Resistance of welded connections

EN 1993 is intended to be used with Eurocodes EN 1990 - Basis of Structural Design, EN 1991 - Actions on structures and EN 1992 to EN 1999, when steel structures or steel components are referred to.

Symbols

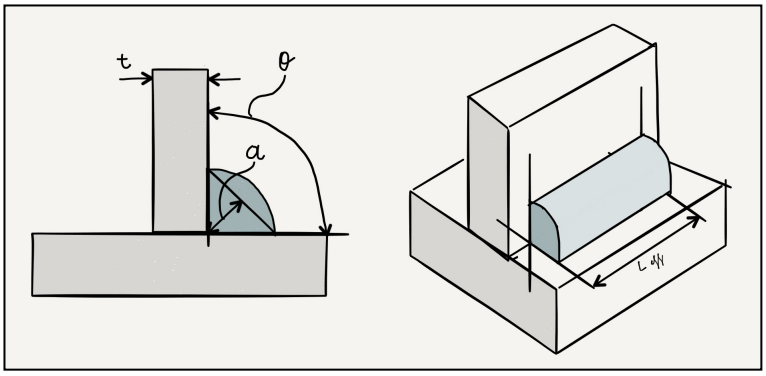
θ	-	Angle between the fusion faces
a	-	Effective throat thickness
l_{eff}	-	Effective length of the weld
A_w	-	Design throat area
Steel grade	-	Lower strength grade
f_y	-	Nominal yeld strength
f_u	-	Nominal ultimate tensile strength
β_w	-	Correlation factor
t	-	Thinner outer connected part
$f_{vw,d}$	-	Design shear strength of the weld
$F_{w,Rd}$	-	Shear resistance per shear plane
F_w	-	Design value of the the weld force
$F_{w,Ed}$	-	Design value of the the weld force per unit length
$\tau_{\|\|}$ =	-	Shear stress parallel to the axis of the weld
SF	-	Safety factor

References

EN 1993-1-8:2005 "Eurocode 3: Design of steel structures - Part 1-8: Design of joints

Resistance of welded connections - Fillet welds

Object: Nodo Tipo



Fillet welds

θ	90 °	Faces angle
a	3,5 mm	Effective throat thickness
L_{eff}	143 mm	Effective weld lenght
	150 mm	Overall weld length
A_w =	500,5	mm^2 - Design throat area

Connected steel member

Steel grade	S 235	Lower strength grade
f_y =	235 MPa	
f_u =	360 MPa	
β_w =	0,8	Correlation factor
t	10,00 mm	Thinner outer connected part

Weld design resistance

$f_{vw,d}$ =	208 MPa	Design shear strength of the weld
$F_{w,Rd}$ =	727 N/mm	Shear resistance per shear plane

Weld force design value

F_w	83000 N	Design value of the weld force
$F_{w,Ed}$ =	580 N/mm	Design value of the weld force per unit length

Weld design check

Directional method

$\tau_{\perp\perp}$ =	165,83 MPa	
$(3\ \tau_{\perp\perp}^2)^{0,5}$ =	287,23 MPa	
$(f_u / (\beta_w\ \gamma_{M2}))$ =	360,00 MPa	

		SF
$(3\ \tau_{\perp\perp}^2)^{0,5} / (f_u / (\beta_w\ \gamma_{M2}))$=	0,80	**1,25**

Simplified method

		SF
$F_{w,Ed}/F_{w,Rd}$ =	0,80	**1,25**

Note:

Fillet welds finishing at the ends or sides of parts should be returned continuously, full size, around the corner for a distance of at least twice the leg length of the weld, unless access or the configuration of the joint renders this impracticable.

Nominal values

Correlation factor β_w for fillet welds

	β_w
S 235	0,8
S 275	0,85
S 355	0,9
S 420	1
S 460	1

Nominal values of yeld strength fy and ultimate tensile strength fu

Steel grade	f_y [N/mm^2]	f_u [N/mm^2]
S 235	235	360
S 275	275	430
S 355	355	510
S 450	440	550

National annex for EN 1993-1-8

EN 1993 gives values with notes indicating where national choices may have to be made. Therefore the National Standard implementing EN 1993-1 should have a National Annex containing all Nationally Determined Parameters to be used for the design of steel structures to be constructed in the relevant country.

The National Annex may only contain information on those parameters which are left open in the Eurocode for national choice, known as Nationally Determined Parameters, to be used for the design of buildings and civil engineering works to be constructed in the country concerned.

National choice is allowed in EN 1993-1-8 through the following values:

Action safety factors

γ_G	1,35
γ_Q	1,50

Materials safety factors

γ_{M0}	1,00
γ_{M1}	1,00
γ_{M2}	1,25