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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

alpha_0: 1.6

Beta: 0.7819557364538499

Shear lag reduction for flange 3

Shear Lag is not neglectable

alpha_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 0.005

4.5 Stiffened plate elements with longitudinal stiffeners

Side 2

4.5.4 Interaction between plate and column buckling

all_tension: False

rho_c = 1

Side 3

4.5.2 Plate type behaviour

sigma_cr = 693.155152120132

Lambda: 0.528272198215649

Rho_Global: 1.0

4.5.3 Column type buckling behaviour

Column number 1

A_sl=6025.64, A_sl_eff=4960.0, I_sl=9435491.89

sigma_cr_c=324548.7

e1=60.88, e2=49.17

All tension =False

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Buckling Values 1

beta_A_c =0.8231483349563683

lambda_c_bar =0.024413668563332266

Phi_c =0.46531274481815865

Chi_c =1.0752866351197248

Column number 2

A_sl=6025.64, A_sl_eff=4960.0, I_sl=9435491.89

sigma_cr_c=324548.7

e1=60.88, e2=49.17

All tension =False

Buckling Values 2

beta_A_c =0.8231483349563684

lambda_c_bar =0.02441366856333224

Phi_c =0.46531274481815865

Chi_c =1.0752866351197248

Column number 3

A_sl=6025.64, A_sl_eff=4960.0, I_sl=9435491.89

sigma_cr_c=324548.7

e1=60.88, e2=49.17

All tension =False

Buckling Values 3

beta_A_c =0.8231483349563686

lambda_c_bar =0.02441366856333225

Phi_c =0.46531274481815865

Chi_c =1.0752866351197248

Column number 4

A_sl=6025.64, A_sl_eff=4960.0, I_sl=9435491.89

sigma_cr_c=324548.7

e1=60.88, e2=49.17

All tension =False

Buckling Values 4

beta_A_c =0.8231483349563682

lambda_c_bar =0.02441366856333221

Phi_c =0.46531274481815865

Chi_c =1.0752866351197248

Critical buckling values

Chi_c: 1.0752866351197248

sigma_cr_c: 324548.70278807846

4.5.4 Interaction between plate and column buckling

all_tension: False

rho_c = 1.0752866351197248

Side 4

4.5.4 Interaction between plate and column buckling

all_tension: False

rho_c = 1

<div style="background-color: red;">

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

</div>

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 948.2774649297252

eta_3: 0.029739872548061177

7.1 Interaction between shear force, bending moment and axial force

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

<div style="background-color:red;">

Resistance to shear and interaction shear force and bending moment for side 2
</div>

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 6.4025

eta_3: 1.0152298313496109

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

<div style="background-color:red;">

Resistance to shear and interaction shear force and bending moment for side 3
</div>

5. Resistance to shear

stiffened plate; EBPlate

k_tau: 2140.029214538078

eta_3: 0.05566693889886314

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: 5.3677777777777775

eta_3: 0.08561609835973506

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.06421207376980129

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.04280804917986753

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.021404024589933762

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 9.125084513044796e-19

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.021404024589933766

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.042808049179867524

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.0642120737698013

eta_3_panel < 1: pass subpanel

5. Resistance to shear

unstiffened plate; (A.5)

k_tau: 5.3677777777777775

eta_3: 0.08561609835973506

eta_3_panel < 1: pass subpanel

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

5. Resistance to shear

  unstiffened plate; (A.5)

  k_tau: 6.4025

  eta_3: 1.0152298313496109

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: 14621108Nm^2

interaction side 2: 0.2405077242579735

interaction side 3: -1

interaction side 4: 0.2405077242579735

cost: 2404CHF/m

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