Due to elastic deformations of a linear system and to the lack of uniformity in the distribution of the unit loads, we resorted to theoretic safety factors (CTS) according to which the close contact between the mobile part and raceways is given by the following quantities:

CTS crossrollers	2
CTS balls	4
CTS needles	1

Example 1

Calculation example and load check:
– Rails = GR9 300
– Stroke = 180 mm
– Cages = AA9/11
– Load (F) = 6000 N
– L_g = 210 mm
– Preload = 10%

– Roller load = $\frac{6000}{11}$ = 545,5 N

Load due to mobile portion NRP = 80/11 = 7,3 N.
It is also necessary to take the preload into account.
That is: 10% of 545,5 N = 54,6 N.
The sum of the forces acting on the table (preload, weight, external load, etc.) must be smaller than the capacity P which in this case is 1300 N.

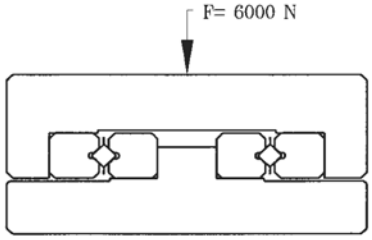


Fig. 11

Therefore:
545,5 + 7,3 + 54,6 = 607,4 N 607,4 N < 1300 N
Thus our selection is verified positively.

Example 2

Loading condition as indicated in Fig. 12a and 12b.

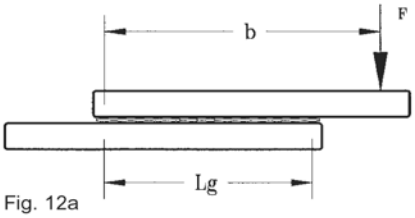


Fig. 12a

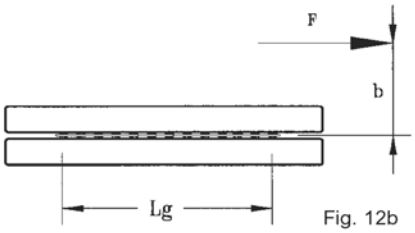


Fig. 12b

Rails, cages and stroke characteristics as in table TR6 310

– NR	= 16
– NRP	= 16:2 = 8
– Preload	= 8% (F3)
– Upper table weight	= 45 N (F2)
– External load	= 200 N (F)
– b	= 300 mm
– L_g	= 180 mm
– CTS	= 2

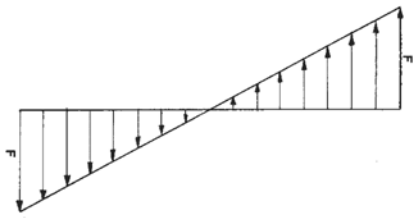
This calculation is valid for both cases 12a e 12b

$F1 = \frac{Fxb}{CxCTS} = \frac{200x300}{180x2} = 166,7\ N$

F2 = 45 N/16 = 2,8 N
F3 = 8% x 166,7 N = 13,3 N
$\sum F = F1 + F2 + F3 < C = 166,7 + 2,8 + 13,3 = 182,8\ N < 530\ N$
where 530 N is the load rating for a roller diameter of 6 mm
(Table on Page 20)
This calculation is valid for the roller at the two extremities of the cage, thus it represents the worst condition. In addition, if only the roller of the extremities would be under load, both rails and structure would deform permanently.

Therefore, it is safe to assume that the load distribution is similar to the one depicted in Figure 13.

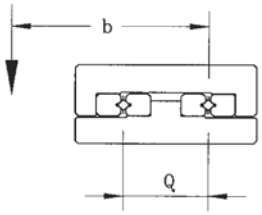
Fig. 13



Example 3

Loading condition as shown.

Fig. 14a



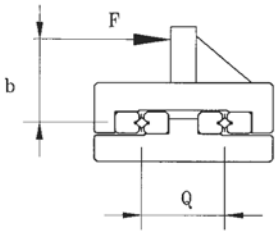


Fig. 14b

The rails, cages and stroke characteristics as in table TR3-155

b	= 120 mm
Q	= 28 mm
NR	= 21
NRP	= 21/2 = 10.5 (10)
Preload	= 10% (F3)
Upper table weight	= 7 N (F2)
P	= 130 N/Roller
F	= 160 N

$F1 = \frac{Fxb}{QxNRP} = \frac{160x120}{28x10} = 68,6\ N$

F2 = 0,33 N
F3 = 10% 68.6 = 6,86 N
$\sum F = F1 + F2 + F3 = 75,8\ N < 130\ N$
where 130 N is the load rating for a roller diameter of 3 mm
(Table on Page 20)

Therefore our system loading checks out.

Note: For applications not shown, please refer to our Engineering office.