1.3. Rated Load and Rated Life

Rated Load

The basic load ratings for LM Stroke model ST are indicated in the respective dimensional tables of the "THK General Catalog - Product Specifications," provided separately.

Rated Life

The rated life of LM Stroke model ST is obtained using the following equation.

$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P_C} \right)^3$$

L : Rated life (rotating 10^6 times)
(The total number of revolutions that 90% of a group of identical LM strokes independently operating under the same conditions can achieve without showing flaking)
C : Basic dynamic load rating (kN)
P_C : Calculated radial load (kN)
f_H : Hardness factor (see Fig. 2 on page D-7)
f_T : Temperature factor (see Fig. 3 on page D-7)
f_C : Contact factor (see table 1 on page D-8)
f_W : Load factor (see table 2 on page D-8)

Calculating the Service Life Time

When the rated life (L) has been obtained, if the number of revolutions per minute and the number of reciprocations per minute are constant, the service life time is obtained using the following equation.

●For Rotating Motion or Complex Motion

$$L_h = \frac{10^6 \times L}{60 \sqrt{(dm \cdot n)^2 + (10 \times \alpha \cdot \ell_s \cdot n_1)^2}/dm}$$

●For Reciprocating Motion

$$L_h = \frac{10^6 \times L}{60 \times 10 \times \alpha \cdot \ell_s \cdot n_1 / \pi \cdot dm}$$

L_h : Service life time (h)
n : Number of revolutions per minute (min^{-1})
n_1 : Number of reciprocations per minute (min^{-1})
ℓ_s : Stroke length (mm)
dm : Pitch circle diameter (mm)
(dm≒1.15×dr)
dr : Ball inscribed circle diameter (mm)
α : Factor for cage material
(α=0.7)

Tolerance Value in Rotation and Reciprocating Speed

The permissible speed limit of LM Stroke model ST is obtained using the following equation.

$$DN \geqq dm \cdot n + 10 \times \ell_s \cdot n_1$$

For the DN value above, the following value applies as a standard value.
For oil lubrication: DN=600000
For grease lubrication: DN=300000
However, the following points must be taken into account.
n_1 ≦5000
$\ell_s \cdot n_1$ ≦50000

■f_H : Hardness factor

To maximize the load capacity of LM Stroke model ST, the hardness of the raceways needs to be between 58 to 64 HRC.
If the hardness is lower than this range, the basic dynamic load rating and the basic static load rating decrease. Therefore, it is necessary to multiply each rating by the respective hardness factor (f_H).
Normally, f_H=1.0 since LM Stroke model ST has sufficient hardness.

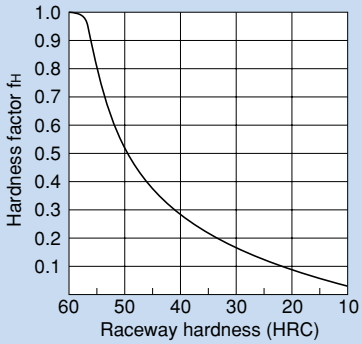

Fig. 2 Hardness factor (f_H)

■f_T : Temperature factor

If the temperature of the atmosphere surrounding the operating LM Stroke model ST exceeds 100℃, take into account the adverse effect of the high temperature and multiply the basic load ratings by the temperature factor indicated in Fig. 3.

Note: If the ambient temperature exceeds 80℃, contact THK.

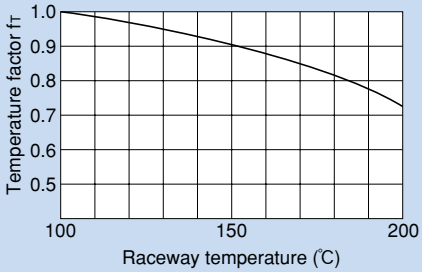

Fig. 3 Temperature Factor (f_T)

■f_C : Contact factor

When multiple nuts of LM Stroke model ST are used in close contact with each other, their linear motion is affected by moments and mounting accuracy, making it difficult to achieve uniform load distribution. In such applications, multiply the basic load rating (C) and (C_0) by the corresponding contact factor in the table on the right.

Note: If uneven load distribution is expected in a large machine, take into account the respective contact factor indicated in table 1.

Table 1 Contact Factor (f_C)

Number of nuts in close contact with each other	Contact factor f_C
2	0.81
3	0.72
4	0.66
5	0.61
Normal use	1

■f_W : Load factor

In general, reciprocating machines tend to involve vibrations or impact during operation. It is difficult to accurately determine vibrations generated during high-speed operation and impact during frequent start-up and stop. Therefore, when speed and vibrations have a significant influence, divide the basic dynamic load rating (C or C_0), by the corresponding load factor in table 2 of empirically obtained data.

Table 2 Load Factor (f_W)

Vibrations/impact	Speed (V)	f_W
Faint	Very low V≦0.25m/s	1 to 1.2
Weak	Slow 0.25<V≦1m/s	1.2 to 1.5
Medium	Medium 1<V≦2m/s	1.5 to 2
Strong	High V>2m/s	2 to 3.5