

Features of
RC Beam-Column-Tie
Analysis of Reinforced Concrete Rectangular Sections in
Bi-axial Bending & Shear Under Axial Compression or Tension
for Designing to BS8110

by
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RC Beam-Column-Tie is an Excel spreadsheet for calculating the shear and bending moment capacities of rectangular reinforced concrete sections under axial compression or tension. The calculated shear capacities are in two directions as non-concurrent. The calculated bending moment capacities are in two directions as non-concurrent and bi-axial as concurrent.

Sections can be singly, doubly or randomly reinforced to resist axial load and bending. They can also have links to enhance their shear resistance. The capacities are calculated using BS8110-1. The applied axial load can be any value in the range of pure compression capacity as a maximum positive upper value and pure tension capacity as a maximum negative lower value. Its various features are listed below.

- ◆ The sections can be singly, doubly or randomly reinforced.
- ◆ The axial load value can be compression as positive or tension as negative.
- ◆ The shear capacities are calculated for two directions as non-concurrent.
- ◆ The moment capacities are calculated in two directions as non-concurrent and biaxial as concurrent.
- ◆ In the calculation of shear resistance capacities in two directions, the influence of axial compression or tension is taken into account.
- ◆ Axial load capacities for the sections are calculated in Pure-Axial-Compression, Pure-Axial-Tension and at Balanced-Failure-Load.
- ◆ The design data is stored within the "RC Beam-Column-Tie" file. It can be recalled and updated at a later date.
- ◆ Each "RC Beam-Column-Tie" file can hold information for as many columns as required, e.g. over 30,000 by inserting and or deleting the data rows in its "Store" worksheet. This limit in Excel 2007/2010 is 1 million.
- ◆ Command buttons at top of the screen allow the storage and or recall of the design data. This permits re-design with ease and rapidity when design information changes.
- ◆ Using its "Auto Analysis" feature, all sections can be analysed by the click of a command button. If so desired, the results of each section analysis can also be printed by using this feature.

- ◆ When the section capacity is insufficient, Failed-Checks are shown in red colour. This makes the failing sections apparent at a glance.
- ◆ The output of "RC Beam-Column-Tie" is a single-page document on screen and in print. Its layout is so arranged that both the user and the checker can grasp and verify results by hand calculations.
- ◆ An iterative procedure is employed to calculate maximum moment capacities corresponding to the balanced failure load and the applied axial load.
- ◆ The section and its reinforcing bars are plotted in two separate diagrams. One diagram is for bending about the X-axis and the other about the Y-axis. In both diagrams, the position of neutral axis is also shown.
- ◆ RC Beam-Column-Tie incorporates the use of default values for new sections and or un-defined data. The user can change this data to preferred values. They are f_{cu} , g_{mc} , g_{ms} , section width, section depth, reinforcing bar area, cover to top and bottom steel and cover to side steel.

- ◆ An interactive worksheet is included to help select reinforcing bar numbers, diameter and or spacing to provide a given area of steel in the section.