



Buckling Proof according to EC 1993 Part 1-5

3.2 Effective width for elastic shear lag

Shear lag reduction for flange 1

Shear Lag is not neglectable

α_0 : 1.7

Beta: 0.24478873240829493

Shear lag reduction for flange 3

Shear Lag is not neglectable

α_0 : 1.3

Beta: 0.3855877454628728

4.4 Plate elements without longitudinal stiffeners

Iteratively changing the widths until $M_{Rd_el_eff}$ converges to a limit of 0.02

4.5 Stiffened plate elements with longitudinal stiffeners

Side 2

4.5.2 Plate type behaviour

$\sigma_{cr} = 2762.596517303435$

$\Lambda = 0.291450213008637$

$\rho_{Global} = 1.0$

4.5.3 Column type buckling behaviour

Column number 9

$A_{sl} = 13386.8$, $A_{sl_eff} = 13043.61$, $I_{sl} = 27290271.36$

$\sigma_{cr_c} = 264.07$

$e_1 = 71.98$, $e_2 = 60.67$

All tension = False

Buckling Values 9

$\beta_{A_c} = 0.9743634503930891$

$\lambda_{c_bar} = 0.9311710322871$

$\Phi_c = 1.0784767266940296$

Chi_c =0.6163079515675952

Critical buckling values

Chi_c: 0.6163079515675952

sigma_cr_c: 264.0766078787383

4.5.4 Interaction between plate and column buckling

all_tension: False

rho_c = 1.0

Side 3

4.5.2 Plate type behaviour

sigma_cr = 763.4553085859943

Lambda: 0.5017492377112954

Rho_Global: 1.0

4.5.3 Column type buckling behaviour

Column number 10

A_sl=16998.1, A_sl_eff=13902.39, I_sl=27320365.52

sigma_cr_c=208.2

e1=84.87, e2=47.78

All tension =False

Buckling Values 10

beta_A_c =0.8178792681216397

lambda_c_bar =0.960806674379394

Phi_c =1.10708338313521

Chi_c =0.6034751810906328

Column number 11

$A_{sl}=16998.1$, $A_{sl_eff}=13902.39$, $I_{sl}=27320365.52$

$\sigma_{cr_c}=208.2$

$e_1=84.87$, $e_2=47.78$

All tension =False

Buckling Values 11

$\beta_{A_c}=0.8178792681216398$

$\lambda_{c_bar}=0.960806674379394$

$\Phi_{c}=1.10708338313521$

$\chi_{c}=0.6034751810906328$

Critical buckling values

χ_{c} : 0.6034751810906328

σ_{cr_c} : 208.20206822935626

4.5.4 Interaction between plate and column buckling

all_tension: False

$\rho_{c} = 1.0$

Side 4

4.5.2 Plate type behaviour

$\sigma_{cr} = 2762.596517303435$

λ : 0.291450213008637

ρ_{Global} : 1.0

4.5.3 Column type buckling behaviour

Column number 12

$A_{sl}=13386.8$, $A_{sl_eff}=13043.61$, $I_{sl}=27290271.36$

$\sigma_{cr_c}=264.07$

$e_1=71.98$, $e_2=60.67$

All tension =False

Buckling Values 12

$\beta_{A_c}=0.9743634503930892$

$\lambda_{c_bar}=0.9311710322871002$

$\Phi_c=1.0784767266940298$

$\chi_c=0.6163079515675951$

Critical buckling values

χ_c : 0.6163079515675951

σ_{cr_c} : 264.0766078787382

4.5.4 Interaction between plate and column buckling

all_tension: False

$\rho_c = 1.0$

Resistance to shear and interaction shear force and bending moment for side 1

5. Resistance to shear

stiffened plate; EBPlate

k_{τ} : 1571.021788264538

η_3 : 0.2988082046987719

7.1 Interaction between shear force, bending moment and axial force

Flange -> (7.1), comment (5)

$\eta_3 \leq 0.5$; no interaction needed

utilisation: -1

Proofing Resistance to shear for each subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.14832990711883806

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.13225644628535996

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.11618298545188181

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.1001095246184037

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.08403606378492556

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.06796260295144745

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.051889142117969314

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.035815681284491176

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.01974222045101305

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.03581568128449115

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.05188914211796928

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.0679626029514474

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.08403606378492554

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.1001095246184037

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.11618298545188185

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.13225644628535996

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.353840830449827

eta_3: 0.1483299071188381

eta_3_panel < 1: pass subpanel

Resistance to shear and interaction shear force and bending moment for side 2

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 21.01369360902256

eta_3: 0.520359254539201

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

eta_3 > 0.5; interaction needed

utilisation: 0.3445193014321691

Resistance to shear and interaction shear force and bending moment for side 3

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 94.91010475849093

eta_3: 0.26156247342409644

7.1 Interaction between shear force, bending moment and axial force

Flange -> (7.1), comment (5)

eta_3 <= 0.5; no interaction needed

utilisation: -1

Proofing Resistance to shear for each subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.51015625

eta_3: 0.1793046625337844

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3625

eta_3: 0.09077769662046681

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.480625

eta_3: 0.05177784476512376

$\eta_{3_panel} < 1$: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_{τ} : 5.3625

η_3 : 0.09077769662046681

$\eta_{3_panel} < 1$: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_{τ} : 5.51015625

η_3 : 0.1793046625337844

$\eta_{3_panel} < 1$: pass subpanel

Resistance to shear and interaction shear force and bending moment for side 4

5. Resistance to shear

stiffened plate; EBPlate

k_{τ} : 21.01353383458647

η_3 : 0.6004168070617667

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

$\eta_3 > 0.5$; interaction needed

utilisation: 0.3738502166827279

