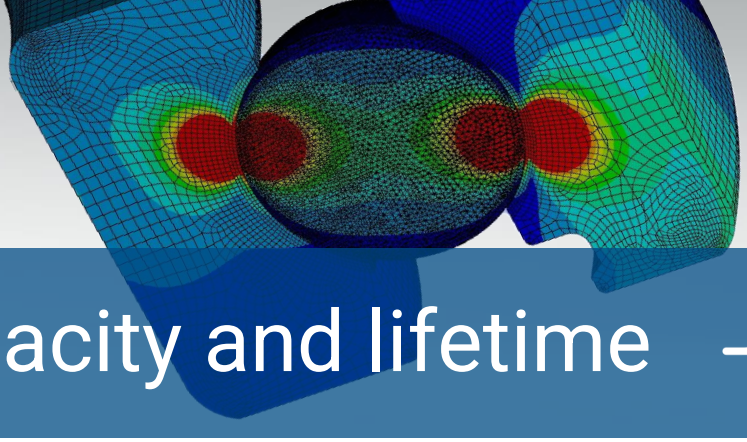


Load capacity and lifetime

JESA bearing solutions

The load capacity is given by the static and dynamic load coefficient according to the DIN ISO 281 and DIN ISO 76 norms.

Dynamic load capacity and lifetime

The resistance to the material strength determines the bearings dynamic load capacity load capacity. It is described by:

- the dynamic load base C
- the nominal lifetimes L and Lh

The dynamic load

For continued rotation bearings, the lifetime is determined by the dynamic load C. The C load corresponds to a constant limited load in height, way and direction, for which a definite quantity of bearing sample can reach a million spin lifetime.

Calculation of lifetime

The ball bearings lifetime is estimated according DIN ISO 281 as following:

$$L = (C/P)^3$$

$$Lh = (16'666/n) \times (C/P)^3$$

- **L** in 106 spins, nominal lifetime in millions spins which was reached and surpassed by 90% of a sufficient quantity of identical bearings before a sign of material weariness would show.
- **Lh** in h, nominal lifetime in according the L definition
- **C** in N, bsic dynamic load
- **P** in N, equivalent load for radial bearings
- **n** in min-1, rotation speed

Static load

Bearings subject to high loads while they are stationary, at a slow rotation speed or in oscilation rotation movement may sustain local plastic deformations. These deformations will cause noise and thus limit the good functioning of the bearing.

Basic static load

The bearings, which do not rotate well, are calculated according to the basic static load CO. The basic static load CO is the load for which the Hertz pressure between rolling body and the bearing ring reaches 4200 N/mm2 in the most loaded place.

Static safety factor

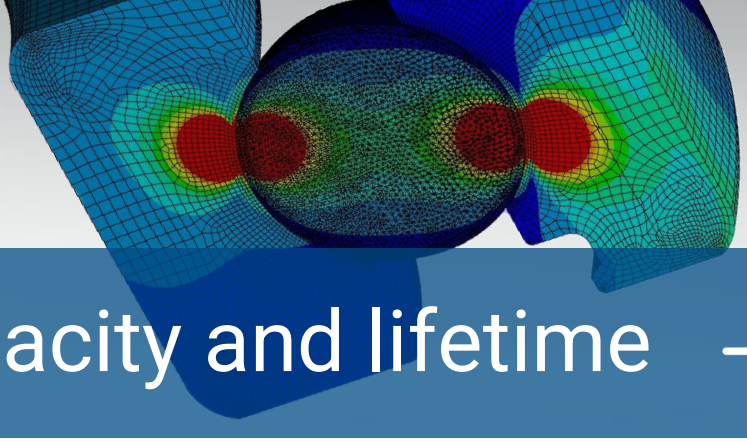
The S0 static safety factor is determined by the relation of static load CO and its equivalent P0 static load.

$$S0 = C0/P0$$

- **S0** static safety factor
- **C0** en N, charge statique
- **P0** en N, charge statique équivalente.

According to the operating conditions and requirements set out to bearings, the following values can be chosen for the SO static safety factor :

- S0 = 0,5 to 0,7 for low requirement applications and an operating without shocks
- S0 = 1,0 to 1,2 for application known as normaland an operating without shocks
- S0 = 1,5 to 2,0 for high requirement applications and an operating with continuous loads (with shocks)



Load capacity and lifetime

JESA bearing solutions

Equivalent load | equivalent dynamic load

$$P = X.Fr + Y.Fa \ [N]$$

For deep groove ball bearings, values for X and Y depend on the relation Fa/C0.

- **Fr** [N], radial strengh applying to the bearing.
- **Fa** [N], axial strengh applying to the bearing.

Equivalent static load

$$P0 = Fr \text{ for } Fa/Fr < 0,8$$
$$P0 = 0,6.X.Fr + 0,5.Y.Fa \text{ for } Fa/Fr > 0,8$$

Radial factor X and axial factor Y

See chart below valid for bearings assembled in standard bore class (J5 and K5 for the bore of the inner ring, j6 for the housing).

	normal radial clearance					radial C3 clearance				
$\frac{Fa}{C0}$	e	$\frac{Fa}{Fr} \leq e$		$\frac{Fa}{Fr} > e$		e	$\frac{Fa}{Fr} \leq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y		X	Y	X	Y
0,025	0,22	1	0	0,56	2	0,31	1	0	0,46	1,75
0,04	0,24	1	0	0,56	1,8	0,33	1	0	0,46	1,62
0,07	0,27	1	0	0,56	1,6	0,36	1	0	0,46	1,46
0,13	0,31	1	0	0,56	1,4	0,41	1	0	0,46	1,3
0,25	0,37	1	0	0,56	1,2	0,46	1	0	0,46	1,14
0,5	0,44	1	0	0,56	1	0,54	1	0	0,46	1