FRAMEAI - FABRICATION DRAWING

Single-Bay Portal Frame — Demo Structure

MARK	PROFILE	SEC CLASS	LENGTH (mm)	MASS (kg)	LOCATION
B01	HEB 240	Class 1	5500	4577	Left column
B02	HEB 240	Class 1	5500	4577	Right column
R01	IPE 360	Class 1	7020	4008	Left rafter
R02	IPE 360	Class 1	7020	4008	Right rafter
RC01	RC 250x500	Class -	4200	263	Ground floor beam

SUMMARY

Total Members: 5

Total Mass: 17.2 t

Profiles: HEB 240, IPE 360

REV A

Drawn: FrameAI

18/06/2026

SCALE: NTS

NA: Eurocode (Recommended)

MEMBER: B01 - HEB 240

Left column | Length: 5500 mm | Class 1

MEMBER DATA

Mark: B01
Profile: HEB 240
Length: 5500 mm
Mass: 4577 kg
Section Class: 1
Location: Left column

HEB 240 - Section Class 1 (EN 1993-1-1)

5500 mm

MEMBER: B02 - HEB 240

Right column | Length: 5500 mm | Class 1

MEMBER DATA

Mark: B02
Profile: HEB 240
Length: 5500 mm
Mass: 4577 kg
Section Class: 1
Location: Right column

HEB 240 - Section Class 1 (EN 1993-1-1)

MEMBER: R01 - IPE 360

Left rafter | Length: 7020 mm | Class 1

MEMBER DATA

Mark: R01
Profile: IPE 360
Length: 7020 mm
Mass: 4008 kg
Section Class: 1
Location: Left rafter

IPE 360 - Section Class 1 (EN 1993-1-1)

MEMBER: R02 - IPE 360

Right rafter | Length: 7020 mm | Class 1

MEMBER DATA

Mark: R02
Profile: IPE 360
Length: 7020 mm
Mass: 4008 kg
Section Class: 1
Location: Right rafter

IPE 360 - Section Class 1 (EN 1993-1-1)

7020 mm

MEMBER: RC01 - RC 250x500

Ground floor beam | Length: 4200 mm | Class -

MEMBER DATA

Mark: RC01
Profile: RC 250x500
Length: 4200 mm
Mass: 263 kg
Section Class: -
Location: Ground floor beam

RC 250x500 - Section Class - (EN 1993-1-1)

4200 mm

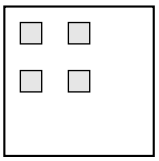
CONNECTION DETAILS - EN 1993-1-8

Bolted connection schedule with utilisation checks — γ_M2 = 1.25

MARK	TYPE	CONN.	BOLT SPEC	PLATE	GOV. CHECK	UTIL.
C01	end plate	M	4× M20 gr.8.8	10mm S275	shear	16%
C02	end plate	M	4× M20 gr.8.8	10mm S275	shear	16%
C03	end plate	P	2× M20 gr.8.8	8mm S275	bearing	17%

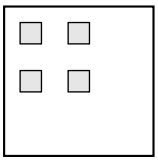
CONNECTION DETAIL SKETCHES

C01



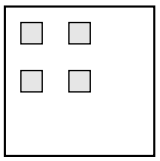
M20 gr.8.8

C02



M20 gr.8.8

C03



M20 gr.8.8

UTILISATION LEGEND:

< 85% (OK) 85-100% (Marginal) > 100% (FAIL)

Ref: EN 1993-1-8:2005 §3 — γ_M2 = 1.25

CONNECTION DETAIL — C01

End-plate (shear) · EN 1993-1-8:2005 §3 · 4× M20 gr.8.8

PASS

η = 16%

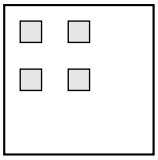
GEOMETRY & LOADING

Bolt spec: 4× M20 gr.8.8

Shear planes: 1 | Plate: 10mm S275 t=-mm

V_Ed: - N_Ed: -

Type: M Governing: shear



M20 gr.8.8

LIMIT STATE CHECKS (EN 1993-1-8 §3)

CHECK	CAPACITY (kN)	DEMAND (kN)	RATIO	STATUS
Bolt shear (F_v,Rd) EN §3.6	-	-	-	OK
Bearing (F_b,Rd) EN §3.6	-	-	-	OK
Bolt tension (F_t,Rd) EN §3.	-	-	-	OK
Block tearing (V_eff,1,Rd) §	-	-	-	OK

[OK] C01: PASS — utilisation η = 16% (governing: shear)

Code references:

EN 1993-1-8:2005 Table 3.1 (bolt grades) · §3.6.1 (shear/bearing) · §3.6.2 (tension) · §3.7 (interaction) · §3.10 (block tearing)

γ_M2 = 1.25 | α_v = 0.6 (8.8/10.9) / 0.5 (≤6.8) | Clearance hole = d + 2mm (Table 3.3)

CONNECTION DETAIL — C02

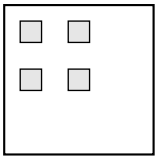
End-plate (shear) · EN 1993-1-8:2005 §3 · 4× M20 gr.8.8

PASS

η = 16%

GEOMETRY & LOADING

Bolt spec: 4× M20 gr.8.8
Shear planes: 1 | Plate: 10mm S275 t=-mm
V_Ed: - N_Ed: -
Type: M Governing: shear



M20 gr.8.8

LIMIT STATE CHECKS (EN 1993-1-8 §3)

CHECK	CAPACITY (kN)	DEMAND (kN)	RATIO	STATUS
Bolt shear (F_v,Rd) EN §3.6	-	-	-	OK
Bearing (F_b,Rd) EN §3.6	-	-	-	OK
Bolt tension (F_t,Rd) EN §3.	-	-	-	OK
Block tearing (V_eff,1,Rd) §	-	-	-	OK

[OK] C02: PASS — utilisation η = 16% (governing: shear)

Code references:

EN 1993-1-8:2005 Table 3.1 (bolt grades) · §3.6.1 (shear/bearing) · §3.6.2 (tension) · §3.7 (interaction) · §3.10 (block tearing)

γ_M2 = 1.25 | α_v = 0.6 (8.8/10.9) / 0.5 (≤6.8) | Clearance hole = d + 2mm (Table 3.3)

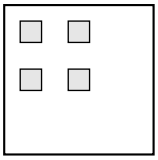
CONNECTION DETAIL — C03

End-plate (shear) · EN 1993-1-8:2005 §3 · 2× M20 gr.8.8

PASS
η = 17%

GEOMETRY & LOADING

Bolt spec: 2× M20 gr.8.8
Shear planes: 1 | Plate: 8mm S275 t=-mm
V_Ed: - N_Ed: -
Type: P Governing: bearing



M20 gr.8.8

LIMIT STATE CHECKS (EN 1993-1-8 §3)

CHECK	CAPACITY (kN)	DEMAND (kN)	RATIO	STATUS
Bolt shear (F_v,Rd) EN §3.6	-	-	-	OK
Bearing (F_b,Rd) EN §3.6	-	-	-	OK
Bolt tension (F_t,Rd) EN §3.	-	-	-	OK
Block tearing (V_eff,1,Rd) §	-	-	-	OK

[OK] C03: PASS — utilisation η = 17% (governing: bearing)

Code references:
EN 1993-1-8:2005 Table 3.1 (bolt grades) · §3.6.1 (shear/bearing) · §3.6.2 (tension) · §3.7 (interaction) · §3.10 (block tearing)
γ_M2 = 1.25 | α_v = 0.6 (8.8/10.9) / 0.5 (≤6.8) | Clearance hole = d + 2mm (Table 3.3)

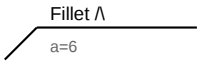
WELD DETAILS - EN 1993-1-8 §4 / ISO 2553

Fillet weld schedule — directional & simplified methods — γ_M2 = 1.25

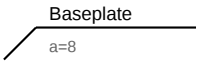
MARK	TYPE	WELD SPEC	THROAT (mm)	L_eff (mm)	METHOD	UTIL.	STATUS
W01	baseplate	a=6mm S275 L=150mm	a=6	138	simplified	16%	OK
W02	baseplate	a=6mm S275 L=150mm	a=6	138	simplified	16%	OK
W03	end plate haunch	a=8mm S355 L=300mm	a=8	284	directional	30%	OK

ISO 2553 WELD SYMBOLS (schematic)

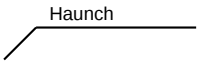
Fillet weld - arrow side



Fillet weld - other side



All-round fillet (O flag)



End-plate haunch weld

REFERENCES: EN 1993-1-8:2005 §4.5.3.2 eq.4.1 (directional) | §4.5.3.3 eq.4.4 (simplified) | β_w Table 4.1 | γ_M2 = 1.25

Symbols per ISO 2553:2019. Throat ≥ 3mm, ≤ 0.7×t_min (§4.5.2).

[OK] Welds verified per EN 1993-1-8 §4 -- all welds PASS

RC BEAM BENDING - EN 1992-1-1 §6.1

Singly-reinforced rectangular beam design (rectangular stress block, §3.1.7)

MARK	bxh (mm)	fck / fyk	M_Ed (kNm)	A_s,req (mm2)	x/d	M_Rd (kNm)	UTIL.	GOVERNS
RC01	250x500	C30/B500	-	1799	0.511	280	100%	ductility limit ex

[!] x/d = 0.511 > ξ_lim(0.45) — compression reinforcement required for ductility

EN 1992-1-1:2004 §6.1 - rectangular stress block (§3.1.7)

A_s,min §9.2.1.1 | ξ_lim = 0.45 (f_ck ≤ 50) / 0.35 (f_ck > 50) | γ_c = 1.5 | γ_s = 1.15 | α_cc = 0.85