In this application, heavy loads, shocks, and shaft deflection are expected; therefore, spherical roller bearings are appropriate. The following spherical roller bearings satisfy the above size limitation (refer to Page B196).

![Image]

Therefore, with this bearing arrangement, the axial load \( F_{ax} = 0.6 \times 1.569 = 1.240 \text{ kN} \), \( Y_t \) is applied on bearing 1 and not on bearing II.

For bearing I:

\[
F_{1z} = 1.569 \text{ kN}, \quad F_{ax} = 0.6 \times 1.569 + 0.73 \times 3.474 = 3.164 \text{ kN}
\]

The fatigue life factor \( f_e = \frac{C_e}{P} \) is

\[
f_e = 0.42 \times 38000 = 5.04
\] and the rating fatigue life \( L_h = 500 \times 5.04 = 25750 \) h.

For bearing II:

\[
F_{ax} = 3.931 \text{ kN}, \quad F_{az} = 0
\]

the equivalent load \( P = F_{ax} = 3.931 \text{ kN} \), \( Y_t \) is

the fatigue life factor

\[
f_e = \frac{C_e}{P} = 0.42 \times 30000 = 4.59
\] and the rating fatigue life \( L_h = 500 \times 4.59 = 22950 \) h are obtained.

Remarks: For face-to-face arrangements (DF type), please contact NSK.

**Example 6**

Select a bearing for a speed reducer under the following conditions:

- Operating conditions
  - Radial load \( F_{1z} = 245 \text{ kN} \), \( 0.6 \times 1.569 = 1.240 \text{ kN} \)
  - Axial load \( F_{ax} = 49 \text{ kN} \), \( 0.6 \times 1.569 + 0.73 \times 3.474 = 3.164 \text{ kN} \)
  - Speed \( n = 500 \text{ min}^{-1} \)
  - Size limitation
  - Shaft diameter: 300mm
  - Bore of housing: Less than 500mm

The speed of rolling bearings is subject to certain limits. When bearings are operating, the higher the speed, the higher the bearing temperature due to friction. The limiting speed is the empirically obtained value for the maximum speed at which bearings can be continuously operated without failing from seizure or generation of excessive heat. Consequently, the limiting speed of bearings varies depending on such factors as bearing type and size, cage form, and material, load, lubricating method, and heat dissipating method including the design of the bearing’s surroundings. The limiting speeds for bearings lubricated by grease and oil are listed in the bearing tables. The limiting speeds in the tables are applicable to bearings of standard design and subjected to normal loads, i.e. \( C/P \geq 12 \) and \( F_1/F_r \leq 0.2 \) approximately. The limiting speeds for oil lubrication listed in the bearing tables are for conventional oil bath lubrication. Some types of lubricants are not suitable for high speed, even though they may be markedly superior in other respects. When speeds are more than 70 percent of the listed limiting speed, it is necessary to select an oil or grease which has high speed characteristics.

(Refer to)

Table 12.2 Grease Properties (Pages A110 and 111)
Table 12.5 Example of Selection of Lubricant for Bearing Operating Conditions (Page A113)
Table 15.8 Brands and Properties of Lubricating Grease (Pages A138 to A141)

**6. LIMITING SPEED**

**6.2 Limiting Speed for Rubber Contact Seals for Ball Bearings**

The maximum permissible speed for contact rubber sealed bearings (CDU type) is determined mainly by the sliding surface speed of the inner circumference of the seal. Values for the limiting speed are listed in the bearing tables.

The maximum permissible speed may be determined by multiplying the limiting speed found in the bearing tables by the correction factor shown in Figs. 5.1 and 6.2.