



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 : 1.6

Beta: 0.7819557364538499

Shear lag reduction for flange 3

Shear Lag is not neglectable

α_0 : 1.6

Beta: 0.8651284996081308

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

$\sigma_{cr} = 764.7960756476917$

$\Lambda = 0.42516627276630536$

$\rho_{Global} = 1.0$

4.5.3 Column type buckling behaviour

Column number 1

$A_{sl}=7991.9$, $A_{sl_eff}=6178.74$, $I_{sl}=9425706.6$

$\sigma_{cr_c}=24.44$

$e_1=71.37$, $e_2=36.82$

All tension =False

Buckling Values 1

$\beta_{A_c}=0.7731250965958131$

$\lambda_{c_bar}=2.7262613018060633$

$\Phi_c=4.700409783777019$

Chi_c = 0.11724120829089879

Critical buckling values

Chi_c: 0.11724120829089879

sigma_cr_c: 24.444585393574922

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 = 693.1471070262281

Lambda: 0.52849595408833

Rho_Global: 1.0

4.5.3 Column type buckling behaviour

Column number 2

A_sl=6025.64, A_sl_eff=4964.14, I_sl=9435491.89

sigma_cr_c=32.45

e1=60.88, e2=49.17

All tension =False

Buckling Values 2

beta_A_c = 0.8238362289037507

lambda_c_bar = 2.4423867519557727

Phi_c = 3.9294181531554626

Chi_c = 0.14270263741088354

Column number 3

$A_{sl}=6025.64$, $A_{sl_eff}=4964.14$, $I_{sl}=9435491.89$

$\sigma_{cr_c}=32.45$

$e_1=60.88$, $e_2=49.17$

All tension =False

Buckling Values 3

$\beta_{A_c}=0.8238362289037509$

$\lambda_{c_bar}=2.44238675195577$

$\Phi_c=3.929418153155455$

$\chi_c=0.14270263741088388$

Column number 4

$A_{sl}=6025.64$, $A_{sl_eff}=4964.14$, $I_{sl}=9435491.89$

$\sigma_{cr_c}=32.45$

$e_1=60.88$, $e_2=49.17$

All tension =False

Buckling Values 4

$\beta_{A_c}=0.823836228903751$

$\lambda_{c_bar}=2.44238675195577$

$\Phi_c=3.929418153155455$

$\chi_c=0.14270263741088388$

Column number 5

$A_{sl}=6025.64$, $A_{sl_eff}=4964.14$, $I_{sl}=9435491.89$

$\sigma_{cr_c}=32.45$

$e_1=60.88$, $e_2=49.17$

All tension =False

Buckling Values 5

$\beta_{A_c} = 0.8238362289037505$

$\lambda_{c_bar} = 2.442386751955767$

$\Phi_c = 3.929418153155447$

$\chi_c = 0.14270263741088418$

Critical buckling values

χ_c : 0.14270263741088354

σ_{cr_c} : 32.454870278807846

4.5.4 Interaction between plate and column buckling

all_tension: False

$\rho_c = 1.0$

Side 4

4.5.2 Plate type behaviour

$\sigma_{cr} = 538.2014903501105$

λ : 0.506826346959982

ρ_{Global} : 1.0

4.5.3 Column type buckling behaviour

Column number 6

$A_{sl} = 7991.9$, $A_{sl_eff} = 6178.74$, $I_{sl} = 9425706.6$

$\sigma_{cr_c} = 24.44$

$e_1 = 71.37$, $e_2 = 36.82$

All tension = False

Buckling Values 6

$\beta_{A_c} = 0.7731250965958131$

$\lambda_{c_bar} = 2.7262613018060624$

$\Phi_{c_c} = 4.700409783777017$

$\chi_{c_c} = 0.11724120829089885$

Critical buckling values

χ_{c_c} : 0.11724120829089885

σ_{cr_c} : 24.444585393574943

4.5.4 Interaction between plate and column buckling

all_tension: False

$\rho_{c_c} = 1.0$

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

5. Resistance to shear

stiffened plate; EBPlate

k_{τ} : 948.2774576583284

η_3 : 0.029983561745562146

7.1 Interaction between shear force, bending moment and axial force

Deck plate is ignored, as it is dimensioned with EC 3-2

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

5. Resistance to shear

stiffened plate; EBPlate

k_{τ} : 15.116578947368422

η_3 : 0.6607123212796018

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

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

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 2140.028722158777

eta_3: 0.050754962614982295

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: 5.367777777777775

eta_3: 0.07806144827514026

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 0.0585460862063552

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 0.03903072413757013

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 0.019515362068785062

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 8.319899252222056e-19

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 0.019515362068785066

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 0.03903072413757013

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 0.0585460862063552

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.367777777777775

eta_3: 0.07806144827514026

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_tau: 15.116578947368422

eta_3: 0.6607123212796018

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

7.1 Interaction between shear force, bending moment and axial force

Web -> (7.1) without iterating

Results:

EI: 16420974Nm²

interaction side 2: -0.62515049403541

interaction side 3: -1

interaction side 4: -0.62515049403541

cost: 2468CHF/m

