.62	101
80	122.17	135
100	152.71	168
120	183.25	202
140	213.79	236
160	244.33	269
180	274.87	303
200	305.42	337
240	366.50	404

Number of teeth = 17



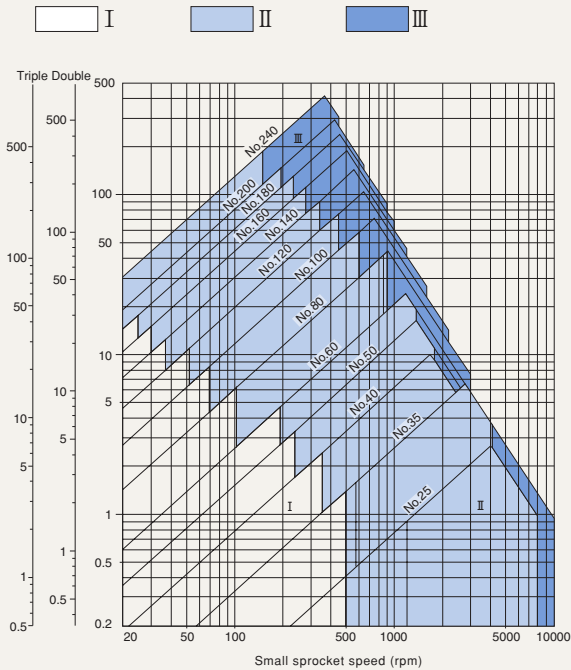
Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
25	34.56	38
35	51.84	57
40	69.12	76
50	86.39	94
60	103.67	113
80	138.23	151
100	172.79	189
120	207.35	227
140	241.91	264
160	276.46	302
180	311.02	340
200	345.58	378
240	414.70	453

Number of teeth = 19



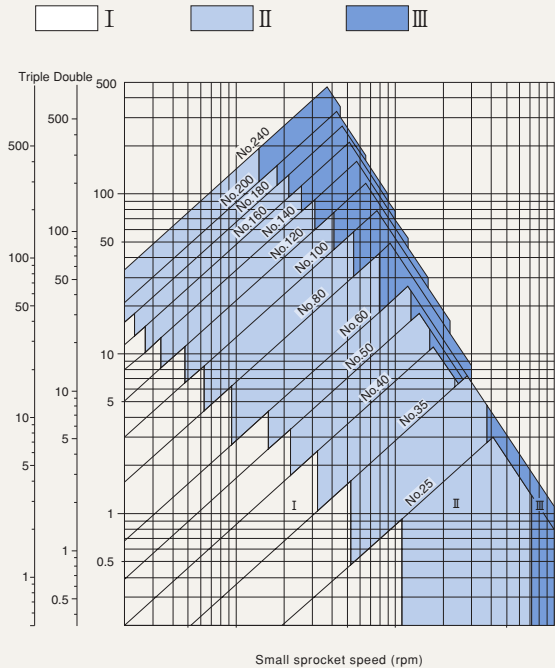
Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
25	38.58	42
35	57.87	63
40	77.16	84
50	96.45	105
60	115.74	126
80	154.32	167
100	192.90	209
120	231.48	251
140	270.06	293
160	308.64	335
180	324.12	358
200	385.79	419
240	462.95	502

Number of teeth = 21



Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
25	42.61	46
35	63.91	69
40	85.21	92
50	106.51	115
60	127.82	138
80	170.42	184
100	213.03	230
120	255.63	276
140	298.24	322
160	340.84	368
180	383.45	413
200	426.05	459
240	511.26	551

Number of teeth = 23

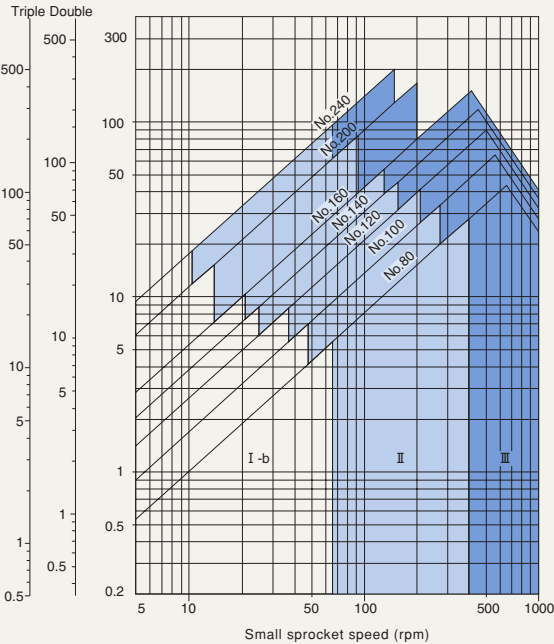


Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
25	46.63	50
35	69.95	75
40	93.27	100
50	116.58	125
60	139.90	150
80	186.54	200
100	233.17	250
120	279.80	300
140	326.44	350
160	373.07	400
180	419.71	450
200	466.34	500
240	559.61	600

SUPER ROLLER CHAINS

Number of teeth = 15

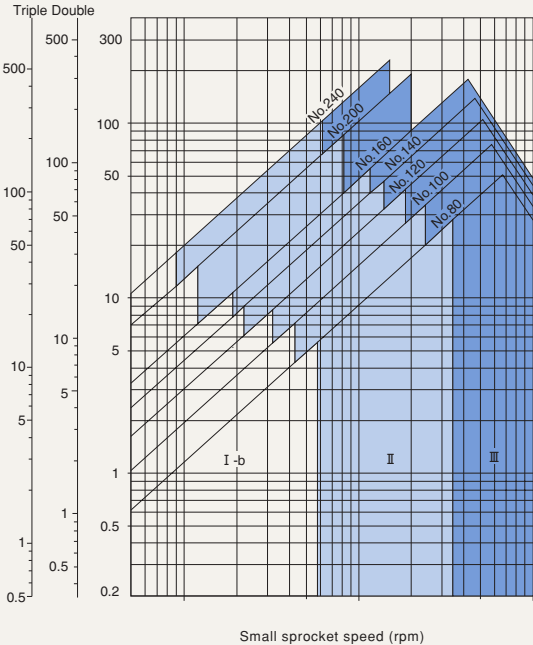
I II III (Refer to page 62 for the lubricated types.)



Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
80	122.17	135
100	152.71	168
120	183.25	202
140	213.79	236
160	244.33	269
200	305.42	337
240	366.50	404

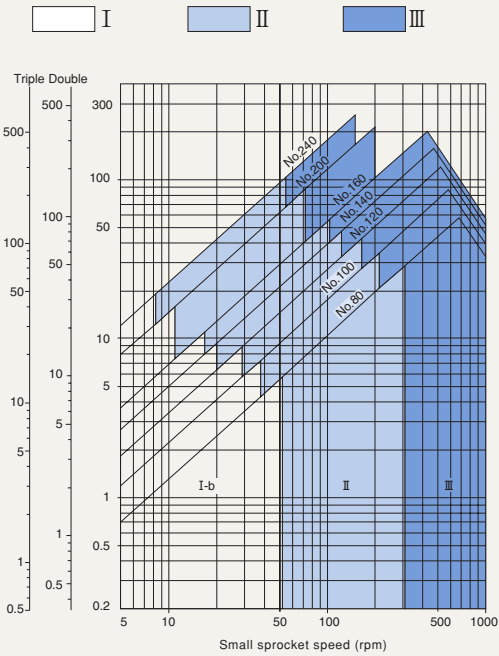
Number of teeth = 17

(Refer to page 62 for the lubricated types.)



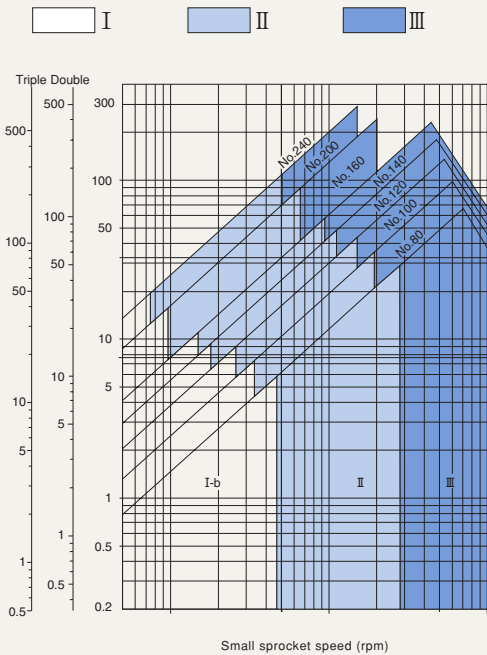
Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
80	138.23	151
100	172.79	189
120	207.35	227
140	241.91	264
160	276.46	302
200	345.58	378
240	414.70	453

Number of teeth = 19



Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
80	154.32	167
100	192.90	209
120	231.48	251
140	270.06	293
160	308.64	335
200	385.79	419
240	462.95	502

Number of teeth = 21



Chain number (No.)	Pitch circle diameter (mm)	Outer diameter (mm)
80	170.42	184
100	213.03	230
120	255.63	276
140	298.24	322
160	340.84	368
200	426.05	459
240	511.26	551

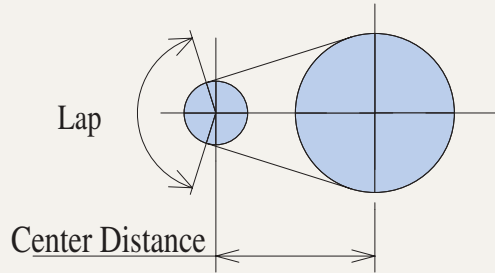
INSTALLATION AND ARRANGEMENT

To design excellent chain drives, chains and sprockets should be properly arranged and installed.

CENTER DISTANCE AND CHAIN LAP

Chain lap on the small sprocket must be at least 120 degrees.

Sprockets can be spaced at any distance as long as their teeth do not touch. Optimum distance is 30 to 50 times of pitch of the chain used except when there is a pulsating load. In case of pulsating drive, distance of less than 20 chain pitches is adequate.



TENSION AND SLACK

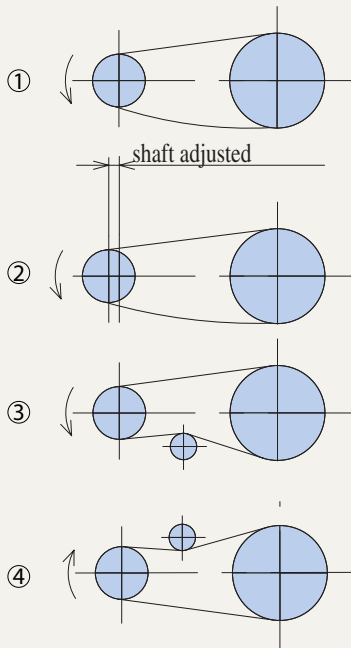
Proper amount of chain tension should be maintained. Inadequate tension will step up wear, while excessive sag will result in pulsating impact, stranding and breakage.

Adequate slack is 4% of the span for normal drives. In the following cases, the slack should be about 2% of the span.

- 1) Vertical position or near to vertical position.
- 2) Center distance exceeding 1 meter.
- 3) Heavy load application with frequent starts and stops.
- 4) Application with sudden reverse motions.

DRIVE POSITIONS

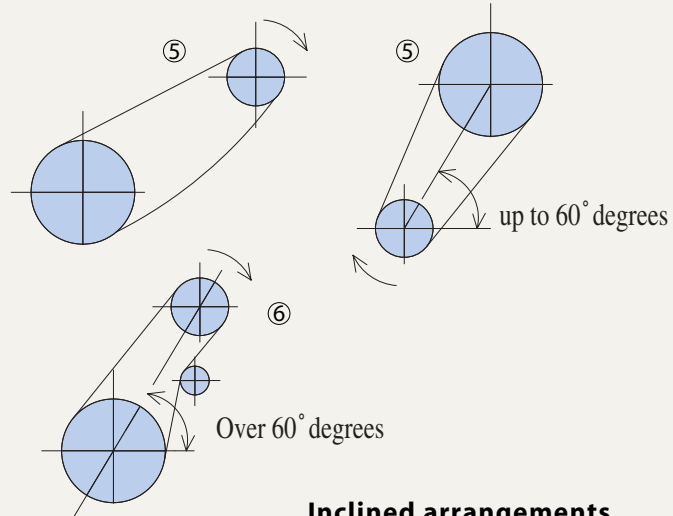
〈Horizontal〉



Horizontal arrangements

- ① Generally roller chain slack is on the lower side.
- ② When the center distance is short chain slack is adjusted by expanding it.
- ③ When the center distance is long, chain slack is adjusted by installing a tightener.
- When chain slacks on the upper side, adjust it by a tightener.

〈Inclined and Vertical〉



Inclined arrangements

- ⑤ Inclined operation should be within 60°, possible.
- ⑥ Too much slack will cause chain to ride up on the lower sprocket or come off. It should be adjusted by a tightener.

Vertical arrangements

- ⑦, ⑧ Excessive chain sag should be automatically adjusted by a tightener. It is mandatory when the driving shaft (small sprocket) is placed on the bottom side.

LUBRICATION

Proper lubrication of roller chains is a very important factor in getting their best possible performance and longer lifetime. No matter how well a transmission system is designed, if it is not properly lubricated, its service life will be shortened.

Abrasion between the pin and bushing causes roller chains to stretch. Therefore, these parts should be well lubricated.

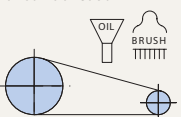
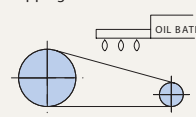
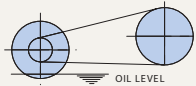
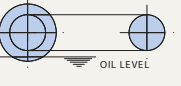
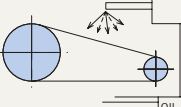
The gap between the pin-link plate and roller-link plate on the slack side of the chain should be filled with lubricant.

The oil forms a film which minimizes wear of the pin and bushing thus increasing the chain service life.

It also reduces noises and cools down the chain running at high speed.

POINTS OF LUBRICATION

- 1) Fill and change oil periodically.
- 2) Generally, heavy oil and grease are not suitable as a lubricant.
- 3) Avoid mix of oil with another kind or other maker's.
- 4) Adequate lubrication quantity is also essential for a chain's longer service life.

Type	Method	Amount	Method	Amount
I	Manual lubrication 	●Periodically to keep chain joints from drying	Dripping lubrication 	●Usually 4-20 drops of oil per minute. ●Excess oil should be reserved in a simple case.
	Oil bath lubrication 	●Effective at medium and low speeds. ●To be dipped 6~12 mm.		
II	Lubrication by slinger disc For large speed ratio 		Lubrication by slinger disc For small speed ratio 	●Effective at rather high speeds. ●To be dipped 12~25mm at about 200m/min. circumferential speed of slinger disc.
	Forced lubrication 	●Effective for heavy load, high power and high speed. ●Ab ltr/min. should be filled without oil shortage or heating up. ●Closed circulating lubrication system needs a clean tank or case.		

Chain No.	Temperature[°C]							
	-10	0	40	50	-10	0	40	50
	0	40	50	60	0	40	50	60
Lubrication Type	TYPE I · II				TYPE III			
~ 50	SAE10	SAE20	SAE30	SAE50	SAE10	SAE20	SAE30	SAE40
60 ~ 80	20	30	40	50	10	20	30	40
100	20	30	40	50	20	30	40	50
120 ~	30	40	50	50	20	30	40	50

W A R N I N G

**If misselected, misinstalled and missafe-guard Chain will break and serious injury or property damage can result.
Please read an instruction manual carefully before installation.**

Roller Chain Application Information

Please select the chain(compare with Technical Data)when you use.

If the chain abused through improper installation, operating or maintenance procedures, failure can lead to personal injury or property damage.

Ultimate Tensile Strength

Ultimate tensile strength is the one time pull required to break the chain therefore these are not the allowable working load.

Safety factor must be considered when selecting roller chain.

A roller chain should never be loaded above 50% of Ultimate strength for even one cycle.

When to use a multiple-strand roller chain, please consider the multiple-strand factor.

Guarding

The chain can break in normal service due to the effects of wear, fatigue or unexpected overloads. Therefore a roller chain drive should have adequate guarding to prevent personal injury or property damage.

Connecting Link

When a slip-fit connecting link coverside for ease of assembly is used, a chain's working capacity is reduced as much as 20% on some models. Uniking CHAIN offered New Connecting Links with slip-fit coverside as strong as the base chain Recommend this New Connecting Link to use.

Offset Link

One-pitch offset links are very handy, pin and offset linkplates have to be slip-fitted.

It's allowable working load is approximately 30% less.

Therefore one-pitch offset links are not recommended especially frequent, impact load demand high speed driving.

Cotter Pin, Spring Clip

Keep angle 90% approx. to spread out prongs of cotter pin. Do not reuse the cotter and do not use the commercial cotters on the market.

Be sure to insert spring clip properly into and seat in the groove on the end to Pin after installation of Connecting Link cover plate onto pins, and do not spring one leg of the clip over the pin end to avoid breakdown of the leg.

Do not spread out clip's legs too much to prevent falling spring clip off and unexpected accident.

Install spring clips with solid end pointing in the direction of chain travel.

Rust Corrosion

If a chain is corroded, its capacity is reduced. If corrosion is severe, the link plates may crack even though the chain is not under load.

In view this, carbon steel chain should not be exposed to corrosive conditions, acid fumes, salt spray sea water.

Chain corrosion from normal atmospheric conditions may be minimized by proper lubrication.

CAUTION

- 1) Always lock out machinery power switch before attempting removal, installation, or any servicing of chain.
- 2) Wear eye and face protection when grinding, driving, or disassembling pins.
- 3) Always wear gloves, protective clothing and safety shoes with steel toe when working with chains.
- 4) Make absolutely sure that chain is properly supported to prevent uncontrolled movement of chain and parts.
- 5) Chain pressers and breaking tools are recommended to be in good working order and to be used according to instructions.
- 6) Avoid plating or welding assembled chains or components.
- 7) Never repair damaged chains by replacing only the component parts.
- 8) Damaged chain may be yielded and therefore should not be reworked.

Maintenance Check List

Inspect on regularly scheduled basis for worn, damaged or broken parts, possible interference by other systems components, and proper lubrication.

Normal maintenance procedures can prevent most of the conditions described below.

Carefully inspect roller chain drives on the same schedule as associated equipment.

Sprocket Misalignment

Wear on the sides of sprocket teeth generally indicates improper installation of sprockets and/or shafts. If shafts are out of parallel or not in the same plane, non-symmetrical wear will appear on sprockets or chain rollers. After proper alignment is made retighten set screws in sprocket hubs.

Chain wear and Elongation

Normal wear will cause some increase in chain length. However, if a sudden increase in elongation occurs, look for severe wear on the tips of sprocket teeth. This may be caused by any of the following: excessive loading or shock loading, displacement and/or wear in bearings, displacement of take-up, or under-designed drives.

Excessive elongation may be an indication that chain and/or sprockets should be replaced.

Before replacing chain or sprockets, recalculate initial drive design. Check chain tension if there is too much accumulated slack in the drive.

Broken Chain Parts

Generally caused by an overloaded drive; extreme misalignment; excessive elongation causing chain to jump sprocket teeth; heavy shock; improper drive design geometry; foreign objects. Recalculate initial drive design and make necessary correction. Inspect sprockets and shafts for proper alignment or looseness.

Link Plate Wear

Wear on inside of the link plates and on one side of sprocket teeth may be caused by a misalignment misalignment of sprockets. Realign sprockets and shafts. Inspect chain carefully, readjust chain properly or replace.

Removing Chain

Turn the drive until a connecting link is fully engaged with one of the sprockets so as to relieve the tension on the connecting pin.

The connecting link may then be removed.

Excessive Noise

Can be caused by broken links and chain rollers, extreme misalignment, elongation, chain jumping sprocket teeth, loose sprockets, broken teeth, accumulation of dirt packed into the chain or sprockets teeth, interference by foreign objects, contacting a fixed object.

Check for worn broken or missing parts. Check alignment of shafts and/or sprockets.

Lubrication

On slow speed drives, where manual lubrication is used, if drip lubrication is used check for adequate oil flow and proper application to the chain.

With bath or pump lubrication, check oil level and add oil if needed. Check oil for contamination and change oil if needed.

If pump lubrication is used, check each orifice to be sure it is clear and is directing oil onto the chain properly.

Recommended Replacement

Measure the chain wear elongation and if elongation exceeds functional limits or is greater than 3% (0.36 inch in one foot) replace the entire chain.

Do not connect a new section of chain to a worn chain because it may run roughly and damage the drive. Do not continue to run a chain worn beyond

3% elongation because the chain will not engage the sprockets properly and it may damage the sprockets.

Cutting Riveted Chain

The two pins of a pin link must be driven out of the link plate. Strike the pins alternately to avoid distortion of the roller link plates as well as the plates of the adjacent links. Chain cutting tools can also be used. Follow their instruction carefully.

Inserting New Links

Insert only on new roller chain. Pitch variance between a new link and an old link, especially one which is elongated due to wear, will cause shock when the new link engages the sprockets.

Installing New Chain

Chain and/or related parts should be visually inspected for damage, which could have occurred during shipping prior to installation.

Never install new chain on worn sprockets as this will permanently damage chain. With new chain and sprockets installed, check for proper and sprockets installed, check for proper tension and alignment.