

WP0267

Dodge® chain drives: installation, lubrication, and maintenance

Dodge Customer/Order Engineering

01-25-2018



This paper covers basic installation, maintenance, and lubrication procedures for chain drives. Modern chains are made up of the following components:

- Pin and roller link plates which are the primary load carrying components.
- Pins connect pin link plates.
- Bushings which connect roller link plates and provide support for the free turning rollers.
- Rollers which provide rolling engagement with the sprocket teeth.

Figure 1 illustrates construction of a modern chain.

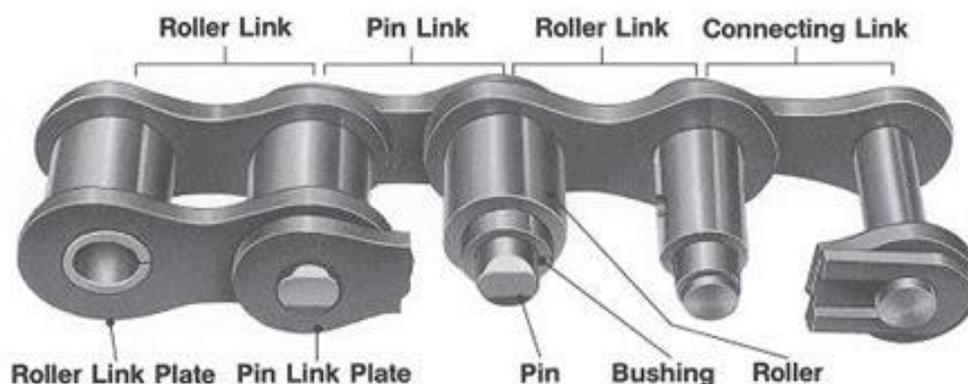


Figure 1. Modern chain construction

Proper tension is essential to achieving performance and longevity of chain drive components. An over tensioned chain will wear faster due to high contact forces between the rollers, bushings, and sprocket teeth. An over tensioned chain also creates higher loads on the shaft and bearings. Under tensioning a chain drive also has adverse effects. If the tension is not sufficient, the rollers will not remain seated in the sprocket and will ride out of the sprocket seat creating abnormal wear on the rollers and sprocket teeth.

The amount of tension in a chain can be related to chain sag. This sag is called the catenary effect. The catenary is a curve made by a chain suspended between two points. As a rule of thumb, a sag of 2 to 3% of the center distance is sufficient to tighten the chain. See Figure 2 showing a tensioned chain with the correct amount of sag.

EXTERNAL/PUBLIC DOCUMENT

ABB Motors and Mechanical Inc.

6040 Ponders Court

Greenville, SC 29615

Phone: +1864 284 5700

Email: DodgeEngineering@abb.com

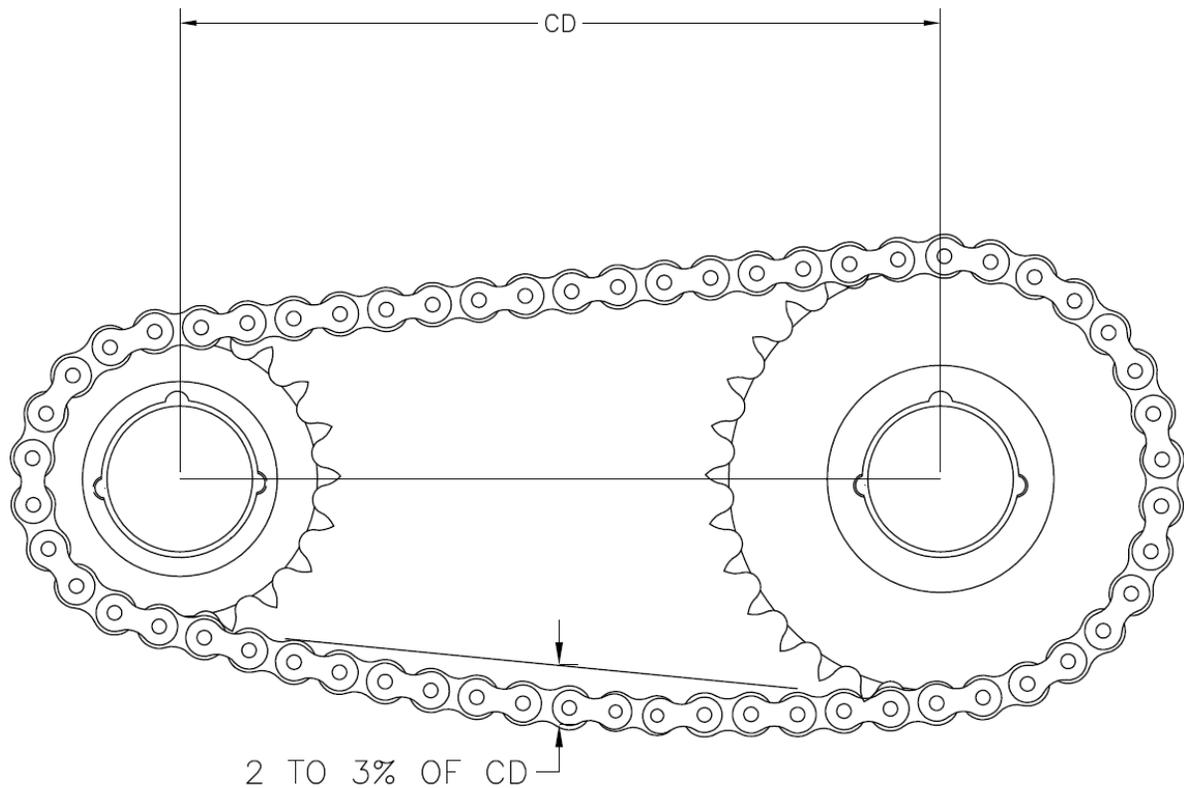


Figure 2. Properly tensioned chain drive.

Parallel misalignment between sprockets should be minimized for best performance. At most, do not exceed 0.050" per foot. Shafts should also be level and parallel with each other.

Proper lubrication of chain drives is also critical for drive performance and longevity of components. Chain manufacturers estimate 90-95% of all chain drives are improperly lubricated. Roller chains have moving components, and lubrication is required to reduce or minimize the wear due to the relative movement of these components against each other. Lubrication is required between the roller and bushing surfaces as well as the bushing and pin surfaces. Lubrication also decreases wear on the sprocket.

Conventional oils without any additives are commonly recommended for chain drives. Ideally, the highest viscosity of which will flow between the rollers, bushings, and pins will provide the greatest film thickness and best wear life. See table 1 for suggested oils based on ambient temperatures.

Applying grease to a chain serves no purpose. Grease will lubricate the roller OD and sprocket, but no oil will reach the internal components of the chain

Ambient Temp (F)	SUS 100F	SAE Gear Oil	ISO
20-40	200-400	80W	46 or 86
40-100	400-650	85W	100
100-120	650-950	90	150
120-140	950-1450	90	220

Table 1. Recommended chain oil based on ambient temperatures.

EXTERNAL/PUBLIC DOCUMENT

ABB Motors and Mechanical Inc.
 6040 Ponders Court
 Greenville, SC 29615
 Phone: +1864 284 5700
 Email: DodgeEngineering@abb.com

Chain lubrication is usually accomplished by employing one of three methods.

Manual or drip – Oil is manually applied to the chain or a drip system is set up where oil drips onto the chain through piping or tubing. This is a gravity fed system where oil flows from a tank through the piping.

Bath – This requires a housing be made to enclose the chain. This type of system is designed so that an oil level is maintained in the bottom, just touching the lowest point on one of the sprockets. The chain is continually pulled through the oil bath.

Circulating – This system also requires the chain drive to be enclosed in a housing, and an oil level is contained in the bottom of the enclosure. The oil level does not touch the sprockets in this system. Instead, a pump is used to supply a steady stream of oil to the chain. The oil falls back into the original sump.

These recommended types of lubrication systems are determined by the chain speed and the amount of power transmitted. Table 2 can be used as a guide for determining the type of lubricating system based on speed of the chain (fpm). The final selection should be based on the type of system recommended in the horsepower rating tables for the specific chain, sprocket, speed and horsepower transmitted.

Chain No.	35	40	50	60	80	100	120	140	160	200
Manual	350	300	250	215	165	145	125	110	100	80
Bath	2650	220	1900	1750	1475	1250	1170	1050	1000	865
Circulation	Use for speeds higher than bath limits									

Table 2. Lubrication system based on chain speed

Chain drives should be inspected after the initial 100 hours of operation. After the initial run, 500 hour intervals are commonly used. More frequent intervals may be required where shock loading is present or in severe duty applications.

Chain replacement is recommended once the chain has elongated by 3%. At 3% elongation, hardened surfaces of the pins and bushings have been worn, and failure is imminent.

Check the sprocket for roughness or binding when the chain engages or disengages from the sprocket. Inspect the sprocket teeth for wear or reduced cross section. If these conditions are present, the teeth have been worn, and the sprocket should be replaced. Do not use new chains on worn sprockets, or new sprockets on worn chains. Either scenario will result in a significant reduction in the life of the drive.

For any questions please call us at 864-284-5700 or e-mail us at DodgeEngineering@abb.com.

EXTERNAL/PUBLIC DOCUMENT

ABB Motors and Mechanical Inc.
 6040 Ponders Court
 Greenville, SC 29615
 Phone: +1864 284 5700
 Email: DodgeEngineering@abb.com