

Appendix : The shaft specifications for one-way clutches

TOK recommend the shaft specifications for one-way clutch as specified below.

• Limit deviation of shaft	: ISO286-2:2010, h9
• Material	: Solid steel shaft (A pipe not recommended)
• Surface hardness	: 600~800Hv0.1 (Equivalent to HRC55.2~64) Effective hardened layer depth 0.1mm or more
• Appearance	: No lubricant and dust are allowed.
• Surface plating	: Not allowed

The recommended shaft is specified for using a one-way clutch as full performance, and users usually use a hardened steel shaft.

TOK will recommend a durability test by using an actual unit.

A shaft may not be needed in a heat treatment when a machine works with low torque. In case of this condition, you can reduce the cost of the shaft.

Reference information is as given below.

1. Materials

- A slippery shaft which is like plastic shaft is not recommended because a one-way clutch cannot work.
- Free cutting steels (ISO 683-4) cannot be recommended since the steel easily wears.
- Sulfur (S) and lead (Pb) are material components to improve cutting. However, these material components also cause of wear out.
- TOK recommends high carbon chromium bearing steels (ISO 683-17) and martensitic stainless steels (ISO 683-18).

2. Heat treatment and surface plating

- The heat treatment of soft steels such as free cutting steels (ISO 683-4) are suitable shaft for one-way clutches. In case of free cutting steels (ISO 683-4), can be made harder by carburizing and quenching.
- In case of a soft steel shaft, effective hardened layer depth need 0.1mm or more after a heat treatment.
- When effective hardened layer depth is thin, hardened layer peel out from the material surface when using the machine, and then a shaft becomes narrow and one-way clutch does not work.
- The shaft hardness should be equivalent to the hardness of the pins inside a one-way clutch to maintain long endurance.
- Surface plating should not be recommended.
When you insist on applying a surface plating to prevent rust, it is important that the plating is thick and hard. Plating thickness needs 10 micrometer or more, and 700 Hv hardness or more (ex. Autocatalytic nickel-phosphorus coatings on metals). It is important to test plated shafts personally to ensure they are compatible with your machine.

3. Surface texture

- Surface texture of a shaft should be aimed at 0.1 to 1.6 $\mu\text{m-Ra}$.
- Debris and dirt make one-way clutches defective. One-way clutches can be prevented from having defects by buffing, cleaning, and degreasing the shaft.