

# Retained Ring Calculation Manual

Notations are according to the referenced source

Calculations for steel and hard metal inner rings are on separate sheets.

The program works for 1 to 5 rings for steel or hard metal inner rings, but in the practice, more than two retaining rings are generally not applied due to manufacturing difficulties.

The number of rings is given by how many ( $k_i$ ) values are given from top to down.

The program calculates those values which are not given.

Calculations can be made for three cases:

1. Given inner radius ( $R_{bi}$ ), given allowed stresses ( $k_i$ ), and given outer radius ( $R_k$ )  $\rightarrow p_{1max}$   
(Optimally counted allowed maximal internal pressure.)
2. Given inner radius ( $R_{bi}$ ), given allowed stresses ( $k_i$ ), given inner pressure ( $p_{1max}$ )  $\rightarrow R_k$   
(Optimally counted outer radius.)
3. Non-optimal allowed inner pressure, counted by rounded radiuses ( $R_{bi}$ )  $\rightarrow p_{1max}$

The last column in the table shows the overlapping value  $\delta_i$  related to the radius.

The calculation starts by double-clicking on the "SZÁMOL" (Calculate) cell.

It is enough to delete the unnecessary data only in column  $R_{bi}$ .

(Columns  $a_i$  and  $n$  are only informative, and not needed for the calculations.)

The hard-metal sheet can be used for calculating rigid-hard steel inserts, using the Young's modulus ( $E_1$ ) and Poisson coefficient of the inner ring ( $\mu$ ).

The program sends warning messages, when the loading is unbearable or the case is not realizable.

The program also calculates the following values (see below the table): the outer pressure on the retained but not loaded inner ring ( $p_2'$ ); the tangential stress on the inner radius ( $\sigma_{tb}$ ); and the critical outer pressure on the inner ring, regarding the stability of this ring ( $p_{krit}$ ).