

Maintenance

Check

a. Confirm the following before operation

Connected joint	<ul style="list-style-type: none"> Confirm that the connection is sufficient and that components have no problem. Confirm that bending is smooth (in the case of O-ring chain, bending is slightly stiff).
Chain sprocket attachment	<ul style="list-style-type: none"> Confirm that there is no serious flaw, rust or wear. Confirm that sag is proper. Confirm that no pin rotates. Confirm that rollers rotate smoothly. Confirm that the chain engages with the teeth of sprockets.
Interference	<ul style="list-style-type: none"> Confirm that there is nothing interfering with the chain, or that nothing is likely to interfere with the chain or safety cover.
Lubrication	<ul style="list-style-type: none"> Confirm that the amount of lubrication is appropriate. (For the amount of lubrication, see the table of lubrication types.)
Driving and driven shafts	<ul style="list-style-type: none"> Confirm that the axial measurement and parallel measurement are proper. Confirm that the difference of sprocket planes is within the allowance.
Peripheral equipment	<ul style="list-style-type: none"> Confirm that peripheral equipment is installed correctly.

b. After confirmation and adjustment of the above a, install the safety cover, and switch on the power to start operation.

- It is possible for the chain to be thrown should it break. Do not stay in the direction of rotation during operation.



Caution

- | | |
|--------------------------------|--|
| Obstacles | <ul style="list-style-type: none"> Obstacles may cause breaking or fracturing which can scatter materials and injure people nearby. Be sure to remove all obstacles. |
| Abnormal noise | <ul style="list-style-type: none"> Abnormal noise during operation is a sign of trouble. Immediately switch off the power, and determine the cause. |
| Flaws and rust | <ul style="list-style-type: none"> If any serious flaws or rust is visible, it may cause the chain to break and fracture and possibly injure people nearby. Confirm that the chain has no serious flaws or rust. |
| Sprocket | <ul style="list-style-type: none"> If a sprocket is worn, the sprocket may break, or the chain may ride over the sprocket, breaking it and possibly resulting in injury to people nearby. Confirm that the sprockets are not worn. |
| Devices that prevent accidents | <ul style="list-style-type: none"> Install accident prevention devices. To avoid human injury caused by scattered materials, install safety devices (safety cover, safety net, etc.). Install an emergency stop device. To avoid human injury due to unexpected overload, install an emergency shutdown device such as a load controller or a brake. |

Before trial operation

Confirm the following on chain installation before starting operation.

- The chain correctly engages with the sprockets.
- The joints are normal. (The spring clips are correctly installed and cotters are not bent.)
- The chain sag is proper.
- The chain is not in contact with the chain case.
- The lubrication is proper.

Check items during trial operation

If the chain can be manually rotated, rotate it to confirm that there is no abnormality before starting trial operation.

Be alert to the following during trial operation.

- Whether there is abnormal noise. If the chain contacts the chain case or if the chain heavily vibrates, abnormal noise occurs. Check the installation of chain case and chain sag.
- Whether lubrication is normal during operation. Re-check the condition of lubrication.

Elongation limit of chain Limit of Chain Sag

- Events caused by sag failure

Even if the sag of the chain is normal before the start of operation, it can increase if the chain is elongated due to

wear of pins, bushings, etc. If the sag is excessive, the following will occur.

- Abnormal vibration
- Chain rollers ride over the heads of sprocket teeth.
- The chain is seized by a sprocket.
- The chain contacts the chain case.

These conditions can often cause abnormal noise. Should any abnormal noise occur, immediately stop operation, and check carefully to determine the cause. Such conditions often cause damage not only to the chains, but to the entire equipment. A preliminary check is necessary.

• Elongation limit of chain

Even if sag adjustment is normal, excessive elongation of the chain can cause abnormalities similar to those caused by sag failure that inhibit smooth transmission. In such cases, replace the chain. A guide for replacement based on chain elongation limit is listed below. Even if only one link reaches the elongation limit, replace the entire chain with a new one. Unless lubrication is normal, the chain will elongate quickly, causing the aforementioned troubles. Read the contents of "Lubrication" in the next section carefully for performing proper maintenance.

Elongation limits of chain

Number of teeth of large sprocket	Regular chain	O-ring chain and Sintered bushing roller chain
40 or less	2.0%	1.0%
41~60	1.5	1.0
61~80	1.2	1.0
81~100	1.0	1.0
101 or more	0.8	0.8

※ If elongation of an O-ring chain or Sintered bushing roller chain exceeds the value in the above table, the wear rate of the chain becomes equivalent to a standard chain, and chain wear rapidly increases from that point.

※ The above elongation limits are applicable when the chain can be taken up or when a sag adjusting device is installed. If the shafts are fixed without any sag adjusting device, the recommended elongation limit is 0.5 to 0.7%.

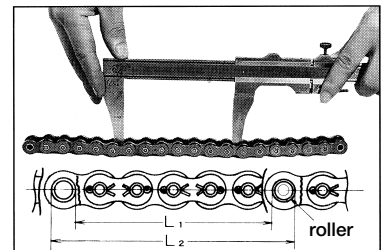
• Elongation measuring method

- To eliminate rattling other than a slight amount of play in the chain as a whole, tighten the chain lightly and measure the elongation.

Note: For an accurate measurement, measure the elongation of the chain applying a measuring load (specified by ANSI) to the chain.

- As illustrated below, measure the inner length (L_1) and the outer length (L_2) and obtain the measured length (L).

$$L = \frac{L_1 + L_2}{2}$$



- Then, obtain chain elongation.

$$\text{Chain elongation} = \frac{\text{Measured length} - \text{Reference length}}{\text{Reference length}} \times 100(\%)$$

$$\text{Reference length} = \text{Chain pitch} \times \text{Number of links}$$

- In order to reduce the measuring gap, measure the length of about six to ten links.

Chain wear-elongation check gage

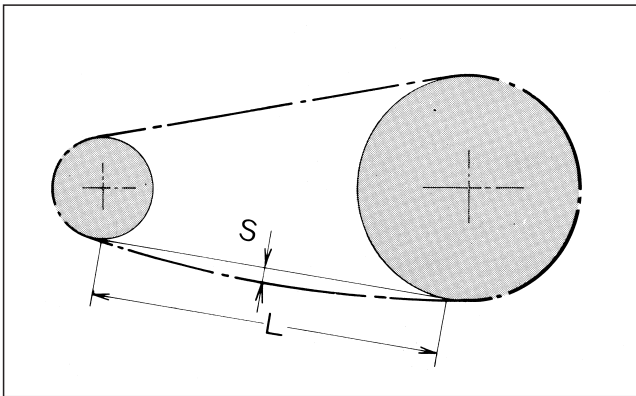
We recommend and can supply a chain wear-elongation check gage (P.114) for facilitated finding of elongation limit.

Sag adjustment of roller chain

To use a roller chain for a longer period of time, proper sag is an important component. If the roller chain is over-tensioned, the oil film between pins and bushings is lost, shortening chain life and damaging the bearings. If the chain sags overly, the chain will vibrate or be seized by the sprocket. In about 50 hours (it differs depending on the service conditions) after starting the roller chain use, the chain will be elongated by about 0.1 percent of the entire length due to the conformability of respective contacts. So, adjust the sag at this time. Thereafter, if proper lubrication is maintained, the elongation will be negligible. Check and adjust the sag at proper intervals.

Optimum sag

In general, keep sag S at about 2 % of span L , but in the case described below, keep it at about 1 %.



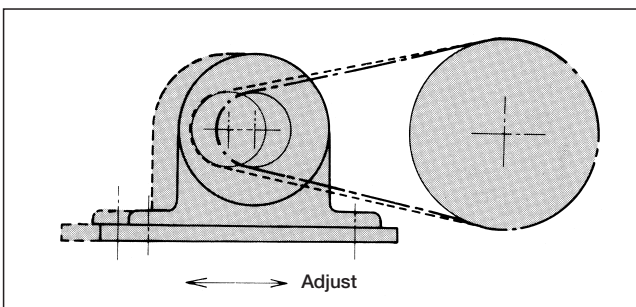
Keep sag at $0.01L$ or less in the following cases:

- When the chain is installed vertically or almost vertically.
- When the chain is installed horizontally or almost horizontally with the top slackened.
- When the center distance between sprockets exceeds 50 times the chain pitch.
- When vibration or shock occurs.
- When the chain is frequently started and stopped.
- When the chain is suddenly reversed.
- When the speed ratio is 7:1 or more (keeping the speed ratio at 7:1 or less is safer and preferable.)

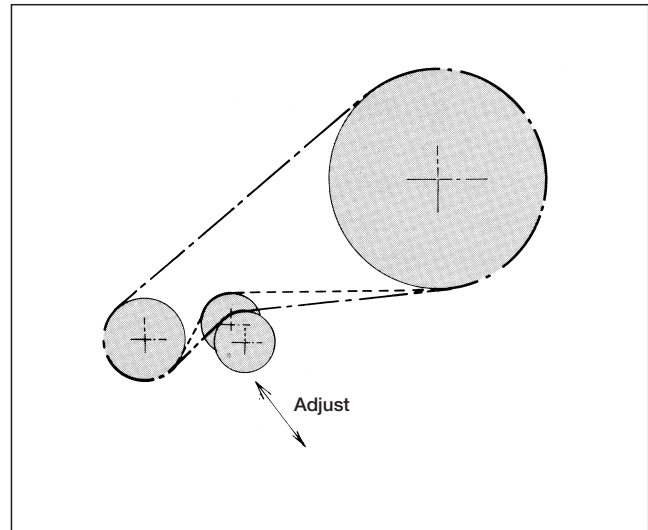
How to adjust sag

Adjust sag in the following ways.

1. Adjustment of the center distance



2. Adjustment using a tensioner or idler



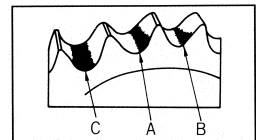
3. Increase or decrease of pitch number by offset link

By using an offset link, the total length of a chain can be increased or decreased by one pitch. However, since offset link performance is generally poor, an even number of links, if possible, is recommended.

Other checks

● Checking sprocket

If a sprocket is not installed at the correct position of the shaft or is not parallel to the shaft, the plates of the chain may be flawed, or the chain may be twisted. This can be judged by examining the contact faces of the sprocket teeth. In this illustration, a uniform contact as indicated by A is normal. If the contact is different on both sides as indicated by B, correction is necessary.



● Checking idler or tensioner

When sag is adjusted, check also whether the idler or tensioner itself is damaged. If the contact between an idler or tensioner and a chain is at the center of the tooth gap bottom as indicated by C, it is normal. If the contact is as indicated by A or B, the bearing of the idler or tensioner may be abnormal.

● Checking chain attachments

In the case of a chain with attachments, it can result in accidents if a mounted part is loosely installed or comes off. Furthermore, if an installation hole is enlarged due to wear, the chain life may be shortened.

For troubles during operation, see "Trouble Shooting".