# Technical Information

## Contact factor ($f_C$)

Load biasing, attributed to mounting errors and multiple bearing assemblies can be accounted for by using the coefficient in table.

| Number of bearings for shaft | Contact factor |
|---|---|
| 1 | 1.00 |
| 2 | 0,81 |
| 3 | 0,72 |
| 4 | 0,66 |
| 5 | 0,61 |

## Load factor ($f_W$)

The loads acting on the linear units include payload, inertial effects during acceleration and deceleration as well as moment loads. All of these factors are difficult to assess and are further complicated by the potential presence of shocks and vibrations. A more practical solution involves the use of the coefficients in table.

| Operating conditions | $f_W$ |
|---|---|
| Low speed operations (< 15 m/min) without shockloads | 1 - 1,5 |
| Medium speed operations (60 m/min) without shockloads | 1,5 - 2 |
| High speed operations (> 60 m/min) without shockloads | 2 - 3,5 |

## Static safety factor

For applications with a high requirement for accuracy and smooth running, the static safety factor fs should be higher than the values shown in table to prevent permanent deformation at the contact points.

$$f_S = \frac{Co}{Po}$$

**$f_S$** = static safety factor
**Po** = static equivalent load (N)
**Co** = static load rating (N)

| Operating conditions | $f_S$ |
|---|---|
| Shafts subjected to small deflections and low shocks | 1 ÷ 2 |
| Elastic deflection can cross load the units | 2 ÷ 4 |
| System subjected to shock & vibration | 3 ÷ 5 |

## Mounting tolerances

The table below shows the tolerances to be used for a proper bearing installation. They insure a precise and smooth motion.

**Recommended mounting tolerances for SBE-LME-LMES-KH bushings**

| Housing material | Housing tolerance |
| --- | --- |
| Steel/cast iron | H7 |
| Aluminium/alloy | H7 |

## Friction

The magnitude of the friction force is affected by several factors. The type of bearing, the operating conditions, the type and quantity of the lubricant, the presence or lack of seals all impact the overall frictional behaviour.

Standard seals can add between 2 and 5 N to the overall friction force.

The magnitude of the coefficient of friction depends upon the operating conditions such as load, moments and/or preload. Table below shows the dynamic coefficient of friction for each type of bearing under normal operating condition (P/C = 0.2) and proper assembly.

| Type of bearing | Friction coefficient |
| --- | --- |
| KH | 0.004 to 0.006 |
| LME/SBE | 0.002 to 0.003 |

## Operating temperature

The operating temperature ranges of the various bearings are shown in table below. Should the operating temperature exceed the limits shown in the table, please contact Rollco. Stainless steel units, without seals, can operate between -20/+120°C.

| Type of bearing | Operating temperature |
| --- | --- |
| KH | -20 to + 100°C |
| LME/LMES/SBE | -20 to + 100°C |

# Lifetime calculation

### Dynamic load rating C

The dynamic load rating C is a load of constant magnitude under which 90% of a statistically significant number of apparently identical bearings would reach a theoretical life of 50 km without the apparent appearance of metal fatigue.

### Static load rating Co

The static load rating Co is defined as the load that would cause a permanent deformation equal to 1/10.000 of the ball diameter at the most stressed contact point.

### Life of a linear ball bearing

Repeated stresses onto the contact surfaces could lead to material fatigue, This will lead to the appearance of surface pitting. The life of the unit is defined as the duration before the appearance of pitting.

### Rated life (L)

The rated life L is the total traveled distance which 90% of a statistically significant number of apparently identical bearings would reach under the same operating conditions without the apparent appearance of metal fatigue.

$$L = (C/P)^3 \cdot 50 \quad (1)$$

**L** = rated life (km)
**C** = dynamic load ratings (N)
**P** = equivalent dynamic load (N)

When a system is subjected to a load equal to the dynamic load rating C the resulting life equal the rated life (50 km). The theoretical life of a linear bearing is affected by the load and by the operating conditions (temperature, vibration, shock, load distribution, etc.) In such cases the theoretical life is calculated with the help of equation 2.

$$L = (f_C \cdot C / f_W \cdot P)^3 \cdot 50 \quad (2)$$

**L** = rated life (km)
**C** = dynamic load ratings (N)
**P** = equivalent dynamic load (N)
$f_C$ = Contact coefficient
$f_W$ = Load factor

The following equation (3) allows the conversion of the rated life in hours.

$$L_h = L \cdot 10^3 / (2 \cdot Ls \cdot n_1 \cdot 60) \quad (3)$$

$L_h$ = rated life (hours)
**Ls** = stroke length (m)
**L** = rated life (km)
$n_1$ = operating frequency (stroke/min)