

Calculation of Bearing Forces

When selecting a combination bearing, the designer must take several factors into consideration such as working environment, safety factor, rotational speed, etc.

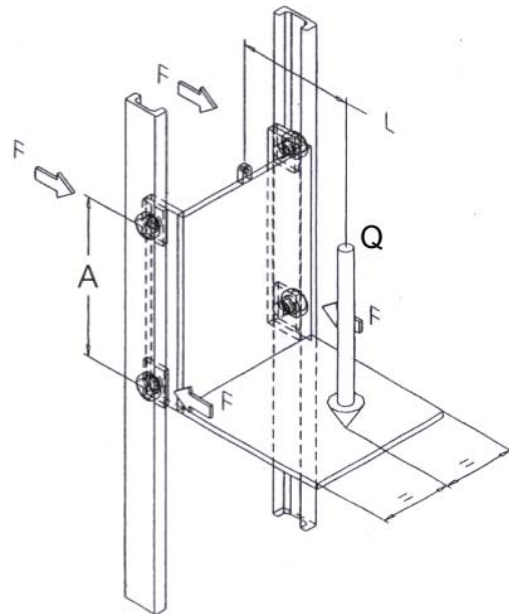
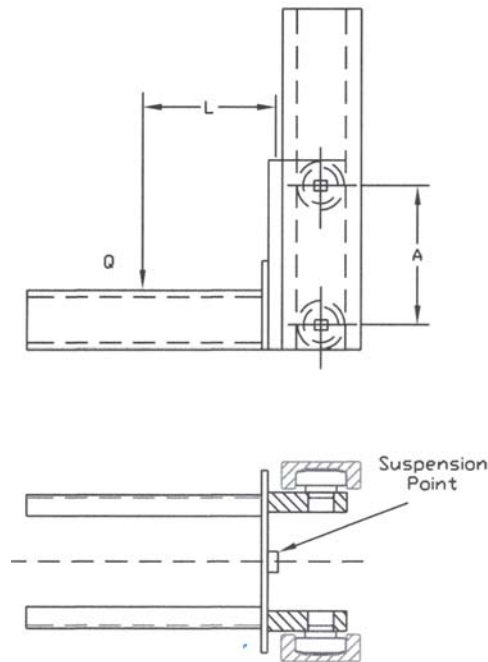
Once these items have been considered and an adjusted load has been established, the designer should select the bearing size based on the forces acting on the bearing, the distance between the bearings and the Hertzian pressure. These items are all related and can be considered using the steps below.

NOTE: Hertzian Pressure, defined as it applies to bearing selection, is the measure of pressure between the contact point of the bearing and the profile it rides on. This figure must not exceed the tensile strength of the profile which is considered to be 750N/mm². Therefore, the limiting factor when using steel profile, is the Hertzian pressure rating.

STEP 1 To determine the maximum force (**F**), based on Hertzian pressure, use the following calculation:

$$F = \frac{(Q \times L)}{(2 \times A)}$$

- Q** - Weight of the load being lifted (N)
- L** - Distance between the load and the suspension point (mm)
- A** - Distance of bearings from the suspension point (mm)
- F** - Maximum static force per bearing, determined by Hertzian Pressure



This formula may be rearranged to calculate the required bearing distance for a set force:

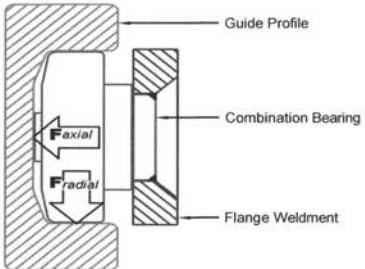
$$A = (Q \times L) / (2 \times F)$$

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STEP 2 Select the most suitable bearing size from the following chart:

Bearing Selection based on Hertzian Pressure						
Standard	Eccentric	Adj-Combi	F(N) radial	F(N) axial	U Profile	I Profile
CF4.053			5230	1685	U53	
CF4.054	4.454	CR4.072	7150	2380	2890	
CF4.055	4.455	CR4.073	8595	2865	2867	3018
CF4.056	4.456	CR4.074	8920	2974	2810	
CF4.057	4.457	CR4.075	8920	2974		3019
CF4.058	4.458	CR4.076	15570	5190	2811	
CF4.059	4.459	CR4.077	15470	5157		2912
CF4.060	4.460	CR4.078	16490	5497		3100
CF4.061	4.461	CR4.078L	16490	5497	2862	
CF4.062	4.462	CR4.079	23520	7840	2891	
CF4.063	4.463	CR4.080	41090	13700	2757	
		4.089	41710	13910		I-10
		4.090	58000	19400		I-16
		4.091	84000	28000		I-18
		4.092	101500	33900		I-28
		4.093	139400	46500	I-36	I-42

Example

To lift a 40000N (9000lbs) load (**Q**), cantilevered a 850mm (33.46") distance (**L**) from the suspension point, with a bearing distance (**A**) of 800mm (31.5") the calculation would be as shown to the right:

$$F = \frac{(40,000 \times 850)}{(2 \times 800)} = 21,250$$

Comparing this value to the chart above, the most suitable bearing would be a **CF4.062**.