

SCI	Tata Steel	v9.0.34.24751
Job Reference:	Projektiranje sovprežne AB plošče	Date: 30/06/2023
Deck Reference:	CF60/0.9_350	Time: 14:12:16
Company Name:		Job No: Magistrsko delo
Client Name:	UL FGG	Calcs By: Polona Ivančič, d.i.g. (UN)
Checked By:		File Name: sovprezna_plosca.pmd

Full Output

Note: Section Designed to Eurocodes, UK National Annex

Construction Stage:	PASS	Max Unity Factor:	0.31
Normal Stage:	PASS	Max Unity Factor:	0.16
Fire Condition:	PASS	Max Unity Factor:	0.20
Serviceability:	SATISFACTORY	Max Unity Factor:	0.41

*** Section Adequate ***

Floor Plan Data (unpropped composite construction with ComFlor 60/0.9/S350 decking)

Beam centres - equal	2.00 m	Profile span type	Multi-span
Beam or wall width	150 mm	Propping	None
		Concrete span type	End

Profile Data (ComFlor 60/0.9/S350 decking.)

Depth	60 mm	Pitch of deck ribs	300 mm
Trough width	120 mm	Crest width	130.7 mm
Nominal sheet thickness	0.90 mm	Design sheet thickness	0.86 mm
Deck weight	0.10 kN/m ²	Yield strength	350 N/mm ²

Concrete Slab (Normal Weight Concrete ; Grade C25/30; Mesh : A252)

Overall slab depth	130 mm		
Concrete characteristic strength	25 N/mm ²	Concrete wet density	2550 kg/m ³
Modular ratio	10	Concrete dry density	2450 kg/m ³

Bar reinforcement :

Diameter	8 mm	Yield strength	500 N/mm ²
Distance from slab soffit	30 mm		

Mesh reinforcement :

Mesh	A252	Yield strength	500 N/mm ²
Cover to Mesh	30 mm	Mesh Layers	Double
Account for End Anchorage	Yes	Shear connectors per rib	1
Diameter of Shear Connectors	19 mm		
Screed depth	50 mm	Screed density	2200 kg/m ³

Section Properties

*** Note - 1: All values of inertia are expressed in steel units

*** Note - 2: Average inertia is used for deflection calculations for the composite stage

*** Note - 3: Cracked dynamic inertia is used for natural frequency calculations

Deck Profile

Sagging Inertia, I _y	92.770 cm ⁴ /m	Area of profile (Net), A _p	1276 mm ² /m
Hogging Inertia, I _y	86.130 cm ⁴ /m	Effective area of profile	1176.00 mm ² /m

Composite

Inertia, I _y - Uncracked	1520 cm ⁴ /m	Inertia, I _y - Cracked	771 cm ⁴ /m
Average inertia	1146 cm ⁴ /m	Cracked inertia (dynamic)	854 cm ⁴ /m
Shear bond coefficients - Tau	0.26		
Concrete volume	0.097 m ³ /m/m		

Loads Acting on Slab (Actions)

*** Note: Slab subjected to uniformly distributed loads (UDL) ONLY

Imposed (occupancy)	3.00 kN/m ²	Partitions	0.50 kN/m ²
Ceilings and services	0.50 kN/m ²	Finishes	0.60 kN/m ²
Self weight of concrete slab (wet)	2.44 kN/m ²	Self weight of decking	0.10 kN/m ²
Self weight of concrete slab (dry)	2.34 kN/m ²	Self weight of screeds	1.08 kN/m ²
Construction load	1.50 kN/m ²		

Line Loads Perpendicular to Deck Span (Actions)

None

Line Loads Parallel to Deck Span (Actions)

None

Fire Data

Design method	Mesh + Deck Method	Fire resistance period	60 mins
Non-permanent imposed loads	N/A		

Partial Safety Factors**Actions**

Permanent, gamma G	1.35
Permanent - accidental, gamma GA	N/A
Variable, gamma Q	1.50
Combination factor - Fire, psi 1	0.50
Combination factor, psi 0	0.70

Materials

Structural steel - elastic, gamma M0	1.00
Structural steel - buckling, gamma M1	1.00
Concrete, gamma C	1.50
Reinforcement, gamma S	1.15
Combination factor, psi 2	0.30

Construction Stage**Loadings**

	@ SLS (kN/m²)	@ ULS (kN/m²)
Self weight of decking	0.10	0.14
Self weight of concrete slab (wet)	2.44	3.66
Reinforcement	0.10	0.14
Total weight of slab	2.64	3.93
Construction live load	0.75	1.13
Construction live load patch	0.75	1.13

Effective Span of DeckEffective span L_e , is the smaller of

- 1) c/c of supports = 2.00 m
 - 2) clear span + deck depth = $1.85 + 60.0 / 1000$
= 1.91 m
- Therefore L_e = 1.91 m

Shear Resistance Check (BS EN 1993-1-3 Clause 6.1.5 and 6.1.7.3)

Applied shear	7.03 kN/m			
Web shear resistance, P_v	58.64 kN/m	Unity Factor	0.12	PASS
Applied reaction	11.27 kN/m			
Web crushing resistance, P_w	36.14 kN/m	Unity Factor	0.31	PASS

Bending Resistance Check (BS EN 1993-1-3 Clause 6.1.4.1)

*** Note: Redistribution of hogging moment is applied, based on equilibrium of the continuous decking as the sagging moment does not exceed design resistance.

Sagging

Max applied moment	2.16 kNm/m			
Moment resistance	9.30 kNm/m	Unity Factor	0.23	PASS

Hogging

Applied moment	0.00 kNm/m			
Moment resistance	7.50 kNm/m	Unity Factor	0.00	PASS

Combined Effects**Bending and Web Crushing (BS EN 1993-1-3 Clause 6.1.11)**

*** Note: Redistribution of hogging moment is applied, based on equilibrium of the continuous decking as the sagging moment does not exceed design resistance.

Design unity factor is the worst case of

1. Maximum hogging:

$$(6.28 / 36.14 + 0.00 / 7.50) / 1.25 = 0.14$$

2. Maximum reaction:

$$(11.27 / 36.14 + 0.00 / 7.50) / 1.25 = 0.25$$

Design unity factor 0.25

PASS

Bending and Shear (BS EN 1993-1-3 Clause 6.1.10)

*** Note: Low shear - This check is not required

Support Interaction Check at Serviceability Limit State (BS EN 1993-1-3 Clause 7.2)

Design unity factor is the worst case of

1. Maximum hogging:

$$(9.21 / 36.14 + 1.59 / 7.50) / (0.9 * 1.25) = 0.41$$

2. Maximum reaction:

$$(9.21 / 36.14 + 1.59 / 7.50) / (0.9 * 1.25) = 0.41$$

Design unity factor 0.41

PASS

Deflection

Allowable deflection is the lesser of

1) Effective span / deflection limit without ponding 10.61 mm

2) Deflection limit without ponding, absolute maximum value 20.00 mm

3) Slab depth / 10 13.00 mm

Max self weight deflection = 1.28mm <= 10.61mm

SATISFACTORY

Normal Stage

Span

The effective composite span is 1.95 m

Loadings

	@ SLS (kN/m ²)	@ ULS (kN/m ²)
Dead (Profile, concrete, reinforcement)	2.55	3.44
Imposed	3.50	5.25
Superimp (Ceiling, services, screed, finishes)	2.18	2.94
Total	8.23	11.63

All line and point described above in 'Loading Details' are applied at the Normal stage

Shear Resistance Check

Vertical Shear (Proprietary Method)

Maximum applied shear 10.85 kN/m

Shear resistance of end diaphragm (ComFlor 225 only) 0.00 kN/m ***test value

Vertical shear resistance in the troughs is the greater of:

$$1. (0.49 * 282.17 * 100.00) / 1000$$

$$2. (0.12 * 2.00 * (100 * 0.01 * 25.00)^{1/3} * 282.17 * 100.00) / 1000$$

$$= 16.64 \text{ kN/m}$$

Vertical shear resistance above the ribs is the greater of:

$$1. (0.49 * 217.83 * 34.00) / 1000$$

$$2. (0.00 * 2.00 * (100 * 0.02 * 25.00)^{1/3} * 217.83 * 34.00) / 1000$$

$$= 6.55 \text{ kN/m}$$

Vertical shear resistance of the decking is:

$$(1000 / 120.00) * 2 * 11134.51 * \cos(22.63) / 1000 = 68.52 \text{ kN/m}$$

Total vertical shear resistance is: 91.71 kN/m

Unity Factor = 10.85/91.71 = 0.12 < 1

PASS

Punching Shear (BS EN 1994-1-1 Clause 9.7.6)

N/A - no concentrated loads have been applied

Bending Resistance Check (BS EN 1994-1-1 Clause 9.7.2)

Applied bending moment	5.28 kNm/m
Depth of concrete stress block	32.22 mm
Lever arm	80.72 mm
Compression in concrete	365.12 kN/m
Moment Resistance	32.53 kNm/m
Unity Factor = $5.28/32.53 = 0.16 < 1$	

PASS

Fire Resistance

Effective span in fire	1.85 m
Fire total UDL	6.50 kN/m ²
Fire free moment	2.78 kNm/m
Moment resistance	12.08 kNm/m
Total moment resistance	13.65 kNm/m
Unity Factor	0.20

PASS

Deflection**Properties**

Modular ratio	10.00
Uncracked section inertia	15202130.00 mm ⁴
Cracked section inertia	7708658.00 mm ⁴

Deflection Checks

Imposed load deflection	0.27 mm
Allowable deflection (20 mm max)	20.00 mm
Total deflection	0.44 mm
Allowable deflection	7.79 mm

SATISFACTORY

PASS

Dynamic Sensitivity

Dynamic inertia (cracked section)	854.05 cm ⁴
Maximum deflection	0.52 mm
Frequency	24.85 Hz
Unity Factor = $3.00/24.85 = 0.12 < 1$	

PASS