

Introduction

In conjunction with updating the third generation of the Swedish Institute of Steel Constructions design handbook for steel joints, the idea to develop an easily used design software for verification of bearing capacity of joints and connections was born.

Purpose

The application is an addition to the third generation of the Swedish Institute of Steel Constructions design handbook for steel joints, publication 183 to 189. It makes it possible to compare and evaluate in a rational way the different design solutions which are presented in the handbook. The calculations are made in accordance with the methods presented in the handbook. A significant amount of time can be saved compared to regular hand calculations.

System requirements

Operating system:

- Windows XP
- Windows Vista
- Windows 7

Hardware requirements:

- At least 1,0 GHZ or higher with a minimum of 512 MB RAM
- 100 MB free disk space

Software requirements:

- Microsoft NET Framework 4

Liability

This application is developed based on general assumptions without regard to cases under special circumstances. Neither the publisher nor the programmer takes responsibility for any damage that can happen directly or indirectly due to use of the application.


Use

After start you are prompted to choose between seven different options which correspond to different joint types and publications: column base, column splice, beam-to-column joint, knee joint and column head joint, beam splice, beam-to-beam joint and bracing joint.

The language (Swedish and English) and market (Sweden, Norway or Custom parameters) can be selected and saved under *Settings*.

The calculation part has a look similar to the handbooks with a tab system. The first tab allows defining detailed data about geometry and loads. The design solutions are presented in individual tabs. Depending on chosen geometry and load cases different solutions become available. Pictograms are only shown next to tabs for available solutions. The last tab displays a comparison between all of the available solutions.

Calculations are updated by clicking on either a new field or use of Enter. Incorrect parameters and inadequate capacities are highlighted in red. By moving the cursor over a red field information on the actual problem is shown in the information field at the bottom.

The information icon () indicates that there is additional information or options available; these will be shown in a new window.

The comparison includes all available design solutions for the specified geometry or load case. Solutions with incorrect parameters or insufficient capacities are highlighted in grey.

Technical requirements

All calculations are made in accordance with the methods presented in the handbook, publication 183 to 189, except for these deviations and additions

Standard sections

Geometrical dimensions for the existing standard sections (HEA, HEB, IPE, HFRHS, CFRHS, U and UPE sections) are taken from Tibnors construction tables, 8th edition.

Material properties

For the available steel grades, f_y , f_u and β_w are obtained automatically, these values are valid for plates with a thickness up to 40mm. For thicker plates custom values can be used.

Bolts

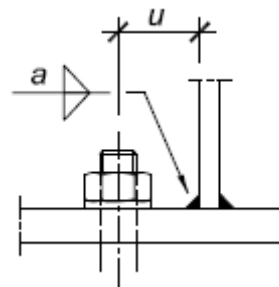
Bolts are assumed to be in accordance with the HR-system, EN 14399-3, with a plain washer according to EN 14399-5 below the nut. By default the possible bolt lengths and position of shear cut is calculated to be able to determine the shear force resistance. This can be changed by clicking on the information icon.

Geometrical limitations

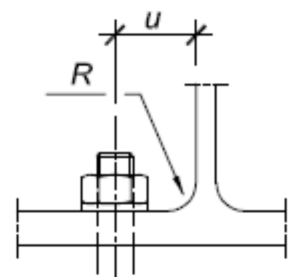
Geometric limitations are calculated so that the components have sufficient space and can be assembled. Hole spacing is in accordance with EN 1993-1-8.

Following minimal distance between bolt and welded part or web is used:

Bolt dimension	Throat thickness [mm]		
	$a \leq 5$	$5 < a \leq 9$	$9 < a$
M12	22	26	34
M14	28	32	40
M16	28	32	40
M18	34	36	44
M20	34	36	44
M22	40	40	48
M24	40	40	48
M27	40	43	52
M30	50	53	62



Bolt dimension	Fillet radius, R [mm]				
	$R \leq 12$	$12 < R \leq 15$	$15 < R \leq 18$	$18 < R \leq 24$	$24 < R$
M12	28	31	34	40	43
M14	30	33	36	42	45
M16	32	35	38	44	47
M18	34	37	40	46	49
M20	36	39	42	48	51
M22	38	41	44	50	53
M24	39	42	45	51	54
M27	42	45	48	54	57
M30	45	48	51	57	60



Anchor bolts uses, instead of these, dimensions from Table 2.5 in *Column base, publication 183*