Fasten449000527-.xlt

From Techno Consultants Ltd

An Excel Template for finding the Capacity of Bolts and Welds to BS449: Part 2

Introduction

Fasten449 is an Excel Template for finding the Capacities of Bolts and Welds to BS449: Part 2. The bolts can be Ordinary, Countersunk or High Strength Friction Grip Bolts. Welds can be Fillet or Butt.

Loading the Template on to your computer

Fasten449 is supplied as an Excel 97 Template, having .XLT as its filename extension.

To load Fasten449 on to your computer, copy this file into Microsoft Office folder for its Templates. Generally the path to this folder in Excel 97 is:

C:\Program Files\Microsoft Office\Templates

If you are using Excel 2000, the path to this folder is:

C:\Windows\Application Data\Microsoft\Templates

To load and use the Template in Excel 97 or Excel 2000, choose:

File, New and the select the file Fasten449000527-

If you receive an Excel Warning about running Macros and are prompted for whether to load them, answer YES to Load and Enable Macros. Fasten449 incorporates VB Macros and to allow your computer to use them is vital for its operation.

Features

Fasten449 is an Excel Spreadsheet Template for finding capacities of Ordinary Bolts, Countersunk Bolts, High Strength Friction Grip Bolts and Fillet Welds using BS 449: Part 2.

The used Tensile Stress Areas are from: BS 4190 for Ordinary Black Bolts, BS 3692 for Precision Bolts and BS 4933 for Countersunk Bolts. The used Tensile Stress Areas and Proof Loads for HSFG Bolts are from: BS 4604: Part 1 for General Grade and BS 4604: Part 2 for Higher Grade (parallel shank) bolts.

Fasten449 includes, in built Cell Comments, Features and User Notes. They provide on the spot information for efficient use of its following three interactive worksheets:

Sheet 1: Ordinary & Countersunk Bolts

Gives capacities for **Ordinary** and **Countersunk** Bolts. The features are:

Bolt Heads can be: Normal or Countersunk

Bolt Grades can be: 4.6, 6.8, 8.8, 10.9, 12.9 and 14.9

Shear Plane can be: Bolt Threads or Shank
When Shear Plane in the Shank is selected, a warning is displayed to remind that Threads should not be in the Shear Plane and that the use of many washers may be necessary to achieve it.

End distance from centre of Bolts to ply edge can be 2d to 1.25d
The permitted Bearing Capacity of the ply is maximum when 2d and reduced to a lesser value when 1.25d, where d is the nominal bolt diameter.

Bolt Diameters are: M1.6, M2, M2.5, M3, M4, M5, M6, M8, M10, M12, (M14), M16, (M18), M20, (M22), M24, (M27), M30, (M33), M36, (M39), M42, (M45), (M52), M56, (M60), M64 and (M68), the sizes in brackets being non-preferred.

Connected Ply Grades can be: S275 (43), S355 (50) and S460 (55).

The capacities calculated are: Tensile, Single Shear, Double Shear and Bearing for various Ply thickneses.

The Combined Tension and Shear Capacity can also be calculated for each bolt diameter. For any typed value of Applied Tension F_t, the corresponding Shear Capacity F_s of Threads or Shank is displayed in the adjacent cell.

Three Colours and Font styles are used to display Bearing Capacities. Values below the single shear capacity are displayed in Red and Normal font. Values above the single shear and below the double shear capacity are displayed in Blue and Bold. Values above double shear capacity are shown in Green and Italic.

User can change Ply thicknesses at the head row of bearing values (shown in light green cell background) to suit any value required for design.

Sheet 2: HSFG Bolts

Gives capacities for High Strength Friction Grip Bolts. The features are:

Bolt Grades can be: General Grade to BS4604: Part 1 and Higher Grade to BS4604: Part 2

Bolt diameters are: M12, M16, M20, M22, M24, M27, M30 and M36 for General Grade and M16, M20, M22, M24, M27, M30 and M33 for Higher Grade Bolts

Slip Factor can be any value in the range 0 to 0.55, depending upon the contact surface. For example, it can be a value of 0.5 for grit or shot blasted steel, a value of 0.05 for steel finished with red-lead paint. In the normal use, however, the surface specified is clean and lightly rusted for which the slip factor is taken as 0.45.

The Applied Tension Condition can be **No Fatigue** or **With Fatigue.**

Based on the Proof Load, the capacities calculated are: Tension Capacity and Slip Resistance in Single/Double Shear.

The Combined Tension and Shear Capacity can also be calculated for each bolt diameter. For any typed value of Applied Tension $\mathbf{F_t}$, the corresponding Shear Capacity $\mathbf{F_s}$ of Threads or Shank is displayed in the adjacent cell.

To display bearing capacities, 3 colours and font styles are used. The values below the single shear capacity are shown in Red and Normal font. The values above the single shear and below the double shear capacity are shown in Blue and Bold. The values above the double shear capacity are shown in Green and Italic.

Ply thicknesses at the head row of bearing values (shown in light green cell background) can be changed to suit any value required for design.

Sheet 3: Fillet Welds

Gives Fillet Weld Capacities for Steel Grades S275, S355 and S460, using E43 and E51 Electrodes to BS639.