Ingenieursburo **Ulehake**
Ontwerpers voor een vitale samenleving

D230085007
D230085007

Sachem Europe BV, Zaltbommel

Fundatie t.b.v. RTO

Constructieberekening Fundatie

Opdrachtnummer : **15877-14**
Document : Ber-11
Status : Definitief
Datum : 04-08-2022

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+31 4 12 63 49 45

Ingenieursburo Ulehake

Opdrachtgever:

Sachem Europe BV
Van Voordenpark 15
5301 KP Zaltbommel

Ontwerp:

-
-
-

Adviseur Bouwconstructies:

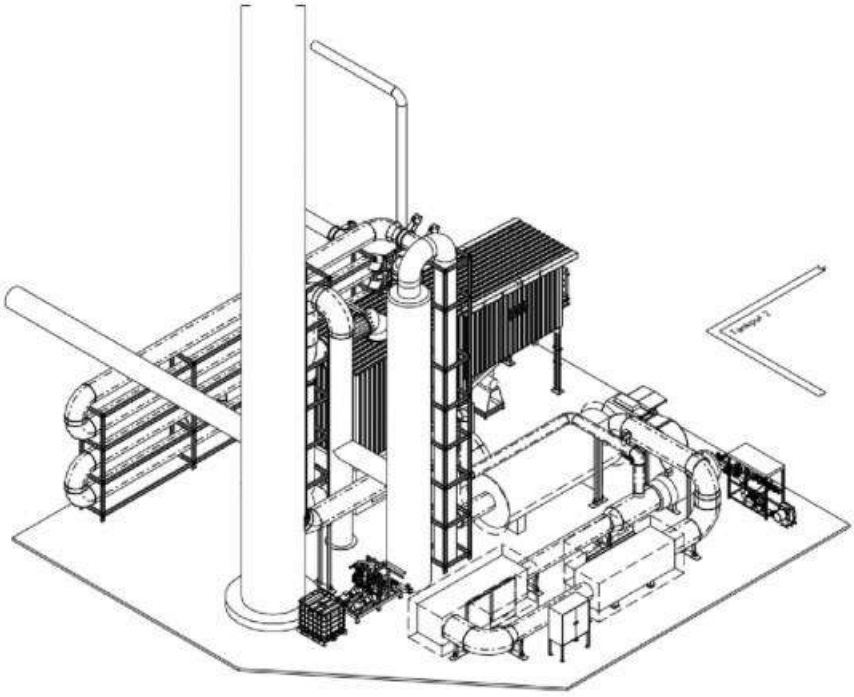
Ingenieursburo Ulehake
Rossinistraat 40
Postbus 402
5340 AK Oss
Tel. (0412) 63 49 45
www.ulehake.nl

Opgesteld [redacted] **Gecontroleerd** : -

INHOUDSOPGAVE

1. INLEIDING

In opdracht van Sachem Europe BV heeft Ingenieursburo Ulehake BV de benodigde fundatie berekend, voor het plaatsen van de RTO op het terrein aan het Van Voordenpark 15 te Zaltbommel.



2. UITGANGSPUNTEN

2.1. Normen

Berekeningen worden uitgevoerd conform de Eurocode (NEN-EN + Nationale bijlagen NL) voor gebouwen

Bouwbesluit 2012	Voorschriften met betrekking tot het bouwen, gebruiken en slopen van bouwwerken

Eurocode 0	**Grondslagen**
EN 1990	Grondslagen van het constructief ontwerp

Eurocode 1	**Belastingen op constructies**
EN 1991-1-1	Algemene belastingen - Volumieke gewichten, eigen gewicht, opgelegde belastingen
EN 1991-1-2	Algemene belastingen - Belasting bij brand
EN 1991-1-3	Algemene belastingen - Sneeuwbelasting
EN 1991-1-4	Algemene belastingen - Windbelasting

Eurocode 2	**Ontwerp en berekening van betonconstructies**
EN 1992-1-1	Algemene regels en regels voor gebouwen
EN 1992-1-2	Algemene regels - Ontwerp en berekening van constructies bij brand

Eurocode 3	**Ontwerp en berekening van staalconstructies**
EN 1993-1-1	Algemene regels en regels voor gebouwen
EN 1993-1-2	Algemene regels - Ontwerp en berekening van constructies bij brand
EN 1993-1-3	Algemene regels - Aanvullende regels voor koudgevormde dunwandige profielen en
EN 1993-1-6	Algemene regels - Sterkte en stabiliteit van staalconstructies
EN 1993-1-8	Algemene regels - Ontwerp en berekening van verbindingen

Eurocode 5	**Ontwerp en berekening van houtconstructies**
EN 1995-1-1	Algemene regels en regels voor gebouwen
EN 1995-1-2	Algemene regels - Ontwerp en berekening van constructies bij brand

Eurocode 6	**Ontwerp en berekening van constructies van metselwerk**
EN 1996-1-1	Algemene regels voor constructies van gewapend en ongewapend metselwerk

Eurocode 7	**Geotechnisch ontwerp**
EN 1997-1	Algemene regels

2.2. Belastingfactoren en combinaties

Gevolgklasse, ontwerplevensduur en veiligheidsfactoren

EN 1990 NB tabel B1 & EN 1991-1-7 NB tabel A1 - Gevolgklasse
CC1 industrie, geen gebouw zijnde, eengezinswoningen (max 3 lagen), industrie (1 of 2 lagen)
Nieuwbouw K_{FI} 0,90 [-]

EN 1990 NB tabel A1.1 - Gebruiksclassificatie

Categorie: E: industrie- of opslagruimtes			Sneeuw en Wind		
Ψ_0 1,00	Ψ_1 0,90	Ψ_2 0,80	Ψ_0 0,00	Ψ_1 0,20	Ψ_2 0,00

EN 1990 NB tabel 2.1 - Ontwerplevensduur		EN 1990 NB art. A1.1 (2)	Ψ_t	1,00	[-]
Klasse:	3	Reductie factor belastingen			
Richtwaarden	50 [jaar]				
Gebouwen en andere gewone constructies					

EN 1990 art. 6.4 & bijlage A NB - Uiterste grenstoestand (blijvend)

Groep	Vlg.		Blijvende belasting		Overheersende belasting		Belasting gelijktijdig met de overheersende
A: EQU	6.10	Ongunstig	1,10 $G_{kj;sup}$	+	1,35 $Q_{k,1}$	+	1,35 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)
	6.10	Gunstig	0,90 $G_{kj;inf}$	+	1,35 $Q_{k,1}$	+	1,35 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)
B: STR/GEO	6.10a	Ongunstig	1,22 $G_{kj;sup}$	+		+	1,35 $\Psi_{0;i}$ $Q_{k,i}$ (i ≥ 1)
	6.10a	Gunstig	0,90 $G_{kj;inf}$	+		+	1,35 $\Psi_{0;i}$ $Q_{k,i}$ (i ≥ 1)
B: STR/GEO	6.10b	Ongunstig	1,08 $G_{kj;sup}$	+	1,35 $Q_{k,1}$	+	1,35 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)
	6.10b	Gunstig	0,90 $G_{kj;inf}$	+	1,35 $Q_{k,1}$	+	1,35 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)
C: STR/GEO	6.10	Ongunstig	1,00 $G_{kj;sup}$	+	1,30 $Q_{k,1}$	+	1,30 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)
	6.10	Gunstig	1,00 $G_{kj;inf}$	+	1,30 $Q_{k,1}$	+	1,30 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)

EN 1990 art. 6.4 & bijlage A NB - Uiterste grenstoestand (tijdelijk)

Groep	Vlg.		Blijvende belasting		Overheersende belasting		Belasting gelijktijdig met de overheersende
Buitengewoon	6.11b	Ongunstig	1,00 $G_{kj;sup}$	+	1,00 A_d	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)
(Brand)	6.11b	Gunstig	1,00 $G_{kj;inf}$	+	1,00 A_d	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)
Aardbeving	6.12b	Ongunstig	1,00 $G_{kj;sup}$	+	1,00 A_{Ed}	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)
	6.12b	Gunstig	1,00 $G_{kj;inf}$	+	1,00 A_{Ed}	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)

* Voor wind op de hoofddraagconstructie $\Psi_{1,1}.Q_{k,1}$; overige gevallen $\Psi_{2,i}$

EN 1990 art. 6.5 & bijlage A - Bruikbaarheidsgrenstoestand

Combinatie	Vlg.		Blijvende belasting		Overheersende belasting		Belasting gelijktijdig met de overheersende
Karakteristiek	6.14b	Ongunstig	1,00 $G_{kj;sup}$	+	1,00 $Q_{k,1}$	+	1,00 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)
	6.14b	Gunstig	1,00 $G_{kj;inf}$	+	1,00 $Q_{k,1}$	+	1,00 $\Psi_{0;i}$ $Q_{k,i}$ (i > 1)
Frequent	6.15b	Ongunstig	1,00 $G_{kj;sup}$	+	1,00 $\Psi_{1;1}$ $Q_{k,}$	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)
	6.15b	Gunstig	1,00 $G_{kj;inf}$	+	1,00 $\Psi_{1;1}$ $Q_{k,}$	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)
Quasi-blijvend	6.16b	Ongunstig	1,00 $G_{kj;sup}$	+	0,00 $\Psi_{2;1}$ $Q_{k,}$	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)
	6.16b	Gunstig	1,00 $G_{kj;inf}$	+	0,00 $\Psi_{2;1}$ $Q_{k,}$	+	1,00 $\Psi_{2;i}$ $Q_{k,i}$ (i > 1)

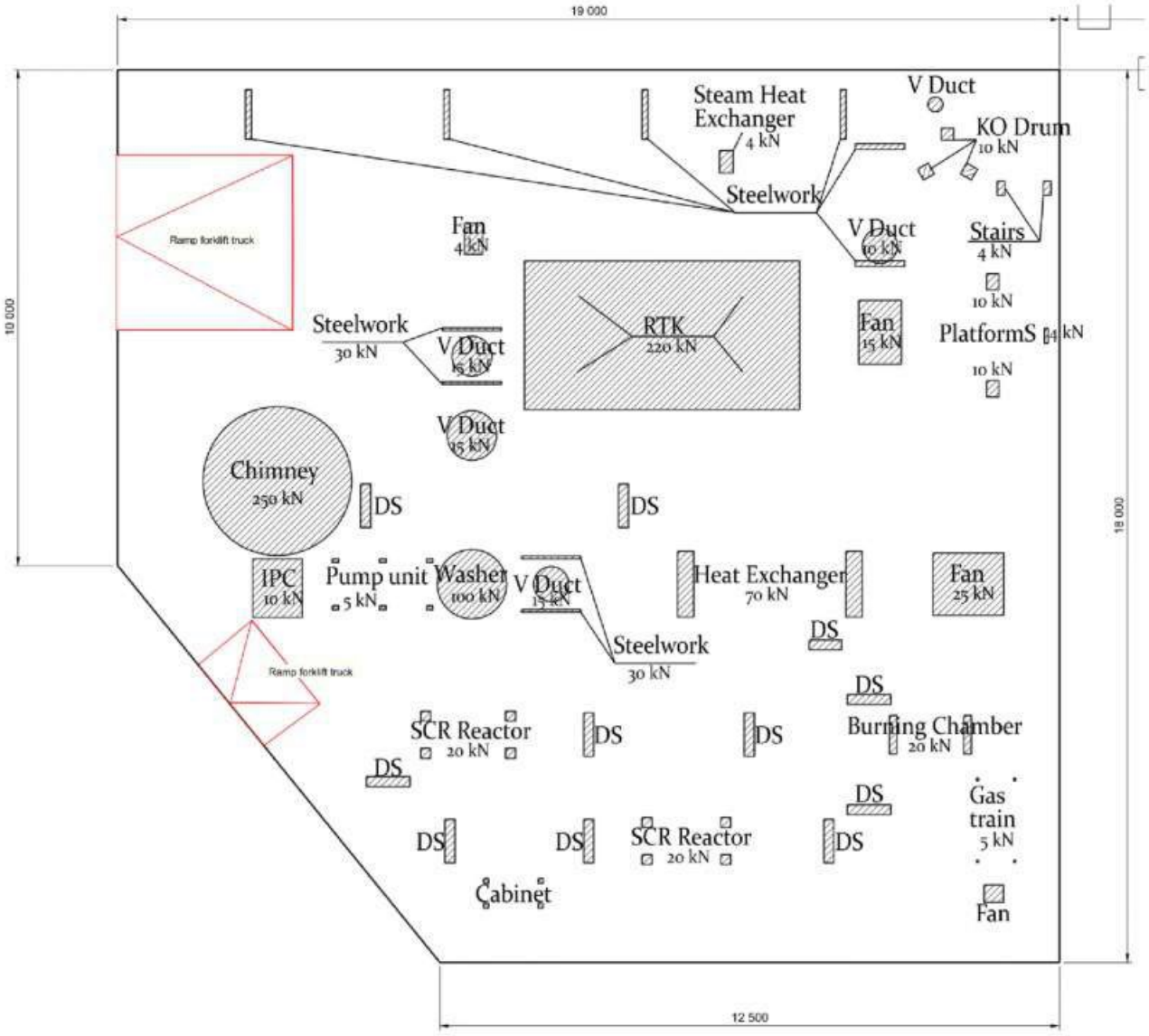
2.3. Materialen

Betonconstructies	Beton kwaliteit	
Fundatie	C30/37	XC4, XF2
Wapening	B500A	voor staven rond 4 en 5
Wapening	B500B	overige diameters

2.4. Basisbelastingen

Belastingen uit installaties cf. opgave derden. Deze belastingen zijn omgeslagen naar een veranderlijke belasting voor het vloeroppervlak van 15,0 kN/m2. Enkel de zwaardere componenten (chimney, washer & RTO-unit) zijn separaat als belasting toegevoegd in de berekening van de fundatieplaat.

Voor de belastingen (moment t.g.v. windbelasting) uit de schoorsteen is de berekening van de leverancier van de schoorsteen aagehouden.



Support reactions

Node	at γ_F-fold loads V	H	M	at 1.00-fold loads V	H	M
-	kN	kN	kNm	kN	kN	kNm
10	176.440	99.525	2198.329	135.723	62.203	1373.955

2.5. Milieuklasse

EN 1990 NB tabel 2.1 - Ontwerplevensduur

Klasse: 3
Richtwaarden 50 [jaar]
Gebouwen en andere gewone constructies

Specifieke kwaliteitsbeheersing Nee

Als er sprake is van afwerkingen of nabewerkingen waardoor de dekking gecomprimeerd kan worden, dient een toeslag van minimaal 5 mm op de dekking toegepast te worden.

Element	Sterkteklasse	zijde	Milieuklassen					minimale dekking (mm)	max scheur-wijdte (mm)
			carbonatie	chloriden	zeewater	vorst	chemisch		
Fundatie	C30/37	Boven	XC4			XF2		35	0,3
		Onder	XC4					35	0,3
Geometrie Vloer		Korrel <32	Wap. Dia. 10			Uitvoering Werkvloer			

2.6. Peil van het project

Paallengte/Aanlegdiepte is bepaald aan de hand van het aangehouden peil op basis van de hoogte van het huidige maaiveld. Voor aanvang werkzaamheden dient men te controleren of het peil ten opzichte van NAP overeenkomt met de opgegeven uitgangspunten.

- PEIL = 3,00 m + NAP

2.7. Fundering

Geotechnisch rapport

Grond mechanisch onderzoek	JA
Funderingsadvies	NEE
Uitgevoerd door	Geosonda
Rapportnummer/kenmerk	17038234-1281
Datum	1-4-2021

Keuze fundering: op palen

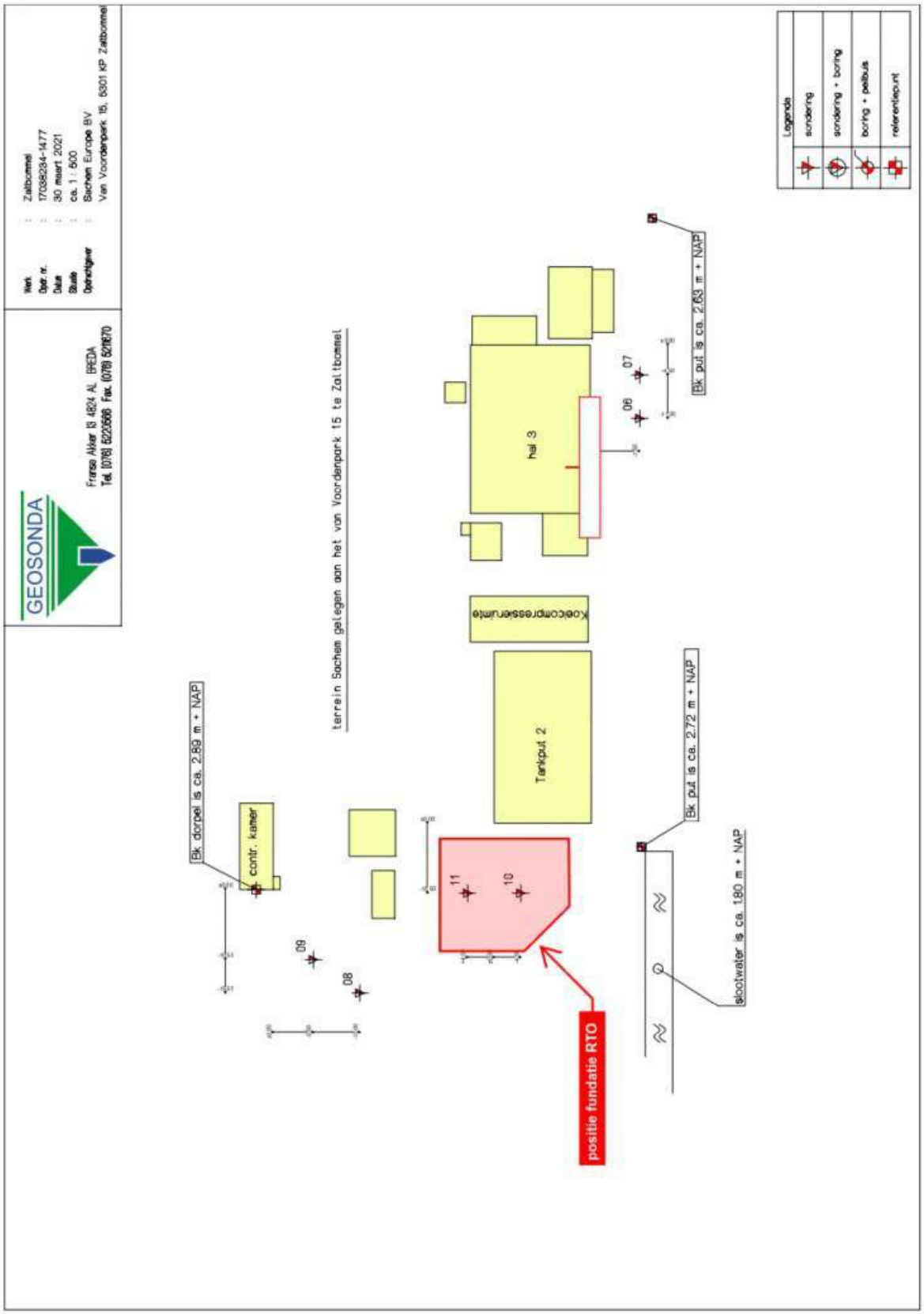
Gekozen is voor een fundering op palen. Volgende palen zijn aangehouden:

Paaltype	Afmeting [mm]	Draagvermogen [kN]	Paalpunt t.o.v. NAP [m]
Avegaarpaal	400	487	-10,5

Korf [Ø*n]	Korf lengte [mm]	Centreerstaaf [Ø * mm]	
5Ø12	4,0 m	25	lengte centreerstaaf 7,50 m

3. CONSTRUCTIE BEREKENING

3.1. Sonderingen

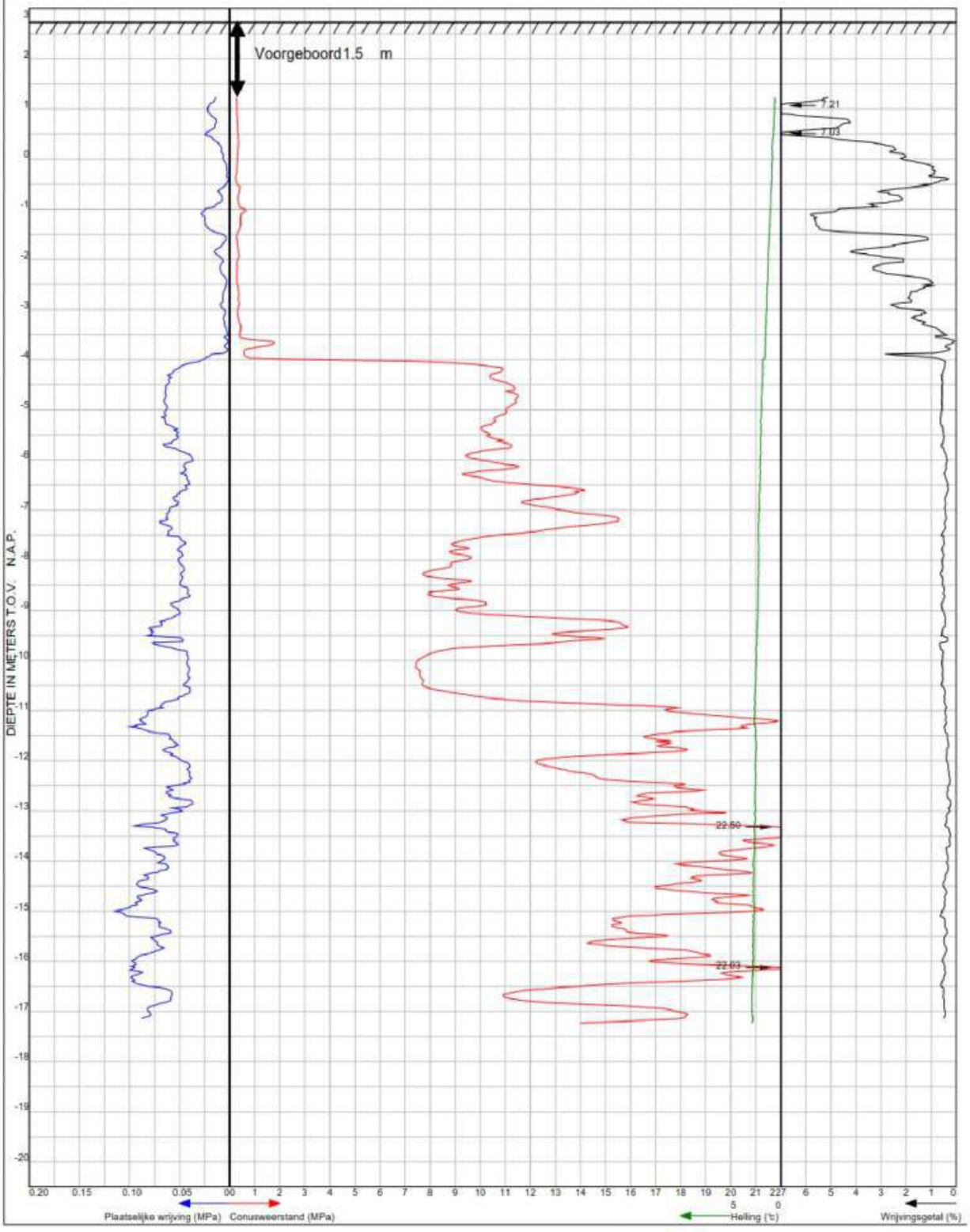


GEOSONDA

Franse Akker 13, 4824 AL Breda
Tel. (076) 5220566 Fax (076) 5211670

Opdrachtnr.: 17038234 Sondering: 10

Plaats: Zaltbommel Datum: 30-3-2021
Locatie: Van Voordenpark 15
Maaiveldhoogte: 2.75 m t.o.v. N.A.P. sondering volgens
Grondwaterstand: m t.o.v. maaiveld NEN-EN-ISO 22476-1 K2

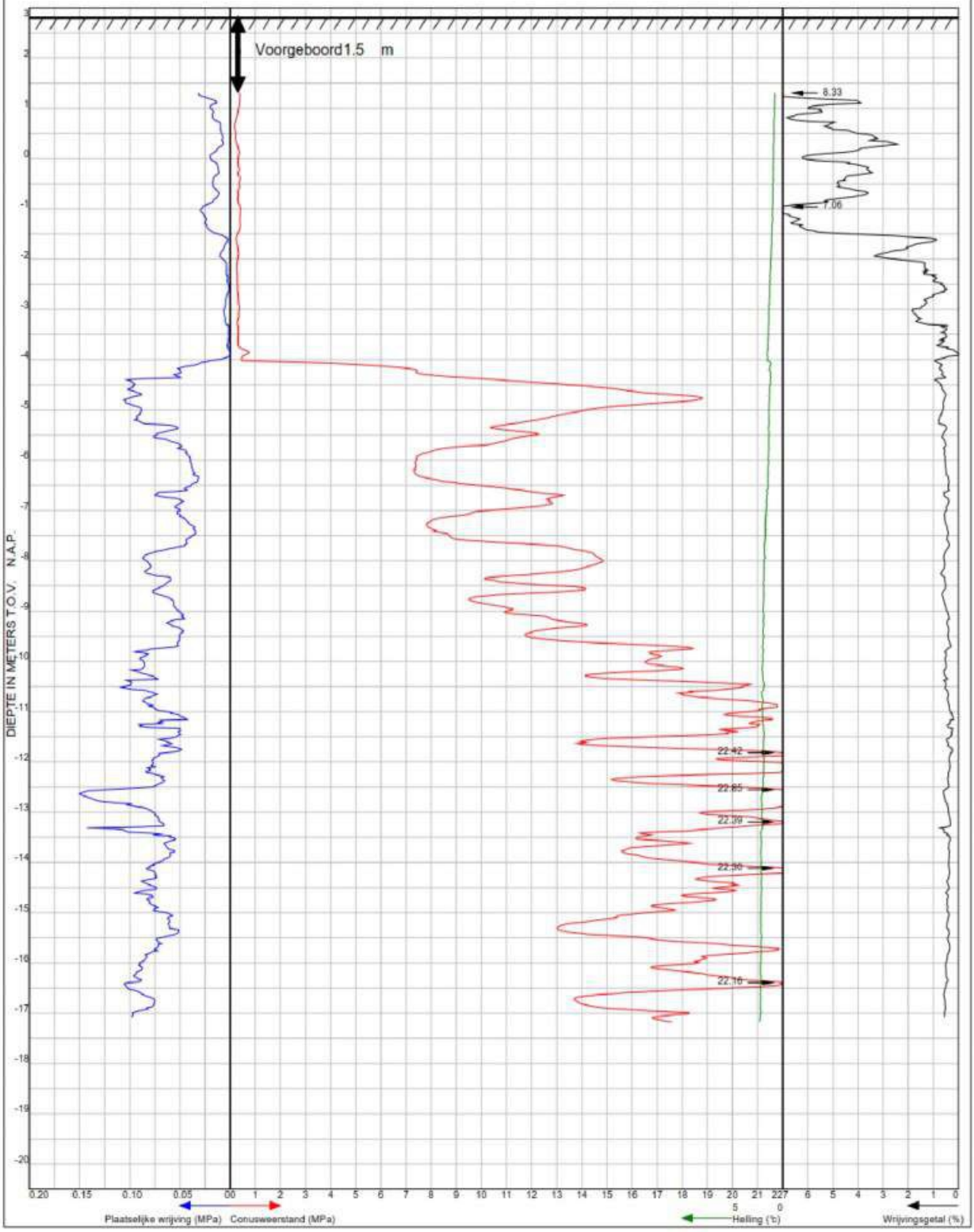


GEOSONDA

Franse Akker 13, 4824 AL Breda
Tel. (076) 5220566 Fax (076) 5211670

Opdrachtnr.: 17038234 Sondering: 11

Plaats: Zaltbommel Datum: 30-3-2021
Locatie: Van Voordenpark 15
Maaiveldhoogte: 2.82 m t.o.v. N.A.P. sondering volgens
Grondwaterstand: m t.o.v. maaiveld NEN-EN-ISO 22476-1 K2



3.1.1. Berekening paaldraagvermogen

Technosoft Paalfunderingen release 6.71 **4 aug 2022**

ALGEMENE GEGEVENS

Project :
Onderdeel :
Datum : 04-08-2022
Bestand : X:\Ing.Buro\15800 tm 15899\15877\BouwConstructie\Besteksfase\berekeningen\15877-14 RTO\15877-14_sonderingen_10_11.pvw
Berekeningstype : Verticaal belaste paal
Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Toegepaste normen volgens Eurocode met Nederlandse NB

Geotechniek	EN 1997-1:2004	AC:2009	
	NEN-EN 1997-1:2005	C1+A1:2013	NB:2016
	NEN 9997-1:2016	C2:2017	

GRONDSOORTEN

Nr.	Omschrijving	$\gamma_{k;1}$ [kN/m³]	$\gamma_{sat;k;1}$ [kN/m³]	$\varphi'_{k;1}$ [°]	$\gamma_{k;2}$ [kN/m³]	$\gamma_{sat;k;2}$ [kN/m³]	$\varphi'_{k;2}$ [°]
1	Zand - Schoon - Los	17.00	19.00	30.00	18.00	20.00	32.50
2	Zand - Schoon - Matig	18.00	20.00	32.50	19.00	21.00	35.00
3	Zand - Schoon - Vast	19.00	21.00	35.00	20.00	22.00	40.00
4	Zand - Zwak siltig - Kleiig	18.00	20.00	27.00	19.00	21.00	32.50
5	Zand - Sterk siltig - Kleiig	18.00	20.00	25.00	19.00	21.00	30.00
6	Klei - Schoon - Matig	17.00	17.00	17.50	19.00	19.00	17.50
7	Klei - Zwak zandig - Slap	15.00	15.00	22.50	18.00	18.00	22.50
8	Klei - Zwak zandig - Vast	20.00	20.00	22.50	21.00	21.00	27.50
9	Klei - Organisch - Matig	15.00	15.00	15.00	16.00	16.00	15.00
10	Veen - Niet voorbelast - Slap	10.00	10.00	15.00	12.00	12.00	15.00
11	Veen - Matig voorbelast - Matig	12.00	12.00	15.00	13.00	13.00	15.00

BODEMPROFIELGEGEVENS: Sondering 10

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.
d50-reductie is meegenomen overeenkomstig NEN-EN 9997 art. 7.6.2.3 (i)
Hoogte maaiveld [m] : 2.75 Grondwaterstand [m] : 1.75

Laag	Van [m]	Tot [m]	Omschrijving	OCR	Aandeel pos. kleef [%]	α_s	d_{50} [mm]
1	2.75	1.23	Veen - Niet voorbelast - Slap	1.0	0.0		
2	1.23	0.02	Klei - Zwak zandig - Slap	1.0	0.0		
3	0.02	-0.34	Klei - Organisch - Matig	1.0	0.0		
4	-0.34	-0.65	Klei - Zwak zandig - Slap	1.0	0.0		
5	-0.65	-0.96	Klei - Organisch - Matig	1.0	0.0		
6	-0.96	-1.36	Klei - Zwak zandig - Slap	1.0	0.0		
7	-1.36	-1.51	Klei - Organisch - Matig	1.0	0.0		
8	-1.51	-2.02	Klei - Zwak zandig - Slap	1.0	0.0		
9	-2.02	-2.85	Klei - Organisch - Matig	1.0	0.0		
10	-2.85	-2.99	Veen - Matig voorbelast - Matig	1.0	0.0		
11	-2.99	-3.17	Klei - Organisch - Matig	1.0	0.0		
12	-3.17	-3.33	Klei - Zwak zandig - Slap	1.0	0.0		
13	-3.33	-3.65	Klei - Organisch - Matig	1.0	0.0		
14	-3.65	-3.81	Klei - Zwak zandig - Vast	1.0	0.0		
15	-3.81	-3.96	Klei - Zwak zandig - Slap	1.0	0.0		
16	-3.96	-4.03	Zand - Sterk siltig - Kleiig	1.0	100.0		
17	-4.03	-4.87	Zand - Schoon - Matig	1.0	100.0		
18	-4.87	-5.77	Zand - Zwak siltig - Kleiig	1.0	100.0		
19	-5.77	-5.91	Zand - Sterk siltig - Kleiig	1.0	100.0		
20	-5.91	-6.13	Zand - Zwak siltig - Kleiig	1.0	100.0		
21	-6.13	-6.36	Zand - Sterk siltig - Kleiig	1.0	100.0		
22	-6.36	-6.43	Zand - Zwak siltig - Kleiig	1.0	100.0		
23	-6.43	-6.59	Zand - Schoon - Matig	1.0	100.0		
24	-6.59	-6.83	Zand - Zwak siltig - Kleiig	1.0	100.0		
25	-6.83	-7.23	Zand - Schoon - Matig	1.0	100.0		
26	-7.23	-8.11	Zand - Sterk siltig - Kleiig	1.0	100.0		
27	-8.11	-8.33	Zand - Schoon - Los	1.0	100.0		
28	-8.33	-8.55	Zand - Sterk siltig - Kleiig	1.0	100.0		
29	-8.55	-8.70	Zand - Schoon - Los	1.0	100.0		
30	-8.70	-9.07	Zand - Sterk siltig - Kleiig	1.0	100.0		
31	-9.07	-9.33	Zand - Zwak siltig - Kleiig	1.0	100.0		

Laag	Van [m]	Tot [m]	Omschrijving	OCR	Aandeel pos. kleef [%]	α_s	d_{50} [mm]
32	-9.33	-9.75	Zand - Sterk siltig - Kleiig	1.0	100.0		
33	-9.75	-10.58	Zand - Schoon - Los	1.0	100.0		
34	-10.58	-10.78	Zand - Sterk siltig - Kleiig	1.0	100.0		
35	-10.78	-11.30	Zand - Schoon - Matig	1.0	100.0		
36	-11.30	-11.78	Zand - Zwak siltig - Kleiig	1.0	100.0		
37	-11.78	-12.37	Zand - Sterk siltig - Kleiig	1.0	100.0		
38	-12.37	-13.03	Zand - Zwak siltig - Kleiig	1.0	100.0		
39	-13.03	-13.19	Zand - Sterk siltig - Kleiig	1.0	100.0		
40	-13.19	-13.54	Zand - Schoon - Matig	1.0	100.0		
41	-13.54	-14.35	Zand - Zwak siltig - Kleiig	1.0	100.0		
42	-14.35	-14.52	Zand - Sterk siltig - Kleiig	1.0	100.0		
43	-14.52	-14.99	Zand - Zwak siltig - Kleiig	1.0	100.0		
44	-14.99	-15.66	Zand - Sterk siltig - Kleiig	1.0	100.0		
45	-15.66	-15.89	Zand - Zwak siltig - Kleiig	1.0	100.0		
46	-15.89	-16.07	Zand - Sterk siltig - Kleiig	1.0	100.0		
47	-16.07	-16.32	Zand - Zwak siltig - Kleiig	1.0	100.0		
48	-16.32	-16.52	Zand - Sterk siltig - Kleiig	1.0	100.0		
49	-16.52	-16.75	Zand - Schoon - Los	1.0	100.0		
50	-16.75	-17.24	Zand - Sterk siltig - Kleiig	1.0	100.0		

BODEMPROFIELGEGEVENS: Sondering 11

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.
d50-reductie is meegenomen overeenkomstig NEN-EN 9997 art. 7.6.2.3 (i)
Hoogte maaiveld [m] : 2.82 Grondwaterstand [m] : 1.82

Laag	Van [m]	Tot [m]	Omschrijving	OCR	Aandeel pos. kleef [%]	α_s	d_{50} [mm]
1	2.82	2.52	Klei - Schoon - Matig	1.0	0.0		
2	2.52	1.27	Klei - Zwak zandig - Vast	1.0	0.0		
3	1.27	0.99	Klei - Schoon - Matig	1.0	0.0		
4	0.99	0.69	Klei - Organisch - Matig	1.0	0.0		
5	0.69	0.35	Klei - Zwak zandig - Slap	1.0	0.0		
6	0.35	0.10	Klei - Schoon - Matig	1.0	0.0		
7	0.10	-0.29	Klei - Zwak zandig - Slap	1.0	0.0		
8	-0.29	-0.42	Klei - Schoon - Matig	1.0	0.0		
9	-0.42	-1.40	Klei - Zwak zandig - Slap	1.0	0.0		
10	-1.40	-1.56	Klei - Organisch - Matig	1.0	0.0		
11	-1.56	-1.89	Klei - Zwak zandig - Slap	1.0	0.0		
12	-1.89	-3.74	Klei - Organisch - Matig	1.0	0.0		
13	-3.74	-3.87	Klei - Schoon - Matig	1.0	0.0		
14	-3.87	-3.99	Klei - Organisch - Matig	1.0	0.0		
15	-3.99	-4.28	Zand - Sterk siltig - Kleiig	1.0	100.0		
16	-4.28	-4.68	Zand - Schoon - Matig	1.0	100.0		
17	-4.68	-4.77	Zand - Schoon - Vast	1.0	100.0		
18	-4.77	-4.98	Zand - Schoon - Matig	1.0	100.0		
19	-4.98	-5.69	Zand - Zwak siltig - Kleiig	1.0	100.0		
20	-5.69	-6.44	Zand - Sterk siltig - Kleiig	1.0	100.0		
21	-6.44	-6.81	Zand - Schoon - Matig	1.0	100.0		
22	-6.81	-6.90	Zand - Zwak siltig - Kleiig	1.0	100.0		
23	-6.90	-7.60	Zand - Sterk siltig - Kleiig	1.0	100.0		
24	-7.60	-7.82	Zand - Zwak siltig - Kleiig	1.0	100.0		
25	-7.82	-8.02	Zand - Schoon - Matig	1.0	100.0		
26	-8.02	-8.20	Zand - Zwak siltig - Kleiig	1.0	100.0		
27	-8.20	-8.47	Zand - Sterk siltig - Kleiig	1.0	100.0		
28	-8.47	-8.55	Zand - Zwak siltig - Kleiig	1.0	100.0		
29	-8.55	-9.58	Zand - Sterk siltig - Kleiig	1.0	100.0		
30	-9.58	-9.91	Zand - Schoon - Matig	1.0	100.0		
31	-9.91	-10.38	Zand - Zwak siltig - Kleiig	1.0	100.0		
32	-10.38	-11.42	Zand - Schoon - Matig	1.0	100.0		
33	-11.42	-11.66	Zand - Sterk siltig - Kleiig	1.0	100.0		
34	-11.66	-12.17	Zand - Schoon - Matig	1.0	100.0		
35	-12.17	-12.44	Zand - Sterk siltig - Kleiig	1.0	100.0		
36	-12.44	-12.91	Zand - Schoon - Matig	1.0	100.0		
37	-12.91	-13.03	Zand - Zwak siltig - Kleiig	1.0	100.0		
38	-13.03	-13.24	Zand - Schoon - Matig	1.0	100.0		
39	-13.24	-13.55	Zand - Sterk siltig - Kleiig	1.0	100.0		
40	-13.55	-13.71	Zand - Zwak siltig - Kleiig	1.0	100.0		
41	-13.71	-13.92	Zand - Sterk siltig - Kleiig	1.0	100.0		
42	-13.92	-14.07	Zand - Zwak siltig - Kleiig	1.0	100.0		
43	-14.07	-14.29	Zand - Schoon - Matig	1.0	100.0		

Laag	Van [m]	Tot [m]	Omschrijving	OCR	Aandeel pos. kleef [%]	α_s	d_{50} [mm]
44	-14.29	-14.74	Zand - Zwak siltig - Kleiig	1.0	100.0		
45	-14.74	-15.57	Zand - Sterk siltig - Kleiig	1.0	100.0		
46	-15.57	-15.99	Zand - Zwak siltig - Kleiig	1.0	100.0		
47	-15.99	-16.10	Zand - Sterk siltig - Kleiig	1.0	100.0		
48	-16.10	-16.50	Zand - Zwak siltig - Kleiig	1.0	100.0		
49	-16.50	-17.20	Zand - Sterk siltig - Kleiig	1.0	100.0		

SONDERINGSGEGEVENS ALGEMEEN: Sondering 10

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.
Hoogte maaiveld [m] : 2.75 Bodemprofiel: Sondering 10
Traject negatieve kleef : 2.75 tot -4.00 [m]
Traject positieve kleef : -4.00 tot -17.24 [m]

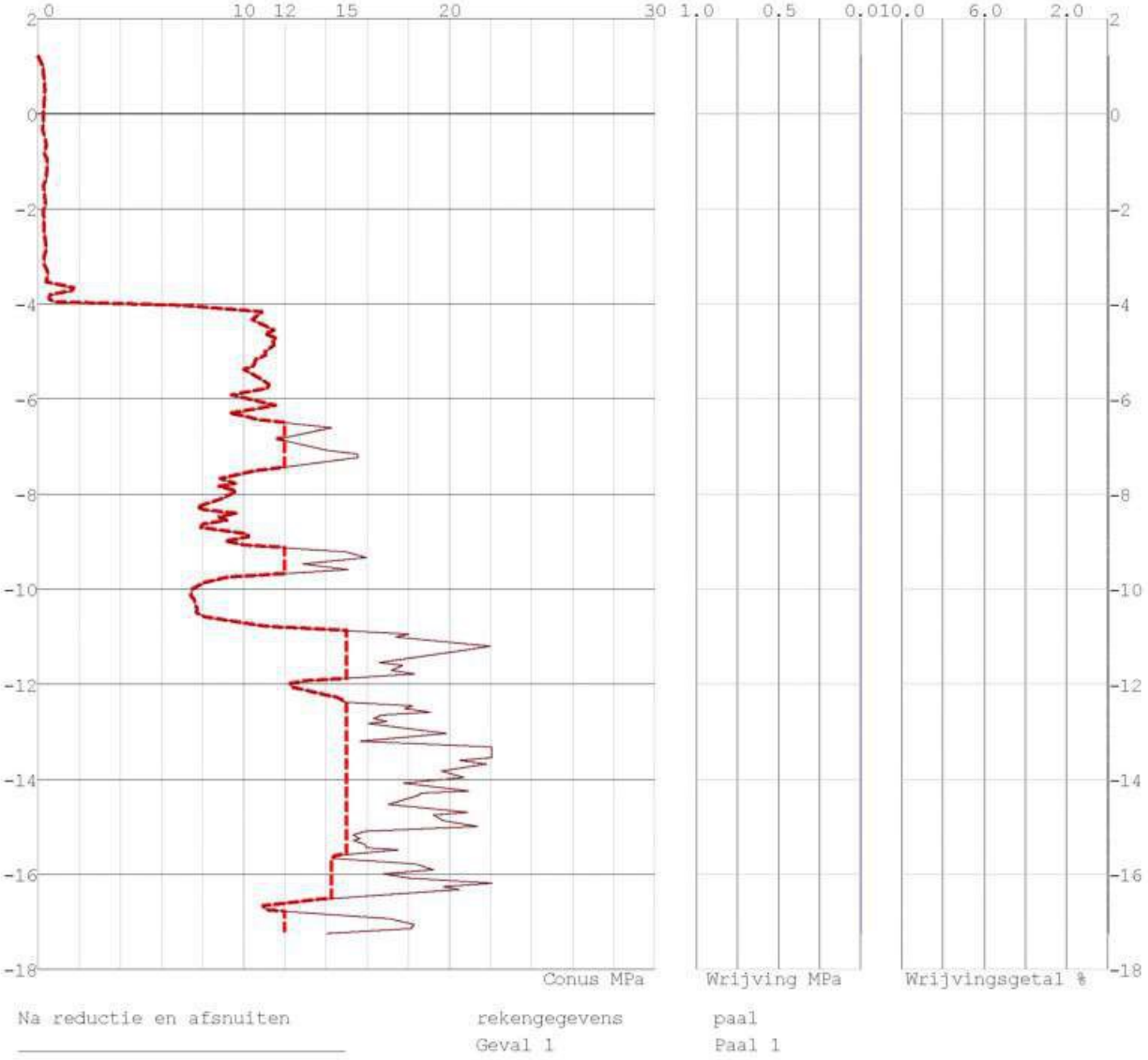
SONDERINGSGEGEVENS TABEL: Sondering 10

Regel	Niveau [m]	Conus [MPa]	Wrijving [MPa]	Regel	Niveau [m]	Conus [MPa]	Wrijving [MPa]
1	1.23	0.00	0.000	74	-9.58	15.06	0.000
2	1.00	0.24	0.000	75	-9.75	9.21	0.000
3	0.51	0.33	0.000	76	-9.87	8.04	0.000
4	0.02	0.28	0.000	77	-10.00	7.47	0.000
5	-0.34	0.23	0.000	78	-10.14	7.41	0.000
6	-0.50	0.33	0.000	79	-10.21	7.58	0.000
7	-0.65	0.39	0.000	80	-10.33	7.62	0.000
8	-0.84	0.32	0.000	81	-10.41	7.75	0.000
9	-0.96	0.44	0.000	82	-10.49	7.68	0.000
10	-1.09	0.43	0.000	83	-10.58	8.12	0.000
11	-1.36	0.41	0.000	84	-10.78	11.00	0.000
12	-1.51	0.27	0.000	85	-10.94	18.02	0.000
13	-1.93	0.37	0.000	86	-11.00	17.35	0.000
14	-2.02	0.28	0.000	87	-11.20	21.96	0.000
15	-2.49	0.28	0.000	88	-11.30	20.39	0.000
16	-2.85	0.40	0.000	89	-11.53	16.55	0.000
17	-2.99	0.30	0.000	90	-11.60	17.69	0.000
18	-3.17	0.31	0.000	91	-11.70	17.14	0.000
19	-3.33	0.48	0.000	92	-11.78	18.29	0.000
20	-3.54	0.40	0.000	93	-11.93	13.01	0.000
21	-3.65	1.74	0.000	94	-11.99	12.24	0.000
22	-3.71	1.63	0.000	95	-12.06	12.35	0.000
23	-3.81	0.57	0.000	96	-12.27	14.50	0.000
24	-3.90	0.55	0.000	97	-12.37	14.96	0.000
25	-3.96	0.80	0.000	98	-12.45	18.18	0.000
26	-4.03	7.07	0.000	99	-12.50	17.79	0.000
27	-4.16	10.91	0.000	100	-12.58	19.09	0.000
28	-4.33	10.41	0.000	101	-12.64	16.66	0.000
29	-4.55	11.47	0.000	102	-12.71	16.31	0.000
30	-4.62	11.03	0.000	103	-12.77	16.95	0.000
31	-4.71	11.54	0.000	104	-12.82	16.01	0.000
32	-4.78	11.41	0.000	105	-12.94	18.23	0.000
33	-4.87	11.47	0.000	106	-13.03	19.84	0.000
34	-5.00	11.04	0.000	107	-13.19	15.63	0.000
35	-5.07	11.09	0.000	108	-13.32	22.03	0.000
36	-5.17	10.58	0.000	109	-13.54	22.05	0.000
37	-5.30	10.49	0.000	110	-13.60	20.51	0.000
38	-5.37	10.01	0.000	111	-13.67	21.78	0.000
39	-5.46	10.38	0.000	112	-13.82	19.61	0.000
40	-5.61	10.98	0.000	113	-13.96	20.70	0.000
41	-5.70	11.25	0.000	114	-14.07	17.73	0.000
42	-5.77	11.12	0.000	115	-14.24	20.94	0.000
43	-5.91	9.42	0.000	116	-14.29	18.63	0.000
44	-6.13	11.54	0.000	117	-14.35	18.39	0.000
45	-6.30	9.30	0.000	118	-14.52	17.00	0.000
46	-6.36	10.09	0.000	119	-14.68	20.88	0.000
47	-6.43	10.68	0.000	120	-14.75	19.22	0.000
48	-6.59	14.26	0.000	121	-14.86	19.70	0.000
49	-6.83	11.67	0.000	122	-14.99	21.35	0.000
50	-7.07	14.06	0.000	123	-15.09	15.88	0.000
51	-7.15	15.52	0.000	124	-15.16	15.29	0.000
52	-7.23	15.53	0.000	125	-15.24	15.63	0.000

SONDERINGSGEGEVENS TABEL: Sondering 10

Regel	Niveau [m]	Conus [MPa]	Wrijving [MPa]	Regel	Niveau [m]	Conus [MPa]	Wrijving [MPa]
53	-7.51	10.54	0.000	126	-15.29	15.29	0.000
54	-7.67	8.87	0.000	127	-15.36	15.87	0.000
55	-7.78	9.57	0.000	128	-15.43	15.92	0.000
56	-7.83	8.79	0.000	129	-15.48	17.50	0.000
57	-7.93	9.62	0.000	130	-15.59	14.51	0.000
58	-7.99	9.45	0.000	131	-15.66	14.27	0.000
59	-8.11	8.88	0.000	132	-15.78	18.36	0.000
60	-8.27	7.73	0.000	133	-15.89	19.22	0.000
61	-8.33	8.06	0.000	134	-15.99	16.77	0.000
62	-8.41	9.65	0.000	135	-16.07	18.07	0.000
63	-8.48	8.80	0.000	136	-16.18	22.07	0.000
64	-8.55	9.18	0.000	137	-16.26	19.67	0.000
65	-8.63	8.04	0.000	138	-16.32	20.45	0.000
66	-8.70	7.92	0.000	139	-16.52	13.66	0.000
67	-8.83	10.18	0.000	140	-16.66	10.94	0.000
68	-8.89	10.24	0.000	141	-16.75	11.09	0.000
69	-8.99	9.10	0.000	142	-16.92	17.06	0.000
70	-9.07	10.09	0.000	143	-17.04	18.25	0.000
71	-9.21	14.96	0.000	144	-17.13	18.12	0.000
72	-9.33	15.97	0.000	145	-17.24	13.98	0.000
73	-9.46	12.87	0.000				

SONDERINGSGEGEVENS GRAFIEK: Sondering 10



Na reductie en afsnuiten

rekengegevens
Geval 1

paal
Paal 1

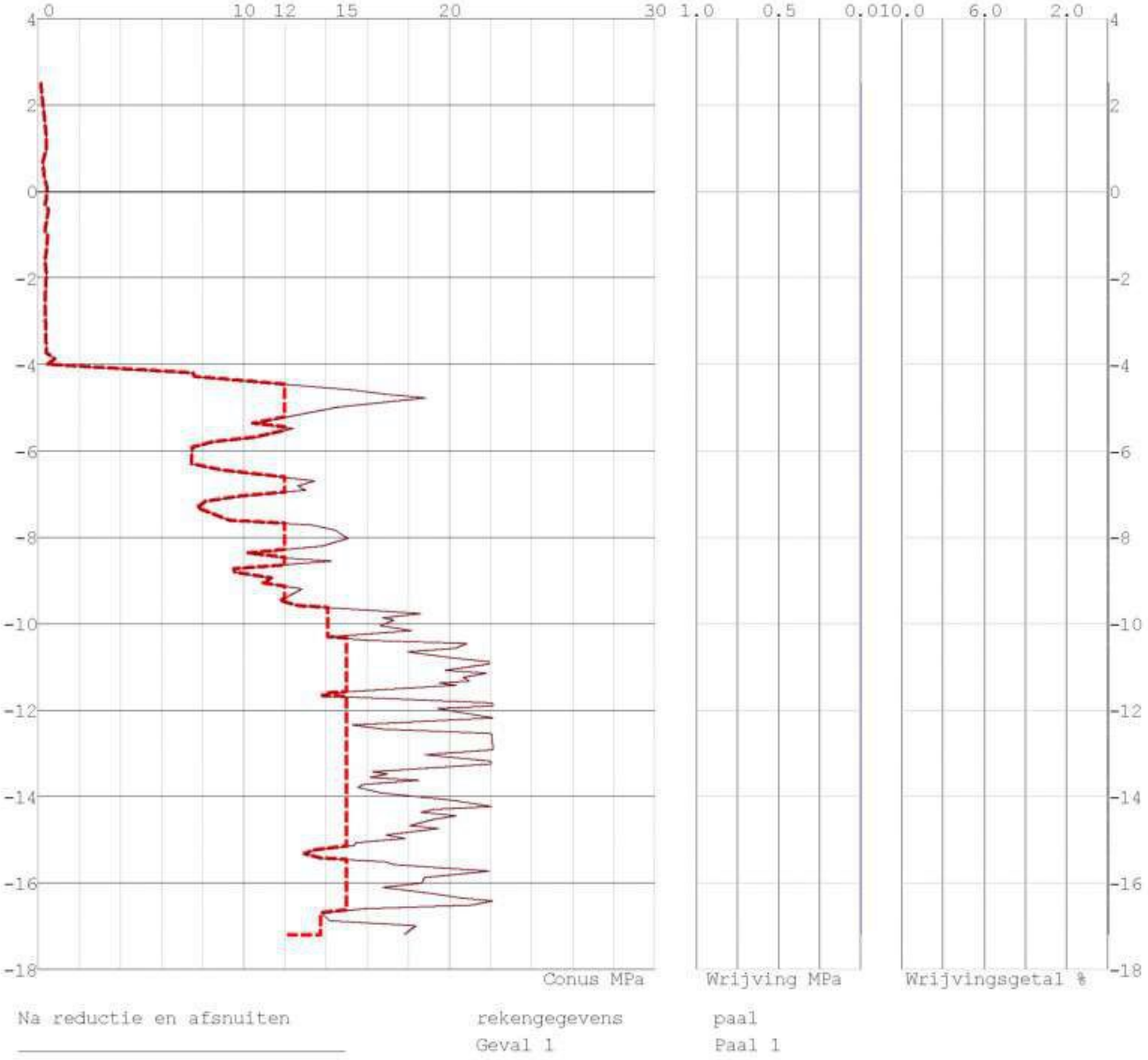
SONDERINGSGEGEVENS ALGEMEEN: Sondering 11

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.
Hoogte maaiveld [m] : 2.82 Bodemprofiel: Sondering 11
Traject negatieve kleef : 2.82 tot -4.00 [m]
Traject positieve kleef : -4.00 tot -17.20 [m]

SONDERINGSGEGEVENS TABEL: Sondering 11

Regel	Niveau [m]	Conus [MPa]	Wrijving [MPa]	Regel	Niveau [m]	Conus [MPa]	Wrijving [MPa]
1	2.52	0.12	0.000	62	-10.56	20.27	0.000
2	1.27	0.41	0.000	63	-10.64	17.94	0.000
3	0.99	0.41	0.000	64	-10.79	20.28	0.000
4	0.69	0.24	0.000	65	-10.87	21.93	0.000
5	0.35	0.29	0.000	66	-10.92	21.93	0.000
6	0.10	0.43	0.000	67	-11.07	19.76	0.000
7	-0.19	0.41	0.000	68	-11.14	21.76	0.000
8	-0.29	0.35	0.000	69	-11.23	20.67	0.000
9	-0.42	0.50	0.000	70	-11.31	20.98	0.000
10	-0.91	0.34	0.000	71	-11.36	19.46	0.000
11	-0.98	0.48	0.000	72	-11.42	20.31	0.000
12	-1.40	0.42	0.000	73	-11.59	14.08	0.000
13	-1.56	0.32	0.000	74	-11.66	13.83	0.000
14	-1.89	0.42	0.000	75	-11.82	22.09	0.000
15	-2.56	0.35	0.000	76	-11.90	22.10	0.000
16	-3.74	0.39	0.000	77	-11.96	19.42	0.000
17	-3.87	0.81	0.000	78	-12.17	22.10	0.000
18	-3.99	0.48	0.000	79	-12.34	15.28	0.000
19	-4.19	7.52	0.000	80	-12.44	16.79	0.000
20	-4.28	7.60	0.000	81	-12.53	22.04	0.000
21	-4.58	15.34	0.000	82	-12.91	22.12	0.000
22	-4.68	16.94	0.000	83	-13.03	18.80	0.000
23	-4.77	18.84	0.000	84	-13.17	22.00	0.000
24	-4.98	14.57	0.000	85	-13.24	22.00	0.000
25	-5.36	10.44	0.000	86	-13.42	16.27	0.000
26	-5.47	12.40	0.000	87	-13.47	16.97	0.000
27	-5.69	10.48	0.000	88	-13.55	16.12	0.000
28	-5.78	8.53	0.000	89	-13.61	18.48	0.000
29	-5.91	7.50	0.000	90	-13.71	15.77	0.000
30	-6.30	7.45	0.000	91	-13.78	15.55	0.000
31	-6.44	8.93	0.000	92	-13.92	16.70	0.000
32	-6.69	13.44	0.000	93	-14.07	20.12	0.000
33	-6.81	12.62	0.000	94	-14.22	22.03	0.000
34	-6.90	13.00	0.000	95	-14.29	19.24	0.000
35	-7.05	9.77	0.000	96	-14.36	18.60	0.000
36	-7.16	8.14	0.000	97	-14.43	20.33	0.000
37	-7.31	7.75	0.000	98	-14.52	19.23	0.000
38	-7.42	8.36	0.000	99	-14.66	18.05	0.000
39	-7.60	9.31	0.000	100	-14.74	19.45	0.000
40	-7.71	13.23	0.000	101	-14.88	16.91	0.000
41	-7.82	14.39	0.000	102	-14.96	17.80	0.000
42	-8.02	15.05	0.000	103	-15.06	15.43	0.000
43	-8.20	13.74	0.000	104	-15.12	15.38	0.000
44	-8.36	10.22	0.000	105	-15.24	13.34	0.000
45	-8.47	12.13	0.000	106	-15.32	12.95	0.000
46	-8.55	14.26	0.000	107	-15.43	13.87	0.000
47	-8.73	9.52	0.000	108	-15.51	16.87	0.000
48	-8.81	9.57	0.000	109	-15.57	17.33	0.000
49	-8.93	11.34	0.000	110	-15.72	21.92	0.000
50	-9.05	10.91	0.000	111	-15.87	18.76	0.000
51	-9.19	12.84	0.000	112	-15.99	18.63	0.000
52	-9.47	11.77	0.000	113	-16.10	16.74	0.000
53	-9.58	12.65	0.000	114	-16.23	18.97	0.000
54	-9.76	18.61	0.000	115	-16.34	20.61	0.000
55	-9.85	16.74	0.000	116	-16.40	22.09	0.000
56	-9.91	17.28	0.000	117	-16.50	21.04	0.000
57	-10.04	16.61	0.000	118	-16.58	15.97	0.000
58	-10.15	18.16	0.000	119	-16.69	13.76	0.000
59	-10.30	14.10	0.000	120	-16.86	14.16	0.000
60	-10.38	16.11	0.000	121	-16.99	18.37	0.000
61	-10.45	20.83	0.000	122	-17.20	17.79	0.000

SONDERINGSGEGEVENS GRAFIEK: Sondering 11



PAALGEGEVENS Paal 1

Type	:	Avegaarpaal
Wijze van installeren	:	Schroeven
Diameter [m]	:	0.400
Elasticiteitsmodulus [N/mm²]	:	20000 (Beton)
Factor α_s (tabel 7.c EC 7.1)	:	0.006 (zandlagen; voor kleilagen zie tabel 7.d)
Factor α_t (tabel 7.c EC 7.1)	:	0.0045 (zandlagen; voor kleilagen zie tabel 7.d)
Paalklassefactor α_p	:	0.56
Paalvoetvormfactor β	:	1.00
Type lastzakkingsdiagram	:	Avegaarpaal
Verm.factor * $\varphi'_{j;k}$	:	1.00

REKENGEGEVENS Geval 1

Berekening : Ontwerpend
Rekenmethode : Drukpalen volgens NEN-EN 1997-1, art. 7.6.2
Sondering(en) : Sondering 10, Sondering 11

Stijf bouwwerk : NEE
Paalgroep : NEE
Aantal sonderingen : 2
Factor $\xi_{3\ (n=1)}$: 1.39
Factor $\xi_{3\ (gem)}$: 1.32
Factor $\xi_{4\ (min)}$: 1.32
Weerstandsfactor γ_R : 1.20
$\gamma_{f;nk}$: 1.0
$R_{s;cal;max;1}$ begrenzen op 0.75 * $R_{b;cal;max;1}$: NEE
UGT draagvermogen zonder negatieve kleef : NEE

Paal : Paal 1
Niveau paalkop [m] : N.A.P. 0.00
Paalpuntniveau : N.A.P. -10.50
Bovenbel. [kN/m²] : 0.00

TUSSENRESULTATEN Geval 1 (n=1)

Tussenresultaten punt en schacht (Sondering : Sondering 10)

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau [m]	Trj2 [m]	q_{cI} [MPa]	q_{cII} [MPa]	q_{cIII} [MPa]	q_{bmax} [MPa]	$q_{bmax;red}$ [MPa]	q_{csa} [MPa]	$F_{nk;k}$ [kN]	$F_{c;tot1}$ [kN]	$F_{c;tot2}$ [kN]
-10.50	-10.78	9.1	9.1	2.0	3.1	3.1	10.2	-47.2	-47.2	-47.2

Tussenresultaten zakking 1 (Sondering : Sondering 10)

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau [m]	$R_{b;1}$ [kN]	$R_{s;1}$ [kN]	$R_{bc;1}$ [kN]	$R_{sc;1}$ [kN]	$R_{b;2}$ [kN]	$R_{s;2}$ [kN]	$R_{bc;2}$ [kN]	$R_{sc;2}$ [kN]
-10.50	246.4	316.9	15.5	32.0	295.7	380.3	15.5	31.9

Tussenresultaten zakking 2 (Sondering : Sondering 10)

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau [m]	L [m]	l [m]	$s_{b;1}$ [mm]	$s_{el;1}$ [mm]	$s_{1;1}$ [mm]	$s_{b;2}$ [mm]	$s_{el;2}$ [mm]	$s_{1;2}$ [mm]
-10.50	10.50	4.00	-0.7	-0.2	-0.9	-0.6	-0.2	-0.8

Tussenresultaten punt en schacht (Sondering : Sondering 11)

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau [m]	Trj2 [m]	q_{cI} [MPa]	q_{cII} [MPa]	q_{cIII} [MPa]	q_{bmax} [MPa]	$q_{bmax;red}$ [MPa]	q_{csa} [MPa]	$F_{nk;k}$ [kN]	$F_{c;tot1}$ [kN]	$F_{c;tot2}$ [kN]
-10.50	-11.66	19.5	13.8	2.0	5.2	5.2	11.0	-65.1	-65.1	-65.1

Tussenresultaten zakking 1 (Sondering : Sondering 11)

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau [m]	$R_{b;1}$ [kN]	$R_{s;1}$ [kN]	$R_{bc;1}$ [kN]	$R_{sc;1}$ [kN]	$R_{b;2}$ [kN]	$R_{s;2}$ [kN]	$R_{bc;2}$ [kN]	$R_{sc;2}$ [kN]
-10.50	415.1	339.0	28.4	37.1	498.1	406.9	28.2	36.9

Tussenresultaten zakking 2 (Sondering : Sondering 11)

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau [m]	L [m]	l [m]	$s_{b;1}$ [mm]	$s_{el;1}$ [mm]	$s_{1;1}$ [mm]	$s_{b;2}$ [mm]	$s_{el;2}$ [mm]	$s_{1;2}$ [mm]
-10.50	10.50	4.00	-0.8	-0.2	-1.0	-0.7	-0.2	-0.9

RESULTATEN Geval 1 (n=1)

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau [m]	Sondering 10 $F_{netto;d}$ [kN]	Sondering 11 $F_{netto;d}$ [kN]
-10.50	488	**651**

DETAIL BER. DRAAGVERMOGEN Geval 1; Sondering 10; N.A.P.-10.50

Uitgangspunten

- gehanteerde sondering : Sondering 10
- gehanteerde paal : Paal 1
- paalpuntniveau : N.A.P.-10.50 m
- traject positieve kleef : N.A.P. -4.00 m
  tot: N.A.P.-10.50 m

Maximale draagkracht van de paalpunt

De maximale puntweerstand volgens art. 7.6.2.3 (e) bedraagt :

$q_{b;max} = 0.5 * \alpha_p * \beta * s * ((q_{c;I;gem} + q_{c;II;gem})/2 + q_{c;III;gem})$
$= 3.106$ MPa

waarin :		in dit geval :
$q_{c;I;gem}$	= de gemiddelde waarde van de conusweerstanden over traject I	= 9.09 MPa
$q_{c;II;gem}$	= de gemiddelde waarde van de conusweerstanden over traject II	= 9.09 MPa
$q_{c;III;gem}$	= de gemiddelde waarde van de conusweerstanden over traject III	= 2.00 MPa
α_p	= paalklassefactor	= 0.56 -
β	= factor voor de paalvoetvorm	= 1.00 -
φ	= hoek van de inwendige wrijving	= 30.0 -
r	= verhouding b/a	= 1.00 -
s	= factor voor de vorm van de voet	= 1.00 -

Voor een uitgebreide beschrijving van het bepalen van de gemiddelde conusweerstanden in de gebieden I, II en III wordt verwezen naar art. 7.6.2.3 (e) in de norm.

De maximale draagkracht van de paalpunt volgens art. 7.6.2.3 (c) bedraagt:

$R_{b;cal;max;i} = A_b * q_{b;max;i}$
$= 390$ kN

waarin :		in dit geval :
A_b	= oppervlak van de paalvoet	= 0.1257 m²

Maximale paalschachtwrijving

De maximale paalschachtwrijving volgens art. 7.6.2.3 (i) bedraagt:

$q_{s;max;z} = \alpha_s * q_{c;z;a}$

De maximale schachtwrijvingskracht volgens art. 7.6.2.3 (c) bedraagt:
$R_{s;cal;max;i} = O_{s;\Delta l;gem} * \Sigma\, q_{s;max;z;i} * d_z$
$= 502$ kN

Per laag
Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Nr	Laag	Nivo [m]	$O_{s;gem}$ [m²]	α_s	Perc. [%]	$q_{c;z;a}$ [MPa]	$q_{s;max}$ [MPa]	d_z [m]	$R_{c;cal}$ [kN]
--	----	-4.00	--	--	--	--	--	--	--
1	Zand - Sterk siltig - Kleiig	-4.03	1.26	0.0060	100	5.73	0.034	0.03	1.3
2	Zand - Schoon - Matig	-4.87	1.26	0.0060	100	10.74	0.064	0.84	68.0
3	Zand - Zwak siltig - Kleiig	-5.77	1.26	0.0060	100	10.79	0.065	0.90	73.2
4	Zand - Sterk siltig - Kleiig	-5.91	1.26	0.0060	100	10.27	0.062	0.14	10.8
5	Zand - Zwak siltig - Kleiig	-6.13	1.26	0.0060	100	10.48	0.063	0.22	17.4
6	Zand - Sterk siltig - Kleiig	-6.36	1.26	0.0060	100	10.23	0.061	0.23	17.7
7	Zand - Zwak siltig - Kleiig	-6.43	1.26	0.0060	100	10.38	0.062	0.07	5.5
8	Zand - Schoon - Matig	-6.59	1.26	0.0060	100	11.76	0.071	0.16	14.2
9	Zand - Zwak siltig - Kleiig	-6.83	1.26	0.0060	100	11.98	0.072	0.24	21.7
10	Zand - Schoon - Matig	-7.23	1.26	0.0060	100	11.99	0.072	0.40	36.1
11	Zand - Sterk siltig - Kleiig	-8.11	1.26	0.0060	100	10.14	0.061	0.88	67.3
12	Zand - Schoon - Los	-8.33	1.26	0.0060	100	8.20	0.049	0.22	13.6
13	Zand - Sterk siltig - Kleiig	-8.55	1.26	0.0060	100	9.02	0.054	0.22	15.0
14	Zand - Schoon - Los	-8.70	1.26	0.0060	100	8.31	0.050	0.15	9.4
15	Zand - Sterk siltig - Kleiig	-9.07	1.26	0.0060	100	9.52	0.057	0.37	26.6

Per laag
Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Nr	Laag	Nivo [m]	$O_{B;gem}$ [m²]	α_B	Perc. [%]	$q_{c;z;a}$ [MPa]	$q_{B;max}$ [MPa]	d_E [m]	$R_{c;cal}$ [kN]
16	Zand - Zwak siltig - Kleiig	-9.33	1.26	0.0060	100	11.80	0.071	0.26	23.1
17	Zand - Sterk siltig - Kleiig	-9.75	1.26	0.0060	100	11.73	0.070	0.42	37.1
18	Zand - Schoon - Los	-10.50	1.26	0.0060	100	7.77	0.047	0.75	44.0
totaal			1.26	0.0060		10.24	0.061	6.50	502.0

Maximale draagkracht

De maximale draagkracht van de paal volgens art. 7.6.2.3 (c) bedraagt:

$R_{c;cal;i}$ = $R_{b;cal;max;i}$ + $R_{s;cal;max;i}$
= 892 kN (= 390 + 502)

De karakteristieke waarde van de maximale draagkracht van de paal volgens art. 7.6.2.3 (b) bedraagt:

$R_{c;k}$ = $R_{c;cal}$ / $\xi_{3\ (n=1)}$
= 642 kN

waarin : in dit geval :
$\xi_{3\ (n=1)}$ = factor volgens art. A.3.3.3 bij 1 sondering = 1.39 -

Voor de rekenwaarde van de maximale draagkracht van de paal kan volgens art. 2.4.7.3.3 worden aangehouden :

$R_{c;d}$ = $R_{c;k}$ / γ_R
= 535 kN

waarin : in dit geval :
γ_R = partiële weerstandsfactor volgens art. A.3.3.2 tabel A.6, A.7 of A.8 = 1.20 -

DETAIL BER. DRAAGVERMOGEN Geval 1; Sondering 11; N.A.P.-10.50

Uitgangspunten

- gehanteerde sondering : Sondering 11
- gehanteerde paal : Paal 1
- paalpuntniveau : N.A.P.-10.50 m
- traject positieve kleef : N.A.P. -4.00 m

tot: N.A.P.-10.50 m

Maximale draagkracht van de paalpunt

De maximale puntweerstand volgens art. 7.6.2.3 (e) bedraagt :

$q_{b;max} = 0.5 * \alpha_p * \beta * s * ((q_{c;I;gem} + q_{c;II;gem})/2 + q_{c;III;gem})$
$= 5.232$ MPa

waarin :		in dit geval :
$q_{c;I;gem}$	= de gemiddelde waarde van de conusweerstanden over traject I	= 19.54 MPa
$q_{c;II;gem}$	= de gemiddelde waarde van de conusweerstanden over traject II	= 13.83 MPa
$q_{c;III;gem}$	= de gemiddelde waarde van de conusweerstanden over traject III	= 2.00 MPa
α_p	= paalklassefactor	= 0.56 -
β	= factor voor de paalvoetvorm	= 1.00 -
φ	= hoek van de inwendige wrijving	= 32.5 -
r	= verhouding b/a	= 1.00 -
s	= factor voor de vorm van de voet	= 1.00 -

Voor een uitgebreide beschrijving van het bepalen van de gemiddelde conusweerstanden in de gebieden I, II en III wordt verwezen naar art. 7.6.2.3 (e) in de norm.

De maximale draagkracht van de paalpunt volgens art. 7.6.2.3 (c) bedraagt:

$R_{b;cal;max;i} = A_b * q_{b;max;i}$
$= 657$ kN

waarin :		in dit geval :
A_b	= oppervlak van de paalvoet	= 0.1257 m²

Maximale paalschachtwrijving

De maximale paalschachtwrijving volgens art. 7.6.2.3 (i) bedraagt:

$q_{s;max;z} = \alpha_s * q_{c;z;a}$

De maximale schachtwrijvingskracht volgens art. 7.6.2.3 (c) bedraagt:

$R_{s;cal;max;i} = O_{s;\Delta l;gem} * \Sigma\, q_{s;max;z;i} * d_z$
$= 537$ kN

Per laag

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Nr	Laag	Nivo [m]	$O_{s;gem}$ [m]	α_s	Perc. [%]	$q_{c;z;a}$ [MPa]	$q_{s;max}$ [MPa]	d_z [m]	$R_{c;cal}$ [kN]
--	----	-4.00	--	--	--	--	--	--	--
1	Zand - Sterk siltig - Kleiig	-4.28	1.26	0.0060	100	5.26	0.032	0.28	11.1
2	Zand - Schoon - Matig	-4.68	1.26	0.0060	100	11.06	0.066	0.40	33.4
3	Zand - Schoon - Vast	-4.77	1.26	0.0060	100	12.00	0.072	0.09	8.1
4	Zand - Schoon - Matig	-4.98	1.26	0.0060	100	12.00	0.072	0.21	19.0
5	Zand - Zwak siltig - Kleiig	-5.69	1.26	0.0060	100	11.56	0.069	0.71	61.9
6	Zand - Sterk siltig - Kleiig	-6.44	1.26	0.0060	100	7.95	0.048	0.75	44.9
7	Zand - Schoon - Matig	-6.81	1.26	0.0060	100	11.29	0.068	0.37	31.5
8	Zand - Zwak siltig - Kleiig	-6.90	1.26	0.0060	100	12.00	0.072	0.09	8.1
9	Zand - Sterk siltig - Kleiig	-7.60	1.26	0.0060	100	9.05	0.054	0.70	47.8
10	Zand - Zwak siltig - Kleiig	-7.82	1.26	0.0060	100	11.54	0.069	0.22	19.1
11	Zand - Schoon - Matig	-8.02	1.26	0.0060	100	12.00	0.072	0.20	18.1
12	Zand - Zwak siltig - Kleiig	-8.20	1.26	0.0060	100	12.00	0.072	0.18	16.3
13	Zand - Sterk siltig - Kleiig	-8.47	1.26	0.0060	100	11.40	0.068	0.27	23.2
14	Zand - Zwak siltig - Kleiig	-8.55	1.26	0.0060	100	12.00	0.072	0.08	7.2
15	Zand - Sterk siltig - Kleiig	-9.58	1.26	0.0060	100	11.39	0.068	1.03	88.4

Per laag

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Nr	Laag	Nivo [m]	$O_{s;gem}$ [m²]	α_s	Perc. [%]	$q_{c;z;a}$ [MPa]	$q_{s;max}$ [MPa]	d_z [m]	$R_{c;cal}$ [kN]
16	Zand - Schoon - Matig	-9.91	1.26	0.0060	100	14.00	0.084	0.33	34.8
17	Zand - Zwak siltig - Kleiig	-10.38	1.26	0.0060	100	14.22	0.085	0.47	50.4
18	Zand - Schoon - Matig	-10.50	1.26	0.0060	100	15.00	0.090	0.12	13.6
totaal			1.26	0.0060		10.96	0.066	6.50	537.0

Maximale draagkracht

De maximale draagkracht van de paal volgens art. 7.6.2.3 (c) bedraagt:

$R_{c;cal;1}$ = $R_{b;cal;max;1}$ + $R_{s;cal;max;1}$
= 1194 kN (= 657 + 537)

De karakteristieke waarde van de maximale draagkracht van de paal volgens art. 7.6.2.3 (b) bedraagt:

$R_{c;k}$ = $R_{c;cal}$ / $\xi_{3\ (n=1)}$
= 859 kN

waarin : in dit geval :

$\xi_{3\ (n=1)}$ = factor volgens art. A.3.3.3 bij 1 sondering = 1.39 -

Voor de rekenwaarde van de maximale draagkracht van de paal kan volgens art. 2.4.7.3.3 worden aangehouden :

$R_{c;d}$ = $R_{c;k}$ / γ_R
= 716 kN

waarin : in dit geval :

γ_R = partiële weerstandsfactor volgens art. A.3.3.2 tabel A.6, A.7 of A.8 = 1.20 -

DETAIL BER. NEGATIEVE KLEEF Geval 1; Sondering 10; N.A.P.-10.50

Uitgangspunten

- gehanteerde sondering : Sondering 10
- gehanteerde paal : Paal 1
- paalpuntniveau : N.A.P.-10.50 m
- paalkopniveau : N.A.P. 0.00 m
- traject negatieve kleef : N.A.P. 2.75 m
  tot : N.A.P. -4.00 m
- $p_{sur;k}$: 22.84 kN/m²

Berekening negatieve kleef

De karakteristieke waarde van de maximale negatieve kleefbelasting v.e. alleenstaande paal volgens art. 7.3.2.2 (d) bedraagt:

$F_{nk;k} = O_{s;gem} * \sum d_j * K_{0;j;k} * \tan \delta_{j;k} * (\sigma'_{v;j-1;k} + \sigma'_{v;j;k})/2.0$
$= -47.2$ kN

waarin :

$O_{s;gem}$ = omtrek van de dwarsdoorsnede van de paalschacht
d_j = de dikte van de grondlaag i
$K_{0;j;k}$ = de karakteristieke waarde van de neutrale gronddrukfactor in laag i
$\delta_{j;k}$ = de karakteristieke waarde van de wrijvingshoek
$\sigma'_{v;j;k}$ = de karakteristieke waarde van de effectieve verticale spanning onder in laag j

Per laag

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Nr	Laag	Nivo [m]	Hoogte [m]	$O_{s;gem}$ [m²]	$K_{0;j} * \tan(\delta_i)$	$\sigma'_{v;j;k}$ [kN/m²]
--	----	0.00	--	--	--	22.84
1	Klei - Organisch - Matig	-0.34	0.34	1.26	0.25	24.88
2	Klei - Zwak zandig - Slap	-0.65	0.31	1.26	0.26	27.36
3	Klei - Organisch - Matig	-0.96	0.31	1.26	0.25	29.22
4	Klei - Zwak zandig - Slap	-1.36	0.40	1.26	0.26	32.42
5	Klei - Organisch - Matig	-1.51	0.15	1.26	0.25	33.32
6	Klei - Zwak zandig - Slap	-2.02	0.51	1.26	0.26	37.40
7	Klei - Organisch - Matig	-2.85	0.83	1.26	0.25	42.38
8	Veen - Matig voorbelast - Mati	-2.99	0.14	1.26	0.25	42.80
9	Klei - Organisch - Matig	-3.17	0.18	1.26	0.25	43.88
10	Klei - Zwak zandig - Slap	-3.33	0.16	1.26	0.26	45.16
11	Klei - Organisch - Matig	-3.65	0.32	1.26	0.25	47.08
12	Klei - Zwak zandig - Vast	-3.81	0.16	1.26	0.32	48.84
13	Klei - Zwak zandig - Slap	-3.96	0.15	1.26	0.26	50.04
14	Zand - Sterk siltig - Kleiig	-4.00	0.04	1.26	0.33	50.48

Rekenwaarde

De rekenwaarde van de maximale negatieve kleefbelasting van een alleenstaande paal bedraagt :

$F_{nk;d} = F_{nk;k} * \gamma_{f;nk} = -47.2$ kN

waarin : in dit geval :

$\gamma_{f;nk}$ = belastingfactor voor de negatieve kleef (art. 7.3.2.2 (b)) 1.0 -

DETAIL BER. NEGATIEVE KLEEF Geval 1; Sondering 11; N.A.P.-10.50

Uitgangspunten

- gehanteerde sondering : Sondering 11
- gehanteerde paal : Paal 1
- paalpuntniveau : N.A.P.-10.50 m
- paalkopniveau : N.A.P. 0.00 m
- traject negatieve kleef : N.A.P. 2.82 m
  tot : N.A.P. -4.00 m
- $p_{sur;k}$: 36.54 kN/m²

Berekening negatieve kleef

De karakteristieke waarde van de maximale negatieve kleefbelasting v.e. alleenstaande paal volgens art. 7.3.2.2 (d) bedraagt:

$F_{nk;k} = O_{s;gem} * \sum d_j * K_{0;j;k} * \tan \delta_{j;k} * (\sigma'_{v;j-1;k} + \sigma'_{v;j;k})/2.0$
$= -65.1$ kN

waarin :

$O_{s;gem}$ = omtrek van de dwarsdoorsnede van de paalschacht
d_j = de dikte van de grondlaag i
$K_{0;j;k}$ = de karakteristieke waarde van de neutrale gronddrukfactor in laag i
$\delta_{j;k}$ = de karakteristieke waarde van de wrijvingshoek
$\sigma'_{v;j;k}$ = de karakteristieke waarde van de effectieve verticale spanning onder in laag j

Per laag

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Nr	Laag	Nivo [m]	Hoogte [m]	$O_{s;gem}$ [m¹]	$K_{0;j} * \tan(\delta_i)$	$\sigma'_{v;j;k}$ [kN/m²]
--	----	0.00	--	--	--	36.54
1	Klei - Zwak zandig - Slap	-0.29	0.29	1.26	0.26	38.86
2	Klei - Schoon - Matig	-0.42	0.13	1.26	0.25	40.03
3	Klei - Zwak zandig - Slap	-1.40	0.98	1.26	0.26	47.87
4	Klei - Organisch - Matig	-1.56	0.16	1.26	0.25	48.83
5	Klei - Zwak zandig - Slap	-1.89	0.33	1.26	0.26	51.47
6	Klei - Organisch - Matig	-3.74	1.85	1.26	0.25	62.57
7	Klei - Schoon - Matig	-3.87	0.13	1.26	0.25	63.74
8	Klei - Organisch - Matig	-3.99	0.12	1.26	0.25	64.46
9	Zand - Sterk siltig - Kleiig	-4.00	0.01	1.26	0.33	64.57

Rekenwaarde

De rekenwaarde van de maximale negatieve kleefbelasting van een alleenstaande paal bedraagt :

$F_{nk;d} = F_{nk;k} * \gamma_{f;nk} = -65.1$ kN

waarin :		in dit geval :
$\gamma_{f;nk}$	= belastingfactor voor de negatieve kleef (art. 7.3.2.2 (b))	1.0 -

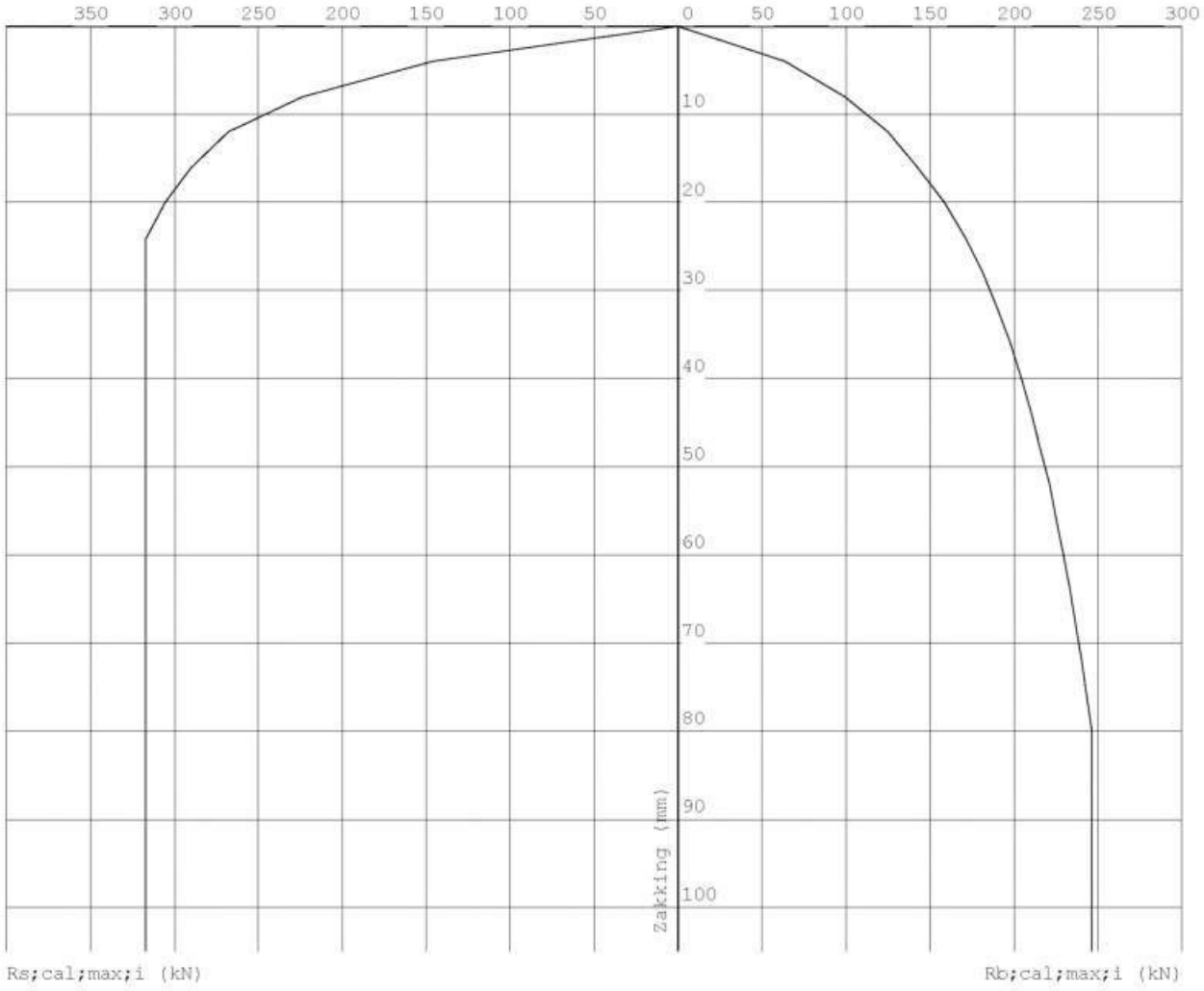
LAST_ZAKKINGSDIAGRAM Geval 1

Uitgangspunten
- gehanteerde sondering : Sondering 10
- gehanteerde paal : Paal 1
- paalpuntniveau : N.A.P.-10.50 m

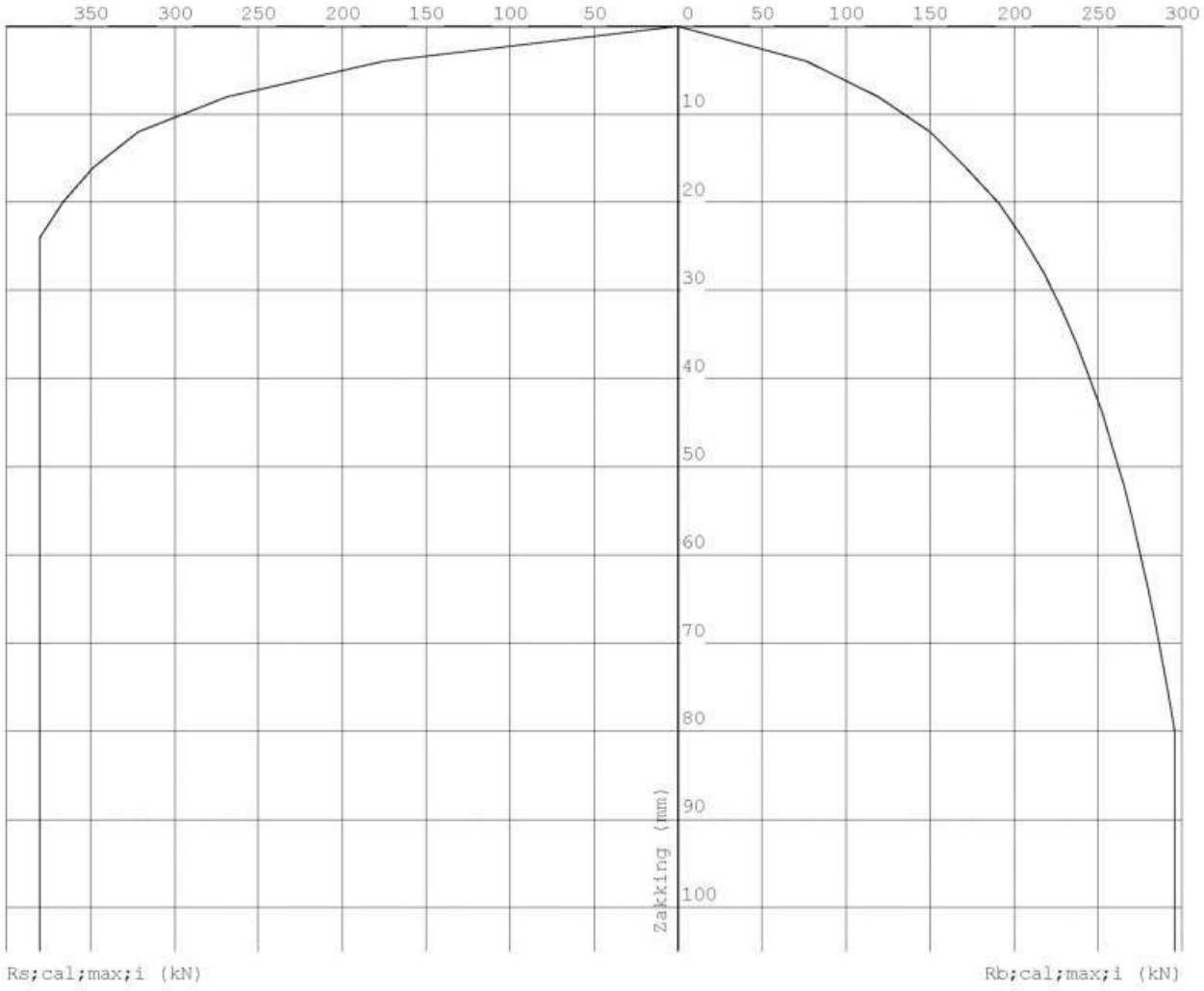
Last-zakkingsgedrag paal

paalzakking (mm)		draagvermogen 1B (kN)			paalzakking (mm)		draagvermogen 2 (kN)		
voet	kop	punt	wrijving	totaal	voet	kop	punt	wrijving	totaal
0.0	0.0	0	0	0	0.0	0.0	0	0	0
4.0	4.7	64	146	210	4.0	4.8	76	175	252
8.0	9.1	99	224	323	8.0	9.3	119	269	387
12.0	13.3	125	268	393	12.0	13.6	150	321	471
16.0	17.4	142	290	433	16.0	17.7	171	348	519
20.0	21.5	159	305	464	20.0	21.9	190	366	557
24.0	25.6	171	317	488	24.0	26.0	205	380	585
24.1	25.7	171	317	488	24.1	26.0	205	380	585
28.0	29.7	181	317	498	28.0	30.0	218	380	598
32.0	33.7	190	317	507	32.0	34.0	228	380	608
36.0	37.7	198	317	515	36.0	38.1	237	380	618
40.0	41.8	204	317	521	40.0	42.1	245	380	625
44.0	45.8	210	317	527	44.0	46.2	253	380	633
48.0	49.8	216	317	533	48.0	50.2	259	380	639
52.0	53.8	221	317	538	52.0	54.2	265	380	645
56.0	57.9	225	317	542	56.0	58.2	270	380	651
60.0	61.9	229	317	546	60.0	62.2	275	380	655
64.0	65.9	233	317	550	64.0	66.3	280	380	660
68.0	69.9	237	317	554	68.0	70.3	284	380	664
72.0	73.9	240	317	557	72.0	74.3	288	380	668
76.0	77.9	243	317	560	76.0	78.3	292	380	672
79.9	81.9	246	317	563	79.9	82.3	296	380	676
400.0	401.9	246	317	563	400.0	402.3	296	380	676

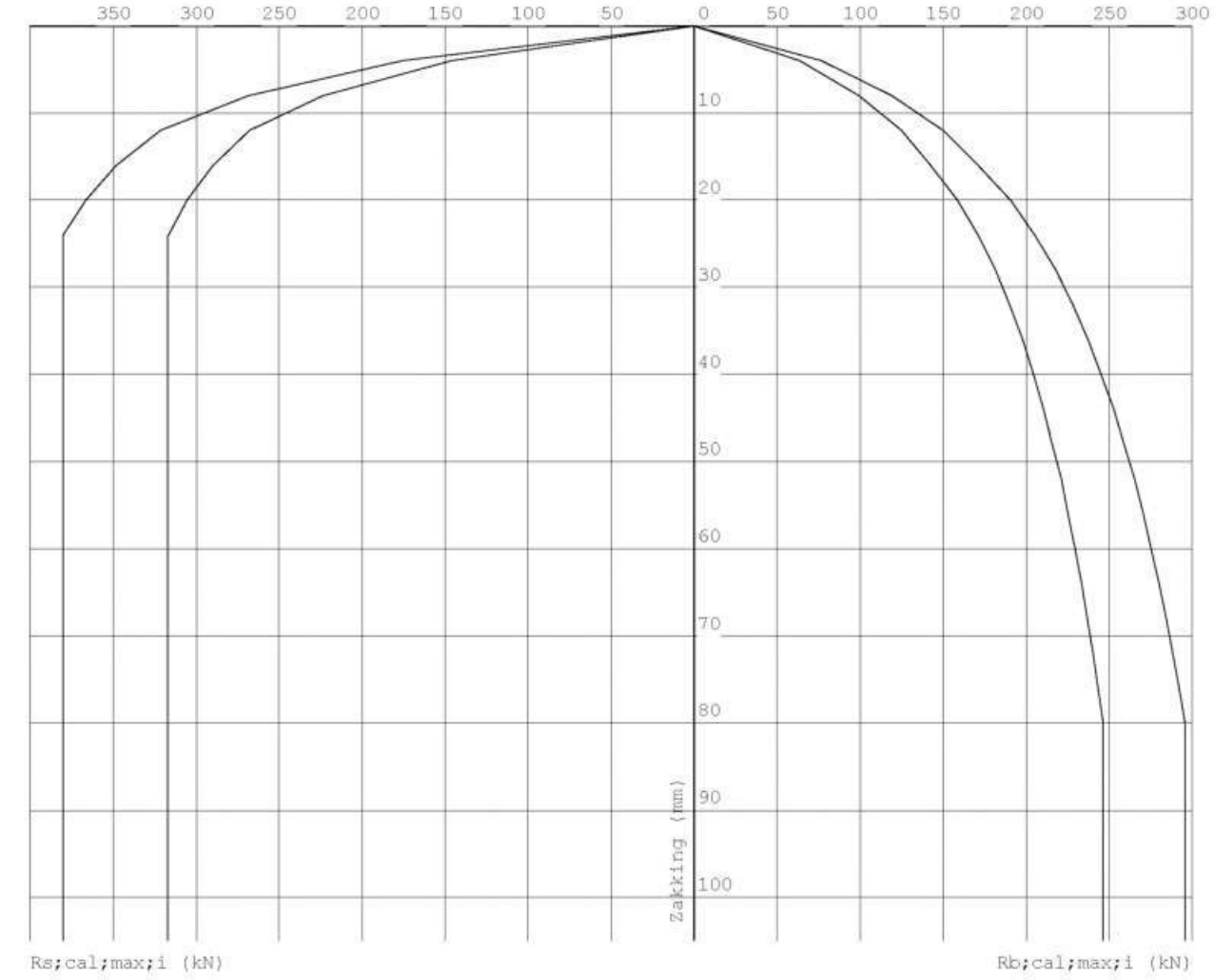
Last-zakkingsdiagram grenstoestand 1B



Last-zakkingsdiagram grenstoestand 2



Last-zakkingsdiagram grenstoestand 1B en 2



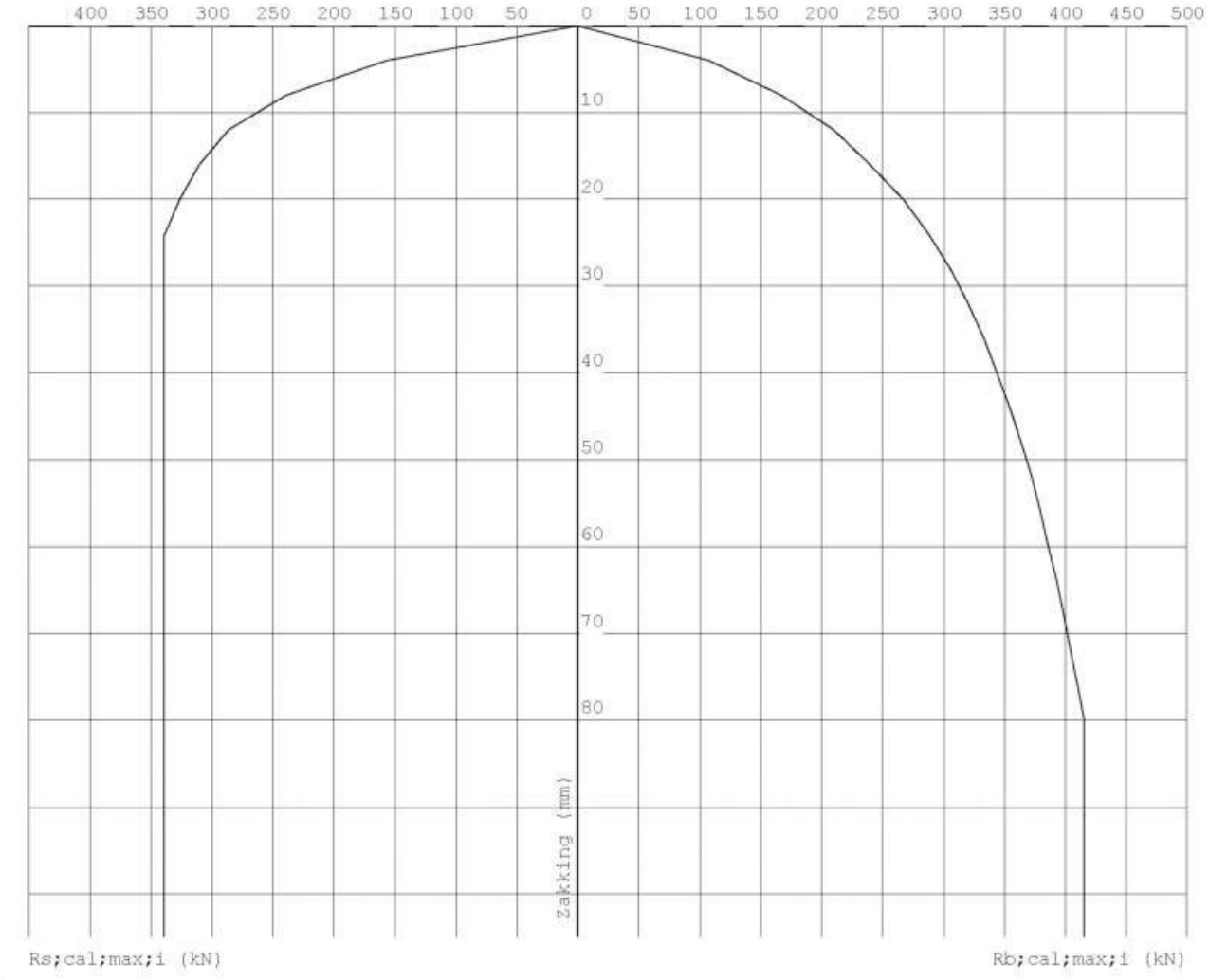
LAST_ZAKKINGSDIAGRAM Geval 1

Uitgangspunten
- gehanteerde sondering : Sondering 11
- gehanteerde paal : Paal 1
- paalpuntniveau : N.A.P.-10.50 m

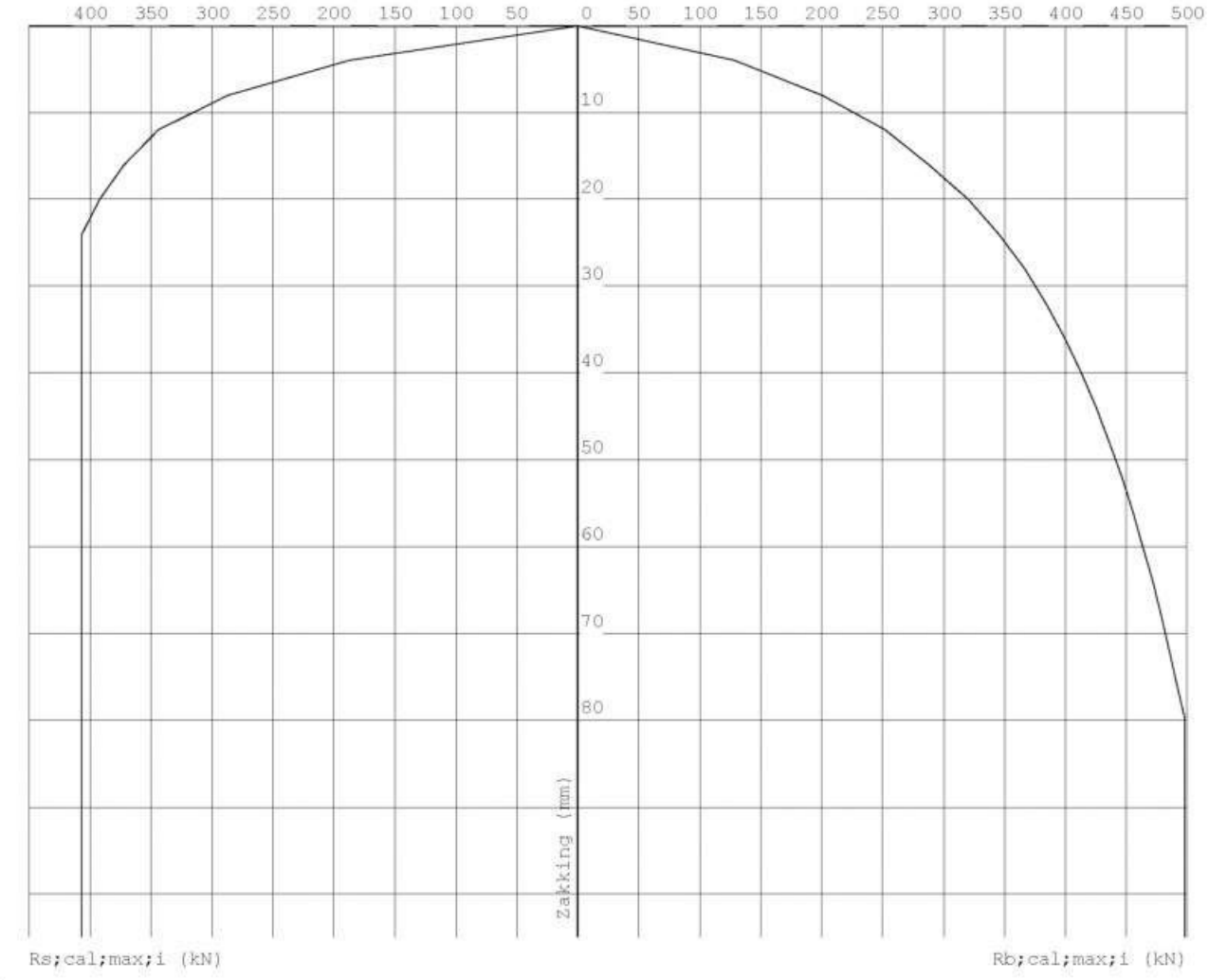
Last-zakkingsgedrag paal

paalzakking (mm)		draagvermogen 1B (kN)			paalzakking (mm)		draagvermogen 2 (kN)		
voet	kop	punt	wrijving	totaal	voet	kop	punt	wrijving	totaal
0.0	0.0	0	0	0	0.0	0.0	0	0	0
4.0	4.9	107	156	263	4.0	5.1	129	187	316
8.0	9.4	167	239	406	8.0	9.7	200	287	488
12.0	13.7	210	287	497	12.0	14.0	252	344	596
16.0	17.9	240	310	550	16.0	18.3	288	372	660
20.0	22.1	267	327	594	20.0	22.5	321	392	712
24.0	26.2	288	339	627	24.0	26.6	345	407	752
24.1	26.2	288	339	627	24.1	26.7	346	407	752
28.0	30.3	306	339	645	28.0	30.7	367	407	773
32.0	34.3	320	339	659	32.0	34.8	384	407	791
36.0	38.4	333	339	672	36.0	38.8	400	407	806
40.0	42.4	344	339	683	40.0	42.9	413	407	820
44.0	46.5	354	339	694	44.0	47.0	425	407	832
48.0	50.5	363	339	702	48.0	51.0	436	407	843
52.0	54.5	372	339	711	52.0	55.0	447	407	854
56.0	58.6	379	339	718	56.0	59.1	455	407	862
60.0	62.6	386	339	725	60.0	63.1	463	407	870
64.0	66.6	393	339	732	64.0	67.1	472	407	879
68.0	70.6	399	339	738	68.0	71.2	479	407	885
72.0	74.7	404	339	743	72.0	75.2	485	407	892
76.0	78.7	410	339	749	76.0	79.2	492	407	898
79.9	82.6	415	339	754	79.9	83.2	498	407	905
400.0	402.7	415	339	754	400.0	403.3	498	407	905

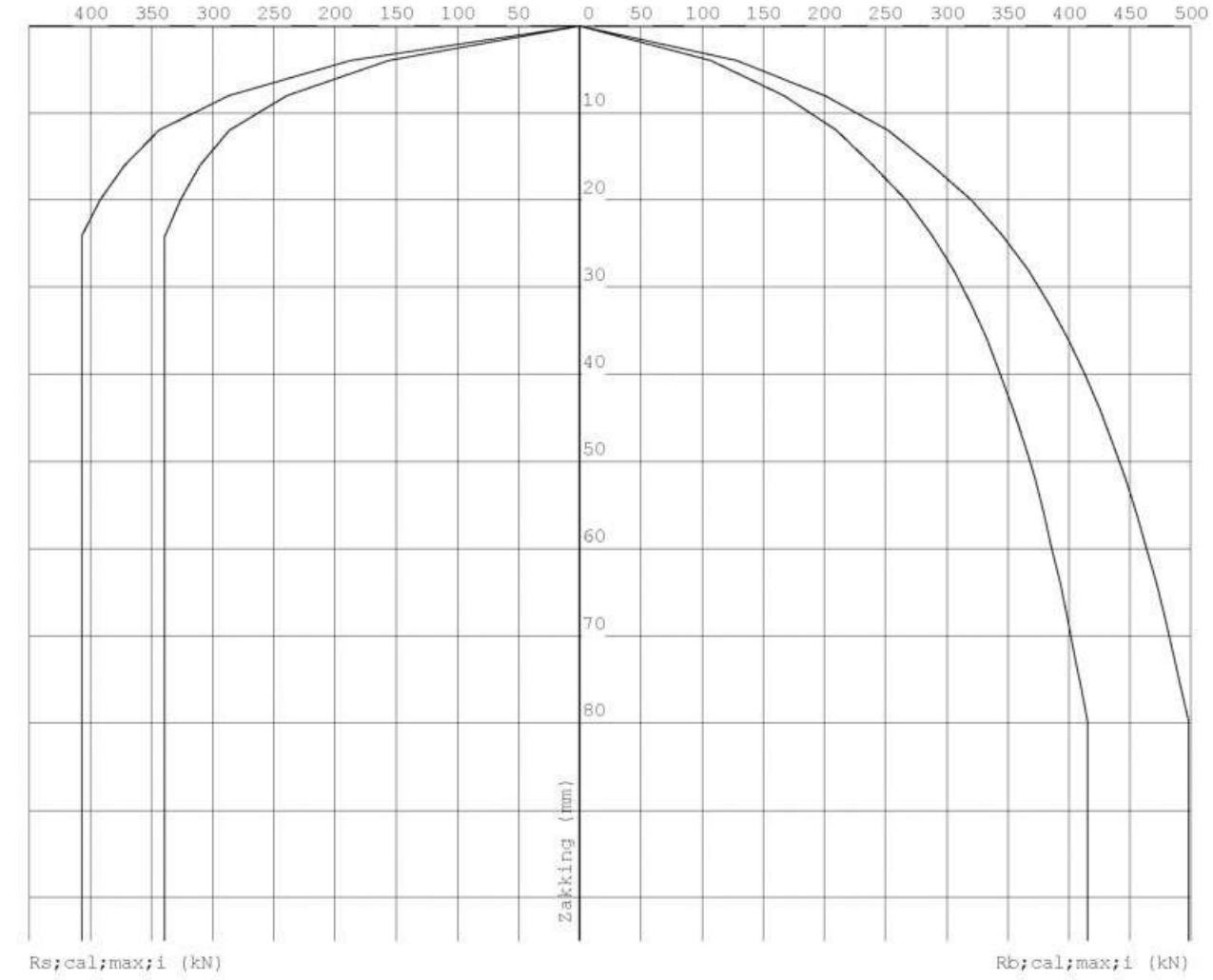
Last-zakkingsdiagram grenstoestand 1B



Last-zakkingsdiagram grenstoestand 2



Last-zakkingsdiagram grenstoestand 1B en 2



SAMENVATTINGSTABEL Geval 1 (n=1)

Uitgangspunten
- paal : Paal 1
- paaltype : Avegaarpaal
- schachtafmeting : 400 mm

Paalklassefactor α_p : 0.56
Factor α_s (tabel 7.c EC 7.1) : 0.006 (zandlagen; voor kleilagen zie tabel 7.d)
Correlatiefactor $\xi_{3(n=1)}$: 1.39

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

sondering	maaiveld niveau	paalpunt niveau	Bezwijkdraagvermogen $R_{b;cal}$ [kN]	$R_{s;cal}$ [kN]	$R_{c;cal}$ [kN]	Rekenwaarden $R_{c;d}$ [kN]	$F_{nk;d}$ [kN]	$R_{c;netto;d}$ [kN]
Sondering 10	2.75	-10.50	390.3	502.0	892.3	535.0	-47.2	487.8
Sondering 11	2.82	-10.50	657.4	537.0	1194.5	716.1	-65.1	651.0

Totaal resultaten Geval 1 (van 2 sonderingen)

Uitgangspunten
Correlatiefactor ξ_{3gem} (n= 2) : 1.32
Correlatiefactor ξ_{4min} (n= 2) : 1.32

gebaseerd op sonderingen:
Sondering 10 Sondering 11

$R_{c;k} = \min.\{ R_{c;cal;gem}/\xi_3 ; R_{c;cal;min}/\xi_4 \}$ (7.8)

Inheiniveau [m]	
-10.50	$R_{c;k}$ = min.{(1043.4/ 1.32);(892.3/ 1.32)}= 676.0

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Niveau	$F_{netto;d}$
-10.50	498.2 *

* WAARSCHUWING n.a.v. NEN-NA 1997-1 art. A.3.3.3 1)

Bij toepassing van de waarden van ξ_1, ξ_2, ξ_3 en ξ_4 van de tabellen A.9 en A.10 mag de variatiecoëfficiënt van de draagkracht van palen in een groep, bepaald volgens de verschillende voor deze groep geldende sonderingen, niet groter zijn dan 12%. Deze variatiecoëfficiënt van 12% geeft bij een kans van onderschrijding van 5% een minimumdraagkracht groter dan 80% van het gemiddelde.

Inheiniveau [m]	Aantal [-]	$R_{c;cal;gem}$ [kN]	Var.coëff. [%]
-10.50	2	1043.40	20.5

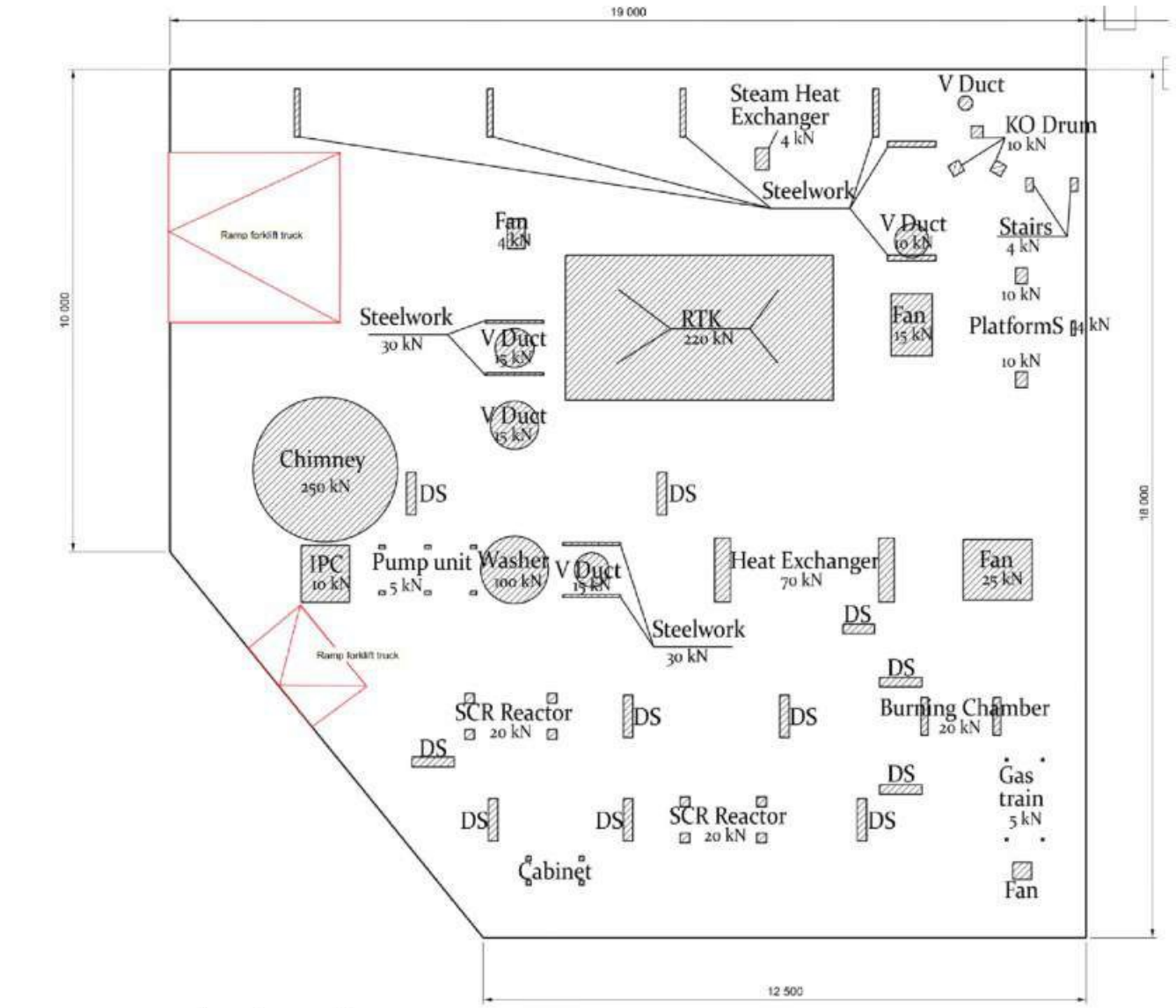
OVERZICHT NETTO DRAAGVERMOGEN DRUKPALEN

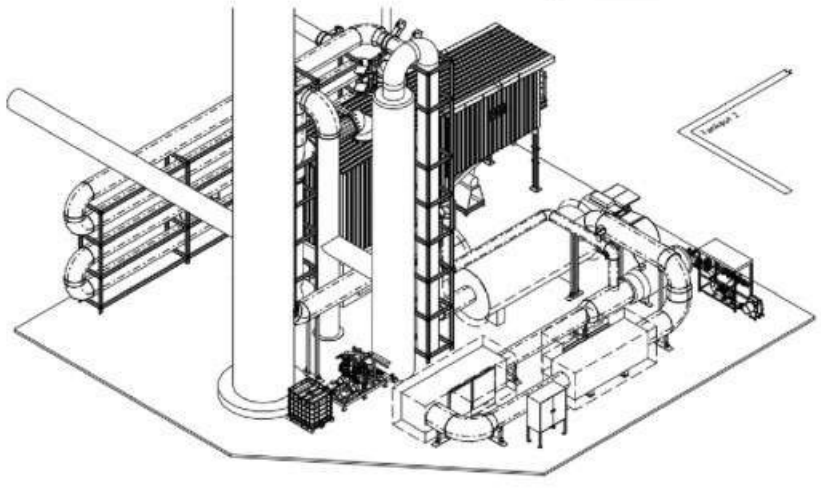
Netto paaldraagvermogen(s) zijn naar beneden toe afgerond op: 1.0 kN nauwkeurig
Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

sondering	maaiveld niveau	paalpunt niveau	$R_{c;netto;d}$ [kN] Geval 1
Sondering 10	2.75	-10.50	487
Sondering 11	2.82	-10.50	651

3.2. Berekening fundatieplaat

3.2.1. Belastingopgave t.b.v. berekening fundatie





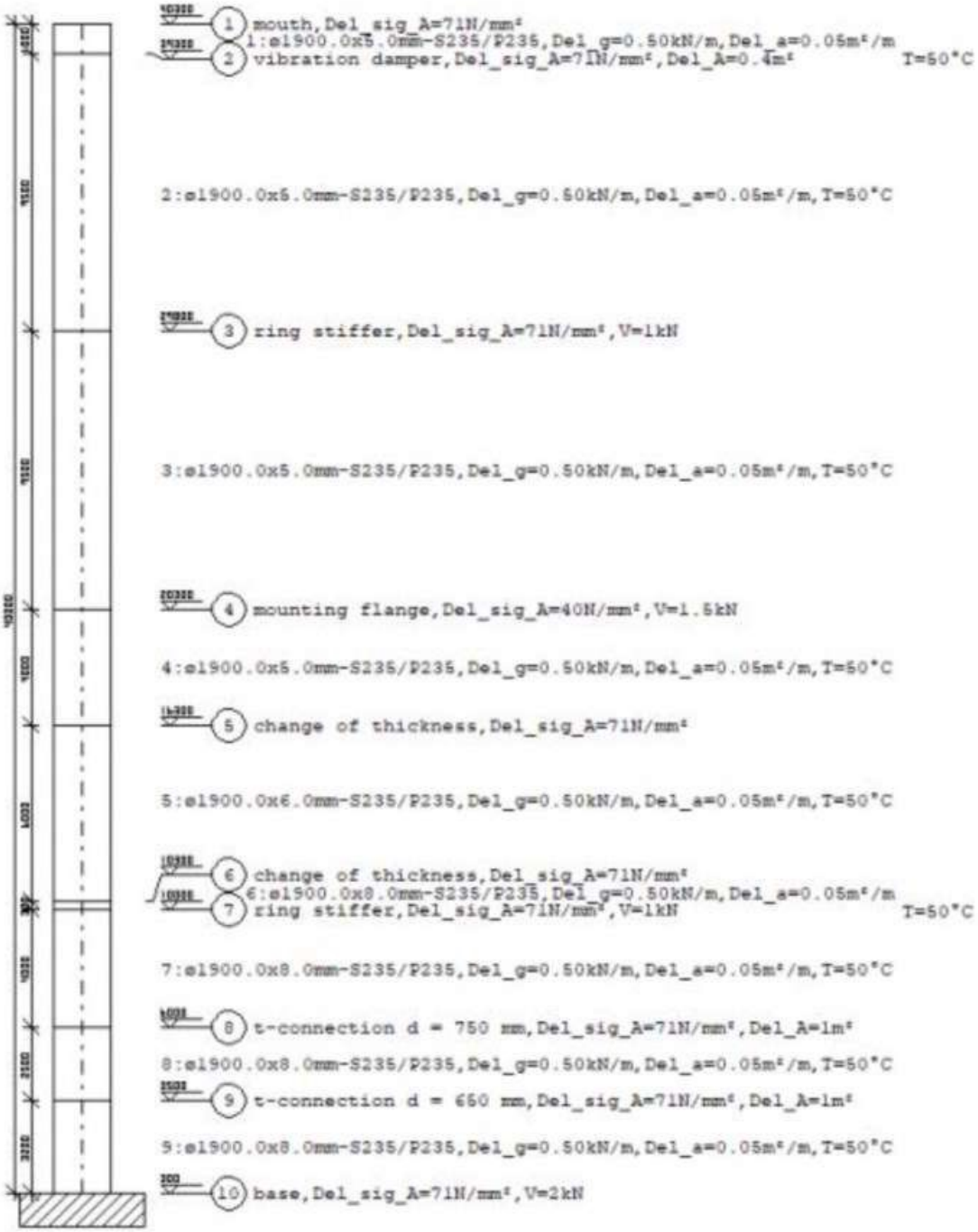
3.2.2. Berekening belastingen schoorsteen

Aangehouden belastingen uit scjhoorsteen t.b.v. berekening fundatie:

Jeremias
FSA STAHLKAMIN Seite 7 Pos.:
Blatt 1

5996-NL-Zaltbommel

Systemsketch



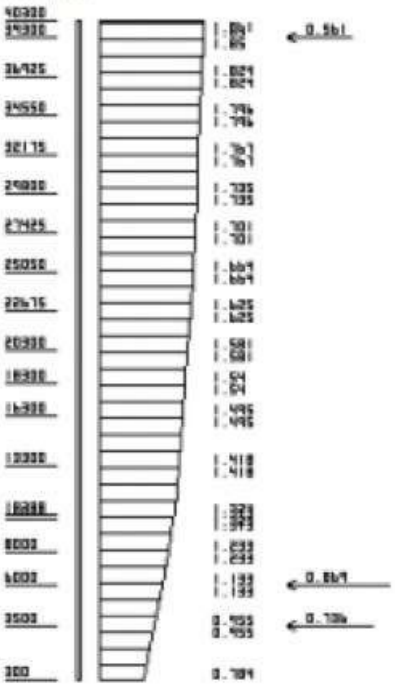
Jeremias
FSA STAHLKAMIN Seite 10 Pos.:
Blatt 4

Material properties

Tube	Material	T	E	f_y	f_y/γ_M
-	-	°C	N/mm²	N/mm²	N/mm²
1	S235/P235	50	208125	235.00	213.64
2	S235/P235	50	208125	235.00	213.64
3	S235/P235	50	208125	235.00	213.64
4	S235/P235	50	208125	235.00	213.64
5	S235/P235	50	208125	235.00	213.64
6	S235/P235	50	208125	235.00	213.64
7	S235/P235	50	208125	235.00	213.64
8	S235/P235	50	208125	235.00	213.64
9	S235/P235	50	208125	235.00	213.64

Loading case 1: Gustload - static according to [3]

Loads



Tube	Point	v(z)	q(z)	$\varnothing_w$	ΔA	Re	c_{fr}	Ψ_λ	κ	w;W
-	-	m/s	kN/m²	mm	m²/m	-	-	-	-	kN/m;kN
1	above	44.56	1.241	1900.0	0.05	$5.644*10^6$	0.885	0.755	1.137	1.861
	below	44.43	1.234	1900.0	0.05	$5.628*10^6$	0.885	0.755	1.137	1.850
	N. 2	44.43	1.234		0.40	m²			1.137	0.561
2	above	44.43	1.234	1900.0	0.05	$5.628*10^6$	0.885	0.755	1.137	1.850
	below	43.06	1.159	1900.0	0.05	$5.454*10^6$	0.883	0.755	1.137	1.735
3	above	43.06	1.159	1900.0	0.05	$5.454*10^6$	0.883	0.755	1.137	1.735
	below	41.14	1.058	1900.0	0.05	$5.212*10^6$	0.881	0.755	1.137	1.581
4	above	41.14	1.058	1900.0	0.05	$5.212*10^6$	0.881	0.755	1.137	1.581
	below	40.04	1.002	1900.0	0.05	$5.072*10^6$	0.880	0.755	1.137	1.495
5	above	40.04	1.002	1900.0	0.05	$5.072*10^6$	0.880	0.755	1.137	1.495
	below	37.73	0.890	1900.0	0.05	$4.779*10^6$	0.877	0.755	1.137	1.324
6	above	37.73	0.890	1900.0	0.05	$4.779*10^6$	0.877	0.755	1.137	1.324
	below	37.58	0.882	1900.0	0.05	$4.760*10^6$	0.877	0.755	1.137	1.313
7	above	37.58	0.882	1900.0	0.05	$4.760*10^6$	0.877	0.755	1.137	1.313
	below	34.97	0.764	1900.0	0.05	$4.429*10^6$	0.874	0.755	1.137	1.133
	N. 8	34.97	0.764		1.00	m²			1.137	0.869
8	above	34.97	0.764	1900.0	0.05	$4.429*10^6$	0.874	0.755	1.137	1.133

Jeremias
FSA STAHLKAMIN Seite 11 Pos.:
Blatt 5

Tube	Point	v(z)	q(z)	$\varnothing_v$	ΔA	Re	c_{fl}	Ψ_1	κ	w;W
-	-	m/s	kN/m²	mm	m²/m	-	-	-	-	kN/m;kN
	below	32.18	0.647	1900.0	0.05	$4.076*10^6$	0.870	0.755	1.137	0.955
	N. 9	32.18	0.647		1.00	m²			1.137	0.736
9	above	32.18	0.647	1900.0	0.05	$4.076*10^6$	0.870	0.755	1.137	0.955
	below	29.23	0.534	1900.0	0.05	$3.703*10^6$	0.866	0.755	1.137	0.784

Inner forces
According to 2nd order theory with 1.60-fold windloads and 1.30-fold deadweight loads and a lateral deviation of 1/333

Tube	N_{above}	V_{above}	M_{above}	N_{below}	V_{below}	M_{below}
-	kN	kN	kNm	kN	kN	kNm
1	0.000	-0.000	0.000	-3.688	2.980	1.507
2	-3.688	3.878	1.507	-38.721	31.266	171.479
3	-40.021	31.270	171.479	-75.054	56.637	594.998
4	-77.004	56.643	594.998	-91.754	66.537	843.680
5	-91.754	66.537	843.680	-117.514	80.187	1287.746
6	-117.514	80.187	1287.746	-119.165	80.824	1312.035
7	-120.465	80.828	1312.035	-142.475	88.753	1653.238
8	-142.475	90.144	1653.238	-156.232	94.362	1884.759
9	-156.232	95.539	1884.759	-173.840	100.046	2198.329

Deformations

Node	v_z	φ_t
-	mm	rad
1	234.583	0.0082954
2	226.287	0.0082952
3	148.071	0.0080745
4	76.107	0.0068344
5	50.710	0.0058045
6	21.204	0.0038975
7	20.047	0.0038095
8	7.381	0.0024726
9	2.420	0.0014744
10	0.000	0.0000000

Support reactions

	at γ_F-fold loads			at 1.00-fold loads		
Node	V	H	M	V	H	M
-	kN	kN	kNm	kN	kN	kNm
10	176.440	99.525	2198.329	135.723	62.203	1373.955

Stressproofs

Tube	above	above	below	below	
-	σ_{max}	σ_{min}	σ_{max}	σ_{min}	
-	N/mm²	N/mm²	N/mm²	N/mm²	
1	0.000	-0.000	-.017	-.231	≤213.636
2	-.017	-.231	10.891	-13.493	≤213.636
3	10.847	-13.536	39.782	-44.825	≤213.636
4	39.717	-44.891	56.902	-63.067	≤213.636
5	47.496	-52.636	73.127	-79.710	≤213.636
6	55.024	-59.967	56.074	-61.086	≤213.636
7	56.046	-61.113	70.818	-76.810	≤213.636
8	70.818	-76.810	80.865	-87.436	≤213.636
9	80.865	-87.436	94.495	-101.807	≤213.636

3.2.3. F001 – berekening fundatieplaat

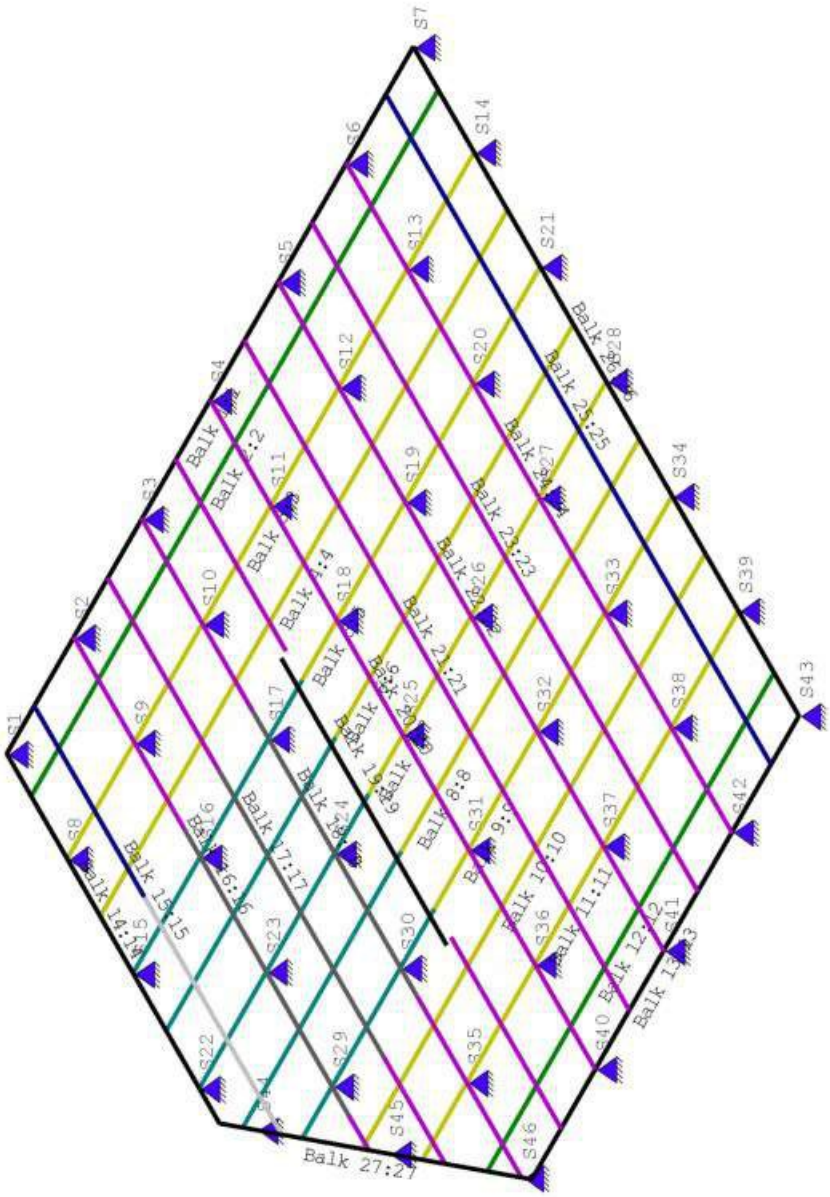
Technosoft Balkroosters release 6.74 **4 aug 2022**

```
Project......: 15877-14 - Sachem Europe BV - RTO
Onderdeel....: F001 - fundatie RTO
Dimensies....: kN/m/rad
Datum........: 01/08/2022
Bestand......: X:\Ing.Buro\15800 tm
               15899\15877\BouwConstructie\Besteksfase\berekeningen\
               15877-14 RTO\F001 - fundatieplaat RTO.grw
Torsiefac....: 100 %

Betrouwbaarheidsklasse        :  1      Referentieperiode          : 50
Ouderdom bij belasten         :  28     Relatieve vochtigheid      : 50%
Doorbuigingen(beton) zijn dmv gecorrigeerde stijfheden berekend.

Fysisch lineair : Er is gerekend met de e-modulus uit de materiaaltabel.
Fys.NLE.kort    : Er is gerekend met een gecorrigeerde e-modulus (korte duur).
Deze e-mod. is berekend mbv de krachten uit de fysisch lineair berekening.
```

Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010,A1:2019	NB:2019(nl)
	NEN-EN 1991-1-1:2002	C1/C11:2019	NB:2019(nl)
Beton	NEN-EN 1992-1-1:2011(nl)	C2/A1:2015(nl)	NB:2016(nl)

GEOMETRIE



MATERIALEN

Mt	Kwaliteit	E-modulus[N/mm2]	S.G.	Pois.	Uitz. coëff
1	C30/37	9465	25.0	0.20	1.0000e-05
2	C30/37	9465	12.5	0.20	1.0000e-05

MATERIALEN vervolg

Mt	Kwaliteit	Cement	Kruipfac.
1	C30/37		2.47
2	C30/37		2.47

PROFIELEN [mm]

Prof.	Omschrijving	Materiaal	Oppervlak	Torsietr.	Traagheid	Vormf.
1	B*H 500*800	1:C30/37	4.000e+05	2.064e+10	2.133e+10	0.00
2	B*H 1750*250	2:C30/37	4.375e+05	8.296e+09	2.279e+09	0.00
3	B*H 1500*250	2:C30/37	3.750e+05	6.994e+09	1.953e+09	0.00
4	B*H 2025*250	2:C30/37	5.062e+05	9.728e+09	2.637e+09	0.00
5	B*H 1550*250	2:C30/37	3.875e+05	7.254e+09	2.018e+09	0.00
6	B*H 1500*800	2:C30/37	1.200e+06	1.720e+11	6.400e+10	0.00
7	B*H 2025*800	2:C30/37	1.620e+06	2.607e+11	8.640e+10	0.00
8	B*H 1550*800	2:C30/37	1.240e+06	1.804e+11	6.613e+10	0.00
9	B*H 1550*800	2:C30/37	8.137e+05	5.752e+10	4.524e+10	0.00

PROFIELEN vervolg [mm]

Prof.	Staaftype	Breedte	Hoogte	Zs	Rek.As	Type	b1	h1	b2	h2
1	0:Normaal	500	800	400	0.00	0:RH				
2	0:Normaal	1750	250	125	0.00	0:RH				
3	0:Normaal	1500	250	125	0.00	0:RH				
4	0:Normaal	2025	250	125	0.00	0:RH				
5	0:Normaal	1550	250	125	0.00	0:RH				
6	0:Normaal	1500	800	400	0.00	0:RH				
7	0:Normaal	2025	800	400	0.00	0:RH				
8	0:Normaal	1550	800	400	0.00	0:RH				
9	0:Normaal	1550	800	465	202.98	3:L3	775	550		

PROFIELVORMEN [mm]

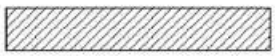
1 B*H 500*800

2 B*H 1750*250

3 B*H 1500*250

4 B*H 2025*250

5 B*H 1550*250



6 B*H 1500*800

7 B*H 2025*800

8 B*H 1550*800

9 B*H 1550*800

KNOPEN

Knoop	X	Y	Knoop	X	Y
1	0.000	17.500	6	18.500	11.750
2	18.500	17.500	7	0.000	8.750
3	0.000	14.750	8	18.500	8.750
4	18.500	14.750	9	1.697	5.750
5	0.000	11.750	10	18.500	5.750
11	4.135	2.750	16	18.500	16.375
12	18.500	2.750	17	0.000	10.250
13	6.369	0.000	18	18.500	10.250
14	18.500	0.000	19	2.916	4.250
15	0.000	16.375	20	18.500	4.250
21	5.455	1.125	26	18.500	7.250
22	18.500	1.125	27	0.000	7.839
23	0.000	13.250	28	12.350	17.500
24	18.500	13.250	29	12.350	0.000
25	0.478	7.250	30	9.250	17.500
31	9.250	0.000	36	7.700	17.500
32	6.150	17.500	37	7.700	0.000
33	6.150	0.270	38	4.600	17.500
34	10.800	17.500	39	4.600	2.177
35	10.800	0.000	40	3.050	17.500
41	3.050	4.085	46	17.238	17.500
42	1.263	17.500	47	17.238	0.000
43	1.263	6.285	48	15.450	17.500
44	13.900	17.500	49	15.450	0.000
45	13.900	0.000			

BALKEN

Nr.	Naam	Begin	Eind	Profiel
1	1	1	2	1:B*H 500*800
2	2	15	16	2:B*H 1750*250
3	3	3	4	3:B*H 1500*250
4	4	23	24	3:B*H 1500*250
5	5	5	6	Zie Doorsnedesectoren
6	6	17	18	Zie Doorsnedesectoren
7	7	7	8	Zie Doorsnedesectoren
8	8	25	26	Zie Doorsnedesectoren
9	9	9	10	Zie Doorsnedesectoren
10	10	19	20	3:B*H 1500*250
11	11	11	12	3:B*H 1500*250
12	12	21	22	2:B*H 1750*250
13	13	13	14	1:B*H 500*800
14	14	27	1	1:B*H 500*800
15	15	43	42	Zie Doorsnedesectoren
16	16	41	40	Zie Doorsnedesectoren
17	17	39	38	Zie Doorsnedesectoren
18	18	33	32	Zie Doorsnedesectoren
19	19	37	36	Zie Doorsnedesectoren
20	20	31	30	5:B*H 1550*250
21	21	35	34	5:B*H 1550*250
22	22	29	28	5:B*H 1550*250
23	23	45	44	5:B*H 1550*250
24	24	49	48	5:B*H 1550*250
25	25	47	46	4:B*H 2025*250
26	26	14	2	1:B*H 500*800
27	27	27	13	1:B*H 500*800

BALKEN vervolg

Nr.	Naam	Aansl.begin	Aansl.eind	Excentr.	Pasm.begin	Pasm.eind	Opm.
1	1	WDM	WDM	0.000	0.000	0.000	
2	2	WDM	WDM	0.000	0.000	0.000	
3	3	WDM	WDM	0.000	0.000	0.000	
4	4	WDM	WDM	0.000	0.000	0.000	
5	5	WDM	WDM	0.000	0.000	0.000	
6	6	WDM	WDM	0.000	0.000	0.000	
7	7	WDM	WDM	0.000	0.000	0.000	
8	8	WDM	WDM	0.000	0.000	0.000	
9	9	WDM	WDM	0.000	0.000	0.000	
10	10	WDM	WDM	0.000	0.000	0.000	
11	11	WDM	WDM	0.000	0.000	0.000	
12	12	WDM	WDM	0.000	0.000	0.000	
13	13	WDM	WDM	0.000	0.000	0.000	
14	14	WDM	WDM	0.000	0.000	0.000	
15	15	WDM	WDM	0.000	0.000	0.000	
16	16	WDM	WDM	0.000	0.000	0.000	
17	17	WDM	WDM	0.000	0.000	0.000	
18	18	WDM	WDM	0.000	0.000	0.000	
19	19	WDM	WDM	0.000	0.000	0.000	
20	20	WDM	WDM	0.000	0.000	0.000	
21	21	WDM	WDM	0.000	0.000	0.000	
22	22	WDM	WDM	0.000	0.000	0.000	
23	23	WDM	WDM	0.000	0.000	0.000	
24	24	WDM	WDM	0.000	0.000	0.000	
25	25	WDM	WDM	0.000	0.000	0.000	
26	26	WDM	WDM	0.000	0.000	0.000	
27	27	WDM	WDM	0.000	0.000	0.000	

BALKEN vervolg

Nr.	Naam	Toevallige inklemming % begin	tussen	eind
	Alle balken	15	15	15

DOORSNEDESECTOREN

Balk	Vanaf	Tot	Lengte	Profiel	Eindcode
Balk 5:5	0.000	7.700	7.700	6:B*H 1500*800	1:Vast
Balk 5:5	7.700	18.500	10.800	3:B*H 1500*250	1:Vast
Balk 6:6	0.000	7.700	7.700	6:B*H 1500*800	1:Vast
Balk 6:6	7.700	18.500	10.800	3:B*H 1500*250	1:Vast
Balk 7:7	0.000	7.700	7.700	6:B*H 1500*800	1:Vast
Balk 7:7	7.700	18.500	10.800	3:B*H 1500*250	1:Vast
Balk 8:8	0.000	7.222	7.222	6:B*H 1500*800	1:Vast
Balk 8:8	7.222	18.022	10.800	3:B*H 1500*250	1:Vast
Balk 9:9	0.000	6.003	6.003	6:B*H 1500*800	1:Vast
Balk 9:9	6.003	16.803	10.800	3:B*H 1500*250	1:Vast
Balk 15:15	0.000	6.215	6.215	7:B*H 2025*800	1:Vast
Balk 15:15	6.215	11.215	5.000	4:B*H 2025*250	1:Vast
Balk 16:16	0.000	0.915	0.915	5:B*H 1550*250	1:Vast
Balk 16:16	0.915	8.415	7.500	8:B*H 1550*800	1:Vast
Balk 16:16	8.415	13.415	5.000	5:B*H 1550*250	1:Vast
Balk 17:17	0.000	2.823	2.823	5:B*H 1550*250	1:Vast
Balk 17:17	2.823	10.323	7.500	8:B*H 1550*800	1:Vast
Balk 17:17	10.323	15.323	5.000	5:B*H 1550*250	1:Vast
Balk 18:18	0.000	4.730	4.730	5:B*H 1550*250	1:Vast
Balk 18:18	4.730	12.230	7.500	8:B*H 1550*800	1:Vast
Balk 18:18	12.230	17.230	5.000	5:B*H 1550*250	1:Vast
Balk 19:19	0.000	5.000	5.000	5:B*H 1550*250	1:Vast
Balk 19:19	5.000	12.500	7.500	9:B*H 1550*800	1:Vast

DOORSNEDESECTOREN

Balk	Vanaf	Tot	Lengte	Profiel	Eindcode
Balk 19:19	12.500	17.500	5.000	5:B*H 1550*250	1:Vast

STEUNPUNTTYPEN

Nr. : 1
Afmeting : Rond 400
Min.afst.: 0.500
Assenstelsel: Globaal
Rotatie X:Vrij
Verplaatsing Z:Veerwaarde: 30000
Rotatie Y:Vrij

STEUNPUNTEN

Nr.	Steunpunttype	Balk	Positie	Excentr.	Hoek	Opm:
1	1:Rond 400	Balk 1:1	0.000	0.000	0.000	
2	1:Rond 400	Balk 1:1	3.050	0.000	0.000	
3	1:Rond 400	Balk 1:1	6.150	0.000	0.000	
4	1:Rond 400	Balk 1:1	9.250	0.000	0.000	
5	1:Rond 400	Balk 1:1	12.350	0.000	0.000	
6	1:Rond 400	Balk 1:1	15.450	0.000	0.000	
7	1:Rond 400	Balk 1:1	18.500	0.000	0.000	
8	1:Rond 400	Balk 3:3	0.000	0.000	0.000	
9	1:Rond 400	Balk 3:3	3.050	0.000	0.000	
10	1:Rond 400	Balk 3:3	6.150	0.000	0.000	
11	1:Rond 400	Balk 3:3	9.250	0.000	0.000	
12	1:Rond 400	Balk 3:3	12.350	0.000	0.000	
13	1:Rond 400	Balk 3:3	15.450	0.000	0.000	
14	1:Rond 400	Balk 3:3	18.500	0.000	0.000	
15	1:Rond 400	Balk 5:5	0.000	0.000	0.000	
16	1:Rond 400	Balk 5:5	3.050	0.000	0.000	
17	1:Rond 400	Balk 5:5	6.150	0.000	0.000	
18	1:Rond 400	Balk 5:5	9.250	0.000	0.000	
19	1:Rond 400	Balk 5:5	12.350	0.000	0.000	
20	1:Rond 400	Balk 5:5	15.450	0.000	0.000	
21	1:Rond 400	Balk 5:5	18.500	0.000	0.000	
22	1:Rond 400	Balk 7:7	0.000	0.000	0.000	
23	1:Rond 400	Balk 7:7	3.050	0.000	0.000	
24	1:Rond 400	Balk 7:7	6.150	0.000	0.000	
25	1:Rond 400	Balk 7:7	9.250	0.000	0.000	
26	1:Rond 400	Balk 7:7	12.350	0.000	0.000	
27	1:Rond 400	Balk 7:7	15.450	0.000	0.000	
28	1:Rond 400	Balk 7:7	18.500	0.000	0.000	
29	1:Rond 400	Balk 9:9	1.353	0.000	0.000	
30	1:Rond 400	Balk 9:9	4.453	0.000	0.000	
31	1:Rond 400	Balk 9:9	7.553	0.000	0.000	
32	1:Rond 400	Balk 9:9	10.653	0.000	0.000	
33	1:Rond 400	Balk 9:9	13.753	0.000	0.000	
34	1:Rond 400	Balk 9:9	16.803	0.000	0.000	
35	1:Rond 400	Balk 11:11	2.015	0.000	0.000	
36	1:Rond 400	Balk 11:11	5.115	0.000	0.000	
37	1:Rond 400	Balk 11:11	8.215	0.000	0.000	
38	1:Rond 400	Balk 11:11	11.315	0.000	0.000	
39	1:Rond 400	Balk 11:11	14.365	0.000	0.000	
40	1:Rond 400	Balk 13:13	2.881	0.000	0.000	
41	1:Rond 400	Balk 13:13	5.981	0.000	0.000	
42	1:Rond 400	Balk 13:13	9.081	0.000	0.000	
43	1:Rond 400	Balk 13:13	12.131	0.000	0.000	
44	1:Rond 400	Balk 27:27	1.216	0.000	0.000	
45	1:Rond 400	Balk 27:27	5.499	0.000	0.000	

STEUNPUNTEN

Nr.	Steunpunttype	Balk	Positie	Excentr.	Hoek Opm:
46	1:Rond 400	Balk 27:27	9.782	0.000	0.000

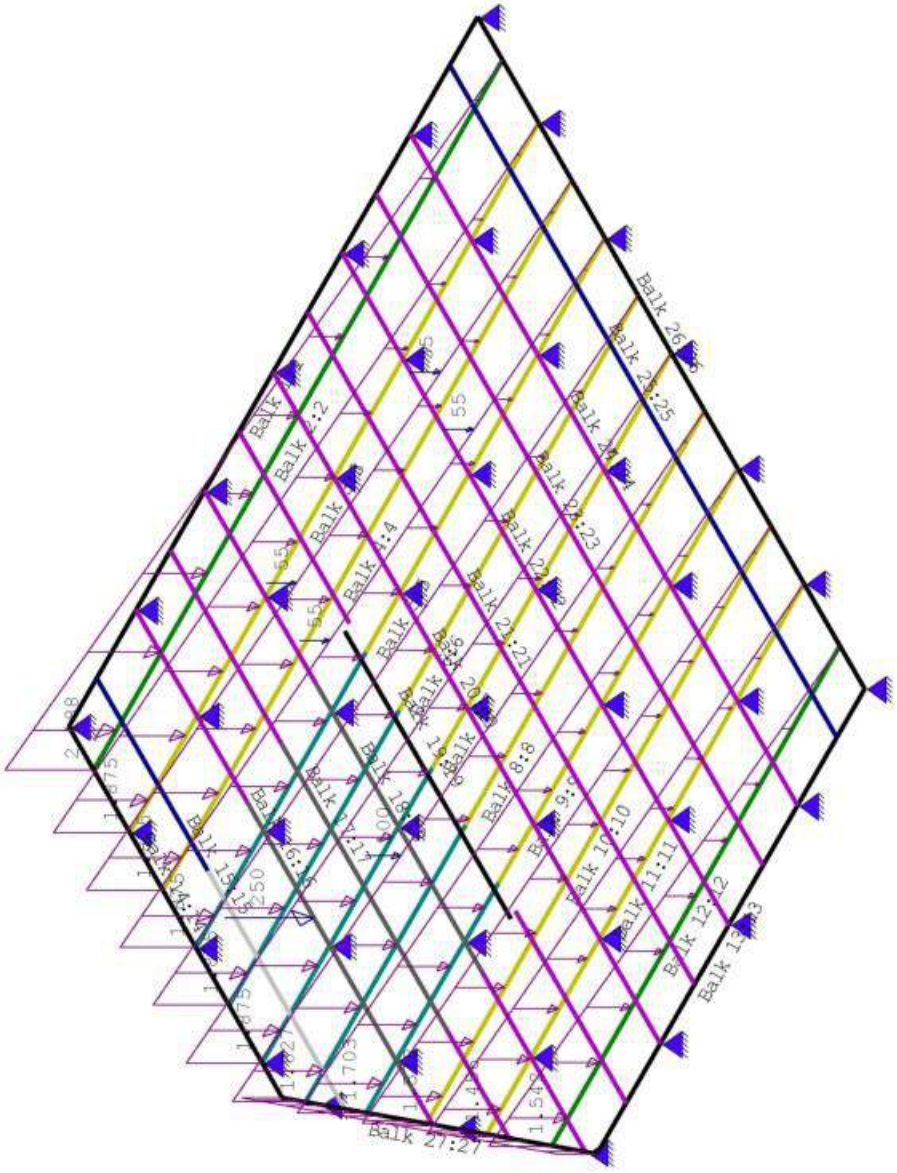
BELASTINGGEVALLEN

B.G.	Omschrijving	Belast/onbelast	ψ_0	ψ_1	ψ_2	e.g.
1	Permanent	2:Permanent EN1991				-1.00
2	Veranderlijk	0:Alles tegelijk	0.50	0.50	0.30	0.00
3	Wind van onder	0:Alles tegelijk	0.00	0.20	0.00	0.00
4	Wind van boven	0:Alles tegelijk	0.00	0.20	0.00	0.00
5	Wind van links	0:Alles tegelijk	0.00	0.20	0.00	0.00
6	Wind van rechts	0:Alles tegelijk	0.00	0.20	0.00	0.00

BELASTINGGEVALLEN

B.G.	Omschrijving	Type
1	Permanent	1 Permanente belasting
2	Veranderlijk	2 Ver. bel. pers. ed. (q_k)
3	Wind van onder	7 Wind van links onderdruk A
4	Wind van boven	7 Wind van links onderdruk A
5	Wind van links	7 Wind van links onderdruk A
6	Wind van rechts	7 Wind van links onderdruk A

VELDBELASTINGEN B.G:1
Permanent



VELDBELASTINGEN B.G:1
Permanent

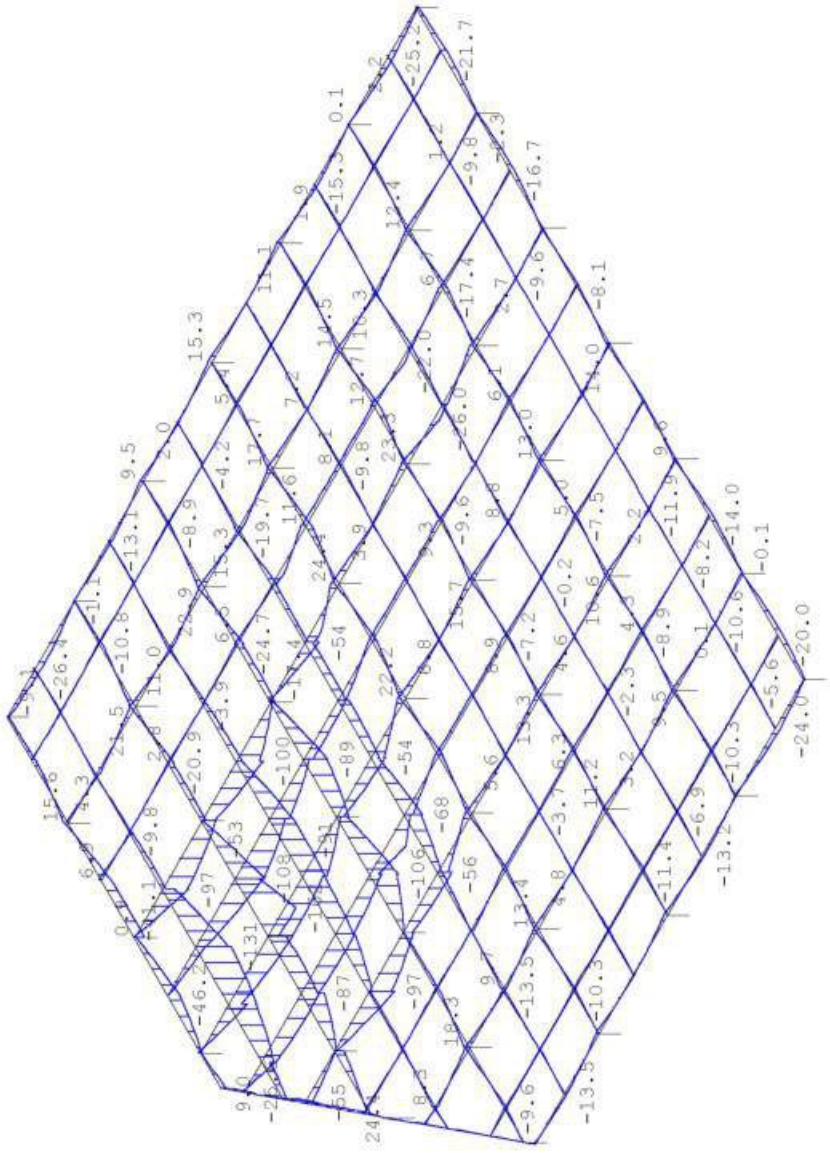
Balk	Last	Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 2:2	1	1:q-last	-2.188	0.000	0.000	18.500	0.000
Balk 3:3	1	1:q-last	-1.875	0.000	0.000	18.500	0.000
Balk 4:4	1	1:q-last	-1.875	0.000	0.000	18.500	0.000
Balk 4:4	2	8:Puntlast	-55.000		8.000		0.000
Balk 4:4	3	8:Puntlast	-55.000		13.500		0.000
Balk 5:5	1	1:q-last	-1.875	0.000	0.000	18.500	0.000
Balk 5:5	2	8:Puntlast	-55.000		8.000		0.000
Balk 5:5	3	8:Puntlast	-55.000		13.500		0.000
Balk 6:6	1	1:q-last	-1.875	0.000	0.000	18.500	0.000
Balk 7:7	1	1:q-last	-1.875	0.000	0.000	18.500	0.000
Balk 8:8	1	1:q-last	-1.827	0.000	0.000	18.022	0.000
Balk 8:8	2	8:Puntlast	-100.000		6.420		0.000

VELDBELASTINGEN B.G:1

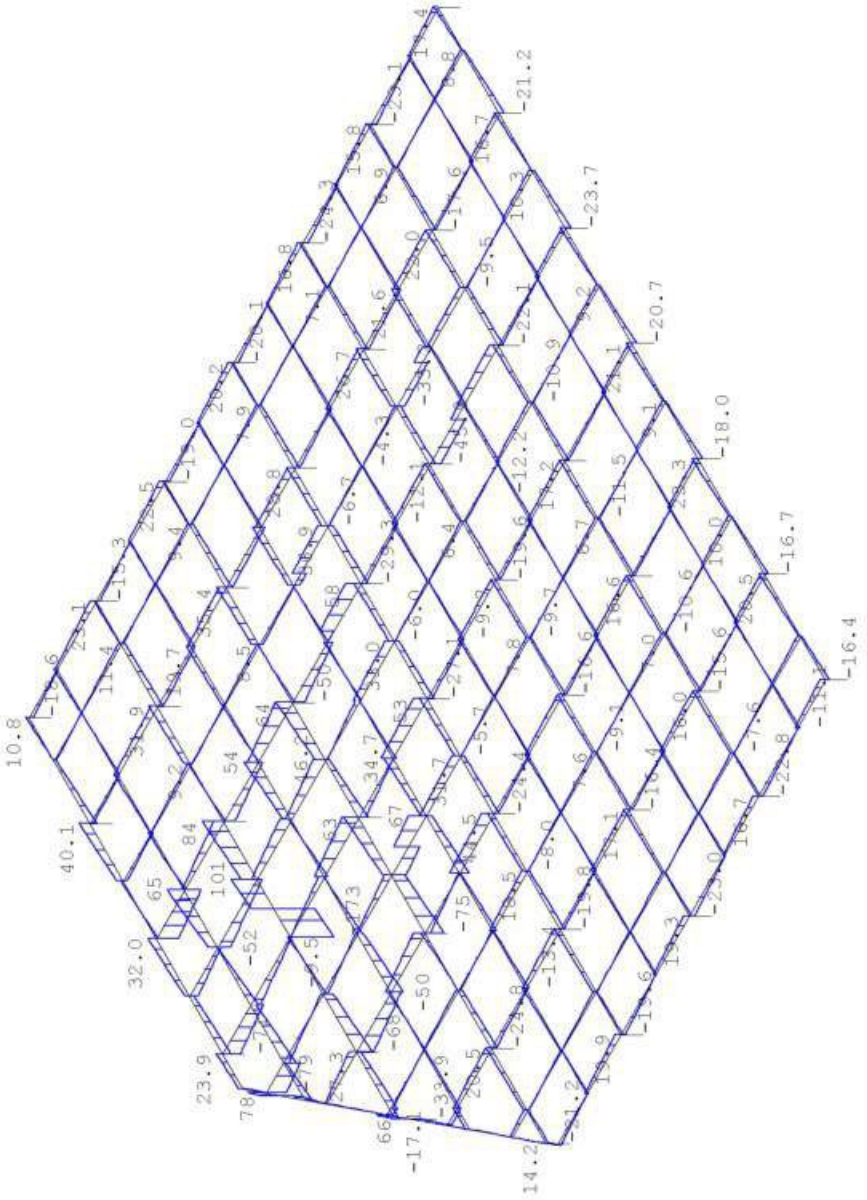
Permanent

Balk	Last	Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 9:9	1	1:q-last	-1.703	0.000	0.000	16.803	0.000
Balk 10:10	1	1:q-last	-1.578	0.000	0.000	15.584	0.000
Balk 11:11	1	1:q-last	-1.456	0.000	0.000	14.365	0.000
Balk 12:12	1	1:q-last	-1.542	0.000	0.000	13.045	0.000
Balk 16:16	1	8:Puntlast	-250.000		5.390		0.000
Balk 27:27	1	1:q-last	-1.000	-1.000	0.000	10.100	0.000

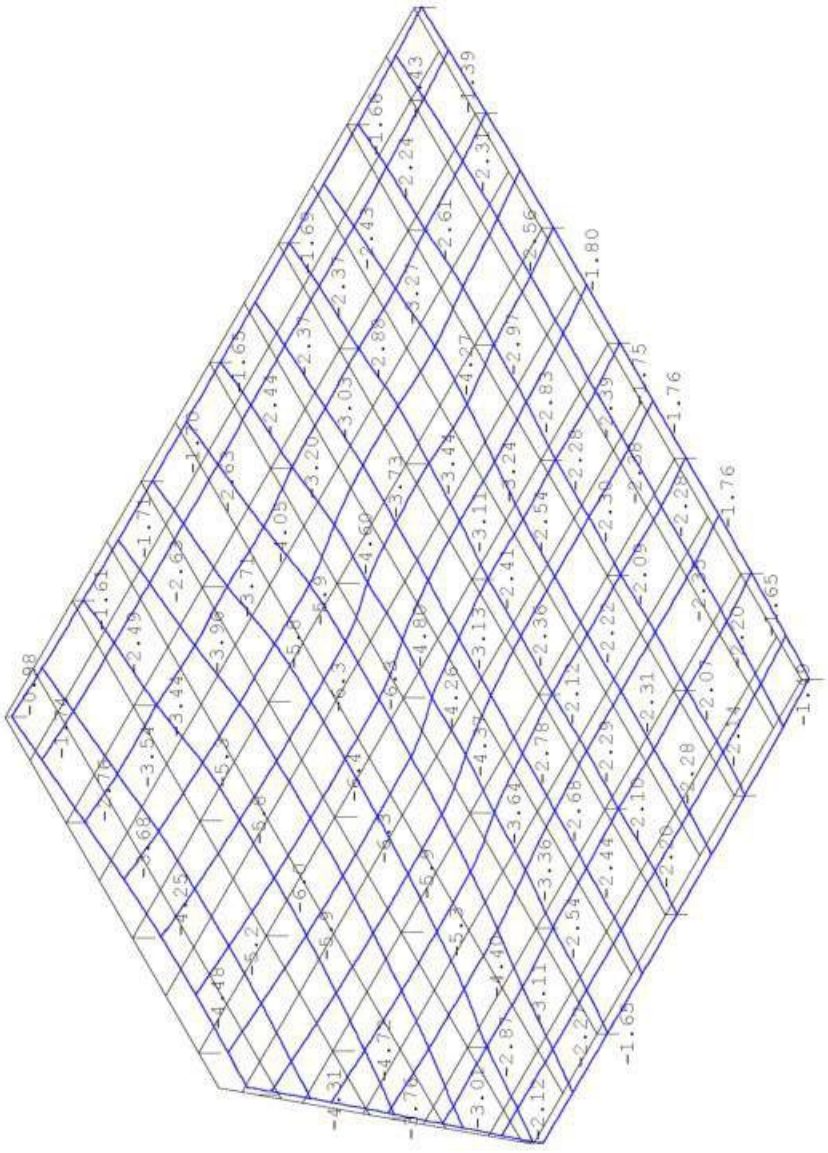
MOMENTEN Fysisch lineair B.G:1
Permanent



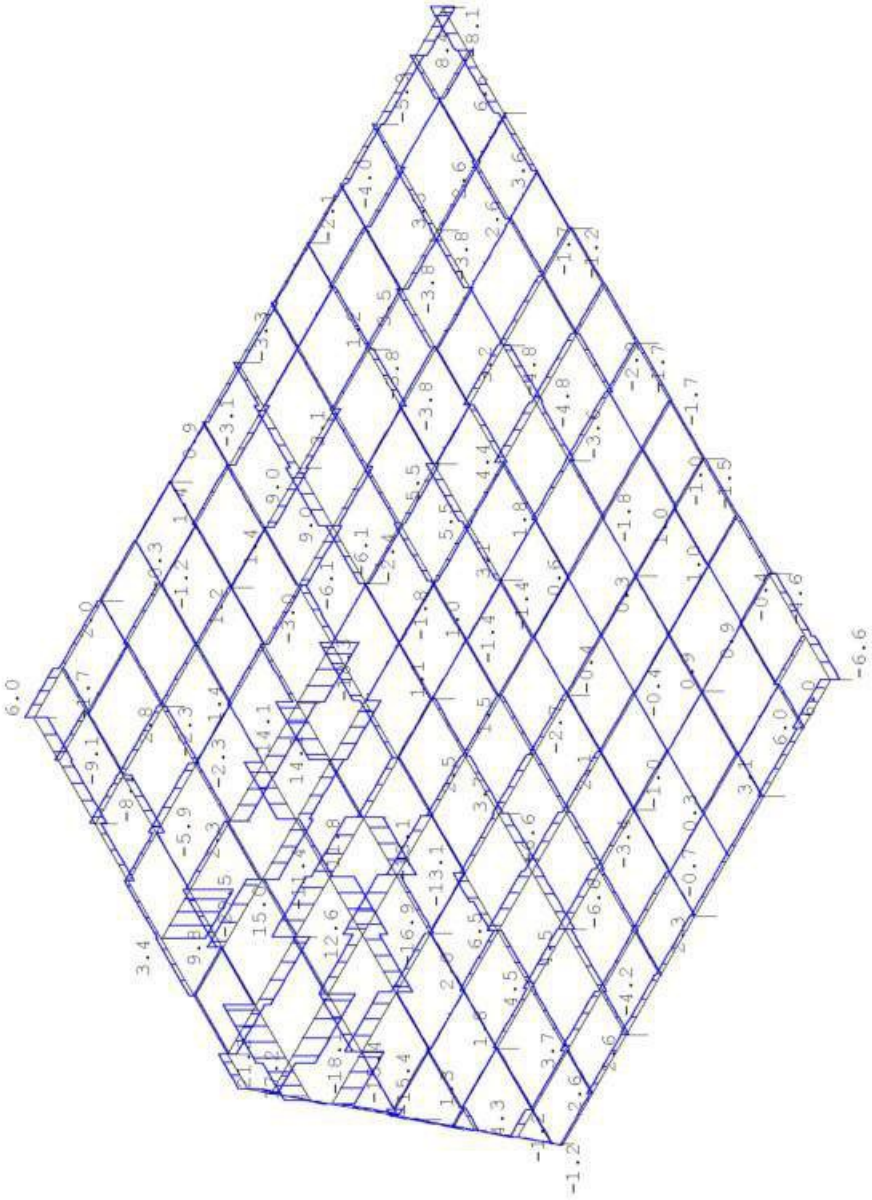
DWARSKRACHTEN Fysisch lineair B.G:1
Permanent



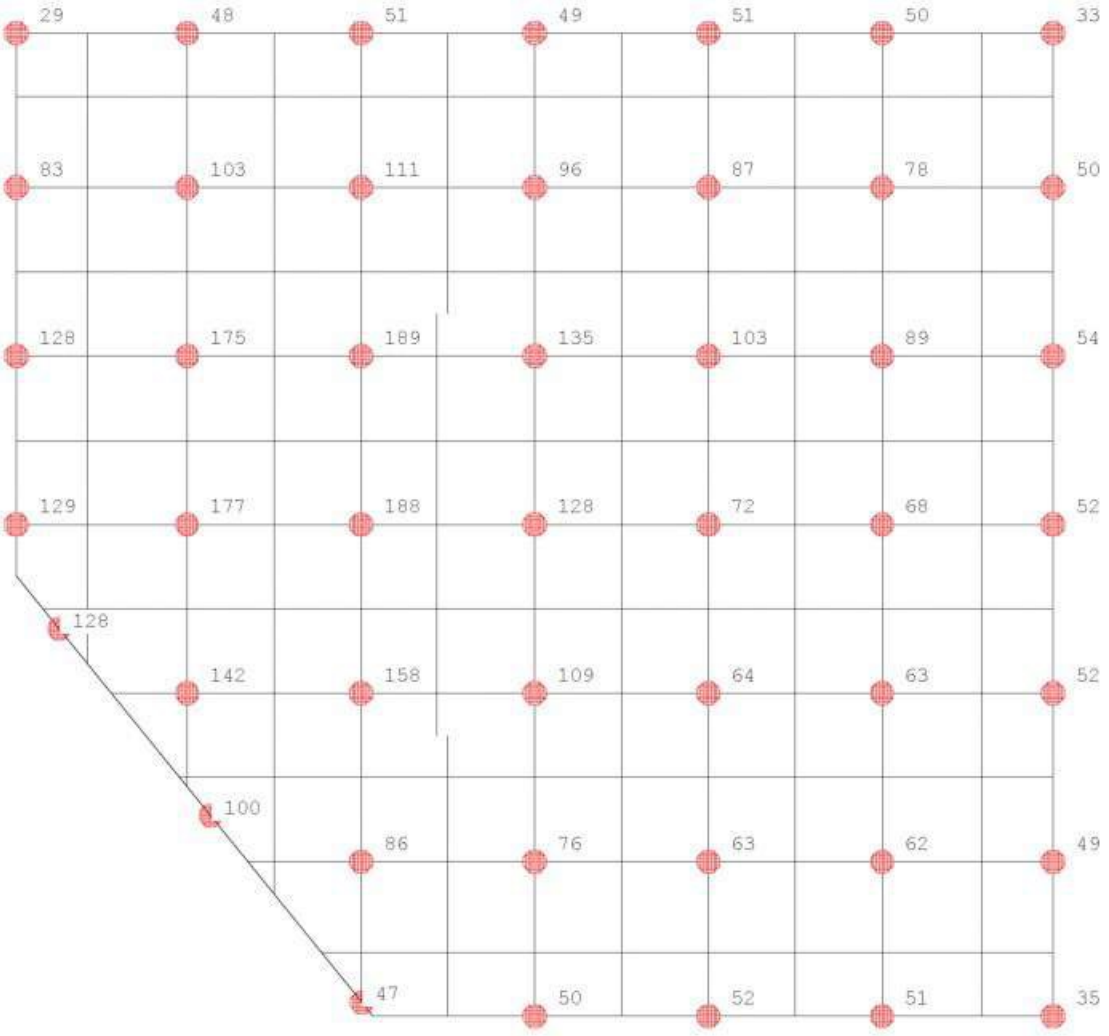
VERPLAATSINGEN [mm] Fysisch lineair B.G:1
Permanent



WRINGMOMENTEN Fysisch lineair B.G:1
Permanent



REACTIES Fysisch lineair B.G:1
Permanent



REACTIES Fysisch lineair B.G:1
Permanent

Balk	Stp	MX	Z	MY
1	1	0.00	29.42	0.00
1	2	0.00	48.35	0.00
1	3	0.00	50.81	0.00
1	4	0.00	49.44	0.00
1	5	0.00	50.74	0.00
1	6	0.00	49.84	0.00
1	7	0.00	32.50	0.00
3	8	0.00	82.66	0.00
3	9	0.00	103.12	0.00
3	10	0.00	111.44	0.00
3	11	0.00	95.93	0.00
3	12	0.00	86.51	0.00
3	13	0.00	78.20	0.00
3	14	0.00	49.70	0.00
5	15	0.00	127.59	0.00
5	16	0.00	175.13	0.00

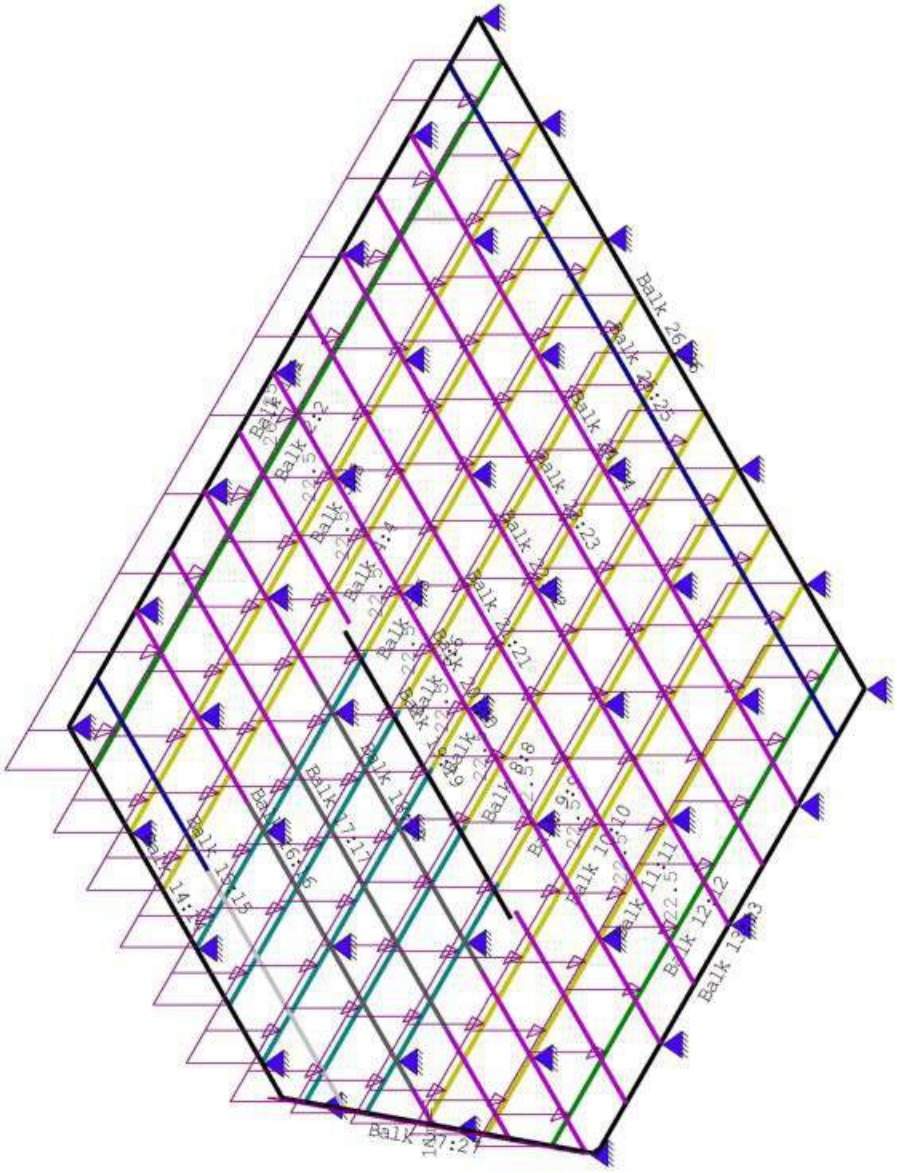
REACTIES Fysisch lineair B.G:1
Permanent

Balk	Stp	MX	Z	MY
5	17	0.00	188.92	0.00
5	18	0.00	135.11	0.00
5	19	0.00	103.19	0.00
5	20	0.00	89.06	0.00
5	21	0.00	53.84	0.00
7	22	0.00	129.27	0.00
7	23	0.00	176.71	0.00
7	24	0.00	188.20	0.00
7	25	0.00	127.74	0.00
7	26	0.00	72.16	0.00
7	27	0.00	68.27	0.00
7	28	0.00	52.42	0.00
9	29	0.00	141.66	0.00
9	30	0.00	157.63	0.00
9	31	0.00	109.23	0.00
9	32	0.00	63.59	0.00
9	33	0.00	62.82	0.00
9	34	0.00	52.44	0.00
11	35	0.00	86.15	0.00
11	36	0.00	76.15	0.00
11	37	0.00	63.11	0.00
11	38	0.00	62.22	0.00
11	39	0.00	49.39	0.00
13	40	0.00	49.61	0.00
13	41	0.00	52.31	0.00
13	42	0.00	51.02	0.00
13	43	0.00	35.20	0.00
14	22	0.00	129.27	0.00
14	15	0.00	127.59	0.00
14	8	0.00	82.66	0.00
14	1	0.00	29.42	0.00
16	29	0.00	141.66	0.00
16	23	0.00	176.71	0.00
16	16	0.00	175.13	0.00
16	9	0.00	103.12	0.00
16	2	0.00	48.35	0.00
18	46	0.00	46.88	0.00
18	35	0.00	86.15	0.00
18	30	0.00	157.63	0.00
18	24	0.00	188.20	0.00
18	17	0.00	188.92	0.00
18	10	0.00	111.44	0.00
18	3	0.00	50.81	0.00
20	40	0.00	49.61	0.00
20	36	0.00	76.15	0.00
20	31	0.00	109.23	0.00
20	25	0.00	127.74	0.00
20	18	0.00	135.11	0.00
20	11	0.00	95.93	0.00
20	4	0.00	49.44	0.00
22	41	0.00	52.31	0.00
22	37	0.00	63.11	0.00
22	32	0.00	63.59	0.00
22	26	0.00	72.16	0.00
22	19	0.00	103.19	0.00
22	12	0.00	86.51	0.00

REACTIES Fysisch lineair B.G:1
Permanent

Balk	Stp	MX	Z	MY
22	5	0.00	50.74	0.00
24	42	0.00	51.02	0.00
24	38	0.00	62.22	0.00
24	33	0.00	62.82	0.00
24	27	0.00	68.27	0.00
24	20	0.00	89.06	0.00
24	13	0.00	78.20	0.00
24	6	0.00	49.84	0.00
26	43	0.00	35.20	0.00
26	39	0.00	49.39	0.00
26	34	0.00	52.44	0.00
26	28	0.00	52.42	0.00
26	21	0.00	53.84	0.00
26	14	0.00	49.70	0.00
26	7	0.00	32.50	0.00
27	44	0.00	127.62	0.00
27	45	0.00	99.80	0.00
27	46	0.00	46.88	0.00
			3993.11	: Som reacties
			-3993.11	: Som belastingen

VELDBELASTINGEN B.G:2
Veranderlijk



VELDBELASTINGEN B.G:2
Veranderlijk

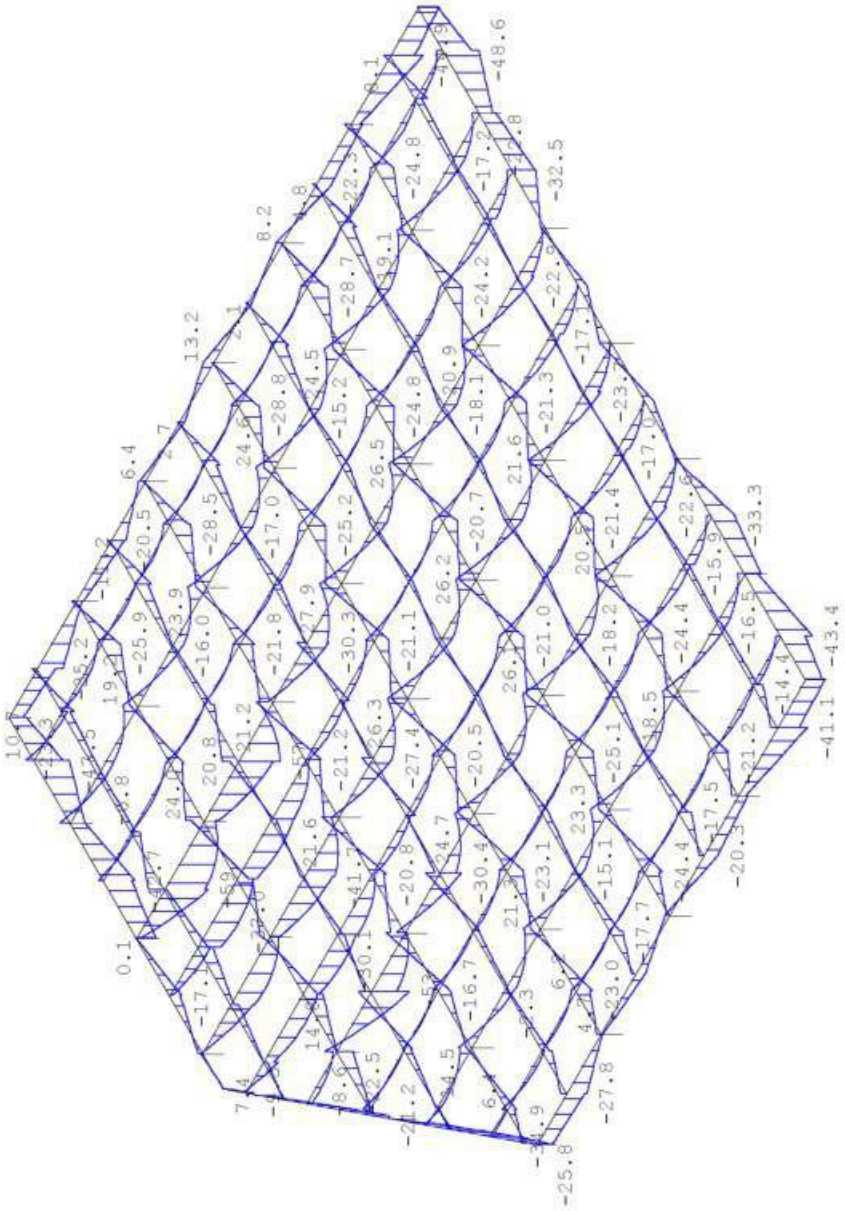
Balk	Last Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 2:2	1 1:q-last	-26.250	-26.250	0.000	18.500	0.000
Balk 3:3	1 1:q-last	-22.500	-22.500	0.000	18.500	0.000
Balk 4:4	1 1:q-last	-22.500	-22.500	0.000	18.500	0.000
Balk 5:5	1 1:q-last	-22.500	-22.500	0.000	18.500	0.000
Balk 6:6	1 1:q-last	-22.500	-22.500	0.000	18.500	0.000
Balk 7:7	1 1:q-last	-22.500	-22.500	0.000	18.500	0.000
Balk 8:8	1 1:q-last	-22.500	-22.500	0.000	18.022	0.000
Balk 9:9	1 1:q-last	-22.500	-22.500	0.000	16.803	0.000
Balk 10:10	1 1:q-last	-22.500	-22.500	0.000	15.584	0.000
Balk 11:11	1 1:q-last	-22.500	-22.500	0.000	14.365	0.000
Balk 12:12	1 1:q-last	-22.500	-22.500	0.000	13.045	0.000

VELDBELASTINGEN B.G:2

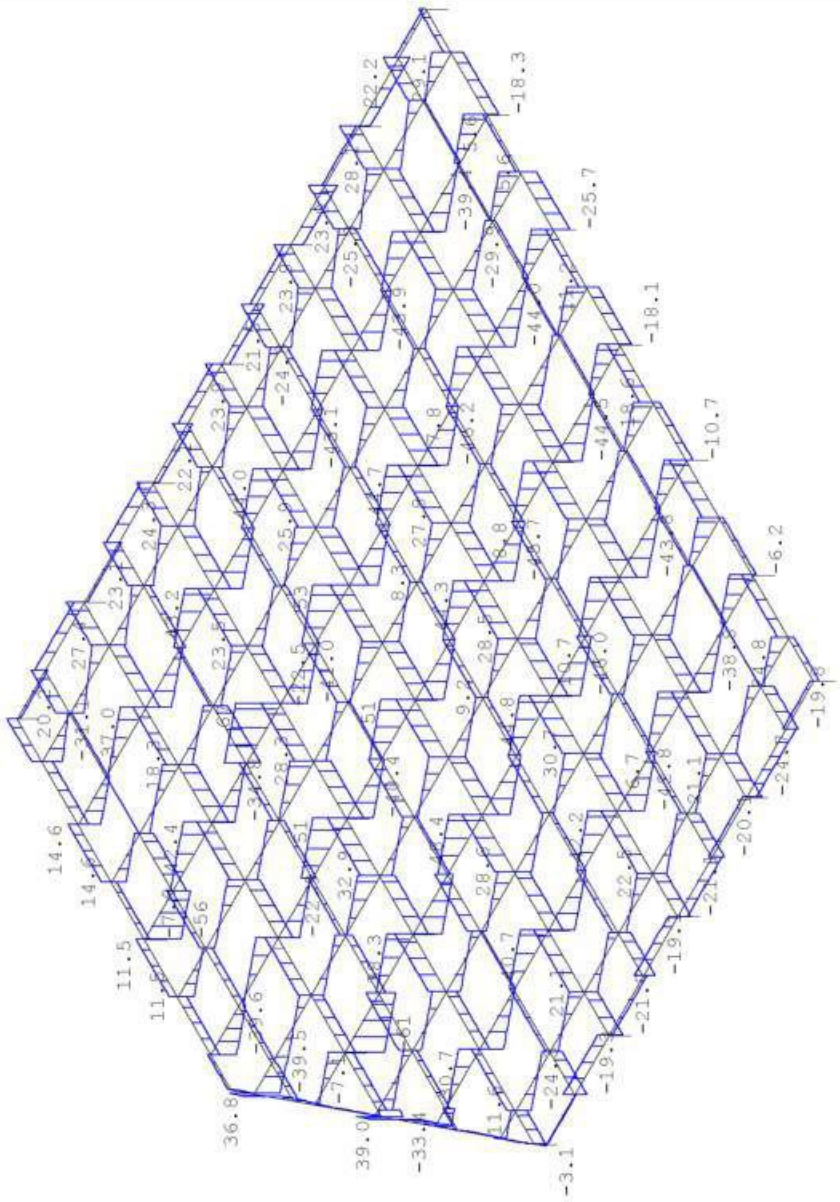
Veranderlijk

Balk	Last	Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 27:27	1	1:q-last	-1.000	-1.000	0.000	10.100	0.000

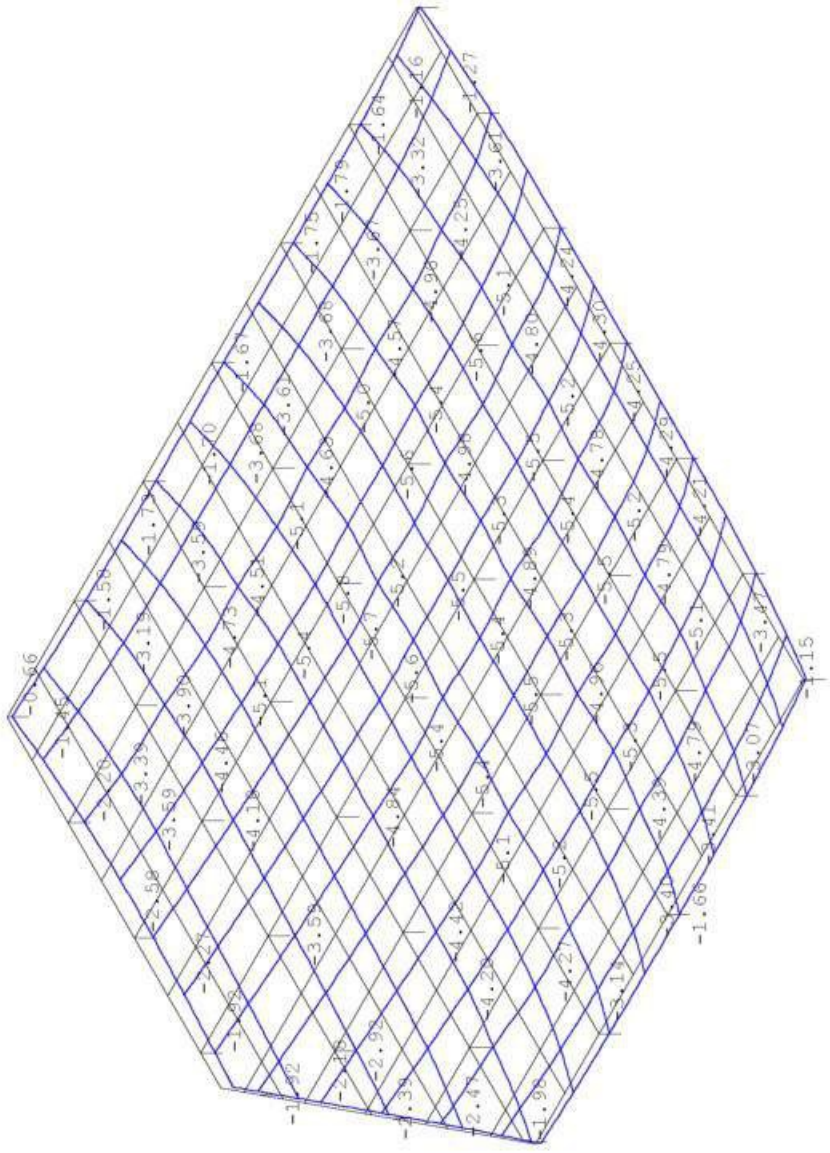
MOMENTEN Fysisch lineair B.G:2
Veranderlijk



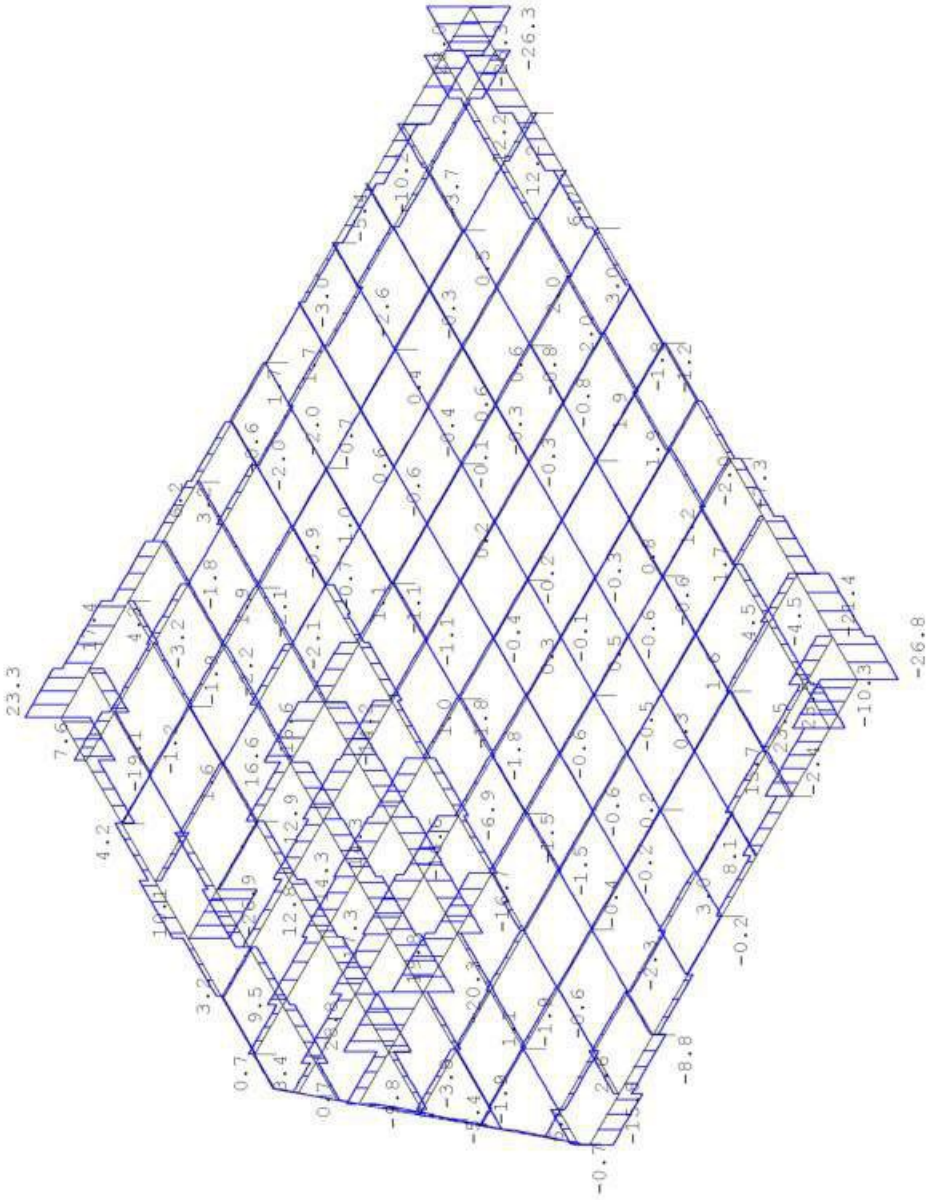
DWARSKRACHTEN Fysisch lineair B.G:2
Veranderlijk



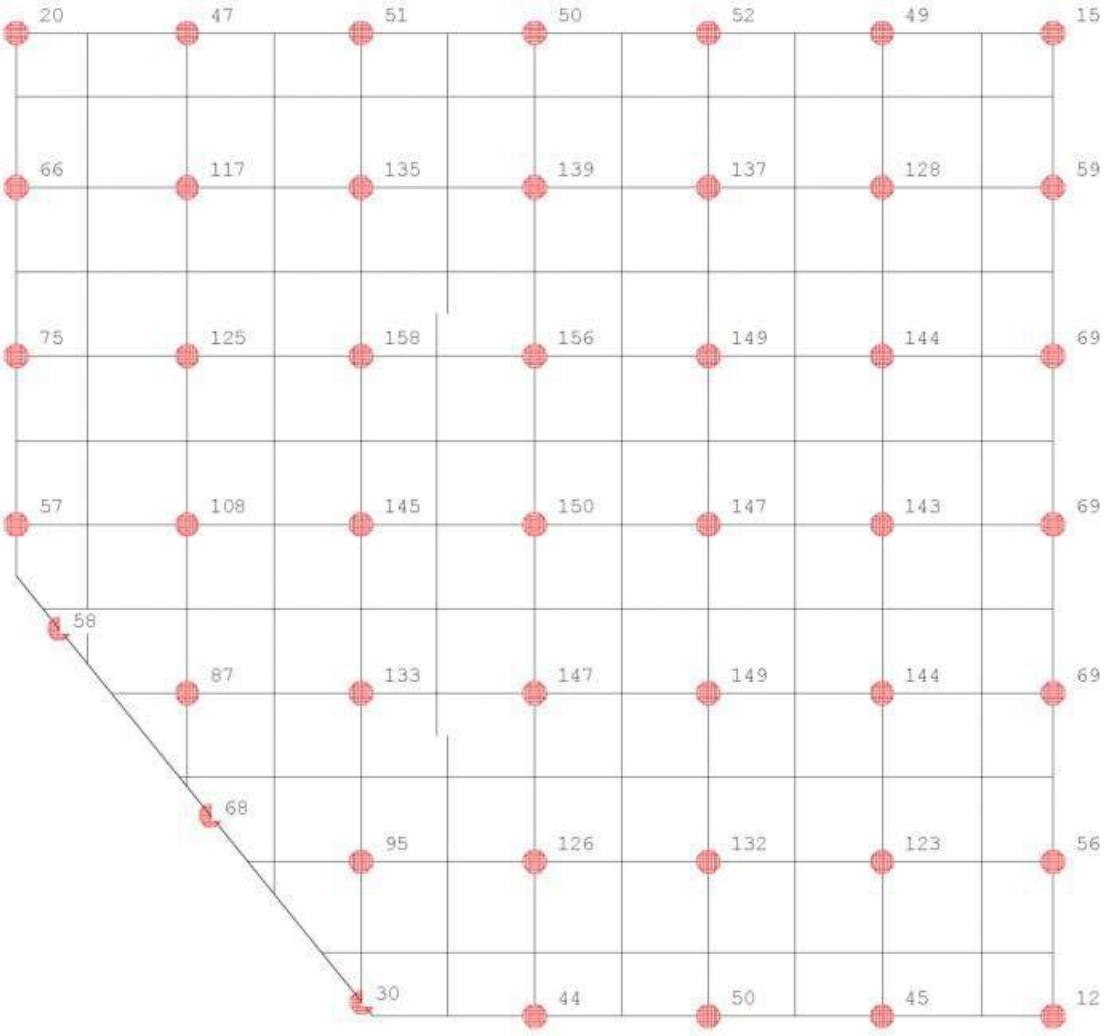
VERPLAATSINGEN [mm] Fysisch lineair B.G:2
Veranderlijk



WRINGMOMENTEN Fysisch lineair B.G:2
Veranderlijk



REACTIES Fysisch lineair B.G:2
Veranderlijk



REACTIES Fysisch lineair B.G:2
Veranderlijk

Balk	Stp	MX	Z	MY
1	1	0.00	19.74	0.00
1	2	0.00	47.32	0.00
1	3	0.00	51.32	0.00
1	4	0.00	50.01	0.00
1	5	0.00	52.37	0.00
1	6	0.00	49.22	0.00
1	7	0.00	15.25	0.00
3	8	0.00	65.93	0.00
3	9	0.00	117.04	0.00
3	10	0.00	135.39	0.00
3	11	0.00	138.88	0.00
3	12	0.00	137.00	0.00
3	13	0.00	127.54	0.00
3	14	0.00	58.51	0.00
5	15	0.00	75.25	0.00
5	16	0.00	125.41	0.00

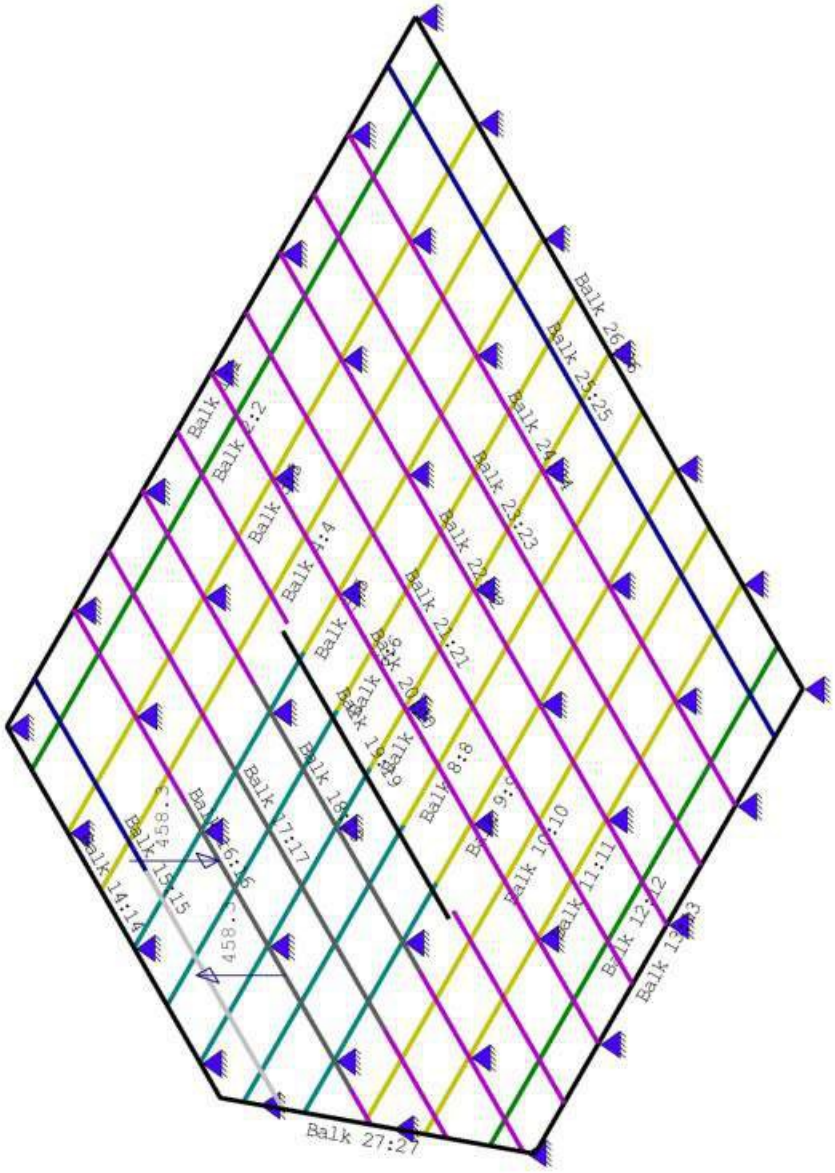
REACTIES Fysisch lineair B.G:2
Veranderlijk

Balk	Stp	MX	Z	MY
5	17	0.00	158.29	0.00
5	18	0.00	155.65	0.00
5	19	0.00	149.47	0.00
5	20	0.00	144.07	0.00
5	21	0.00	69.42	0.00
7	22	0.00	57.47	0.00
7	23	0.00	107.55	0.00
7	24	0.00	145.34	0.00
7	25	0.00	150.02	0.00
7	26	0.00	146.56	0.00
7	27	0.00	143.26	0.00
7	28	0.00	68.51	0.00
9	29	0.00	87.47	0.00
9	30	0.00	132.56	0.00
9	31	0.00	146.72	0.00
9	32	0.00	148.89	0.00
9	33	0.00	143.68	0.00
9	34	0.00	68.69	0.00
11	35	0.00	95.30	0.00
11	36	0.00	125.57	0.00
11	37	0.00	131.70	0.00
11	38	0.00	122.93	0.00
11	39	0.00	55.75	0.00
13	40	0.00	44.46	0.00
13	41	0.00	49.93	0.00
13	42	0.00	45.04	0.00
13	43	0.00	12.21	0.00
14	22	0.00	57.47	0.00
14	15	0.00	75.25	0.00
14	8	0.00	65.93	0.00
14	1	0.00	19.74	0.00
16	29	0.00	87.47	0.00
16	23	0.00	107.55	0.00
16	16	0.00	125.41	0.00
16	9	0.00	117.04	0.00
16	2	0.00	47.32	0.00
18	46	0.00	29.96	0.00
18	35	0.00	95.30	0.00
18	30	0.00	132.56	0.00
18	24	0.00	145.34	0.00
18	17	0.00	158.29	0.00
18	10	0.00	135.39	0.00
18	3	0.00	51.32	0.00
20	40	0.00	44.46	0.00
20	36	0.00	125.57	0.00
20	31	0.00	146.72	0.00
20	25	0.00	150.02	0.00
20	18	0.00	155.65	0.00
20	11	0.00	138.88	0.00
20	4	0.00	50.01	0.00
22	41	0.00	49.93	0.00
22	37	0.00	131.70	0.00
22	32	0.00	148.89	0.00
22	26	0.00	146.56	0.00
22	19	0.00	149.47	0.00
22	12	0.00	137.00	0.00

REACTIES Fysisch lineair B.G:2
Veranderlijk

Balk	Stp	MX	Z	MY
22	5	0.00	52.37	0.00
24	42	0.00	45.04	0.00
24	38	0.00	122.93	0.00
24	33	0.00	143.68	0.00
24	27	0.00	143.26	0.00
24	20	0.00	144.07	0.00
24	13	0.00	127.54	0.00
24	6	0.00	49.22	0.00
26	43	0.00	12.21	0.00
26	39	0.00	55.75	0.00
26	34	0.00	68.69	0.00
26	28	0.00	68.51	0.00
26	21	0.00	69.42	0.00
26	14	0.00	58.51	0.00
26	7	0.00	15.25	0.00
27	44	0.00	57.71	0.00
27	45	0.00	67.53	0.00
27	46	0.00	29.96	0.00
			4327.90	: Som reacties
			-4327.90	: Som belastingen

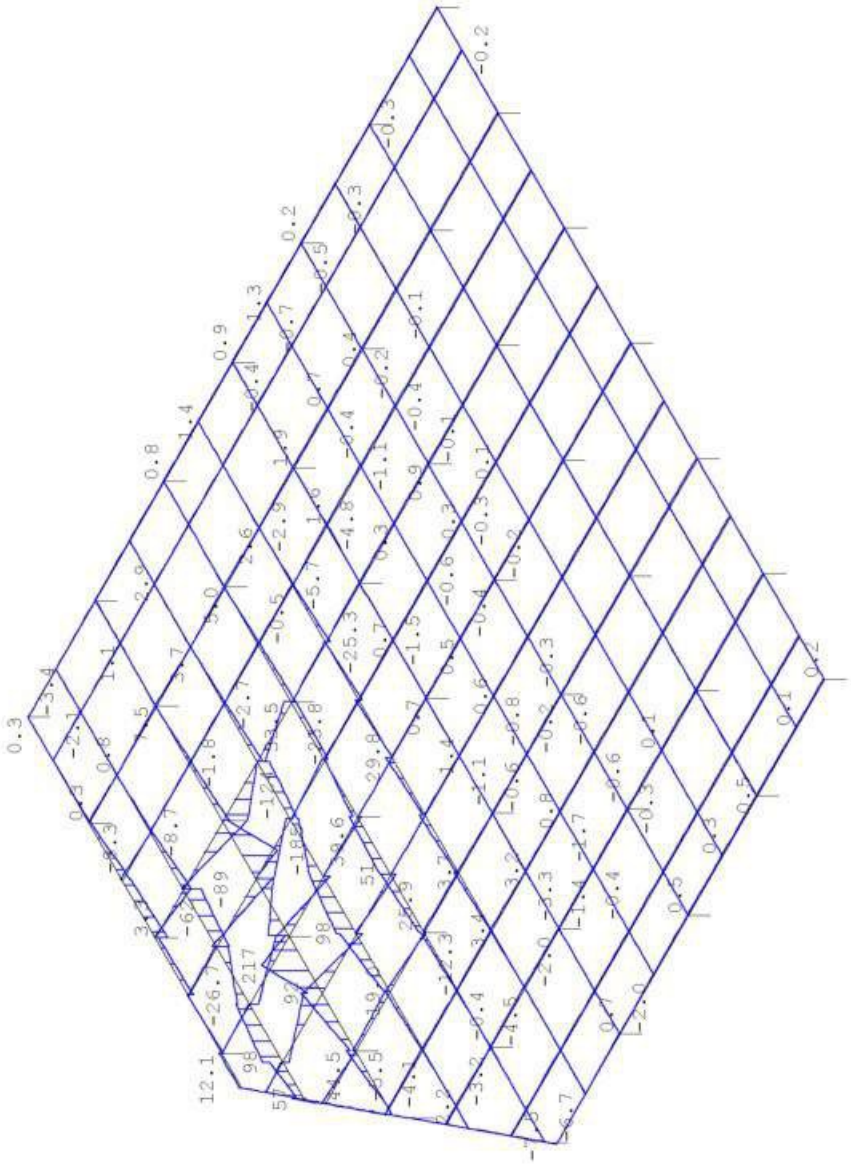
VELDBELASTINGEN B.G:3 Wind van onder



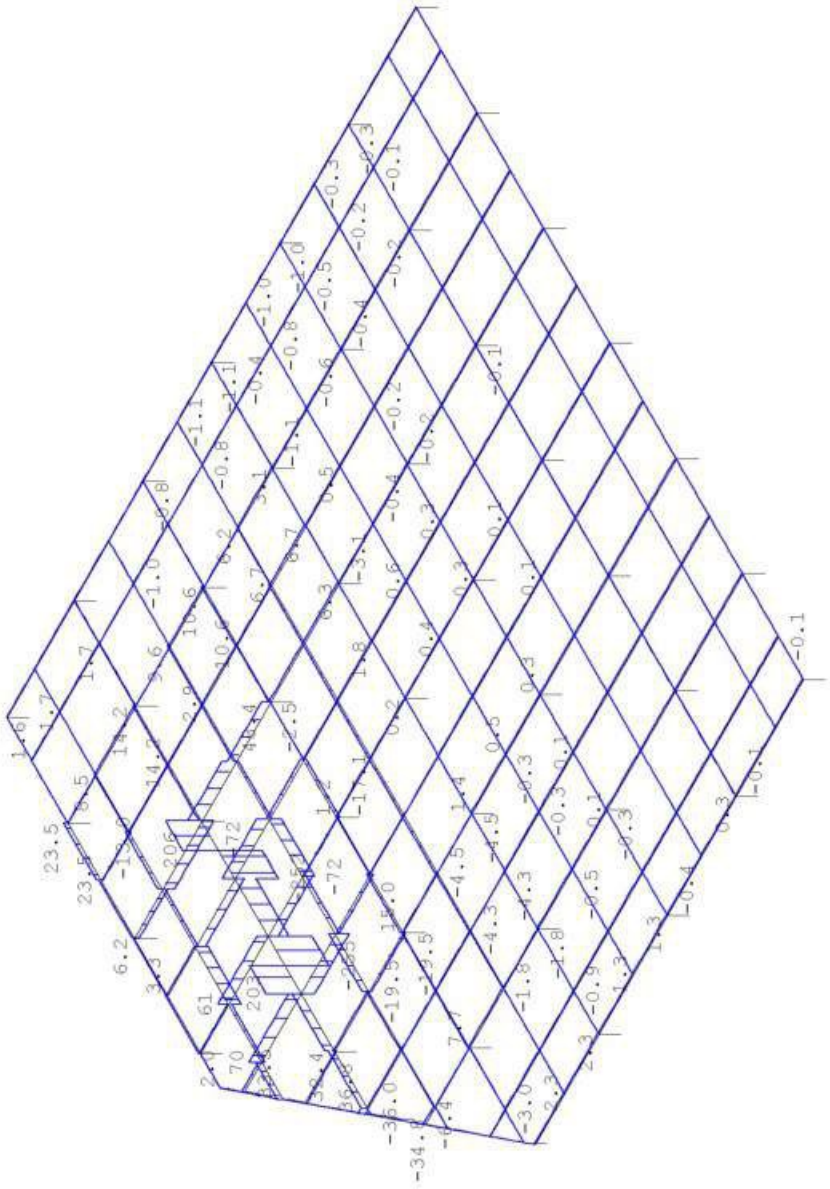
VELDBELASTINGEN B.G:3 Wind van onder

Balk	Last	Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 16:16	1	8:Puntlast	458.300		3.890		0.000
Balk 16:16	2	8:Puntlast	-458.300		6.890		0.000

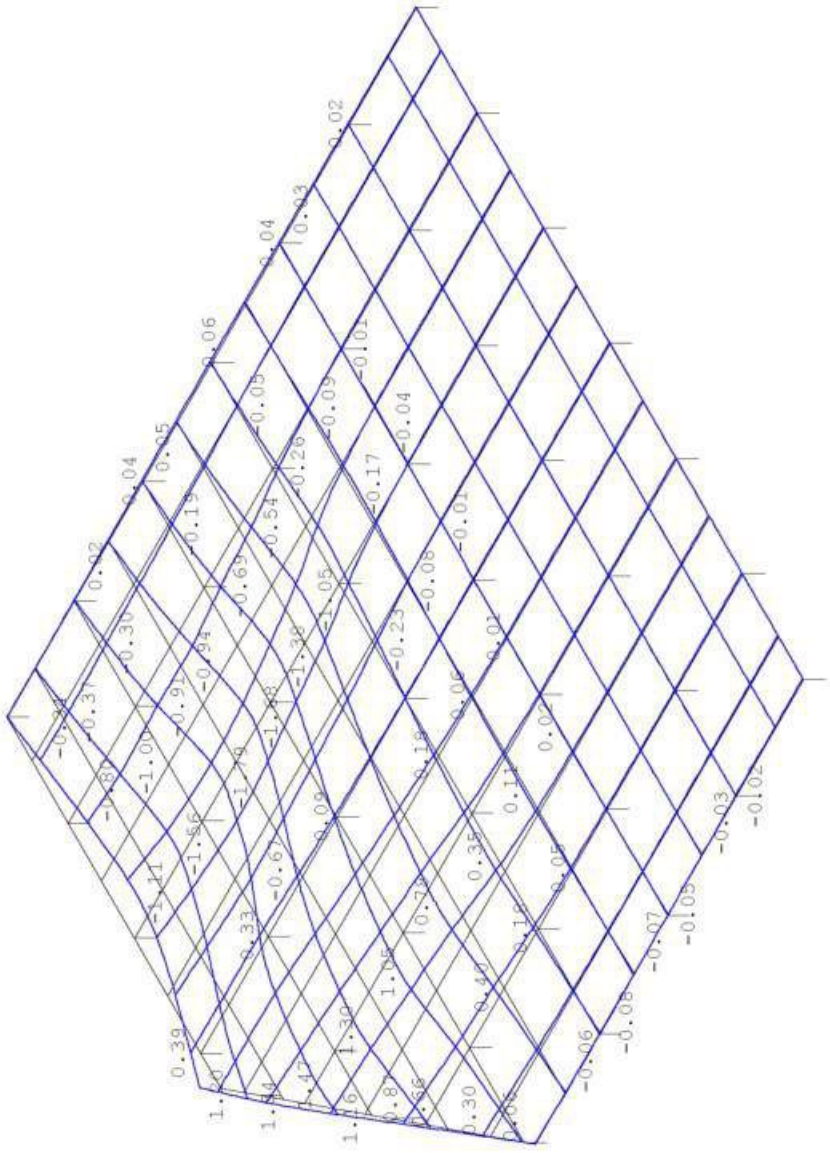
MOMENTEN Fysisch lineair B.G:3 Wind van onder



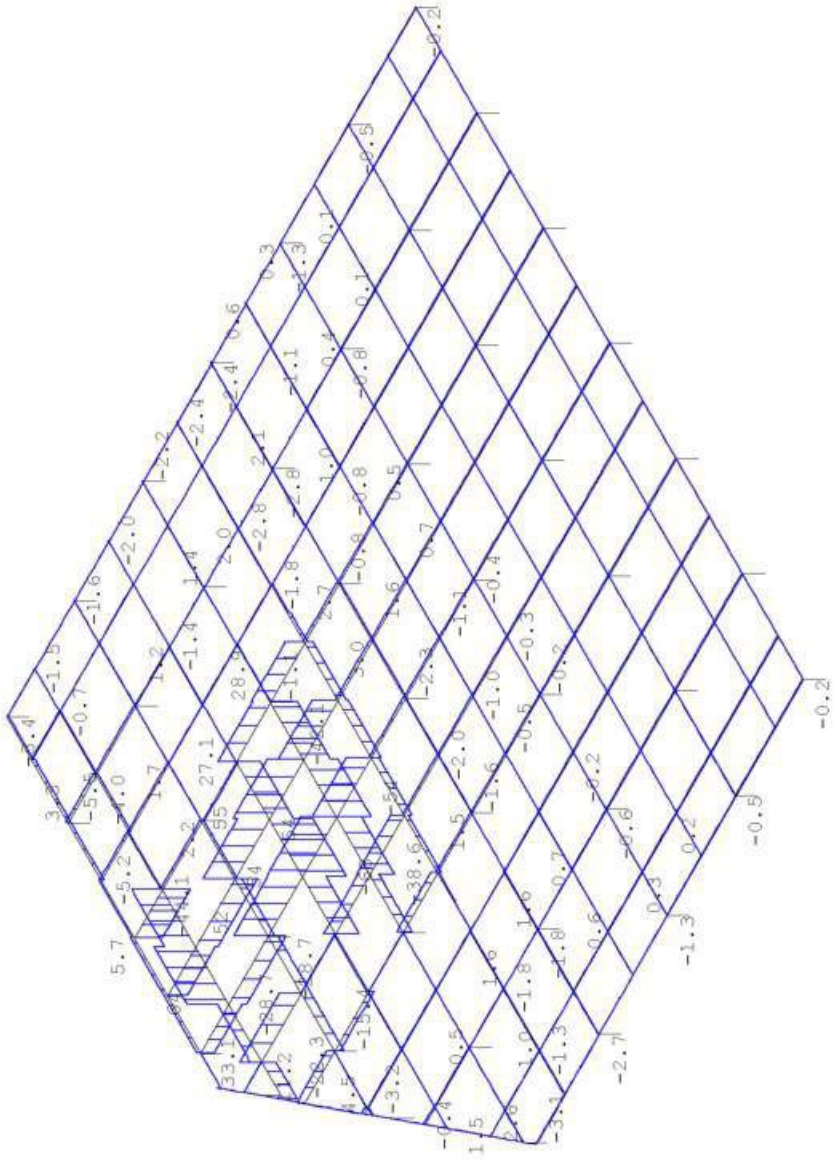
DWARSKRACHTEN Fysisch lineair B.G:3 Wind van onder



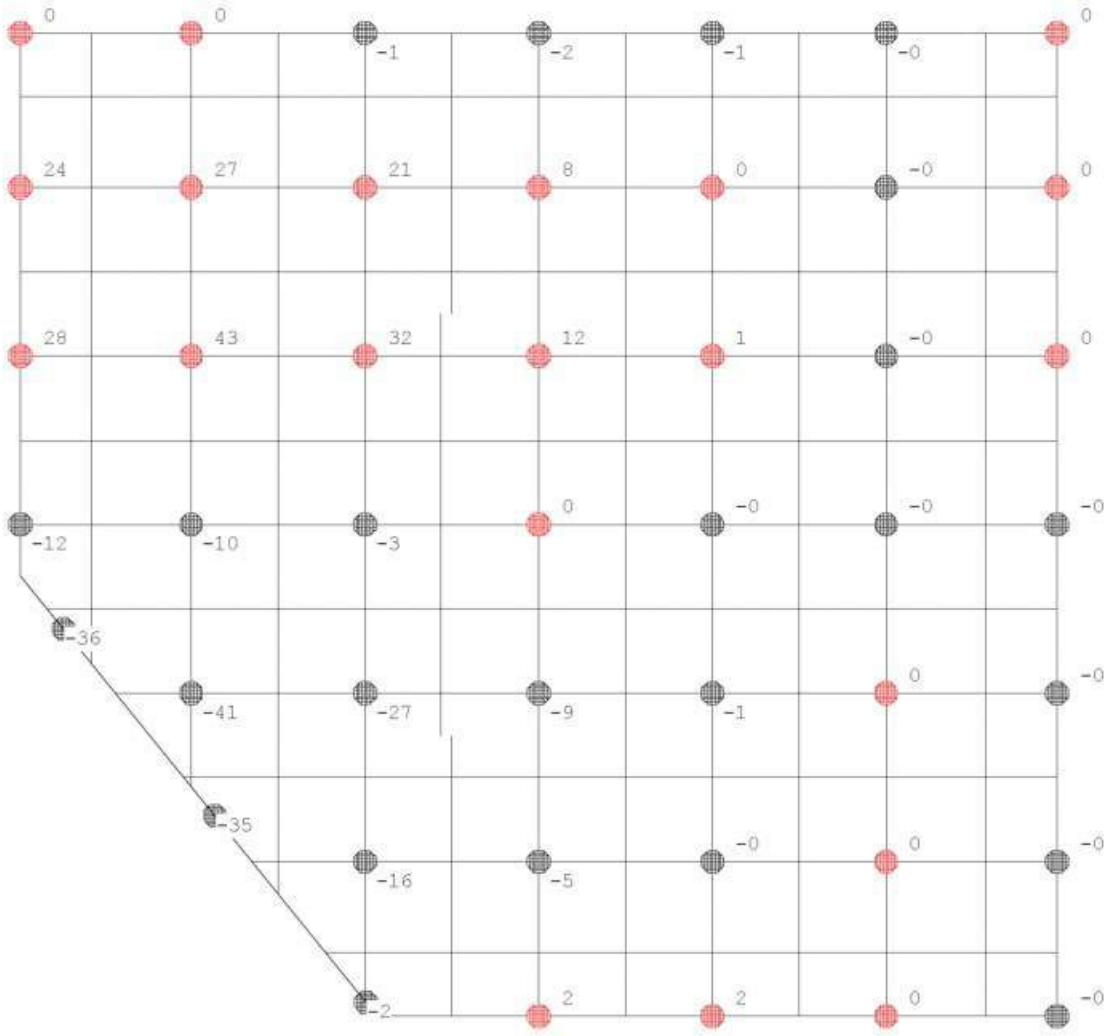
VERPLAATSINGEN [mm] Fysisch lineair B.G:3 Wind van onder



WRINGMOMENTEN Fysisch lineair B.G:3 Wind van onder



REACTIES Fysisch lineair B.G:3 Wind van onder



REACTIES Fysisch lineair B.G:3 Wind van onder

Balk	Stp	MX	Z	MY
1	1	0.00	0.16	0.00
1	2	0.00	0.03	0.00
1	3	0.00	-1.20	0.00
1	4	0.00	-1.73	0.00
1	5	0.00	-1.35	0.00
1	6	0.00	-0.53	0.00
1	7	0.00	0.00	0.00
3	8	0.00	24.07	0.00
3	9	0.00	27.35	0.00
3	10	0.00	20.76	0.00
3	11	0.00	7.79	0.00
3	12	0.00	0.42	0.00
3	13	0.00	-0.11	0.00
3	14	0.00	0.08	0.00
5	15	0.00	27.87	0.00
5	16	0.00	43.33	0.00

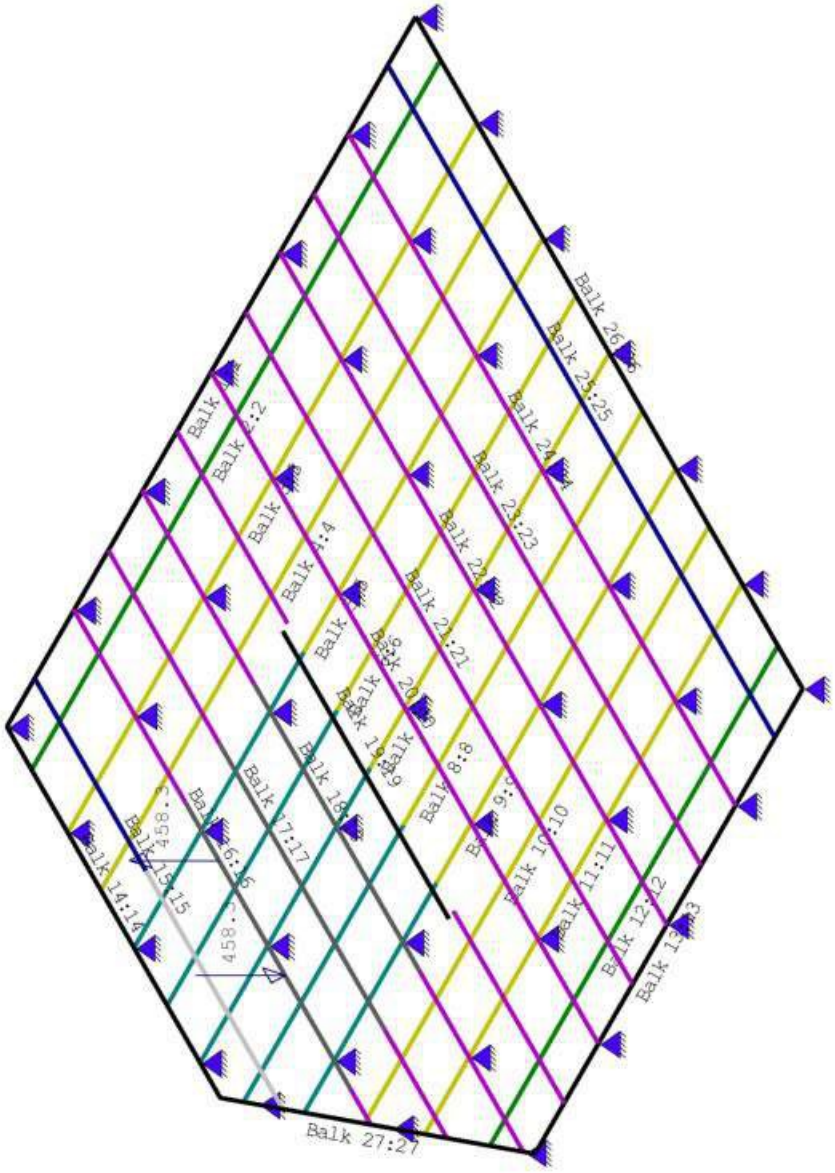
REACTIES Fysisch lineair B.G:3 Wind van onder

Balk	Stp	MX	Z	MY
5	17	0.00	31.80	0.00
5	18	0.00	11.97	0.00
5	19	0.00	0.87	0.00
5	20	0.00	-0.13	0.00
5	21	0.00	0.04	0.00
7	22	0.00	-11.78	0.00
7	23	0.00	-9.94	0.00
7	24	0.00	-2.61	0.00
7	25	0.00	0.26	0.00
7	26	0.00	-0.06	0.00
7	27	0.00	-0.07	0.00
7	28	0.00	-0.00	0.00
9	29	0.00	-40.92	0.00
9	30	0.00	-26.92	0.00
9	31	0.00	-8.70	0.00
9	32	0.00	-0.62	0.00
9	33	0.00	0.04	0.00
9	34	0.00	-0.04	0.00
11	35	0.00	-16.41	0.00
11	36	0.00	-5.28	0.00
11	37	0.00	-0.18	0.00
11	38	0.00	0.04	0.00
11	39	0.00	-0.10	0.00
13	40	0.00	2.33	0.00
13	41	0.00	1.58	0.00
13	42	0.00	0.51	0.00
13	43	0.00	-0.03	0.00
14	22	0.00	-11.78	0.00
14	15	0.00	27.87	0.00
14	8	0.00	24.07	0.00
14	1	0.00	0.16	0.00
16	29	0.00	-40.92	0.00
16	23	0.00	-9.94	0.00
16	16	0.00	43.33	0.00
16	9	0.00	27.35	0.00
16	2	0.00	0.03	0.00
18	46	0.00	-1.62	0.00
18	35	0.00	-16.41	0.00
18	30	0.00	-26.92	0.00
18	24	0.00	-2.61	0.00
18	17	0.00	31.80	0.00
18	10	0.00	20.76	0.00
18	3	0.00	-1.20	0.00
20	40	0.00	2.33	0.00
20	36	0.00	-5.28	0.00
20	31	0.00	-8.70	0.00
20	25	0.00	0.26	0.00
20	18	0.00	11.97	0.00
20	11	0.00	7.79	0.00
20	4	0.00	-1.73	0.00
22	41	0.00	1.58	0.00
22	37	0.00	-0.18	0.00
22	32	0.00	-0.62	0.00
22	26	0.00	-0.06	0.00
22	19	0.00	0.87	0.00
22	12	0.00	0.42	0.00

REACTIES Fysisch lineair B.G:3 Wind van onder

Balk	Stp	MX	Z	MY
22	5	0.00	-1.35	0.00
24	42	0.00	0.51	0.00
24	38	0.00	0.04	0.00
24	33	0.00	0.04	0.00
24	27	0.00	-0.07	0.00
24	20	0.00	-0.13	0.00
24	13	0.00	-0.11	0.00
24	6	0.00	-0.53	0.00
26	43	0.00	-0.03	0.00
26	39	0.00	-0.10	0.00
26	34	0.00	-0.04	0.00
26	28	0.00	-0.00	0.00
26	21	0.00	0.04	0.00
26	14	0.00	0.08	0.00
26	7	0.00	0.00	0.00
27	44	0.00	-36.05	0.00
27	45	0.00	-34.91	0.00
27	46	0.00	-1.62	0.00
			0.00	: Som reacties
			0.00	: Som belastingen

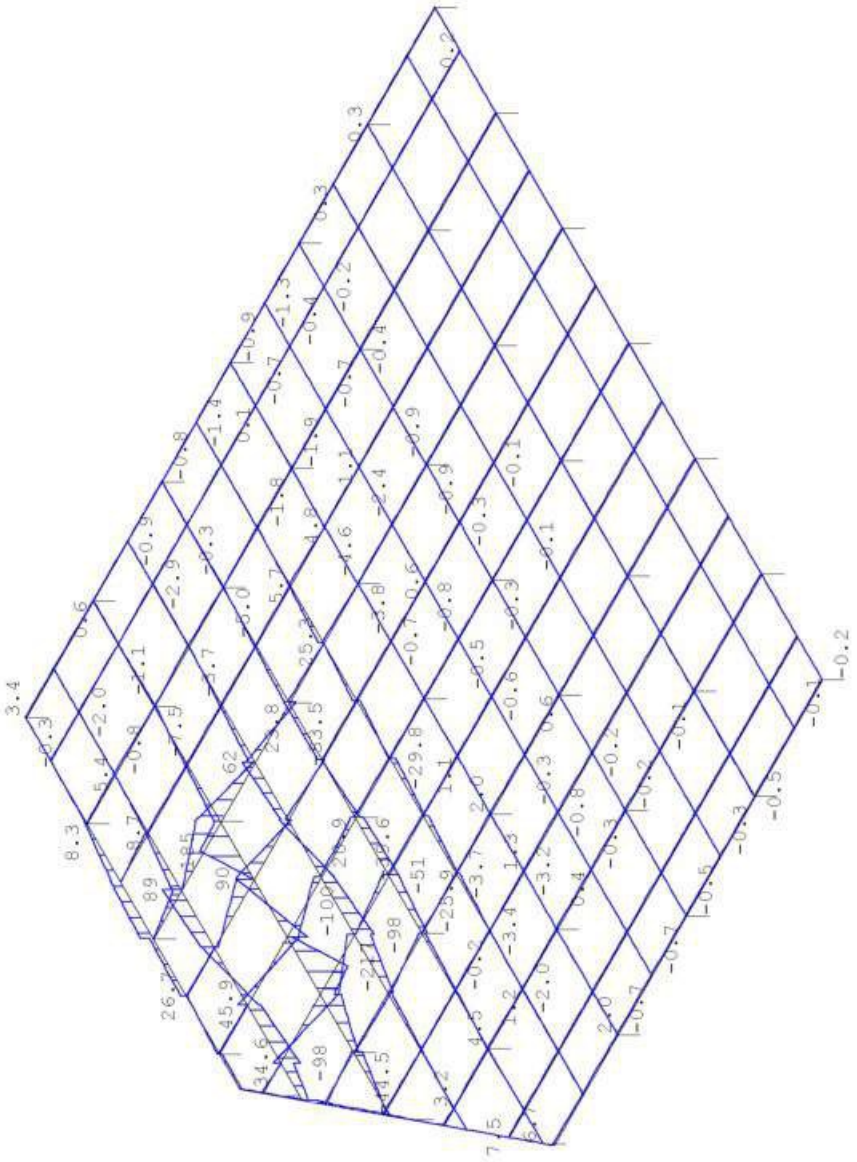
VELDBELASTINGEN B.G:4 Wind van boven



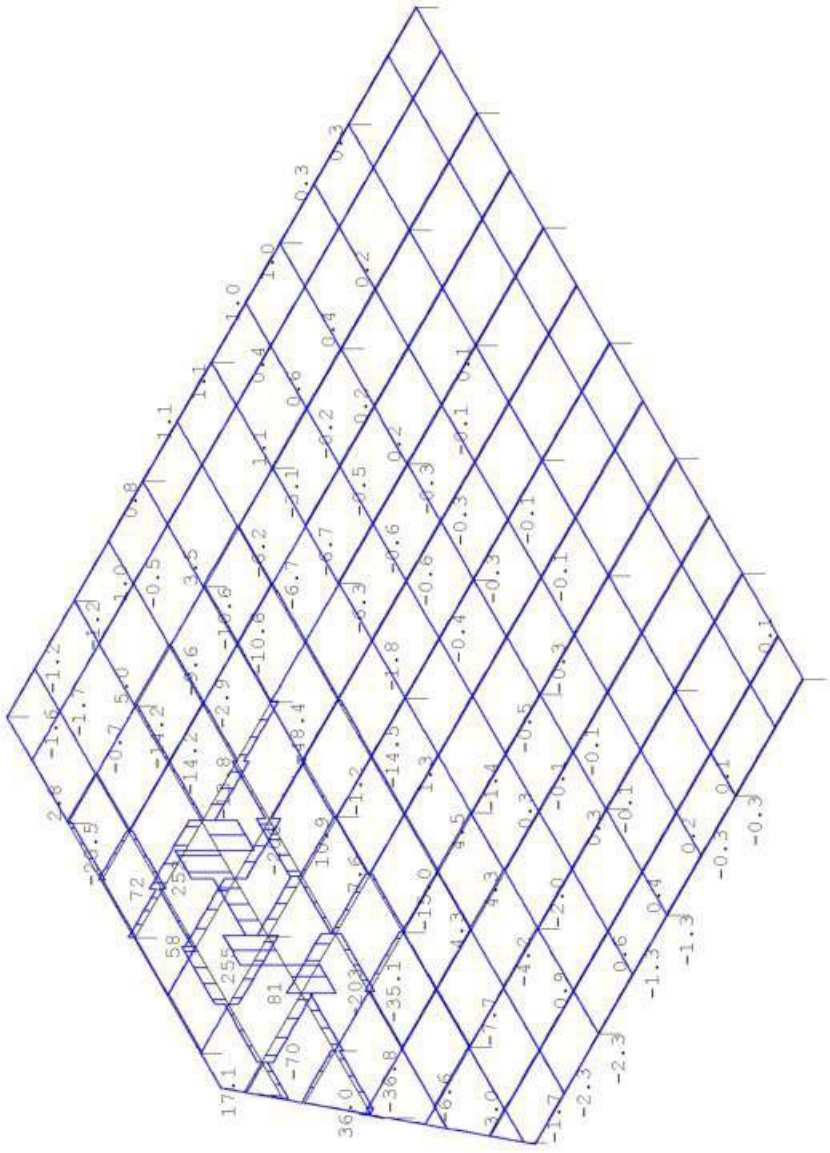
VELDBELASTINGEN B.G:4 Wind van boven

Balk	Last	Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 16:16	1	8:Puntlast	-458.300		3.890		0.000
Balk 16:16	2	8:Puntlast	458.300		6.890		0.000

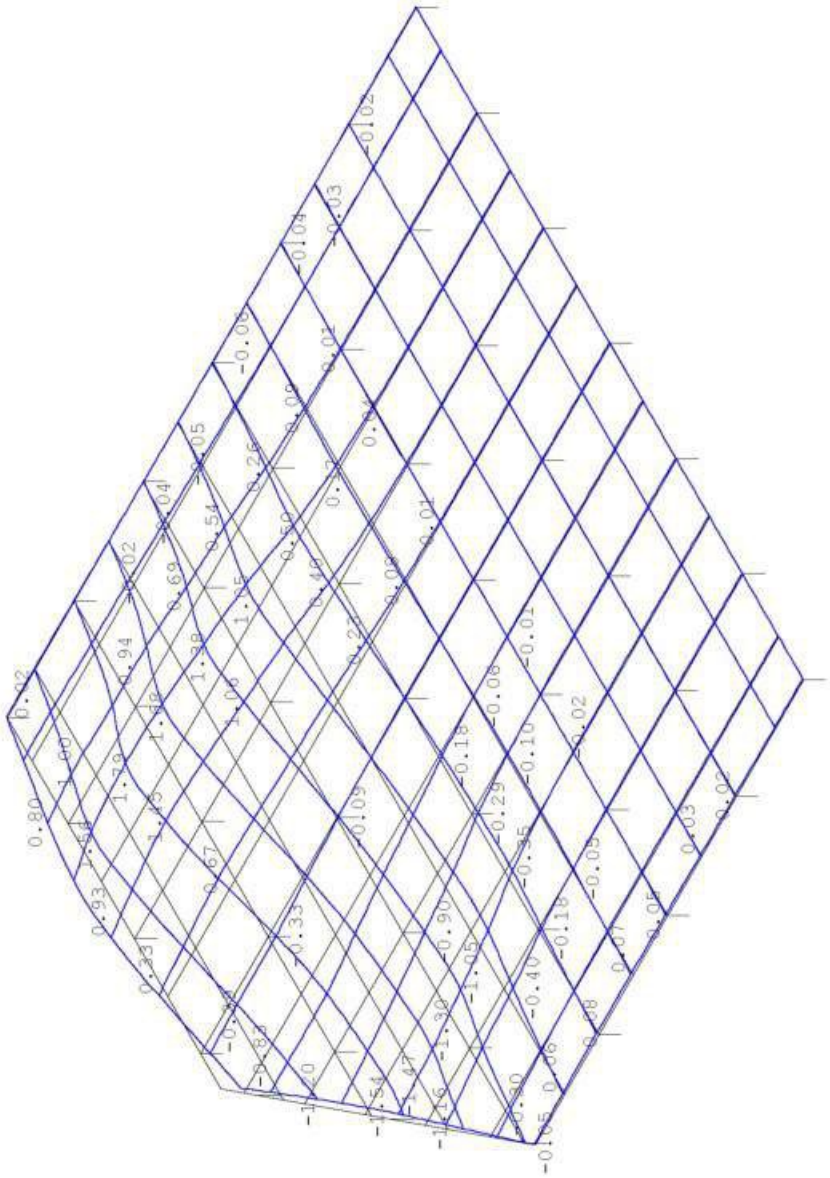
MOMENTEN Fysisch lineair B.G:4 Wind van boven



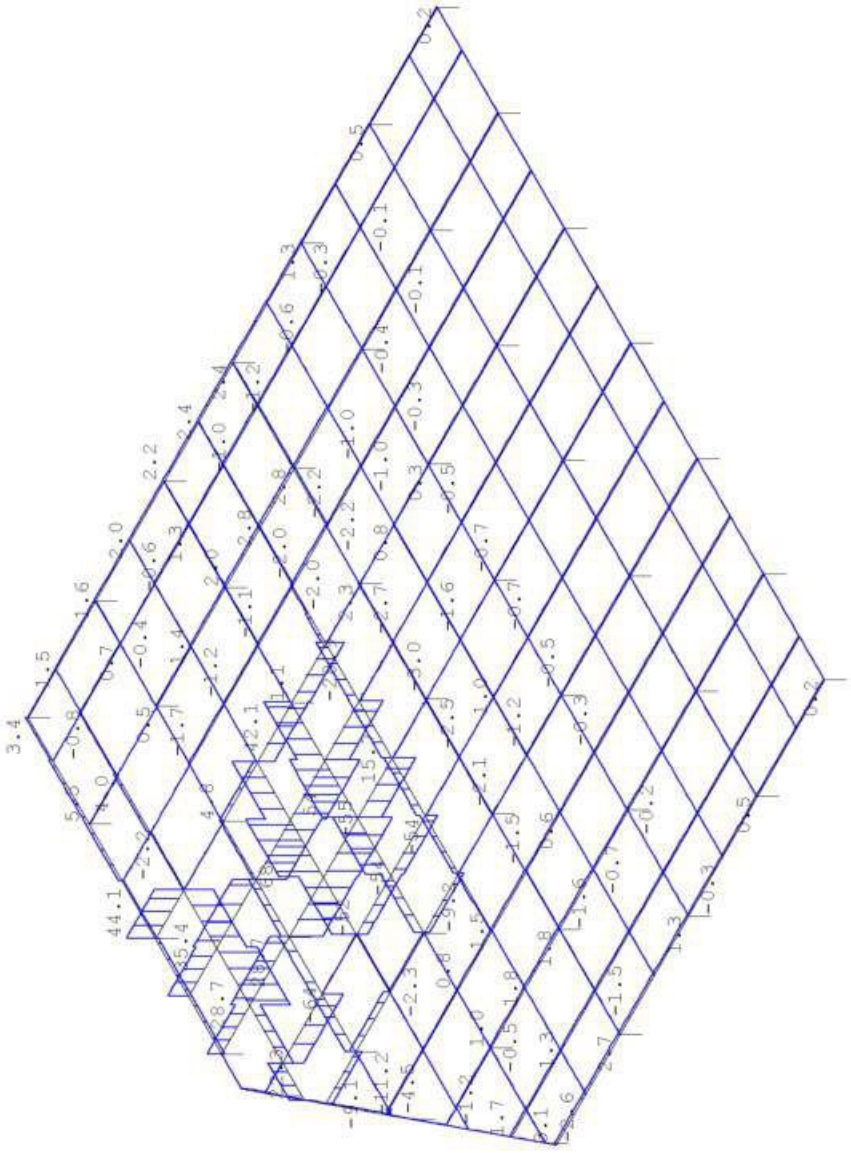
DWARSKRACHTEN Fysisch lineair B.G:4 Wind van boven



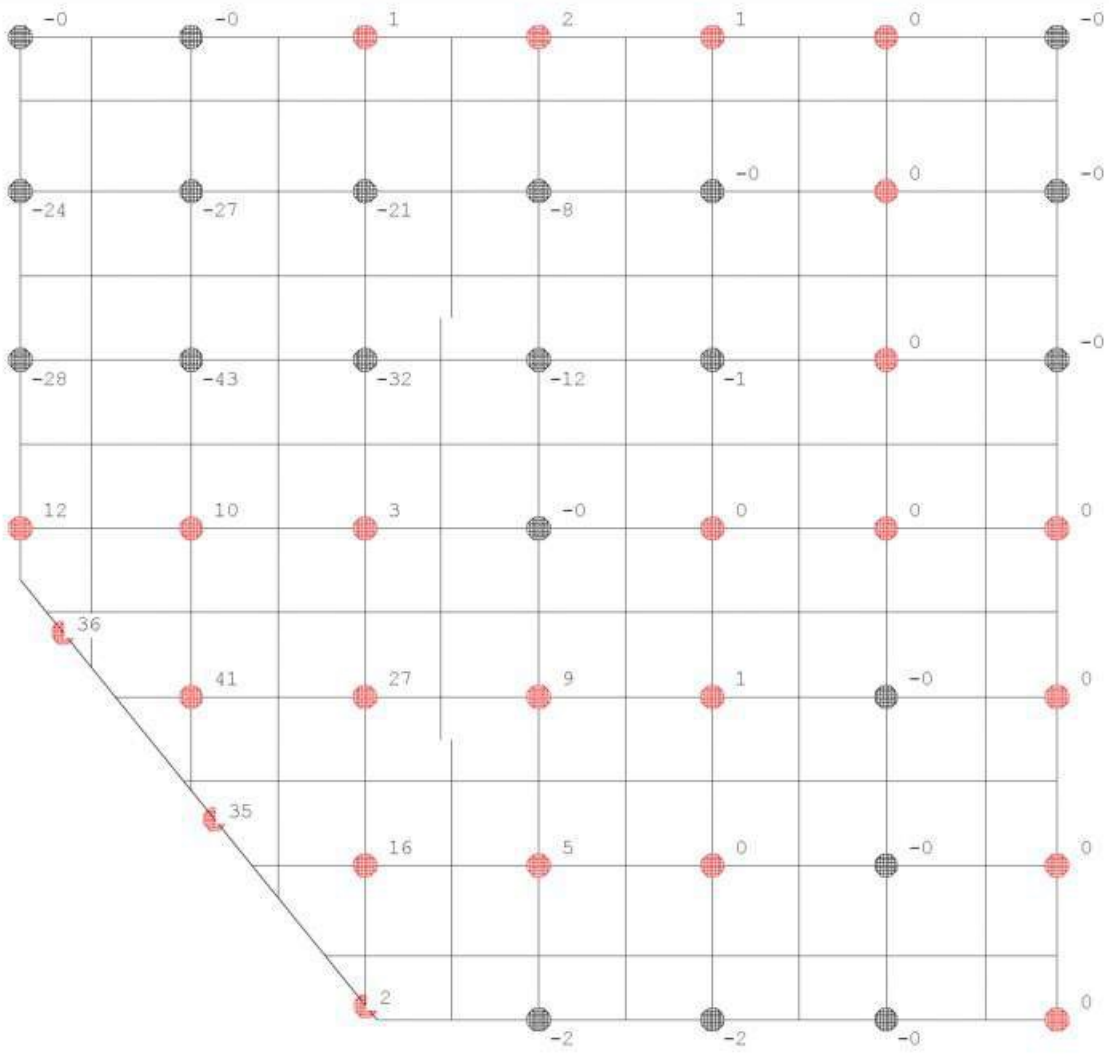
VERPLAATSINGEN [mm] Fysisch lineair B.G:4 Wind van boven



WRINGMOMENTEN Fysisch lineair B.G:4 Wind van boven



REACTIES Fysisch lineair B.G:4 Wind van boven



REACTIES Fysisch lineair B.G:4 Wind van boven

Balk	Stp	MX	Z	MY
1	1	0.00	-0.16	0.00
1	2	0.00	-0.03	0.00
1	3	0.00	1.20	0.00
1	4	0.00	1.73	0.00
1	5	0.00	1.35	0.00
1	6	0.00	0.53	0.00
1	7	0.00	-0.00	0.00
3	8	0.00	-24.07	0.00
3	9	0.00	-27.35	0.00
3	10	0.00	-20.76	0.00
3	11	0.00	-7.79	0.00
3	12	0.00	-0.42	0.00
3	13	0.00	0.11	0.00
3	14	0.00	-0.08	0.00
5	15	0.00	-27.87	0.00
5	16	0.00	-43.33	0.00

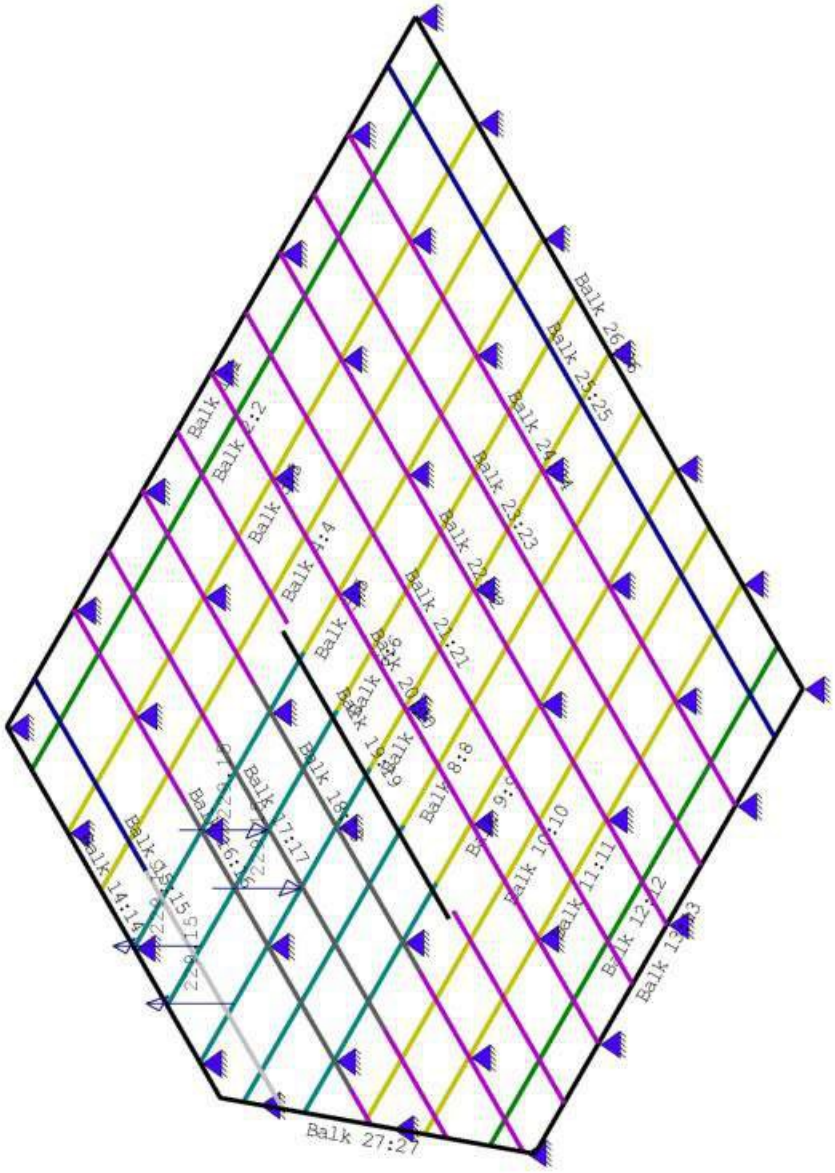
REACTIES Fysisch lineair B.G:4 Wind van boven

Balk	Stp	MX	Z	MY
5	17	0.00	-31.80	0.00
5	18	0.00	-11.97	0.00
5	19	0.00	-0.87	0.00
5	20	0.00	0.13	0.00
5	21	0.00	-0.04	0.00
7	22	0.00	11.78	0.00
7	23	0.00	9.94	0.00
7	24	0.00	2.61	0.00
7	25	0.00	-0.26	0.00
7	26	0.00	0.06	0.00
7	27	0.00	0.07	0.00
7	28	0.00	0.00	0.00
9	29	0.00	40.92	0.00
9	30	0.00	26.92	0.00
9	31	0.00	8.70	0.00
9	32	0.00	0.62	0.00
9	33	0.00	-0.04	0.00
9	34	0.00	0.04	0.00
11	35	0.00	16.41	0.00
11	36	0.00	5.28	0.00
11	37	0.00	0.18	0.00
11	38	0.00	-0.04	0.00
11	39	0.00	0.10	0.00
13	40	0.00	-2.33	0.00
13	41	0.00	-1.58	0.00
13	42	0.00	-0.51	0.00
13	43	0.00	0.03	0.00
14	22	0.00	11.78	0.00
14	15	0.00	-27.87	0.00
14	8	0.00	-24.07	0.00
14	1	0.00	-0.16	0.00
16	29	0.00	40.92	0.00
16	23	0.00	9.94	0.00
16	16	0.00	-43.33	0.00
16	9	0.00	-27.35	0.00
16	2	0.00	-0.03	0.00
18	46	0.00	1.62	0.00
18	35	0.00	16.41	0.00
18	30	0.00	26.92	0.00
18	24	0.00	2.61	0.00
18	17	0.00	-31.80	0.00
18	10	0.00	-20.76	0.00
18	3	0.00	1.20	0.00
20	40	0.00	-2.33	0.00
20	36	0.00	5.28	0.00
20	31	0.00	8.70	0.00
20	25	0.00	-0.26	0.00
20	18	0.00	-11.97	0.00
20	11	0.00	-7.79	0.00
20	4	0.00	1.73	0.00
22	41	0.00	-1.58	0.00
22	37	0.00	0.18	0.00
22	32	0.00	0.62	0.00
22	26	0.00	0.06	0.00
22	19	0.00	-0.87	0.00
22	12	0.00	-0.42	0.00

REACTIES Fysisch lineair B.G:4 Wind van boven

Balk	Stp	MX	Z	MY
22	5	0.00	1.35	0.00
24	42	0.00	-0.51	0.00
24	38	0.00	-0.04	0.00
24	33	0.00	-0.04	0.00
24	27	0.00	0.07	0.00
24	20	0.00	0.13	0.00
24	13	0.00	0.11	0.00
24	6	0.00	0.53	0.00
26	43	0.00	0.03	0.00
26	39	0.00	0.10	0.00
26	34	0.00	0.04	0.00
26	28	0.00	0.00	0.00
26	21	0.00	-0.04	0.00
26	14	0.00	-0.08	0.00
26	7	0.00	-0.00	0.00
27	44	0.00	36.05	0.00
27	45	0.00	34.91	0.00
27	46	0.00	1.62	0.00
			0.00	: Som reacties
			0.00	: Som belastingen

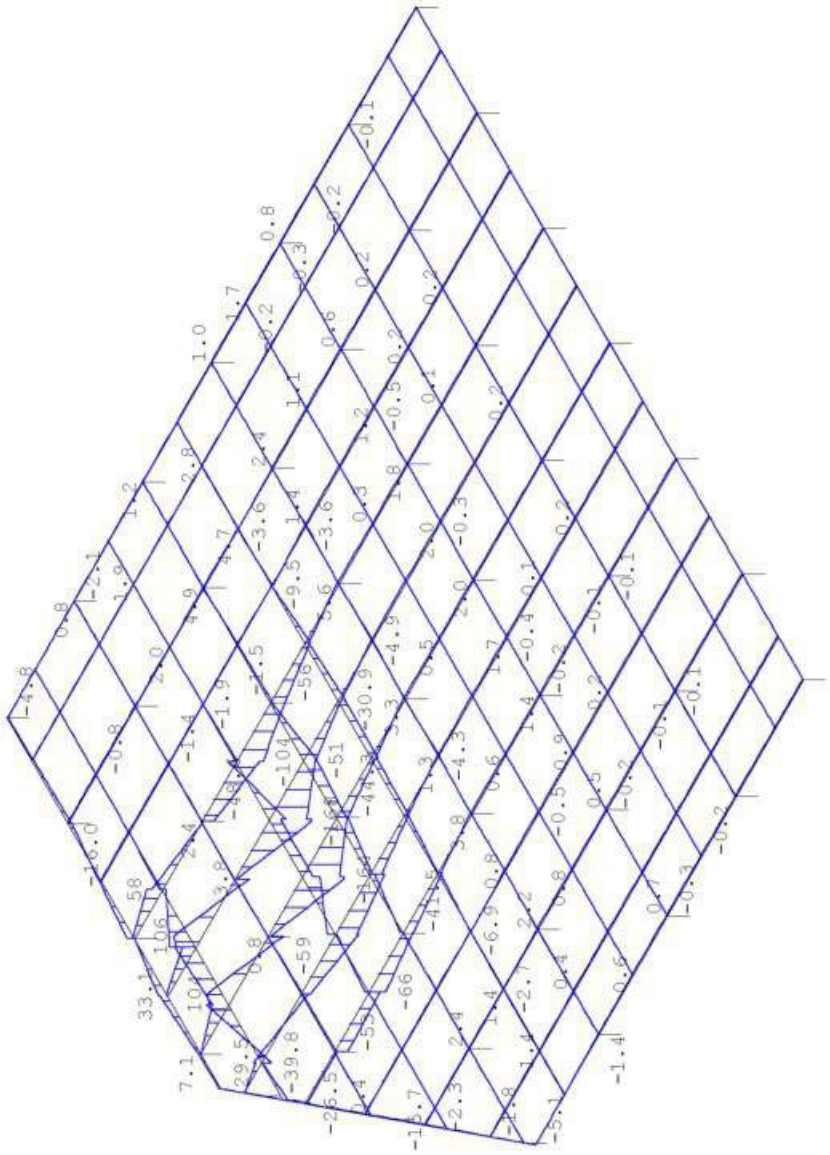
VELDBELASTINGEN B.G:5 Wind van links



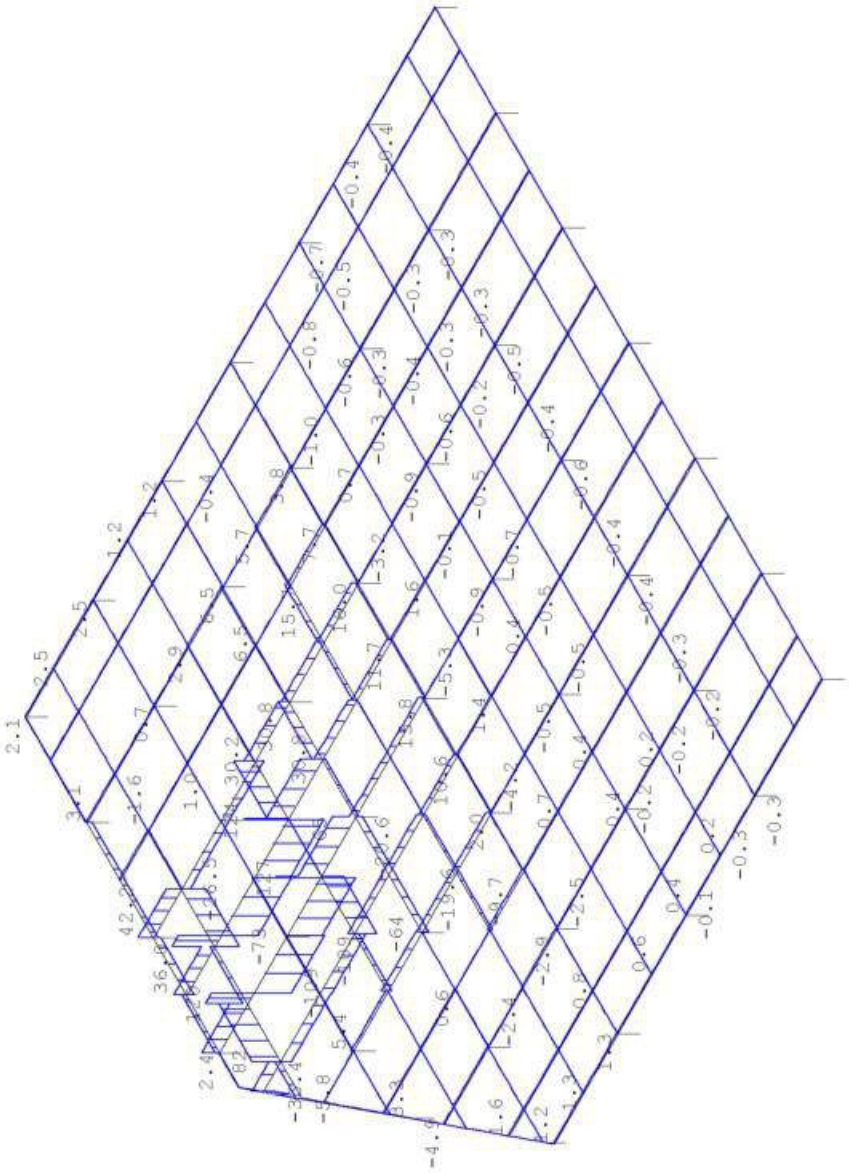
VELDBELASTINGEN B.G:5 Wind van links

Balk	Last	Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 6:6	1	8:Puntlast	229.150		1.550		0.000
Balk 6:6	2	8:Puntlast	-229.150		4.550		0.000
Balk 7:7	1	8:Puntlast	229.150		1.550		0.000
Balk 7:7	2	8:Puntlast	-229.150		4.550		0.000

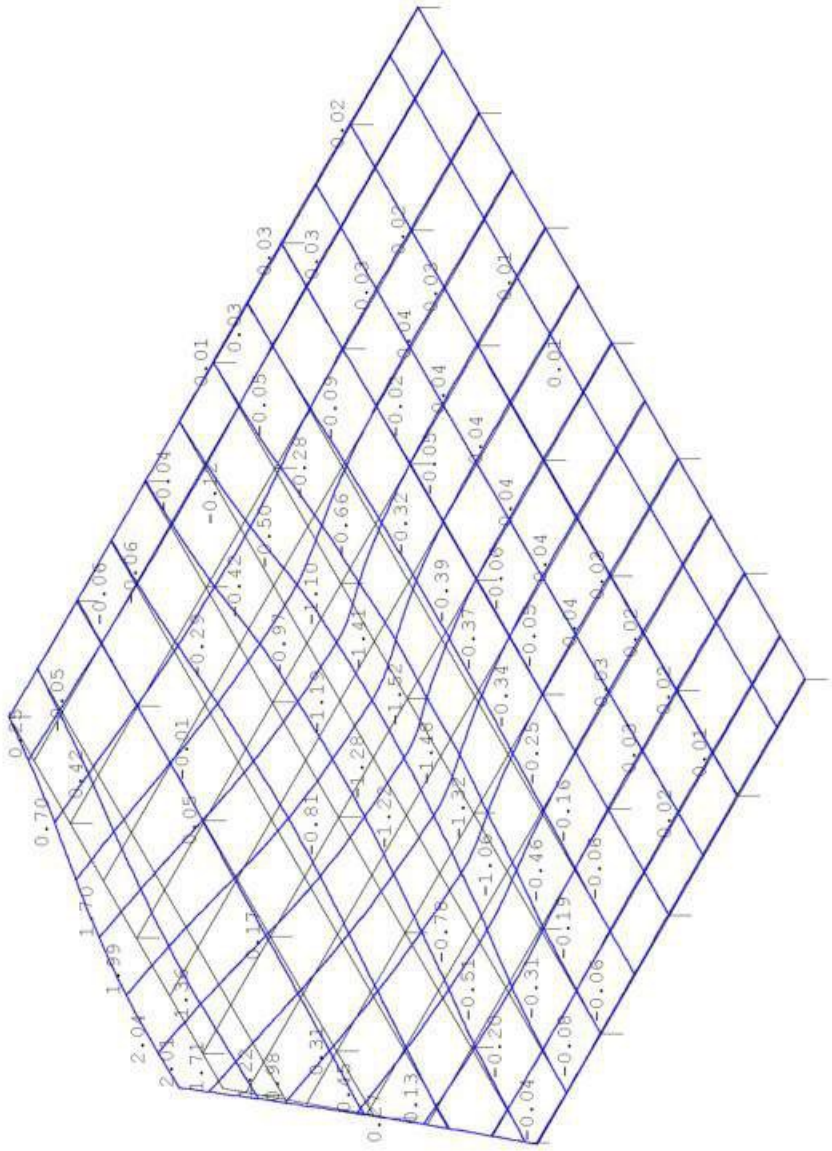
MOMENTEN Fysisch lineair B.G:5 Wind van links



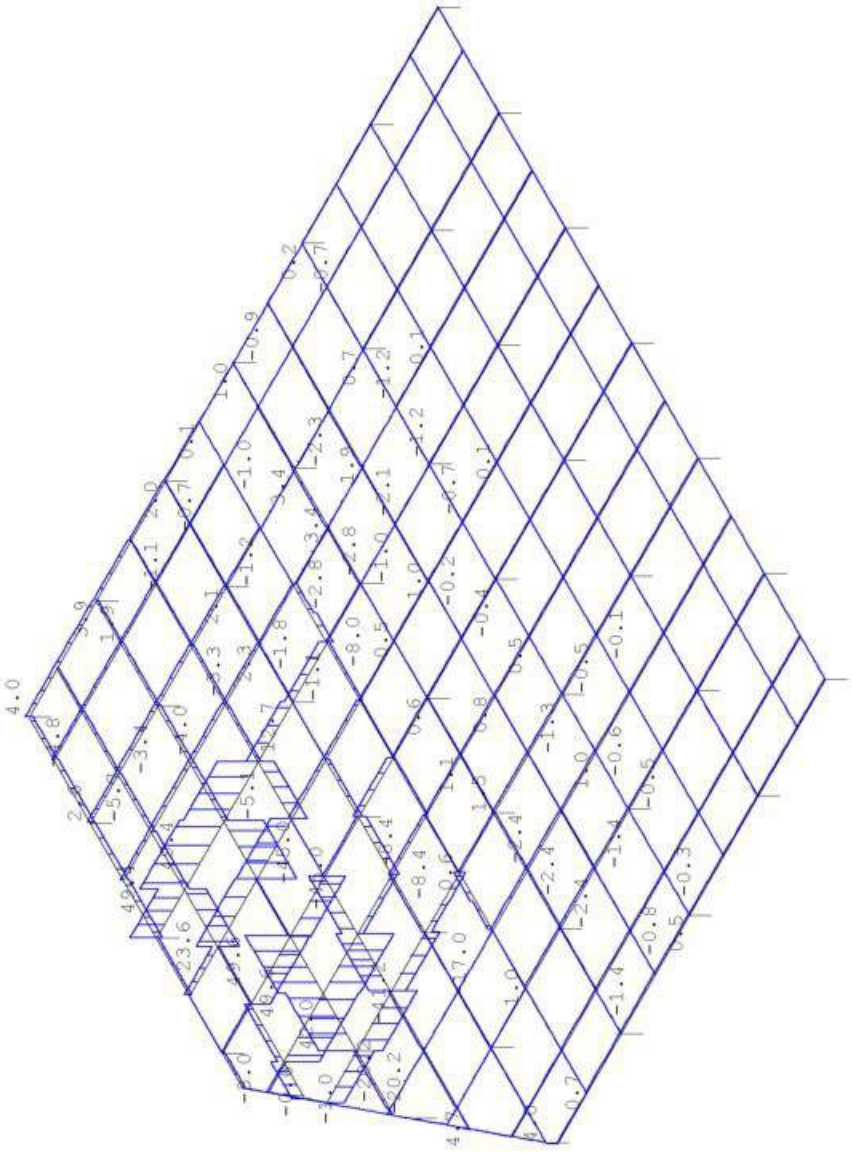
DWARSKRACHTEN Fysisch lineair B.G:5 Wind van links



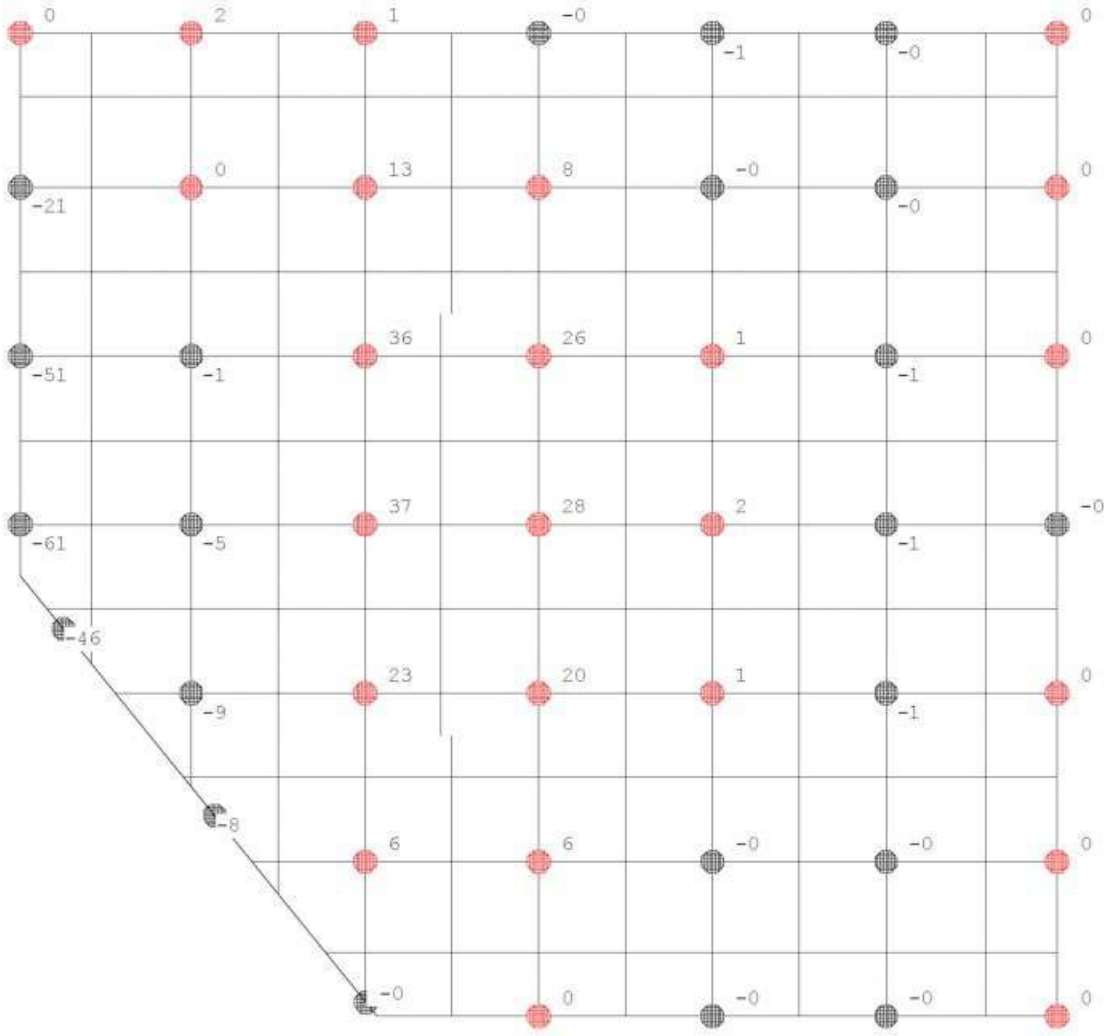
VERPLAATSINGEN [mm] Fysisch lineair B.G:5 Wind van links



WRINGMOMENTEN Fysisch lineair B.G:5 Wind van links



REACTIES Fysisch lineair B.G:5 Wind van links



REACTIES Fysisch lineair B.G:5 Wind van links

Balk	Stp	MX	Z	MY
1	1	0.00	0.15	0.00
1	2	0.00	1.93	0.00
1	3	0.00	1.14	0.00
1	4	0.00	-0.32	0.00
1	5	0.00	-1.03	0.00
1	6	0.00	-0.55	0.00
1	7	0.00	0.06	0.00
3	8	0.00	-21.03	0.00
3	9	0.00	0.11	0.00
3	10	0.00	12.62	0.00
3	11	0.00	8.38	0.00
3	12	0.00	-0.20	0.00
3	13	0.00	-0.58	0.00
3	14	0.00	0.05	0.00
5	15	0.00	-50.85	0.00
5	16	0.00	-1.36	0.00

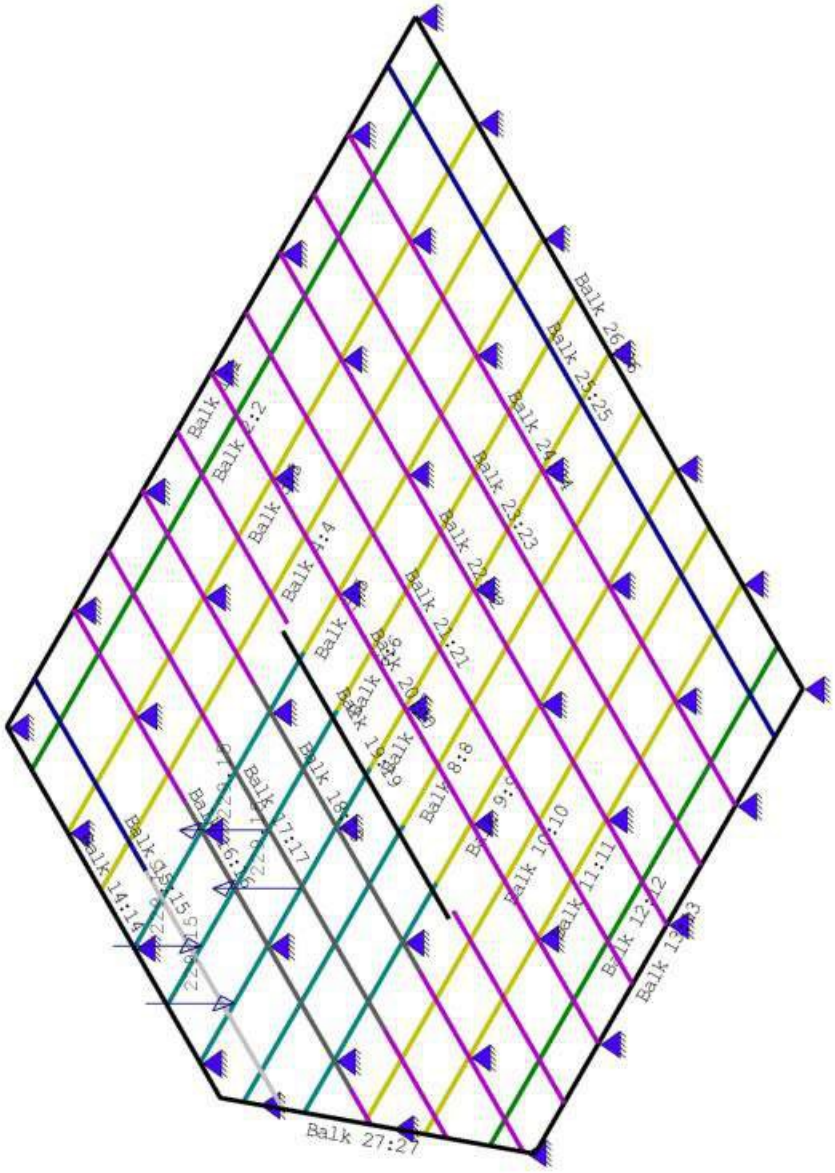
REACTIES Fysisch lineair B.G:5 Wind van links

Balk	Stp	MX	Z	MY
5	17	0.00	35.67	0.00
5	18	0.00	25.54	0.00
5	19	0.00	1.38	0.00
5	20	0.00	-0.83	0.00
5	21	0.00	0.01	0.00
7	22	0.00	-61.16	0.00
7	23	0.00	-5.10	0.00
7	24	0.00	36.61	0.00
7	25	0.00	27.90	0.00
7	26	0.00	1.70	0.00
7	27	0.00	-0.95	0.00
7	28	0.00	-0.01	0.00
9	29	0.00	-9.27	0.00
9	30	0.00	23.31	0.00
9	31	0.00	20.03	0.00
9	32	0.00	0.90	0.00
9	33	0.00	-0.80	0.00
9	34	0.00	0.00	0.00
11	35	0.00	6.01	0.00
11	36	0.00	5.76	0.00
11	37	0.00	-0.16	0.00
11	38	0.00	-0.47	0.00
11	39	0.00	0.02	0.00
13	40	0.00	0.44	0.00
13	41	0.00	-0.28	0.00
13	42	0.00	-0.29	0.00
13	43	0.00	0.02	0.00
14	22	0.00	-61.16	0.00
14	15	0.00	-50.85	0.00
14	8	0.00	-21.03	0.00
14	1	0.00	0.15	0.00
16	29	0.00	-9.27	0.00
16	23	0.00	-5.10	0.00
16	16	0.00	-1.36	0.00
16	9	0.00	0.11	0.00
16	2	0.00	1.93	0.00
18	46	0.00	-0.48	0.00
18	35	0.00	6.01	0.00
18	30	0.00	23.31	0.00
18	24	0.00	36.61	0.00
18	17	0.00	35.67	0.00
18	10	0.00	12.62	0.00
18	3	0.00	1.14	0.00
20	40	0.00	0.44	0.00
20	36	0.00	5.76	0.00
20	31	0.00	20.03	0.00
20	25	0.00	27.90	0.00
20	18	0.00	25.54	0.00
20	11	0.00	8.38	0.00
20	4	0.00	-0.32	0.00
22	41	0.00	-0.28	0.00
22	37	0.00	-0.16	0.00
22	32	0.00	0.90	0.00
22	26	0.00	1.70	0.00
22	19	0.00	1.38	0.00
22	12	0.00	-0.20	0.00

REACTIES Fysisch lineair B.G:5 Wind van links

Balk	Stp	MX	Z	MY
22	5	0.00	-1.03	0.00
24	42	0.00	-0.29	0.00
24	38	0.00	-0.47	0.00
24	33	0.00	-0.80	0.00
24	27	0.00	-0.95	0.00
24	20	0.00	-0.83	0.00
24	13	0.00	-0.58	0.00
24	6	0.00	-0.55	0.00
26	43	0.00	0.02	0.00
26	39	0.00	0.02	0.00
26	34	0.00	0.00	0.00
26	28	0.00	-0.01	0.00
26	21	0.00	0.01	0.00
26	14	0.00	0.05	0.00
26	7	0.00	0.06	0.00
27	44	0.00	-45.77	0.00
27	45	0.00	-8.24	0.00
27	46	0.00	-0.48	0.00
			0.00	: Som reacties
			0.00	: Som belastingen

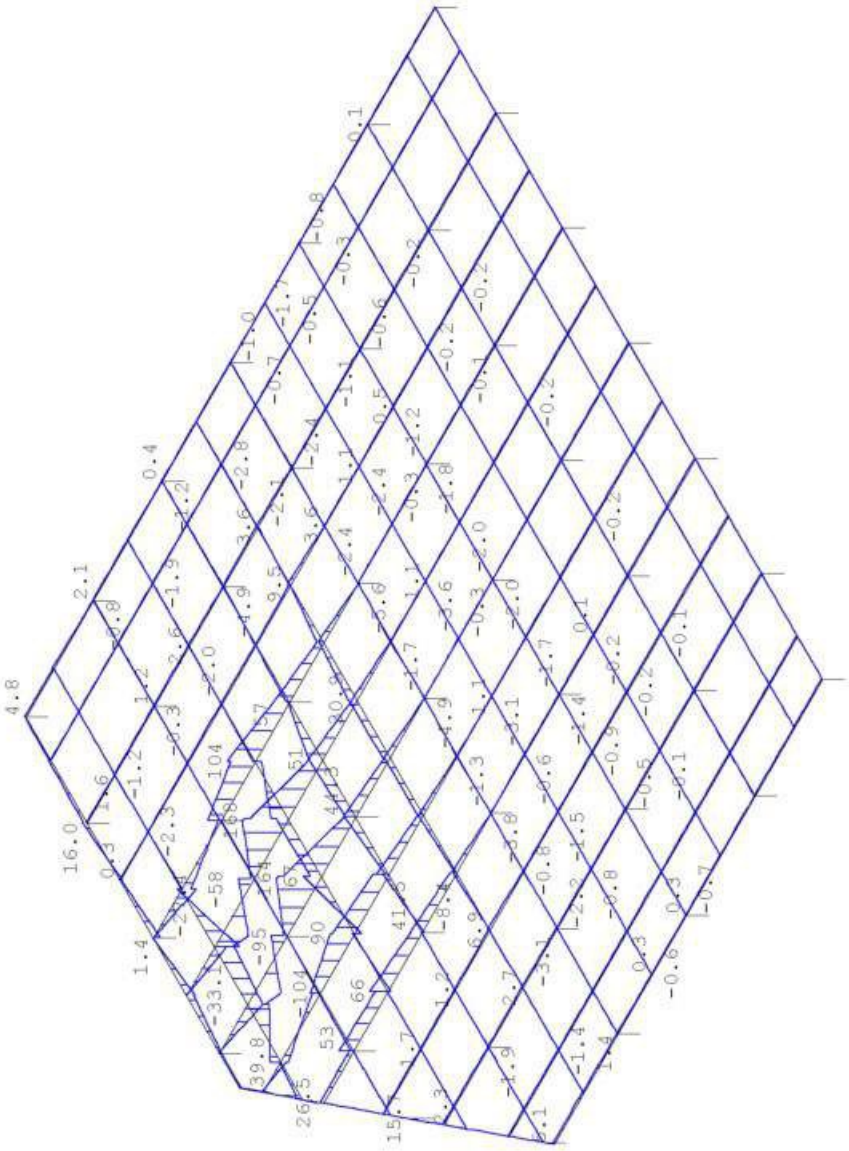
VELDBELASTINGEN B.G:6 Wind van rechts



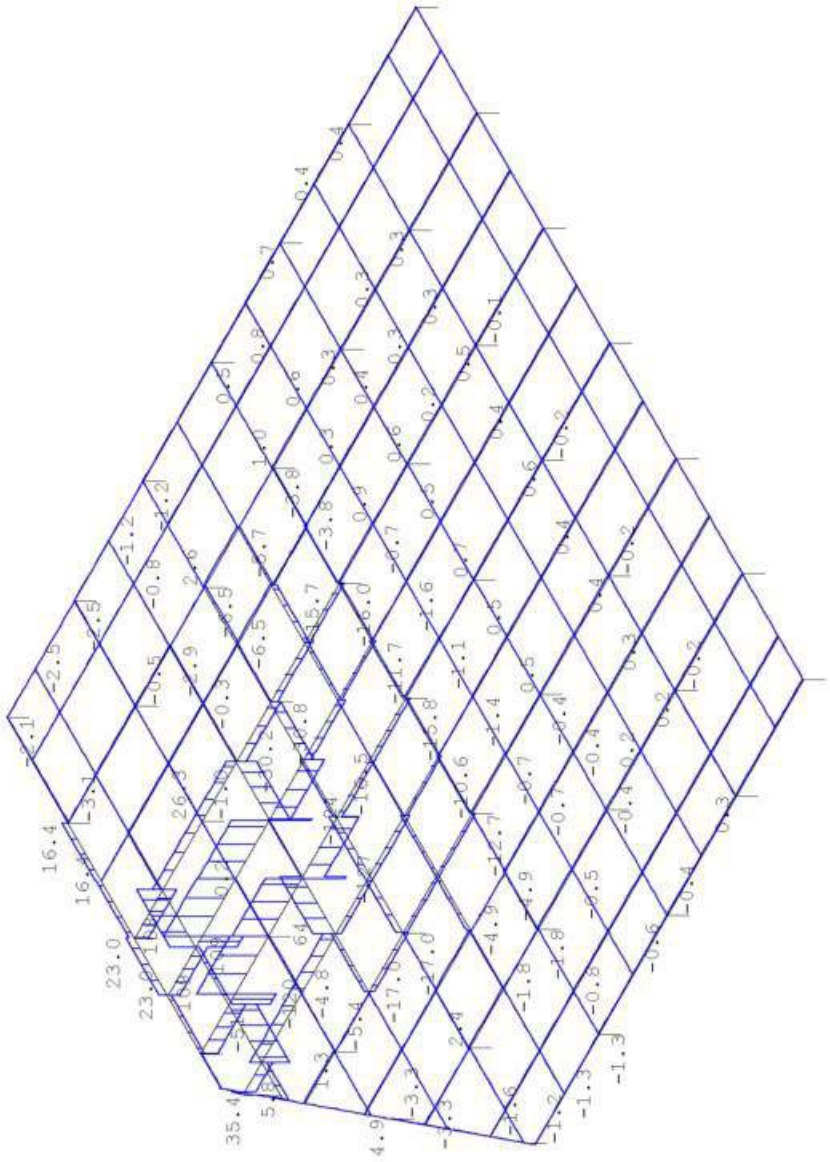
VELDBELASTINGEN B.G:6 Wind van rechts

Balk	Last	Type	q1/p/m	q2	Afstand	Lengte	Exc.
Balk 6:6	1	8:Puntlast	-229.150		1.550		0.000
Balk 6:6	2	8:Puntlast	229.150		4.550		0.000
Balk 7:7	1	8:Puntlast	-229.150		1.550		0.000
Balk 7:7	2	8:Puntlast	229.150		4.550		0.000

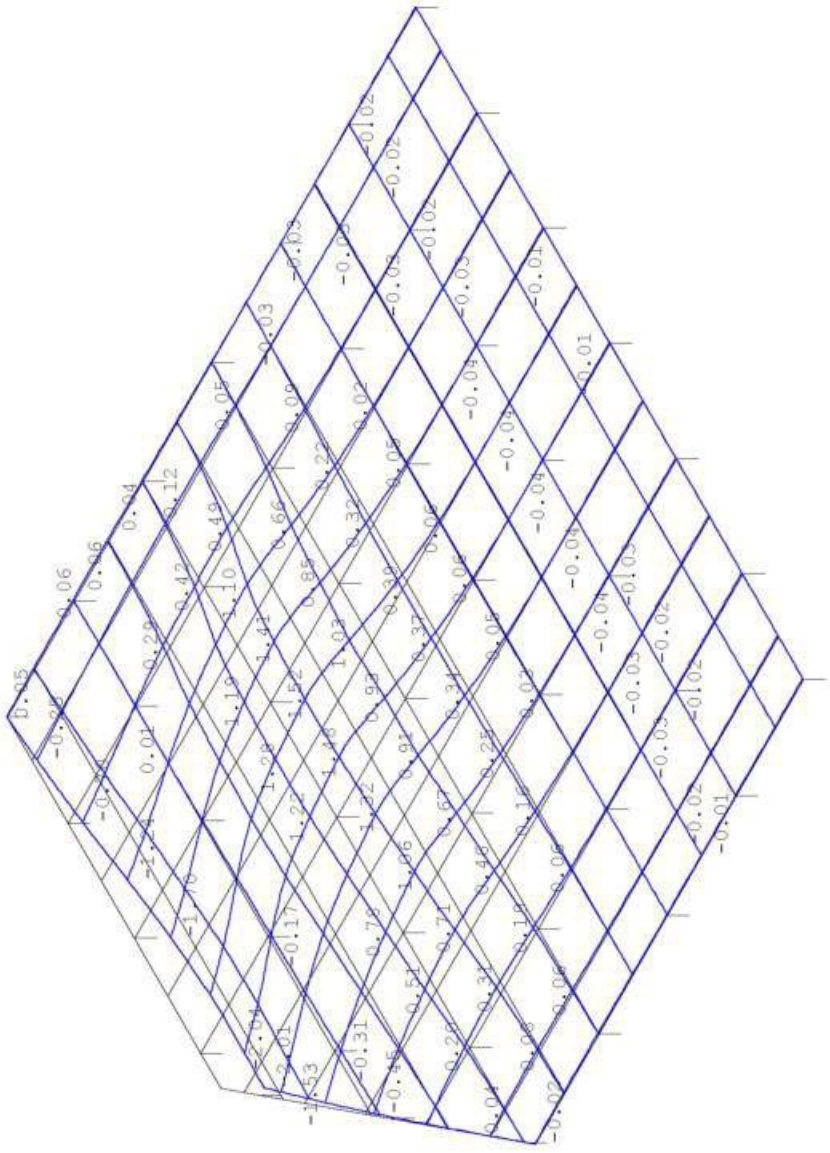
MOMENTEN Fysisch lineair B.G:6 Wind van rechts



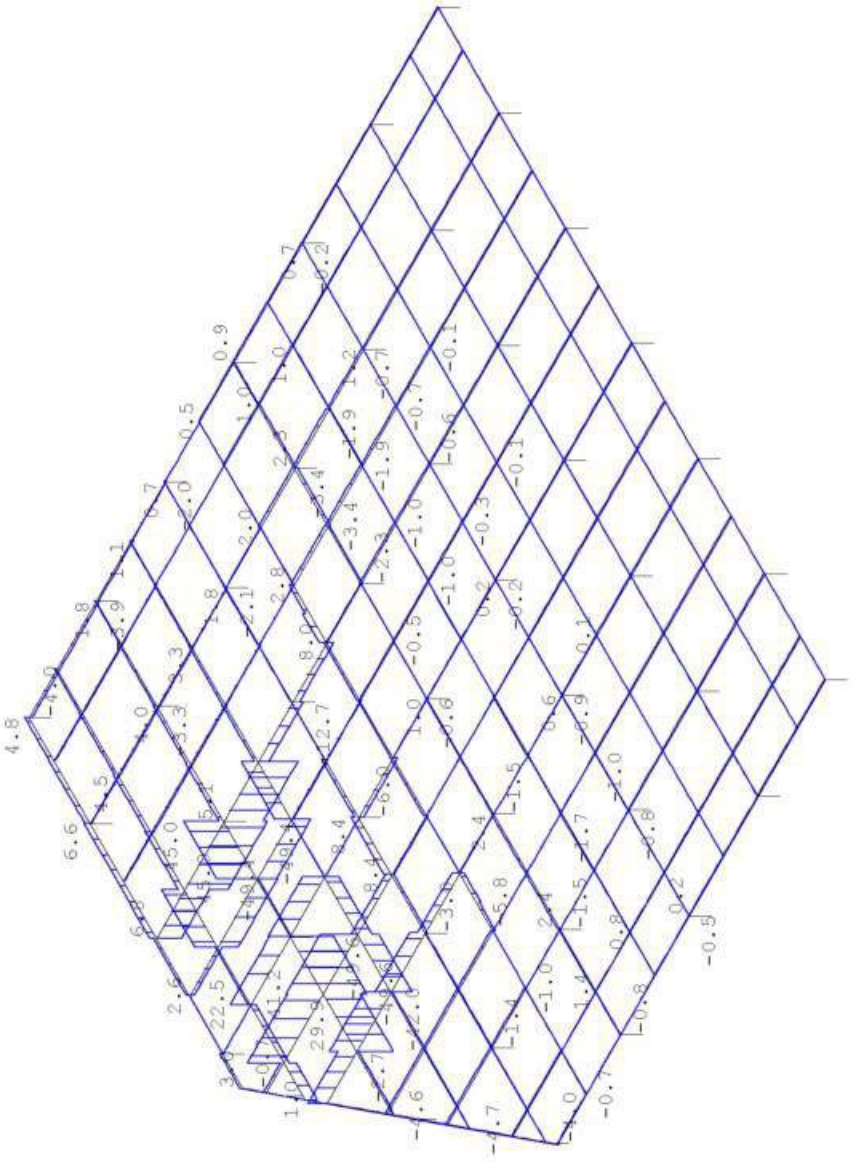
DWARSKRACHTEN Fysisch lineair B.G:6 Wind van rechts



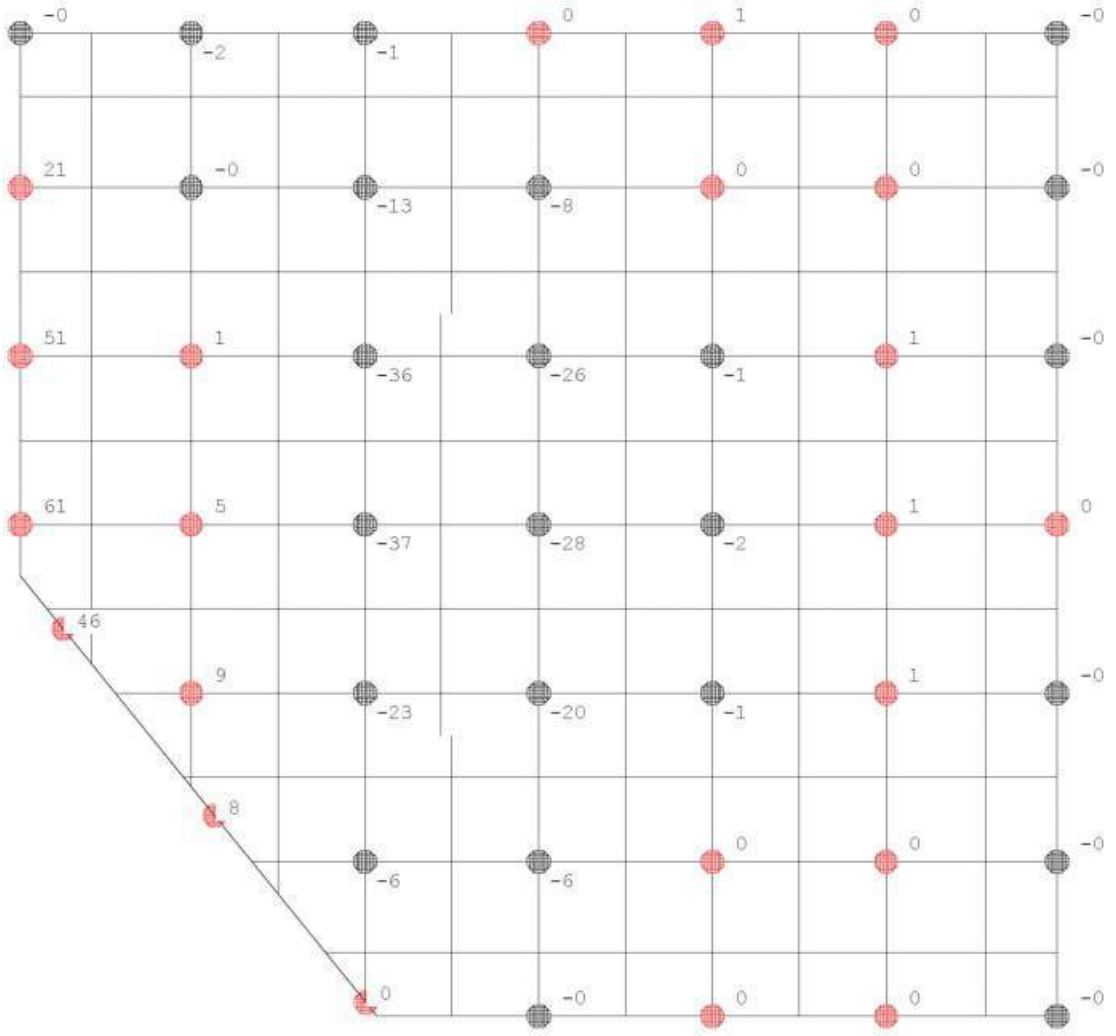
VERPLAATSINGEN [mm] Fysisch lineair B.G:6 Wind van rechts



WRINGMOMENTEN Fysisch lineair B.G:6 Wind van rechts



REACTIES Fysisch lineair B.G:6 Wind van rechts



REACTIES Fysisch lineair B.G:6 Wind van rechts

Balk	Stp	MX	Z	MY
1	1	0.00	-0.15	0.00
1	2	0.00	-1.93	0.00
1	3	0.00	-1.14	0.00
1	4	0.00	0.32	0.00
1	5	0.00	1.03	0.00
1	6	0.00	0.55	0.00
1	7	0.00	-0.06	0.00
3	8	0.00	21.03	0.00
3	9	0.00	-0.11	0.00
3	10	0.00	-12.62	0.00
3	11	0.00	-8.38	0.00
3	12	0.00	0.20	0.00
3	13	0.00	0.58	0.00
3	14	0.00	-0.05	0.00
5	15	0.00	50.85	0.00
5	16	0.00	1.36	0.00

REACTIES Fysisch lineair B.G:6 Wind van rechts

Balk	Stp	MX	Z	MY
5	17	0.00	-35.67	0.00
5	18	0.00	-25.54	0.00
5	19	0.00	-1.38	0.00
5	20	0.00	0.83	0.00
5	21	0.00	-0.01	0.00
7	22	0.00	61.16	0.00
7	23	0.00	5.10	0.00
7	24	0.00	-36.61	0.00
7	25	0.00	-27.90	0.00
7	26	0.00	-1.70	0.00
7	27	0.00	0.95	0.00
7	28	0.00	0.01	0.00
9	29	0.00	9.27	0.00
9	30	0.00	-23.31	0.00
9	31	0.00	-20.03	0.00
9	32	0.00	-0.90	0.00
9	33	0.00	0.80	0.00
9	34	0.00	-0.00	0.00
11	35	0.00	-6.01	0.00
11	36	0.00	-5.76	0.00
11	37	0.00	0.16	0.00
11	38	0.00	0.47	0.00
11	39	0.00	-0.02	0.00
13	40	0.00	-0.44	0.00
13	41	0.00	0.28	0.00
13	42	0.00	0.29	0.00
13	43	0.00	-0.02	0.00
14	22	0.00	61.16	0.00
14	15	0.00	50.85	0.00
14	8	0.00	21.03	0.00
14	1	0.00	-0.15	0.00
16	29	0.00	9.27	0.00
16	23	0.00	5.10	0.00
16	16	0.00	1.36	0.00
16	9	0.00	-0.11	0.00
16	2	0.00	-1.93	0.00
18	46	0.00	0.48	0.00
18	35	0.00	-6.01	0.00
18	30	0.00	-23.31	0.00
18	24	0.00	-36.61	0.00
18	17	0.00	-35.67	0.00
18	10	0.00	-12.62	0.00
18	3	0.00	-1.14	0.00
20	40	0.00	-0.44	0.00
20	36	0.00	-5.76	0.00
20	31	0.00	-20.03	0.00
20	25	0.00	-27.90	0.00
20	18	0.00	-25.54	0.00
20	11	0.00	-8.38	0.00
20	4	0.00	0.32	0.00
22	41	0.00	0.28	0.00
22	37	0.00	0.16	0.00
22	32	0.00	-0.90	0.00
22	26	0.00	-1.70	0.00
22	19	0.00	-1.38	0.00
22	12	0.00	0.20	0.00

REACTIES Fysisch lineair B.G:6 Wind van rechts

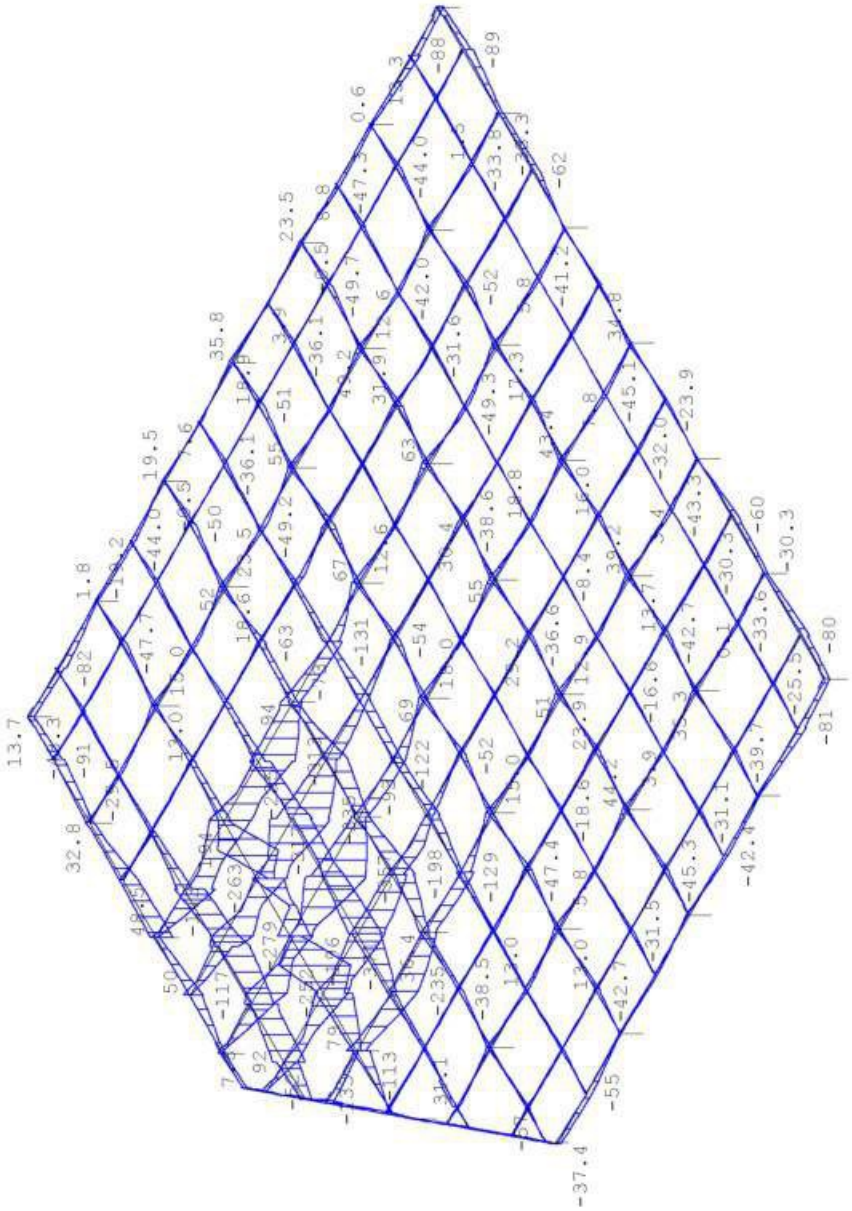
Balk	Stp	MX	Z	MY
22	5	0.00	1.03	0.00
24	42	0.00	0.29	0.00
24	38	0.00	0.47	0.00
24	33	0.00	0.80	0.00
24	27	0.00	0.95	0.00
24	20	0.00	0.83	0.00
24	13	0.00	0.58	0.00
24	6	0.00	0.55	0.00
26	43	0.00	-0.02	0.00
26	39	0.00	-0.02	0.00
26	34	0.00	-0.00	0.00
26	28	0.00	0.01	0.00
26	21	0.00	-0.01	0.00
26	14	0.00	-0.05	0.00
26	7	0.00	-0.06	0.00
27	44	0.00	45.77	0.00
27	45	0.00	8.24	0.00
27	46	0.00	0.48	0.00
			0.00	: Som reacties
			0.00	: Som belastingen

BELASTINGCOMBINATIES

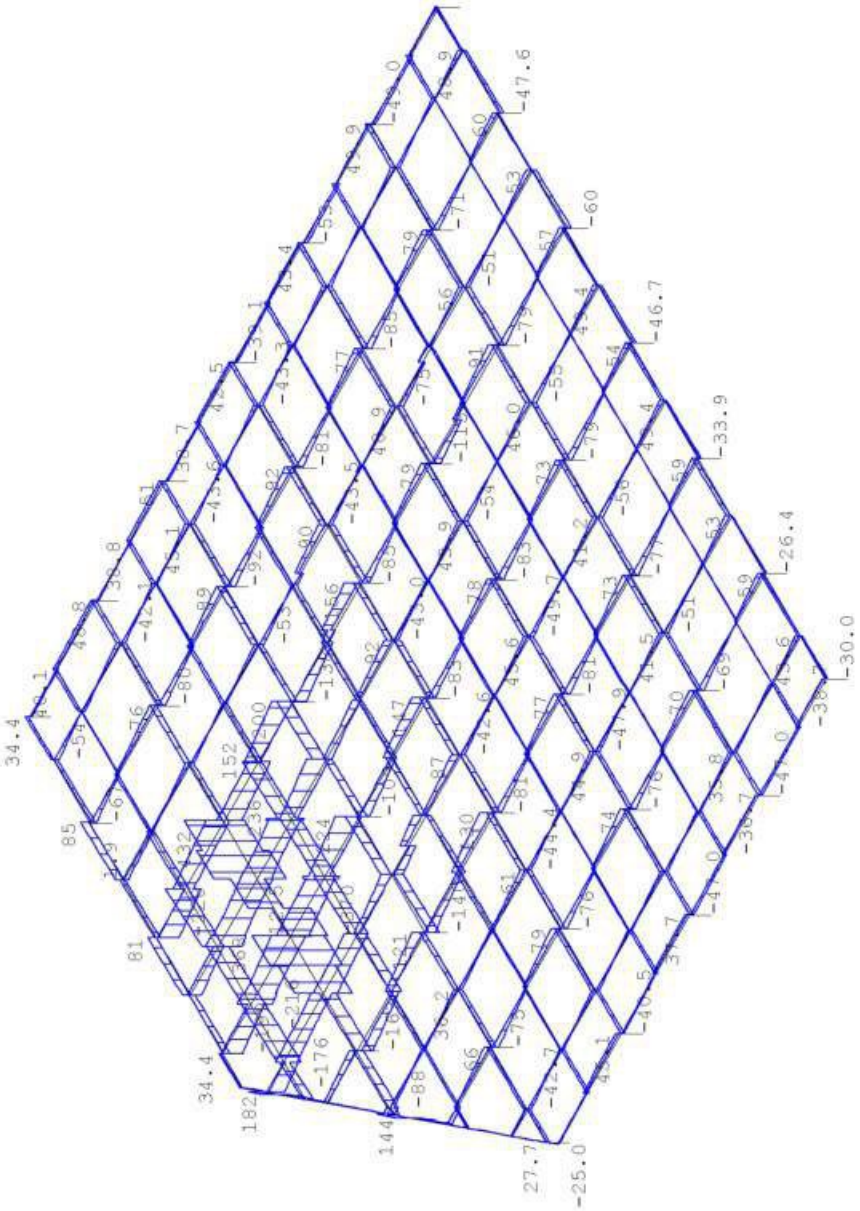
BC	Type	BG	Gen.	Factor	BG	Gen.	Factor	BG	Gen.	Factor	BG	Gen.	Factor
1	Fund.	1	Perm	1.22									
2	Fund.	1	Perm	1.22	2	psi0	1.35						
3	Fund.	1	Perm	1.08	2	Extr	1.35						
4	Fund.	1	Perm	0.90	3	Extr	1.35						
5	Fund.	1	Perm	1.08	2	psi0	1.35	3	Extr	1.35			
6	Fund.	1	Perm	0.90	4	Extr	1.35						
7	Fund.	1	Perm	1.08	2	psi0	1.35	4	Extr	1.35			
8	Fund.	1	Perm	0.90	5	Extr	1.35						
9	Fund.	1	Perm	1.08	2	Extr	1.35	5	Extr	1.35			
10	Fund.	1	Perm	0.90	6	Extr	1.35						
11	Fund.	1	Perm	1.08	2	Extr	1.35	6	Extr	1.35			
12	Kar.	1	Perm	1.00	2	Extr	1.00						
13	Kar.	1	Perm	1.00	3	Extr	1.00						
14	Kar.	1	Perm	1.00	2	psi0	1.00	3	Extr	1.00			
15	Kar.	1	Perm	1.00	4	Extr	1.00						
16	Kar.	1	Perm	1.00	2	psi0	1.00	4	Extr	1.00			
17	Kar.	1	Perm	1.00	5	Extr	1.00						
18	Kar.	1	Perm	1.00	2	psi0	1.00	5	Extr	1.00			
19	Kar.	1	Perm	1.00	6	Extr	1.00						
20	Kar.	1	Perm	1.00	2	psi0	1.00	6	Extr	1.00			
21	Freq.	1	Perm	1.00									
22	Freq.	1	Perm	1.00	2	psi1	1.00						
23	Freq.	1	Perm	1.00	3	psi1	1.00						
24	Freq.	1	Perm	1.00	2	psi2	1.00	3	psi1	1.00			
25	Freq.	1	Perm	1.00	4	psi1	1.00						
26	Freq.	1	Perm	1.00	2	psi2	1.00	4	psi1	1.00			
27	Freq.	1	Perm	1.00	5	psi1	1.00						
28	Freq.	1	Perm	1.00	2	psi2	1.00	5	psi1	1.00			
29	Freq.	1	Perm	1.00	6	psi1	1.00						
30	Freq.	1	Perm	1.00	2	psi2	1.00	6	psi1	1.00			
31	Quas.	1	Perm	1.00									
32	Quas.	1	Perm	1.00	2	psi2	1.00						
33	Blij.	1	Perm	1.00									

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES

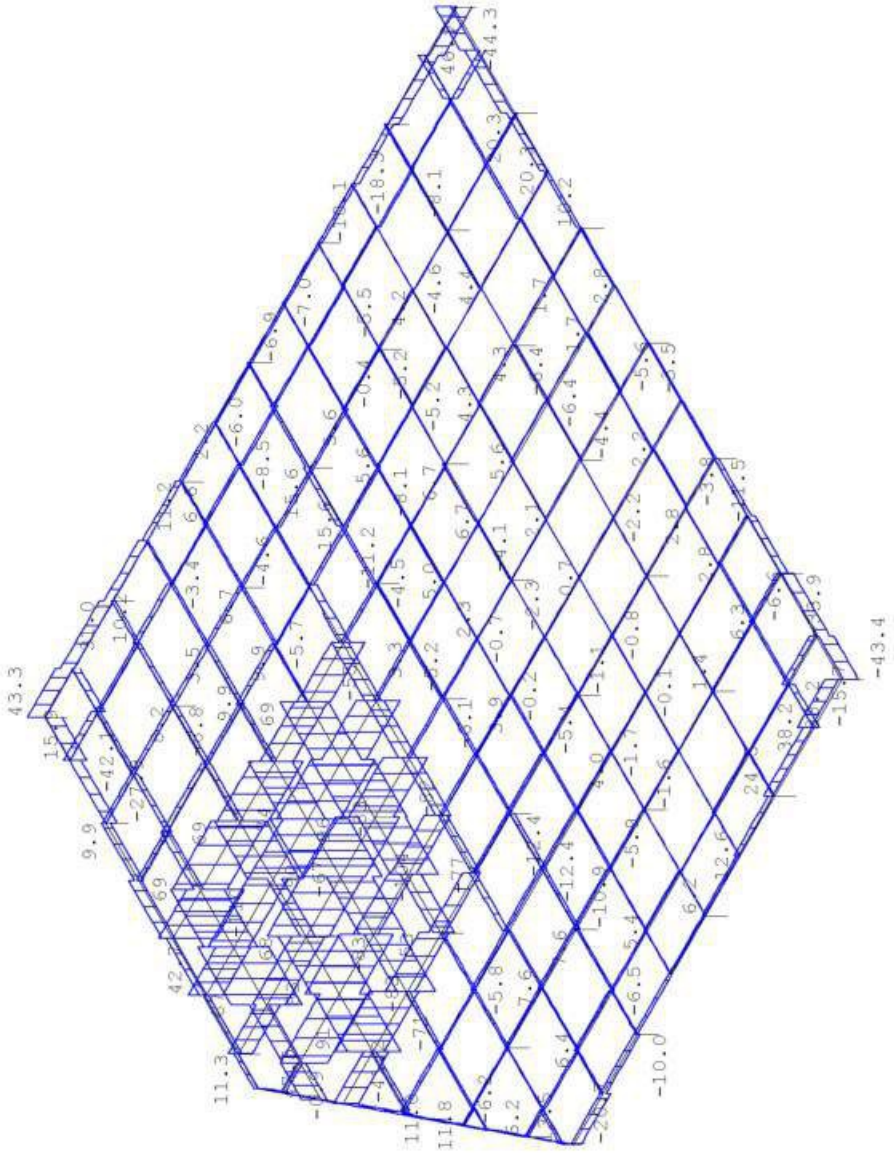
MOMENTEN Fysisch lineair Fundamentele combinatie



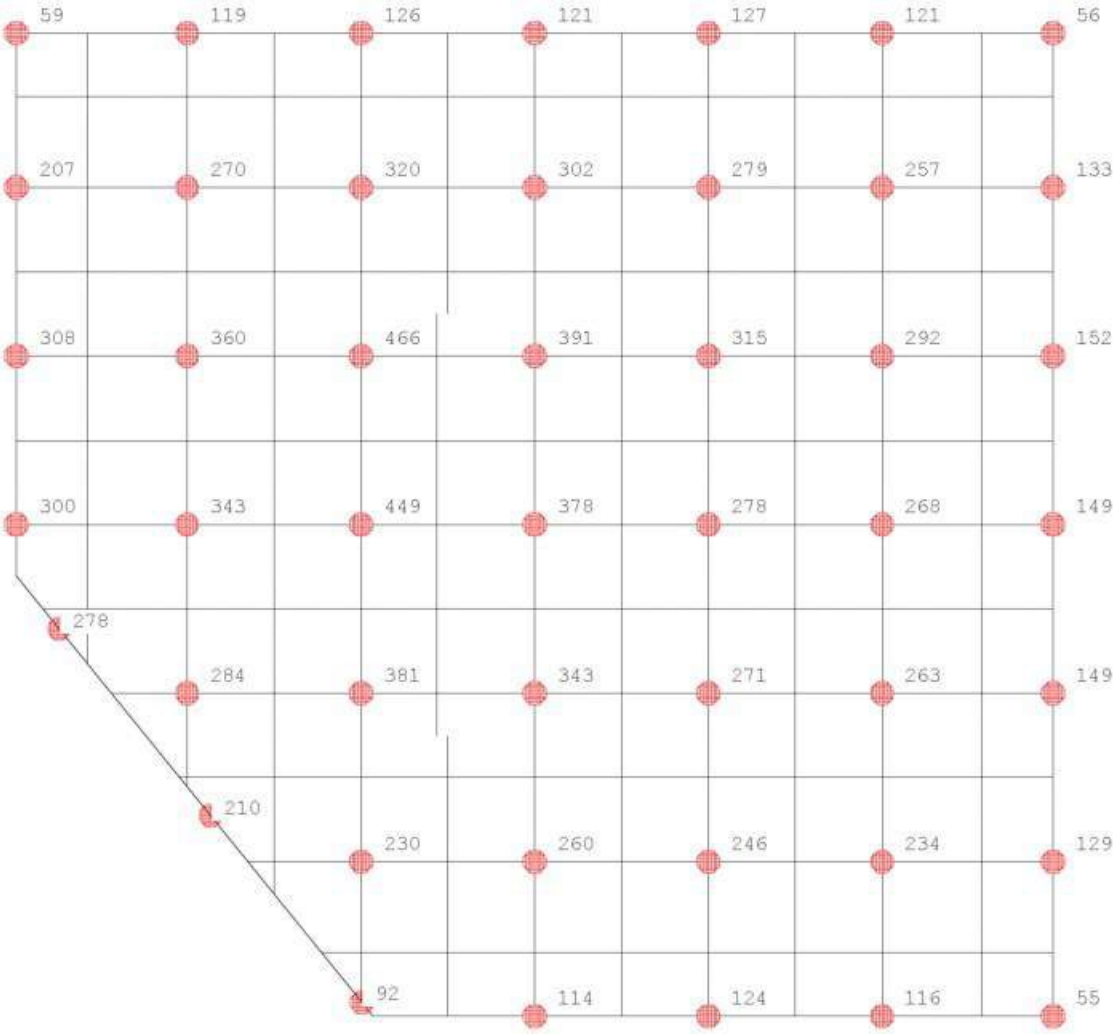
DWARSKRACHTEN Fysisch lineair combinatie Fundamentele



WRINGMOMENTEN Fysisch lineair combinatie Fundamentele



REACTIES Fysisch lineair Fundamentele combinatie



REACTIES Fysisch lineair Fundamentele combinatie

Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
1	1	0.00	0.00	26.27	58.62	0.00	0.00
1	2	0.00	0.00	40.92	118.71	0.00	0.00
1	3	0.00	0.00	44.10	125.71	0.00	0.00
1	4	0.00	0.00	42.16	121.34	0.00	0.00
1	5	0.00	0.00	43.84	126.89	0.00	0.00
1	6	0.00	0.00	44.12	121.02	0.00	0.00
1	7	0.00	0.00	29.17	55.77	0.00	0.00
3	8	0.00	0.00	41.90	206.68	0.00	0.00
3	9	0.00	0.00	55.89	269.51	0.00	0.00
3	10	0.00	0.00	72.27	320.17	0.00	0.00
3	11	0.00	0.00	75.02	302.40	0.00	0.00
3	12	0.00	0.00	77.29	278.64	0.00	0.00
3	13	0.00	0.00	69.60	257.41	0.00	0.00
3	14	0.00	0.00	44.63	132.74	0.00	0.00
5	15	0.00	0.00	46.18	308.03	0.00	0.00

REACTIES Fysisch lineair Fundamentele combinatie

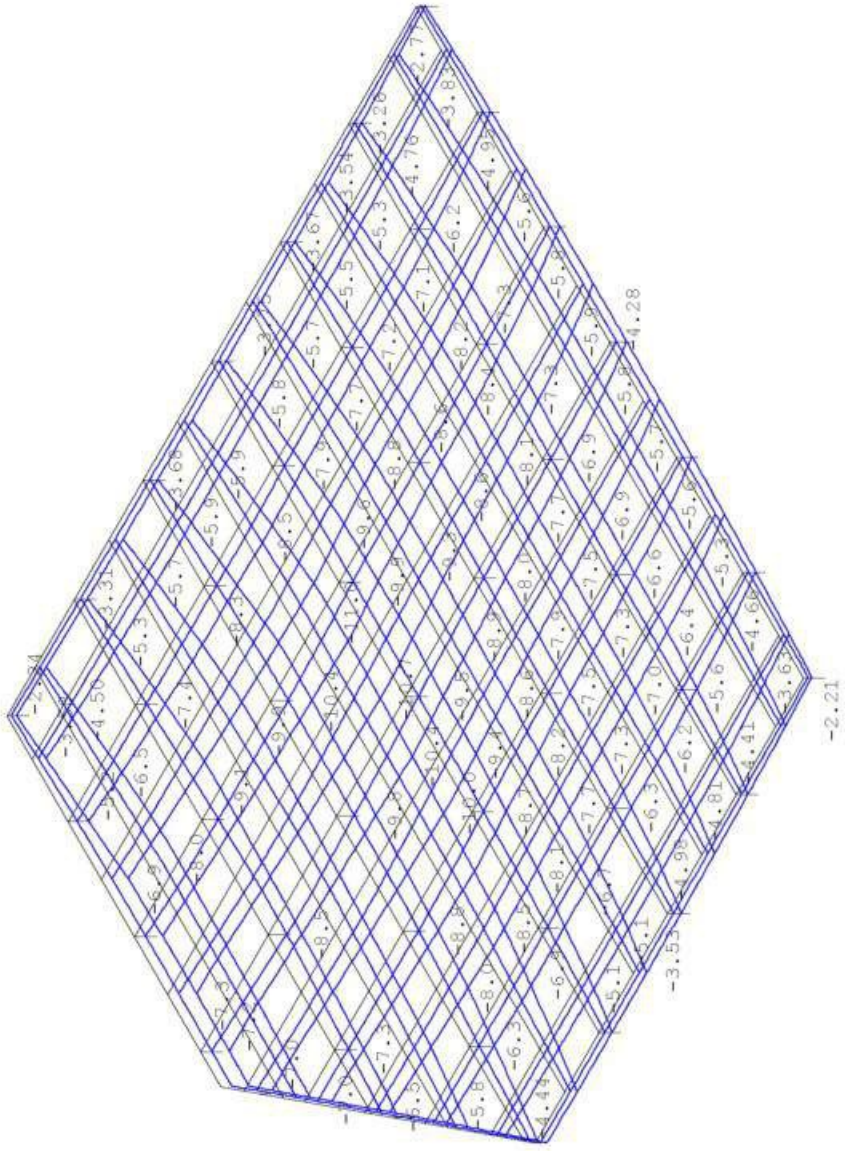
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
5	16	0.00	0.00	99.12	360.28	0.00	0.00
5	17	0.00	0.00	121.88	465.87	0.00	0.00
5	18	0.00	0.00	87.12	390.53	0.00	0.00
5	19	0.00	0.00	91.01	315.08	0.00	0.00
5	20	0.00	0.00	79.03	291.80	0.00	0.00
5	21	0.00	0.00	48.41	151.88	0.00	0.00
7	22	0.00	0.00	33.78	299.76	0.00	0.00
7	23	0.00	0.00	145.62	342.93	0.00	0.00
7	24	0.00	0.00	119.95	448.89	0.00	0.00
7	25	0.00	0.00	77.31	378.15	0.00	0.00
7	26	0.00	0.00	62.66	278.08	0.00	0.00
7	27	0.00	0.00	60.17	268.41	0.00	0.00
7	28	0.00	0.00	47.16	149.11	0.00	0.00
9	29	0.00	0.00	72.25	283.59	0.00	0.00
9	30	0.00	0.00	105.52	380.66	0.00	0.00
9	31	0.00	0.00	71.26	343.09	0.00	0.00
9	32	0.00	0.00	56.02	270.90	0.00	0.00
9	33	0.00	0.00	55.46	262.88	0.00	0.00
9	34	0.00	0.00	47.15	149.37	0.00	0.00
11	35	0.00	0.00	55.37	229.80	0.00	0.00
11	36	0.00	0.00	60.76	259.54	0.00	0.00
11	37	0.00	0.00	56.55	246.17	0.00	0.00
11	38	0.00	0.00	55.36	233.79	0.00	0.00
11	39	0.00	0.00	44.32	128.64	0.00	0.00
13	40	0.00	0.00	41.50	114.19	0.00	0.00
13	41	0.00	0.00	44.95	124.28	0.00	0.00
13	42	0.00	0.00	45.23	116.31	0.00	0.00
13	43	0.00	0.00	31.63	54.53	0.00	0.00
14	22	0.00	0.00	33.78	299.76	0.00	0.00
14	15	0.00	0.00	46.18	308.03	0.00	0.00
14	8	0.00	0.00	41.90	206.68	0.00	0.00
14	1	0.00	0.00	26.27	58.62	0.00	0.00
16	29	0.00	0.00	72.25	283.59	0.00	0.00
16	23	0.00	0.00	145.62	342.93	0.00	0.00
16	16	0.00	0.00	99.12	360.28	0.00	0.00
16	9	0.00	0.00	55.89	269.51	0.00	0.00
16	2	0.00	0.00	40.92	118.71	0.00	0.00
18	46	0.00	0.00	40.01	91.73	0.00	0.00
18	35	0.00	0.00	55.37	229.80	0.00	0.00
18	30	0.00	0.00	105.52	380.66	0.00	0.00
18	24	0.00	0.00	119.95	448.89	0.00	0.00
18	17	0.00	0.00	121.88	465.87	0.00	0.00
18	10	0.00	0.00	72.27	320.17	0.00	0.00
18	3	0.00	0.00	44.10	125.71	0.00	0.00
20	40	0.00	0.00	41.50	114.19	0.00	0.00
20	36	0.00	0.00	60.76	259.54	0.00	0.00
20	31	0.00	0.00	71.26	343.09	0.00	0.00
20	25	0.00	0.00	77.31	378.15	0.00	0.00
20	18	0.00	0.00	87.12	390.53	0.00	0.00
20	11	0.00	0.00	75.02	302.40	0.00	0.00
20	4	0.00	0.00	42.16	121.34	0.00	0.00
22	41	0.00	0.00	44.95	124.28	0.00	0.00
22	37	0.00	0.00	56.55	246.17	0.00	0.00
22	32	0.00	0.00	56.02	270.90	0.00	0.00
22	26	0.00	0.00	62.66	278.08	0.00	0.00

REACTIES Fysisch lineair Fundamentele combinatie

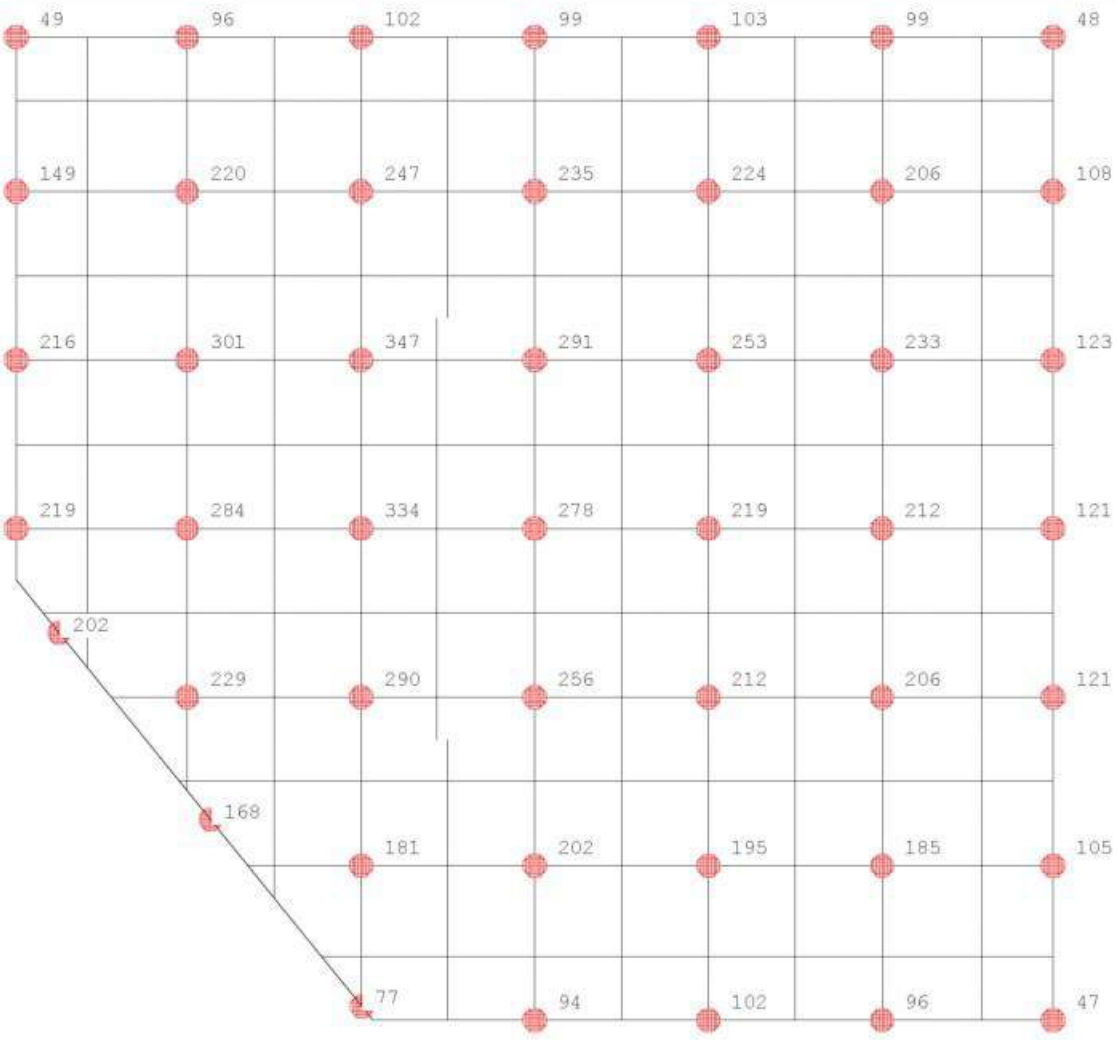
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
22	19	0.00	0.00	91.01	315.08	0.00	0.00
22	12	0.00	0.00	77.29	278.64	0.00	0.00
22	5	0.00	0.00	43.84	126.89	0.00	0.00
24	42	0.00	0.00	45.23	116.31	0.00	0.00
24	38	0.00	0.00	55.36	233.79	0.00	0.00
24	33	0.00	0.00	55.46	262.88	0.00	0.00
24	27	0.00	0.00	60.17	268.41	0.00	0.00
24	20	0.00	0.00	79.03	291.80	0.00	0.00
24	13	0.00	0.00	69.60	257.41	0.00	0.00
24	6	0.00	0.00	44.12	121.02	0.00	0.00
26	43	0.00	0.00	31.63	54.53	0.00	0.00
26	39	0.00	0.00	44.32	128.64	0.00	0.00
26	34	0.00	0.00	47.15	149.37	0.00	0.00
26	28	0.00	0.00	47.16	149.11	0.00	0.00
26	21	0.00	0.00	48.41	151.88	0.00	0.00
26	14	0.00	0.00	44.63	132.74	0.00	0.00
26	7	0.00	0.00	29.17	55.77	0.00	0.00
27	44	0.00	0.00	53.07	277.53	0.00	0.00
27	45	0.00	0.00	42.70	210.08	0.00	0.00
27	46	0.00	0.00	40.01	91.73	0.00	0.00

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES

VERPLAATSINGEN [mm] Fys.NLE.kort Karakteristieke combinatie



REACTIES Fysisch lineair Karakteristieke combinatie



REACTIES Fysisch lineair Karakteristieke combinatie

Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
1	1	0.00	0.00	29.27	49.16	0.00	0.00
1	2	0.00	0.00	46.43	95.67	0.00	0.00
1	3	0.00	0.00	49.60	102.13	0.00	0.00
1	4	0.00	0.00	47.71	99.45	0.00	0.00
1	5	0.00	0.00	49.39	103.11	0.00	0.00
1	6	0.00	0.00	49.29	99.06	0.00	0.00
1	7	0.00	0.00	32.45	47.76	0.00	0.00
3	8	0.00	0.00	58.59	148.59	0.00	0.00
3	9	0.00	0.00	75.77	220.16	0.00	0.00
3	10	0.00	0.00	90.68	246.83	0.00	0.00
3	11	0.00	0.00	87.54	234.80	0.00	0.00
3	12	0.00	0.00	86.09	223.51	0.00	0.00
3	13	0.00	0.00	77.62	205.74	0.00	0.00
3	14	0.00	0.00	49.62	108.22	0.00	0.00
5	15	0.00	0.00	76.74	216.07	0.00	0.00

REACTIES Fysisch lineair Karakteristieke combinatie

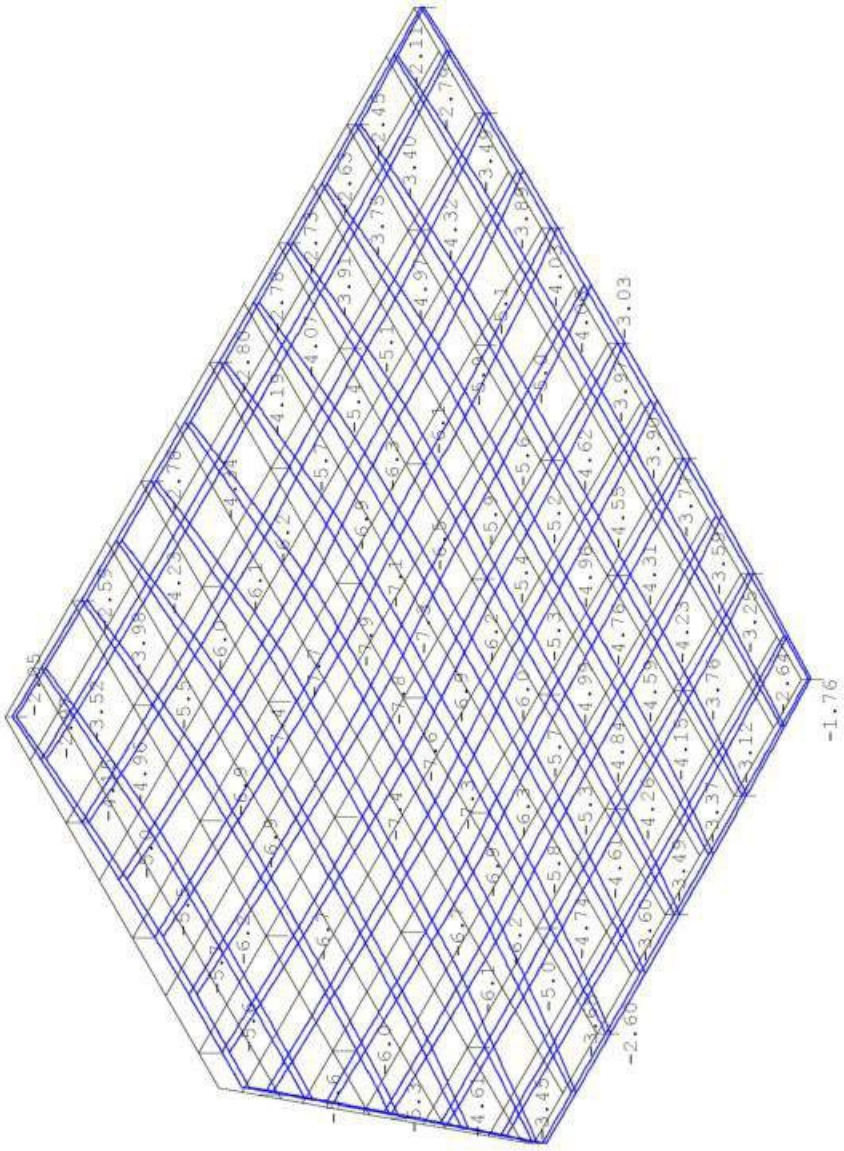
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
5	16	0.00	0.00	131.80	300.54	0.00	0.00
5	17	0.00	0.00	153.25	347.21	0.00	0.00
5	18	0.00	0.00	109.57	290.77	0.00	0.00
5	19	0.00	0.00	101.81	252.65	0.00	0.00
5	20	0.00	0.00	88.23	233.13	0.00	0.00
5	21	0.00	0.00	53.80	123.26	0.00	0.00
7	22	0.00	0.00	68.11	219.16	0.00	0.00
7	23	0.00	0.00	166.77	284.26	0.00	0.00
7	24	0.00	0.00	151.59	333.54	0.00	0.00
7	25	0.00	0.00	99.85	277.76	0.00	0.00
7	26	0.00	0.00	70.46	218.72	0.00	0.00
7	27	0.00	0.00	67.32	211.53	0.00	0.00
7	28	0.00	0.00	52.41	120.93	0.00	0.00
9	29	0.00	0.00	100.74	229.13	0.00	0.00
9	30	0.00	0.00	130.71	290.19	0.00	0.00
9	31	0.00	0.00	89.20	255.95	0.00	0.00
9	32	0.00	0.00	62.69	212.48	0.00	0.00
9	33	0.00	0.00	62.02	206.50	0.00	0.00
9	34	0.00	0.00	52.40	121.13	0.00	0.00
11	35	0.00	0.00	69.73	181.44	0.00	0.00
11	36	0.00	0.00	70.39	201.73	0.00	0.00
11	37	0.00	0.00	62.93	194.81	0.00	0.00
11	38	0.00	0.00	61.75	185.15	0.00	0.00
11	39	0.00	0.00	49.29	105.15	0.00	0.00
13	40	0.00	0.00	47.28	94.07	0.00	0.00
13	41	0.00	0.00	50.73	102.24	0.00	0.00
13	42	0.00	0.00	50.51	96.06	0.00	0.00
13	43	0.00	0.00	35.17	47.41	0.00	0.00
14	22	0.00	0.00	68.11	219.16	0.00	0.00
14	15	0.00	0.00	76.74	216.07	0.00	0.00
14	8	0.00	0.00	58.59	148.59	0.00	0.00
14	1	0.00	0.00	29.27	49.16	0.00	0.00
16	29	0.00	0.00	100.74	229.13	0.00	0.00
16	23	0.00	0.00	166.77	284.26	0.00	0.00
16	16	0.00	0.00	131.80	300.54	0.00	0.00
16	9	0.00	0.00	75.77	220.16	0.00	0.00
16	2	0.00	0.00	46.43	95.67	0.00	0.00
18	46	0.00	0.00	45.27	76.84	0.00	0.00
18	35	0.00	0.00	69.73	181.44	0.00	0.00
18	30	0.00	0.00	130.71	290.19	0.00	0.00
18	24	0.00	0.00	151.59	333.54	0.00	0.00
18	17	0.00	0.00	153.25	347.21	0.00	0.00
18	10	0.00	0.00	90.68	246.83	0.00	0.00
18	3	0.00	0.00	49.60	102.13	0.00	0.00
20	40	0.00	0.00	47.28	94.07	0.00	0.00
20	36	0.00	0.00	70.39	201.73	0.00	0.00
20	31	0.00	0.00	89.20	255.95	0.00	0.00
20	25	0.00	0.00	99.85	277.76	0.00	0.00
20	18	0.00	0.00	109.57	290.77	0.00	0.00
20	11	0.00	0.00	87.54	234.80	0.00	0.00
20	4	0.00	0.00	47.71	99.45	0.00	0.00
22	41	0.00	0.00	50.73	102.24	0.00	0.00
22	37	0.00	0.00	62.93	194.81	0.00	0.00
22	32	0.00	0.00	62.69	212.48	0.00	0.00
22	26	0.00	0.00	70.46	218.72	0.00	0.00

REACTIES Fysisch lineair Karakteristieke combinatie

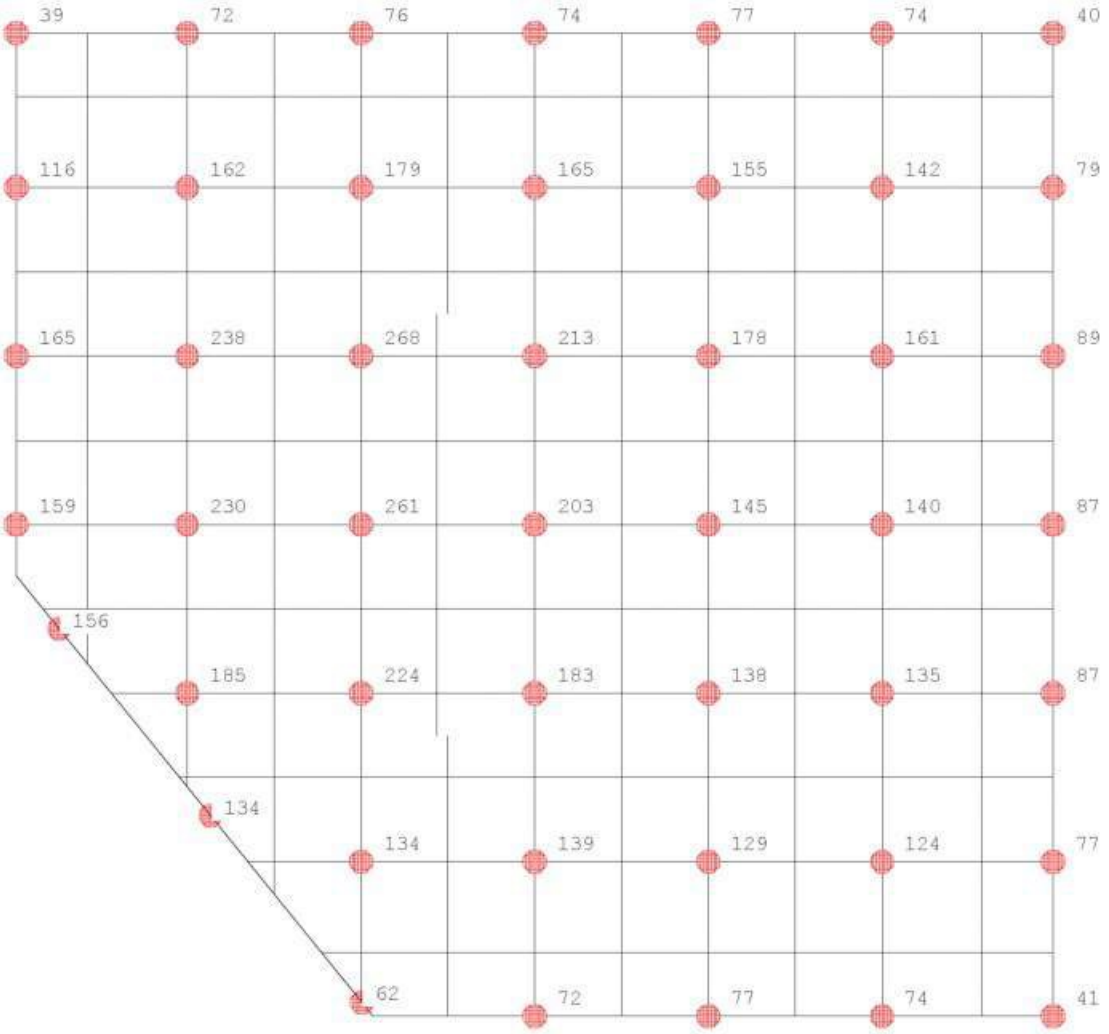
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
22	19	0.00	0.00	101.81	252.65	0.00	0.00
22	12	0.00	0.00	86.09	223.51	0.00	0.00
22	5	0.00	0.00	49.39	103.11	0.00	0.00
24	42	0.00	0.00	50.51	96.06	0.00	0.00
24	38	0.00	0.00	61.75	185.15	0.00	0.00
24	33	0.00	0.00	62.02	206.50	0.00	0.00
24	27	0.00	0.00	67.32	211.53	0.00	0.00
24	20	0.00	0.00	88.23	233.13	0.00	0.00
24	13	0.00	0.00	77.62	205.74	0.00	0.00
24	6	0.00	0.00	49.29	99.06	0.00	0.00
26	43	0.00	0.00	35.17	47.41	0.00	0.00
26	39	0.00	0.00	49.29	105.15	0.00	0.00
26	34	0.00	0.00	52.40	121.13	0.00	0.00
26	28	0.00	0.00	52.41	120.93	0.00	0.00
26	21	0.00	0.00	53.80	123.26	0.00	0.00
26	14	0.00	0.00	49.62	108.22	0.00	0.00
26	7	0.00	0.00	32.45	47.76	0.00	0.00
27	44	0.00	0.00	81.85	202.25	0.00	0.00
27	45	0.00	0.00	64.89	168.48	0.00	0.00
27	46	0.00	0.00	45.27	76.84	0.00	0.00

OMHULLENDE VAN DE FREQUENTE COMBINATIES

VERPLAATSINGEN [mm] Fys.NLE.kort Frequente combinatie



REACTIES Fysisch lineair Frequente combinatie



REACTIES Fysisch lineair Frequente combinatie

Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
1	1	0.00	0.00	29.39	39.29	0.00	0.00
1	2	0.00	0.00	47.97	72.01	0.00	0.00
1	3	0.00	0.00	50.57	76.47	0.00	0.00
1	4	0.00	0.00	49.09	74.44	0.00	0.00
1	5	0.00	0.00	50.47	76.92	0.00	0.00
1	6	0.00	0.00	49.73	74.45	0.00	0.00
1	7	0.00	0.00	32.49	40.13	0.00	0.00
3	8	0.00	0.00	77.85	115.63	0.00	0.00
3	9	0.00	0.00	97.65	161.64	0.00	0.00
3	10	0.00	0.00	107.29	179.13	0.00	0.00
3	11	0.00	0.00	94.25	165.36	0.00	0.00
3	12	0.00	0.00	86.43	155.01	0.00	0.00
3	13	0.00	0.00	78.09	141.97	0.00	0.00
3	14	0.00	0.00	49.69	78.96	0.00	0.00
5	15	0.00	0.00	117.42	165.21	0.00	0.00

REACTIES Fysisch lineair Frequente combinatie

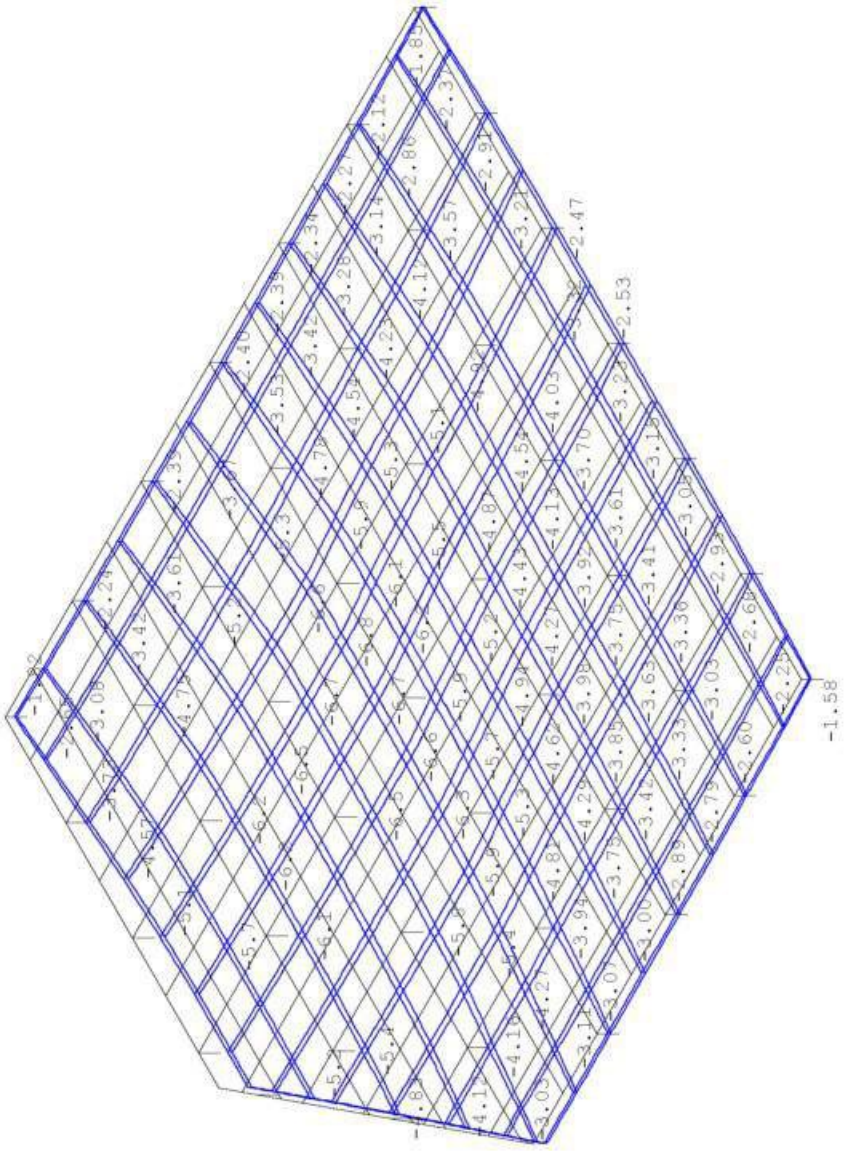
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
5	16	0.00	0.00	166.46	237.83	0.00	0.00
5	17	0.00	0.00	181.79	268.06	0.00	0.00
5	18	0.00	0.00	130.01	212.94	0.00	0.00
5	19	0.00	0.00	102.91	177.92	0.00	0.00
5	20	0.00	0.00	88.90	161.10	0.00	0.00
5	21	0.00	0.00	53.83	88.55	0.00	0.00
7	22	0.00	0.00	117.03	158.74	0.00	0.00
7	23	0.00	0.00	174.72	230.49	0.00	0.00
7	24	0.00	0.00	180.88	260.87	0.00	0.00
7	25	0.00	0.00	122.16	202.75	0.00	0.00
7	26	0.00	0.00	71.82	145.44	0.00	0.00
7	27	0.00	0.00	68.08	139.90	0.00	0.00
7	28	0.00	0.00	52.42	86.67	0.00	0.00
9	29	0.00	0.00	133.48	185.40	0.00	0.00
9	30	0.00	0.00	152.24	223.91	0.00	0.00
9	31	0.00	0.00	105.22	182.59	0.00	0.00
9	32	0.00	0.00	63.41	138.04	0.00	0.00
9	33	0.00	0.00	62.66	134.66	0.00	0.00
9	34	0.00	0.00	52.44	86.79	0.00	0.00
11	35	0.00	0.00	82.86	133.79	0.00	0.00
11	36	0.00	0.00	75.00	138.94	0.00	0.00
11	37	0.00	0.00	63.07	128.96	0.00	0.00
11	38	0.00	0.00	62.13	123.69	0.00	0.00
11	39	0.00	0.00	49.37	77.27	0.00	0.00
13	40	0.00	0.00	49.14	71.84	0.00	0.00
13	41	0.00	0.00	51.99	77.27	0.00	0.00
13	42	0.00	0.00	50.92	73.54	0.00	0.00
13	43	0.00	0.00	35.19	41.30	0.00	0.00
14	22	0.00	0.00	117.03	158.74	0.00	0.00
14	15	0.00	0.00	117.42	165.21	0.00	0.00
14	8	0.00	0.00	77.85	115.63	0.00	0.00
14	1	0.00	0.00	29.39	39.29	0.00	0.00
16	29	0.00	0.00	133.48	185.40	0.00	0.00
16	23	0.00	0.00	174.72	230.49	0.00	0.00
16	16	0.00	0.00	166.46	237.83	0.00	0.00
16	9	0.00	0.00	97.65	161.64	0.00	0.00
16	2	0.00	0.00	47.97	72.01	0.00	0.00
18	46	0.00	0.00	46.56	61.86	0.00	0.00
18	35	0.00	0.00	82.86	133.79	0.00	0.00
18	30	0.00	0.00	152.24	223.91	0.00	0.00
18	24	0.00	0.00	180.88	260.87	0.00	0.00
18	17	0.00	0.00	181.79	268.06	0.00	0.00
18	10	0.00	0.00	107.29	179.13	0.00	0.00
18	3	0.00	0.00	50.57	76.47	0.00	0.00
20	40	0.00	0.00	49.14	71.84	0.00	0.00
20	36	0.00	0.00	75.00	138.94	0.00	0.00
20	31	0.00	0.00	105.22	182.59	0.00	0.00
20	25	0.00	0.00	122.16	202.75	0.00	0.00
20	18	0.00	0.00	130.01	212.94	0.00	0.00
20	11	0.00	0.00	94.25	165.36	0.00	0.00
20	4	0.00	0.00	49.09	74.44	0.00	0.00
22	41	0.00	0.00	51.99	77.27	0.00	0.00
22	37	0.00	0.00	63.07	128.96	0.00	0.00
22	32	0.00	0.00	63.41	138.04	0.00	0.00
22	26	0.00	0.00	71.82	145.44	0.00	0.00

REACTIES Fysisch lineair Frequente combinatie

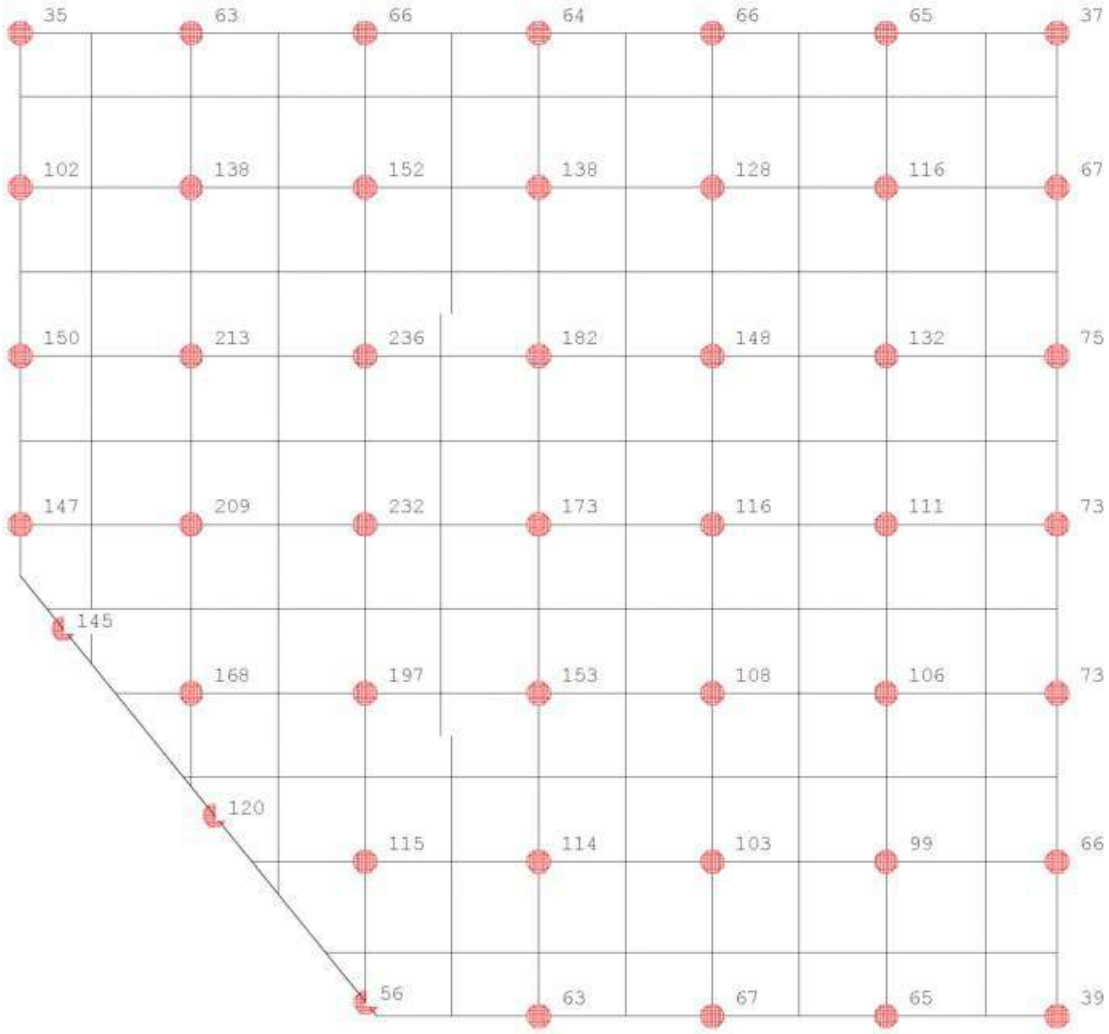
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
22	19	0.00	0.00	102.91	177.92	0.00	0.00
22	12	0.00	0.00	86.43	155.01	0.00	0.00
22	5	0.00	0.00	50.47	76.92	0.00	0.00
24	42	0.00	0.00	50.92	73.54	0.00	0.00
24	38	0.00	0.00	62.13	123.69	0.00	0.00
24	33	0.00	0.00	62.66	134.66	0.00	0.00
24	27	0.00	0.00	68.08	139.90	0.00	0.00
24	20	0.00	0.00	88.90	161.10	0.00	0.00
24	13	0.00	0.00	78.09	141.97	0.00	0.00
24	6	0.00	0.00	49.73	74.45	0.00	0.00
26	43	0.00	0.00	35.19	41.30	0.00	0.00
26	39	0.00	0.00	49.37	77.27	0.00	0.00
26	34	0.00	0.00	52.44	86.79	0.00	0.00
26	28	0.00	0.00	52.42	86.67	0.00	0.00
26	21	0.00	0.00	53.83	88.55	0.00	0.00
26	14	0.00	0.00	49.69	78.96	0.00	0.00
26	7	0.00	0.00	32.49	40.13	0.00	0.00
27	44	0.00	0.00	118.47	156.48	0.00	0.00
27	45	0.00	0.00	92.82	133.57	0.00	0.00
27	46	0.00	0.00	46.56	61.86	0.00	0.00

OMHULLENDE VAN DE QUASI-BLIJVENDE COMBINATIES

VERPLAATSINGEN [mm] Fys.NLE.kort Quasi-blijvende combinatie



REACTIES Fysisch lineair Quasi-blijvende combinatie



REACTIES Fysisch lineair Quasi-blijvende combinatie

Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
1	1	0.00	0.00	29.42	35.34	0.00	0.00
1	2	0.00	0.00	48.35	62.55	0.00	0.00
1	3	0.00	0.00	50.81	66.21	0.00	0.00
1	4	0.00	0.00	49.44	64.44	0.00	0.00
1	5	0.00	0.00	50.74	66.45	0.00	0.00
1	6	0.00	0.00	49.84	64.61	0.00	0.00
1	7	0.00	0.00	32.50	37.08	0.00	0.00
3	8	0.00	0.00	82.66	102.44	0.00	0.00
3	9	0.00	0.00	103.12	138.23	0.00	0.00
3	10	0.00	0.00	111.44	152.06	0.00	0.00
3	11	0.00	0.00	95.93	137.59	0.00	0.00
3	12	0.00	0.00	86.51	127.61	0.00	0.00
3	13	0.00	0.00	78.20	116.46	0.00	0.00
3	14	0.00	0.00	49.70	67.26	0.00	0.00
5	15	0.00	0.00	127.59	150.16	0.00	0.00

REACTIES Fysisch lineair Quasi-blijvende combinatie

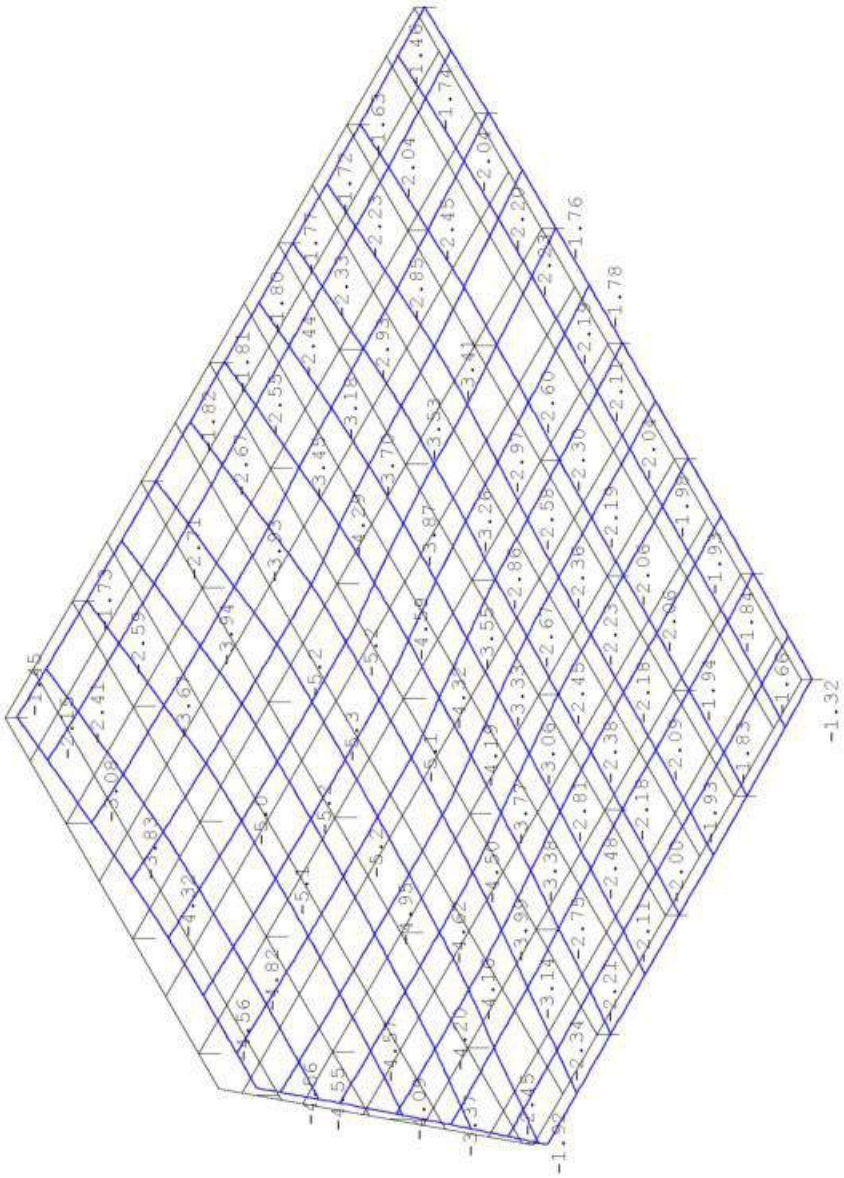
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
5	16	0.00	0.00	175.13	212.75	0.00	0.00
5	17	0.00	0.00	188.92	236.41	0.00	0.00
5	18	0.00	0.00	135.11	181.81	0.00	0.00
5	19	0.00	0.00	103.19	148.03	0.00	0.00
5	20	0.00	0.00	89.06	132.28	0.00	0.00
5	21	0.00	0.00	53.84	74.66	0.00	0.00
7	22	0.00	0.00	129.27	146.51	0.00	0.00
7	23	0.00	0.00	176.71	208.98	0.00	0.00
7	24	0.00	0.00	188.20	231.80	0.00	0.00
7	25	0.00	0.00	127.74	172.75	0.00	0.00
7	26	0.00	0.00	72.16	116.13	0.00	0.00
7	27	0.00	0.00	68.27	111.25	0.00	0.00
7	28	0.00	0.00	52.42	72.97	0.00	0.00
9	29	0.00	0.00	141.66	167.91	0.00	0.00
9	30	0.00	0.00	157.63	197.40	0.00	0.00
9	31	0.00	0.00	109.23	153.25	0.00	0.00
9	32	0.00	0.00	63.59	108.26	0.00	0.00
9	33	0.00	0.00	62.82	105.92	0.00	0.00
9	34	0.00	0.00	52.44	73.05	0.00	0.00
11	35	0.00	0.00	86.15	114.73	0.00	0.00
11	36	0.00	0.00	76.15	113.82	0.00	0.00
11	37	0.00	0.00	63.11	102.62	0.00	0.00
11	38	0.00	0.00	62.22	99.10	0.00	0.00
11	39	0.00	0.00	49.39	66.12	0.00	0.00
13	40	0.00	0.00	49.61	62.95	0.00	0.00
13	41	0.00	0.00	52.31	67.29	0.00	0.00
13	42	0.00	0.00	51.02	64.53	0.00	0.00
13	43	0.00	0.00	35.20	38.86	0.00	0.00
14	22	0.00	0.00	129.27	146.51	0.00	0.00
14	15	0.00	0.00	127.59	150.16	0.00	0.00
14	8	0.00	0.00	82.66	102.44	0.00	0.00
14	1	0.00	0.00	29.42	35.34	0.00	0.00
16	29	0.00	0.00	141.66	167.91	0.00	0.00
16	23	0.00	0.00	176.71	208.98	0.00	0.00
16	16	0.00	0.00	175.13	212.75	0.00	0.00
16	9	0.00	0.00	103.12	138.23	0.00	0.00
16	2	0.00	0.00	48.35	62.55	0.00	0.00
18	46	0.00	0.00	46.88	55.87	0.00	0.00
18	35	0.00	0.00	86.15	114.73	0.00	0.00
18	30	0.00	0.00	157.63	197.40	0.00	0.00
18	24	0.00	0.00	188.20	231.80	0.00	0.00
18	17	0.00	0.00	188.92	236.41	0.00	0.00
18	10	0.00	0.00	111.44	152.06	0.00	0.00
18	3	0.00	0.00	50.81	66.21	0.00	0.00
20	40	0.00	0.00	49.61	62.95	0.00	0.00
20	36	0.00	0.00	76.15	113.82	0.00	0.00
20	31	0.00	0.00	109.23	153.25	0.00	0.00
20	25	0.00	0.00	127.74	172.75	0.00	0.00
20	18	0.00	0.00	135.11	181.81	0.00	0.00
20	11	0.00	0.00	95.93	137.59	0.00	0.00
20	4	0.00	0.00	49.44	64.44	0.00	0.00
22	41	0.00	0.00	52.31	67.29	0.00	0.00
22	37	0.00	0.00	63.11	102.62	0.00	0.00
22	32	0.00	0.00	63.59	108.26	0.00	0.00
22	26	0.00	0.00	72.16	116.13	0.00	0.00

REACTIES Fysisch lineair Quasi-blijvende combinatie

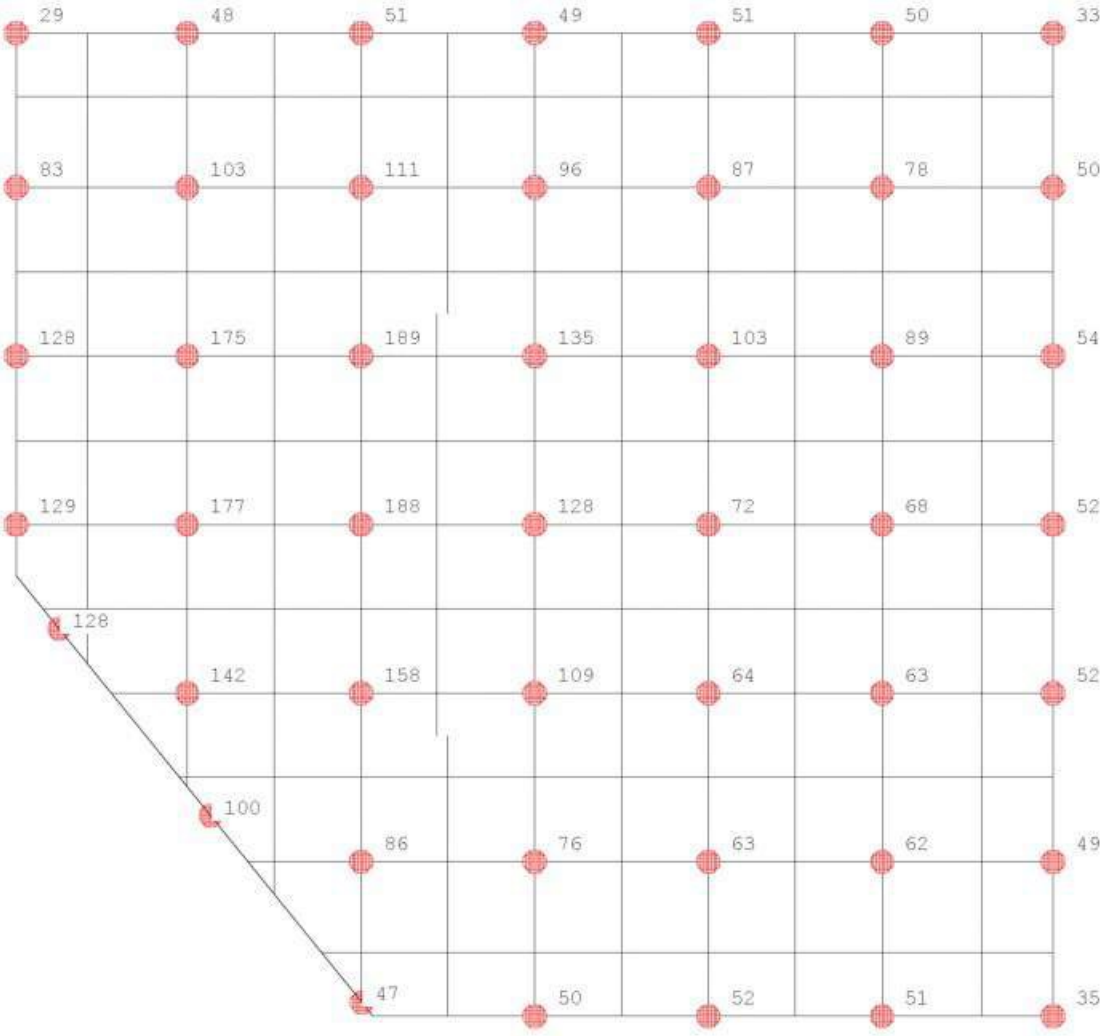
Balk	Stp	MX		Z		MY	
		min.	max.	min.	max.	min.	max.
22	19	0.00	0.00	103.19	148.03	0.00	0.00
22	12	0.00	0.00	86.51	127.61	0.00	0.00
22	5	0.00	0.00	50.74	66.45	0.00	0.00
24	42	0.00	0.00	51.02	64.53	0.00	0.00
24	38	0.00	0.00	62.22	99.10	0.00	0.00
24	33	0.00	0.00	62.82	105.92	0.00	0.00
24	27	0.00	0.00	68.27	111.25	0.00	0.00
24	20	0.00	0.00	89.06	132.28	0.00	0.00
24	13	0.00	0.00	78.20	116.46	0.00	0.00
24	6	0.00	0.00	49.84	64.61	0.00	0.00
26	43	0.00	0.00	35.20	38.86	0.00	0.00
26	39	0.00	0.00	49.39	66.12	0.00	0.00
26	34	0.00	0.00	52.44	73.05	0.00	0.00
26	28	0.00	0.00	52.42	72.97	0.00	0.00
26	21	0.00	0.00	53.84	74.66	0.00	0.00
26	14	0.00	0.00	49.70	67.26	0.00	0.00
26	7	0.00	0.00	32.50	37.08	0.00	0.00
27	44	0.00	0.00	127.62	144.94	0.00	0.00
27	45	0.00	0.00	99.80	120.06	0.00	0.00
27	46	0.00	0.00	46.88	55.87	0.00	0.00

OMHULLENDE VAN DE BLIJVENDE COMBINATIES

VERPLAATSINGEN [mm] Fys.NLE.kort Blijvende combinatie



REACTIES Fysisch lineair combinatie — Blijvende



REACTIES Fysisch lineair combinatie — Blijvende

Balk	Stp	MX	Z	MY
1	1	0.00	29.42	0.00
1	2	0.00	48.35	0.00
1	3	0.00	50.81	0.00
1	4	0.00	49.44	0.00
1	5	0.00	50.74	0.00
1	6	0.00	49.84	0.00
1	7	0.00	32.50	0.00
3	8	0.00	82.66	0.00
3	9	0.00	103.12	0.00
3	10	0.00	111.44	0.00
3	11	0.00	95.93	0.00
3	12	0.00	86.51	0.00
3	13	0.00	78.20	0.00
3	14	0.00	49.70	0.00
5	15	0.00	127.59	0.00
5	16	0.00	175.13	0.00

REACTIES Fysisch lineair Blijvende combinatie

Balk	Stp	MX	Z	MY
5	17	0.00	188.92	0.00
5	18	0.00	135.11	0.00
5	19	0.00	103.19	0.00
5	20	0.00	89.06	0.00
5	21	0.00	53.84	0.00
7	22	0.00	129.27	0.00
7	23	0.00	176.71	0.00
7	24	0.00	188.20	0.00
7	25	0.00	127.74	0.00
7	26	0.00	72.16	0.00
7	27	0.00	68.27	0.00
7	28	0.00	52.42	0.00
9	29	0.00	141.66	0.00
9	30	0.00	157.63	0.00
9	31	0.00	109.23	0.00
9	32	0.00	63.59	0.00
9	33	0.00	62.82	0.00
9	34	0.00	52.44	0.00
11	35	0.00	86.15	0.00
11	36	0.00	76.15	0.00
11	37	0.00	63.11	0.00
11	38	0.00	62.22	0.00
11	39	0.00	49.39	0.00
13	40	0.00	49.61	0.00
13	41	0.00	52.31	0.00
13	42	0.00	51.02	0.00
13	43	0.00	35.20	0.00
14	22	0.00	129.27	0.00
14	15	0.00	127.59	0.00
14	8	0.00	82.66	0.00
14	1	0.00	29.42	0.00
16	29	0.00	141.66	0.00
16	23	0.00	176.71	0.00
16	16	0.00	175.13	0.00
16	9	0.00	103.12	0.00
16	2	0.00	48.35	0.00
18	46	0.00	46.88	0.00
18	35	0.00	86.15	0.00
18	30	0.00	157.63	0.00
18	24	0.00	188.20	0.00
18	17	0.00	188.92	0.00
18	10	0.00	111.44	0.00
18	3	0.00	50.81	0.00
20	40	0.00	49.61	0.00
20	36	0.00	76.15	0.00
20	31	0.00	109.23	0.00
20	25	0.00	127.74	0.00
20	18	0.00	135.11	0.00
20	11	0.00	95.93	0.00
20	4	0.00	49.44	0.00
22	41	0.00	52.31	0.00
22	37	0.00	63.11	0.00
22	32	0.00	63.59	0.00
22	26	0.00	72.16	0.00
22	19	0.00	103.19	0.00
22	12	0.00	86.51	0.00

REACTIES Fysisch lineair Blijvende combinatie

Balk	Stp	MX	Z	MY
22	5	0.00	50.74	0.00
24	42	0.00	51.02	0.00
24	38	0.00	62.22	0.00
24	33	0.00	62.82	0.00
24	27	0.00	68.27	0.00
24	20	0.00	89.06	0.00
24	13	0.00	78.20	0.00
24	6	0.00	49.84	0.00
26	43	0.00	35.20	0.00
26	39	0.00	49.39	0.00
26	34	0.00	52.44	0.00
26	28	0.00	52.42	0.00
26	21	0.00	53.84	0.00
26	14	0.00	49.70	0.00
26	7	0.00	32.50	0.00
27	44	0.00	127.62	0.00
27	45	0.00	99.80	0.00
27	46	0.00	46.88	0.00

PROFIELGEGEVENS Balk [N] [mm] t.b.v. profiel:1 B*H 500*800

Algemeen

Materiaal : 1:C30/37

Doorsnede

breedte : 500 hoogte : 800 zwaartepunt tov onderkant : 400

Fictieve dikte : 307.7

Betonkwaliteit element	: 1:C30/37	Kruipcoëf.	: 2.470
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.50
Staalkwaliteit beugels	: 500		

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	2de laag	2de laag
Nominale dekking	:	35	35
Toegepaste dekking	:	43	43
Toegepaste zijdekking	:	43	
Beugel / Verdeelwapening	:	1ste laag	1ste laag
Nominale dekking	:	35	35
Toegepaste dekking	:	35	35
Toegepaste zijdekking	:	35	

Wapening		Boven	Onder
Basiswapening buitenste laag	:	4x12	5x12
Basiswapening 2e laag	:		
H.o.h.afstand 2e laag	:	60	60

Beugels

Beugeldiameter : 8

Min. hoek betondrukdiagonaal θ : 21.8 z berekenen via: MRd

PROFIELGEGEVENS Vloer [N] [mm] t.b.v. profiel:2 B*H 1750*250

Algemeen

Materiaal : 2:C30/37

Doorsnede
breedte : 1750 hoogte : 250 zwaartepunt tov onderkant : 125
Fictieve dikte : 218.8

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470		
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.50		

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35
Beugel / Verdeelwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	45	45

Wapening		Boven	Onder
Basiswapening	:	10-100	10-150
Hoofdwapening laag	:	1	1
Diameter verdeelwapening	:	6.0	6.0

PROFIELGEGEVENS Vloer [N] [mm] t.b.v. profiel:3 B*H
1500*250

Algemeen
Materiaal : 2:C30/37

Doorsnede
breedte : 1500 hoogte : 250 zwaartepunt tov onderkant : 125
Fictieve dikte : 214.3

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470		
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.75		

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35
Beugel / Verdeelwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	45	45

Wapening		Boven	Onder
Basiswapening	:	10-100	10-150
Hoofdwapening laag	:	1	1
Diameter verdeelwapening	:	6.0	6.0

PROFIELGEGEVENS Vloer [N] [mm] t.b.v. profiel:4 B*H
2025*250

Algemeen
Materiaal : 2:C30/37

Doorsnede
breedte : 2025 hoogte : 250 zwaartepunt tov onderkant : 125
Fictieve dikte : 222.5

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470		
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.75		

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	41	41
Beugel / Verdeelwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35

Wapening		Boven	Onder
Basiswapening	:	10-100	10-150
Hoofdwapening laag	:	2	2
Diameter verdeelwapening	:	6.0	6.0

PROFIELGEGEVENS Vloer [N] [mm] t.b.v. profiel:5 B*H 1550*250

Algemeen
Materiaal : 2:C30/37

Doorsnede
breedte : 1550 hoogte : 250 zwaartepunt tov onderkant : 125
Fictieve dikte : 215.3

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.50

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	41	41
Beugel / Verdeelwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35

Wapening		Boven	Onder
Basiswapening	:	10-100	10-150
Hoofdwapening laag	:	2	2
Diameter verdeelwapening	:	6.0	6.0

PROFIELGEGEVENS Vloer [N] [mm] t.b.v. profiel:6 B*H 1500*800

Algemeen
Materiaal : 2:C30/37

Doorsnede
breedte : 1500 hoogte : 800 zwaartepunt tov onderkant : 400
Fictieve dikte : 521.7

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.50

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35
Beugel / Verdeelwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	45	47

Wapening		Boven	Onder
Basiswapening	:	10-100	12-150
Hoofdwapening laag	:	1	1
Diameter verdeelwapening	:	6.0	6.0

PROFIELGEGEVENS Vloer [N] [mm] t.b.v. profiel:7 B*H 2025*800

Algemeen
Materiaal : 2:C30/37

Doorsnede
breedte : 2025 hoogte : 800 zwaartepunt tov onderkant : 400
Fictieve dikte : 573.5

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.50

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	41	41
Beugel / Verdeelwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35

Wapening		Boven	Onder
Basiswapening	:	10-100	12-150
Hoofdwapening laag	:	2	2
Diameter verdeelwapening	:	6.0	6.0

PROFIELGEGEVENS Vloer **[N] [mm]** t.b.v. profiel:8 B*H
1550*800

Algemeen
Materiaal : 2:C30/37

Doorsnede
breedte : 1550 hoogte : 800 zwaartepunt tov onderkant : 400
Fictieve dikte : 527.7

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.50

Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	41	41
Beugel / Verdeelwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35

Wapening		Boven	Onder
Basiswapening	:	10-100	12-150
Hoofdwapening laag	:	2	2
Diameter verdeelwapening	:	6.0	6.0

PROFIELGEGEVENS Vloer **[N] [mm]** t.b.v. profiel:9 B*H
1550*800

Algemeen
Materiaal : 2:C30/37

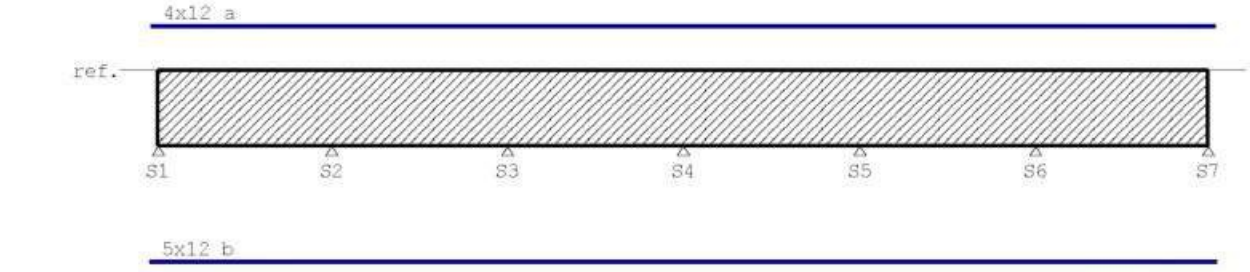
Doorsnede
breedte : 1550 hoogte : 800 zwaartepunt tov onderkant : 465
Fictieve dikte : 346.3

Betonkwaliteit element	: 2:C30/37	Kruipcoëf.	: 2.470
Staalkwaliteit hoofdwapening	: 500	ε_{uk}	: 2.50

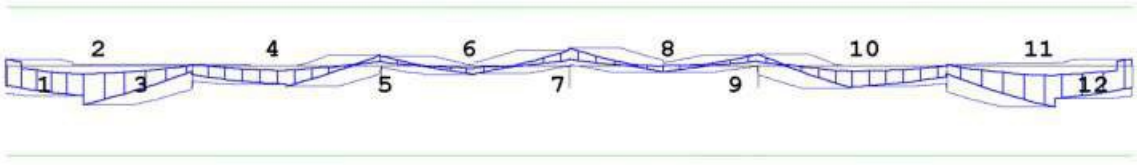
Betondekking		Boven	Onder
Milieu	:	XC4 (XF2)	XC4
Hoofdwapening	:	2de laag	2de laag
Nominale dekking	:	30	30
Toegepaste dekking	:	41	41
Beugel / Verdeelwapening	:	1ste laag	1ste laag
Nominale dekking	:	30	30
Toegepaste dekking	:	35	35

Wapening		Boven	Onder
Basiswapening	:	10-100	12-150
Hoofdwapening laag	:	2	2
Diameter verdeelwapening	:	6.0	6.0

Hoofdwapening Fysisch lineair Balk
1:1



MEd dekkingslijn Fysisch lineair Balk
1:1



△ S1 △ S2 △ S3 △ S4 △ S5 △ S6 △ S7

Hoofdwapening Balk
1:1

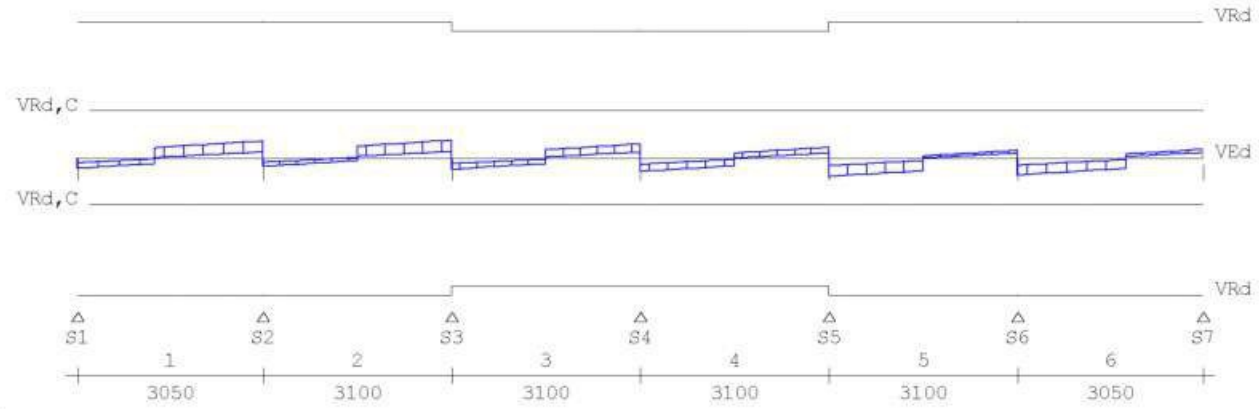
Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S1+0	12.36	122.13	669	Bov	399*	453	4x12	54
2	S1+1263	-82.38	-188.72	717	Ond	399*	566	5x12	54
3	S2+0	1.81	122.13	669	Bov	399*	453	4x12	54
4	S2+1550	-43.96	-188.72	717	Ond	399*	566	5x12	54
5	S3+0	21.57	122.13	669	Bov	399*	453	4x12	54
6	S3+1550	-18.47	-188.72	717	Ond	399*	566	5x12	54
7	S4+0	35.77	122.13	669	Bov	399*	453	4x12	54
8	S4+1550	-14.63	-188.72	717	Ond	399*	566	5x12	54
9	S5+0	23.52	122.13	669	Bov	399*	453	4x12	54
10	S5+1550	-47.32	-188.72	717	Ond	399*	566	5x12	54
11	S7-1262	-87.96	-188.72	717	Ond	399*	566	5x12	54
12	S7-0	13.19	122.13	669	Bov	399*	453	4x12	54

Opmerkingen
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4 Balk
1:1

Geb.	Pos. [mm]	Zijde	$M_{z;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S1+683	Ond	-43.97	312	0.324	0.101	1.00	0.300	0.34	
2	S3-827	Bov	13.74	312	0.126	0.039	1.00	0.300	0.13	
2	S2+930	Ond	-23.32	312	0.172	0.054	1.00	0.300	0.18	
3	S4-620	Bov	21.88	312	0.201	0.063	1.00	0.300	0.21	
3	S3+773	Ond	-11.50	312	0.085	0.026	1.00	0.300	0.09	
4	S4+0	Bov	21.88	312	0.201	0.063	1.00	0.300	0.21	
4	S4+861	Ond	-7.20	312	0.053	0.017	1.00	0.300	0.06	
5	S5+0	Bov	14.80	312	0.136	0.042	1.00	0.300	0.14	
5	S5+703	Ond	-26.43	312	0.195	0.061	1.00	0.300	0.20	
6	S6+0	Bov	0.10	312	0.001	0.000	1.00	0.300	0.00	
6	S6+1192	Ond	-47.69	312	0.352	0.110	1.00	0.300	0.37	

DWARSKRACHTEN Fysisch lineair combinatie — Balk 1:1 Fundamentele



Wring- en dwarskrachtwapening

Balk 1:1

Geb.	Vanaf [mm]	Tot [mm]	Beugels	Lengte [mm]	<Wringing> A_{langs} [mm²]	A_{bgl} [mm²/m]	<Dwarskr.> A_{bgl} [mm²/m]	A_{opg} [mm²]	V_{Ed} [kN]	T_{Ed} [kNm]	Opm.
1	S1+0	S2+0	Ø8-200	3050	0	0	0	0	48.8	43	
2	S2+0	S3+0	Ø8-200	3100	0	0	0	0	50.6	43	
3	S3+0	S4+0	Ø8-200	3100	0	0	0	0	40.0	43	
4	S4+0	S5+0	Ø8-200	3100	0	0	0	0	39.0	43	
5	S5+0	S6+0	Ø8-200	3100	0	0	0	0	53.2	43	
6	S6+0	S7+0	Ø8-200	3050	0	0	0	0	49.0	43	

Wring- en dwarskrachten

Balk 1:1

Geb.	Vanaf [mm]	Tot [mm]	θ [°]	V_{Rd} [kN]	V_{Ed} [kN]	$V_{Rd,C}$ [kN]	$V_{Rd,Max}$ [kN]	T_{Ed} [kNm]	$T_{Rd,C}$ [kNm]	$T_{Rd,Max}$ [kNm]	V_{opg}	Opm.
1	S1+0	S2+0	21.8	392	49	134	1306	43	93	251	0	
2	S2+0	S3+0	21.8	366	51	134	1306	43	93	251	0	
3	S3+0	S4+0	21.8	366	40	134	1218	43	93	251	0	
4	S4+0	S5+0	21.8	366	39	134	1218	43	93	251	0	
5	S5+0	S6+0	21.8	366	53	134	1218	43	93	251	0	
6	S6+0	S7+0	21.8	392	49	134	1306	43	93	251	0	

Stijfheden (blijvend en quasi-blijvend)

Balk 1:1

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	305	452	565	-14.3	34012	-20.5	34012	10638
1	610	452	565	-18.6	34012	-25.3	34012	10638
1	915	452	565	-22.0	34012	-29.1	34012	10638
1	1220	452	565	-24.4	34012	-31.9	34012	10638
1	1263	452	565	-24.6	34012	-32.3	34012	10638
1	1525	452	565	-24.6	34012	-34.0	34012	10638
1	1830	452	565	-21.8	34012	-29.8	34012	10638
1	2135	452	565	-18.0	34012	-24.6	34012	10638
1	2440	452	565	-13.3	34012	-18.5	34012	10638
1	2745	452	565	-7.6	34012	-11.4	34012	10638
2	310	452	565	-5.4	34012	-9.2	34012	10638
2	620	452	565	-8.7	34012	-12.9	34012	10638
2	930	452	565	-11.0	34012	-15.7	34012	10638
2	1240	452	565	-12.4	34012	-17.5	34012	10638
2	1550	452	565	-12.8	34012	-18.4	34012	10638
2	1550	452	565	-12.8	34012	-18.4	34012	10638
2	1860	452	565	-10.4	34012	-14.9	34012	10638
2	2170	452	565	-6.8	34012	-9.6	34012	10638

Stijfheden (blijvend en quasi-blijvend)

Balk

1:1

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	2480	452	565	-2.2	34012	-3.3	34012	10638
2	3100	452	565	9.8	34012	12.2	34012	10638
3	0	452	565	9.8	34012	12.2	34012	10638
3	310	452	565	4.1	34012	5.2	34012	10638
3	930	452	565	-3.9	34012	-4.4	34012	10638
3	1240	452	565	-6.4	34012	-7.7	34012	10638
3	1550	452	565	-8.0	34012	-10.1	34012	10638
3	1550	452	565	-8.0	34012	-10.1	34012	10638
3	1860	452	565	-5.1	34012	-6.1	34012	10638
3	2480	452	565	1.7	34012	3.1	34012	10638
3	2790	452	565	6.6	34012	9.2	34012	10638
3	3100	452	565	12.4	34012	16.3	34012	10638
4	0	452	565	12.4	34012	16.3	34012	10638
4	310	452	565	9.5	34012	12.3	34012	10638
4	620	452	565	4.7	34012	6.3	34012	10638
4	1240	452	565	-2.0	34012	-2.8	34012	10638
4	1550	452	565	-3.9	34012	-5.9	34012	10638
4	1550	452	565	-3.9	34012	-5.9	34012	10638
4	1860	452	565	-2.1	34012	-3.1	34012	10638
4	2480	452	565	2.5	34012	3.2	34012	10638
4	2790	452	565	6.3	34012	7.8	34012	10638
4	3100	452	565	11.1	34012	13.3	34012	10638
5	0	452	565	11.1	34012	13.3	34012	10638
5	620	452	565	-2.7	34012	-3.9	34012	10638
5	930	452	565	-7.9	34012	-10.9	34012	10638
5	1240	452	565	-12.0	34012	-16.9	34012	10638
5	1550	452	565	-15.3	34012	-22.0	34012	10638
5	1550	452	565	-15.3	34012	-22.0	34012	10638
5	1860	452	565	-13.8	34012	-19.8	34012	10638
5	2170	452	565	-12.2	34012	-18.0	34012	10638
5	2480	452	565	-9.7	34012	-15.1	34012	10638
5	2790	452	565	-6.3	34012	-11.4	34012	10638
6	305	452	565	-6.5	34012	-12.0	34012	10638
6	610	452	565	-12.1	34012	-19.3	34012	10638
6	915	452	565	-16.9	34012	-25.7	34012	10638
6	1220	452	565	-20.7	34012	-31.1	34012	10638
6	1525	452	565	-23.5	34012	-35.6	34012	10638
6	1788	452	565	-25.2	34012	-38.7	34012	10638
6	1830	452	565	-22.1	34012	-32.1	34012	10638
6	2135	452	565	-20.1	34012	-29.7	34012	10638
6	2440	452	565	-17.1	34012	-26.3	34012	10638
6	2745	452	565	-13.2	34012	-22.0	34012	10638

Stijfheden (frequent en karakteristiek)

Balk

1:1

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	305	452	565	-24.6	34012	12020	-35.0	34012	14853
1	610	452	565	-29.7	34012	11854	-40.8	34012	14404
1	915	452	565	-33.8	34012	11772	-45.6	34012	14178
1	1220	452	565	-37.0	34012	11739	-49.6	34012	14085
1	1263	452	565	-37.4	34012	11737	-61.6	34012	15810
1	1525	452	565	-40.3	34012	11908	-55.9	34012	14551
1	1830	452	565	-35.1	34012	11875	-48.4	34012	14463
1	2135	452	565	-29.0	34012	11875	-40.0	34012	14462
1	2440	452	565	-21.9	34012	11934	-30.6	34012	14621
1	2745	452	565	-14.0	34012	12157	-20.3	34012	15211
2	310	452	565	-11.7	34012	12499	-18.1	34012	16072
2	620	452	565	-15.7	34012	12140	-22.8	34012	15167
2	930	452	565	-18.8	34012	12011	-26.6	34012	14828
2	1240	452	565	-20.9	34012	11986	-29.5	34012	14763
2	1550	452	565	-22.1	34012	12032	-33.5	34012	15444

Stijfheden (blijvend en quasi-blijvend)

Balk

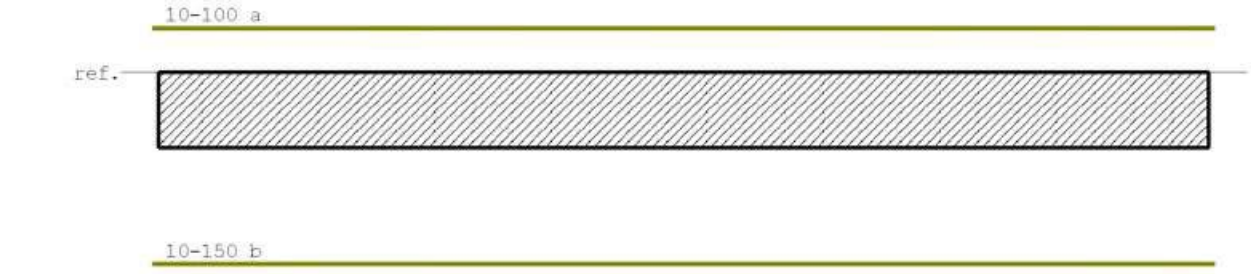
1:1

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
2	1550	452	565	-22.1	34012	12032	-33.5	34012	15444
2	1860	452	565	-17.8	34012	12006	-25.2	34012	14815
2	2170	452	565	-11.4	34012	11954	-15.9	34012	14675
2	2480	452	565	-4.0	34012	12078	-5.7	34012	15006
2	3100	452	565	13.7	34012	11550	17.7	34012	13548
3	0	452	565	13.7	34012	11550	15.9	34012	12689
3	310	452	565	5.9	34012	11645	7.8	34012	13821
3	930	452	565	-4.7	34012	11187	-5.6	34012	12454
3	1240	452	565	-8.6	34012	11442	-10.8	34012	13229
3	1550	452	565	-11.5	34012	11623	-15.0	34012	13758
3	1550	452	565	-11.5	34012	11623	-15.0	34012	13758
3	1860	452	565	-6.8	34012	11457	-8.6	34012	13273
3	2480	452	565	4.1	34012	12649	6.4	34012	16430
3	2790	452	565	11.0	34012	11964	15.4	34012	14704
3	3100	452	565	18.9	34012	11752	25.4	34012	14122
4	0	452	565	18.9	34012	11752	28.5	34012	15099
4	310	452	565	14.1	34012	11693	18.8	34012	13957
4	620	452	565	7.4	34012	11812	10.0	34012	14287
4	1240	452	565	-3.3	34012	11926	-4.6	34012	14600
4	1550	452	565	-7.2	34012	12160	-10.5	34012	15221
4	1550	452	565	-7.2	34012	12160	-10.5	34012	15221
4	1860	452	565	-3.8	34012	12089	-5.4	34012	15034
4	2480	452	565	3.6	34012	11564	4.6	34012	13588
4	2790	452	565	8.7	34012	11507	11.1	34012	13422
4	3100	452	565	14.8	34012	11433	18.5	34012	13202
5	0	452	565	14.8	34012	11433	18.7	34012	13267
5	620	452	565	-4.7	34012	12036	-6.7	34012	14895
5	930	452	565	-12.9	34012	11919	-18.0	34012	14582
5	1240	452	565	-20.2	34012	11961	-28.3	34012	14694
5	1550	452	565	-26.4	34012	12036	-37.6	34012	14894
5	1550	452	565	-26.4	34012	12036	-37.6	34012	14894
5	1860	452	565	-23.8	34012	12033	-33.9	34012	14888
5	2170	452	565	-21.8	34012	12094	-31.3	34012	15047
5	2480	452	565	-18.8	34012	12258	-27.8	34012	15471
5	2790	452	565	-14.8	34012	12636	-23.3	34012	16399
6	305	452	565	-15.8	34012	12691	-25.0	34012	16531
6	610	452	565	-24.1	34012	12321	-36.1	34012	15629
6	915	452	565	-31.6	34012	12200	-46.2	34012	15321
6	1220	452	565	-38.1	34012	12167	-55.5	34012	15238
6	1525	452	565	-43.6	34012	12182	-63.7	34012	15275
6	1788	452	565	-47.7	34012	12219	-70.1	34012	15371
6	1830	452	565	-38.8	34012	12065	-55.5	34012	14971
6	2135	452	565	-36.1	34012	12117	-52.1	34012	15107
6	2440	452	565	-32.5	34012	12228	-47.8	34012	15395
6	2745	452	565	-27.9	34012	12439	-42.6	34012	15924

Hoofdwapening Fysisch lineair

Balk

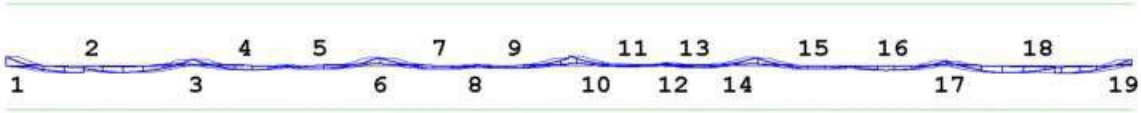
2:2



MEd dekkingslijn Fysisch lineair

Balk

2:2



Hoofdwapening

Balk

2:2

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	16.70	129.11	153	Bov	507*	1375	10-100	54
2	1237	-16.64	-93.42	115	Ond	507*	917	10-150	54
3	3050	12.03	129.11	153	Bov	507*	1375	10-100	54
4	3993	-9.67	-93.42	115	Ond	507*	917	10-150	54
5	5100	-7.94	-93.42	115	Ond	507*	917	10-150	54
6	6150	15.78	129.11	153	Bov	507*	1375	10-100	54
7	7167	-7.75	-93.42	115	Ond	507*	917	10-150	54
8	7700	0.79	129.11	153	Bov	507*	1375	10-100	54
9	8259	-7.21	-93.42	115	Ond	507*	917	10-150	54
10	9250	18.91	129.11	153	Bov	507*	1375	10-100	54
11	10237	-3.79	-93.42	115	Ond	507*	917	10-150	54
12	10800	3.88	129.11	153	Bov	507*	1375	10-100	54
13	11370	-4.43	-93.42	115	Ond	507*	917	10-150	54
14	12350	15.93	129.11	153	Bov	507*	1375	10-100	54
15	13356	-8.35	-93.42	115	Ond	507*	917	10-150	54
16	14485	-10.68	-93.42	115	Ond	507*	917	10-150	54
17	15450	8.80	129.11	153	Bov	507*	1375	10-100	54
18	17321	-17.19	-93.42	115	Ond	507*	917	10-150	54
19	18500	11.64	129.11	153	Bov	507*	1375	10-100	54

Opmerkingen

[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk

2:2

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	0	Bov	6.34	260	0.070	0.018	1.17	0.350	0.05	
1	1237	Ond	-9.31	260	0.152	0.040	1.17	0.350	0.11	
2	6150	Bov	8.15	260	0.090	0.024	1.17	0.350	0.07	
2	4296	Ond	-4.52	260	0.074	0.019	1.17	0.350	0.06	
3	9250	Bov	9.89	260	0.110	0.029	1.17	0.350	0.08	
3	7434	Ond	-3.98	260	0.065	0.017	1.17	0.350	0.05	
4	9250	Bov	9.89	260	0.110	0.029	1.17	0.350	0.08	
4	10519	Ond	-1.18	260	0.019	0.005	1.17	0.350	0.01	
5	12198	Bov	8.33	260	0.093	0.024	1.17	0.350	0.07	
5	11370	Ond	-1.43	260	0.023	0.006	1.17	0.350	0.02	
6	12350	Bov	8.33	260	0.093	0.024	1.17	0.350	0.07	
6	14485	Ond	-5.47	260	0.090	0.023	1.17	0.350	0.07	
7	18500	Bov	5.38	260	0.060	0.016	1.17	0.350	0.04	
7	17042	Ond	-9.26	260	0.152	0.039	1.17	0.350	0.11	

DWARSKRACHTEN Fysisch lineair Balk 2:2 Fundamentele combinatie

37000

Stijfheden (blijvend en quasi-blijvend) Balk 2:2

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1374	916	1.0	34287	4.2	34287	10910
1	610	1374	916	-3.6	34287	-4.7	34287	10910
1	915	1374	916	-4.9	34287	-6.9	34287	10910
1	1212	1374	916	-5.4	34287	-7.8	34287	10910
1	1220	1374	916	-5.4	34287	-7.8	34287	10910
1	1830	1374	916	-4.5	34287	-6.6	34287	10910
1	1952	1374	916	-4.1	34287	-6.4	34287	10910
1	2135	1374	916	-3.4	34287	-5.7	34287	10910
1	2440	1374	916	-1.6	34287	-3.5	34287	10910
1	3050	1374	916	4.0	34287	5.3	34287	10910
2	0	1374	916	4.0	34287	5.3	34287	10910
2	620	1374	916	-1.0	34287	-2.3	34287	10910
2	930	1374	916	-1.9	34287	-3.4	34287	10910
2	967	1374	916	-1.9	34287	-3.5	34287	10910
2	1240	1374	916	-2.0	34287	-3.2	34287	10910
2	1860	1374	916	-2.2	34287	-3.1	34287	10910
2	2061	1374	916	-1.9	34287	-3.1	34287	10910
2	2170	1374	916	-1.6	34287	-2.8	34287	10910
2	2790	1374	916	1.5	34287	2.0	34287	10910
2	3100	1374	916	4.1	34287	6.5	34287	10910
3	0	1374	916	4.1	34287	6.5	34287	10910
3	620	1374	916	-0.8	34287	-1.5	34287	10910
3	930	1374	916	-2.0	34287	-3.1	34287	10910
3	1020	1374	916	-2.3	34287	-3.3	34287	10910
3	1240	1374	916	-2.6	34287	-3.3	34287	10910
3	1860	1374	916	-2.3	34287	-2.9	34287	10910
3	2102	1374	916	-2.1	34287	-3.1	34287	10910
3	2170	1374	916	-2.0	34287	-3.0	34287	10910
3	2480	1374	916	-1.2	34287	-1.7	34287	10910
3	3100	1374	916	2.5	34287	5.1	34287	10910
4	0	1374	916	2.5	34287	5.1	34287	10910
4	155	1374	916	4.2	34287	5.8	34287	10910
4	310	1374	916	3.1	34287	3.9	34287	10910
4	465	1374	916	2.2	34287	2.3	34287	10910
4	775	1374	916	0.8	34287	0.1	34287	10910
4	930	1374	916	0.4	34287	-0.4	34287	10910
4	1016	1374	916	0.2	34287	-0.6	34287	10910
4	1085	1374	916	0.1	34287	-0.7	34287	10910
4	1240	1374	916	-0.0	34287	-0.5	34287	10910
4	1550	1374	916	0.1	34287	0.7	34287	10910
5	0	1374	916	0.1	34287	0.7	34287	10910
5	310	1374	916	0.0	34287	-0.5	34287	10910
5	465	1374	916	-0.0	34287	-0.8	34287	10910
5	574	1374	916	0.1	34287	-0.8	34287	10910
5	620	1374	916	0.1	34287	-0.8	34287	10910
5	775	1374	916	0.4	34287	-0.4	34287	10910

Stijfheden (blijvend en quasi-blijvend)

Balk
2:2

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
5	1085	1374	916	1.4	34287	1.4	34287	10910
5	1240	1374	916	2.2	34287	2.8	34287	10910
5	1395	1374	916	3.0	34287	4.5	34287	10910
5	1550	1374	916	4.1	34287	6.6	34287	10910
6	0	1374	916	4.1	34287	6.6	34287	10910
6	620	1374	916	-1.3	34287	-2.1	34287	10910
6	930	1374	916	-2.4	34287	-3.6	34287	10910
6	1022	1374	916	-2.6	34287	-3.8	34287	10910
6	1240	1374	916	-2.8	34287	-3.7	34287	10910
6	1860	1374	916	-2.7	34287	-4.0	34287	10910
6	2130	1374	916	-2.6	34287	-4.3	34287	10910
6	2170	1374	916	-2.5	34287	-4.3	34287	10910
6	2480	1374	916	-1.8	34287	-3.2	34287	10910
6	3100	1374	916	1.3	34287	3.0	34287	10910
7	0	1374	916	1.3	34287	3.0	34287	10910
7	610	1374	916	-1.4	34287	-3.6	34287	10910
7	915	1374	916	-2.6	34287	-5.3	34287	10910
7	1085	1374	916	-3.0	34287	-5.8	34287	10910
7	1220	1374	916	-3.2	34287	-5.9	34287	10910
7	1830	1374	916	-4.8	34287	-7.5	34287	10910
7	1857	1374	916	-4.8	34287	-7.4	34287	10910
7	2135	1374	916	-4.0	34287	-6.5	34287	10910
7	2440	1374	916	-2.5	34287	-4.3	34287	10910
7	3050	1374	916	1.8	34287	3.9	34287	10910

Stijfheden (frequent en karakteristiek)

Balk
2:2

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1374	916	6.3	34287	14154	11.7	34287	19340
1	610	1374	916	-5.3	34287	11954	-7.0	34287	14197
1	915	1374	916	-8.3	34287	12283	-11.7	34287	15101
1	1212	1374	916	-9.3	34287	12304	-13.2	34287	15156
1	1220	1374	916	-9.3	34287	12302	-13.2	34287	15151
1	1830	1374	916	-8.0	34287	12394	-11.5	34287	15392
1	1952	1374	916	-8.0	34287	12551	-11.8	34287	15796
1	2135	1374	916	-7.3	34287	12768	-11.2	34287	16336
1	2440	1374	916	-4.7	34287	13271	-7.8	34287	17507
1	3050	1374	916	6.2	34287	12113	8.5	34287	14642
2	0	1374	916	6.2	34287	12113	8.5	34287	14665
2	620	1374	916	-3.1	34287	13314	-5.1	34287	17603
2	930	1374	916	-4.5	34287	12958	-7.1	34287	16791
2	967	1374	916	-4.5	34287	12923	-7.1	34287	16707
2	1240	1374	916	-4.0	34287	12565	-5.9	34287	15831
2	1860	1374	916	-3.6	34287	12242	-5.1	34287	14992
2	2061	1374	916	-3.8	34287	12648	-5.8	34287	16040
2	2170	1374	916	-3.6	34287	12826	-5.6	34287	16475
2	2790	1374	916	2.3	34287	12024	3.1	34287	14395
2	3100	1374	916	8.1	34287	12620	12.2	34287	15971
3	0	1374	916	8.1	34287	12620	11.6	34287	15534
3	620	1374	916	-1.9	34287	12917	-3.0	34287	16694
3	930	1374	916	-3.8	34287	12475	-5.5	34287	15603
3	1020	1374	916	-4.0	34287	12347	-5.6	34287	15269
3	1240	1374	916	-3.7	34287	11888	-4.8	34287	14010
3	1860	1374	916	-3.3	34287	11938	-4.3	34287	14153
3	2102	1374	916	-3.7	34287	12346	-5.3	34287	15267
3	2170	1374	916	-3.6	34287	12401	-5.2	34287	15412
3	2480	1374	916	-2.1	34287	12382	-3.0	34287	15360
3	3100	1374	916	6.8	34287	13189	11.1	34287	17323
4	0	1374	916	6.8	34287	13189	14.3	34287	19531
4	155	1374	916	6.9	34287	12209	9.6	34287	14903
4	310	1374	916	4.4	34287	11825	5.6	34287	13827

Stijfheden (blijvend en quasi-blijvend)

Balk

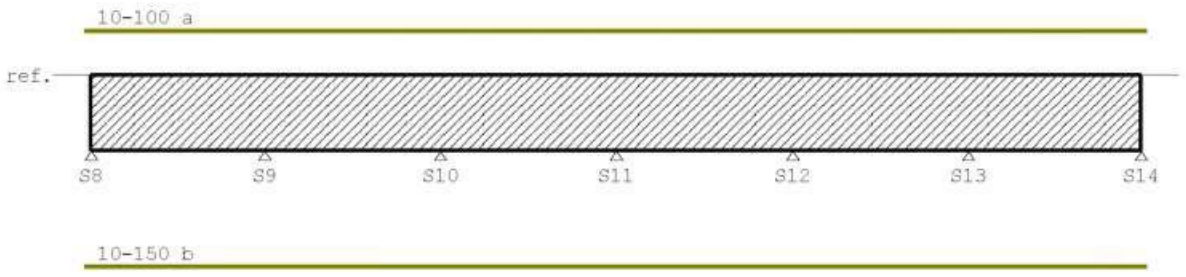
2:2

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
4	465	1374	916	2.4	34287	11261	2.4	34287	11382
4	775	1374	916	-0.4	34287	106699	-1.6	34287	40728
4	930	1374	916	-1.0	34287	17617	-2.4	34287	24580
4	1016	1374	916	-1.2	34287	16138	-2.5	34287	22647
4	1085	1374	916	-1.2	34287	15521	-2.5	34287	21719
4	1240	1374	916	-0.9	34287	14782	-1.7	34287	20494
4	1550	1374	916	1.1	34287	14302	2.1	34287	19621
5	0	1374	916	1.1	34287	14302	2.4	34287	20747
5	310	1374	916	-0.9	34287	15098	-1.8	34287	21034
5	465	1374	916	-1.4	34287	14976	-2.7	34287	20829
5	574	1374	916	-1.4	34287	15281	-2.9	34287	21336
5	620	1374	916	-1.4	34287	15527	-2.9	34287	21729
5	775	1374	916	-0.9	34287	17962	-2.3	34287	24981
5	1085	1374	916	1.5	34287	11097	1.3	34287	10447
5	1240	1374	916	3.2	34287	11997	4.3	34287	14319
5	1395	1374	916	5.5	34287	12443	8.1	34287	15520
5	1550	1374	916	8.3	34287	12676	12.6	34287	16109
6	0	1374	916	8.3	34287	12676	10.4	34287	14468
6	620	1374	916	-2.6	34287	12604	-3.9	34287	15929
6	930	1374	916	-4.4	34287	12475	-6.4	34287	15602
6	1022	1374	916	-4.6	34287	12386	-6.5	34287	15372
6	1240	1374	916	-4.3	34287	12040	-5.8	34287	14438
6	1860	1374	916	-4.9	34287	12457	-7.2	34287	15557
6	2130	1374	916	-5.5	34287	12743	-8.4	34287	16274
6	2170	1374	916	-5.4	34287	12768	-8.3	34287	16336
6	2480	1374	916	-4.1	34287	12871	-6.4	34287	16585
6	3100	1374	916	4.1	34287	13346	6.8	34287	17673
7	0	1374	916	4.1	34287	13346	6.5	34287	17365
7	610	1374	916	-5.0	34287	13621	-8.7	34287	18267
7	915	1374	916	-7.2	34287	13242	-11.8	34287	17442
7	1085	1374	916	-7.6	34287	13086	-12.3	34287	17089
7	1220	1374	916	-7.6	34287	12953	-12.0	34287	16779
7	1830	1374	916	-9.2	34287	12541	-13.7	34287	15772
7	1857	1374	916	-9.2	34287	12561	-13.7	34287	15821
7	2135	1374	916	-8.2	34287	12704	-12.4	34287	16179
7	2440	1374	916	-5.4	34287	12747	-8.3	34287	16285
7	3050	1374	916	5.4	34287	13328	9.0	34287	17635

Hoofdwapening Fysisch lineair

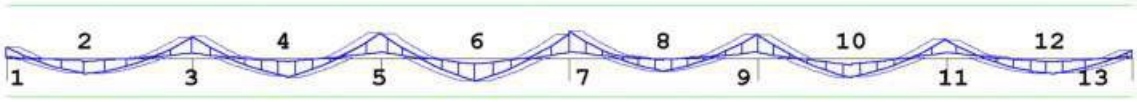
Balk

3:3



MEd dekkingslijn Fysisch lineair

Balk
3:3



△ S8 △ S9 △ S10 △ S11 △ S12 △ S13 △ S14

Hoofdwapening

Balk
3:3

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S8+0	22.30	110.30	152	Bov	435*	1179	10-100	54
2	S8+1263	-33.92	-79.82	115	Ond	456*	786	10-150	1
3	S9+0	44.07	110.30	152	Bov	594*	1179	10-100	1
4	S9+1550	-41.41	-79.82	115	Ond	557*	786	10-150	1
5	S10+0	51.97	110.30	152	Bov	660*	1179	10-100	1
6	S10+1550	-49.21	-79.82	115	Ond	660*	786	10-150	1
7	S11+0	54.65	110.30	152	Bov	660*	1179	10-100	1
8	S11+1550	-27.93	-79.82	115	Ond	435*	786	10-150	54
9	S12+0	49.17	110.30	152	Bov	660*	1179	10-100	1
10	S12+1550	-42.05	-79.82	115	Ond	566*	786	10-150	1
11	S13+0	39.03	110.30	152	Bov	525*	1179	10-100	1
12	S14-1262	-33.81	-79.82	115	Ond	454*	786	10-150	1
13	S14-0	14.99	110.30	152	Bov	435*	1179	10-100	54

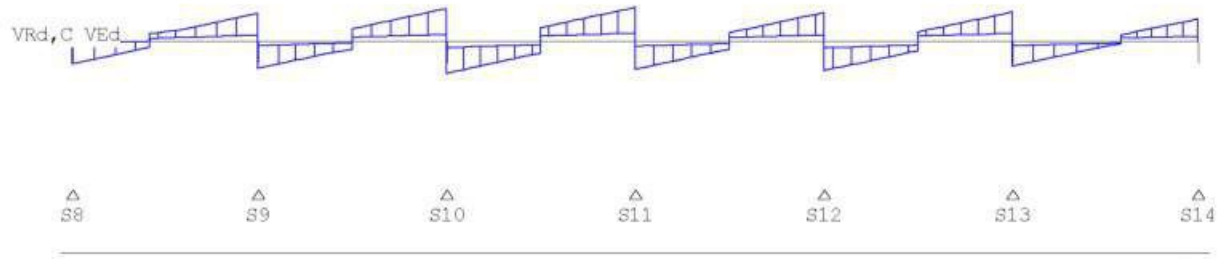
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
3:3

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S9+0	Bov	25.32	260	0.328	0.085	1.17	0.350	0.24	
1	S8+1263	Ond	-22.27	260	0.425	0.111	1.17	0.350	0.32	
2	S10+0	Bov	28.84	260	0.374	0.097	1.17	0.350	0.28	
2	S9+1550	Ond	-23.07	260	0.441	0.115	1.17	0.350	0.33	
3	S11+0	Bov	29.97	260	0.388	0.101	1.17	0.350	0.29	
3	S10+1550	Ond	-28.25	260	0.540	0.140	1.17	0.350	0.40	
4	S11+0	Bov	29.97	260	0.388	0.101	1.17	0.350	0.29	
4	S11+1550	Ond	-14.22	260	0.272	0.071	1.17	0.350	0.20	
5	S12+0	Bov	26.63	260	0.345	0.090	1.17	0.350	0.26	
5	S12+1550	Ond	-26.03	260	0.497	0.129	1.17	0.350	0.37	
6	S13+0	Bov	21.66	260	0.281	0.073	1.17	0.350	0.21	
6	S14-1262	Ond	-18.41	260	0.352	0.091	1.17	0.350	0.26	

DWARSKRACHTEN Fysisch lineair combinatie — Balk 3:3 Fundamentele



Stijfheden (blijvend en quasi-blijvend) — Balk 3:3

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1178	785	3.8	34287	7.6	34287	10910
1	610	1178	785	-4.7	34287	-6.1	34287	10910
1	915	1178	785	-8.1	34287	-11.1	34287	10910
1	1220	1178	785	-10.9	34287	-14.8	34287	10910
1	1263	1178	785	-11.2	34287	-15.3	34287	10910
1	1525	1178	785	-12.7	34287	-16.4	34287	10910
1	1830	1178	785	-8.1	34287	-11.2	34287	10910
1	2135	1178	785	-2.9	34287	-4.8	34287	10910
1	2745	1178	785	9.3	34287	11.7	34287	10910
1	3050	1178	785	16.3	34287	21.7	34287	10910
2	0	1178	785	16.3	34287	21.7	34287	10910
2	310	1178	785	8.1	34287	10.5	34287	10910
2	930	1178	785	-4.6	34287	-6.9	34287	10910
2	1240	1178	785	-10.0	34287	-13.7	34287	10910
2	1550	1178	785	-14.8	34287	-19.4	34287	10910
2	1550	1178	785	-14.8	34287	-19.4	34287	10910
2	1860	1178	785	-9.9	34287	-13.6	34287	10910
2	2170	1178	785	-4.1	34287	-6.0	34287	10910
2	2790	1178	785	9.2	34287	12.7	34287	10910
2	3100	1178	785	16.7	34287	23.9	34287	10910
3	0	1178	785	16.7	34287	23.9	34287	10910
3	310	1178	785	8.7	34287	12.0	34287	10910
3	930	1178	785	-6.5	34287	-8.7	34287	10910
3	1240	1178	785	-13.3	34287	-17.2	34287	10910
3	1550	1178	785	-19.5	34287	-24.5	34287	10910
3	1550	1178	785	-19.5	34287	-24.5	34287	10910
3	1860	1178	785	-14.0	34287	-17.9	34287	10910
3	2170	1178	785	-7.7	34287	-9.8	34287	10910
3	2790	1178	785	6.6	34287	10.1	34287	10910
3	3100	1178	785	14.5	34287	21.8	34287	10910
4	0	1178	785	14.5	34287	21.8	34287	10910
4	310	1178	785	11.7	34287	15.4	34287	10910
4	620	1178	785	6.3	34287	7.0	34287	10910
4	1240	1178	785	-2.8	34287	-6.3	34287	10910
4	1550	1178	785	-6.6	34287	-11.2	34287	10910
4	1550	1178	785	-6.6	34287	-11.2	34287	10910
4	1860	1178	785	-2.8	34287	-6.2	34287	10910
4	2480	1178	785	4.8	34287	5.4	34287	10910
4	2790	1178	785	9.3	34287	13.0	34287	10910
4	3100	1178	785	14.4	34287	21.7	34287	10910
5	0	1178	785	14.4	34287	21.7	34287	10910
5	310	1178	785	5.6	34287	9.2	34287	10910
5	930	1178	785	-7.0	34287	-9.1	34287	10910
5	1240	1178	785	-12.6	34287	-16.4	34287	10910
5	1550	1178	785	-17.7	34287	-22.7	34287	10910
5	1550	1178	785	-17.7	34287	-22.7	34287	10910

Stijfheden (blijvend en quasi-blijvend)

Balk

3:3

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
5	1860	1178	785	-11.0	34287	-15.2	34287	10910
5	2170	1178	785	-5.9	34287	-8.6	34287	10910
5	2790	1178	785	5.6	34287	7.9	34287	10910
5	3100	1178	785	12.1	34287	17.8	34287	10910
6	0	1178	785	12.1	34287	17.8	34287	10910
6	305	1178	785	7.5	34287	9.4	34287	10910
6	915	1178	785	-0.9	34287	-3.7	34287	10910
6	1220	1178	785	-4.5	34287	-8.7	34287	10910
6	1525	1178	785	-7.5	34287	-12.5	34287	10910
6	1788	1178	785	-9.8	34287	-15.0	34287	10910
6	1830	1178	785	-8.0	34287	-13.0	34287	10910
6	2135	1178	785	-5.9	34287	-10.0	34287	10910
6	2440	1178	785	-3.4	34287	-5.9	34287	10910
6	3050	1178	785	3.0	34287	5.6	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

3:3

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1178	785	10.1	34287	13153	16.4	34287	17243
1	610	1178	785	-7.0	34287	11952	-9.2	34287	14191
1	915	1178	785	-13.0	34287	12166	-18.0	34287	14785
1	1220	1178	785	-17.5	34287	12163	-24.1	34287	14779
1	1263	1178	785	-17.9	34287	12156	-28.3	34287	15924
1	1525	1178	785	-18.8	34287	11969	-24.9	34287	14240
1	1830	1178	785	-13.3	34287	12210	-18.4	34287	14906
1	2135	1178	785	-6.1	34287	12746	-9.3	34287	16283
1	2745	1178	785	13.2	34287	11858	17.1	34287	13923
1	3050	1178	785	25.3	34287	12080	34.3	34287	14549
2	0	1178	785	25.3	34287	12080	34.5	34287	14603
2	310	1178	785	12.1	34287	11997	16.1	34287	14320
2	930	1178	785	-8.5	34287	12484	-12.4	34287	15626
2	1240	1178	785	-16.3	34287	12192	-22.5	34287	14856
2	1550	1178	785	-22.4	34287	12014	-31.1	34287	14693
2	1550	1178	785	-22.4	34287	12014	-31.1	34287	14693
2	1860	1178	785	-16.0	34287	12192	-22.2	34287	14856
2	2170	1178	785	-7.3	34287	12418	-10.6	34287	15455
2	2790	1178	785	15.0	34287	12194	20.9	34287	14862
2	3100	1178	785	28.7	34287	12309	40.7	34287	15170
3	0	1178	785	28.7	34287	12309	40.5	34287	15139
3	310	1178	785	14.2	34287	12205	19.7	34287	14893
3	930	1178	785	-10.1	34287	12069	-13.7	34287	14519
3	1240	1178	785	-19.8	34287	11979	-26.3	34287	14269
3	1550	1178	785	-27.8	34287	11878	-36.8	34287	14119
3	1550	1178	785	-27.8	34287	11878	-36.8	34287	14119
3	1860	1178	785	-20.5	34287	11949	-27.1	34287	14183
3	2170	1178	785	-11.2	34287	11931	-14.7	34287	14131
3	2790	1178	785	12.4	34287	12509	18.2	34287	15689
3	3100	1178	785	26.6	34287	12452	38.7	34287	15543
4	0	1178	785	26.6	34287	12452	42.3	34287	16289
4	310	1178	785	17.9	34287	12042	24.1	34287	14445
4	620	1178	785	7.4	34287	11371	8.6	34287	12449
4	1240	1178	785	-8.6	34287	13351	-14.4	34287	17685
4	1550	1178	785	-14.2	34287	12768	-21.8	34287	16336
4	1550	1178	785	-14.2	34287	12768	-21.8	34287	16336
4	1860	1178	785	-8.5	34287	13364	-14.3	34287	17713
4	2480	1178	785	5.9	34287	11499	7.0	34287	12849
4	2790	1178	785	15.4	34287	12237	21.6	34287	14976
4	3100	1178	785	26.6	34287	12477	38.9	34287	15607
5	0	1178	785	26.6	34287	12477	37.1	34287	15197
5	310	1178	785	11.5	34287	12678	17.4	34287	16114
5	930	1178	785	-10.4	34287	11977	-13.8	34287	14262

Stijfheden (blijvend en quasi-blijvend)

Balk

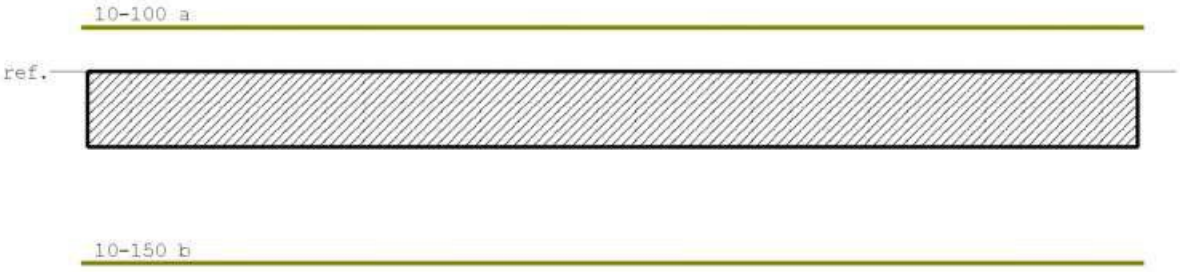
3:3

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}^* [N/mm²]	M_{Qb} [kNm]	$E_{cQb;on}^*$ [N/mm²]	$E_{cQb;\infty}^*$ [N/mm²]	
5	1240	1178	785	-19.0	34287	12018	-25.4	34287	14378
5	1550	1178	785	-26.0	34287	11959	-34.4	34287	14213
5	1550	1178	785	-26.0	34287	11959	-34.4	34287	14213
5	1860	1178	785	-18.0	34287	12213	-25.1	34287	14914
5	2170	1178	785	-10.4	34287	12369	-15.0	34287	15326
5	2790	1178	785	9.4	34287	12259	13.2	34287	15036
5	3100	1178	785	21.7	34287	12404	31.2	34287	15418
6	0	1178	785	21.7	34287	12404	29.7	34287	15007
6	305	1178	785	10.7	34287	11873	13.9	34287	13965
6	915	1178	785	-5.6	34287	14124	-10.2	34287	19281
6	1220	1178	785	-11.5	34287	13092	-18.5	34287	17102
6	1525	1178	785	-15.8	34287	12730	-24.1	34287	16242
6	1788	1178	785	-18.4	34287	12499	-27.0	34287	15664
6	1830	1178	785	-16.4	34287	12691	-24.9	34287	16146
6	2135	1178	785	-12.7	34287	12780	-19.5	34287	16364
6	2440	1178	785	-7.5	34287	12841	-11.7	34287	16513
6	3050	1178	785	7.3	34287	13010	11.7	34287	16912

Hoofdwapening Fysisch lineair

Balk

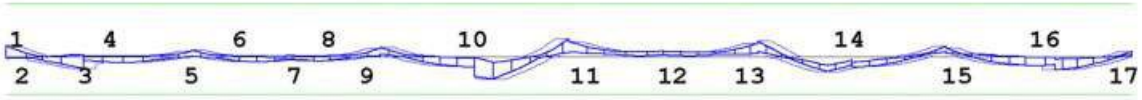
4:4



MEd dekkingslijn Fysisch lineair

Balk

4:4



Hoofdwapening

Balk

4:4

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	-4.09	-79.82	115	Ond	435*	786	10-150	54
2	0	21.69	110.30	152	Bov	435*	1179	10-100	54
3	1263	2.97	110.30	152	Bov	435*	1179	10-100	54
4	1263	-25.57	-79.82	115	Ond	435*	786	10-150	54
5	3050	13.01	110.30	152	Bov	435*	1179	10-100	54
6	4098	-11.05	-79.82	115	Ond	435*	786	10-150	54
7	4600	1.39	110.30	152	Bov	435*	1179	10-100	54
8	5085	-9.21	-79.82	115	Ond	435*	786	10-150	54
9	6150	18.64	110.30	152	Bov	435*	1179	10-100	54
10	8000	-47.59	-79.82	115	Ond	639*	786	10-150	1
11	9250	36.95	110.30	152	Bov	497*	1179	10-100	1
12	10800	10.60	110.30	152	Bov	435*	1179	10-100	54
13	12350	31.86	110.30	152	Bov	435*	1179	10-100	54
14	13500	-31.79	-79.82	115	Ond	435*	786	10-150	54
15	15450	21.07	110.30	152	Bov	435*	1179	10-100	54
16	17238	-28.83	-79.82	115	Ond	435*	786	10-150	54
17	18500	10.18	110.30	152	Bov	435*	1179	10-100	54

Hoofdwapening

Balk
4:4

Geb.	Pos. [mm]	M_{Sd} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.

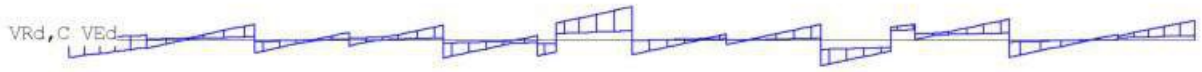
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
4:4

Geb.	Pos. [mm]	Zijde	$M_{S;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	0	Bov	10.17	260	0.132	0.034	1.17	0.350	0.10	
1	1263	Ond	-12.95	260	0.247	0.064	1.17	0.350	0.18	
2	6150	Bov	10.39	260	0.135	0.035	1.17	0.350	0.10	
2	4349	Ond	-5.33	260	0.102	0.026	1.17	0.350	0.08	
3	9250	Bov	22.21	260	0.288	0.075	1.17	0.350	0.21	
3	8000	Ond	-29.30	260	0.560	0.145	1.17	0.350	0.42	
4	9250	Bov	22.21	260	0.288	0.075	1.17	0.350	0.21	
5	12199	Bov	18.86	260	0.244	0.064	1.17	0.350	0.18	
6	12350	Bov	18.86	260	0.244	0.064	1.17	0.350	0.18	
6	13500	Ond	-24.65	260	0.471	0.122	1.17	0.350	0.35	
7	15450	Bov	14.27	260	0.185	0.048	1.17	0.350	0.14	
7	17238	Ond	-14.66	260	0.280	0.073	1.17	0.350	0.21	

DWARSKRACHTEN Fysisch lineair Balk 4:4 Fundamentele combinatie



37000

Stijfheden (blijvend en quasi-blijvend)

Balk
4:4

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	0	1178	785	6.9	34287	8.6	34287	10910
1	610	1178	785	-2.5	34287	-3.6	34287	10910
1	915	1178	785	-6.3	34287	-7.9	34287	10910
1	1220	1178	785	-9.4	34287	-10.9	34287	10910
1	1263	1178	785	-9.8	34287	-11.2	34287	10910
1	1830	1178	785	-4.5	34287	-6.1	34287	10910
1	1909	1178	785	-4.3	34287	-6.1	34287	10910
1	2135	1178	785	-3.7	34287	-5.4	34287	10910
1	2440	1178	785	-2.3	34287	-3.4	34287	10910
1	3050	1178	785	2.1	34287	4.1	34287	10910
2	0	1178	785	2.1	34287	4.1	34287	10910
2	620	1178	785	-1.7	34287	-2.5	34287	10910
2	930	1178	785	-3.0	34287	-4.2	34287	10910
2	1058	1178	785	-3.4	34287	-4.5	34287	10910
2	1240	1178	785	-3.7	34287	-4.6	34287	10910
2	1860	1178	785	-2.5	34287	-3.3	34287	10910
2	2029	1178	785	-2.3	34287	-3.2	34287	10910
2	2170	1178	785	-1.9	34287	-2.9	34287	10910
2	2790	1178	785	1.1	34287	1.6	34287	10910

Stijfheden (blijvend en quasi-blijvend)

Balk

4:4

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	3100	1178	785	3.4	34287	5.7	34287	10910
3	0	1178	785	3.4	34287	5.7	34287	10910
3	620	1178	785	-2.2	34287	-3.1	34287	10910
3	930	1178	785	-5.8	34287	-7.2	34287	10910
3	1240	1178	785	-8.7	34287	-10.2	34287	10910
3	1550	1178	785	-11.1	34287	-11.9	34287	10910
3	1850	1178	785	-25.4	34287	-27.8	34287	10910
3	1860	1178	785	-25.1	34287	-27.4	34287	10910
3	2170	1178	785	-15.6	34287	-17.4	34287	10910
3	2790	1178	785	5.1	34287	6.2	34287	10910
3	3100	1178	785	16.2	34287	19.8	34287	10910
4	0	1178	785	16.2	34287	19.8	34287	10910
4	155	1178	785	10.7	34287	13.0	34287	10910
4	310	1178	785	9.8	34287	11.2	34287	10910
4	465	1178	785	9.1	34287	9.7	34287	10910
4	620	1178	785	8.6	34287	8.6	34287	10910
4	775	1178	785	8.1	34287	8.1	34287	10910
4	930	1178	785	7.8	34287	7.8	34287	10910
4	1085	1178	785	7.7	34287	7.7	34287	10910
4	1395	1178	785	7.7	34287	7.7	34287	10910
4	1550	1178	785	8.0	34287	8.0	34287	10910
5	0	1178	785	8.0	34287	8.0	34287	10910
5	155	1178	785	7.5	34287	7.5	34287	10910
5	310	1178	785	7.0	34287	7.0	34287	10910
5	620	1178	785	6.5	34287	6.5	34287	10910
5	775	1178	785	6.4	34287	6.4	34287	10910
5	930	1178	785	6.4	34287	6.5	34287	10910
5	1085	1178	785	6.6	34287	7.3	34287	10910
5	1240	1178	785	6.9	34287	8.5	34287	10910
5	1395	1178	785	7.4	34287	9.9	34287	10910
5	1550	1178	785	7.9	34287	11.6	34287	10910
6	0	1178	785	7.9	34287	11.6	34287	10910
6	620	1178	785	-6.9	34287	-7.1	34287	10910
6	930	1178	785	-15.9	34287	-17.2	34287	10910
6	1150	1178	785	-22.0	34287	-23.6	34287	10910
6	1240	1178	785	-19.5	34287	-21.1	34287	10910
6	1550	1178	785	-10.4	34287	-11.8	34287	10910
6	1860	1178	785	-10.3	34287	-12.3	34287	10910
6	2170	1178	785	-5.7	34287	-7.7	34287	10910
6	2790	1178	785	4.8	34287	4.9	34287	10910
6	3100	1178	785	10.8	34287	12.9	34287	10910
7	0	1178	785	10.8	34287	12.9	34287	10910
7	610	1178	785	1.9	34287	-0.3	34287	10910
7	915	1178	785	0.1	34287	-3.2	34287	10910
7	1220	1178	785	-1.2	34287	-5.0	34287	10910
7	1436	1178	785	-1.8	34287	-5.6	34287	10910
7	1788	1178	785	-2.4	34287	-5.5	34287	10910
7	1830	1178	785	-6.5	34287	-11.3	34287	10910
7	2135	1178	785	-4.9	34287	-9.0	34287	10910
7	2440	1178	785	-2.9	34287	-5.7	34287	10910
7	3050	1178	785	2.6	34287	4.2	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

4:4

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1178	785	10.2	34287	12150	12.8	34287	14005
1	610	1178	785	-4.3	34287	12337	-6.2	34287	15245
1	915	1178	785	-8.9	34287	11877	-11.6	34287	13976
1	1220	1178	785	-12.5	34287	11977	-14.3	34287	13035
1	1263	1178	785	-13.0	34287	12014	-14.5	34287	12889
1	1830	1178	785	-7.2	34287	12193	-10.0	34287	14859

Stijfheden (blijvend en quasi-blijvend)

Balk

4:4

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
1	1909	1178	785	-7.2	34287	12258	-10.1	34287	15033
1	2135	1178	785	-6.5	34287	12384	-9.4	34287	15367
1	2440	1178	785	-4.2	34287	12417	-6.1	34287	15451
1	3050	1178	785	5.4	34287	13055	8.6	34287	17016
2	0	1178	785	5.4	34287	13055	8.8	34287	17174
2	620	1178	785	-3.1	34287	12478	-4.5	34287	15610
2	930	1178	785	-5.0	34287	12255	-7.0	34287	15025
2	1058	1178	785	-5.3	34287	12120	-7.2	34287	14659
2	1240	1178	785	-5.2	34287	11848	-6.8	34287	13893
2	1860	1178	785	-3.8	34287	12012	-5.1	34287	14361
2	2029	1178	785	-3.9	34287	12314	-5.5	34287	15182
2	2170	1178	785	-3.6	34287	12497	-5.2	34287	15660
2	2790	1178	785	1.9	34287	12371	2.7	34287	15333
2	3100	1178	785	7.1	34287	12704	10.8	34287	16178
3	0	1178	785	7.1	34287	12704	14.3	34287	18547
3	620	1178	785	-3.7	34287	12190	-5.1	34287	14850
3	930	1178	785	-8.2	34287	11871	-10.6	34287	13961
3	1240	1178	785	-11.1	34287	11588	-13.5	34287	13124
3	1550	1178	785	-12.8	34287	11461	-24.8	34287	16920
3	1850	1178	785	-29.3	34287	11316	-33.2	34287	12272
3	1860	1178	785	-29.0	34287	11320	-32.8	34287	12284
3	2170	1178	785	-18.6	34287	11413	-21.6	34287	12580
3	2790	1178	785	7.0	34287	11791	8.9	34287	13727
3	3100	1178	785	22.2	34287	11776	28.2	34287	13684
4	0	1178	785	22.2	34287	11776	23.3	34287	12163
4	155	1178	785	14.6	34287	11782	18.6	34287	13701
4	310	1178	785	12.2	34287	11516	14.5	34287	12901
4	465	1178	785	10.1	34287	11211	11.1	34287	11931
4	620	1178	785	8.9	34287	11235	8.4	34287	10763
4	775	1178	785	8.5	34287	11266	6.3	34287	9151
4	930	1178	785	8.2	34287	11293	5.0	34287	7828
4	1085	1178	785	8.1	34287	11316	4.3	34287	7062
4	1395	1178	785	8.2	34287	11350	4.9	34287	7790
4	1550	1178	785	8.5	34287	11357	6.2	34287	9120
5	0	1178	785	8.5	34287	11357	6.0	34287	8898
5	155	1178	785	7.8	34287	11215	4.4	34287	7368
5	310	1178	785	7.3	34287	11227	3.5	34287	6452
5	620	1178	785	6.8	34287	11236	3.7	34287	7198
5	775	1178	785	6.7	34287	11231	4.8	34287	8882
5	930	1178	785	6.8	34287	11217	6.6	34287	11007
5	1085	1178	785	7.8	34287	11384	9.0	34287	12491
5	1240	1178	785	9.5	34287	11787	12.1	34287	13716
5	1395	1178	785	11.6	34287	12125	15.9	34287	14673
5	1550	1178	785	14.1	34287	12397	20.4	34287	15400
6	0	1178	785	14.1	34287	12397	25.1	34287	17177
6	620	1178	785	-7.3	34287	11086	-7.7	34287	11506
6	930	1178	785	-18.0	34287	11269	-20.1	34287	12120
6	1150	1178	785	-24.6	34287	11238	-27.3	34287	12021
6	1240	1178	785	-22.2	34287	11285	-24.9	34287	12173
6	1550	1178	785	-12.7	34287	11459	-18.9	34287	14698
6	1860	1178	785	-13.6	34287	11689	-16.9	34287	13427
6	2170	1178	785	-9.0	34287	12103	-12.2	34287	14612
6	2790	1178	785	5.0	34287	11002	5.1	34287	11230
6	3100	1178	785	14.3	34287	11685	17.7	34287	13416
7	0	1178	785	14.3	34287	11685	13.7	34287	11346
7	610	1178	785	-1.7	34287	25408	-5.3	34287	30806
7	915	1178	785	-5.4	34287	15117	-10.9	34287	21066
7	1220	1178	785	-7.6	34287	14173	-14.0	34287	19376
7	1436	1178	785	-8.2	34287	13850	-14.6	34287	18740
7	1788	1178	785	-7.6	34287	13434	-22.7	34287	22515
7	1830	1178	785	-14.4	34287	12832	-22.3	34287	16490
7	2135	1178	785	-11.7	34287	12968	-18.5	34287	16814

Stijfheden (blijvend en quasi-blijvend)

Balk

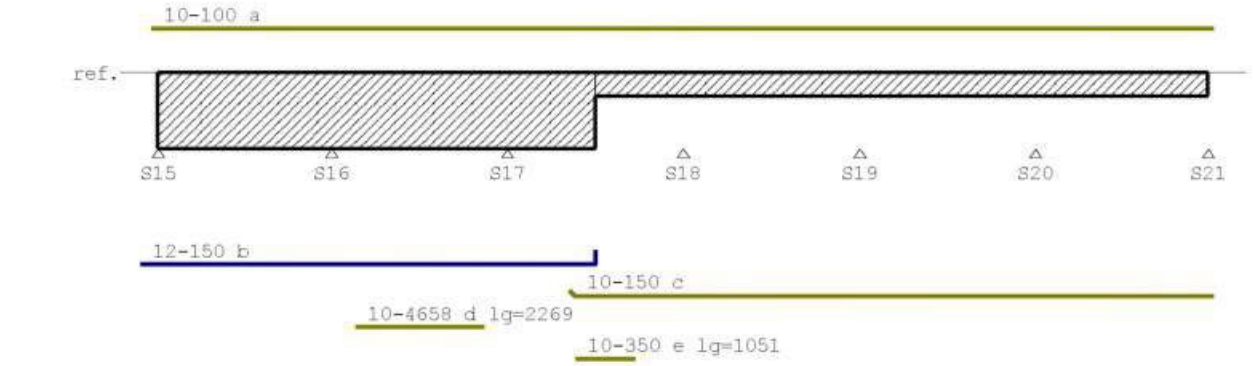
4:4

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]	
7	2440	1178	785	-7.5	34287	13134	-12.2	34287	17197
7	3050	1178	785	5.3	34287	12706	8.0	34287	16184

Hoofdwapening Fysisch lineair

Balk

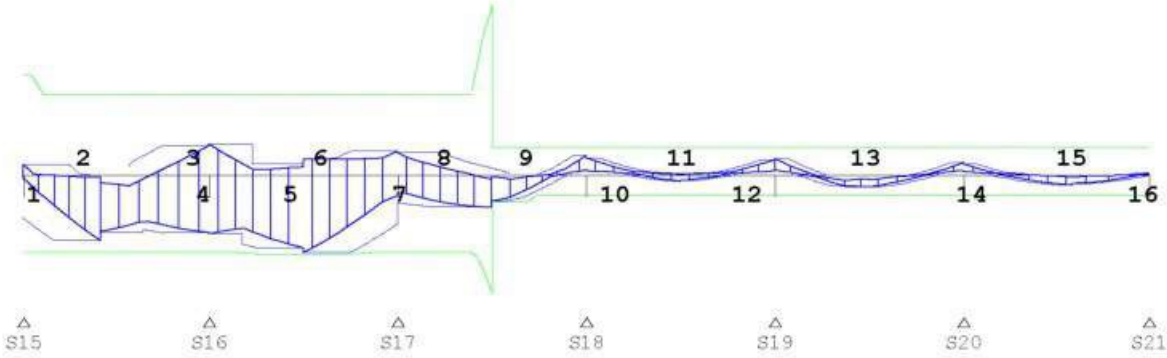
5:5



MEd dekkingslijn Fysisch lineair

Balk

5:5



Hoofdwapening

Balk

5:5

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S15+0	39.47	399.83	722	Bov	904*	1179	10-100	54
2	S15+1263	-263.10	-307.92	721	Ond	973*	1132	12-150	1
3	S16+0	-235.28	-307.92	721	Ond	904*	1132	12-150	54
4	S16+0	122.40	321.05	722	Bov	904*	1179	10-100	54
5	S16+1550	61.16	321.06	722	Bov	904*	1179	10-100	54
6	S16+1550	-312.52	-314.67	725	Ond	1157*	1132	12-150	1
					Ond		26	+10-4658	
7	S17+0	93.85	321.05	722	Bov	904*	1179	10-100	54
8	S17+1550	-130.96	-472.08	470	Ond	904*	1132	12-150	54
9	S17+1550	-105.07	-106.11	141	Ond	1152	786	10-150	28
					Ond		337	+10-350	
10	S18+0	75.55	110.30	152	Bov	819	1179	10-100	
11	S18+1550	-25.41	-79.82	115	Ond	435*	786	10-150	54
12	S19+0	63.10	110.30	152	Bov	681	1179	10-100	
13	S19+1550	-49.32	-79.82	115	Ond	660*	786	10-150	1
14	S20+0	47.97	110.30	152	Bov	644*	1179	10-100	1
15	S21-1262	-41.21	-79.82	115	Ond	555*	786	10-150	1
16	S21-0	7.39	110.30	152	Bov	435*	1179	10-100	54

Hoofdwapening

Balk 5:5

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z B/O [mm]	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.

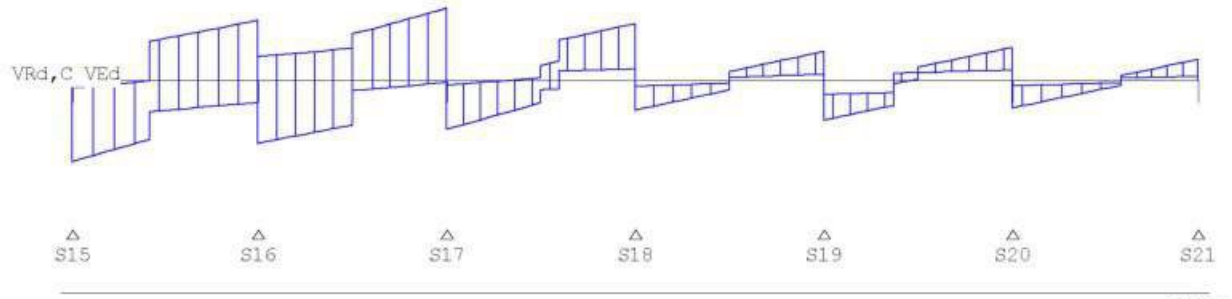
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[28] Berekening van Ab houdt geen rekening met wapening gedrukte zijde.
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4

Balk 5:5

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S15+0	Bov	1.72	260	0.006	0.002	1.17	0.350	0.00	
1	S15+509	Ond	-127.02	312	0.460	0.144	1.17	0.350	0.41	
2	S17-755	Bov	16.79	260	0.058	0.015	1.17	0.350	0.04	
2	S16+791	Ond	-132.12	308	0.469	0.145	1.17	0.350	0.41	
3	S18+0	Bov	41.98	260	0.544	0.141	1.17	0.350	0.40	
3	S17+1550	Ond	-52.36	260	0.711	0.185	1.17	0.350	0.53	
3	S17+894	Ond	-69.58	312	0.252	0.079	1.17	0.350	0.22	
4	S18+0	Bov	41.98	260	0.544	0.141	1.17	0.350	0.40	
4	S18+1550	Ond	-9.94	260	0.190	0.049	1.17	0.350	0.14	
5	S19+0	Bov	36.59	260	0.474	0.123	1.17	0.350	0.35	
5	S19+1015	Ond	-31.44	260	0.601	0.156	1.17	0.350	0.45	
6	S20+0	Bov	29.19	260	0.378	0.098	1.17	0.350	0.28	
6	S21-1262	Ond	-21.00	260	0.401	0.104	1.17	0.350	0.30	

DWARSKRACHTEN Fysisch lineair Balk 5:5 Fundamentele combinatie



Stijfheden (blijvend en quasi-blijvend)

Balk 5:5

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	305	1178	1131	-25.3	33769	-32.2	33769	10396
1	610	1178	1131	-49.9	33769	-60.9	33769	10396
1	915	1178	1131	-72.9	33769	-87.5	33769	10396
1	1220	1178	1131	-94.4	33769	-111.9	33769	10396
1	1263	1178	1131	-97.3	33769	-115.1	33769	10396
1	1525	1178	1131	-90.7	33769	-107.0	33769	10396
1	1830	1178	1131	-86.3	33769	-101.5	33769	10396
1	2135	1178	1131	-80.3	33769	-93.9	33769	10396
1	2440	1178	1131	-72.8	33769	-84.1	33769	10396
1	2745	1178	1131	-63.7	33769	-72.0	33769	10396
2	310	1178	1131	-63.2	33769	-72.3	33769	10396
2	620	1178	1144	-74.8	33775	-86.1	33775	10401
2	930	1178	1156	-84.8	33779	-97.7	33779	10406

Stijfheden (blijvend en quasi-blijvend)

Balk

5:5

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	1240	1178	1156	-93.2	33779	-107.1	33779	10406
2	1550	1178	1156	-100.1	33779	-114.2	33779	10406
2	1550	1178	1156	-100.1	33779	-114.2	33779	10406
2	1860	1178	1156	-75.0	33779	-88.9	33779	10406
2	2170	1178	1156	-60.6	33779	-70.6	33779	10406
2	2480	1178	1147	-44.5	33776	-50.0	33776	10402
2	2790	1178	1131	-27.0	33769	-27.2	33769	10396
3	310	1178	1131	-11.1	33769	-12.7	33769	10396
3	620	1178	1131	-24.3	33769	-28.7	33769	10396
3	930	1178	1131	-35.9	33769	-42.5	33769	10396
3	1240	1178	1260	-45.9	33784	-54.1	33784	10410
3	1550	1178	2248	-54.5	33894	-63.5	33894	10519
3	1550	1178	1121	-54.5	34538	-63.5	34538	11164
3	1860	1178	1122	-39.4	34538	-45.7	34538	11165
3	2170	1178	1093	-23.4	34517	-27.0	34517	11143
3	2790	1178	785	10.3	34287	14.1	34287	10910
3	3100	1178	785	28.0	34287	36.4	34287	10910
4	0	1178	785	28.0	34287	36.4	34287	10910
4	310	1178	785	18.0	34287	22.1	34287	10910
4	620	1178	785	12.2	34287	13.1	34287	10910
4	1240	1178	785	2.1	34287	-1.4	34287	10910
4	1550	1178	785	-2.2	34287	-6.8	34287	10910
4	1550	1178	785	-2.2	34287	-6.8	34287	10910
4	1860	1178	785	1.9	34287	-1.6	34287	10910
4	2480	1178	785	9.3	34287	10.2	34287	10910
4	2790	1178	785	13.8	34287	17.9	34287	10910
4	3100	1178	785	18.7	34287	26.7	34287	10910
5	0	1178	785	18.7	34287	26.7	34287	10910
5	310	1178	785	9.4	34287	13.3	34287	10910
5	930	1178	785	-17.1	34287	-19.1	34287	10910
5	1240	1178	785	-24.6	34287	-28.6	34287	10910
5	1550	1178	785	-19.5	34287	-24.9	34287	10910
5	1550	1178	785	-19.5	34287	-24.9	34287	10910
5	1860	1178	785	-15.1	34287	-19.5	34287	10910
5	2170	1178	785	-7.3	34287	-10.1	34287	10910
5	2790	1178	785	9.8	34287	12.3	34287	10910
5	3100	1178	785	19.1	34287	25.2	34287	10910
6	0	1178	785	19.1	34287	25.2	34287	10910
6	305	1178	785	9.5	34287	11.8	34287	10910
6	915	1178	785	0.3	34287	-2.9	34287	10910
6	1220	1178	785	-3.5	34287	-8.7	34287	10910
6	1525	1178	785	-7.0	34287	-13.3	34287	10910
6	1788	1178	785	-9.6	34287	-16.4	34287	10910
6	1830	1178	785	-8.5	34287	-14.3	34287	10910
6	2135	1178	785	-6.5	34287	-11.5	34287	10910
6	2440	1178	785	-4.1	34287	-7.7	34287	10910
6	2745	1178	785	-1.2	34287	-2.7	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

5:5

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	305	1178	1131	-36.7	33769	11378	-48.2	33769	13506
1	610	1178	1131	-68.3	33769	11234	-86.7	33769	13088
1	915	1178	1131	-97.2	33769	11168	-121.5	33769	12894
1	1220	1178	1131	-123.5	33769	11122	-152.7	33769	12755
1	1263	1178	1131	-127.0	33769	11116	-156.8	33769	12737
1	1525	1178	1131	-117.9	33769	11103	-145.0	33769	12699
1	1830	1178	1131	-111.7	33769	11094	-137.1	33769	12669
1	2135	1178	1131	-104.9	33769	11213	-125.5	33769	12592
1	2440	1178	1131	-99.5	33769	11645	-110.3	33769	12446
1	2745	1178	1131	-91.8	33769	12218	-91.4	33769	12185

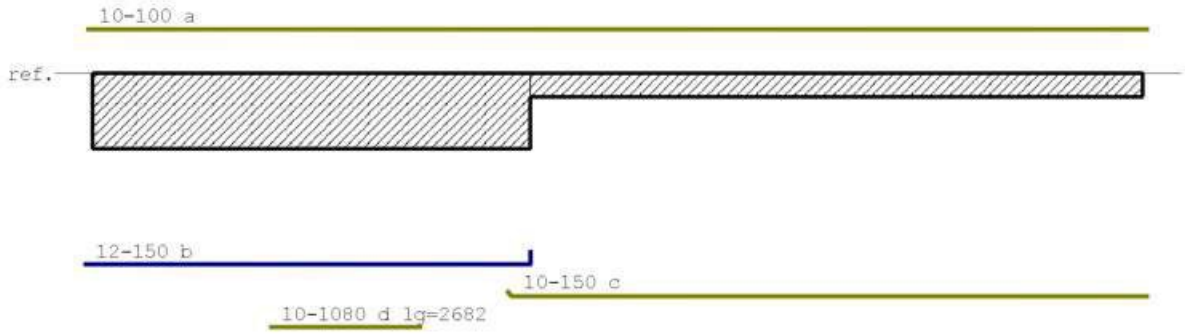
Stijfheden

Balk

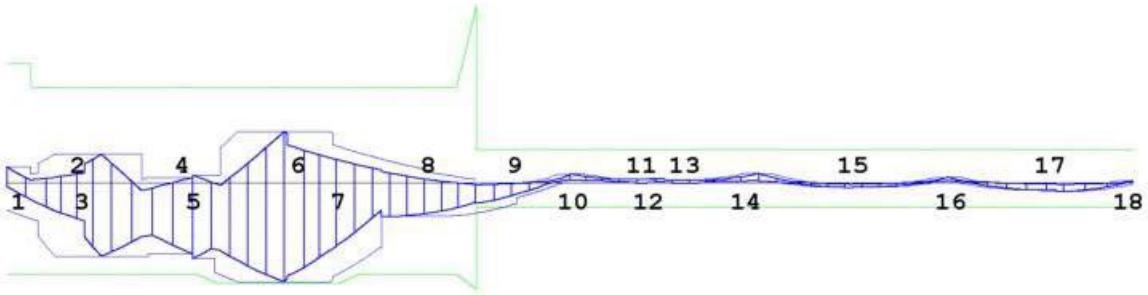
5:5

Veld	A_{bov} [mm²]	A_{ond} [mm²]	E_{totaal} [N/mm²]	E_{on} [N/mm²]	Pos [mm]	M_{Ek} [kNm]	M_{Eqp} [kNm]	M_{Eg} [kNm]	Veld-lengte [mm]	
2	310	1178	1131	-92.2	33769	12230	-93.3	33769	12318	
2	620	1178	1144	-101.3	33775	11603	-112.4	33775	12412	
2	930	1178	1156	-112.3	33779	11435	-127.8	33779	12431	
2	1240	1178	1156	-123.3	33779	11449	-139.4	33779	12395	
2	1550	1178	1156	-132.1	33779	11481	-147.3	33779	12320	
2	1550	1178	1156	-132.1	33779	11481	-147.3	33779	12320	
2	1860	1178	1156	-107.8	33779	11842	-121.4	33779	12772	
2	2170	1178	1156	-87.6	33779	12023	-94.0	33779	12570	
2	2480	1178	1147	-65.2	33776	12398	-62.7	33776	12102	
2	2790	1178	1131	-40.5	33769	13449	-27.8	33769	10546	
3	310	1178	1131	-22.7	33769	14938	-16.5	33769	12358	
3	620	1178	1131	-37.4	33769	12375	-39.1	33769	12740	
3	930	1178	1131	-49.8	33769	11569	-58.0	33769	12755	
3	1240	1178	1260	-60.1	33784	11178	-73.2	33784	12702	
3	1550	1178	2248	-69.6	33894	11190	-84.7	33894	12711	
3	1550	1178	1121	-69.6	15855	8444	-84.7	7878	5801	
3	1860	1178	1122	-50.0	34538	11840	-60.5	34538	13369	
3	2170	1178	1093	-29.4	34517	11798	-35.4	34517	13285	
3	2790	1178	785	16.6	34287	12153	22.8	34287	14751	
3	3100	1178	785	42.0	34287	11997	55.9	34287	14319	
4	0	1178	785	42.0	34287	11997	50.5	34287	13468	
4	310	1178	785	24.7	34287	11780	31.4	34287	13697	
4	620	1178	785	13.6	34287	11240	15.1	34287	12025	
4	1240	1178	785	-3.7	34287	18999	-9.4	34287	26090	
4	1550	1178	785	-9.9	34287	13855	-17.7	34287	18750	
4	1550	1178	785	-9.9	34287	13855	-17.7	34287	18750	
4	1860	1178	785	-3.9	34287	18271	-9.7	34287	25326	
4	2480	1178	785	10.8	34287	11357	12.4	34287	12403	
4	2790	1178	785	20.6	34287	12000	27.5	34287	14328	
4	3100	1178	785	32.0	34287	12300	45.3	34287	15145	
5	0	1178	785	32.0	34287	12300	49.9	34287	15964	
5	310	1178	785	16.0	34287	12302	22.6	34287	15151	
5	930	1178	785	-20.4	34287	11423	-23.8	34287	12613	
5	1240	1178	785	-31.3	34287	11591	-38.1	34287	13131	
5	1550	1178	785	-28.5	34287	11942	-40.4	34287	14762	
5	1550	1178	785	-28.5	34287	11942	-40.4	34287	14762	
5	1860	1178	785	-22.4	34287	11972	-29.7	34287	14247	
5	2170	1178	785	-11.9	34287	12189	-16.5	34287	14849	
5	2790	1178	785	13.9	34287	11866	18.0	34287	13946	
5	3100	1178	785	29.2	34287	12045	39.3	34287	14452	
6	0	1178	785	29.2	34287	12045	34.7	34287	13417	
6	305	1178	785	13.3	34287	11824	17.0	34287	13824	
6	915	1178	785	-5.1	34287	15394	-10.6	34287	21518	
6	1220	1178	785	-12.1	34287	13516	-20.6	34287	18044	
6	1525	1178	785	-17.5	34287	13053	-28.1	34287	17012	
6	1788	1178	785	-21.0	34287	12812	-32.4	34287	16441	
6	1830	1178	785	-18.2	34287	12753	-27.8	34287	16298	
6	2135	1178	785	-14.9	34287	12879	-23.2	34287	16604	
6	2440	1178	785	-10.0	34287	13025	-16.0	34287	16948	
6	2745	1178	785	-3.7	34287	13444	-6.3	34287	17888	

Hoofdwapening Fysisch lineair Balk
6:6



MEd dekkingslijn Fysisch lineair Balk
6:6



Hoofdwapening Balk
6:6

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	50.24	399.83	722	Bov	904*	1179	10-100	54
2	1550	-248.71	-307.92	721	Ond	920*	1132	12-150	1
3	1550	94.62	321.05	722	Bov	904*	1179	10-100	54
4	3050	-256.37	-307.92	721	Ond	948*	1132	12-150	1
5	3050	23.93	321.05	722	Bov	904*	1179	10-100	54
6	4550	-334.92	-337.09	736	Ond	1240*	1132	12-150	1
					Ond		110	+10-1080	
7	4550	170.11	321.10	721	Bov	904*	1179	10-100	54
8	6269	-114.36	-307.92	721	Ond	904*	1132	12-150	54
9	7700	-78.68	-79.82	115	Ond	854	786	10-150	28
10	9250	27.83	110.30	152	Bov	435*	1179	10-100	54
11	10433	-0.77	-79.82	115	Ond	435*	786	10-150	54
12	10800	12.21	110.30	152	Bov	435*	1179	10-100	54
13	11137	-1.62	-79.82	115	Ond	435*	786	10-150	54
14	12350	30.37	110.30	152	Bov	435*	1179	10-100	54
15	13823	-16.18	-79.82	115	Ond	435*	786	10-150	54
16	15450	17.30	110.30	152	Bov	435*	1179	10-100	54
17	17238	-31.07	-79.82	115	Ond	435*	786	10-150	54
18	18500	4.66	110.30	152	Bov	435*	1179	10-100	54

Hoofdwapening

Balk 6:6

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z B/O [mm]	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.

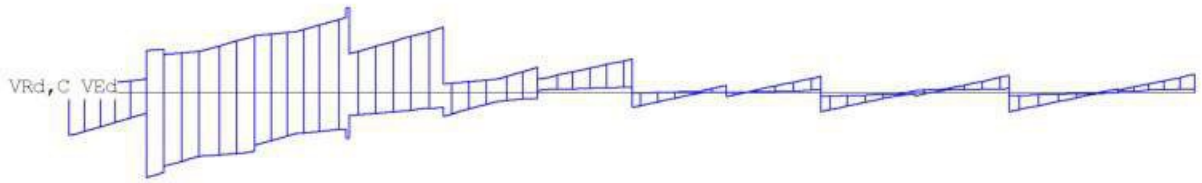
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[28] Berekening van Ab houdt geen rekening met wapening gedrukte zijde.
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4

Balk 6:6

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	9250	Bov	16.17	260	0.209	0.054	1.17	0.350	0.16	
1	7700	Ond	-41.39	260	0.791	0.206	1.17	0.350	0.59	
1	2317	Ond	-134.24	312	0.486	0.152	1.17	0.350	0.43	
2	9250	Bov	16.17	260	0.209	0.054	1.17	0.350	0.16	
3	12204	Bov	15.85	260	0.205	0.053	1.17	0.350	0.15	
4	12350	Bov	15.85	260	0.205	0.053	1.17	0.350	0.15	
4	13823	Ond	-10.53	260	0.201	0.052	1.17	0.350	0.15	
5	15450	Bov	10.07	260	0.130	0.034	1.17	0.350	0.10	
5	17238	Ond	-15.93	260	0.304	0.079	1.17	0.350	0.23	

DWARSKRACHTEN Fysisch lineair Balk 6:6 Fundamentele combinatie



37000

Stijfheden (blijvend en quasi-blijvend)

Balk 6:6

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	513	1178	1131	-20.8	33769	-25.0	33769	10396
1	1027	1178	1131	-32.6	33769	-38.1	33769	10396
1	1540	1178	1131	-53.2	33769	-63.8	33769	10396
1	2053	1178	1131	-75.2	33769	-86.2	33769	10396
1	2567	1178	1131	-92.7	33769	-102.4	33769	10396
1	3076	1178	1131	-107.6	33769	-116.0	33769	10396
1	3080	1178	1131	-107.6	33769	-115.9	33769	10396
1	3593	1178	1240	-95.8	33813	-106.1	33813	10440
1	4107	1178	1240	-79.8	33813	-90.2	33813	10440
1	4620	1178	1240	-74.8	33813	-84.1	33813	10440
1	5133	1178	1240	-61.8	33813	-70.1	33813	10440
1	5647	1178	1175	-44.4	33787	-50.0	33787	10413
1	6673	1178	1131	-38.8	33769	-42.5	33769	10396
1	6898	1178	1131	-38.6	33769	-42.6	33769	10396
1	7187	1178	1131	-37.1	33769	-41.1	33769	10396
1	7700	1178	785	-31.2	34287	-33.7	34287	10910
1	8217	1178	785	-20.6	34287	-23.4	34287	10910

Stijfheden (blijvend en quasi-blijvend)

Balk

6:6

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	9250	1178	785	10.5	34287	13.4	34287	10910
2	0	1178	785	10.5	34287	13.4	34287	10910
2	155	1178	785	9.9	34287	12.0	34287	10910
2	310	1178	785	9.2	34287	10.4	34287	10910
2	465	1178	785	8.6	34287	9.0	34287	10910
2	620	1178	785	8.1	34287	8.1	34287	10910
2	775	1178	785	7.8	34287	7.8	34287	10910
2	930	1178	785	7.6	34287	7.6	34287	10910
2	1240	1178	785	7.6	34287	7.6	34287	10910
2	1395	1178	785	7.8	34287	7.8	34287	10910
2	1550	1178	785	8.2	34287	8.2	34287	10910
3	0	1178	785	8.2	34287	8.2	34287	10910
3	155	1178	785	5.5	34287	5.5	34287	10910
3	465	1178	785	5.5	34287	5.5	34287	10910
3	620	1178	785	5.6	34287	5.6	34287	10910
3	775	1178	785	5.9	34287	5.9	34287	10910
3	930	1178	785	6.3	34287	6.5	34287	10910
3	1085	1178	785	6.9	34287	7.7	34287	10910
3	1240	1178	785	7.6	34287	9.3	34287	10910
3	1395	1178	785	8.4	34287	11.1	34287	10910
3	1550	1178	785	9.3	34287	13.2	34287	10910
4	0	1178	785	9.3	34287	13.2	34287	10910
4	310	1178	785	2.9	34287	4.5	34287	10910
4	930	1178	785	-3.7	34287	-4.9	34287	10910
4	1240	1178	785	-6.3	34287	-7.9	34287	10910
4	1537	1178	785	-8.3	34287	-9.6	34287	10910
4	1550	1178	785	-8.3	34287	-9.7	34287	10910
4	1860	1178	785	-5.2	34287	-7.0	34287	10910
4	2170	1178	785	-3.4	34287	-5.2	34287	10910
4	2480	1178	785	-1.1	34287	-2.3	34287	10910
4	3100	1178	785	4.9	34287	7.0	34287	10910
5	0	1178	785	4.9	34287	7.0	34287	10910
5	610	1178	785	0.4	34287	-1.8	34287	10910
5	915	1178	785	-1.8	34287	-5.3	34287	10910
5	1220	1178	785	-3.5	34287	-7.8	34287	10910
5	1525	1178	785	-4.7	34287	-9.1	34287	10910
5	1788	1178	785	-5.4	34287	-9.4	34287	10910
5	1830	1178	785	-7.3	34287	-12.4	34287	10910
5	2135	1178	785	-6.0	34287	-10.6	34287	10910
5	2440	1178	785	-4.3	34287	-7.8	34287	10910
5	2745	1178	785	-2.2	34287	-4.0	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

6:6

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	513	1178	1131	-29.3	33769	11557	-34.9	33769	12922
1	1027	1178	1131	-46.1	33769	11805	-50.9	33769	12581
1	1540	1178	1131	-84.7	33769	12540	-88.5	33769	12890
1	2053	1178	1131	-96.4	33769	11222	-111.9	33769	12362
1	2567	1178	1131	-113.3	33769	11140	-124.9	33769	11878
1	3076	1178	1131	-133.6	33769	11439	-135.4	33769	11541
1	3080	1178	1131	-133.4	33769	11436	-135.4	33769	11544
1	3593	1178	1240	-119.6	33813	11318	-130.1	33813	11965
1	4107	1178	1240	-114.4	33813	12228	-114.6	33813	12240
1	4620	1178	1240	-112.5	33813	12644	-105.8	33813	12161
1	5133	1178	1240	-92.1	33813	12502	-89.6	33813	12286
1	5647	1178	1175	-65.6	33787	12461	-63.2	33787	12164
1	6673	1178	1131	-50.2	33769	11633	-51.0	33769	11759
1	6898	1178	1131	-49.3	33769	11472	-52.0	33769	11878
1	7187	1178	1131	-46.5	33769	11298	-50.4	33769	11913
1	7700	1178	785	-36.7	34287	11557	-43.5	34287	12877

Stijfheden (blijvend en quasi-blijvend)

Balk

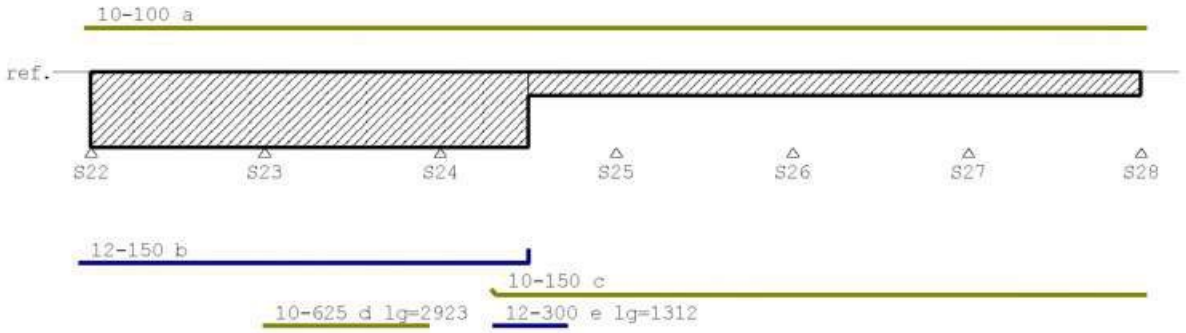
6:6

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
1	8217	1178	785	-25.4	34287	11550	-29.7	34287	12768
1	9250	1178	785	15.4	34287	11961	20.4	34287	14216
2	0	1178	785	15.4	34287	11961	21.6	34287	14688
2	155	1178	785	13.5	34287	11762	17.0	34287	13644
2	310	1178	785	11.2	34287	11471	13.2	34287	12763
2	465	1178	785	9.4	34287	11220	10.0	34287	11692
2	620	1178	785	8.5	34287	11295	7.5	34287	10280
2	775	1178	785	8.3	34287	11355	5.6	34287	8610
2	930	1178	785	8.1	34287	11411	4.4	34287	7324
2	1240	1178	785	8.3	34287	11499	4.1	34287	6875
2	1395	1178	785	8.5	34287	11527	4.9	34287	7798
2	1550	1178	785	8.9	34287	11544	6.5	34287	9234
3	0	1178	785	8.9	34287	11544	3.6	34287	5891
3	155	1178	785	6.0	34287	11474	2.5	34287	5963
3	465	1178	785	5.9	34287	11471	2.2	34287	5470
3	620	1178	785	6.0	34287	11450	3.1	34287	6999
3	775	1178	785	6.3	34287	11419	4.6	34287	9174
3	930	1178	785	6.9	34287	11371	6.8	34287	11306
3	1085	1178	785	8.3	34287	11442	9.7	34287	12672
3	1240	1178	785	10.4	34287	11790	13.3	34287	13724
3	1395	1178	785	12.9	34287	12070	17.5	34287	14521
3	1550	1178	785	15.8	34287	12292	22.4	34287	15124
4	0	1178	785	15.8	34287	12292	20.0	34287	14179
4	310	1178	785	5.5	34287	12536	8.1	34287	15757
4	930	1178	785	-5.7	34287	12037	-7.6	34287	14430
4	1240	1178	785	-8.9	34287	11859	-11.5	34287	13926
4	1537	1178	785	-10.5	34287	11581	-12.7	34287	13103
4	1550	1178	785	-10.5	34287	11566	-12.7	34287	13056
4	1860	1178	785	-8.3	34287	12161	-11.4	34287	14772
4	2170	1178	785	-6.5	34287	12544	-9.5	34287	15779
4	2480	1178	785	-3.1	34287	13223	-5.0	34287	17400
4	3100	1178	785	8.4	34287	12312	11.9	34287	15177
5	0	1178	785	8.4	34287	12312	14.0	34287	16544
5	610	1178	785	-3.3	34287	15736	-7.0	34287	22052
5	915	1178	785	-7.7	34287	13824	-13.7	34287	18685
5	1220	1178	785	-10.6	34287	13370	-17.8	34287	17727
5	1525	1178	785	-12.1	34287	13083	-19.4	34287	17081
5	1788	1178	785	-12.1	34287	12836	-24.5	34287	18785
5	1830	1178	785	-15.8	34287	12791	-24.3	34287	16390
5	2135	1178	785	-13.7	34287	12883	-21.4	34287	16614
5	2440	1178	785	-10.2	34287	12944	-16.0	34287	16756
5	2745	1178	785	-5.1	34287	12951	-8.1	34287	16773

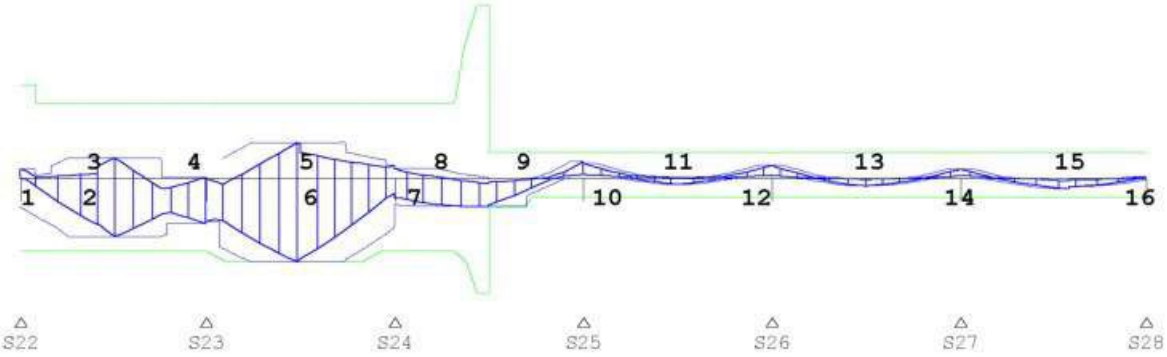
Hoofdwapening Fysisch lineair

Balk

7:7



MEd dekkingslijn Fysisch lineair Balk
7:7



Hoofdwapening Balk
7:7

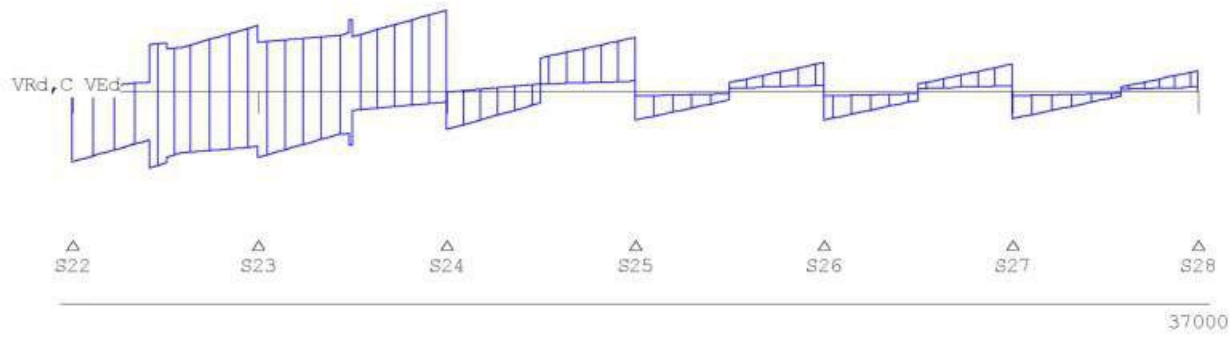
Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S22+0	37.75	399.83	722	Bov	904*	1179	10-100	54
2	S23-1500	86.37	321.05	722	Bov	904*	1179	10-100	54
3	S23-1500	-251.64	-307.92	721	Ond	931*	1132	12-150	1
4	S23+0	-195.68	-309.98	722	Ond	904*	1132	12-150	54
5	S23+1500	-357.22	-358.33	744	Ond	1323*	1132	12-150	1
					Ond		189	+10-625	
6	S23+1500	151.82	321.13	721	Bov	904*	1179	10-100	54
7	S24+0	52.86	321.05	722	Bov	904*	1179	10-100	54
8	S24+1344	-122.04	-489.61	443	Ond	904*	1132	12-150	54
9	S24+1550	-122.04	-123.85	156	Ond	1348	786	10-150	
					Ond		566	+12-300	
10	S25+0	69.29	110.30	152	Bov	750	1179	10-100	
11	S25+1550	-26.60	-79.82	115	Ond	435*	786	10-150	54
12	S26+0	54.91	110.30	152	Bov	660*	1179	10-100	1
13	S26+1550	-34.58	-79.82	115	Ond	465*	786	10-150	1
14	S27+0	39.00	110.30	152	Bov	525*	1179	10-100	1
15	S28-1262	-45.07	-79.82	115	Ond	605*	786	10-150	1
16	S28-0	6.76	110.30	152	Bov	435*	1179	10-100	54

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4 Balk
7:7

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S22+0	Bov	8.47	260	0.029	0.008	1.17	0.350	0.02	
1	S23-639	Ond	-108.78	312	0.394	0.123	1.17	0.350	0.35	
2	S23+0	Ond	-108.78	302	0.391	0.118	1.17	0.350	0.34	
2	S23+1500	Ond	-122.07	302	0.380	0.115	1.17	0.350	0.33	
3	S25+0	Bov	38.34	260	0.497	0.129	1.17	0.350	0.37	
3	S24+1550	Ond	-66.00	258	0.775	0.201	1.17	0.350	0.57	
3	S24+1344	Ond	-66.04	293	0.227	0.067	1.17	0.350	0.19	
4	S25+0	Bov	38.34	260	0.497	0.129	1.17	0.350	0.37	
4	S25+1550	Ond	-11.04	260	0.211	0.055	1.17	0.350	0.16	
5	S26+0	Bov	28.73	260	0.372	0.097	1.17	0.350	0.28	
5	S26+1550	Ond	-17.91	260	0.342	0.089	1.17	0.350	0.25	
6	S27+0	Bov	21.10	260	0.273	0.071	1.17	0.350	0.20	
6	S28-1262	Ond	-23.92	260	0.457	0.119	1.17	0.350	0.34	

DWARSKRACHTEN Fysisch lineair combinatie — Balk 7:7 Fundamentele



Stijfheden (blijvend en quasi-blijvend) — Balk 7:7

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{sg} [kNm]	E_{sg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	305	1178	1131	-13.9	33769	-16.8	33769	10396
1	610	1178	1131	-33.4	33769	-38.9	33769	10396
1	915	1178	1131	-51.2	33769	-58.8	33769	10396
1	1220	1178	1131	-67.5	33769	-76.6	33769	10396
1	1263	1178	1131	-69.7	33769	-78.9	33769	10396
1	1830	1178	1131	-68.8	33769	-79.1	33769	10396
1	2135	1178	1131	-77.1	33769	-86.6	33769	10396
1	2440	1178	1131	-83.9	33769	-92.0	33769	10396
1	2465	1178	1131	-84.4	33769	-92.3	33769	10396
1	2745	1178	1131	-89.1	33769	-95.2	33769	10396
2	310	1178	1302	-90.4	33838	-97.4	33838	10465
2	620	1178	1319	-89.3	33846	-98.4	33846	10472
2	930	1178	1319	-86.7	33846	-97.2	33846	10472
2	949	1178	1319	-86.5	33846	-97.1	33846	10472
2	1550	1178	1319	-76.7	33846	-88.1	33846	10472
2	1550	1178	1319	-76.7	33846	-88.1	33846	10472
2	1860	1178	1319	-78.7	33846	-89.4	33846	10472
2	2170	1178	1319	-64.8	33846	-73.1	33846	10472
2	2480	1178	1319	-49.3	33846	-54.5	33846	10472
2	2790	1178	1193	-32.2	33794	-33.7	33794	10421
3	310	1178	1131	-36.3	33769	-37.3	33769	10396
3	620	1178	1131	-43.1	33769	-46.9	33769	10396
3	930	1178	1131	-48.4	33769	-54.3	33769	10396
3	1240	1178	2107	-52.2	33879	-59.6	33879	10504
3	1550	1178	2482	-54.4	33921	-62.6	33921	10545
3	1550	1178	1351	-54.4	34698	-62.6	34698	11323
3	1860	1178	1351	-35.6	34698	-41.6	34698	11323
3	2170	1178	1131	-21.2	34539	-24.7	34539	11166
3	2790	1178	785	9.2	34287	12.6	34287	10910
3	3100	1178	785	25.2	34287	33.1	34287	10910
4	0	1178	785	25.2	34287	33.1	34287	10910
4	310	1178	785	16.0	34287	19.7	34287	10910
4	620	1178	785	10.4	34287	11.1	34287	10910
4	1240	1178	785	0.9	34287	-2.7	34287	10910
4	1550	1178	785	-3.1	34287	-7.8	34287	10910
4	1550	1178	785	-3.1	34287	-7.8	34287	10910
4	1860	1178	785	-0.5	34287	-4.0	34287	10910
4	2480	1178	785	6.5	34287	7.4	34287	10910
4	2790	1178	785	10.8	34287	14.9	34287	10910
4	3100	1178	785	15.7	34287	23.5	34287	10910
5	0	1178	785	15.7	34287	23.5	34287	10910
5	310	1178	785	8.0	34287	11.9	34287	10910
5	930	1178	785	-1.6	34287	-3.5	34287	10910
5	1240	1178	785	-5.6	34287	-9.5	34287	10910

Stijfheden (blijvend en quasi-blijvend)

Balk

7:7

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
5	1550	1178	785	-9.1	34287	-14.4	34287	10910
5	1550	1178	785	-9.1	34287	-14.4	34287	10910
5	1860	1178	785	-5.7	34287	-9.9	34287	10910
5	2170	1178	785	-2.7	34287	-5.3	34287	10910
5	2790	1178	785	4.9	34287	7.3	34287	10910
5	3100	1178	785	9.3	34287	15.3	34287	10910
6	0	1178	785	9.3	34287	15.3	34287	10910
6	305	1178	785	6.1	34287	8.3	34287	10910
6	915	1178	785	-2.7	34287	-6.1	34287	10910
6	1220	1178	785	-6.4	34287	-11.7	34287	10910
6	1525	1178	785	-9.6	34287	-16.2	34287	10910
6	1788	1178	785	-12.1	34287	-19.2	34287	10910
6	1830	1178	785	-9.3	34287	-15.3	34287	10910
6	2135	1178	785	-7.6	34287	-12.9	34287	10910
6	2440	1178	785	-5.5	34287	-9.4	34287	10910
6	2745	1178	785	-2.9	34287	-4.8	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

7:7

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	305	1178	1131	-19.2	33769	11401	-23.5	33769	12939
1	610	1178	1131	-44.4	33769	11378	-51.8	33769	12563
1	915	1178	1131	-67.5	33769	11406	-76.5	33769	12377
1	1220	1178	1131	-88.3	33769	11448	-97.6	33769	12218
1	1263	1178	1131	-91.0	33769	11454	-100.3	33769	12195
1	1830	1178	1131	-93.7	33769	11659	-103.0	33769	12390
1	2135	1178	1131	-94.7	33769	11045	-108.8	33769	12103
1	2440	1178	1131	-97.4	33769	10811	-110.9	33769	11787
1	2465	1178	1131	-97.8	33769	10812	-110.9	33769	11759
1	2745	1178	1131	-104.0	33769	11046	-109.4	33769	11421
2	310	1178	1302	-106.0	33838	11086	-113.8	33838	11621
2	620	1178	1319	-113.4	33846	11519	-119.6	33846	11933
2	930	1178	1319	-118.5	33846	11952	-121.8	33846	12164
2	949	1178	1319	-118.7	33846	11979	-121.8	33846	12176
2	1550	1178	1319	-119.7	33846	12805	-132.8	33846	13637
2	1550	1178	1319	-119.7	33846	12805	-132.8	33846	13637
2	1860	1178	1319	-113.7	33846	12281	-114.5	33846	12335
2	2170	1178	1319	-93.3	33846	12313	-92.4	33846	12241
2	2480	1178	1319	-70.6	33846	12436	-66.6	33846	11979
2	2790	1178	1193	-45.8	33794	12752	-37.1	33794	11131
3	310	1178	1131	-45.1	33769	11818	-39.5	33769	10827
3	620	1178	1131	-53.7	33769	11396	-55.7	33769	11669
3	930	1178	1131	-60.1	33769	11138	-68.1	33769	12087
3	1240	1178	2107	-64.5	33879	11088	-76.8	33879	12429
3	1550	1178	2482	-68.1	33921	11165	-81.8	33921	12580
3	1550	1178	1351	-68.1	20938	9760	-81.8	9877	6813
3	1860	1178	1351	-45.6	34698	12035	-55.6	34698	13638
3	2170	1178	1131	-27.1	34539	11858	-32.9	34539	13423
3	2790	1178	785	14.9	34287	12189	20.6	34287	14848
3	3100	1178	785	38.3	34287	12035	51.5	34287	14426
4	0	1178	785	38.3	34287	12035	46.9	34287	13653
4	310	1178	785	22.2	34287	11808	28.4	34287	13777
4	620	1178	785	11.7	34287	11288	12.6	34287	11897
4	1240	1178	785	-5.0	34287	16032	-10.8	34287	22492
4	1550	1178	785	-10.8	34287	13532	-18.8	34287	18188
4	1550	1178	785	-10.8	34287	13532	-18.8	34287	18188
4	1860	1178	785	-6.3	34287	14531	-12.0	34287	20046
4	2480	1178	785	8.0	34287	11494	9.5	34287	12833
4	2790	1178	785	17.6	34287	12183	24.3	34287	14832
4	3100	1178	785	28.7	34287	12454	41.8	34287	15548
5	0	1178	785	28.7	34287	12454	39.7	34287	15110

Stijfheden (blijvend en quasi-blijvend)

Balk

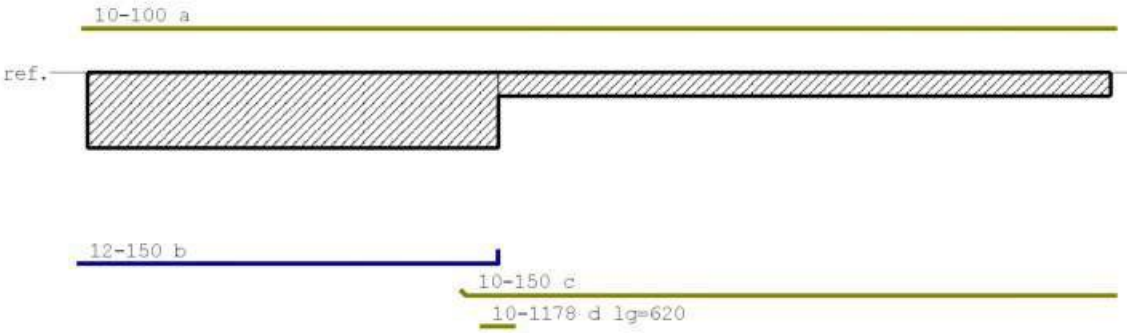
7:7

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
5	310	1178	785	14.5	34287	12438	21.1	34287	15508
5	930	1178	785	-4.9	34287	13376	-8.1	34287	17741
5	1240	1178	785	-12.2	34287	12795	-18.7	34287	16401
5	1550	1178	785	-17.9	34287	12595	-26.7	34287	15908
5	1550	1178	785	-17.9	34287	12595	-26.7	34287	15908
5	1860	1178	785	-12.8	34287	12860	-19.9	34287	16557
5	2170	1178	785	-7.1	34287	13158	-11.6	34287	17253
5	2790	1178	785	9.0	34287	12467	13.1	34287	15581
5	3100	1178	785	19.3	34287	12701	29.3	34287	16172
6	0	1178	785	19.3	34287	12701	31.1	34287	16661
6	305	1178	785	9.8	34287	12164	13.4	34287	14780
6	915	1178	785	-8.4	34287	13392	-14.1	34287	17775
6	1220	1178	785	-15.2	34287	12962	-24.0	34287	16799
6	1525	1178	785	-20.5	34287	12759	-31.4	34287	16313
6	1788	1178	785	-23.9	34287	12616	-35.8	34287	15961
6	1830	1178	785	-19.3	34287	12695	-29.2	34287	16155
6	2135	1178	785	-16.4	34287	12768	-25.1	34287	16335
6	2440	1178	785	-12.0	34287	12801	-18.5	34287	16415
6	2745	1178	785	-6.1	34287	12729	-9.3	34287	16239

Hoofdwapening Fysisch lineair

Balk

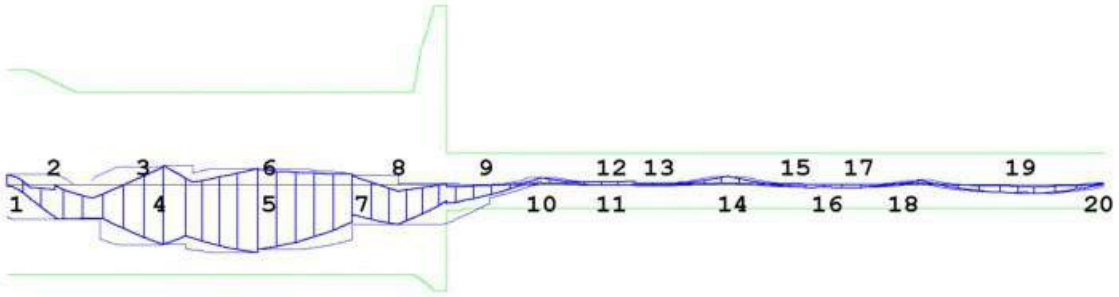
8:8



MEd dekkingslijn Fysisch lineair

Balk

8:8



Hoofdwapening

Balk

8:8

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	35.08	399.83	722	Bov	904*	1179	10-100	54
2	1019	-119.62	-307.92	721	Ond	904*	1132	12-150	54
3	2572	-209.79	-307.92	721	Ond	904*	1132	12-150	54
4	2572	66.17	321.05	722	Bov	904*	1179	10-100	54
5	4122	56.63	321.05	722	Bov	904*	1179	10-100	54
6	4122	-233.84	-307.92	721	Ond	904*	1132	12-150	54
7	5672	37.19	321.05	722	Bov	904*	1179	10-100	54

Hoofdwapening

Balk
8:8

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
8	6420	-137.29	-307.92	721	Ond	904*	1132	12-150	54
9	7222	-81.53	-87.70	123	Ond	886	786	10-150	
					Ond		101	+10-1178	
10	8772	25.05	110.30	152	Bov	435*	1179	10-100	54
11	10322	10.25	110.30	152	Bov	435*	1179	10-100	54
12	9944	-2.94	-79.82	115	Ond	435*	786	10-150	54
13	10613	-4.19	-79.82	115	Ond	435*	786	10-150	54
14	11872	29.22	110.30	152	Bov	435*	1179	10-100	54
15	13215	-9.12	-79.82	115	Ond	435*	786	10-150	54
16	13422	0.50	110.30	152	Bov	435*	1179	10-100	54
17	13823	-10.42	-79.82	115	Ond	435*	786	10-150	54
18	14972	16.04	110.30	152	Bov	435*	1179	10-100	54
19	16760	-31.99	-79.82	115	Ond	435*	786	10-150	54
20	18022	4.80	110.30	152	Bov	435*	1179	10-100	54

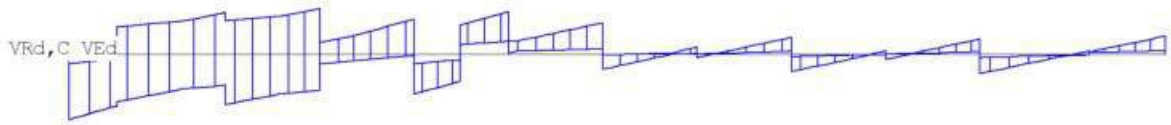
Opmerkingen
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4

Balk
8:8

Geb.	Pos. [mm]	Zijde	$M_{x;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	8772	Bov	14.71	260	0.191	0.050	1.17	0.350	0.14	
1	7222	Ond	-44.15	260	0.752	0.196	1.17	0.350	0.56	
1	4122	Ond	-98.06	312	0.355	0.111	1.17	0.350	0.32	
2	8772	Bov	14.71	260	0.191	0.050	1.17	0.350	0.14	
3	11730	Bov	15.31	260	0.198	0.052	1.17	0.350	0.15	
4	11872	Bov	15.31	260	0.198	0.052	1.17	0.350	0.15	
4	13823	Ond	-4.13	260	0.079	0.021	1.17	0.350	0.06	
5	14972	Bov	8.96	260	0.116	0.030	1.17	0.350	0.09	
5	16760	Ond	-16.80	260	0.321	0.083	1.17	0.350	0.24	

DWARSKRACHTEN Fysisch lineair — Balk 8:8 Fundamentele combinatie



36044

Stijfheden (blijvend en quasi-blijvend)

Balk
8:8

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	516	1178	1131	-32.8	33769	-36.8	33769	10396
1	1032	1178	1131	-60.1	33769	-65.9	33769	10396
1	1548	1178	1131	-67.2	33769	-74.7	33769	10396
1	1942	1178	1131	-69.5	33769	-77.3	33769	10396
1	2063	1178	1131	-69.7	33769	-77.4	33769	10396
1	3095	1178	1131	-71.2	33769	-79.8	33769	10396
1	3548	1178	1131	-73.9	33769	-82.9	33769	10396
1	3611	1178	1131	-74.0	33769	-82.9	33769	10396

Stijfheden (blijvend en quasi-blijvend)

Balk

8:8

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	4127	1178	1131	-67.1	33769	-75.6	33769	10396
1	4643	1178	1131	-63.7	33769	-71.5	33769	10396
1	5159	1178	1131	-55.9	33769	-61.3	33769	10396
1	6190	1178	1131	-61.1	33769	-64.5	33769	10396
1	6420	1178	1131	-72.1	33769	-75.8	33769	10396
1	6706	1178	1246	-56.0	33782	-59.6	33782	10409
1	7222	1178	885	-23.6	34362	-25.6	34362	10986
1	7739	1178	785	-19.6	34287	-22.1	34287	10910
1	8772	1178	785	10.1	34287	12.9	34287	10910
2	0	1178	785	10.1	34287	12.9	34287	10910
2	155	1178	785	8.0	34287	9.9	34287	10910
2	310	1178	785	7.3	34287	8.3	34287	10910
2	465	1178	785	6.8	34287	7.0	34287	10910
2	620	1178	785	6.4	34287	6.4	34287	10910
2	775	1178	785	6.1	34287	6.1	34287	10910
2	930	1178	785	5.9	34287	5.9	34287	10910
2	1240	1178	785	6.1	34287	6.1	34287	10910
2	1395	1178	785	6.3	34287	6.3	34287	10910
2	1550	1178	785	6.7	34287	6.7	34287	10910
3	0	1178	785	6.7	34287	6.7	34287	10910
3	288	1178	785	3.3	34287	2.2	34287	10910
3	310	1178	785	3.3	34287	2.2	34287	10910
3	620	1178	785	4.0	34287	4.0	34287	10910
3	775	1178	785	4.5	34287	4.5	34287	10910
3	930	1178	785	5.1	34287	5.1	34287	10910
3	1085	1178	785	5.9	34287	6.6	34287	10910
3	1240	1178	785	6.8	34287	8.4	34287	10910
3	1395	1178	785	7.8	34287	10.4	34287	10910
3	1550	1178	785	8.9	34287	12.8	34287	10910
4	0	1178	785	8.9	34287	12.8	34287	10910
4	310	1178	785	4.8	34287	6.3	34287	10910
4	930	1178	785	0.8	34287	-0.4	34287	10910
4	1240	1178	785	-0.4	34287	-2.0	34287	10910
4	1380	1178	785	-0.8	34287	-2.4	34287	10910
4	1860	1178	785	-0.9	34287	-2.8	34287	10910
4	1960	1178	785	-0.9	34287	-2.8	34287	10910
4	2170	1178	785	-0.6	34287	-2.4	34287	10910
4	2480	1178	785	0.3	34287	-0.9	34287	10910
4	3100	1178	785	3.5	34287	5.6	34287	10910
5	0	1178	785	3.5	34287	5.6	34287	10910
5	610	1178	785	-1.1	34287	-3.3	34287	10910
5	915	1178	785	-3.4	34287	-7.0	34287	10910
5	1220	1178	785	-5.3	34287	-9.6	34287	10910
5	1525	1178	785	-6.8	34287	-11.1	34287	10910
5	1788	1178	785	-7.6	34287	-11.6	34287	10910
5	1830	1178	785	-8.2	34287	-13.3	34287	10910
5	2135	1178	785	-6.9	34287	-11.5	34287	10910
5	2440	1178	785	-5.3	34287	-8.8	34287	10910
5	2745	1178	785	-3.2	34287	-4.9	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

8:8

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	516	1178	1131	-39.5	33769	10910	-46.2	33769	12103
1	1032	1178	1131	-70.1	33769	10855	-79.2	33769	11768
1	1548	1178	1131	-79.8	33769	10872	-92.4	33769	11981
1	1942	1178	1131	-86.7	33769	11237	-95.4	33769	11970
1	2063	1178	1131	-88.4	33769	11382	-95.1	33769	11941
1	3095	1178	1131	-90.7	33769	11340	-99.8	33769	12076
1	3548	1178	1131	-96.9	33769	11556	-103.8	33769	12084
1	3611	1178	1131	-97.4	33769	11589	-103.8	33769	12073

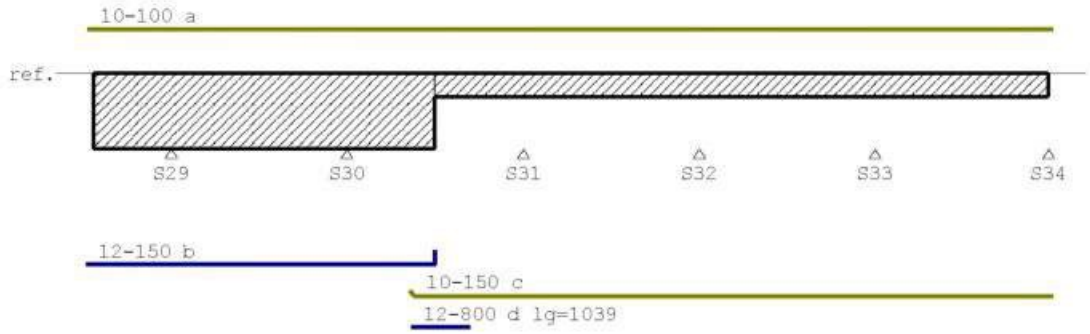
Stijfheden (blijvend en quasi-blijvend)

Balk

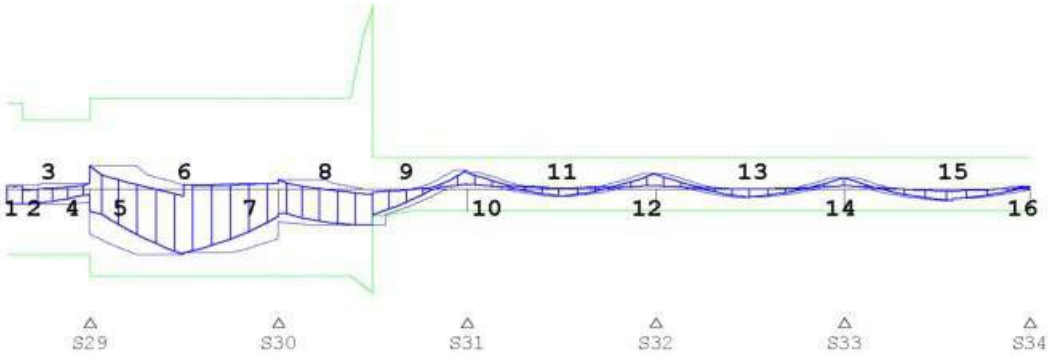
8:8

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
1	4127	1178	1131	-92.2	33769	11879	-95.4	33769	12140
1	4643	1178	1131	-86.4	33769	11802	-89.9	33769	12108
1	5159	1178	1131	-74.4	33769	11839	-74.1	33769	11801
1	6190	1178	1131	-71.7	33769	11172	-72.2	33769	11233
1	6420	1178	1131	-82.1	33769	10985	-84.3	33769	11178
1	6706	1178	1246	-64.9	33782	11036	-67.8	33782	11370
1	7222	1178	885	-29.0	34362	11955	-40.1	34362	14573
1	7739	1178	785	-24.0	34287	11547	-27.8	34287	12706
1	8772	1178	785	14.7	34287	11923	19.3	34287	14109
2	0	1178	785	14.7	34287	11923	19.0	34287	13987
2	155	1178	785	11.2	34287	11847	14.5	34287	13890
2	310	1178	785	9.0	34287	11495	10.7	34287	12837
2	465	1178	785	7.3	34287	11244	7.5	34287	11440
2	620	1178	785	6.7	34287	11325	5.0	34287	9208
2	775	1178	785	6.5	34287	11395	3.2	34287	6734
2	930	1178	785	6.4	34287	11459	2.0	34287	4743
2	1240	1178	785	6.6	34287	11550	1.8	34287	4137
2	1395	1178	785	6.9	34287	11573	2.7	34287	5629
2	1550	1178	785	7.3	34287	11582	4.2	34287	7766
3	0	1178	785	7.3	34287	11582	0.6	34287	1450
3	288	1178	785	1.4	34287	7930	-0.5	34287	-4396
3	310	1178	785	1.4	34287	7944	-0.5	34287	-4290
3	620	1178	785	4.3	34287	11594	1.0	34287	3660
3	775	1178	785	4.8	34287	11512	2.8	34287	7731
3	930	1178	785	5.5	34287	11429	5.2	34287	11036
3	1085	1178	785	7.1	34287	11453	8.3	34287	12706
3	1240	1178	785	9.4	34287	11825	12.1	34287	13826
3	1395	1178	785	12.2	34287	12100	16.6	34287	14604
3	1550	1178	785	15.3	34287	12307	21.7	34287	15164
4	0	1178	785	15.3	34287	12307	20.3	34287	14623
4	310	1178	785	7.3	34287	12039	9.8	34287	14437
4	930	1178	785	-1.2	34287	19796	-3.3	34287	26857
4	1240	1178	785	-3.1	34287	14237	-5.8	34287	19498
4	1380	1178	785	-3.5	34287	13742	-6.1	34287	18517
4	1860	1178	785	-4.1	34287	13830	-7.3	34287	18699
4	1960	1178	785	-4.1	34287	13917	-7.4	34287	18873
4	2170	1178	785	-3.7	34287	14199	-6.8	34287	19426
4	2480	1178	785	-1.7	34287	16102	-3.7	34287	22594
4	3100	1178	785	7.0	34287	12643	10.5	34287	16027
5	0	1178	785	7.0	34287	12643	12.9	34287	17760
5	610	1178	785	-4.8	34287	13853	-8.5	34287	18744
5	915	1178	785	-9.4	34287	13199	-15.3	34287	17346
5	1220	1178	785	-12.5	34287	12935	-19.6	34287	16735
5	1525	1178	785	-14.1	34287	12711	-21.3	34287	16195
5	1788	1178	785	-14.2	34287	12487	-25.3	34287	17313
5	1830	1178	785	-16.6	34287	12671	-25.1	34287	16097
5	2135	1178	785	-14.6	34287	12734	-22.3	34287	16252
5	2440	1178	785	-11.1	34287	12732	-16.9	34287	16248
5	2745	1178	785	-6.1	34287	12554	-9.0	34287	15803

Hoofdwapening Fysisch lineair Balk
9:9



MEd dekkingslijn Fysisch lineair Balk
9:9



Hoofdwapening Balk
9:9

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S29-1353	8.38	302.51	590	Bov	904*	1179	10-100	2,54
2	S29-1103	8.34	302.51	590	Bov	904*	1179	10-100	2,54
3	S29-0	-50.60	-232.33	590	Ond	904*	1132	12-150	2,54
4	S29-0	16.62	242.01	590	Bov	904*	1179	10-100	2,54
5	S29+0	78.94	321.05	722	Bov	904*	1179	10-100	54
6	S29+1550	-235.28	-307.92	721	Ond	904*	1132	12-150	54
7	S30+0	30.00	321.05	722	Bov	904*	1179	10-100	54
8	S30+1409	-129.38	-347.66	552	Ond	904*	1132	12-150	54
9	S30+1550	-96.04	-96.33	132	Ond	1049	786	10-150	28
					Ond		213	+12-800	
10	S31+0	62.38	110.30	152	Bov	673	1179	10-100	
11	S31+1550	-28.19	-79.82	115	Ond	435*	786	10-150	54
12	S32+0	51.29	110.30	152	Bov	660*	1179	10-100	1
13	S32+1550	-32.53	-79.82	115	Ond	437*	786	10-150	1
14	S33+0	37.35	110.30	152	Bov	502*	1179	10-100	1
15	S34-1262	-43.35	-79.82	115	Ond	584*	786	10-150	1
16	S34-0	6.50	110.30	152	Bov	435*	1179	10-100	54

Hoofdwapening

Balk 9:9

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[2] Benodigde wapening en inwendige hefboomsarm zijn bepaald volgens gedrongen ligger detaillering, zie nationale bijlage art. 6.1(10).
[28] Berekening van Ab houdt geen rekening met wapening gedrukte zijde.
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4

Balk 9:9

Geb.	Pos. [mm]	Zijde	$M_{g;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S29-705	Bov	3.71	260	0.013	0.003	1.17	0.350	0.01	
1	S29-1453	Ond	-32.76	312	0.119	0.037	1.17	0.350	0.11	
2	S29+0	Bov	3.71	260	0.013	0.003	1.17	0.350	0.01	
2	S29+930	Ond	-123.10	312	0.446	0.139	1.17	0.350	0.40	
3	S31+0	Bov	34.40	260	0.446	0.116	1.17	0.350	0.33	
3	S31-1340	Ond	-51.56	269	0.787	0.212	1.17	0.350	0.61	
3	S30+852	Ond	-69.95	312	0.253	0.079	1.17	0.350	0.23	
4	S31+0	Bov	34.40	260	0.446	0.116	1.17	0.350	0.33	
4	S31+1550	Ond	-12.30	260	0.235	0.061	1.17	0.350	0.17	
5	S32+0	Bov	26.30	260	0.341	0.089	1.17	0.350	0.25	
5	S32+1550	Ond	-15.78	260	0.301	0.078	1.17	0.350	0.22	
6	S33+0	Bov	19.68	260	0.255	0.066	1.17	0.350	0.19	
6	S34-1262	Ond	-23.17	260	0.443	0.115	1.17	0.350	0.33	

DWARSKRACHTEN Fysisch lineair Balk 9:9 Fundamentele combinatie

Stijfheden (blijvend en quasi-blijvend)

Balk 9:9

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	59	1178	1131	-27.1	33769	-29.5	33769	10396
1	135	1178	1131	-26.6	33769	-29.1	33769	10396
1	271	1178	1131	-25.5	33769	-28.1	33769	10396
1	406	1178	1131	-24.1	33769	-26.7	33769	10396
1	541	1178	1131	-22.4	33769	-24.8	33769	10396
1	676	1178	1131	-20.4	33769	-22.5	33769	10396
1	812	1178	1131	-18.1	33769	-19.8	33769	10396
1	947	1178	1131	-15.5	33769	-16.7	33769	10396
1	1082	1178	1131	-12.5	33769	-13.1	33769	10396
1	1218	1178	1131	-9.3	33769	-9.3	33769	10396
2	310	1178	1131	-31.6	33769	-32.4	33769	10396
2	620	1178	1131	-50.2	33769	-55.8	33769	10396

Stijfheden (blijvend en quasi-blijvend)

Balk

9:9

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	930	1178	1131	-67.4	33769	-77.0	33769	10396
2	1240	1178	1131	-82.9	33769	-95.9	33769	10396
2	1550	1178	1131	-96.8	33769	-112.6	33769	10396
2	1550	1178	1131	-96.8	33769	-112.6	33769	10396
2	1860	1178	1131	-80.0	33769	-90.0	33769	10396
2	2170	1178	1131	-72.3	33769	-81.0	33769	10396
2	2480	1178	1131	-62.9	33769	-69.7	33769	10396
2	2790	1178	1131	-52.0	33769	-56.2	33769	10396
3	310	1178	1131	-44.5	33769	-45.0	33769	10396
3	620	1178	1131	-49.6	33769	-53.2	33769	10396
3	930	1178	1131	-53.1	33769	-59.2	33769	10396
3	1240	1178	1285	-55.1	33787	-63.0	33787	10413
3	1550	1178	2125	-55.5	33881	-64.6	33881	10506
3	1550	1178	997	-55.5	34442	-64.6	28983	4492
3	1860	1178	946	-28.8	34405	-34.1	34405	11030
3	2170	1178	788	-16.9	34289	-20.0	34289	10912
3	2790	1178	785	8.5	34287	11.8	34287	10910
3	3100	1178	785	22.0	34287	29.5	34287	10910
4	0	1178	785	22.0	34287	29.5	34287	10910
4	310	1178	785	13.1	34287	16.6	34287	10910
4	620	1178	785	8.0	34287	8.4	34287	10910
4	1240	1178	785	-0.6	34287	-4.4	34287	10910
4	1550	1178	785	-4.1	34287	-9.0	34287	10910
4	1550	1178	785	-4.1	34287	-9.0	34287	10910
4	1860	1178	785	-1.6	34287	-5.2	34287	10910
4	2480	1178	785	4.9	34287	5.6	34287	10910
4	2790	1178	785	8.8	34287	12.8	34287	10910
4	3100	1178	785	13.3	34287	21.1	34287	10910
5	0	1178	785	13.3	34287	21.1	34287	10910
5	310	1178	785	7.9	34287	11.7	34287	10910
5	930	1178	785	-0.4	34287	-2.5	34287	10910
5	1240	1178	785	-3.8	34287	-7.9	34287	10910
5	1550	1178	785	-6.7	34287	-12.1	34287	10910
5	1550	1178	785	-6.7	34287	-12.1	34287	10910
5	1860	1178	785	-4.3	34287	-8.7	34287	10910
5	2170	1178	785	-1.7	34287	-4.4	34287	10910
5	2790	1178	785	5.2	34287	7.6	34287	10910
5	3100	1178	785	9.3	34287	15.3	34287	10910
6	0	1178	785	9.3	34287	15.3	34287	10910
6	305	1178	785	5.0	34287	7.2	34287	10910
6	915	1178	785	-3.2	34287	-6.5	34287	10910
6	1220	1178	785	-6.7	34287	-11.8	34287	10910
6	1525	1178	785	-9.7	34287	-15.9	34287	10910
6	1788	1178	785	-11.9	34287	-18.7	34287	10910
6	1830	1178	785	-9.7	34287	-15.4	34287	10910
6	2135	1178	785	-7.8	34287	-12.8	34287	10910
6	2440	1178	785	-5.5	34287	-9.0	34287	10910
6	2745	1178	785	-2.8	34287	-4.2	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

9:9

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	59	1178	1131	-32.4	33769	11079	-35.0	33769	11670
1	135	1178	1131	-31.8	33769	11033	-34.9	33769	11743
1	271	1178	1131	-30.5	33769	10992	-34.1	33769	11842
1	406	1178	1131	-29.1	33769	11033	-32.7	33769	11903
1	541	1178	1131	-27.3	33769	11089	-30.5	33769	11922
1	676	1178	1131	-25.0	33769	11168	-27.6	33769	11892
1	812	1178	1131	-22.4	33769	11281	-23.9	33769	11793
1	947	1178	1131	-19.3	33769	11455	-19.6	33769	11579
1	1082	1178	1131	-15.7	33769	11744	-14.5	33769	11139

Stijfheden (blijvend en quasi-blijvend)

Balk

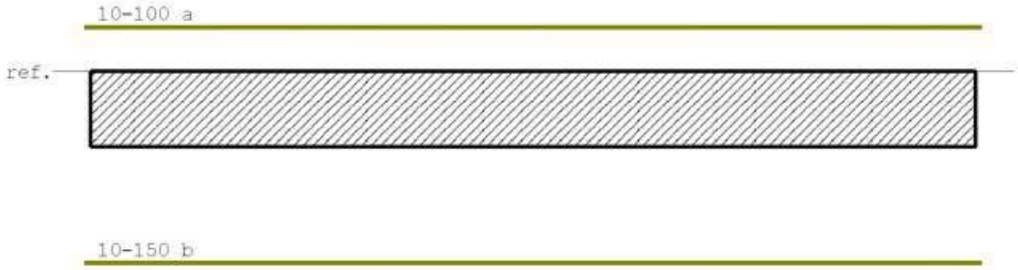
9:9

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
1	1218	1178	1131	-11.9	33769	12280	-8.7	33769	9966
2	310	1178	1131	-42.6	33769	12458	-34.5	33769	10850
2	620	1178	1131	-65.7	33769	11601	-68.9	33769	11963
2	930	1178	1131	-86.5	33769	11253	-99.4	33769	12323
2	1240	1178	1131	-105.1	33769	11065	-126.3	33769	12473
2	1550	1178	1131	-123.1	33769	11049	-149.4	33769	12532
2	1550	1178	1131	-123.1	33769	11049	-149.4	33769	12532
2	1860	1178	1131	-102.1	33769	11327	-113.3	33769	12121
2	2170	1178	1131	-92.0	33769	11341	-101.3	33769	12069
2	2480	1178	1131	-79.7	33769	11387	-85.5	33769	11917
2	2790	1178	1131	-65.2	33769	11490	-65.9	33769	11577
3	310	1178	1131	-52.4	33769	11531	-46.1	33769	10569
3	620	1178	1131	-59.8	33769	11259	-61.6	33769	11479
3	930	1178	1131	-65.0	33769	11080	-73.4	33769	12003
3	1240	1178	1285	-68.3	33787	11001	-81.5	33787	12351
3	1550	1178	2125	-70.7	33881	11167	-85.9	33881	12668
3	1550	1178	997	-70.7	13133	4031	-85.9	6927	3497
3	1860	1178	946	-37.7	34405	11791	-46.7	34405	13493
3	2170	1178	788	-22.1	34289	11667	-27.4	34289	13356
3	2790	1178	785	13.9	34287	12203	19.3	34287	14886
3	3100	1178	785	34.4	34287	12096	46.8	34287	14593
4	0	1178	785	34.4	34287	12096	42.7	34287	13837
4	310	1178	785	18.9	34287	11901	24.7	34287	14048
4	620	1178	785	8.8	34287	11281	9.3	34287	11697
4	1240	1178	785	-6.9	34287	14537	-13.2	34287	20056
4	1550	1178	785	-12.3	34287	13334	-20.5	34287	17649
4	1550	1178	785	-12.3	34287	13334	-20.5	34287	17649
4	1860	1178	785	-7.7	34287	13941	-13.8	34287	18923
4	2480	1178	785	6.1	34287	11556	7.4	34287	13025
4	2790	1178	785	15.4	34287	12346	22.0	34287	15266
4	3100	1178	785	26.3	34287	12605	39.3	34287	15932
5	0	1178	785	26.3	34287	12605	38.8	34287	15833
5	310	1178	785	14.3	34287	12439	20.7	34287	15508
5	930	1178	785	-3.9	34287	14425	-7.4	34287	19852
5	1240	1178	785	-10.6	34287	13229	-17.5	34287	17414
5	1550	1178	785	-15.8	34287	12945	-24.9	34287	16761
5	1550	1178	785	-15.8	34287	12945	-24.9	34287	16761
5	1860	1178	785	-11.7	34287	13169	-19.0	34287	17279
5	2170	1178	785	-6.3	34287	13648	-10.9	34287	18323
5	2790	1178	785	9.3	34287	12407	13.3	34287	15428
5	3100	1178	785	19.4	34287	12713	29.4	34287	16201
6	0	1178	785	19.4	34287	12713	29.6	34287	16236
6	305	1178	785	8.7	34287	12345	12.4	34287	15266
6	915	1178	785	-8.7	34287	13162	-14.2	34287	17263
6	1220	1178	785	-15.2	34287	12874	-23.6	34287	16591
6	1525	1178	785	-20.1	34287	12711	-30.6	34287	16197
6	1788	1178	785	-23.2	34287	12585	-34.5	34287	15881
6	1830	1178	785	-19.3	34287	12625	-28.9	34287	15983
6	2135	1178	785	-16.1	34287	12690	-24.4	34287	16145
6	2440	1178	785	-11.4	34287	12702	-17.3	34287	16174
6	2745	1178	785	-5.2	34287	12528	-7.7	34287	15737

Hoofdwapening Fysisch lineair

Balk

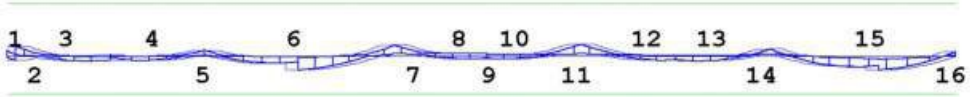
10:10



MEd dekkingslijn Fysisch lineair

Balk

10:10



Hoofdwapening

Balk

10:10

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	134	-10.12	-79.82	115	Ond	435*	786	10-150	54
2	134	18.52	110.30	152	Bov	435*	1179	10-100	54
3	1300	-11.09	-79.82	115	Ond	435*	786	10-150	54
4	1617	-10.07	-79.82	115	Ond	435*	786	10-150	54
5	3234	11.13	110.30	152	Bov	435*	1179	10-100	54
6	4784	-29.49	-79.82	115	Ond	435*	786	10-150	54
7	6334	22.61	110.30	152	Bov	435*	1179	10-100	54
8	7553	-6.54	-79.82	115	Ond	435*	786	10-150	54
9	7884	3.99	110.30	152	Bov	435*	1179	10-100	54
10	8193	-6.31	-79.82	115	Ond	435*	786	10-150	54
11	9434	23.91	110.30	152	Bov	435*	1179	10-100	54
12	10741	-9.17	-79.82	115	Ond	435*	786	10-150	54
13	11375	-10.83	-79.82	115	Ond	435*	786	10-150	54
14	12534	13.71	110.30	152	Bov	435*	1179	10-100	54
15	14322	-30.32	-79.82	115	Ond	435*	786	10-150	54
16	15584	8.55	110.30	152	Bov	435*	1179	10-100	54

Opmerkingen

[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk

10:10

Geb.	Pos. [mm]	Zijde	$M_{g;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	134	Bov	9.02	260	0.117	0.030	1.17	0.350	0.09	
1	1300	Ond	-6.27	260	0.120	0.031	1.17	0.350	0.09	
2	6334	Bov	12.59	260	0.163	0.042	1.17	0.350	0.12	
2	4784	Ond	-16.57	260	0.316	0.082	1.17	0.350	0.24	
3	6334	Bov	12.59	260	0.163	0.042	1.17	0.350	0.12	
3	7774	Ond	-0.54	260	0.010	0.003	1.17	0.350	0.01	
4	9285	Bov	12.22	260	0.158	0.041	1.17	0.350	0.12	
4	8193	Ond	-1.15	260	0.022	0.006	1.17	0.350	0.02	
5	9434	Bov	12.22	260	0.158	0.041	1.17	0.350	0.12	
5	11375	Ond	-4.56	260	0.087	0.023	1.17	0.350	0.06	
6	12534	Bov	7.64	260	0.099	0.026	1.17	0.350	0.07	
6	14322	Ond	-16.12	260	0.308	0.080	1.17	0.350	0.23	

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Stijfheden (blijvend en quasi-blijvend) Balk 10:10

Veld	Pos [mm]	Aboven [mm²]	Aonder [mm²]	Mεg [kNm]	Eεg* [N/mm²]	MQb [kNm]	EQb;on* [N/mm²]	EQb;∞* [N/mm²]
1	134	1178	785	0.3	34287	0.8	34287	10910
1	323	1178	785	3.0	34287	4.2	34287	10910
1	970	1178	785	-2.5	34287	-3.5	34287	10910
1	1294	1178	785	-4.2	34287	-5.3	34287	10910
1	1344	1178	785	-4.4	34287	-5.5	34287	10910
1	1617	1178	785	-5.3	34287	-5.8	34287	10910
1	2257	1178	785	-3.2	34287	-4.2	34287	10910
1	2264	1178	785	-3.2	34287	-4.2	34287	10910
1	2587	1178	785	-2.2	34287	-3.0	34287	10910
1	3234	1178	785	1.6	34287	3.3	34287	10910
2	0	1178	785	1.6	34287	3.3	34287	10910
2	620	1178	785	-3.2	34287	-4.1	34287	10910
2	930	1178	785	-4.8	34287	-6.3	34287	10910
2	1135	1178	785	-5.6	34287	-7.0	34287	10910
2	1550	1178	785	-6.5	34287	-6.9	34287	10910
2	1550	1178	785	-6.5	34287	-6.9	34287	10910
2	1860	1178	785	-10.8	34287	-12.5	34287	10910
2	2170	1178	785	-7.0	34287	-8.6	34287	10910
2	2480	1178	785	-2.6	34287	-3.5	34287	10910
2	3100	1178	785	7.7	34287	10.3	34287	10910
3	0	1178	785	7.7	34287	10.3	34287	10910
3	155	1178	785	6.5	34287	8.3	34287	10910
3	310	1178	785	5.5	34287	6.3	34287	10910
3	465	1178	785	4.6	34287	4.6	34287	10910
3	620	1178	785	3.8	34287	3.8	34287	10910
3	930	1178	785	2.6	34287	1.2	34287	10910
3	1085	1178	785	2.3	34287	0.7	34287	10910
3	1212	1178	785	2.0	34287	0.5	34287	10910
3	1240	1178	785	2.0	34287	0.5	34287	10910
3	1395	1178	785	1.9	34287	0.5	34287	10910
4	155	1178	785	1.0	34287	-0.2	34287	10910
4	310	1178	785	1.1	34287	-0.3	34287	10910
4	310	1178	785	1.1	34287	-0.3	34287	10910
4	465	1178	785	1.3	34287	-0.0	34287	10910
4	620	1178	785	1.6	34287	0.5	34287	10910
4	930	1178	785	2.7	34287	2.7	34287	10910
4	1085	1178	785	3.4	34287	3.9	34287	10910
4	1240	1178	785	4.3	34287	5.6	34287	10910
4	1395	1178	785	5.2	34287	7.6	34287	10910
4	1550	1178	785	6.4	34287	9.9	34287	10910
5	0	1178	785	6.4	34287	9.9	34287	10910
5	310	1178	785	3.8	34287	5.0	34287	10910
5	930	1178	785	0.1	34287	-1.2	34287	10910
5	1240	1178	785	-0.9	34287	-2.6	34287	10910
5	1334	1178	785	-1.1	34287	-2.8	34287	10910
5	1860	1178	785	-1.2	34287	-3.2	34287	10910

Stijfheden (blijvend en quasi-blijvend)

Balk
10:10

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
5	1942	1178	785	-1.1	34287	-3.2	34287	10910
5	2170	1178	785	-0.7	34287	-2.7	34287	10910
5	2480	1178	785	0.2	34287	-1.0	34287	10910
5	3100	1178	785	3.6	34287	5.7	34287	10910
6	0	1178	785	3.6	34287	5.7	34287	10910
6	610	1178	785	-1.3	34287	-3.4	34287	10910
6	915	1178	785	-3.4	34287	-6.6	34287	10910
6	1220	1178	785	-5.0	34287	-8.8	34287	10910
6	1465	1178	785	-6.0	34287	-9.7	34287	10910
6	1788	1178	785	-6.8	34287	-9.9	34287	10910
6	1830	1178	785	-8.0	34287	-12.7	34287	10910
6	2135	1178	785	-6.5	34287	-10.6	34287	10910
6	2440	1178	785	-4.6	34287	-7.3	34287	10910
6	3050	1178	785	0.7	34287	2.4	34287	10910

Stijfheden (frequent en karakteristiek)

Balk
10:10

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	134	1178	785	1.2	34287	13795	13.1	34287	30220
1	323	1178	785	5.0	34287	12254	7.0	34287	15023
1	970	1178	785	-4.2	34287	12296	-5.9	34287	15136
1	1294	1178	785	-6.0	34287	11895	-7.9	34287	14030
1	1344	1178	785	-6.2	34287	11822	-7.9	34287	13818
1	1617	1178	785	-6.3	34287	11522	-6.8	34287	12211
1	2257	1178	785	-4.8	34287	12015	-6.4	34287	14368
1	2264	1178	785	-4.8	34287	12022	-6.4	34287	14388
1	2587	1178	785	-3.5	34287	12160	-4.9	34287	14769
1	3234	1178	785	4.4	34287	13189	7.2	34287	17323
2	0	1178	785	4.4	34287	13189	8.1	34287	18333
2	620	1178	785	-4.8	34287	12030	-6.4	34287	14410
2	930	1178	785	-7.2	34287	11990	-9.6	34287	14300
2	1135	1178	785	-7.9	34287	11842	-10.2	34287	13876
2	1550	1178	785	-7.6	34287	11635	-17.8	34287	18750
2	1550	1178	785	-7.6	34287	11635	-17.8	34287	18750
2	1860	1178	785	-13.6	34287	11550	-16.4	34287	13006
2	2170	1178	785	-9.6	34287	11781	-12.2	34287	13700
2	2480	1178	785	-4.0	34287	12034	-5.4	34287	14421
2	3100	1178	785	12.1	34287	12094	16.4	34287	14588
3	0	1178	785	12.1	34287	12094	17.5	34287	15132
3	155	1178	785	9.5	34287	11946	12.6	34287	14174
3	310	1178	785	6.9	34287	11562	8.3	34287	13042
3	465	1178	785	4.9	34287	11363	4.7	34287	11099
3	620	1178	785	4.1	34287	11473	1.8	34287	6268
3	930	1178	785	0.3	34287	3685	-2.0	34287	-100296
3	1085	1178	785	-0.3	34287	-8699	-2.9	34287	73473
3	1212	1178	785	-0.5	34287	-32983	-3.1	34287	52499
3	1240	1178	785	-0.5	34287	-37471	-3.1	34287	51480
3	1395	1178	785	-0.4	34287	-15725	-2.6	34287	61346
4	155	1178	785	-1.0	34287	23541	-3.0	34287	29716
4	310	1178	785	-1.1	34287	22990	-3.4	34287	29358
4	310	1178	785	-1.1	34287	22990	-3.4	34287	29358
4	465	1178	785	-0.9	34287	32976	-3.0	34287	33897
4	620	1178	785	-0.2	34287	-7586	-2.0	34287	77106
4	930	1178	785	2.9	34287	11433	2.0	34287	8860
4	1085	1178	785	4.2	34287	11508	5.0	34287	12879
4	1240	1178	785	6.5	34287	12032	8.7	34287	14416
4	1395	1178	785	9.1	34287	12345	13.0	34287	15264
4	1550	1178	785	12.2	34287	12550	18.1	34287	15793
5	0	1178	785	12.2	34287	12550	18.1	34287	15816
5	310	1178	785	5.9	34287	12098	8.0	34287	14600
5	930	1178	785	-2.1	34287	15403	-4.3	34287	21531

Stijfheden (blijvend en quasi-blijvend)

Balk

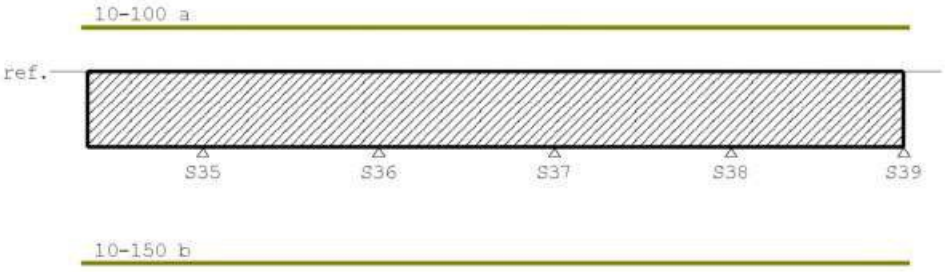
10:10

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]	
5	1240	1178	785	-3.7	34287	13729	-6.4	34287	18492
5	1334	1178	785	-3.8	34287	13514	-6.6	34287	18040
5	1860	1178	785	-4.6	34287	13627	-7.9	34287	18278
5	1942	1178	785	-4.6	34287	13711	-8.0	34287	18455
5	2170	1178	785	-4.0	34287	14028	-7.3	34287	19094
5	2480	1178	785	-1.9	34287	15738	-4.0	34287	22054
5	3100	1178	785	7.1	34287	12575	10.5	34287	15856
6	0	1178	785	7.1	34287	12575	11.0	34287	16250
6	610	1178	785	-4.8	34287	13653	-8.4	34287	18334
6	915	1178	785	-8.8	34287	13123	-14.3	34287	17173
6	1220	1178	785	-11.3	34287	12865	-17.6	34287	16568
6	1465	1178	785	-12.2	34287	12669	-18.4	34287	16092
6	1788	1178	785	-11.9	34287	12342	-24.1	34287	18244
6	1830	1178	785	-15.9	34287	12613	-23.8	34287	15952
6	2135	1178	785	-13.3	34287	12667	-20.0	34287	16087
6	2440	1178	785	-9.1	34287	12635	-13.7	34287	16008
6	3050	1178	785	3.6	34287	14021	6.5	34287	19081

Hoofdwapening Fysisch lineair

Balk

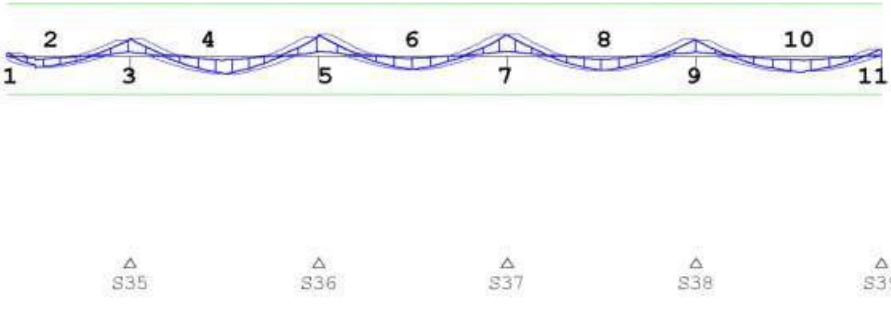
11:11



MEd dekkingslijn Fysisch lineair

Balk

11:11



Hoofdwapening

Balk

11:11

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S35-2015	6.19	110.30	152	Bov	435*	1179	10-100	54
2	S35-1550	-24.30	-79.82	115	Ond	435*	786	10-150	54
3	S35+0	36.04	110.30	152	Bov	485*	1179	10-100	1
4	S35+1550	-38.02	-79.82	115	Ond	511*	786	10-150	1
5	S36+0	44.71	110.30	152	Bov	602*	1179	10-100	1
6	S36+1550	-28.89	-79.82	115	Ond	435*	786	10-150	54
7	S37+0	44.16	110.30	152	Bov	595*	1179	10-100	1
8	S37+1550	-30.80	-79.82	115	Ond	435*	786	10-150	54
9	S38+0	35.35	110.30	152	Bov	475*	1179	10-100	1
10	S39-1262	-33.65	-79.82	115	Ond	452*	786	10-150	1
11	S39-0	13.88	110.30	152	Bov	435*	1179	10-100	54

Hoofdwapening

Balk
11:11

Geb.	Pos. [mm]	M_{Sd} [kNm]	M_{Rd} [kNm]	z B/O [mm]	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.

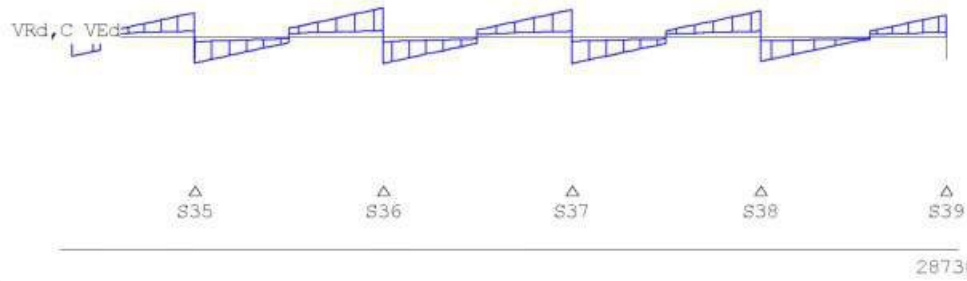
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
11:11

Geb.	Pos. [mm]	Zijde	$M_{S;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S35-196	Bov	20.33	260	0.263	0.068	1.17	0.350	0.20	
1	S35-1758	Ond	-15.10	260	0.288	0.075	1.17	0.350	0.21	
2	S36+0	Bov	24.09	260	0.312	0.081	1.17	0.350	0.23	
2	S35+1550	Ond	-20.63	260	0.394	0.102	1.17	0.350	0.29	
3	S36+0	Bov	24.09	260	0.312	0.081	1.17	0.350	0.23	
3	S36+1550	Ond	-15.41	260	0.294	0.077	1.17	0.350	0.22	
4	S37+0	Bov	22.85	260	0.296	0.077	1.17	0.350	0.22	
4	S37+1550	Ond	-16.02	260	0.306	0.080	1.17	0.350	0.23	
5	S38+0	Bov	18.73	260	0.243	0.063	1.17	0.350	0.18	
5	S39-1262	Ond	-18.79	260	0.359	0.093	1.17	0.350	0.27	

DWARSKRACHTEN Fysisch lineair — Balk 11:11 Fundamentele combinatie



Stijfheden (blijvend en quasi-blijvend)

Balk
11:11

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	202	1178	785	-3.6	34287	-4.2	34287	10910
1	403	1178	785	-7.3	34287	-9.0	34287	10910
1	465	1178	785	-8.4	34287	-10.4	34287	10910
1	604	1178	785	-10.5	34287	-12.4	34287	10910
1	806	1178	785	-7.9	34287	-9.8	34287	10910
1	1008	1178	785	-5.1	34287	-6.6	34287	10910
1	1209	1178	785	-2.1	34287	-2.9	34287	10910
1	1612	1178	785	4.8	34287	5.9	34287	10910
1	1814	1178	785	8.5	34287	11.2	34287	10910
1	2015	1178	785	12.5	34287	16.9	34287	10910
2	0	1178	785	12.5	34287	16.9	34287	10910
2	310	1178	785	5.8	34287	7.6	34287	10910
2	930	1178	785	-4.9	34287	-7.5	34287	10910
2	1240	1178	785	-9.5	34287	-13.2	34287	10910
2	1550	1178	785	-13.5	34287	-17.8	34287	10910
2	1550	1178	785	-13.5	34287	-17.8	34287	10910
2	1860	1178	785	-9.2	34287	-12.9	34287	10910
2	2170	1178	785	-5.0	34287	-7.1	34287	10910
2	2790	1178	785	5.1	34287	7.9	34287	10910
2	3100	1178	785	11.0	34287	17.3	34287	10910
3	0	1178	785	11.0	34287	17.3	34287	10910

Stijfheden (blijvend en quasi-blijvend)

Balk

11:11

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
3	310	1178	785	8.1	34287	11.0	34287	10910
3	930	1178	785	-0.9	34287	-3.0	34287	10910
3	1240	1178	785	-4.7	34287	-8.3	34287	10910
3	1550	1178	785	-7.9	34287	-12.4	34287	10910
3	1550	1178	785	-7.9	34287	-12.4	34287	10910
3	1860	1178	785	-4.1	34287	-7.6	34287	10910
3	2170	1178	785	-1.1	34287	-3.0	34287	10910
3	2790	1178	785	6.4	34287	9.8	34287	10910
3	3100	1178	785	10.9	34287	17.9	34287	10910
4	0	1178	785	10.9	34287	17.9	34287	10910
4	310	1178	785	6.4	34287	9.7	34287	10910
4	930	1178	785	-1.8	34287	-3.8	34287	10910
4	1240	1178	785	-5.1	34287	-8.9	34287	10910
4	1550	1178	785	-7.9	34287	-12.8	34287	10910
4	1550	1178	785	-7.9	34287	-12.8	34287	10910
4	1860	1178	785	-5.4	34287	-9.5	34287	10910
4	2170	1178	785	-2.4	34287	-5.1	34287	10910
4	2790	1178	785	5.0	34287	7.2	34287	10910
4	3100	1178	785	9.5	34287	15.0	34287	10910
5	0	1178	785	9.5	34287	15.0	34287	10910
5	305	1178	785	4.8	34287	6.7	34287	10910
5	915	1178	785	-2.8	34287	-5.6	34287	10910
5	1220	1178	785	-5.9	34287	-10.0	34287	10910
5	1525	1178	785	-8.6	34287	-13.4	34287	10910
5	1788	1178	785	-10.6	34287	-15.5	34287	10910
5	1830	1178	785	-8.9	34287	-13.8	34287	10910
5	2135	1178	785	-6.8	34287	-10.7	34287	10910
5	2440	1178	785	-4.1	34287	-6.6	34287	10910
5	3050	1178	785	2.4	34287	4.9	34287	10910

Stijfheden (frequent en karakteristiek)

Balk

11:11

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	202	1178	785	-4.5	34287	11515	-5.4	34287	12901
1	403	1178	785	-10.1	34287	11783	-12.8	34287	13704
1	465	1178	785	-11.7	34287	11799	-18.1	34287	15395
1	604	1178	785	-13.7	34287	11650	-16.8	34287	13310
1	806	1178	785	-11.0	34287	11807	-14.0	34287	13776
1	1008	1178	785	-7.6	34287	11977	-10.1	34287	14261
1	1209	1178	785	-3.5	34287	12288	-5.0	34287	15114
1	1612	1178	785	6.7	34287	11865	8.7	34287	13943
1	1814	1178	785	12.9	34287	12025	17.3	34287	14397
1	2015	1178	785	19.8	34287	12121	27.1	34287	14663
2	0	1178	785	19.8	34287	12121	28.6	34287	15129
2	310	1178	785	8.8	34287	12029	11.9	34287	14408
2	930	1178	785	-9.2	34287	12478	-13.4	34287	15610
2	1240	1178	785	-15.7	34287	12232	-22.0	34287	14963
2	1550	1178	785	-20.6	34287	12049	-28.0	34287	14530
2	1550	1178	785	-20.6	34287	12049	-28.0	34287	14530
2	1860	1178	785	-15.3	34287	12248	-21.4	34287	15008
2	2170	1178	785	-8.6	34287	12327	-12.2	34287	15218
2	2790	1178	785	9.8	34287	12540	14.5	34287	15769
2	3100	1178	785	21.4	34287	12581	31.9	34287	15873
3	0	1178	785	21.4	34287	12581	34.7	34287	16605
3	310	1178	785	13.0	34287	12150	17.8	34287	14743
3	930	1178	785	-4.5	34287	13904	-8.0	34287	18848
3	1240	1178	785	-10.7	34287	12901	-16.8	34287	16656
3	1550	1178	785	-15.4	34287	12594	-23.0	34287	15904
3	1550	1178	785	-15.4	34287	12594	-23.0	34287	15904
3	1860	1178	785	-10.0	34287	13003	-15.8	34287	16895
3	2170	1178	785	-4.2	34287	13660	-7.3	34287	18349

Stijfheden (blijvend en quasi-blijvend)

Balk

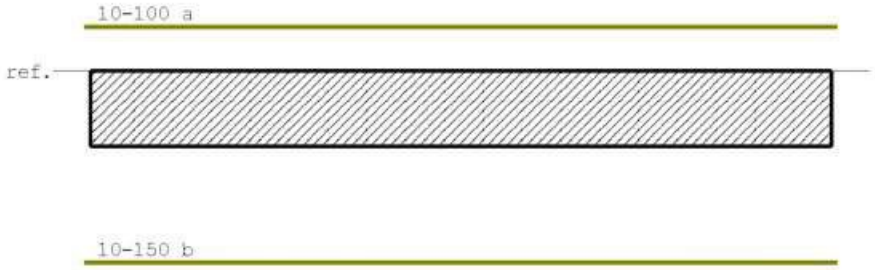
11:11

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
3	2790	1178	785	12.1	34287	12509	17.7	34287	15690
3	3100	1178	785	22.6	34287	12697	34.2	34287	16161
4	0	1178	785	22.6	34287	12697	34.5	34287	16223
4	310	1178	785	11.9	34287	12493	17.4	34287	15648
4	930	1178	785	-5.2	34287	13296	-8.6	34287	17564
4	1240	1178	785	-11.4	34287	12842	-17.7	34287	16515
4	1550	1178	785	-16.0	34287	12648	-24.1	34287	16070
4	1550	1178	785	-16.0	34287	12648	-24.1	34287	16070
4	1860	1178	785	-12.2	34287	12863	-19.0	34287	16565
4	2170	1178	785	-6.8	34287	13238	-11.2	34287	17434
4	2790	1178	785	8.6	34287	12321	12.3	34287	15200
4	3100	1178	785	18.7	34287	12612	28.0	34287	15950
5	0	1178	785	18.7	34287	12612	26.3	34287	15409
5	305	1178	785	7.9	34287	12210	11.0	34287	14905
5	915	1178	785	-7.4	34287	13126	-11.9	34287	17181
5	1220	1178	785	-12.8	34287	12773	-19.6	34287	16347
5	1525	1178	785	-16.6	34287	12564	-24.7	34287	15829
5	1788	1178	785	-18.8	34287	12391	-27.0	34287	15385
5	1830	1178	785	-17.1	34287	12538	-25.2	34287	15763
5	2135	1178	785	-13.4	34287	12611	-20.0	34287	15947
5	2440	1178	785	-8.2	34287	12615	-12.3	34287	15956
5	3050	1178	785	6.6	34287	13186	10.8	34287	17316

Hoofdwapening Fysisch lineair

Balk

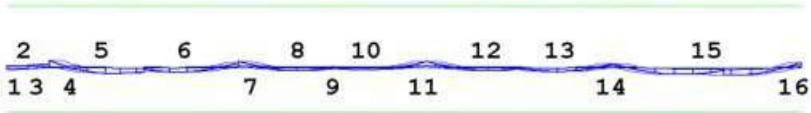
12:12



MEd dekkingslijn Fysisch lineair

Balk

12:12



Hoofdwapening

Balk

12:12

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	3.78	129.11	153	Bov	507*	1375	10-100	2,54,68
2	0	-5.00	-93.42	115	Ond	507*	917	10-150	2,54,68
3	695	5.96	129.11	153	Bov	507*	1375	10-100	2,54,68
4	695	13.44	129.11	153	Bov	507*	1375	10-100	54
5	1797	-12.70	-93.42	115	Ond	507*	917	10-150	54
6	2811	-9.64	-93.42	115	Ond	507*	917	10-150	54
7	3795	13.05	129.11	153	Bov	507*	1375	10-100	54
8	4791	-6.47	-93.42	115	Ond	507*	917	10-150	54
9	5345	1.14	129.11	153	Bov	507*	1375	10-100	54
10	5906	-5.57	-93.42	115	Ond	507*	917	10-150	54
11	6895	12.73	129.11	153	Bov	507*	1375	10-100	54
12	7899	-6.52	-93.42	115	Ond	507*	917	10-150	54
13	9021	-8.87	-93.42	115	Ond	507*	917	10-150	54
14	9995	8.59	129.11	153	Bov	507*	1375	10-100	54

Hoofdwapening

Balk
12:12

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
15	11846	-16.65	-93.42	115	Ond	507*	917	10-150	54
16	13045	9.50	129.11	153	Bov	507*	1375	10-100	54

Opmerkingen
[2] Benodigde wapening en inwendige hefboomsarm zijn bepaald volgens gedrongen ligger detaillering, zie nationale bijlage art. 6.1(10).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[68] MRd als gevolg van de gedrongen ligger berekening (NB. 6.1(10)) is groter dan MRd volgens 6.1(P). De momentweerstand en inwendige hefboomsarm volgens 6.1(P) zijn maatgevend en daarom alsnog toegepast.

Scheurvorming volgens artikel 7.3.4

Balk
12:12

Geb.	Pos. [mm]	Zijde	$M_{x;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	511	Bov	3.48	260	0.039	0.010	1.17	0.350	0.03	
1	-50	Ond	-3.24	260	0.053	0.014	1.17	0.350	0.04	
2	3795	Bov	7.03	260	0.078	0.020	1.17	0.350	0.06	
2	2021	Ond	-5.82	260	0.095	0.025	1.17	0.350	0.07	
3	3795	Bov	7.03	260	0.078	0.020	1.17	0.350	0.06	
3	5068	Ond	-2.90	260	0.048	0.012	1.17	0.350	0.04	
4	6895	Bov	6.41	260	0.071	0.019	1.17	0.350	0.05	
4	9021	Ond	-4.20	260	0.069	0.018	1.17	0.350	0.05	
5	13045	Bov	4.72	260	0.052	0.014	1.17	0.350	0.04	
5	11846	Ond	-9.39	260	0.154	0.040	1.17	0.350	0.11	

DWARSKRACHTEN Fysisch lineair — Balk 12:12 Fundamentele combinatie

26090

Stijfheden (blijvend en quasi-blijvend)

Balk
12:12

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1374	916	-2.9	34287	-1.9	34287	10910
1	99	1374	916	-2.3	34287	-1.6	34287	10910
1	298	1374	916	-0.9	34287	-0.5	34287	10910
1	397	1374	916	-0.1	34287	0.2	34287	10910
1	496	1374	916	0.8	34287	1.1	34287	10910
1	596	1374	916	1.7	34287	2.1	34287	10910
1	695	1374	916	2.7	34287	3.2	34287	10910
2	0	1374	916	2.7	34287	3.2	34287	10910
2	620	1374	916	-1.1	34287	-2.4	34287	10910
2	930	1374	916	-2.2	34287	-4.1	34287	10910
2	1123	1374	916	-2.5	34287	-4.5	34287	10910
2	1240	1374	916	-2.6	34287	-4.5	34287	10910
2	1550	1374	916	-2.3	34287	-3.6	34287	10910
2	2119	1374	916	-1.9	34287	-3.4	34287	10910
2	2170	1374	916	-1.9	34287	-3.4	34287	10910
2	2480	1374	916	-1.2	34287	-2.4	34287	10910
2	3100	1374	916	2.0	34287	3.5	34287	10910

Stijfheden

Balk

12:12

Veld	A_{bov} [mm²]	A_{ond} [mm²]	E_{totaal} [N/mm²]	E_{on} [N/mm²]	Pos [mm]	M_{Ek} [kNm]	M_{Eqp} [kNm]	M_{Eg} [kNm]	Veld-lengte [mm]
3	0	1374	916	2.0	34287	3.5	34287		10910
3	620	1374	916	0.2	34287	-0.6	34287		10910
3	930	1374	916	-0.7	34287	-2.0	34287		10910
3	1017	1374	916	-0.9	34287	-2.1	34287		10910
3	1240	1374	916	-1.1	34287	-2.0	34287		10910
3	1860	1374	916	-0.6	34287	-1.3	34287		10910
3	2114	1374	916	-0.6	34287	-1.7	34287		10910
3	2170	1374	916	-0.6	34287	-1.6	34287		10910
3	2790	1374	916	1.1	34287	1.5	34287		10910
3	3100	1374	916	2.9	34287	5.0	34287		10910
4	0	1374	916	2.9	34287	5.0	34287		10910
4	620	1374	916	-0.3	34287	-1.0	34287		10910
4	930	1374	916	-1.0	34287	-2.1	34287		10910
4	1014	1374	916	-1.1	34287	-2.2	34287		10910
4	1240	1374	916	-1.2	34287	-2.1	34287		10910
4	1860	1374	916	-1.6	34287	-2.9	34287		10910
4	2122	1374	916	-1.6	34287	-3.2	34287		10910
4	2170	1374	916	-1.5	34287	-3.1	34287		10910
4	2480	1374	916	-0.9	34287	-2.1	34287		10910
4	3100	1374	916	2.1	34287	3.5	34287		10910
5	0	1374	916	2.1	34287	3.5	34287		10910
5	610	1374	916	-2.0	34287	-4.0	34287		10910
5	915	1374	916	-3.0	34287	-5.5	34287		10910
5	1094	1374	916	-3.3	34287	-5.9	34287		10910
5	1220	1374	916	-3.4	34287	-5.9	34287		10910
5	1830	1374	916	-5.3	34287	-7.7	34287		10910
5	1832	1374	916	-5.3	34287	-7.7	34287		10910
5	2135	1374	916	-4.3	34287	-6.6	34287		10910
5	2440	1374	916	-2.7	34287	-4.3	34287		10910
5	3050	1374	916	2.0	34287	3.6	34287		10910

Stijfheden (frequent en karakteristiek)

Balk

12:12

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^{*}$ [N/mm²]	$E_{Ef,\infty}^{*}$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^{*}$ [N/mm²]	$E_{Ek;\infty}^{*}$ [N/mm²]
1	0	1374	916	-1.2	34287	7960	0.4	34287	-4171
1	99	1374	916	-1.1	34287	8384	0.1	34287	-1199
1	298	1374	916	-0.3	34287	6374	0.3	34287	-14922
1	397	1374	916	0.4	34287	16978	0.9	34287	22668
1	496	1374	916	1.3	34287	12227	1.7	34287	14667
1	596	1374	916	2.3	34287	11680	2.8	34287	13400
1	695	1374	916	3.5	34287	11593	4.3	34287	13139
2	0	1374	916	3.5	34287	11593	9.4	34287	19783
2	620	1374	916	-3.3	34287	13296	-5.4	34287	17565
2	930	1374	916	-5.4	34287	13034	-8.6	34287	16969
2	1123	1374	916	-5.8	34287	12929	-9.2	34287	16722
2	1240	1374	916	-5.8	34287	12858	-9.0	34287	16554
2	1550	1374	916	-4.4	34287	12542	-6.5	34287	15774
2	2119	1374	916	-4.4	34287	12901	-7.0	34287	16656
2	2170	1374	916	-4.4	34287	12926	-6.9	34287	16716
2	2480	1374	916	-3.2	34287	13071	-5.1	34287	17053
2	3100	1374	916	4.5	34287	12901	7.1	34287	16657
3	0	1374	916	4.5	34287	12901	10.1	34287	19718
3	620	1374	916	-1.2	34287	15983	-2.6	34287	22421
3	930	1374	916	-2.8	34287	13626	-4.8	34287	18276
3	1017	1374	916	-2.9	34287	13441	-4.9	34287	17881
3	1240	1374	916	-2.6	34287	13017	-4.2	34287	16929
3	1860	1374	916	-1.8	34287	13460	-3.1	34287	17923
3	2114	1374	916	-2.3	34287	13598	-4.0	34287	18217
3	2170	1374	916	-2.3	34287	13649	-4.0	34287	18324
3	2790	1374	916	1.8	34287	12216	2.5	34287	14921

Stijfheden (blijvend en quasi-blijvend)

Balk

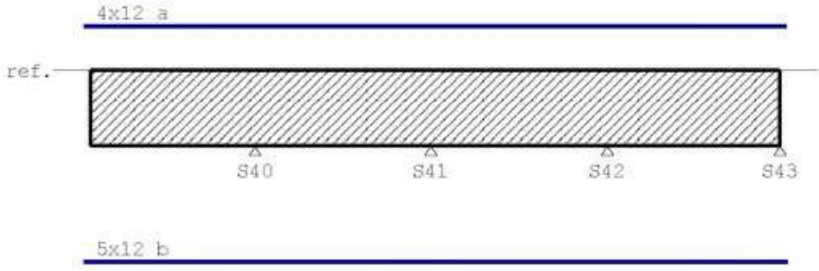
12:12

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
3	3100	1374	916	6.4	34287	12845	10.0	34287	16521
4	0	1374	916	6.4	34287	12845	9.8	34287	16384
4	620	1374	916	-1.5	34287	14088	-2.7	34287	19211
4	930	1374	916	-2.9	34287	13286	-4.8	34287	17541
4	1014	1374	916	-3.0	34287	13189	-4.9	34287	17324
4	1240	1374	916	-2.7	34287	12900	-4.2	34287	16652
4	1860	1374	916	-3.7	34287	12910	-5.8	34287	16677
4	2122	1374	916	-4.2	34287	13141	-6.8	34287	17215
4	2170	1374	916	-4.2	34287	13176	-6.8	34287	17293
4	2480	1374	916	-2.9	34287	13467	-5.0	34287	17938
4	3100	1374	916	4.4	34287	12747	6.8	34287	16284
5	0	1374	916	4.4	34287	12747	5.1	34287	13869
5	610	1374	916	-5.3	34287	13101	-8.5	34287	17124
5	915	1374	916	-7.2	34287	12965	-11.4	34287	16807
5	1094	1374	916	-7.6	34287	12877	-11.8	34287	16598
5	1220	1374	916	-7.5	34287	12800	-11.6	34287	16414
5	1830	1374	916	-9.4	34287	12364	-13.4	34287	15316
5	1832	1374	916	-9.3	34287	12366	-13.4	34287	15320
5	2135	1374	916	-8.2	34287	12549	-12.1	34287	15792
5	2440	1374	916	-5.4	34287	12658	-8.2	34287	16065
5	3050	1374	916	4.7	34287	12936	7.4	34287	16737

Hoofdwapening Fysisch lineair

Balk

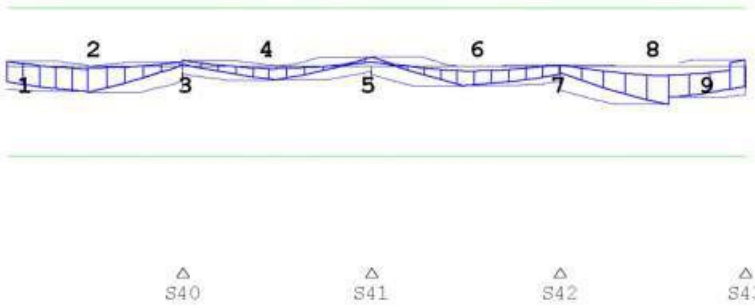
13:13



MEd dekkingslijn Fysisch lineair

Balk

13:13



Hoofdwapening

Balk

13:13

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S40-2881	9.08	122.13	669	Bov	399*	453	4x12	54
2	S40-1550	-55.24	-188.72	717	Ond	399*	566	5x12	54
3	S40+0	10.93	122.13	669	Bov	399*	453	4x12	54
4	S40+1550	-29.53	-188.72	717	Ond	399*	566	5x12	54
5	S41+0	19.06	122.13	669	Bov	399*	453	4x12	54
6	S41+1550	-42.37	-188.72	717	Ond	399*	566	5x12	54
7	S42+0	1.59	122.13	669	Bov	399*	453	4x12	54

Hoofdwapening

Balk
13:13

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
8	S43-1262	-81.49	-188.72	717	Ond	399*	566	5x12	54
9	S43-0	12.22	122.13	669	Bov	399*	453	4x12	54

Opmerkingen
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

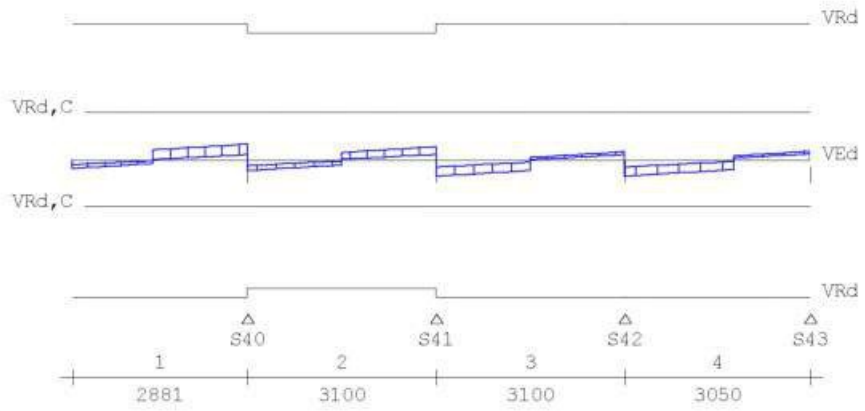
Scheurvorming volgens artikel 7.3.4

Balk
13:13

Geb.	Pos. [mm]	Zijde	$M_{g;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S40-619	Bov	9.40	312	0.086	0.027	1.00	0.300	0.09	
1	S40-2253	Ond	-26.09	312	0.192	0.060	1.00	0.300	0.20	
2	S41-668	Bov	12.94	312	0.119	0.037	1.00	0.300	0.12	
2	S40+980	Ond	-16.44	312	0.121	0.038	1.00	0.300	0.13	
3	S41+0	Bov	12.94	312	0.119	0.037	1.00	0.300	0.12	
3	S41+966	Ond	-23.31	312	0.172	0.054	1.00	0.300	0.18	
4	S42+0	Bov	0.99	312	0.009	0.003	1.00	0.300	0.01	
4	S42+1192	Ond	-44.57	312	0.329	0.103	1.00	0.300	0.34	

DWARSKRACHTEN Fysisch lineair

Balk 13:13 Fundamentele combinatie



Wring- en dwarskrachtwapening

Balk
13:13

Geb.	Vanaf [mm]	Tot [mm]	Beugels	Lengte [mm]	<Wringing> A_{langs} [mm²]	A_{bgl} [mm²/m]	<Dwarskr.> A_{bgl} [mm²/m]	A_{opg} [mm²]	V_{Ed} [kN]	T_{Ed} [kNm]	Opm.
1	S40-2881	S40+0	Ø8-200	2881	0	0	0	0	45.1	21	
2	S40+0	S41+0	Ø8-200	3100	0	0	0	0	37.7	21	
3	S41+0	S42+0	Ø8-200	3100	0	0	0	0	47.0	21	
4	S42+0	S43-0	Ø8-200	3050	0	0	0	0	47.0	25	

Wring- en dwarskrachten

Balk
13:13

Geb.	Vanaf [mm]	Tot [mm]	θ [°]	V_{Rd} [kN]	V_{Ed} [kN]	$V_{Rd,C}$ [kN]	$V_{Rd,Max}$ [kN]	T_{Ed} [kNm]	$T_{Rd,C}$ [kNm]	$T_{Rd,Max}$ [kNm]	V_{opg}	Opm.
1	S40-2881	S40+0	21.8	366	45	134	1306	21	93	251	0	
2	S40+0	S41+0	21.8	366	38	134	1218	21	93	251	0	
3	S41+0	S42+0	21.8	366	47	134	1218	21	93	251	0	
4	S42+0	S43-0	21.8	392	47	134	1306	25	93	251	0	

Stijfheden (blijvend en quasi-blijvend)

Balk

13:13

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{gq} [kNm]	E_{gq}^{*} [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^{*}$ [N/mm²]	$E_{Qb;\infty}^{*}$ [N/mm²]
1	288	452	565	-3.4	34012	-10.0	34012	10638
1	576	452	565	-7.3	34012	-14.2	34012	10638
1	864	452	565	-10.3	34012	-17.5	34012	10638
1	1152	452	565	-12.5	34012	-19.9	34012	10638
1	1331	452	565	-13.5	34012	-21.0	34012	10638
1	1440	452	565	-11.6	34012	-19.4	34012	10638
1	1729	452	565	-9.6	34012	-16.0	34012	10638
1	2017	452	565	-6.7	34012	-11.7	34012	10638
1	2305	452	565	-3.1	34012	-6.7	34012	10638
1	2593	452	565	1.4	34012	-0.8	34012	10638
2	0	452	565	6.8	34012	6.8	34012	10638
2	620	452	565	-1.2	34012	-3.6	34012	10638
2	930	452	565	-4.9	34012	-7.9	34012	10638
2	1240	452	565	-7.6	34012	-11.2	34012	10638
2	1550	452	565	-9.3	34012	-13.6	34012	10638
2	1550	452	565	-9.3	34012	-13.6	34012	10638
2	1860	452	565	-6.4	34012	-9.6	34012	10638
2	2170	452	565	-3.8	34012	-5.8	34012	10638
2	2790	452	565	4.3	34012	4.6	34012	10638
2	3100	452	565	9.8	34012	11.3	34012	10638
3	0	452	565	9.8	34012	11.3	34012	10638
3	620	452	565	-1.9	34012	-3.4	34012	10638
3	930	452	565	-6.6	34012	-9.7	34012	10638
3	1240	452	565	-10.4	34012	-14.9	34012	10638
3	1550	452	565	-13.2	34012	-19.3	34012	10638
3	1550	452	565	-13.2	34012	-19.3	34012	10638
3	1860	452	565	-12.2	34012	-17.7	34012	10638
3	2170	452	565	-10.4	34012	-15.5	34012	10638
3	2480	452	565	-7.6	34012	-12.4	34012	10638
3	2790	452	565	-3.8	34012	-8.3	34012	10638
4	305	452	565	-5.8	34012	-10.7	34012	10638
4	610	452	565	-11.3	34012	-17.8	34012	10638
4	915	452	565	-16.0	34012	-23.9	34012	10638
4	1220	452	565	-19.6	34012	-29.1	34012	10638
4	1525	452	565	-22.4	34012	-33.4	34012	10638
4	1788	452	565	-24.0	34012	-36.3	34012	10638
4	1830	452	565	-22.1	34012	-31.3	34012	10638
4	2135	452	565	-19.6	34012	-28.6	34012	10638
4	2440	452	565	-16.2	34012	-24.9	34012	10638
4	2745	452	565	-11.9	34012	-20.2	34012	10638

Stijfheden (frequent en karakteristiek)

Balk

13:13

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{gf} [kNm]	$E_{gf,on}^{*}$ [N/mm²]	$E_{gf,\infty}^{*}$ [N/mm²]	M_{gk} [kNm]	$E_{gk;on}^{*}$ [N/mm²]	$E_{gk;\infty}^{*}$ [N/mm²]
1	288	452	565	-14.4	34012	13454	-25.4	34012	18212
1	576	452	565	-18.7	34012	12783	-30.2	34012	16744
1	864	452	565	-22.2	34012	12473	-34.1	34012	16007
1	1152	452	565	-24.9	34012	12319	-37.2	34012	15625
1	1331	452	565	-26.1	34012	12270	-40.0	34012	15769
1	1440	452	565	-24.6	34012	12451	-37.6	34012	15952
1	1729	452	565	-20.3	34012	12445	-31.0	34012	15938
1	2017	452	565	-15.1	34012	12552	-23.5	34012	16199
1	2305	452	565	-9.1	34012	13016	-15.2	34012	17274
1	2593	452	565	-2.3	34012	19353	-6.0	34012	26425
2	0	452	565	7.1	34012	10926	5.1	34012	8672
2	620	452	565	-5.2	34012	13474	-9.2	34012	18254
2	930	452	565	-9.9	34012	12361	-15.0	34012	15730
2	1240	452	565	-13.7	34012	12116	-19.7	34012	15104
2	1550	452	565	-16.4	34012	12069	-23.5	34012	14982
2	1550	452	565	-16.4	34012	12069	-23.5	34012	14982
2	1860	452	565	-11.7	34012	12142	-17.0	34012	15172

Stijfheden (blijvend en quasi-blijvend)

Balk

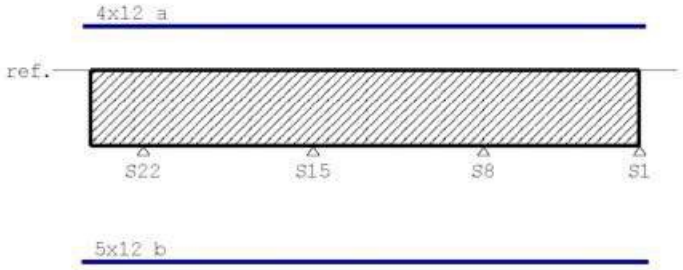
13:13

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
2	2170	452	565	-7.2	34012	12205	-10.5	34012	15335
2	2790	452	565	4.8	34012	10961	5.3	34012	11732
2	3100	452	565	12.3	34012	11257	14.7	34012	12669
3	0	452	565	12.3	34012	11257	15.5	34012	13079
3	620	452	565	-4.4	34012	12623	-7.0	34012	16368
3	930	452	565	-11.7	34012	12080	-16.8	34012	15010
3	1240	452	565	-18.0	34012	12039	-25.6	34012	14902
3	1550	452	565	-23.3	34012	12084	-33.5	34012	15021
3	1550	452	565	-23.3	34012	12084	-33.5	34012	15021
3	1860	452	565	-21.4	34012	12064	-30.6	34012	14968
3	2170	452	565	-19.0	34012	12155	-27.6	34012	15206
3	2480	452	565	-15.6	34012	12392	-23.7	34012	15807
3	2790	452	565	-11.3	34012	13000	-18.8	34012	17237
4	305	452	565	-14.0	34012	12682	-22.2	34012	16509
4	610	452	565	-22.1	34012	12281	-32.8	34012	15529
4	915	452	565	-29.2	34012	12156	-42.5	34012	15210
4	1220	452	565	-35.5	34012	12125	-51.3	34012	15129
4	1525	452	565	-40.8	34012	12141	-59.1	34012	15171
4	1788	452	565	-44.6	34012	12182	-65.1	34012	15275
4	1830	452	565	-37.5	34012	11986	-52.8	34012	14761
4	2135	452	565	-34.5	34012	12065	-49.3	34012	14972
4	2440	452	565	-30.6	34012	12214	-45.0	34012	15359
4	2745	452	565	-25.8	34012	12487	-39.7	34012	16042

Hoofdwapening Fysisch lineair

Balk

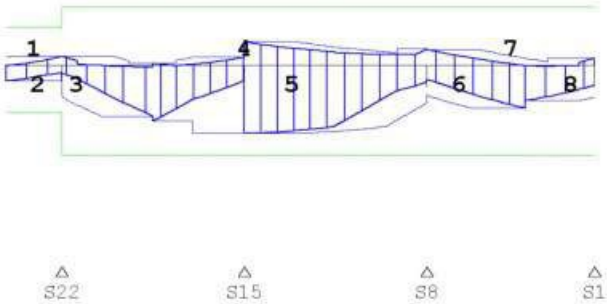
14:14



MEd dekkingslijn Fysisch lineair

Balk

14:14



Hoofdwapening

Balk

14:14

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S22-911	-33.91	-98.78	502	Ond	399*	566	5x12	2,54
2	S22-0	17.65	79.02	502	Bov	399*	453	4x12	2,54
3	S22+0	17.65	122.13	669	Bov	399*	453	4x12	54
4	S15+0	-142.65	-188.72	717	Ond	464*	566	5x12	1
5	S15+0	48.48	122.13	669	Bov	399*	453	4x12	54

Hoofdwapening

Balk
14:14

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
6	S8+0	32.83	122.13	669	Bov	399*	453	4x12	54
7	S1-1125	-91.07	-188.72	717	Ond	399*	566	5x12	54
8	S1-0	13.66	122.13	669	Bov	399*	453	4x12	54

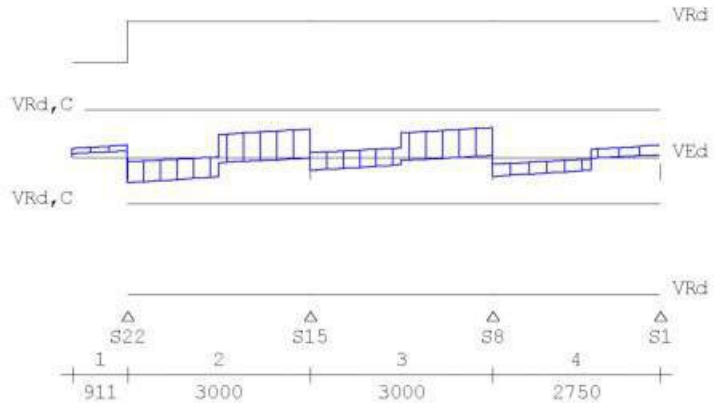
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[2] Benodigde wapening en inwendige hefboomsarm zijn bepaald volgens gedrongen ligger detaillering, zie nationale bijlage art. 6.1(10).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
14:14

Geb.	Pos. [mm]	Zijde	$M_{x;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [%]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S22-848	Bov	2.94	312	0.027	0.008	1.00	0.300	0.03	
1	S22-1038	Ond	-20.18	312	0.149	0.046	1.00	0.300	0.15	
2	S22+0	Bov	2.94	312	0.027	0.008	1.00	0.300	0.03	
2	S15-600	Ond	-58.78	312	0.434	0.135	1.00	0.300	0.45	
3	S8-480	Bov	18.30	312	0.168	0.052	1.00	0.300	0.17	
3	S15+1500	Ond	-61.57	312	0.454	0.142	1.00	0.300	0.47	
4	S8+0	Bov	18.30	312	0.168	0.052	1.00	0.300	0.17	
4	S8+812	Ond	-38.14	312	0.281	0.088	1.00	0.300	0.29	

DWARSKRACHTEN Fysisch lineair — Balk 14:14 Fundamentele combinatie



Wring- en dwarskrachtwapening

Balk
14:14

Geb.	Vanaf [mm]	Tot [mm]	Beugels	Lengte [mm]	<Wringing> A_{langs} [mm²]	<Wringing> A_{bgl} [mm²/m]	<Dwarskr.> A_{bgl} [mm²/m]	<Dwarskr.> A_{opg} [mm²]	V_{Rd} [kN]	T_{Rd} [kNm]	Opm.
1	S22-911	S22+0	Ø8-200	911	0	0	0	0	34.4	11	59
2	S22+0	S15+0	Ø8-200	3000	0	0	0	0	81.1	14	
3	S15+0	S8+0	Ø8-200	3000	0	0	0	0	85.1	26	
4	S8+0	S1+0	Ø8-200	2750	0	0	0	0	54.9	28	

Opmerkingen
[59] 6.2.3: Z is berekend m.b.v. de gedrongen ligger berekening art 6.1 (10)

Wring- en dwarskrachten

Balk

14:14

Geb.	Vanaf [mm]	Tot [mm]	θ [°]	V_{Rd} [kN]	V_{Ed}	$V_{Rd,c}$	$V_{Rd,Max}$	T_{Ed}	$T_{Rd,C}$	$T_{Rd,Max}$	V_{opg}	Opm.
					kN			kNm				
1	S22-911	S22+0	21.8	274	34	134	914	11	93	251	0	59
2	S22+0	S15+0	21.8	392	81	134	1306	14	93	251	0	
3	S15+0	S8+0	21.8	392	85	134	1306	26	93	251	0	
4	S8+0	S1+0	21.8	392	55	134	1306	28	93	251	0	

Opmerkingen
[59] 6.2.3: Z is berekend m.b.v. de gedrongen ligger berekening art 6.1 (10)

Stijfheden (blijvend en quasi-blijvend)

Balk

14:14

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	452	565	-17.7	34012	-18.1	34012	10638
1	101	452	565	-16.2	34012	-16.5	34012	10638
1	202	452	565	-14.5	34012	-14.7	34012	10638
1	304	452	565	-12.8	34012	-12.8	34012	10638
1	405	452	565	-10.9	34012	-10.9	34012	10638
1	506	452	565	-9.0	34012	-9.0	34012	10638
1	607	452	565	-6.9	34012	-6.9	34012	10638
1	709	452	565	-4.8	34012	-4.8	34012	10638
1	810	452	565	-2.5	34012	-2.5	34012	10638
2	300	452	565	-16.2	34012	-16.2	34012	10638
2	600	452	565	-25.1	34012	-25.8	34012	10638
2	900	452	565	-33.0	34012	-35.0	34012	10638
2	1200	452	565	-40.1	34012	-43.3	34012	10638
2	1500	452	565	-46.2	34012	-50.7	34012	10638
2	1500	452	565	-46.2	34012	-50.7	34012	10638
2	1800	452	565	-40.1	34012	-44.2	34012	10638
2	2100	452	565	-33.7	34012	-36.8	34012	10638
2	2400	452	565	-26.3	34012	-28.4	34012	10638
2	2700	452	565	-18.1	34012	-19.1	34012	10638
3	0	452	565	-8.9	34012	-8.9	34012	10638
3	300	452	565	-40.2	34012	-48.9	34012	10638
3	600	452	565	-41.0	34012	-50.5	34012	10638
3	900	452	565	-40.9	34012	-51.1	34012	10638
3	1200	452	565	-40.0	34012	-50.8	34012	10638
3	1500	452	565	-38.1	34012	-49.7	34012	10638
3	1800	452	565	-28.4	34012	-39.9	34012	10638
3	2100	452	565	-19.6	34012	-29.7	34012	10638
3	2400	452	565	-9.8	34012	-18.6	34012	10638
3	3000	452	565	12.5	34012	12.5	34012	10638
4	275	452	565	8.7	34012	1.1	34012	10638
4	550	452	565	2.5	34012	-6.5	34012	10638
4	825	452	565	-2.9	34012	-13.2	34012	10638
4	1100	452	565	-7.6	34012	-19.3	34012	10638
4	1375	452	565	-11.5	34012	-24.5	34012	10638
4	1625	452	565	-14.4	34012	-28.6	34012	10638
4	1650	452	565	-11.8	34012	-23.7	34012	10638
4	1925	452	565	-11.5	34012	-22.1	34012	10638
4	2200	452	565	-10.4	34012	-19.8	34012	10638
4	2475	452	565	-8.6	34012	-16.8	34012	10638

Stijfheden (frequent en karakteristiek)

Balk

14:14

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	452	565	-20.2	34012	11438	-23.2	34012	12525
1	101	452	565	-18.6	34012	11532	-21.7	34012	12760
1	202	452	565	-16.8	34012	11653	-20.1	34012	13057
1	304	452	565	-15.0	34012	11814	-18.4	34012	13442
1	405	452	565	-13.2	34012	12029	-16.6	34012	13902
1	506	452	565	-11.2	34012	12337	-14.7	34012	14521
1	607	452	565	-9.2	34012	12829	-12.7	34012	15468
1	709	452	565	-7.1	34012	13736	-10.6	34012	17090

Stijfheden (blijvend en quasi-blijvend)

Balk

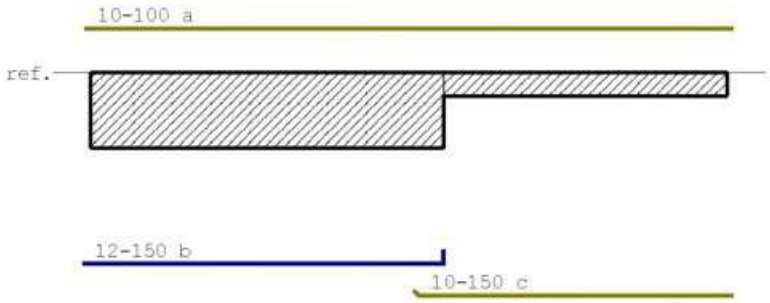
14:14

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
1	810	452	565	-4.9	34012	15965	-8.4	34012	20503
2	300	452	565	-18.6	34012	11677	-27.4	34012	14801
2	600	452	565	-29.0	34012	11507	-42.3	34012	14522
2	900	452	565	-39.0	34012	11438	-56.2	34012	14356
2	1200	452	565	-48.1	34012	11412	-69.2	34012	14320
2	1500	452	565	-56.2	34012	11408	-87.3	34012	14941
2	1500	452	565	-56.2	34012	11408	-87.3	34012	14941
2	1800	452	565	-49.5	34012	11472	-73.1	34012	14605
2	2100	452	565	-41.3	34012	11517	-58.1	34012	14228
2	2400	452	565	-32.6	34012	11678	-42.1	34012	13712
2	2700	452	565	-22.9	34012	12026	-25.2	34012	12778
3	0	452	565	-12.4	34012	13176	-79.2	34012	27250
3	300	452	565	-60.6	34012	12262	-77.8	34012	14287
3	600	452	565	-61.5	34012	12135	-75.5	34012	13784
3	900	452	565	-61.5	34012	12038	-72.4	34012	13329
3	1200	452	565	-60.6	34012	11964	-68.3	34012	12901
3	1500	452	565	-58.8	34012	11910	-66.3	34012	12850
3	1800	452	565	-47.6	34012	11960	-51.2	34012	12537
3	2100	452	565	-36.5	34012	12193	-35.2	34012	11915
3	2400	452	565	-24.5	34012	12743	-18.3	34012	10521
3	3000	452	565	15.7	34012	12378	18.1	34012	13551
4	275	452	565	-4.0	34012	81616	-16.7	34012	39553
4	550	452	565	-12.4	34012	15878	-27.4	34012	22391
4	825	452	565	-20.1	34012	13903	-37.3	34012	19109
4	1100	452	565	-27.0	34012	13259	-46.5	34012	17802
4	1375	452	565	-33.2	34012	12967	-54.9	34012	17164
4	1625	452	565	-38.1	34012	12833	-61.9	34012	16861
4	1650	452	565	-31.6	34012	12847	-51.3	34012	16893
4	1925	452	565	-29.2	34012	12768	-47.0	34012	16710
4	2200	452	565	-26.1	34012	12746	-41.8	34012	16660
4	2475	452	565	-22.2	34012	12804	-35.9	34012	16794

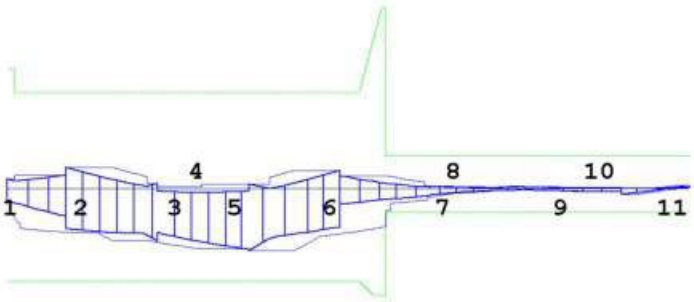
Hoofdwapening Fysisch lineair

Balk

15:15



MEd dekkingslijn Fysisch lineair Balk
15:15



Hoofdwapening Balk
15:15

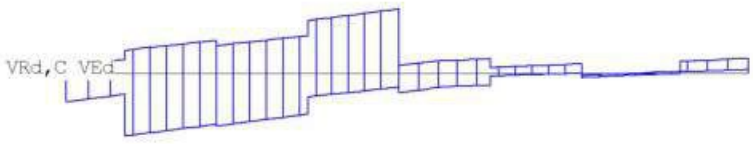
Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	41.84	536.77	676	Bov	1221*	1591	10-100	54
2	965	91.69	431.30	676	Bov	1221*	1591	10-100	54
3	2465	21.30	431.30	676	Bov	1221*	1591	10-100	54
4	3965	-278.91	-413.73	672	Ond	1221*	1528	12-150	54
5	3965	19.22	431.30	676	Bov	1221*	1591	10-100	54
6	5465	78.42	431.30	676	Bov	1221*	1591	10-100	54
7	6215	29.30	147.07	140	Bov	587*	1591	10-100	54
8	6215	-57.15	-108.97	107	Ond	789*	1061	10-150	1
9	8465	7.00	147.07	140	Bov	587*	1591	10-100	54
10	10090	-28.44	-108.97	107	Ond	587*	1061	10-150	54
11	11215	12.31	147.07	140	Bov	587*	1591	10-100	54

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4 Balk
15:15

Geb.	Pos. [mm]	Zijde	$M_{x;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	8465	Bov	4.73	260	0.047	0.012	1.17	0.350	0.03	
1	3254	Ond	-152.27	312	0.412	0.129	1.17	0.350	0.37	
2	11215	Bov	6.87	260	0.068	0.018	1.17	0.350	0.05	
2	10090	Ond	-13.10	260	0.189	0.049	1.17	0.350	0.14	

DWARSKRACHTEN Fysisch lineair Balk 15:15 Fundamentele combinatie



22430

Stijfheden (blijvend en quasi-blijvend)

Balk

15:15

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	518	1590	1527	-25.7	33738	-26.4	33738	10365
1	1036	1590	1527	-48.4	33738	-48.7	33738	10365
1	1554	1590	1527	-72.0	33738	-73.4	33738	10365
1	2072	1590	1527	-90.2	33738	-92.7	33738	10365
1	2590	1590	1527	-108.1	33738	-110.0	33738	10365
1	3107	1590	1527	-121.1	33738	-124.6	33738	10365
1	3625	1590	1527	-128.6	33738	-133.8	33738	10365
1	3965	1590	1527	-130.6	33738	-136.9	33738	10365
1	4143	1590	1527	-114.8	33738	-118.7	33738	10365
1	4661	1590	1527	-92.3	33738	-95.2	33738	10365
1	5179	1590	1527	-64.4	33738	-66.1	33738	10365
1	6215	1590	2587	-16.4	33832	-16.4	33832	10457
1	6665	1590	1060	-13.3	34090	-15.1	34090	10713
1	6965	1590	1060	-10.6	34090	-14.3	34090	10713
1	7115	1590	1060	-7.0	34090	-9.1	34090	10713
1	7565	1590	1060	-4.5	34090	-6.6	34090	10713
1	8015	1590	1060	-0.8	34090	-2.8	34090	10713
2	275	1590	1060	2.1	34090	-0.1	34090	10713
2	550	1590	1060	0.7	34090	-1.7	34090	10713
2	825	1590	1060	-0.2	34090	-2.9	34090	10713
2	1100	1590	1060	-0.7	34090	-3.6	34090	10713
2	1375	1590	1060	-0.6	34090	-3.8	34090	10713
2	1625	1590	1060	-0.2	34090	-3.6	34090	10713
2	1650	1590	1060	-4.6	34090	-9.5	34090	10713
2	1925	1590	1060	-3.2	34090	-6.4	34090	10713
2	2200	1590	1060	-1.3	34090	-2.9	34090	10713
2	2750	1590	1060	3.9	34090	5.7	34090	10713

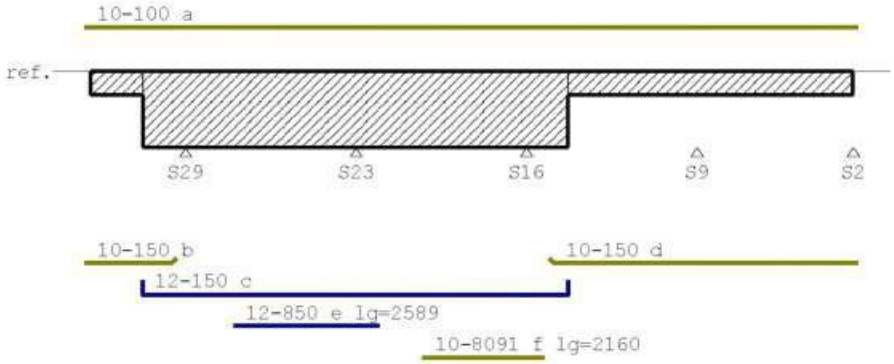
Stijfheden (frequent en karakteristiek)

Balk

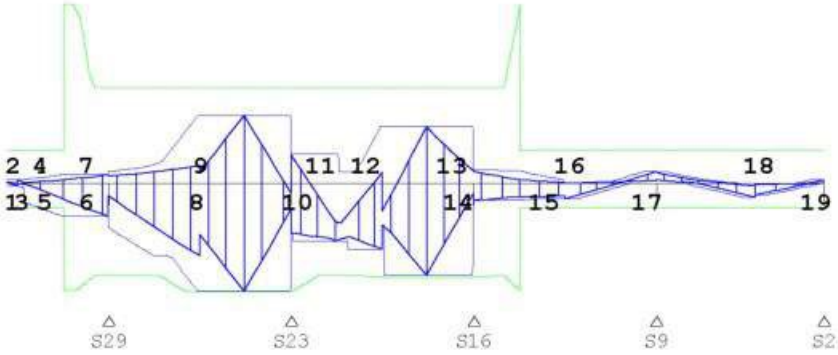
15:15

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	518	1590	1527	-36.3	33738	12781	-27.8	33738	10753
1	1036	1590	1527	-67.9	33738	12896	-49.3	33738	10459
1	1554	1590	1527	-90.4	33738	11917	-76.7	33738	10678
1	2072	1590	1527	-107.5	33738	11454	-98.6	33738	10808
1	2590	1590	1527	-122.2	33738	11130	-114.6	33738	10657
1	3107	1590	1527	-138.0	33738	11109	-133.0	33738	10836
1	3625	1590	1527	-148.4	33738	11122	-146.0	33738	11000
1	3965	1590	1527	-152.3	33738	11145	-151.5	33738	11110
1	4143	1590	1527	-135.2	33738	11317	-128.0	33738	10912
1	4661	1590	1527	-110.2	33738	11448	-101.8	33738	10858
1	5179	1590	1527	-83.0	33738	12061	-70.2	33738	10800
1	6215	1590	2587	-21.7	33832	12572	-12.0	33832	8355
1	6665	1590	1060	-18.4	34090	12224	-19.0	34090	12509
1	6965	1590	1060	-16.8	34090	11922	-23.0	34090	14461
1	7115	1590	1060	-10.9	34090	12111	-13.9	34090	14037
1	7565	1590	1060	-8.0	34090	12144	-11.4	34090	15057
1	8015	1590	1060	-4.2	34090	13795	-7.6	34090	18827
2	275	1590	1060	-1.5	34090	30688	-5.0	34090	33005
2	550	1590	1060	-3.3	34090	15969	-7.3	34090	22489
2	825	1590	1060	-4.7	34090	14477	-9.1	34090	20106
2	1100	1590	1060	-5.6	34090	14114	-10.5	34090	19442
2	1375	1590	1060	-6.0	34090	14196	-11.3	34090	19595
2	1625	1590	1060	-5.9	34090	14602	-21.5	34090	24939
2	1650	1590	1060	-12.7	34090	12996	-20.9	34090	17135
2	1925	1590	1060	-8.6	34090	12944	-13.9	34090	17018
2	2200	1590	1060	-3.9	34090	13110	-6.5	34090	17392
2	2750	1590	1060	6.9	34090	12154	9.8	34090	15083

Hoofdwapening Fysisch lineair Balk
16:16



MEd dekkingslijn Fysisch lineair Balk
16:16



Hoofdwapening Balk
16:16

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S29-1500	3.42	112.89	141	Bov	450*	1218	10-100	54
2	S29-1500	-8.45	-83.63	107	Ond	450*	812	10-150	54
3	S29-1500	9.91	112.89	141	Bov	450*	1218	10-100	54
4	S29-750	-71.75	-83.63	107	Ond	801	812	10-150	
5	S29-750	14.97	112.89	141	Bov	450*	1218	10-100	54
6	S29-0	28.43	330.13	676	Bov	935*	1218	10-100	54
7	S29-0	-113.28	-316.68	672	Ond	935*	1169	12-150	54
8	S23-775	231.17	330.38	668	Bov	935*	1218	10-100	54
9	S23-775	-370.82	-371.21	700	Ond	1385*	1169	12-150	1,28
					Ond		207	+12-850	
10	S23+0	223.89	330.38	668	Bov	935*	1218	10-100	54
11	S23+725	-199.56	-316.68	672	Ond	935*	1169	12-150	54
12	S23+1500	-226.91	-320.27	675	Ond	935*	1169	12-150	54
					Ond		16	+10-8091	
13	S16-775	-317.38	-320.64	675	Ond	1184*	1169	12-150	1
					Ond		16	+10-8091	
14	S16-775	193.88	330.15	676	Bov	935*	1218	10-100	54
15	S16+750	18.25	112.89	141	Bov	450*	1218	10-100	54
16	S16+1500	-53.45	-83.63	107	Ond	703*	812	10-150	1
17	S9+0	39.68	112.89	141	Bov	550*	1218	10-100	1
18	S2-1125	-47.65	-83.63	107	Ond	660*	812	10-150	1
19	S2-0	11.61	112.89	141	Bov	450*	1218	10-100	54

Hoofdwapening

Balk

16:16

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z B/O [mm]	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[28] Berekening van Ab houdt geen rekening met wapening gedrukte zijde.
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4

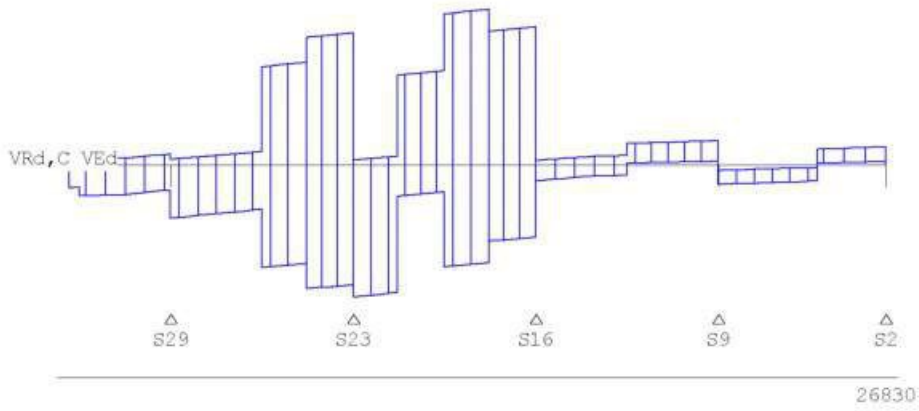
Balk

16:16

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S29-1715	Bov	2.53	260	0.033	0.008	1.17	0.350	0.02	
1	S29-1500	Ond	-3.16	260	0.060	0.015	1.17	0.350	0.04	
2	S29-1500	Bov	5.63	260	0.073	0.019	1.17	0.350	0.05	
2	S29-750	Ond	-33.32	260	0.628	0.163	1.17	0.350	0.47	
2	S29-630	Ond	-50.84	288	0.175	0.050	1.17	0.350	0.14	
3	S29+560	Ond	-104.44	312	0.369	0.115	1.17	0.350	0.33	
3	S29+1507	Ond	-113.70	312	0.342	0.107	1.17	0.350	0.31	
4	S16-524	Bov	7.97	260	0.027	0.007	1.17	0.350	0.02	
4	S23+429	Ond	-165.31	312	0.584	0.182	1.17	0.350	0.52	
4	S23+27	Ond	-165.31	312	0.503	0.157	1.17	0.350	0.45	
5	S9+0	Bov	26.22	260	0.337	0.088	1.17	0.350	0.25	
5	S16+1500	Ond	-29.85	260	0.563	0.146	1.17	0.350	0.42	
6	S9+0	Bov	26.22	260	0.337	0.088	1.17	0.350	0.25	
6	S2-1125	Ond	-23.72	260	0.447	0.116	1.17	0.350	0.33	

DWARSKRACHTEN Fysisch lineair

Balk 16:16 Fundamentele combinatie



Stijfheden (blijvend en quasi-blijvend)

Balk

16:16

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	0	1217	812	2.4	34090	2.4	34090	10713
1	165	1217	812	-0.5	34090	-2.1	34090	10713
2	150	1217	812	0.0	34090	-1.1	34090	10713
2	300	1217	812	-4.7	34090	-6.4	34090	10713
2	450	1217	812	-9.2	34090	-11.6	34090	10713
2	600	1217	812	-13.7	34090	-16.7	34090	10713
2	750	1217	812	-18.1	34090	-21.7	34090	10713
2	900	1217	1980	-22.2	33832	-26.4	33832	10457
2	1050	1217	1729	-26.0	33803	-30.8	33803	10429

Stijfheden (blijvend en quasi-blijvend)

Balk

16:16

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	1200	1217	1332	-29.4	33757	-34.9	33757	10384
2	1350	1217	1169	-32.5	33738	-38.6	33738	10365
2	1500	1217	1169	-35.2	33738	-41.9	33738	10365
3	300	1217	1169	-27.1	33738	-29.0	33738	10365
3	600	1217	1169	-44.1	33738	-47.4	33738	10365
3	900	1217	1197	-59.6	33749	-64.5	33749	10376
3	1200	1217	1342	-73.8	33803	-80.2	33803	10430
3	1500	1217	1375	-86.5	33816	-94.5	33816	10442
3	1500	1217	1375	-86.5	33816	-94.5	33816	10442
3	1800	1217	1375	-66.0	33816	-70.2	33816	10442
3	2100	1217	1375	-68.1	33816	-70.6	33816	10442
3	2400	1217	1375	-68.9	33816	-69.5	33816	10442
3	2700	1217	1375	-68.2	33816	-68.2	33816	10442
4	300	1217	1231	-92.1	33762	-92.1	33762	10388
4	600	1217	1169	-141.8	33738	-142.1	33738	10365
4	725	1217	1169	-162.1	33738	-163.3	33738	10365
4	900	1217	1169	-146.4	33738	-148.8	33738	10365
4	1200	1217	1170	-118.3	33739	-122.7	33739	10365
4	1500	1217	1182	-88.9	33744	-95.3	33744	10370
4	1800	1217	1184	-91.3	33744	-94.2	33744	10370
4	2100	1217	1184	-71.0	33744	-72.0	33744	10370
4	2400	1217	1184	-49.4	33744	-49.4	33744	10370
4	2700	1217	1184	-26.3	33744	-26.3	33744	10370
5	0	1217	1183	-1.9	33744	3.0	33744	10370
5	500	1217	1178	-19.6	33739	-19.6	33739	10366
5	750	1217	1977	-19.4	33832	-19.4	33832	10457
5	1031	1217	812	-18.5	34090	-19.5	34090	10713
5	1312	1217	812	-17.2	34090	-20.4	34090	10713
5	1500	1217	812	-16.1	34090	-20.8	34090	10713
5	1594	1217	812	-18.6	34090	-23.5	34090	10713
5	1875	1217	812	-11.3	34090	-14.7	34090	10713
5	2156	1217	812	-3.7	34090	-5.5	34090	10713
5	2719	1217	812	12.7	34090	14.0	34090	10713
5	3000	1217	812	21.5	34090	24.3	34090	10713
6	0	1217	812	21.5	34090	24.3	34090	10713
6	275	1217	812	14.2	34090	15.4	34090	10713
6	550	1217	812	8.4	34090	8.4	34090	10713
6	1100	1217	812	-2.1	34090	-6.4	34090	10713
6	1375	1217	812	-6.8	34090	-12.9	34090	10713
6	1625	1217	812	-10.8	34090	-18.5	34090	10713
6	1650	1217	812	-6.8	34090	-13.8	34090	10713
6	1925	1217	812	-5.4	34090	-10.1	34090	10713
6	2200	1217	812	-3.5	34090	-6.0	34090	10713
6	2750	1217	812	1.2	34090	3.3	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

16:16

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1217	812	2.5	34090	11087	1.8	34090	8578
1	165	1217	812	-3.3	34090	13981	-3.7	34090	15001
2	150	1217	812	-1.9	34090	14811	-3.8	34090	20686
2	300	1217	812	-7.6	34090	11990	-10.6	34090	14647
2	450	1217	812	-13.7	34090	11963	-17.2	34090	13782
2	600	1217	812	-19.8	34090	11986	-23.8	34090	13446
2	750	1217	812	-25.7	34090	12005	-30.2	34090	13273
2	900	1217	1980	-31.5	33832	11751	-36.4	33832	12891
2	1050	1217	1729	-36.8	33803	11749	-42.2	33803	12820
2	1200	1217	1332	-41.8	33757	11735	-47.7	33757	12760
2	1350	1217	1169	-46.5	33738	11753	-52.9	33738	12751
2	1500	1217	1169	-50.8	33738	11796	-57.7	33738	12780
3	300	1217	1169	-36.9	33738	12190	-33.2	33738	11371

Stijfheden (blijvend en quasi-blijvend)

Balk

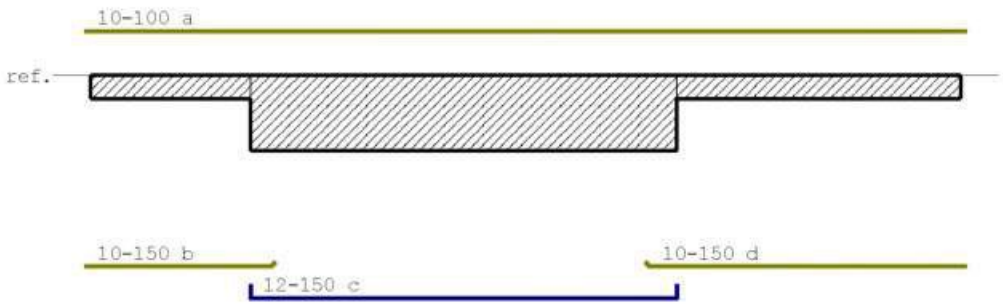
16:16

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
3	600	1217	1169	-58.5	33738	11935	-55.2	33738	11490
3	900	1217	1197	-78.8	33749	11862	-75.9	33749	11578
3	1200	1217	1342	-97.6	33803	11896	-95.1	33803	11701
3	1500	1217	1375	-115.0	33816	11912	-113.0	33816	11776
3	1500	1217	1375	-115.0	33816	11912	-113.0	33816	11776
3	1800	1217	1375	-96.3	33816	12852	-79.9	33816	11402
3	2100	1217	1375	-108.9	33816	13799	-76.2	33816	11004
3	2400	1217	1375	-104.0	33816	13545	-71.0	33816	10599
3	2700	1217	1375	-87.4	33816	12307	-64.5	33816	10045
4	300	1217	1231	-104.7	33762	11332	-86.2	33762	9914
4	600	1217	1169	-147.3	33738	10622	-142.8	33738	10397
4	725	1217	1169	-165.3	33738	10454	-165.9	33738	10481
4	900	1217	1169	-151.1	33738	10476	-154.2	33738	10625
4	1200	1217	1170	-132.5	33739	10924	-133.0	33739	10951
4	1500	1217	1182	-112.6	33744	11601	-126.5	33744	12502
4	1800	1217	1184	-109.8	33744	11503	-101.1	33744	10884
4	2100	1217	1184	-102.7	33744	13079	-74.3	33744	10601
4	2400	1217	1184	-79.2	33744	14027	-46.2	33744	9900
4	2700	1217	1184	-43.7	33744	14316	-16.7	33744	7394
5	0	1217	1183	8.0	33744	18361	6.9	33744	17147
5	500	1217	1178	-24.6	33739	12073	-8.9	33739	5664
5	750	1217	1977	-23.8	33832	11967	-15.4	33832	8849
5	1031	1217	812	-23.1	34090	11982	-21.9	34090	11582
5	1312	1217	812	-23.2	34090	11675	-28.0	34090	13168
5	1500	1217	812	-24.0	34090	11782	-39.0	34090	15745
5	1594	1217	812	-26.8	34090	11693	-34.9	34090	13818
5	1875	1217	812	-16.9	34090	11782	-22.5	34090	14070
5	2156	1217	812	-6.7	34090	12220	-9.7	34090	15256
5	2719	1217	812	14.9	34090	11153	17.0	34090	12183
5	3000	1217	812	26.2	34090	11269	30.9	34090	12549
6	0	1217	812	26.2	34090	11269	30.6	34090	12452
6	275	1217	812	16.4	34090	11143	18.3	34090	11989
6	550	1217	812	9.2	34090	11345	6.4	34090	8780
6	1100	1217	812	-9.2	34090	13591	-16.3	34090	18416
6	1375	1217	812	-17.0	34090	12819	-27.2	34090	16728
6	1625	1217	812	-23.7	34090	12599	-36.7	34090	16205
6	1650	1217	812	-18.4	34090	12954	-30.1	34090	17040
6	1925	1217	812	-13.2	34090	12804	-21.1	34090	16694
6	2200	1217	812	-7.6	34090	12569	-11.7	34090	16134
6	2750	1217	812	4.6	34090	13419	8.1	34090	18058

Hoofdwapening Fysisch lineair

Balk

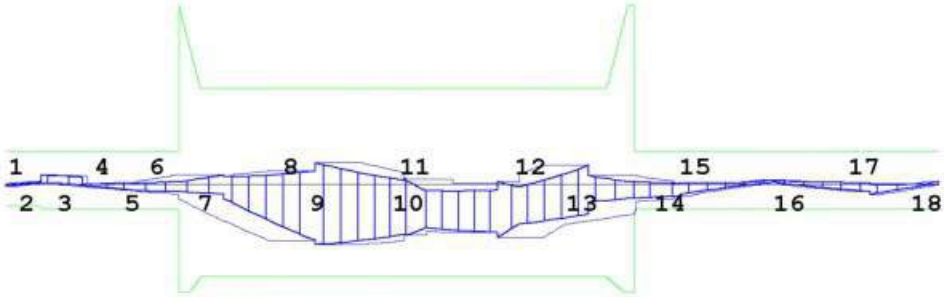
17:17



MEd dekkingslijn Fysisch lineair

Balk

17:17



Hoofdwapening

Balk

17:17

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	-5.83	-75.72	214	Ond	450*	812	10-150	2,54
2	573	9.14	112.89	141	Bov	450*	1218	10-100	2,54,68
3	573	31.11	112.89	141	Bov	450*	1218	10-100	54
4	2073	-23.61	-83.63	107	Ond	450*	812	10-150	54
5	2823	13.93	112.89	141	Bov	450*	1218	10-100	54
6	2823	-27.82	-83.63	107	Ond	450*	812	10-150	54
7	3573	31.43	330.13	676	Bov	935*	1218	10-100	54
8	5073	-207.41	-316.68	672	Ond	935*	1169	12-150	54
9	5073	73.48	330.13	676	Bov	935*	1218	10-100	54
10	6573	17.85	330.13	676	Bov	935*	1218	10-100	54
11	6573	-176.02	-316.68	672	Ond	935*	1169	12-150	54
12	8073	-184.34	-316.68	672	Ond	935*	1169	12-150	54
13	9573	65.65	330.13	676	Bov	935*	1218	10-100	54
14	10323	12.03	112.89	141	Bov	450*	1218	10-100	54
15	10323	-51.52	-83.63	107	Ond	703*	812	10-150	1
16	12573	14.98	112.89	141	Bov	450*	1218	10-100	54
17	14198	-34.52	-83.63	107	Ond	478*	812	10-150	1
18	15323	8.22	112.89	141	Bov	450*	1218	10-100	54

Opmerkingen

[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).

[2] Benodigde wapening en inwendige hefboomsarm zijn bepaald volgens gedrongen ligger detaillering, zie nationale bijlage art. 6.1(10).

[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

[68] MRd als gevolg van de gedrongen ligger berekening (NB. 6.1(10)) is groter dan MRd volgens 6.1(P). De momentweerstand en inwendige hefboomsarm volgens 6.1(P) zijn maatgevend en daarom alsnog toegepast.

[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

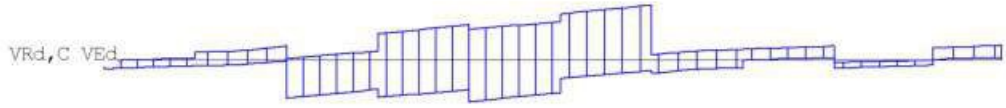
Scheurvorming volgens artikel 7.3.4

Balk

17:17

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	415	Bov	6.91	260	0.089	0.023	1.17	0.350	0.07	
1	-50	Ond	-3.31	260	0.062	0.016	1.17	0.350	0.05	
2	12573	Bov	11.71	260	0.151	0.039	1.17	0.350	0.11	
2	10323	Ond	-27.40	260	0.517	0.134	1.17	0.350	0.38	
2	6902	Ond	-100.98	312	0.357	0.111	1.17	0.350	0.32	
3	12573	Bov	11.71	260	0.151	0.039	1.17	0.350	0.11	
3	14198	Ond	-14.64	260	0.276	0.072	1.17	0.350	0.21	

DWARSKRACHTEN Fysisch lineair Balk 17:17 Fundamentele combinatie



30646

Stijfheden (blijvend en quasi-blijvend) Balk 17:17

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;ron}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1217	812	-2.0	34090	-2.8	34090	10713
1	96	1217	812	-0.7	34090	-1.4	34090	10713
1	191	1217	812	0.7	34090	0.1	34090	10713
1	382	1217	812	3.5	34090	3.5	34090	10713
1	478	1217	812	5.0	34090	5.0	34090	10713
1	573	1217	812	6.5	34090	6.5	34090	10713
2	0	1217	812	6.5	34090	6.5	34090	10713
2	900	1217	812	-0.8	34090	-2.5	34090	10713
2	1350	1217	812	-3.8	34090	-6.6	34090	10713
2	1500	1217	812	-4.6	34090	-7.7	34090	10713
2	1800	1217	812	-7.5	34090	-9.5	34090	10713
2	2250	1217	1980	-8.9	33832	-8.9	33832	10457
2	3250	1217	1169	-26.1	33738	-26.1	33738	10365
2	3750	1217	1169	-47.3	33738	-47.6	33738	10365
2	4250	1217	1169	-64.6	33738	-66.5	33738	10365
2	4500	1217	1169	-71.8	33738	-74.5	33738	10365
2	5250	1217	1169	-77.3	33738	-78.1	33738	10365
2	5504	1217	1169	-79.5	33738	-79.7	33738	10365
2	6250	1217	1169	-87.3	33738	-87.3	33738	10365
2	6750	1217	1169	-90.9	33738	-91.3	33738	10365
2	7250	1217	1169	-90.6	33738	-92.1	33738	10365
2	7415	1217	1169	-89.7	33738	-91.5	33738	10365
2	7750	1217	1169	-78.4	33738	-78.7	33738	10365
2	8250	1217	1169	-59.0	33738	-59.0	33738	10365
2	8750	1217	1169	-35.7	33738	-35.7	33738	10365
2	9750	1217	1980	-21.6	33832	-21.6	33832	10457
2	10200	1217	812	-17.8	34090	-19.7	34090	10713
2	10500	1217	812	-14.6	34090	-18.6	34090	10713
2	10650	1217	812	-11.2	34090	-13.5	34090	10713
2	11100	1217	812	-4.8	34090	-6.6	34090	10713
2	12000	1217	812	11.0	34090	11.0	34090	10713
3	0	1217	812	11.0	34090	11.0	34090	10713
3	275	1217	812	7.7	34090	7.7	34090	10713
3	825	1217	812	3.2	34090	0.3	34090	10713
3	1100	1217	812	1.5	34090	-2.1	34090	10713
3	1375	1217	812	0.2	34090	-4.2	34090	10713
3	1625	1217	812	-0.7	34090	-5.8	34090	10713
3	1650	1217	812	-3.8	34090	-10.1	34090	10713
3	1925	1217	812	-3.2	34090	-7.6	34090	10713
3	2200	1217	812	-2.3	34090	-4.8	34090	10713
3	2750	1217	812	0.7	34090	2.0	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

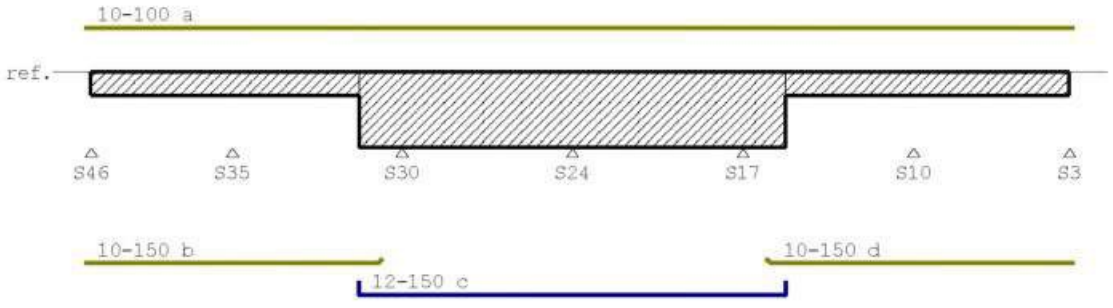
17:17

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^{*}$ [N/mm²]	$E_{Ef,\infty}^{*}$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^{*}$ [N/mm²]	$E_{Ek;\infty}^{*}$ [N/mm²]
1	0	1217	812	-3.3	34090	11997	-4.6	34090	14665
1	96	1217	812	-1.9	34090	12919	-3.0	34090	16960
1	191	1217	812	-0.4	34090	50638	-1.4	34090	37230
1	382	1217	812	3.8	34090	11231	2.0	34090	7151
1	478	1217	812	5.3	34090	11182	3.8	34090	8803
1	573	1217	812	6.9	34090	11152	5.6	34090	9622
2	0	1217	812	6.9	34090	11152	9.6	34090	13725
2	900	1217	812	-3.6	34090	13677	-6.4	34090	18591
2	1350	1217	812	-8.4	34090	12601	-13.0	34090	16212
2	1500	1217	812	-9.8	34090	12530	-18.4	34090	17805
2	1800	1217	812	-11.2	34090	11909	-14.2	34090	13853
2	2250	1217	1980	-11.4	33832	12352	-7.1	33832	8932
2	3250	1217	1169	-33.5	33738	12237	-21.9	33738	9148
2	3750	1217	1169	-58.5	33738	11902	-48.4	33738	10481
2	4250	1217	1169	-80.9	33738	11824	-71.0	33738	10840
2	4500	1217	1169	-90.7	33738	11826	-80.8	33738	10961
2	5250	1217	1169	-94.2	33738	11758	-79.8	33738	10521
2	5504	1217	1169	-94.7	33738	11637	-80.3	33738	10414
2	6250	1217	1169	-96.7	33738	11113	-85.1	33738	10183
2	6750	1217	1169	-99.9	33738	11021	-92.2	33738	10437
2	7250	1217	1169	-100.9	33738	11031	-95.5	33738	10625
2	7415	1217	1169	-100.3	33738	11040	-95.7	33738	10689
2	7750	1217	1169	-88.5	33738	11226	-79.4	33738	10430
2	8250	1217	1169	-68.8	33738	11497	-55.5	33738	9937
2	8750	1217	1169	-47.2	33738	12465	-27.8	33738	8654
2	9750	1217	1980	-25.7	33832	11746	-17.8	33832	9092
2	10200	1217	812	-22.6	34090	11769	-24.1	34090	12255
2	10500	1217	812	-21.2	34090	11705	-27.7	34090	13852
2	10650	1217	812	-15.4	34090	11685	-19.1	34090	13390
2	11100	1217	812	-7.9	34090	12014	-11.0	34090	14710
2	12000	1217	812	11.7	34090	11192	8.3	34090	8760
3	0	1217	812	11.7	34090	11192	8.5	34090	8913
3	275	1217	812	8.2	34090	11201	3.2	34090	5430
3	825	1217	812	-1.6	34090	62000	-6.3	34090	38394
3	1100	1217	812	-4.5	34090	16854	-10.6	34090	23686
3	1375	1217	812	-7.1	34090	14887	-14.4	34090	20814
3	1625	1217	812	-9.2	34090	14328	-25.4	34090	22780
3	1650	1217	812	-14.3	34090	13412	-24.8	34090	18044
3	1925	1217	812	-10.6	34090	13233	-17.9	34090	17661
3	2200	1217	812	-6.4	34090	13021	-10.6	34090	17192
3	2750	1217	812	2.9	34090	13495	5.1	34090	18219

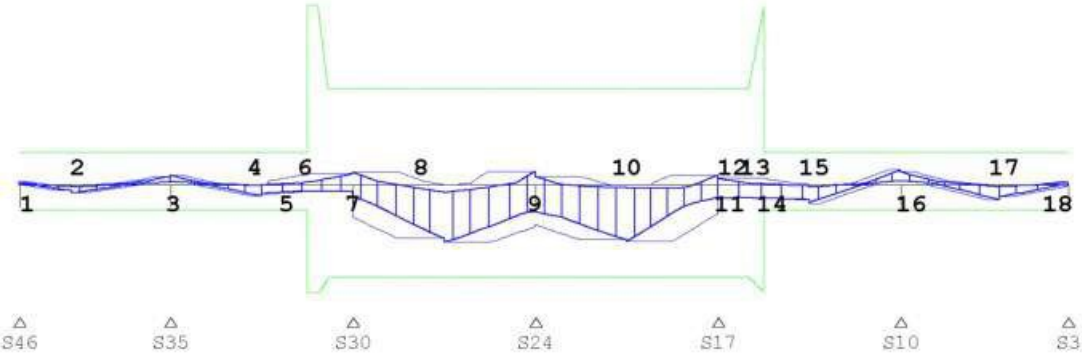
Hoofdwapening Fysisch lineair

Balk

18:18



MEd dekkingslijn Fysisch lineair Balk
18:18



Hoofdwapening Balk
18:18

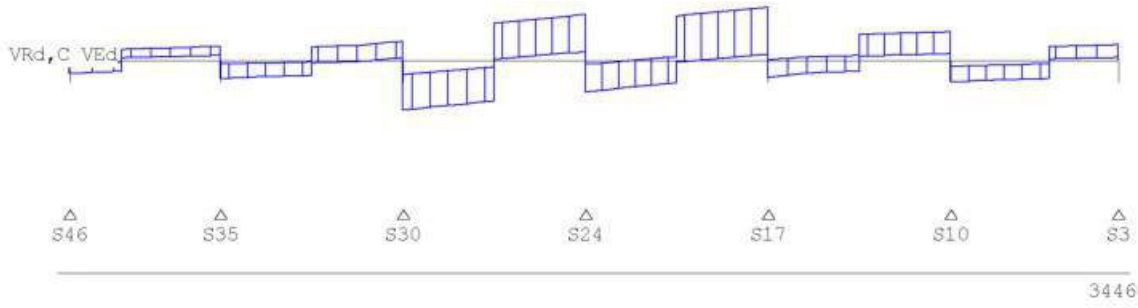
Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S46+0	9.50	112.89	141	Bov	450*	1218	10-100	54
2	S46+855	-28.06	-83.63	107	Ond	450*	812	10-150	54
3	S35+0	32.21	112.89	141	Bov	450*	1218	10-100	54
4	S35+1500	-38.53	-83.63	107	Ond	534*	812	10-150	1
5	S30-750	15.33	112.89	141	Bov	450*	1218	10-100	54
6	S30-750	-23.37	-83.63	107	Ond	450*	812	10-150	54
7	S30+0	42.99	330.13	676	Bov	935*	1218	10-100	54
8	S30+1500	-197.55	-316.68	672	Ond	935*	1169	12-150	54
9	S24+0	45.19	330.13	676	Bov	935*	1218	10-100	54
10	S24+1500	-194.47	-316.68	672	Ond	935*	1169	12-150	54
11	S17+0	33.30	330.13	676	Bov	935*	1218	10-100	54
12	S17+24	-45.31	-316.68	672	Ond	935*	1169	12-150	54
13	S17+750	-62.81	-366.97	514	Ond	935*	1169	12-150	54
14	S17+750	4.93	112.89	141	Bov	450*	1218	10-100	54
15	S17+1500	-62.81	-83.63	107	Ond	703*	812	10-150	1
16	S10+0	49.49	112.89	141	Bov	685*	1218	10-100	1
17	S3-1125	-50.04	-83.63	107	Ond	693*	812	10-150	1
18	S3-0	7.51	112.89	141	Bov	450*	1218	10-100	54

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4 Balk
18:18

Geb.	Pos. [mm]	Zijde	$M_{s;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S35-201	Bov	21.74	260	0.280	0.073	1.17	0.350	0.21	
1	S46+855	Ond	-16.03	260	0.302	0.079	1.17	0.350	0.22	
2	S35+0	Bov	21.74	260	0.280	0.073	1.17	0.350	0.21	
2	S35+1500	Ond	-21.71	260	0.409	0.106	1.17	0.350	0.30	
3	S30+0	Bov	10.98	260	0.037	0.010	1.17	0.350	0.03	
3	S30+900	Ond	-122.63	312	0.433	0.135	1.17	0.350	0.39	
4	S24+900	Ond	-105.96	312	0.374	0.117	1.17	0.350	0.33	
5	S10+0	Bov	29.66	260	0.382	0.099	1.17	0.350	0.28	
5	S17+1500	Ond	-35.64	260	0.672	0.175	1.17	0.350	0.50	
6	S10+0	Bov	29.66	260	0.382	0.099	1.17	0.350	0.28	
6	S3-1125	Ond	-23.13	260	0.436	0.113	1.17	0.350	0.32	

DWARSKRACHTEN Fysisch lineair combinatie — Balk 18:18 Fundamentele



Stijfheden (blijvend en quasi-blijvend) — Balk 18:18

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{sg} [kNm]	E_{sg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1217	812	2.0	34090	3.5	34090	10713
1	496	1217	812	-3.1	34090	-4.3	34090	10713
1	744	1217	812	-5.2	34090	-7.7	34090	10713
1	855	1217	812	-6.0	34090	-9.1	34090	10713
1	992	1217	812	-7.9	34090	-11.3	34090	10713
1	1240	1217	812	-4.6	34090	-7.2	34090	10713
1	1488	1217	812	-1.1	34090	-2.7	34090	10713
1	1984	1217	812	7.0	34090	7.0	34090	10713
1	2232	1217	812	11.4	34090	12.4	34090	10713
1	2480	1217	812	16.2	34090	18.0	34090	10713
2	0	1217	812	16.2	34090	18.0	34090	10713
2	281	1217	812	11.6	34090	12.3	34090	10713
2	844	1217	812	-0.8	34090	-2.8	34090	10713
2	1125	1217	812	-6.5	34090	-9.7	34090	10713
2	1406	1217	812	-11.7	34090	-16.3	34090	10713
2	1500	1217	812	-13.4	34090	-18.4	34090	10713
2	1688	1217	812	-10.1	34090	-13.2	34090	10713
2	1969	1217	812	-9.5	34090	-10.4	34090	10713
2	2500	1217	1688	-7.1	33798	-3.8	33798	10424
2	2750	1217	1169	-4.7	33738	0.7	33738	10365
2	3000	1217	1169	-1.3	33738	6.1	33738	10365
3	0	1217	1169	-1.3	33738	6.1	33738	10365
3	600	1217	1169	-46.8	33738	-46.8	33738	10365
3	900	1217	1169	-65.9	33738	-66.6	33738	10365
3	1200	1217	1169	-83.6	33738	-86.4	33738	10365
3	1500	1217	1169	-100.0	33738	-104.9	33738	10365
3	1500	1217	1169	-100.0	33738	-104.9	33738	10365
3	1800	1217	1169	-95.4	33738	-99.1	33738	10365
3	2100	1217	1169	-83.2	33738	-84.4	33738	10365
3	2400	1217	1169	-69.6	33738	-69.6	33738	10365
3	2700	1217	1169	-54.6	33738	-54.6	33738	10365
4	300	1217	1169	-57.2	33738	-57.2	33738	10365
4	600	1217	1169	-66.8	33738	-66.8	33738	10365
4	900	1217	1169	-75.0	33738	-76.2	33738	10365
4	1200	1217	1169	-81.8	33738	-85.4	33738	10365
4	1500	1217	1169	-87.3	33738	-93.1	33738	10365
4	1500	1217	1169	-87.3	33738	-93.1	33738	10365
4	1800	1217	1169	-76.7	33738	-80.5	33738	10365
4	2100	1217	1169	-62.6	33738	-63.9	33738	10365
4	2400	1217	1169	-47.2	33738	-47.2	33738	10365
4	2700	1217	1169	-30.4	33738	-30.4	33738	10365
5	250	1217	1169	-19.8	33738	-19.8	33738	10365
5	500	1217	1169	-21.2	33738	-21.2	33738	10365
5	750	1217	1977	-21.7	33832	-21.9	33832	10457
5	1031	1217	812	-21.5	34090	-23.6	34090	10713

Stijfheden (blijvend en quasi-blijvend)

Balk

18:18

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
5	1312	1217	812	-20.9	34090	-24.9	34090	10713
5	1500	1217	812	-20.3	34090	-25.6	34090	10713
5	1594	1217	812	-22.1	34090	-28.0	34090	10713
5	1875	1217	812	-13.8	34090	-17.7	34090	10713
5	2156	1217	812	-5.2	34090	-7.1	34090	10713
5	2719	1217	812	13.2	34090	15.2	34090	10713
5	3000	1217	812	22.9	34090	27.0	34090	10713
6	0	1217	812	22.9	34090	27.0	34090	10713
6	275	1217	812	15.5	34090	17.2	34090	10713
6	550	1217	812	9.8	34090	9.8	34090	10713
6	1100	1217	812	-0.5	34090	-5.0	34090	10713
6	1375	1217	812	-5.0	34090	-11.7	34090	10713
6	1625	1217	812	-8.9	34090	-17.4	34090	10713
6	1650	1217	812	-6.2	34090	-13.4	34090	10713
6	1925	1217	812	-4.9	34090	-10.1	34090	10713
6	2200	1217	812	-3.2	34090	-6.5	34090	10713
6	2475	1217	812	-1.2	34090	-2.5	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

18:18

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1217	812	4.5	34090	12649	7.0	34090	16327
1	496	1217	812	-5.0	34090	11975	-7.0	34090	14605
1	744	1217	812	-9.3	34090	12200	-13.5	34090	15204
1	855	1217	812	-11.2	34090	12261	-22.5	34090	18086
1	992	1217	812	-13.6	34090	12094	-19.2	34090	14926
1	1240	1217	812	-8.8	34090	12320	-13.0	34090	15513
1	1488	1217	812	-3.8	34090	13356	-6.6	34090	17925
1	1984	1217	812	7.4	34090	11133	7.2	34090	10880
1	2232	1217	812	13.0	34090	11077	14.5	34090	11939
1	2480	1217	812	19.2	34090	11192	22.2	34090	12308
2	0	1217	812	19.2	34090	11192	25.2	34090	13313
2	281	1217	812	12.8	34090	10999	14.0	34090	11685
2	844	1217	812	-4.0	34090	13687	-7.2	34090	18611
2	1125	1217	812	-11.9	34090	12243	-17.3	34090	15316
2	1406	1217	812	-19.3	34090	12012	-26.9	34090	14705
2	1500	1217	812	-21.7	34090	11976	-30.1	34090	14609
2	1688	1217	812	-15.2	34090	11816	-20.4	34090	14165
2	1969	1217	812	-12.2	34090	11961	-12.4	34090	12062
2	2500	1217	1688	-1.2	33798	4328	4.1	33798	-31977
2	2750	1217	1169	4.2	33738	24872	13.2	33738	30264
2	3000	1217	1169	11.0	33738	15011	23.2	33738	21228
3	0	1217	1169	11.0	33738	15011	14.6	33738	17389
3	600	1217	1169	-53.8	33738	11388	-42.0	33738	9607
3	900	1217	1169	-74.5	33738	11183	-68.2	33738	10535
3	1200	1217	1169	-95.2	33738	11071	-93.0	33738	10895
3	1500	1217	1169	-114.6	33738	11008	-127.0	33738	11784
3	1500	1217	1169	-114.6	33738	11008	-127.0	33738	11784
3	1800	1217	1169	-108.8	33738	11050	-107.7	33738	10973
3	2100	1217	1169	-93.6	33738	11130	-87.0	33738	10590
3	2400	1217	1169	-78.5	33738	11242	-65.0	33738	9874
3	2700	1217	1169	-63.0	33738	11416	-41.5	33738	8499
4	300	1217	1169	-65.3	33738	11340	-45.5	33738	8799
4	600	1217	1169	-75.4	33738	11256	-62.9	33738	9939
4	900	1217	1169	-85.3	33738	11194	-78.9	33738	10620
4	1200	1217	1169	-95.0	33738	11148	-93.6	33738	11035
4	1500	1217	1169	-103.3	33738	11122	-110.5	33738	11633
4	1500	1217	1169	-103.3	33738	11122	-110.5	33738	11633
4	1800	1217	1169	-88.9	33738	11093	-89.4	33738	11133
4	2100	1217	1169	-70.5	33738	11081	-66.9	33738	10694
4	2400	1217	1169	-52.0	33738	11062	-43.0	33738	9701

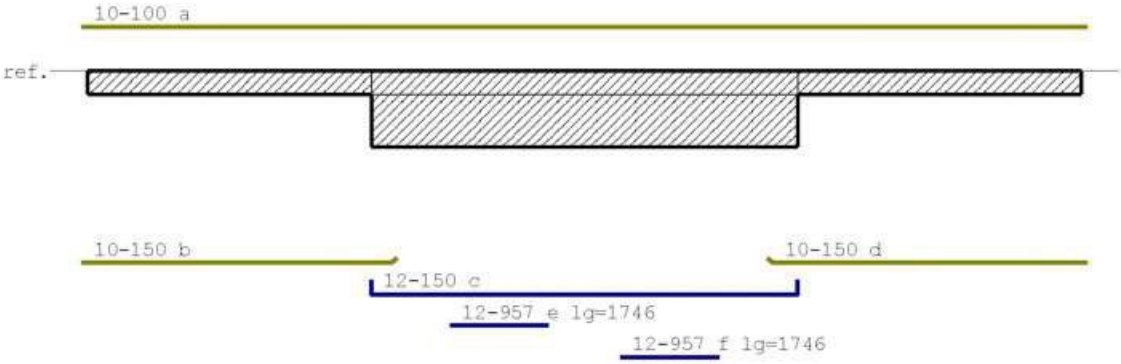
Stijfheden (blijvend en quasi-blijvend)

Balk
18:18

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
4	2700	1217	1169	-35.0	33738	11405	-17.7	33738	6914
5	250	1217	1169	-23.8	33738	11740	-9.2	33738	5752
5	500	1217	1169	-24.9	33738	11538	-16.2	33738	8550
5	750	1217	1977	-25.2	33832	11491	-22.3	33832	10608
5	1031	1217	812	-26.4	34090	11569	-28.5	34090	12145
5	1312	1217	812	-27.6	34090	11474	-34.2	34090	13177
5	1500	1217	812	-29.1	34090	11680	-46.5	34090	15507
5	1594	1217	812	-31.9	34090	11700	-41.7	34090	13839
5	1875	1217	812	-20.3	34090	11742	-26.8	34090	13959
5	2156	1217	812	-8.4	34090	11958	-11.6	34090	14557
5	2719	1217	812	16.6	34090	11356	20.0	34090	12819
5	3000	1217	812	29.7	34090	11424	36.4	34090	13027
6	0	1217	812	29.7	34090	11424	34.3	34090	12552
6	275	1217	812	18.4	34090	11195	21.3	34090	12319
6	550	1217	812	10.4	34090	11173	8.6	34090	9777
6	1100	1217	812	-8.0	34090	14452	-15.6	34090	20061
6	1375	1217	812	-16.1	34090	13201	-27.2	34090	17591
6	1625	1217	812	-23.1	34090	12890	-37.4	34090	16893
6	1650	1217	812	-18.2	34090	13090	-30.3	34090	17347
6	1925	1217	812	-13.6	34090	13000	-22.3	34090	17144
6	2200	1217	812	-8.6	34090	12928	-14.0	34090	16980
6	2475	1217	812	-3.3	34090	12929	-5.3	34090	16982

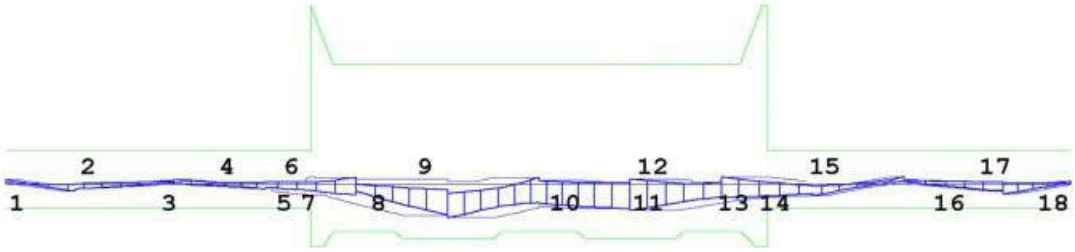
Hoofdwapening Fysisch lineair

Balk
19:19



MEd dekkingslijn Fysisch lineair

Balk
19:19



Hoofdwapening

Balk
19:19

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	12.45	112.89	141	Bov	450*	1218	10-100	54
2	1125	-25.87	-83.63	107	Ond	450*	812	10-150	54
3	2750	12.99	112.89	141	Bov	450*	1218	10-100	54
4	4250	-18.24	-83.63	107	Ond	450*	812	10-150	54

Hoofdwapening

Balk
19:19

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
5	4250	4.35	112.89	141	Bov	450*	1218	10-100	54
6	5000	-28.94	-83.63	107	Ond	450*	812	10-150	54
7	5000	6.32	112.89	141	Bov	450*	1218	10-100	54
8	5750	21.28	405.00	732	Bov	982*	1218	10-100	54
9	7250	-117.35	-186.08	559	Ond	676*	585	12-150	54
					Ond		92	+12-957	
10	8750	20.24	405.00	732	Bov	982*	1218	10-100	54
11	10250	14.16	404.96	732	Bov	982*	1218	10-100	54
12	10250	-91.82	-186.08	559	Ond	676*	585	12-150	54
					Ond		92	+12-957	
13	11750	23.31	405.00	732	Bov	982*	1218	10-100	54
14	12500	9.75	112.89	141	Bov	450*	1218	10-100	54
15	13250	-42.97	-83.63	107	Ond	594*	812	10-150	1
16	14750	23.48	112.89	141	Bov	450*	1218	10-100	54
17	16375	-36.06	-83.63	107	Ond	500*	812	10-150	1
18	17500	7.63	112.89	141	Bov	450*	1218	10-100	54

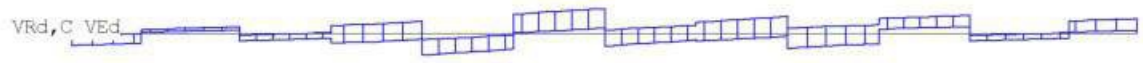
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.
[93] De wapening bij de doorsnede overgang is niet getoetst vlg. NEN-EN 1992-1-1 art.9.9.

Scheurvorming volgens artikel 7.3.4

Balk
19:19

Geb.	Pos. [mm]	Zijde	$M_{g;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	2750	Bov	10.34	260	0.133	0.035	1.17	0.350	0.10	
1	1125	Ond	-12.33	260	0.233	0.060	1.17	0.350	0.17	
2	14750	Bov	16.40	260	0.211	0.055	1.17	0.350	0.16	
2	8123	Ond	-72.85	312	0.510	0.159	1.17	0.350	0.45	
2	6497	Ond	-75.95	312	0.460	0.144	1.17	0.350	0.41	
3	14750	Bov	16.40	260	0.211	0.055	1.17	0.350	0.16	
3	16375	Ond	-15.21	260	0.287	0.075	1.17	0.350	0.21	

DWARSKRACHTEN Fysisch lineair — Balk 19:19 Fundamentele combinatie



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Stijfheden (blijvend en quasi-blijvend)

Balk
19:19

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1217	812	1.9	34090	4.0	34090	10713
1	550	1217	812	-2.2	34090	-3.3	34090	10713
1	825	1217	812	-3.8	34090	-6.4	34090	10713
1	1100	1217	812	-4.9	34090	-9.2	34090	10713
1	1125	1217	812	-5.0	34090	-9.4	34090	10713
1	1375	1217	812	-1.5	34090	-4.1	34090	10713
1	1650	1217	812	-0.5	34090	-2.8	34090	10713

Stijfheden (blijvend en quasi-blijvend)

Balk

19:19

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	1925	1217	812	0.8	34090	-1.0	34090	10713
1	2200	1217	812	2.5	34090	1.0	34090	10713
1	2750	1217	812	7.0	34090	7.0	34090	10713
2	0	1217	812	7.0	34090	7.0	34090	10713
2	900	1217	812	-0.4	34090	-2.3	34090	10713
2	1350	1217	812	-4.0	34090	-6.3	34090	10713
2	1500	1217	812	-5.0	34090	-7.5	34090	10713
2	1800	1217	812	-5.2	34090	-6.6	34090	10713
2	2250	1217	1396	-11.6	33797	-11.6	33797	10420
2	3250	1217	584	-25.5	33737	-25.5	33737	10362
2	3750	1217	676	-42.9	33808	-42.9	33808	10434
2	4250	1217	676	-57.8	33808	-57.9	33808	10434
2	4507	1217	676	-68.0	33808	-71.9	33808	10434
2	4750	1217	676	-63.0	33808	-65.5	33808	10434
2	5250	1217	676	-50.8	33808	-50.8	33808	10434
2	6250	1217	584	-34.5	33737	-34.5	33737	10362
2	6750	1217	676	-38.8	33808	-38.8	33808	10434
2	7250	1217	676	-40.5	33808	-40.9	33808	10434
2	7503	1217	676	-30.7	33808	-34.4	33808	10434
2	7750	1217	676	-32.1	33808	-34.6	33808	10434
2	8250	1217	676	-33.0	33808	-33.0	33808	10434
2	8750	1217	584	-31.3	33737	-31.3	33737	10362
2	9750	1217	1396	-17.2	33797	-18.6	33797	10420
2	10200	1217	812	-18.1	34090	-20.6	34090	10713
2	10500	1217	812	-18.1	34090	-21.3	34090	10713
2	10650	1217	812	-18.0	34090	-21.0	34090	10713
2	11100	1217	812	-7.9	34090	-9.8	34090	10713
2	12000	1217	812	15.3	34090	15.5	34090	10713
3	0	1217	812	15.3	34090	15.5	34090	10713
3	275	1217	812	7.1	34090	7.1	34090	10713
3	825	1217	812	3.7	34090	1.0	34090	10713
3	1100	1217	812	2.6	34090	-0.9	34090	10713
3	1375	1217	812	1.8	34090	-2.5	34090	10713
3	1625	1217	812	1.4	34090	-3.6	34090	10713
3	1650	1217	812	-4.1	34090	-10.5	34090	10713
3	1925	1217	812	-3.1	34090	-7.7	34090	10713
3	2200	1217	812	-1.7	34090	-4.6	34090	10713
3	2750	1217	812	2.0	34090	2.9	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

19:19

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1217	812	5.4	34090	13048	8.9	34090	17254
1	550	1217	812	-4.0	34090	12189	-5.8	34090	15176
1	825	1217	812	-8.2	34090	12579	-12.6	34090	16158
1	1100	1217	812	-12.0	34090	12784	-19.1	34090	16647
1	1125	1217	812	-12.3	34090	12800	-19.7	34090	16685
1	1375	1217	812	-5.9	34090	13499	-10.3	34090	18225
1	1650	1217	812	-4.3	34090	14138	-8.1	34090	19486
1	1925	1217	812	-2.3	34090	17094	-5.4	34090	23988
1	2200	1217	812	0.1	34090	909	-2.4	34090	718653
1	2750	1217	812	7.3	34090	11002	4.7	34090	8058
2	0	1217	812	7.3	34090	11002	6.6	34090	10288
2	900	1217	812	-3.5	34090	14154	-6.6	34090	19518
2	1350	1217	812	-7.9	34090	12393	-11.8	34090	15698
2	1500	1217	812	-9.1	34090	12243	-13.3	34090	15316
2	1800	1217	812	-7.8	34090	12023	-9.7	34090	13749
2	2250	1217	1396	-13.7	33797	11626	-7.7	33797	7741
2	3250	1217	584	-27.9	33737	11036	-21.4	33737	9168
2	3750	1217	676	-46.6	33808	11035	-41.0	33808	10106
2	4250	1217	676	-62.8	33808	11026	-58.0	33808	10441

Stijfheden (blijvend en quasi-blijvend)

Balk

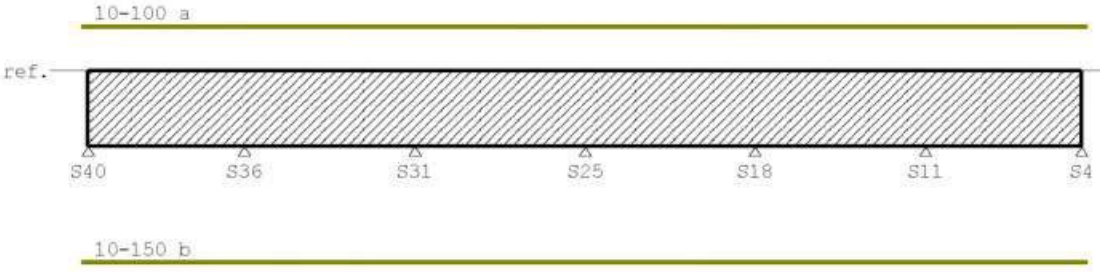
19:19

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
2	4507	1217	676	-75.8	33808	10818	-81.0	33808	11315
2	4750	1217	676	-69.5	33808	10863	-71.5	33808	11079
2	5250	1217	676	-54.9	33808	11006	-50.2	33808	10351
2	6250	1217	584	-40.0	33737	11451	-32.0	33737	9832
2	6750	1217	676	-44.4	33808	11428	-38.2	33808	10318
2	7250	1217	676	-46.6	33808	11393	-41.8	33808	10587
2	7503	1217	676	-40.6	33808	11660	-43.2	33808	12139
2	7750	1217	676	-40.3	33808	11559	-40.5	33808	11612
2	8250	1217	676	-37.7	33808	11406	-33.2	33808	10478
2	8750	1217	584	-34.9	33737	11163	-23.4	33737	8388
2	9750	1217	1396	-21.7	33797	11561	-21.7	33797	11586
2	10200	1217	812	-22.5	34090	11376	-26.3	34090	12608
2	10500	1217	812	-23.5	34090	11427	-32.2	34090	13942
2	10650	1217	812	-23.0	34090	11384	-27.9	34090	12903
2	11100	1217	812	-11.1	34090	11636	-14.3	34090	13653
2	12000	1217	812	16.4	34090	11147	15.8	34090	10869
3	0	1217	812	16.4	34090	11147	8.5	34090	6888
3	275	1217	812	7.6	34090	11160	3.6	34090	6387
3	825	1217	812	-0.7	34090	-16609	-5.2	34090	60470
3	1100	1217	812	-3.3	34090	21137	-9.1	34090	27965
3	1375	1217	812	-5.4	34090	16917	-12.6	34090	23766
3	1625	1217	812	-7.0	34090	15991	-26.3	34090	26174
3	1650	1217	812	-14.9	34090	13374	-25.6	34090	17963
3	1925	1217	812	-10.8	34090	13323	-18.6	34090	17855
3	2200	1217	812	-6.5	34090	13390	-11.2	34090	17998
3	2750	1217	812	3.4	34090	12035	4.8	34090	14768

Hoofdwapening Fysisch lineair

Balk

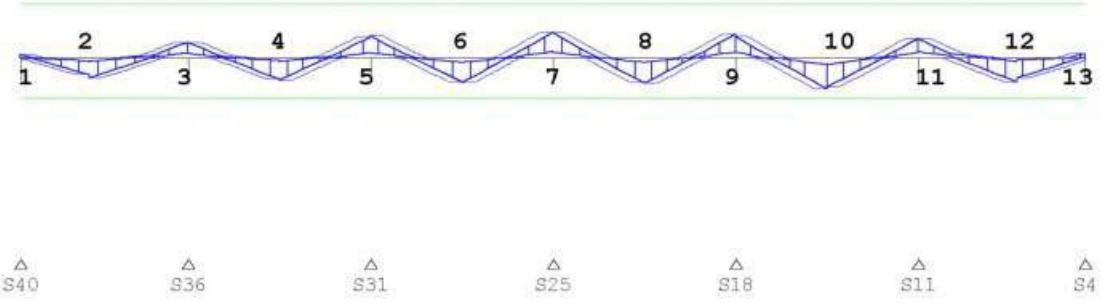
20:20



MEd dekkingslijn Fysisch lineair

Balk

20:20



Hoofdwapening

Balk
20:20

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S40+0	6.99	112.89	141	Bov	450*	1218	10-100	54
2	S40+1125	-42.66	-83.63	107	Ond	592*	812	10-150	1
3	S36+0	32.35	112.89	141	Bov	450*	1218	10-100	54
4	S36+1500	-47.45	-83.63	107	Ond	657*	812	10-150	1
5	S31+0	45.30	112.89	141	Bov	627*	1218	10-100	1
6	S31+1500	-52.37	-83.63	107	Ond	703*	812	10-150	1
7	S25+0	52.68	112.89	141	Bov	703*	1218	10-100	1
8	S25+1500	-54.40	-83.63	107	Ond	703*	812	10-150	1
9	S18+0	48.95	112.89	141	Bov	678*	1218	10-100	1
10	S18+1500	-64.56	-83.63	107	Ond	719	812	10-150	
11	S11+0	39.63	112.89	141	Bov	550*	1218	10-100	1
12	S4-1125	-50.72	-83.63	107	Ond	703*	812	10-150	1
13	S4-0	7.61	112.89	141	Bov	450*	1218	10-100	54

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

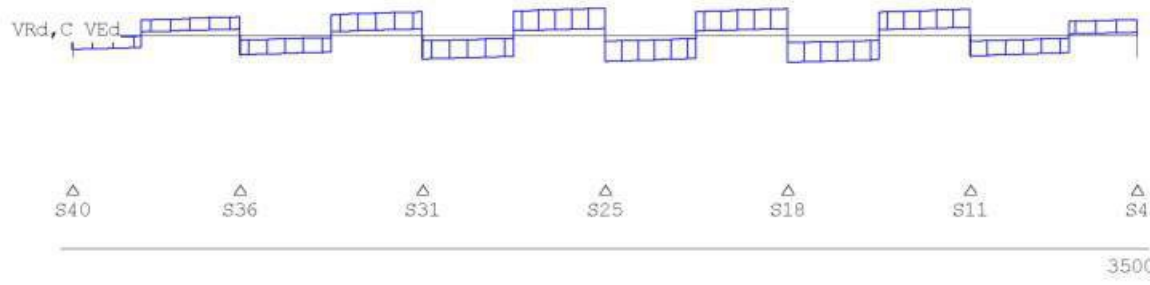
Scheurvorming volgens artikel 7.3.4

Balk
20:20

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S36+0	Bov	19.08	260	0.246	0.064	1.17	0.350	0.18	
1	S40+1125	Ond	-21.77	260	0.411	0.107	1.17	0.350	0.30	
2	S31+0	Bov	24.45	260	0.315	0.082	1.17	0.350	0.23	
2	S36+1500	Ond	-24.52	260	0.462	0.120	1.17	0.350	0.34	
3	S25+0	Bov	28.84	260	0.371	0.097	1.17	0.350	0.28	
3	S31+1500	Ond	-27.72	260	0.523	0.136	1.17	0.350	0.39	
4	S25+0	Bov	28.84	260	0.371	0.097	1.17	0.350	0.28	
4	S25+1500	Ond	-28.48	260	0.537	0.140	1.17	0.350	0.40	
5	S18+0	Bov	26.66	260	0.343	0.089	1.17	0.350	0.25	
5	S18+1500	Ond	-36.41	260	0.687	0.179	1.17	0.350	0.51	
6	S11+0	Bov	23.79	260	0.306	0.080	1.17	0.350	0.23	
6	S4-1125	Ond	-24.29	260	0.458	0.119	1.17	0.350	0.34	

DWARSKRACHTEN Fysisch lineair

Balk 20:20 Fundamentele combinatie



Stijfheden (blijvend en quasi-blijvend)

Balk
20:20

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1217	812	0.4	34090	1.9	34090	10713
1	550	1217	812	-4.4	34090	-6.5	34090	10713
1	825	1217	812	-6.2	34090	-10.2	34090	10713
1	1100	1217	812	-7.7	34090	-13.4	34090	10713
1	1125	1217	812	-7.8	34090	-13.7	34090	10713
1	1375	1217	812	-7.5	34090	-12.8	34090	10713
1	1650	1217	812	-4.0	34090	-7.6	34090	10713

Stijfheden (blijvend en quasi-blijvend)

Balk

20:20

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	1925	1217	812	-0.2	34090	-2.0	34090	10713
1	2475	1217	812	8.5	34090	10.2	34090	10713
1	2750	1217	812	13.4	34090	16.8	34090	10713
2	0	1217	812	13.4	34090	16.8	34090	10713
2	300	1217	812	7.4	34090	8.7	34090	10713
2	900	1217	812	-2.8	34090	-5.5	34090	10713
2	1200	1217	812	-7.2	34090	-12.0	34090	10713
2	1500	1217	812	-11.1	34090	-18.0	34090	10713
2	1500	1217	812	-11.1	34090	-18.0	34090	10713
2	1800	1217	812	-8.5	34090	-12.9	34090	10713
2	2100	1217	812	-3.7	34090	-5.5	34090	10713
2	2700	1217	812	7.3	34090	10.7	34090	10713
2	3000	1217	812	13.5	34090	19.4	34090	10713
3	0	1217	812	13.5	34090	19.4	34090	10713
3	300	1217	812	7.6	34090	11.1	34090	10713
3	900	1217	812	-5.3	34090	-6.6	34090	10713
3	1200	1217	812	-11.1	34090	-14.7	34090	10713
3	1500	1217	812	-16.5	34090	-22.5	34090	10713
3	1500	1217	812	-16.5	34090	-22.5	34090	10713
3	1800	1217	812	-11.2	34090	-14.8	34090	10713
3	2100	1217	812	-4.5	34090	-5.6	34090	10713
3	2700	1217	812	10.2	34090	14.1	34090	10713
3	3000	1217	812	18.3	34090	24.6	34090	10713
4	0	1217	812	18.3	34090	24.6	34090	10713
4	300	1217	812	9.9	34090	13.7	34090	10713
4	900	1217	812	-4.6	34090	-5.8	34090	10713
4	1200	1217	812	-11.2	34090	-14.9	34090	10713
4	1500	1217	812	-17.4	34090	-23.6	34090	10713
4	1500	1217	812	-17.4	34090	-23.6	34090	10713
4	1800	1217	812	-12.0	34090	-15.8	34090	10713
4	2100	1217	812	-5.6	34090	-6.9	34090	10713
4	2700	1217	812	8.5	34090	12.3	34090	10713
4	3000	1217	812	16.3	34090	22.5	34090	10713
5	0	1217	812	16.3	34090	22.5	34090	10713
5	300	1217	812	6.1	34090	9.3	34090	10713
5	900	1217	812	-9.8	34090	-11.9	34090	10713
5	1200	1217	812	-17.0	34090	-21.9	34090	10713
5	1500	1217	812	-23.8	34090	-31.4	34090	10713
5	1500	1217	812	-23.8	34090	-31.4	34090	10713
5	1800	1217	812	-15.1	34090	-20.3	34090	10713
5	2100	1217	812	-8.0	34090	-10.9	34090	10713
5	2700	1217	812	7.5	34090	9.3	34090	10713
5	3000	1217	812	16.0	34090	20.1	34090	10713
6	0	1217	812	16.0	34090	20.1	34090	10713
6	275	1217	812	11.7	34090	13.5	34090	10713
6	825	1217	812	1.8	34090	-0.6	34090	10713
6	1100	1217	812	-2.5	34090	-7.1	34090	10713
6	1375	1217	812	-6.6	34090	-13.3	34090	10713
6	1625	1217	812	-9.9	34090	-18.5	34090	10713
6	1650	1217	812	-6.9	34090	-14.2	34090	10713
6	1925	1217	812	-5.6	34090	-11.0	34090	10713
6	2200	1217	812	-4.1	34090	-7.5	34090	10713
6	2475	1217	812	-2.1	34090	-3.5	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

20:20

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1217	812	2.8	34090	13936	5.2	34090	19101
1	550	1217	812	-8.0	34090	12227	-11.6	34090	15273
1	825	1217	812	-12.8	34090	12470	-19.4	34090	15889
1	1100	1217	812	-17.3	34090	12629	-26.8	34090	16279

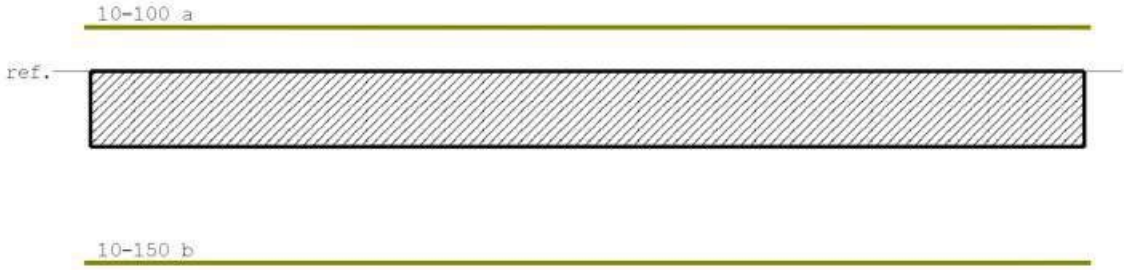
Stijfheden (blijvend en quasi-blijvend)

Balk

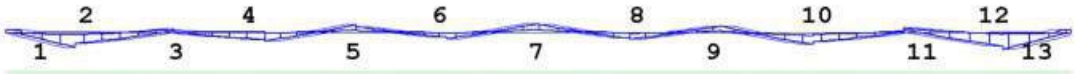
20:20

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
1	1125	1217	812	-17.7	34090	12642	-33.3	34090	17934
1	1375	1217	812	-16.3	34090	12583	-25.2	34090	16168
1	1650	1217	812	-10.0	34090	12805	-15.9	34090	16697
1	1925	1217	812	-3.3	34090	14394	-6.3	34090	19958
1	2475	1217	812	11.3	34090	11487	14.0	34090	13214
1	2750	1217	812	19.1	34090	11664	24.7	34090	13733
2	0	1217	812	19.1	34090	11664	24.4	34090	13613
2	300	1217	812	9.6	34090	11439	11.8	34090	13070
2	900	1217	812	-7.4	34090	12938	-12.0	34090	17004
2	1200	1217	812	-15.2	34090	12532	-23.3	34090	16043
2	1500	1217	812	-22.6	34090	12445	-36.1	34090	16308
2	1500	1217	812	-22.6	34090	12445	-36.1	34090	16308
2	1800	1217	812	-15.8	34090	12258	-23.1	34090	15355
2	2100	1217	812	-6.7	34090	12211	-9.7	34090	15232
2	2700	1217	812	12.9	34090	12154	18.5	34090	15083
2	3000	1217	812	23.3	34090	12116	33.2	34090	14984
3	0	1217	812	23.3	34090	12116	34.2	34090	15242
3	300	1217	812	13.4	34090	12166	19.2	34090	15114
3	900	1217	812	-7.4	34090	11603	-9.5	34090	13558
3	1200	1217	812	-17.2	34090	11855	-23.2	34090	14274
3	1500	1217	812	-26.5	34090	11948	-38.0	34090	14873
3	1500	1217	812	-26.5	34090	11948	-38.0	34090	14873
3	1800	1217	812	-17.3	34090	11858	-23.4	34090	14285
3	2100	1217	812	-6.4	34090	11674	-8.3	34090	13762
3	2700	1217	812	16.7	34090	11977	23.1	34090	14609
3	3000	1217	812	28.8	34090	11910	39.4	34090	14429
4	0	1217	812	28.8	34090	11910	38.6	34090	14264
4	300	1217	812	16.2	34090	11991	22.4	34090	14649
4	900	1217	812	-6.6	34090	11680	-8.6	34090	13779
4	1200	1217	812	-17.4	34090	11863	-23.5	34090	14298
4	1500	1217	812	-27.7	34090	11928	-39.0	34090	14705
4	1500	1217	812	-27.7	34090	11928	-39.0	34090	14705
4	1800	1217	812	-18.3	34090	11839	-24.7	34090	14231
4	2100	1217	812	-7.7	34090	11604	-9.9	34090	13560
4	2700	1217	812	14.8	34090	12112	21.0	34090	14974
4	3000	1217	812	26.7	34090	11998	37.1	34090	14667
5	0	1217	812	26.7	34090	11998	34.6	34090	14084
5	300	1217	812	11.5	34090	12311	17.0	34090	15490
5	900	1217	812	-13.3	34090	11561	-16.9	34090	13435
5	1200	1217	812	-25.1	34090	11750	-33.2	34090	13980
5	1500	1217	812	-36.4	34090	11834	-49.0	34090	14217
5	1500	1217	812	-36.4	34090	11834	-49.0	34090	14217
5	1800	1217	812	-23.8	34090	11903	-32.4	34090	14408
5	2100	1217	812	-12.8	34090	11938	-17.5	34090	14505
5	2700	1217	812	10.5	34090	11619	13.5	34090	13603
5	3000	1217	812	22.9	34090	11678	29.7	34090	13774
6	0	1217	812	22.9	34090	11678	30.4	34090	13951
6	275	1217	812	14.8	34090	11355	17.8	34090	12815
6	825	1217	812	-2.2	34090	21498	-6.3	34090	28242
6	1100	1217	812	-10.2	34090	13484	-17.8	34090	18194
6	1375	1217	812	-17.7	34090	12949	-28.9	34090	17028
6	1625	1217	812	-24.3	34090	12791	-38.7	34090	16663
6	1650	1217	812	-19.1	34090	12997	-31.3	34090	17138
6	1925	1217	812	-14.6	34090	12879	-23.5	34090	16868
6	2200	1217	812	-9.7	34090	12748	-15.4	34090	16564
6	2475	1217	812	-4.5	34090	12530	-6.9	34090	16039

Hoofdwapening Fysisch lineair Balk
21:21



MEd dekkingslijn Fysisch lineair Balk
21:21



Hoofdwapening Balk
21:21

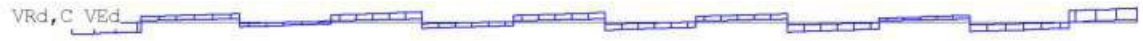
Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	4.72	112.89	141	Bov	450*	1218	10-100	54
2	1125	-31.50	-83.63	107	Ond	450*	812	10-150	54
3	2750	5.82	112.89	141	Bov	450*	1218	10-100	54
4	4250	-18.63	-83.63	107	Ond	450*	812	10-150	54
5	5750	14.96	112.89	141	Bov	450*	1218	10-100	54
6	7250	-13.72	-83.63	107	Ond	450*	812	10-150	54
7	8750	17.97	112.89	141	Bov	450*	1218	10-100	54
8	10250	-14.97	-83.63	107	Ond	450*	812	10-150	54
9	11750	12.62	112.89	141	Bov	450*	1218	10-100	54
10	13250	-25.87	-83.63	107	Ond	450*	812	10-150	54
11	14750	8.79	112.89	141	Bov	450*	1218	10-100	54
12	16375	-36.08	-83.63	107	Ond	500*	812	10-150	1
13	17500	5.41	112.89	141	Bov	450*	1218	10-100	54

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4 Balk
21:21

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	2750	Bov	4.96	260	0.064	0.017	1.17	0.350	0.05	
1	1125	Ond	-15.46	260	0.292	0.076	1.17	0.350	0.22	
2	5750	Bov	8.61	260	0.111	0.029	1.17	0.350	0.08	
2	4250	Ond	-8.85	260	0.167	0.043	1.17	0.350	0.12	
3	8750	Bov	10.46	260	0.135	0.035	1.17	0.350	0.10	
3	7250	Ond	-6.51	260	0.123	0.032	1.17	0.350	0.09	
4	8750	Bov	10.46	260	0.135	0.035	1.17	0.350	0.10	
4	10250	Ond	-7.77	260	0.147	0.038	1.17	0.350	0.11	
5	14750	Bov	7.46	260	0.096	0.025	1.17	0.350	0.07	
5	13250	Ond	-14.95	260	0.282	0.073	1.17	0.350	0.21	
6	14750	Bov	7.46	260	0.096	0.025	1.17	0.350	0.07	
6	16375	Ond	-16.10	260	0.304	0.079	1.17	0.350	0.23	

DWARSKRACHTEN Fysisch lineair Balk 21:21 Fundamentele combinatie



35000

Stijfheden (blijvend en quasi-blijvend) Balk 21:21

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	275	1217	812	-2.8	34090	-3.2	34090	10713
1	550	1217	812	-4.4	34090	-6.4	34090	10713
1	825	1217	812	-5.7	34090	-9.3	34090	10713
1	1100	1217	812	-6.6	34090	-11.7	34090	10713
1	1125	1217	812	-6.6	34090	-11.9	34090	10713
1	1375	1217	812	-5.1	34090	-8.5	34090	10713
1	1650	1217	812	-3.8	34090	-6.6	34090	10713
1	1925	1217	812	-2.2	34090	-4.4	34090	10713
1	2200	1217	812	-0.2	34090	-1.8	34090	10713
1	2750	1217	812	4.8	34090	4.8	34090	10713
2	300	1217	812	0.9	34090	-0.1	34090	10713
2	600	1217	812	-0.3	34090	-1.8	34090	10713
2	900	1217	812	-1.0	34090	-3.0	34090	10713
2	1200	1217	812	-1.3	34090	-3.9	34090	10713
2	1500	1217	812	-1.1	34090	-4.2	34090	10713
2	1500	1217	812	-1.1	34090	-4.2	34090	10713
2	1800	1217	812	-2.7	34090	-4.8	34090	10713
2	2100	1217	812	-1.3	34090	-2.4	34090	10713
2	2700	1217	812	2.8	34090	3.7	34090	10713
2	3000	1217	812	5.6	34090	7.4	34090	10713
3	0	1217	812	5.6	34090	7.4	34090	10713
3	300	1217	812	1.6	34090	2.6	34090	10713
3	900	1217	812	-1.2	34090	-1.6	34090	10713
3	1200	1217	812	-2.0	34090	-3.1	34090	10713
3	1500	1217	812	-2.3	34090	-4.1	34090	10713
3	1500	1217	812	-2.3	34090	-4.1	34090	10713
3	1800	1217	812	-2.1	34090	-3.2	34090	10713
3	2400	1217	812	1.5	34090	2.0	34090	10713
3	2700	1217	812	3.9	34090	5.3	34090	10713
3	3000	1217	812	6.8	34090	9.0	34090	10713
4	0	1217	812	6.8	34090	9.0	34090	10713
4	300	1217	812	3.1	34090	4.4	34090	10713
4	600	1217	812	0.8	34090	1.3	34090	10713
4	1200	1217	812	-2.4	34090	-3.5	34090	10713
4	1500	1217	812	-3.4	34090	-5.2	34090	10713
4	1500	1217	812	-3.4	34090	-5.2	34090	10713
4	1800	1217	812	-3.8	34090	-4.9	34090	10713
4	2100	1217	812	-2.5	34090	-2.9	34090	10713
4	2700	1217	812	1.3	34090	2.4	34090	10713
4	3000	1217	812	3.9	34090	5.8	34090	10713
5	0	1217	812	3.9	34090	5.8	34090	10713
5	600	1217	812	-3.5	34090	-3.6	34090	10713
5	900	1217	812	-6.0	34090	-7.1	34090	10713
5	1200	1217	812	-8.1	34090	-10.2	34090	10713
5	1500	1217	812	-9.8	34090	-12.9	34090	10713
5	1500	1217	812	-9.8	34090	-12.9	34090	10713

Stijfheden (blijvend en quasi-blijvend)

Balk

21:21

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
5	1800	1217	812	-5.4	34090	-7.9	34090	10713
5	2100	1217	812	-4.3	34090	-6.3	34090	10713
5	2400	1217	812	-2.8	34090	-4.3	34090	10713
5	2700	1217	812	-0.9	34090	-1.8	34090	10713
6	0	1217	812	1.5	34090	1.5	34090	10713
6	550	1217	812	1.6	34090	-0.3	34090	10713
6	825	1217	812	-0.6	34090	-3.4	34090	10713
6	1100	1217	812	-2.5	34090	-6.2	34090	10713
6	1375	1217	812	-4.1	34090	-8.6	34090	10713
6	1625	1217	812	-5.1	34090	-10.4	34090	10713
6	1650	1217	812	-5.1	34090	-11.5	34090	10713
6	1925	1217	812	-4.7	34090	-9.4	34090	10713
6	2200	1217	812	-4.0	34090	-6.9	34090	10713
6	2475	1217	812	-2.9	34090	-4.0	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

21:21

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	275	1217	812	-3.5	34090	11349	-4.2	34090	12797
1	550	1217	812	-7.8	34090	12149	-11.1	34090	15071
1	825	1217	812	-11.6	34090	12467	-17.6	34090	15883
1	1100	1217	812	-15.2	34090	12688	-23.8	34090	16419
1	1125	1217	812	-15.5	34090	12706	-24.3	34090	16463
1	1375	1217	812	-10.8	34090	12542	-16.5	34090	16068
1	1650	1217	812	-8.5	34090	12625	-13.2	34090	16269
1	1925	1217	812	-5.9	34090	12924	-9.6	34090	16973
1	2200	1217	812	-2.9	34090	14298	-5.5	34090	19783
1	2750	1217	812	5.0	34090	10969	3.6	34090	8785
2	300	1217	812	-0.7	34090	26881	-2.3	34090	31449
2	600	1217	812	-2.8	34090	14218	-5.3	34090	19636
2	900	1217	812	-4.4	34090	13587	-7.8	34090	18408
2	1200	1217	812	-5.6	34090	13572	-9.8	34090	18377
2	1500	1217	812	-6.3	34090	13816	-14.0	34090	20536
2	1500	1217	812	-6.3	34090	13816	-14.0	34090	20536
2	1800	1217	812	-6.2	34090	12669	-9.7	34090	16375
2	2100	1217	812	-3.2	34090	12777	-5.0	34090	16632
2	2700	1217	812	4.2	34090	11781	5.6	34090	14068
2	3000	1217	812	8.6	34090	11862	11.6	34090	14294
3	0	1217	812	8.6	34090	11862	9.2	34090	12364
3	300	1217	812	3.2	34090	12420	4.8	34090	15766
3	900	1217	812	-1.9	34090	11844	-2.5	34090	14244
3	1200	1217	812	-3.8	34090	12311	-5.6	34090	15490
3	1500	1217	812	-5.3	34090	12647	-9.7	34090	17816
3	1500	1217	812	-5.3	34090	12647	-9.7	34090	17816
3	1800	1217	812	-4.0	34090	12278	-5.8	34090	15406
3	2400	1217	812	2.4	34090	11972	3.3	34090	14598
3	2700	1217	812	6.2	34090	11920	8.5	34090	14455
3	3000	1217	812	10.5	34090	11853	14.1	34090	14269
4	0	1217	812	10.5	34090	11853	12.7	34090	13390
4	300	1217	812	5.2	34090	12076	7.4	34090	14878
4	600	1217	812	1.7	34090	12463	2.5	34090	15872
4	1200	1217	812	-4.2	34090	12109	-5.9	34090	14965
4	1500	1217	812	-6.4	34090	12318	-10.9	34090	16697
4	1500	1217	812	-6.4	34090	12318	-10.9	34090	16697
4	1800	1217	812	-5.7	34090	11772	-7.6	34090	14043
4	2100	1217	812	-3.2	34090	11322	-3.8	34090	12716
4	2700	1217	812	3.2	34090	12772	5.0	34090	16619
4	3000	1217	812	7.0	34090	12199	10.1	34090	15202
5	0	1217	812	7.0	34090	12199	9.0	34090	14247
5	600	1217	812	-3.8	34090	11039	-3.9	34090	11318
5	900	1217	812	-7.9	34090	11451	-9.7	34090	13107

Stijfheden (blijvend en quasi-blijvend)

Balk

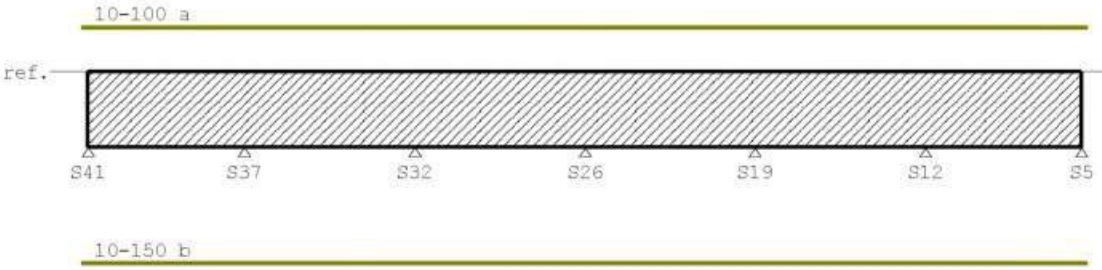
21:21

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
5	1200	1217	812	-11.6	34090	11673	-15.1	34090	13760
5	1500	1217	812	-14.9	34090	11825	-20.1	34090	14190
5	1500	1217	812	-14.9	34090	11825	-20.1	34090	14190
5	1800	1217	812	-9.5	34090	12153	-13.7	34090	15080
5	2100	1217	812	-7.6	34090	12134	-10.8	34090	15030
5	2400	1217	812	-5.2	34090	12234	-7.6	34090	15293
5	2700	1217	812	-2.4	34090	12911	-3.9	34090	16943
6	0	1217	812	1.6	34090	11094	6.6	34090	22862
6	550	1217	812	-1.6	34090	23909	-4.8	34090	29868
6	825	1217	812	-5.3	34090	14123	-10.0	34090	19458
6	1100	1217	812	-8.6	34090	13292	-14.7	34090	17789
6	1375	1217	812	-11.6	34090	13041	-19.2	34090	17236
6	1625	1217	812	-14.0	34090	12967	-27.1	34090	18533
6	1650	1217	812	-15.8	34090	13169	-26.6	34090	17521
6	1925	1217	812	-12.5	34090	12924	-20.3	34090	16972
6	2200	1217	812	-8.8	34090	12612	-13.7	34090	16238
6	2475	1217	812	-4.8	34090	12016	-6.7	34090	14717

Hoofdwapening Fysisch lineair

Balk

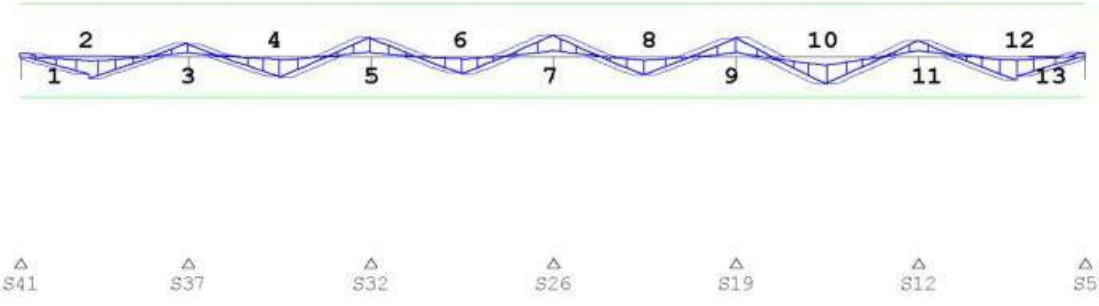
22:22



MEd dekkingslijn Fysisch lineair

Balk

22:22



Hoofdwapening

Balk

22:22

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S41+0	6.80	112.89	141	Bov	450*	1218	10-100	54
2	S41+1125	-45.34	-83.63	107	Ond	627*	812	10-150	1
3	S37+0	27.71	112.89	141	Bov	450*	1218	10-100	54
4	S37+1500	-43.97	-83.63	107	Ond	608*	812	10-150	1
5	S32+0	40.87	112.89	141	Bov	567*	1218	10-100	1
6	S32+1500	-36.63	-83.63	107	Ond	508*	812	10-150	1
7	S26+0	44.82	112.89	141	Bov	620*	1218	10-100	1
8	S26+1500	-38.61	-83.63	107	Ond	535*	812	10-150	1
9	S19+0	40.32	112.89	141	Bov	559*	1218	10-100	1
10	S19+1500	-57.66	-83.63	107	Ond	703*	812	10-150	1
11	S12+0	33.80	112.89	141	Bov	468*	1218	10-100	1

Hoofdwapening

Balk
22:22

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
12	S5-1125	-49.66	-83.63	107	Ond	688*	812	10-150	1
13	S5-0	7.45	112.89	141	Bov	450*	1218	10-100	54

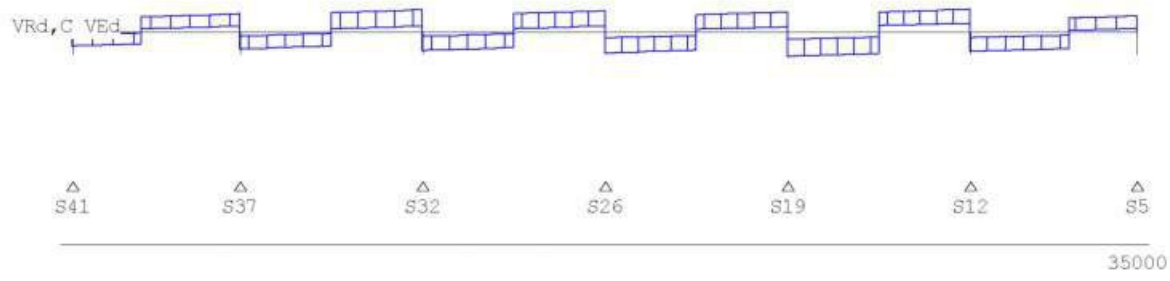
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
22:22

Geb.	Pos. [mm]	Zijde	$M_{S;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S37+0	Bov	16.10	260	0.207	0.054	1.17	0.350	0.15	
1	S41+1125	Ond	-23.56	260	0.444	0.116	1.17	0.350	0.33	
2	S32+0	Bov	21.66	260	0.279	0.072	1.17	0.350	0.21	
2	S37+1500	Ond	-21.51	260	0.406	0.105	1.17	0.350	0.30	
3	S26+0	Bov	25.19	260	0.324	0.084	1.17	0.350	0.24	
3	S32+1500	Ond	-17.71	260	0.334	0.087	1.17	0.350	0.25	
4	S26+0	Bov	25.19	260	0.324	0.084	1.17	0.350	0.24	
4	S26+1500	Ond	-19.87	260	0.375	0.097	1.17	0.350	0.28	
5	S19+0	Bov	21.00	260	0.270	0.070	1.17	0.350	0.20	
5	S19+1500	Ond	-34.19	260	0.645	0.168	1.17	0.350	0.48	
6	S12+0	Bov	20.99	260	0.270	0.070	1.17	0.350	0.20	
6	S5-1125	Ond	-24.34	260	0.459	0.119	1.17	0.350	0.34	

DWARSKRACHTEN Fysisch lineair Balk 22:22 Fundamentele combinatie



Stijfheden (blijvend en quasi-blijvend)

Balk
22:22

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	275	1217	812	-3.1	34090	-3.8	34090	10713
1	550	1217	812	-5.3	34090	-7.8	34090	10713
1	825	1217	812	-7.1	34090	-11.4	34090	10713
1	1100	1217	812	-8.6	34090	-14.6	34090	10713
1	1125	1217	812	-8.7	34090	-14.9	34090	10713
1	1375	1217	812	-8.9	34090	-14.5	34090	10713
1	1650	1217	812	-5.9	34090	-9.6	34090	10713
1	1925	1217	812	-2.4	34090	-4.4	34090	10713
1	2475	1217	812	5.5	34090	7.3	34090	10713
1	2750	1217	812	10.0	34090	13.7	34090	10713
2	0	1217	812	10.0	34090	13.7	34090	10713
2	300	1217	812	4.4	34090	5.8	34090	10713
2	900	1217	812	-2.4	34090	-5.3	34090	10713
2	1200	1217	812	-5.1	34090	-10.2	34090	10713
2	1500	1217	812	-7.4	34090	-14.7	34090	10713
2	1500	1217	812	-7.4	34090	-14.7	34090	10713
2	1800	1217	812	-5.8	34090	-10.6	34090	10713
2	2100	1217	812	-2.2	34090	-4.2	34090	10713

Stijfheden (blijvend en quasi-blijvend)

Balk

22:22

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	2700	1217	812	6.3	34090	9.8	34090	10713
2	3000	1217	812	11.2	34090	17.5	34090	10713
3	0	1217	812	11.2	34090	17.5	34090	10713
3	300	1217	812	5.7	34090	9.3	34090	10713
3	600	1217	812	1.9	34090	3.1	34090	10713
3	1200	1217	812	-4.2	34090	-8.0	34090	10713
3	1500	1217	812	-6.6	34090	-12.8	34090	10713
3	1500	1217	812	-6.6	34090	-12.8	34090	10713
3	1800	1217	812	-3.9	34090	-7.7	34090	10713
3	2400	1217	812	3.9	34090	5.3	34090	10713
3	2700	1217	812	8.5	34090	12.5	34090	10713
3	3000	1217	812	13.5	34090	20.1	34090	10713
4	0	1217	812	13.5	34090	20.1	34090	10713
4	300	1217	812	8.7	34090	12.7	34090	10713
4	600	1217	812	3.5	34090	4.9	34090	10713
4	1200	1217	812	-5.6	34090	-9.3	34090	10713
4	1500	1217	812	-9.6	34090	-15.7	34090	10713
4	1500	1217	812	-9.6	34090	-15.7	34090	10713
4	1800	1217	812	-6.3	34090	-10.0	34090	10713
4	2100	1217	812	-3.2	34090	-4.4	34090	10713
4	2700	1217	812	4.2	34090	8.0	34090	10713
4	3000	1217	812	8.6	34090	14.9	34090	10713
5	0	1217	812	8.6	34090	14.9	34090	10713
5	300	1217	812	3.1	34090	6.7	34090	10713
5	900	1217	812	-10.2	34090	-12.1	34090	10713
5	1200	1217	812	-16.2	34090	-20.9	34090	10713
5	1500	1217	812	-21.8	34090	-29.2	34090	10713
5	1500	1217	812	-21.8	34090	-29.2	34090	10713
5	1800	1217	812	-14.3	34090	-19.4	34090	10713
5	2100	1217	812	-7.9	34090	-10.7	34090	10713
5	2700	1217	812	6.4	34090	8.0	34090	10713
5	3000	1217	812	14.2	34090	18.0	34090	10713
6	0	1217	812	14.2	34090	18.0	34090	10713
6	275	1217	812	9.5	34090	11.2	34090	10713
6	825	1217	812	0.5	34090	-2.0	34090	10713
6	1100	1217	812	-3.5	34090	-8.0	34090	10713
6	1375	1217	812	-7.1	34090	-13.7	34090	10713
6	1625	1217	812	-10.0	34090	-18.6	34090	10713
6	1650	1217	812	-7.3	34090	-14.5	34090	10713
6	1925	1217	812	-6.0	34090	-11.2	34090	10713
6	2200	1217	812	-4.2	34090	-7.5	34090	10713
6	2475	1217	812	-2.2	34090	-3.4	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

22:22

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	275	1217	812	-4.4	34090	11660	-5.7	34090	13722
1	550	1217	812	-9.5	34090	12192	-13.7	34090	15183
1	825	1217	812	-14.2	34090	12410	-21.3	34090	15741
1	1100	1217	812	-18.6	34090	12564	-28.6	34090	16121
1	1125	1217	812	-19.0	34090	12577	-35.7	34090	17863
1	1375	1217	812	-18.3	34090	12466	-27.7	34090	15881
1	1650	1217	812	-12.1	34090	12485	-18.4	34090	15928
1	1925	1217	812	-5.6	34090	12684	-8.8	34090	16411
1	2475	1217	812	8.5	34090	11861	11.5	34090	14291
1	2750	1217	812	16.1	34090	11953	22.2	34090	14545
2	0	1217	812	16.1	34090	11953	20.4	34090	13845
2	300	1217	812	6.8	34090	11845	9.1	34090	14248
2	900	1217	812	-7.2	34090	13146	-12.1	34090	17470
2	1200	1217	812	-13.6	34090	12934	-22.1	34090	16995
2	1500	1217	812	-19.5	34090	12917	-34.1	34090	17590

Stijfheden (blijvend en quasi-blijvend)

Balk

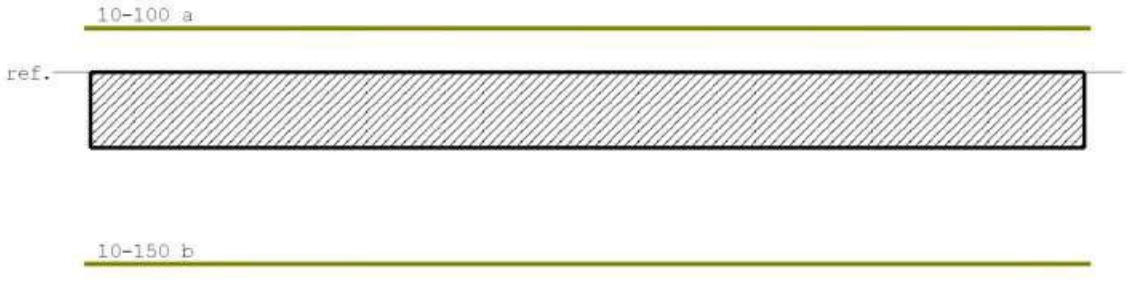
22:22

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
2	1500	1217	812	-19.5	34090	12917	-34.1	34090	17590
2	1800	1217	812	-13.8	34090	12734	-21.7	34090	16530
2	2100	1217	812	-5.6	34090	12835	-8.9	34090	16767
2	2700	1217	812	12.2	34090	12350	18.0	34090	15589
2	3000	1217	812	21.7	34090	12353	32.1	34090	15596
3	0	1217	812	21.7	34090	12353	30.2	34090	15085
3	300	1217	812	11.8	34090	12488	17.9	34090	15935
3	600	1217	812	3.9	34090	12439	5.9	34090	15813
3	1200	1217	812	-10.4	34090	12811	-16.7	34090	16710
3	1500	1217	812	-17.0	34090	12863	-28.2	34090	17100
3	1500	1217	812	-17.0	34090	12863	-28.2	34090	17100
3	1800	1217	812	-10.2	34090	12873	-16.4	34090	16854
3	2400	1217	812	6.3	34090	11936	8.6	34090	14499
3	2700	1217	812	15.1	34090	12173	21.7	34090	15134
3	3000	1217	812	24.4	34090	12206	35.3	34090	15219
4	0	1217	812	24.4	34090	12206	36.0	34090	15370
4	300	1217	812	15.3	34090	12140	21.9	34090	15046
4	600	1217	812	5.9	34090	12033	8.2	34090	14761
4	1200	1217	812	-11.7	34090	12492	-17.8	34090	15946
4	1500	1217	812	-19.9	34090	12490	-30.2	34090	15941
4	1500	1217	812	-19.9	34090	12490	-30.2	34090	15941
4	1800	1217	812	-12.5	34090	12400	-18.7	34090	15716
4	2100	1217	812	-5.2	34090	11979	-7.3	34090	14616
4	2700	1217	812	10.5	34090	12822	16.9	34090	16737
4	3000	1217	812	19.1	34090	12615	29.6	34090	16246
5	0	1217	812	19.1	34090	12615	31.6	34090	16817
5	300	1217	812	9.1	34090	13090	15.1	34090	17346
5	900	1217	812	-13.4	34090	11462	-16.6	34090	13140
5	1200	1217	812	-24.0	34090	11761	-31.8	34090	14012
5	1500	1217	812	-34.2	34090	11898	-46.6	34090	14394
5	1500	1217	812	-34.2	34090	11898	-46.6	34090	14394
5	1800	1217	812	-22.7	34090	11916	-31.0	34090	14443
5	2100	1217	812	-12.6	34090	11936	-17.2	34090	14499
5	2700	1217	812	9.0	34090	11643	11.7	34090	13674
5	3000	1217	812	20.5	34090	11699	26.8	34090	13834
6	0	1217	812	20.5	34090	11699	27.5	34090	14047
6	275	1217	812	12.4	34090	11463	15.4	34090	13144
6	825	1217	812	-3.6	34090	15516	-7.7	34090	21819
6	1100	1217	812	-11.1	34090	13198	-18.7	34090	17585
6	1375	1217	812	-18.2	34090	12875	-29.3	34090	16860
6	1625	1217	812	-24.3	34090	12779	-38.7	34090	16637
6	1650	1217	812	-19.3	34090	12913	-31.3	34090	16946
6	1925	1217	812	-14.7	34090	12794	-23.3	34090	16672
6	2200	1217	812	-9.6	34090	12656	-15.1	34090	16344
6	2475	1217	812	-4.3	34090	12389	-6.4	34090	15687

Hoofdwapening Fysisch lineair

Balk

23:23



MEd dekkingslijn Fysisch lineair

Balk
23:23

Hoofdwapening

Balk
23:23

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	6.89	112.89	141	Bov	450*	1218	10-100	54
2	1125	-31.09	-83.63	107	Ond	450*	812	10-150	54
3	2750	3.94	112.89	141	Bov	450*	1218	10-100	54
4	4250	-16.60	-83.63	107	Ond	450*	812	10-150	54
5	5750	12.93	112.89	141	Bov	450*	1218	10-100	54
6	7250	-8.37	-83.63	107	Ond	450*	812	10-150	54
7	8750	18.83	112.89	141	Bov	450*	1218	10-100	54
8	10250	-9.43	-83.63	107	Ond	450*	812	10-150	54
9	10250	6.92	112.89	141	Bov	450*	1218	10-100	54
10	10788	-2.44	-83.63	107	Ond	450*	812	10-150	54
11	11750	5.84	112.89	141	Bov	450*	1218	10-100	54
12	13250	-31.62	-83.63	107	Ond	450*	812	10-150	54
13	14750	12.55	112.89	141	Bov	450*	1218	10-100	54
14	16375	-34.31	-83.63	107	Ond	475*	812	10-150	1
15	17500	8.82	112.89	141	Bov	450*	1218	10-100	54

Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
23:23

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [%]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	2554	Bov	3.27	260	0.042	0.011	1.17	0.350	0.03	
1	1125	Ond	-15.65	260	0.295	0.077	1.17	0.350	0.22	
2	5750	Bov	7.48	260	0.096	0.025	1.17	0.350	0.07	
2	4250	Ond	-7.50	260	0.142	0.037	1.17	0.350	0.11	
3	8750	Bov	12.24	260	0.158	0.041	1.17	0.350	0.12	
3	7250	Ond	-3.14	260	0.059	0.015	1.17	0.350	0.04	
4	8750	Bov	12.24	260	0.158	0.041	1.17	0.350	0.12	
4	11750	Ond	-7.22	260	0.136	0.035	1.17	0.350	0.10	
5	14750	Bov	10.37	260	0.133	0.035	1.17	0.350	0.10	
5	13250	Ond	-21.57	260	0.407	0.106	1.17	0.350	0.30	
6	14750	Bov	10.37	260	0.133	0.035	1.17	0.350	0.10	
6	16375	Ond	-15.87	260	0.299	0.078	1.17	0.350	0.22	

DWARSKRACHTEN Fysisch lineair Balk 23:23 Fundamentele combinatie

35000

Stijfheden (blijvend en quasi-blijvend) Balk 23:23

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1217	812	-0.2	34090	1.3	34090	10713
1	550	1217	812	-4.2	34090	-6.0	34090	10713
1	825	1217	812	-5.7	34090	-9.2	34090	10713
1	1100	1217	812	-6.8	34090	-11.9	34090	10713
1	1125	1217	812	-6.9	34090	-12.1	34090	10713
1	1375	1217	812	-5.2	34090	-8.4	34090	10713
1	1650	1217	812	-4.2	34090	-6.9	34090	10713
1	1925	1217	812	-2.9	34090	-5.0	34090	10713
1	2200	1217	812	-1.2	34090	-2.8	34090	10713
1	2475	1217	812	0.8	34090	-0.2	34090	10713
2	300	1217	812	0.6	34090	-0.3	34090	10713
2	600	1217	812	-0.5	34090	-2.0	34090	10713
2	900	1217	812	-1.3	34090	-3.4	34090	10713
2	1200	1217	812	-1.6	34090	-4.2	34090	10713
2	1500	1217	812	-1.5	34090	-4.7	34090	10713
2	1500	1217	812	-1.5	34090	-4.7	34090	10713
2	1800	1217	812	-1.8	34090	-4.0	34090	10713
2	2100	1217	812	-0.9	34090	-2.0	34090	10713
2	2700	1217	812	2.3	34090	3.1	34090	10713
2	3000	1217	812	4.6	34090	6.3	34090	10713
3	0	1217	812	4.6	34090	6.3	34090	10713
3	300	1217	812	2.4	34090	3.3	34090	10713
3	600	1217	812	1.1	34090	1.4	34090	10713
3	1200	1217	812	-0.2	34090	-1.3	34090	10713
3	1500	1217	812	-0.1	34090	-1.9	34090	10713
3	1500	1217	812	-0.1	34090	-1.9	34090	10713
3	1800	1217	812	0.8	34090	-0.3	34090	10713
3	2400	1217	812	2.8	34090	3.3	34090	10713
3	2700	1217	812	4.4	34090	5.7	34090	10713
3	3000	1217	812	6.5	34090	8.6	34090	10713
4	0	1217	812	6.5	34090	8.6	34090	10713
4	300	1217	812	5.9	34090	7.2	34090	10713
4	600	1217	812	3.5	34090	4.0	34090	10713
4	1200	1217	812	-0.1	34090	-1.1	34090	10713
4	1500	1217	812	-1.2	34090	-3.0	34090	10713
4	1500	1217	812	-1.2	34090	-3.0	34090	10713
4	2100	1217	812	-0.8	34090	-1.1	34090	10713
4	2400	1217	812	-3.4	34090	-3.4	34090	10713
4	2415	1217	812	-3.5	34090	-3.5	34090	10713
4	2700	1217	812	-5.5	34090	-5.5	34090	10713
5	0	1217	812	-7.2	34090	-5.4	34090	10713
5	600	1217	812	-7.9	34090	-8.0	34090	10713
5	900	1217	812	-10.0	34090	-11.1	34090	10713
5	1200	1217	812	-11.7	34090	-13.7	34090	10713
5	1500	1217	812	-12.9	34090	-15.9	34090	10713
5	1500	1217	812	-12.9	34090	-15.9	34090	10713

Stijfheden (blijvend en quasi-blijvend)

Balk

23:23

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
5	1800	1217	812	-12.1	34090	-14.5	34090	10713
5	2100	1217	812	-7.1	34090	-9.1	34090	10713
5	2400	1217	812	-1.7	34090	-3.1	34090	10713
5	3000	1217	812	10.3	34090	10.3	34090	10713
6	0	1217	812	10.3	34090	10.3	34090	10713
6	550	1217	812	1.8	34090	-0.1	34090	10713
6	825	1217	812	0.6	34090	-2.0	34090	10713
6	1100	1217	812	-0.3	34090	-3.7	34090	10713
6	1375	1217	812	-0.8	34090	-4.9	34090	10713
6	1625	1217	812	-1.0	34090	-5.7	34090	10713
6	1650	1217	812	-5.2	34090	-11.4	34090	10713
6	1925	1217	812	-4.0	34090	-8.3	34090	10713
6	2200	1217	812	-2.4	34090	-4.8	34090	10713
6	2750	1217	812	1.9	34090	3.3	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

23:23

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1217	812	2.3	34090	15214	4.9	34090	21347
1	550	1217	812	-7.2	34090	12083	-10.2	34090	14895
1	825	1217	812	-11.4	34090	12421	-17.2	34090	15769
1	1100	1217	812	-15.3	34090	12636	-23.8	34090	16296
1	1125	1217	812	-15.6	34090	12653	-24.4	34090	16338
1	1375	1217	812	-10.6	34090	12445	-15.9	34090	15829
1	1650	1217	812	-8.7	34090	12460	-13.1	34090	15866
1	1925	1217	812	-6.4	34090	12602	-10.0	34090	16213
1	2200	1217	812	-3.8	34090	13162	-6.4	34090	17506
1	2475	1217	812	-0.9	34090	23127	-2.5	34090	29380
2	300	1217	812	-0.9	34090	19877	-2.5	34090	26911
2	600	1217	812	-3.1	34090	13837	-5.6	34090	18909
2	900	1217	812	-4.7	34090	13393	-8.2	34090	18004
2	1200	1217	812	-6.0	34090	13418	-10.4	34090	18057
2	1500	1217	812	-6.8	34090	13657	-12.7	34090	18920
2	1500	1217	812	-6.8	34090	13657	-12.7	34090	18920
2	1800	1217	812	-5.4	34090	13085	-8.9	34090	17334
2	2100	1217	812	-2.8	34090	13221	-4.8	34090	17635
2	2700	1217	812	3.6	34090	11847	4.9	34090	14254
2	3000	1217	812	7.5	34090	11971	10.3	34090	14594
3	0	1217	812	7.5	34090	11971	9.5	34090	13908
3	300	1217	812	4.0	34090	12014	5.5	34090	14709
3	600	1217	812	1.5	34090	11593	2.0	34090	13529
3	1200	1217	812	-2.0	34090	14321	-3.9	34090	19825
3	1500	1217	812	-3.1	34090	14507	-6.1	34090	20160
3	1500	1217	812	-3.1	34090	14507	-6.1	34090	20160
3	1800	1217	812	-1.0	34090	21573	-2.8	34090	28298
3	2400	1217	812	3.6	34090	11435	4.5	34090	13060
3	2700	1217	812	6.6	34090	11771	8.8	34090	14040
3	3000	1217	812	10.0	34090	11847	13.5	34090	14252
4	0	1217	812	10.0	34090	11847	15.7	34090	15510
4	300	1217	812	8.1	34090	11557	10.2	34090	13422
4	600	1217	812	4.4	34090	11327	5.2	34090	12730
4	1200	1217	812	-1.8	34090	14585	-3.5	34090	20296
4	1500	1217	812	-4.2	34090	13340	-7.2	34090	17891
4	1500	1217	812	-4.2	34090	13340	-7.2	34090	17891
4	2100	1217	812	-1.4	34090	12155	-1.9	34090	15085
4	2400	1217	812	-3.4	34090	10729	-2.2	34090	7846
4	2415	1217	812	-3.5	34090	10729	-2.2	34090	7642
4	2700	1217	812	-5.5	34090	10731	-2.0	34090	4852
5	0	1217	812	-4.3	34090	9023	3.7	34090	-15398
5	600	1217	812	-8.1	34090	10764	-8.2	34090	10891
5	900	1217	812	-11.8	34090	11166	-13.5	34090	12224

Stijfheden (blijvend en quasi-blijvend)

Balk

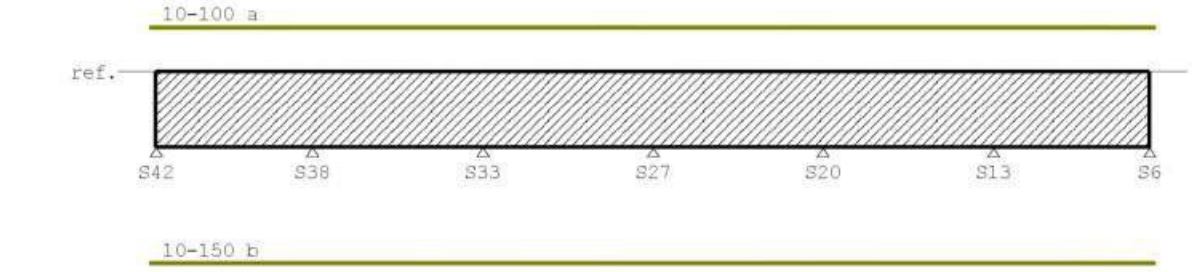
23:23

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{cg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
5	1200	1217	812	-15.0	34090	11408	-18.4	34090	12978
5	1500	1217	812	-17.8	34090	11592	-26.5	34090	14792
5	1500	1217	812	-17.8	34090	11592	-26.5	34090	14792
5	1800	1217	812	-16.2	34090	11513	-20.3	34090	13292
5	2100	1217	812	-10.3	34090	11711	-13.6	34090	13871
5	2400	1217	812	-4.1	34090	12707	-6.4	34090	16465
5	3000	1217	812	10.4	34090	10739	9.2	34090	9877
6	0	1217	812	10.4	34090	10739	4.2	34090	5330
6	550	1217	812	-1.3	34090	31391	-4.4	34090	33249
6	825	1217	812	-3.8	34090	15651	-8.1	34090	22023
6	1100	1217	812	-5.9	34090	14478	-11.5	34090	20108
6	1375	1217	812	-7.6	34090	14192	-14.5	34090	19589
6	1625	1217	812	-8.9	34090	14189	-26.4	34090	23138
6	1650	1217	812	-15.5	34090	13093	-25.8	34090	17353
6	1925	1217	812	-11.1	34090	12993	-18.2	34090	17129
6	2200	1217	812	-6.3	34090	12911	-10.3	34090	16942
6	2750	1217	812	4.3	34090	12659	6.7	34090	16351

Hoofdwapening Fysisch lineair

Balk

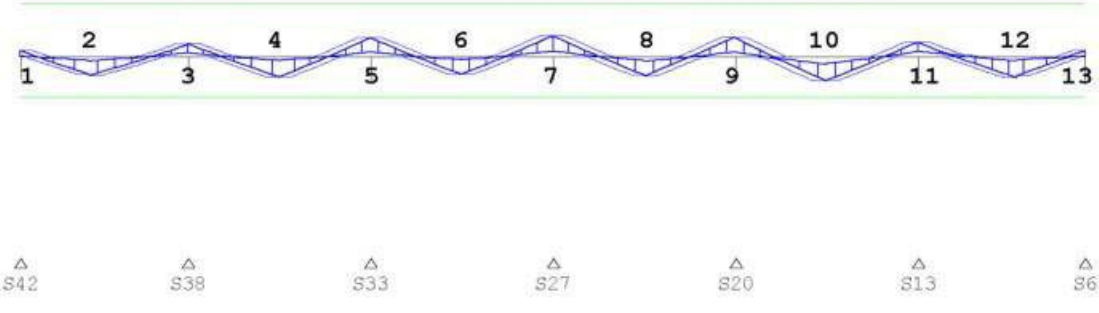
24:24



MEd dekkingslijn Fysisch lineair

Balk

24:24



Hoofdwapening

Balk

24:24

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S42+0	12.00	112.89	141	Bov	450*	1218	10-100	54
2	S42+1125	-39.75	-83.63	107	Ond	551*	812	10-150	1
3	S38+0	26.96	112.89	141	Bov	450*	1218	10-100	54
4	S38+1500	-42.69	-83.63	107	Ond	590*	812	10-150	1
5	S33+0	39.19	112.89	141	Bov	544*	1218	10-100	1
6	S33+1500	-37.10	-83.63	107	Ond	514*	812	10-150	1
7	S27+0	43.44	112.89	141	Bov	601*	1218	10-100	1
8	S27+1500	-40.59	-83.63	107	Ond	563*	812	10-150	1
9	S20+0	40.29	112.89	141	Bov	559*	1218	10-100	1
10	S20+1500	-51.58	-83.63	107	Ond	703*	812	10-150	1
11	S13+0	30.52	112.89	141	Bov	450*	1218	10-100	54

Hoofdwapening

Balk
24:24

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
12	S6-1125	-43.97	-83.63	107	Ond	608*	812	10-150	1
13	S6-0	12.94	112.89	141	Bov	450*	1218	10-100	54

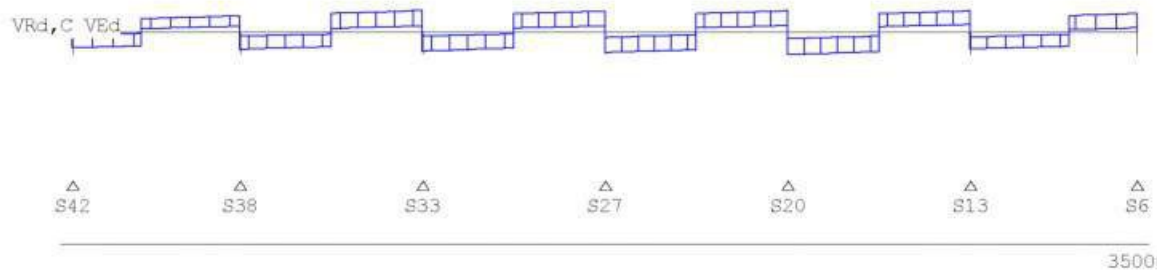
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
24:24

Geb.	Pos. [mm]	Zijde	$M_{S;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S38+0	Bov	15.42	260	0.199	0.052	1.17	0.350	0.15	
1	S42+1125	Ond	-20.92	260	0.395	0.103	1.17	0.350	0.29	
2	S33+0	Bov	20.81	260	0.268	0.070	1.17	0.350	0.20	
2	S38+1500	Ond	-21.10	260	0.398	0.103	1.17	0.350	0.30	
3	S27+0	Bov	23.85	260	0.307	0.080	1.17	0.350	0.23	
3	S33+1500	Ond	-18.16	260	0.342	0.089	1.17	0.350	0.25	
4	S27+0	Bov	23.85	260	0.307	0.080	1.17	0.350	0.23	
4	S27+1500	Ond	-21.40	260	0.404	0.105	1.17	0.350	0.30	
5	S20+0	Bov	21.48	260	0.277	0.072	1.17	0.350	0.21	
5	S20+1500	Ond	-29.52	260	0.557	0.145	1.17	0.350	0.41	
6	S13+0	Bov	18.39	260	0.237	0.062	1.17	0.350	0.18	
6	S6-1125	Ond	-22.15	260	0.418	0.109	1.17	0.350	0.31	

DWARSKRACHTEN Fysisch lineair — Balk 24:24 Fundamentele combinatie



Stijfheden (blijvend en quasi-blijvend)

Balk
24:24

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}$* [N/mm²]	$E_{Qb;\infty}$* [N/mm²]
1	0	1217	812	1.5	34090	3.8	34090	10713
1	550	1217	812	-4.1	34090	-5.9	34090	10713
1	825	1217	812	-6.4	34090	-10.2	34090	10713
1	1100	1217	812	-8.3	34090	-14.1	34090	10713
1	1125	1217	812	-8.4	34090	-14.5	34090	10713
1	1375	1217	812	-8.1	34090	-13.0	34090	10713
1	1650	1217	812	-5.4	34090	-8.6	34090	10713
1	1925	1217	812	-2.3	34090	-3.9	34090	10713
1	2475	1217	812	5.1	34090	6.7	34090	10713
1	2750	1217	812	9.3	34090	12.6	34090	10713
2	0	1217	812	9.3	34090	12.6	34090	10713
2	300	1217	812	4.7	34090	6.3	34090	10713
2	900	1217	812	-2.9	34090	-5.8	34090	10713
2	1200	1217	812	-6.1	34090	-11.1	34090	10713
2	1500	1217	812	-8.8	34090	-16.0	34090	10713
2	1500	1217	812	-8.8	34090	-16.0	34090	10713
2	1800	1217	812	-5.9	34090	-10.5	34090	10713
2	2100	1217	812	-2.4	34090	-4.3	34090	10713

Stijfheden (blijvend en quasi-blijvend)

Balk

24:24

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	2700	1217	812	5.8	34090	9.3	34090	10713
2	3000	1217	812	10.6	34090	16.7	34090	10713
3	0	1217	812	10.6	34090	16.7	34090	10713
3	300	1217	812	6.0	34090	9.7	34090	10713
3	900	1217	812	-1.5	34090	-2.9	34090	10713
3	1200	1217	812	-4.7	34090	-8.6	34090	10713
3	1500	1217	812	-7.4	34090	-13.8	34090	10713
3	1500	1217	812	-7.4	34090	-13.8	34090	10713
3	1800	1217	812	-4.3	34090	-8.1	34090	10713
3	2400	1217	812	3.4	34090	4.7	34090	10713
3	2700	1217	812	7.9	34090	11.8	34090	10713
3	3000	1217	812	12.8	34090	19.3	34090	10713
4	0	1217	812	12.8	34090	19.3	34090	10713
4	300	1217	812	7.7	34090	11.6	34090	10713
4	600	1217	812	2.8	34090	4.2	34090	10713
4	1200	1217	812	-5.6	34090	-9.4	34090	10713
4	1500	1217	812	-9.2	34090	-15.6	34090	10713
4	1500	1217	812	-9.2	34090	-15.6	34090	10713
4	1800	1217	812	-7.3	34090	-11.1	34090	10713
4	2100	1217	812	-3.3	34090	-4.7	34090	10713
4	2700	1217	812	5.8	34090	9.5	34090	10713
4	3000	1217	812	11.1	34090	17.3	34090	10713
5	0	1217	812	11.1	34090	17.3	34090	10713
5	300	1217	812	3.9	34090	7.4	34090	10713
5	900	1217	812	-7.6	34090	-9.5	34090	10713
5	1200	1217	812	-12.8	34090	-17.3	34090	10713
5	1500	1217	812	-17.4	34090	-24.7	34090	10713
5	1500	1217	812	-17.4	34090	-24.7	34090	10713
5	1800	1217	812	-11.4	34090	-16.4	34090	10713
5	2100	1217	812	-6.3	34090	-9.1	34090	10713
5	2700	1217	812	5.2	34090	6.9	34090	10713
5	3000	1217	812	11.5	34090	15.5	34090	10713
6	0	1217	812	11.5	34090	15.5	34090	10713
6	275	1217	812	7.8	34090	9.5	34090	10713
6	825	1217	812	-0.4	34090	-2.4	34090	10713
6	1100	1217	812	-4.0	34090	-7.9	34090	10713
6	1375	1217	812	-7.2	34090	-12.9	34090	10713
6	1625	1217	812	-9.8	34090	-17.2	34090	10713
6	1650	1217	812	-7.2	34090	-14.1	34090	10713
6	1925	1217	812	-5.5	34090	-10.1	34090	10713
6	2200	1217	812	-3.4	34090	-5.7	34090	10713
6	2750	1217	812	1.9	34090	4.3	34090	10713

Stijfheden (frequent en karakteristiek)

Balk

24:24

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	0	1217	812	5.3	34090	13344	9.1	34090	17900
1	550	1217	812	-7.1	34090	12107	-10.1	34090	14958
1	825	1217	812	-12.7	34090	12416	-19.1	34090	15756
1	1100	1217	812	-18.0	34090	12583	-27.8	34090	16169
1	1125	1217	812	-18.5	34090	12596	-31.5	34090	17029
1	1375	1217	812	-16.3	34090	12412	-24.4	34090	15745
1	1650	1217	812	-10.8	34090	12417	-16.2	34090	15758
1	1925	1217	812	-5.0	34090	12581	-7.6	34090	16162
1	2475	1217	812	7.8	34090	11857	10.6	34090	14280
1	2750	1217	812	14.7	34090	11925	20.2	34090	14468
2	0	1217	812	14.7	34090	11925	21.7	34090	15065
2	300	1217	812	7.3	34090	11873	9.9	34090	14325
2	900	1217	812	-7.7	34090	12910	-12.4	34090	16941
2	1200	1217	812	-14.5	34090	12748	-22.9	34090	16563
2	1500	1217	812	-20.9	34090	12740	-33.3	34090	16628

Stijfheden (blijvend en quasi-blijvend)

Balk

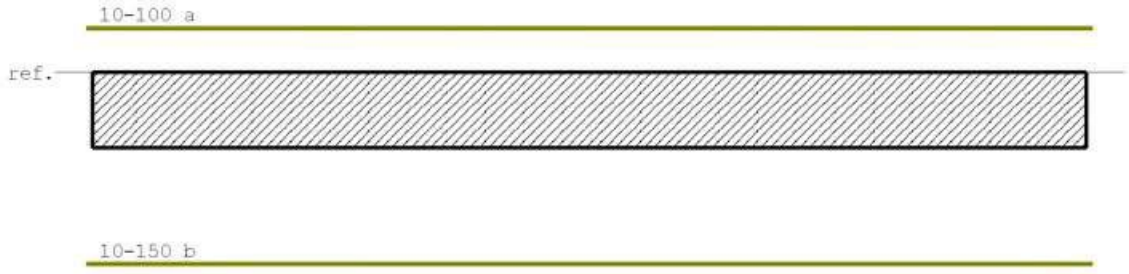
24:24

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
2	1500	1217	812	-20.9	34090	12740	-33.3	34090	16628
2	1800	1217	812	-13.6	34090	12694	-21.3	34090	16435
2	2100	1217	812	-5.6	34090	12724	-8.9	34090	16505
2	2700	1217	812	11.6	34090	12393	17.3	34090	15697
2	3000	1217	812	20.8	34090	12375	31.0	34090	15653
3	0	1217	812	20.8	34090	12375	31.0	34090	15647
3	300	1217	812	12.1	34090	12417	18.2	34090	15758
3	900	1217	812	-3.9	34090	12838	-6.2	34090	16773
3	1200	1217	812	-11.2	34090	12752	-17.7	34090	16572
3	1500	1217	812	-18.1	34090	12792	-28.8	34090	16682
3	1500	1217	812	-18.1	34090	12792	-28.8	34090	16682
3	1800	1217	812	-10.7	34090	12814	-17.0	34090	16718
3	2400	1217	812	5.6	34090	12015	7.8	34090	14714
3	2700	1217	812	14.4	34090	12230	20.9	34090	15281
3	3000	1217	812	23.7	34090	12250	34.5	34090	15333
4	0	1217	812	23.7	34090	12250	34.7	34090	15378
4	300	1217	812	14.2	34090	12254	20.8	34090	15343
4	600	1217	812	5.1	34090	12195	7.3	34090	15191
4	1200	1217	812	-12.0	34090	12527	-18.3	34090	16031
4	1500	1217	812	-19.8	34090	12553	-32.1	34090	16541
4	1500	1217	812	-19.8	34090	12553	-32.1	34090	16541
4	1800	1217	812	-13.7	34090	12297	-20.1	34090	15454
4	2100	1217	812	-5.6	34090	12030	-7.8	34090	14753
4	2700	1217	812	12.0	34090	12480	18.2	34090	15915
4	3000	1217	812	21.5	34090	12358	31.9	34090	15610
5	0	1217	812	21.5	34090	12358	31.0	34090	15377
5	300	1217	812	9.8	34090	12834	15.6	34090	16765
5	900	1217	812	-10.8	34090	11634	-13.9	34090	13648
5	1200	1217	812	-20.4	34090	11934	-28.0	34090	14495
5	1500	1217	812	-29.5	34090	12068	-41.6	34090	14856
5	1500	1217	812	-29.5	34090	12068	-41.6	34090	14856
5	1800	1217	812	-19.7	34090	12111	-28.0	34090	14969
5	2100	1217	812	-10.9	34090	12104	-15.4	34090	14952
5	2700	1217	812	8.0	34090	11884	10.9	34090	14355
5	3000	1217	812	18.2	34090	11902	24.8	34090	14405
6	0	1217	812	18.2	34090	11902	24.3	34090	14258
6	275	1217	812	10.6	34090	11563	13.5	34090	13440
6	825	1217	812	-3.8	34090	14150	-7.1	34090	19510
6	1100	1217	812	-10.4	34090	12899	-16.9	34090	16915
6	1375	1217	812	-16.7	34090	12702	-26.3	34090	16453
6	1625	1217	812	-22.1	34090	12653	-34.5	34090	16336
6	1650	1217	812	-18.7	34090	12878	-30.2	34090	16865
6	1925	1217	812	-13.1	34090	12736	-20.7	34090	16535
6	2200	1217	812	-7.2	34090	12498	-10.9	34090	15960
6	2750	1217	812	5.9	34090	13188	9.9	34090	17564

Hoofdwapening Fysisch lineair

Balk

25:25



MEd dekkingslijn Fysisch lineair Balk
25:25

Hoofdwapening Balk
25:25

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_s [mm²]	Basiswapening +Bijlegwapening	Opm.
1	0	13.65	147.07	140	Bov	587*	1591	10-100	54
2	1125	-25.52	-108.97	107	Ond	587*	1061	10-150	54
3	2750	1.38	147.07	140	Bov	587*	1591	10-100	54
4	4250	-12.12	-108.97	107	Ond	587*	1061	10-150	54
5	5750	5.14	147.07	140	Bov	587*	1591	10-100	54
6	7250	-4.37	-108.97	107	Ond	587*	1061	10-150	54
7	7250	0.38	147.07	140	Bov	587*	1591	10-100	54
8	8750	7.78	147.07	140	Bov	587*	1591	10-100	54
9	10250	-5.85	-108.97	107	Ond	587*	1061	10-150	54
10	11750	5.75	147.07	140	Bov	587*	1591	10-100	54
11	13250	-12.74	-108.97	107	Ond	587*	1061	10-150	54
12	14750	1.51	147.07	140	Bov	587*	1591	10-100	54
13	16375	-28.23	-108.97	107	Ond	587*	1061	10-150	54
14	17500	13.30	147.07	140	Bov	587*	1591	10-100	54

Opmerkingen
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4 Balk
25:25

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cs}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	0	Bov	6.78	260	0.067	0.017	1.17	0.350	0.05	
1	1125	Ond	-12.74	260	0.184	0.048	1.17	0.350	0.14	
2	5543	Bov	3.38	260	0.033	0.009	1.17	0.350	0.02	
2	4250	Ond	-5.42	260	0.078	0.020	1.17	0.350	0.06	
3	8750	Bov	5.03	260	0.050	0.013	1.17	0.350	0.04	
3	7008	Ond	-1.60	260	0.023	0.006	1.17	0.350	0.02	
4	8750	Bov	5.03	260	0.050	0.013	1.17	0.350	0.04	
4	10511	Ond	-2.94	260	0.042	0.011	1.17	0.350	0.03	
5	11750	Bov	3.78	260	0.037	0.010	1.17	0.350	0.03	
5	13250	Ond	-6.30	260	0.091	0.024	1.17	0.350	0.07	
6	17500	Bov	6.25	260	0.062	0.016	1.17	0.350	0.05	
6	16375	Ond	-13.46	260	0.194	0.051	1.17	0.350	0.14	

DWARSKRACHTEN Fysisch lineair Balk 25:25 Fundamentele combinatie

35000

Stijfheden (blijvend en quasi-blijvend)

Balk

25:25

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	0	1590	1060	2.9	34090	5.2	34090	10713
1	550	1590	1060	-2.3	34090	-3.2	34090	10713
1	825	1590	1060	-4.1	34090	-6.6	34090	10713
1	1100	1590	1060	-5.5	34090	-9.6	34090	10713
1	1125	1590	1060	-5.6	34090	-9.9	34090	10713
1	1588	1590	1060	-3.3	34090	-5.3	34090	10713
1	1650	1590	1060	-3.3	34090	-5.3	34090	10713
1	1925	1590	1060	-3.2	34090	-5.1	34090	10713
1	2200	1590	1060	-2.6	34090	-4.4	34090	10713
1	2475	1590	1060	-1.5	34090	-3.3	34090	10713
2	300	1590	1060	-0.5	34090	-1.7	34090	10713
2	600	1590	1060	-1.5	34090	-3.0	34090	10713
2	900	1590	1060	-2.0	34090	-3.8	34090	10713
2	1200	1590	1060	-1.9	34090	-4.0	34090	10713
2	1500	1590	1060	-1.3	34090	-3.7	34090	10713
2	1500	1590	1060	-1.3	34090	-3.7	34090	10713
2	1800	1590	1060	-1.3	34090	-2.7	34090	10713
2	2100	1590	1060	-1.3	34090	-2.2	34090	10713
2	2400	1590	1060	-0.7	34090	-1.2	34090	10713
2	3000	1590	1060	2.2	34090	2.5	34090	10713
3	0	1590	1060	2.2	34090	2.5	34090	10713
3	300	1590	1060	0.9	34090	1.1	34090	10713
3	900	1590	1060	-0.5	34090	-0.9	34090	10713
3	1200	1590	1060	-0.4	34090	-1.1	34090	10713
3	1500	1590	1060	0.3	34090	-0.7	34090	10713
3	1500	1590	1060	0.3	34090	-0.7	34090	10713
3	1800	1590	1060	-0.2	34090	-0.8	34090	10713
3	2400	1590	1060	0.5	34090	0.7	34090	10713
3	2700	1590	1060	1.8	34090	2.3	34090	10713
3	3000	1590	1060	3.6	34090	4.4	34090	10713
4	0	1590	1060	3.6	34090	4.4	34090	10713
4	300	1590	1060	1.0	34090	1.6	34090	10713
4	900	1590	1060	-0.4	34090	-0.6	34090	10713
4	1200	1590	1060	-0.3	34090	-0.8	34090	10713
4	1500	1590	1060	0.4	34090	-0.5	34090	10713
4	1500	1590	1060	0.4	34090	-0.5	34090	10713
4	1800	1590	1060	-1.6	34090	-2.3	34090	10713
4	2100	1590	1060	-1.4	34090	-1.7	34090	10713
4	2700	1590	1060	0.8	34090	1.1	34090	10713
4	3000	1590	1060	2.7	34090	3.4	34090	10713
5	0	1590	1060	2.7	34090	3.4	34090	10713
5	600	1590	1060	-2.1	34090	-2.6	34090	10713
5	900	1590	1060	-2.9	34090	-3.8	34090	10713
5	1200	1590	1060	-3.2	34090	-4.5	34090	10713
5	1500	1590	1060	-2.9	34090	-4.6	34090	10713
5	1500	1590	1060	-2.9	34090	-4.6	34090	10713
5	1800	1590	1060	-3.0	34090	-5.0	34090	10713
5	2100	1590	1060	-3.0	34090	-4.7	34090	10713
5	2400	1590	1060	-2.5	34090	-4.0	34090	10713
5	2700	1590	1060	-1.5	34090	-2.6	34090	10713
6	275	1590	1060	-0.6	34090	-2.4	34090	10713
6	550	1590	1060	-1.9	34090	-4.0	34090	10713
6	825	1590	1060	-2.8	34090	-5.0	34090	10713
6	1100	1590	1060	-3.2	34090	-5.6	34090	10713
6	1375	1590	1060	-3.1	34090	-5.7	34090	10713
6	1625	1590	1060	-2.6	34090	-5.4	34090	10713
6	1650	1590	1060	-4.9	34090	-9.8	34090	10713
6	1925	1590	1060	-3.9	34090	-6.9	34090	10713
6	2200	1590	1060	-2.3	34090	-3.6	34090	10713
6	2750	1590	1060	2.2	34090	4.6	34090	10713

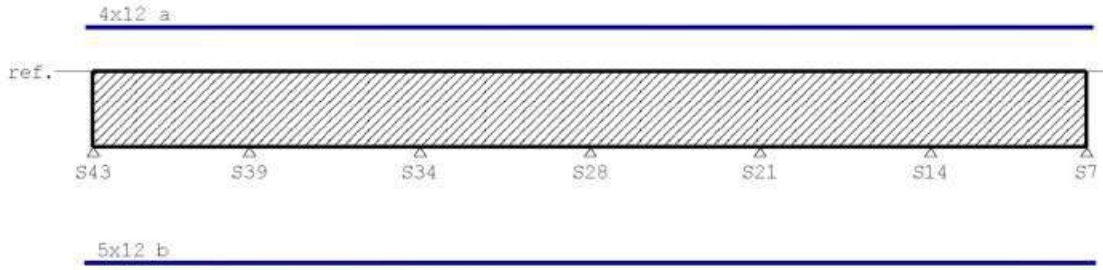
Stijfheden (frequent en karakteristiek)

Balk

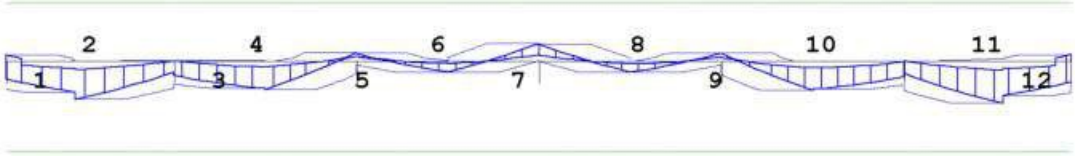
25:25

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^{*}$ [N/mm²]	$E_{Ef,\infty}^{*}$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^{*}$ [N/mm²]	$E_{Ek;\infty}^{*}$ [N/mm²]
1	0	1590	1060	6.8	34090	12721	10.7	34090	16498
1	550	1590	1060	-3.8	34090	12051	-5.3	34090	14811
1	825	1590	1060	-8.3	34090	12451	-12.6	34090	15843
1	1100	1590	1060	-12.4	34090	12658	-19.4	34090	16348
1	1125	1590	1060	-12.8	34090	12675	-20.0	34090	16389
1	1588	1590	1060	-6.6	34090	12429	-9.9	34090	15788
1	1650	1590	1060	-6.6	34090	12412	-9.9	34090	15745
1	1925	1590	1060	-6.4	34090	12423	-9.6	34090	15773
1	2200	1590	1060	-5.7	34090	12606	-8.8	34090	16224
1	2475	1590	1060	-4.5	34090	13133	-7.5	34090	17441
2	300	1590	1060	-2.5	34090	13739	-4.4	34090	18714
2	600	1590	1060	-4.0	34090	12894	-6.5	34090	16903
2	900	1590	1060	-5.0	34090	12803	-8.0	34090	16692
2	1200	1590	1060	-5.4	34090	13002	-8.9	34090	17150
2	1500	1590	1060	-5.3	34090	13516	-9.2	34090	18261
2	1500	1590	1060	-5.3	34090	13516	-9.2	34090	18261
2	1800	1590	1060	-3.6	34090	12980	-5.8	34090	17099
2	2100	1590	1060	-2.9	34090	12659	-4.5	34090	16351
2	2400	1590	1060	-1.6	34090	12780	-2.6	34090	16637
2	3000	1590	1060	2.6	34090	11137	3.0	34090	12133
3	0	1590	1060	2.6	34090	11137	4.3	34090	15139
3	300	1590	1060	1.3	34090	11668	1.7	34090	13747
3	900	1590	1060	-1.2	34090	12648	-1.9	34090	16325
3	1200	1590	1060	-1.6	34090	13498	-2.8	34090	18225
3	1500	1590	1060	-1.4	34090	16105	-3.1	34090	22683
3	1500	1590	1060	-1.4	34090	16105	-3.1	34090	22683
3	1800	1590	1060	-1.1	34090	13636	-2.0	34090	18508
3	2400	1590	1060	0.8	34090	11843	1.1	34090	14241
3	2700	1590	1060	2.6	34090	11775	3.5	34090	14051
3	3000	1590	1060	5.0	34090	11633	6.5	34090	13646
4	0	1590	1060	5.0	34090	11633	5.6	34090	12429
4	300	1590	1060	1.9	34090	12267	2.8	34090	15376
4	900	1590	1060	-0.7	34090	11947	-1.0	34090	14530
4	1200	1590	1060	-1.2	34090	13359	-2.0	34090	17931
4	1500	1590	1060	-1.1	34090	16930	-4.6	34090	27584
4	1500	1590	1060	-1.1	34090	16930	-4.6	34090	27584
4	1800	1590	1060	-2.7	34090	12050	-3.8	34090	14807
4	2100	1590	1060	-2.0	34090	11644	-2.5	34090	13678
4	2700	1590	1060	1.3	34090	11967	1.8	34090	14584
4	3000	1590	1060	3.8	34090	11577	4.8	34090	13482
5	0	1590	1060	3.8	34090	11577	2.3	34090	8070
5	600	1590	1060	-2.9	34090	11602	-3.7	34090	13554
5	900	1590	1060	-4.4	34090	11798	-5.9	34090	14115
5	1200	1590	1060	-5.3	34090	12040	-7.5	34090	14780
5	1500	1590	1060	-5.7	34090	12391	-9.9	34090	17009
5	1500	1590	1060	-5.7	34090	12391	-9.9	34090	17009
5	1800	1590	1060	-6.3	34090	12515	-9.6	34090	16002
5	2100	1590	1060	-5.9	34090	12344	-8.7	34090	15574
5	2400	1590	1060	-4.9	34090	12346	-7.3	34090	15578
5	2700	1590	1060	-3.4	34090	12677	-5.2	34090	16393
6	275	1590	1060	-3.7	34090	13920	-6.8	34090	19071
6	550	1590	1060	-5.3	34090	12984	-8.8	34090	17108
6	825	1590	1060	-6.5	34090	12701	-10.3	34090	16451
6	1100	1590	1060	-7.3	34090	12653	-11.3	34090	16336
6	1375	1590	1060	-7.5	34090	12758	-11.9	34090	16587
6	1625	1590	1060	-7.3	34090	12997	-21.9	34090	22128
6	1650	1590	1060	-13.1	34090	12921	-21.3	34090	16964
6	1925	1590	1060	-9.0	34090	12695	-14.1	34090	16438
6	2200	1590	1060	-4.4	34090	12303	-6.5	34090	15471
6	2750	1590	1060	6.2	34090	13015	10.3	34090	17179

Hoofdwapening Fysisch lineair Balk
26:26



MEd dekkingslijn Fysisch lineair Balk
26:26



Hoofdwapening Balk
26:26

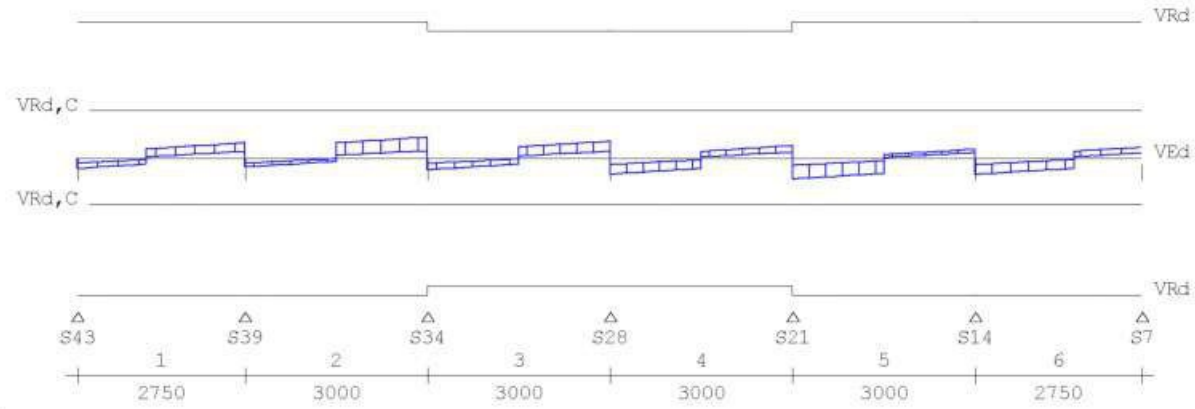
Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S43+0	12.03	122.13	669	Bov	399*	453	4x12	54
2	S43+1125	-80.20	-188.72	717	Ond	399*	566	5x12	54
3	S39+0	0.20	122.13	669	Bov	399*	453	4x12	54
4	S39+1500	-60.04	-188.72	717	Ond	399*	566	5x12	54
5	S34+0	16.64	122.13	669	Bov	399*	453	4x12	54
6	S34+1500	-23.88	-188.72	717	Ond	399*	566	5x12	54
7	S28+0	35.91	122.13	669	Bov	399*	453	4x12	54
8	S28+1500	-24.15	-188.72	717	Ond	399*	566	5x12	54
9	S21+0	16.40	122.13	669	Bov	399*	453	4x12	54
10	S21+1500	-62.00	-188.72	717	Ond	399*	566	5x12	54
11	S7-1125	-89.13	-188.72	717	Ond	399*	566	5x12	54
12	S7-0	13.37	122.13	669	Bov	399*	453	4x12	54

Opmerkingen
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.4 Balk
26:26

Geb.	Pos. [mm]	Zijde	$M_{E;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S39-818	Bov	0.13	312	0.001	0.000	1.00	0.300	0.00	
1	S43+393	Ond	-41.69	312	0.308	0.096	1.00	0.300	0.32	
2	S34-724	Bov	12.00	312	0.110	0.034	1.00	0.300	0.11	
2	S39+900	Ond	-30.62	312	0.226	0.070	1.00	0.300	0.23	
3	S28-600	Bov	21.66	312	0.199	0.062	1.00	0.300	0.21	
3	S34+750	Ond	-12.71	312	0.094	0.029	1.00	0.300	0.10	
4	S28+0	Bov	21.66	312	0.199	0.062	1.00	0.300	0.21	
4	S28+764	Ond	-13.78	312	0.102	0.032	1.00	0.300	0.11	
5	S21+0	Bov	11.11	312	0.102	0.032	1.00	0.300	0.11	
5	S21+765	Ond	-32.99	312	0.243	0.076	1.00	0.300	0.25	
6	S14+812	Ond	-46.01	312	0.339	0.106	1.00	0.300	0.35	

DWARSKRACHTEN Fysisch lineair combinatie — Balk 26:26 Fundamentele



Wring- en dwarskrachtwapening

Balk 26:26

Geb.	Vanaf [mm]	Tot [mm]	Beugels	Lengte [mm]	<Wringing> A_{langs} [mm²]	A_{bgl} [mm²/m]	<Dwarskr.> A_{bgl} [mm²/m]	A_{opg} [mm²]	V_{Ed} [kN]	T_{Ed} [kNm]	Opm.
1	S43+0	S39+0	Ø8-200	2750	0	0	0	0	43.3	43	
2	S39+0	S34+0	Ø8-200	3000	0	0	0	0	59.2	43	
3	S34+0	S28+0	Ø8-200	3000	0	0	0	0	47.9	43	
4	S28+0	S21+0	Ø8-200	3000	0	0	0	0	46.7	43	
5	S21+0	S14+0	Ø8-200	3000	0	0	0	0	60.2	43	
6	S14+0	S7+0	Ø8-200	2750	0	0	0	0	47.5	43	

Wring- en dwarskrachten

Balk 26:26

Geb.	Vanaf [mm]	Tot [mm]	θ [°]	V_{Rd} [kN]	V_{Ed} [kN]	$V_{Rd,C}$ [kN]	$V_{Rd,Max}$ [kN]	T_{Ed} [kNm]	$T_{Rd,C}$ [kNm]	$T_{Rd,Max}$ [kNm]	V_{opg}	Opm.
1	S43+0	S39+0	21.8	392	43	134	1306	43	93	251	0	
2	S39+0	S34+0	21.8	366	59	134	1306	43	93	251	0	
3	S34+0	S28+0	21.8	366	48	134	1218	43	93	251	0	
4	S28+0	S21+0	21.8	366	47	134	1218	43	93	251	0	
5	S21+0	S14+0	21.8	366	60	134	1218	43	93	251	0	
6	S14+0	S7+0	21.8	392	48	134	1306	43	93	251	0	

Stijfheden (blijvend en quasi-blijvend)

Balk 26:26

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	275	452	565	-10.1	34012	-17.9	34012	10638
1	550	452	565	-13.4	34012	-22.0	34012	10638
1	825	452	565	-16.1	34012	-25.4	34012	10638
1	1100	452	565	-17.9	34012	-28.0	34012	10638
1	1125	452	565	-18.1	34012	-28.2	34012	10638
1	1375	452	565	-18.6	34012	-30.5	34012	10638
1	1650	452	565	-16.4	34012	-26.9	34012	10638
1	1925	452	565	-13.4	34012	-22.6	34012	10638
1	2200	452	565	-9.6	34012	-17.6	34012	10638
1	2475	452	565	-5.1	34012	-11.8	34012	10638
2	300	452	565	-4.7	34012	-12.0	34012	10638
2	600	452	565	-8.4	34012	-16.2	34012	10638
2	900	452	565	-11.1	34012	-19.5	34012	10638
2	1200	452	565	-13.0	34012	-21.9	34012	10638
2	1500	452	565	-13.9	34012	-23.4	34012	10638
2	1500	452	565	-13.9	34012	-23.4	34012	10638
2	1800	452	565	-11.0	34012	-18.7	34012	10638
2	2100	452	565	-7.2	34012	-12.6	34012	10638

Stijfheden (blijvend en quasi-blijvend)

Balk

26:26

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
2	2400	452	565	-2.4	34012	-5.6	34012	10638
2	3000	452	565	9.7	34012	11.1	34012	10638
3	0	452	565	9.7	34012	11.1	34012	10638
3	300	452	565	4.7	34012	4.9	34012	10638
3	900	452	565	-2.5	34012	-4.2	34012	10638
3	1200	452	565	-4.7	34012	-7.4	34012	10638
3	1500	452	565	-6.1	34012	-9.7	34012	10638
3	1500	452	565	-6.1	34012	-9.7	34012	10638
3	1800	452	565	-4.2	34012	-6.3	34012	10638
3	2400	452	565	3.1	34012	4.4	34012	10638
3	2700	452	565	8.1	34012	11.0	34012	10638
3	3000	452	565	14.0	34012	18.6	34012	10638
4	0	452	565	14.0	34012	18.6	34012	10638
4	300	452	565	7.2	34012	10.2	34012	10638
4	600	452	565	2.3	34012	3.7	34012	10638
4	1200	452	565	-4.7	34012	-6.6	34012	10638
4	1500	452	565	-6.8	34012	-10.3	34012	10638
4	1500	452	565	-6.8	34012	-10.3	34012	10638
4	1800	452	565	-6.6	34012	-9.0	34012	10638
4	2100	452	565	-4.2	34012	-5.6	34012	10638
4	2700	452	565	3.3	34012	3.9	34012	10638
4	3000	452	565	8.4	34012	10.0	34012	10638
5	0	452	565	8.4	34012	10.0	34012	10638
5	600	452	565	-4.9	34012	-7.7	34012	10638
5	900	452	565	-9.7	34012	-14.9	34012	10638
5	1200	452	565	-13.7	34012	-21.1	34012	10638
5	1500	452	565	-16.7	34012	-26.5	34012	10638
5	1500	452	565	-16.7	34012	-26.5	34012	10638
5	1800	452	565	-15.1	34012	-24.0	34012	10638
5	2100	452	565	-13.3	34012	-21.6	34012	10638
5	2400	452	565	-10.5	34012	-18.4	34012	10638
5	2700	452	565	-6.9	34012	-14.2	34012	10638
6	275	452	565	-5.9	34012	-13.1	34012	10638
6	550	452	565	-10.6	34012	-19.3	34012	10638
6	825	452	565	-14.6	34012	-24.8	34012	10638
6	1100	452	565	-17.7	34012	-29.4	34012	10638
6	1375	452	565	-20.2	34012	-33.4	34012	10638
6	1625	452	565	-21.7	34012	-36.3	34012	10638
6	1650	452	565	-18.7	34012	-30.1	34012	10638
6	1925	452	565	-17.2	34012	-27.7	34012	10638
6	2200	452	565	-14.9	34012	-24.6	34012	10638
6	2475	452	565	-11.9	34012	-20.7	34012	10638

Stijfheden (frequent en karakteristiek)

Balk

26:26

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^*$ [N/mm²]	$E_{Ef,\infty}^*$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^*$ [N/mm²]	$E_{Ek;\infty}^*$ [N/mm²]
1	275	452	565	-23.1	34012	12587	-36.1	34012	16283
1	550	452	565	-27.7	34012	12390	-41.9	34012	15802
1	825	452	565	-31.6	34012	12298	-47.0	34012	15571
1	1100	452	565	-34.7	34012	12267	-51.4	34012	15492
1	1125	452	565	-34.9	34012	12266	-63.4	34012	17211
1	1375	452	565	-38.3	34012	12392	-58.1	34012	15807
1	1650	452	565	-34.0	34012	12404	-51.5	34012	15836
1	1925	452	565	-28.8	34012	12474	-44.2	34012	16009
1	2200	452	565	-22.9	34012	12652	-36.2	34012	16438
1	2475	452	565	-16.2	34012	13099	-27.4	34012	17458
2	300	452	565	-16.8	34012	13266	-28.9	34012	17818
2	600	452	565	-21.4	34012	12779	-34.4	34012	16734
2	900	452	565	-25.1	34012	12560	-39.0	34012	16218
2	1200	452	565	-27.8	34012	12469	-42.7	34012	15997
2	1500	452	565	-29.7	34012	12458	-47.3	34012	16287

Stijfheden (blijvend en quasi-blijvend)

Balk

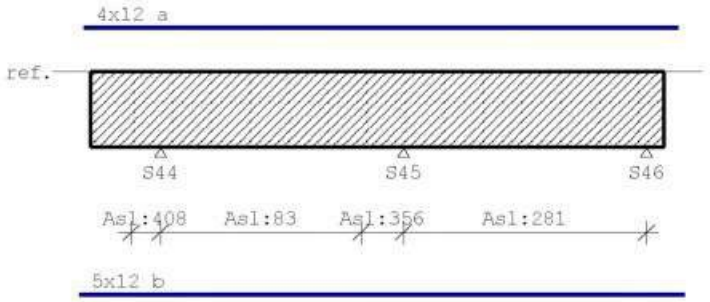
26:26

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{zg} [kNm]	E_{zg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]	
2	1500	452	565	-29.7	34012	12458	-47.3	34012	16287
2	1800	452	565	-23.9	34012	12486	-36.8	34012	16039
2	2100	452	565	-16.3	34012	12566	-25.4	34012	16234
2	2400	452	565	-7.7	34012	13103	-13.0	34012	17465
2	3000	452	565	12.0	34012	11220	14.3	34012	12555
3	0	452	565	12.0	34012	11220	13.5	34012	12125
3	300	452	565	5.0	34012	10832	5.3	34012	11303
3	900	452	565	-5.4	34012	12482	-8.3	34012	16029
3	1200	452	565	-9.2	34012	12285	-13.7	34012	15539
3	1500	452	565	-12.2	34012	12340	-19.0	34012	15972
3	1500	452	565	-12.2	34012	12340	-19.0	34012	15972
3	1800	452	565	-7.6	34012	12149	-11.1	34012	15192
3	2400	452	565	5.2	34012	11980	7.3	34012	14746
3	2700	452	565	13.0	34012	11873	17.9	34012	14456
3	3000	452	565	21.7	34012	11791	29.4	34012	14230
4	0	452	565	21.7	34012	11791	28.4	34012	13941
4	300	452	565	12.2	34012	11991	17.2	34012	14776
4	600	452	565	4.6	34012	12320	6.9	34012	15627
4	1200	452	565	-7.8	34012	11952	-10.9	34012	14671
4	1500	452	565	-12.7	34012	12179	-19.5	34012	15703
4	1500	452	565	-12.7	34012	12179	-19.5	34012	15703
4	1800	452	565	-10.6	34012	11877	-14.6	34012	14468
4	2100	452	565	-6.5	34012	11805	-8.9	34012	14268
4	2700	452	565	4.3	34012	11368	5.3	34012	13009
4	3000	452	565	11.1	34012	11397	13.8	34012	13095
5	0	452	565	11.1	34012	11397	13.5	34012	12894
5	600	452	565	-9.6	34012	12301	-14.3	34012	15579
5	900	452	565	-18.3	34012	12210	-26.9	34012	15349
5	1200	452	565	-26.1	34012	12239	-38.5	34012	15423
5	1500	452	565	-33.0	34012	12306	-49.3	34012	15593
5	1500	452	565	-33.0	34012	12306	-49.3	34012	15593
5	1800	452	565	-29.8	34012	12307	-44.6	34012	15596
5	2100	452	565	-27.2	34012	12378	-41.1	34012	15773
5	2400	452	565	-23.6	34012	12548	-36.7	34012	16189
5	2700	452	565	-19.1	34012	12909	-31.3	34012	17033
6	275	452	565	-17.9	34012	13033	-29.9	34012	17311
6	550	452	565	-25.1	34012	12643	-39.6	34012	16415
6	825	452	565	-31.6	34012	12487	-48.6	34012	16040
6	1100	452	565	-37.2	34012	12427	-56.8	34012	15894
6	1375	452	565	-42.2	34012	12420	-64.2	34012	15877
6	1625	452	565	-46.0	34012	12445	-70.3	34012	15938
6	1650	452	565	-37.8	34012	12356	-56.9	34012	15718
6	1925	452	565	-34.8	34012	12359	-52.4	34012	15726
6	2200	452	565	-31.0	34012	12412	-47.2	34012	15857
6	2475	452	565	-26.5	34012	12542	-41.2	34012	16175

Hoofdwapening Fysisch lineair

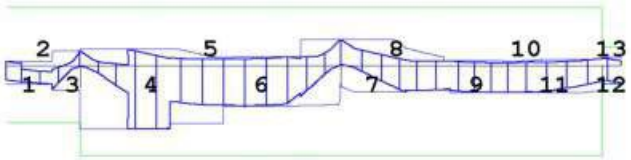
Balk

27:27



MEd dekkingslijn Fysisch lineair

Balk
27:27



△ S44 △ S45 △ S46

Hoofdwapening

Balk
27:27

Geb.	Pos. [mm]	M_{Ed} [kNm]	M_{Rd} [kNm]	z [mm]	B/O	A_b [mm²]	A_a [mm²]	Basiswapening +Bijlegwapening	Opm.
1	S44-1216	7.75	122.13	669	Bov	399*	453	4x12	2,54
2	S44-457	-51.61	-118.96	604	Ond	399*	566	5x12	2,54
3	S44-0	30.09	122.13	669	Bov	399*	453	4x12	2,54
4	S44+787	33.26	122.13	669	Bov	399*	453	4x12	54
5	S44+981	-133.32	-188.72	717	Ond	464*	566	5x12	1
6	S45-875	17.84	122.13	669	Bov	399*	453	4x12	54
7	S45-0	53.56	122.13	669	Bov	399*	453	4x12	54
8	S45+1058	-56.13	-188.72	717	Ond	399*	566	5x12	54
9	S45+1796	9.17	122.13	669	Bov	399*	453	4x12	54
10	S46-1655	-57.07	-188.72	717	Ond	399*	566	5x12	54
11	S46-0	13.20	122.13	669	Bov	399*	453	4x12	54
12	S46+0	15.83	40.06	254	Bov	399*	453	4x12	2,54
13	S46+318	-37.36	-37.55	190	Ond	564*	566	5x12	1,2

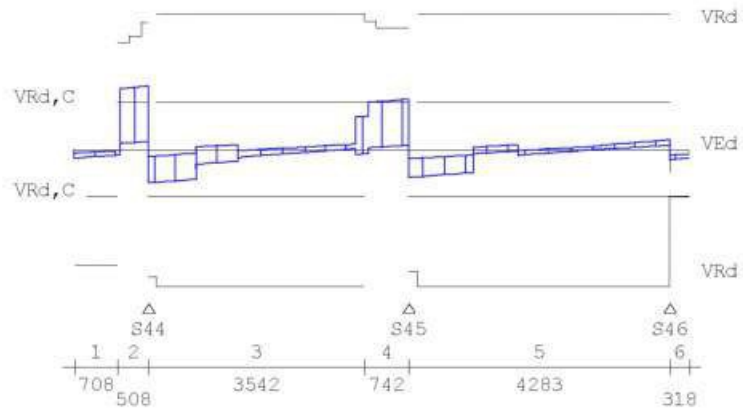
Opmerkingen
[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).
[2] Benodigde wapening en inwendige hefboomsarm zijn bepaald volgens gedrongen ligger detaillering, zie nationale bijlage art. 6.1(10).
[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.4

Balk
27:27

Geb.	Pos. [mm]	Zijde	$M_{g;freq}$ [kNm]	$s_{r,max}$ [mm]	$\varepsilon_{sm}-\varepsilon_{cm}$ [‰]	w_k [mm]	k_x	w_{max} [mm]	U.C.	Opm.
1	S44-457	Bov	12.74	312	0.117	0.037	1.00	0.300	0.12	
1	S44-1336	Ond	-30.52	312	0.225	0.070	1.00	0.300	0.23	
2	S45-662	Bov	28.90	312	0.265	0.083	1.00	0.300	0.28	
2	S44+981	Ond	-68.41	312	0.505	0.157	1.00	0.300	0.52	
3	S45+0	Bov	28.89	312	0.265	0.083	1.00	0.300	0.28	
3	S46-1655	Ond	-20.67	312	0.153	0.048	1.00	0.300	0.16	
4	S46+0	Bov	8.89	312	0.082	0.025	1.00	0.300	0.08	
4	S46+0	Ond	-11.42	312	0.084	0.026	1.00	0.300	0.09	

DWARSKRACHTEN Fysisch lineair combinatie — Balk 27:27 Fundamentele



Wring- en dwarskrachtwapening

Balk 27:27

Geb.	Vanaf [mm]	Tot [mm]	Beugels	Lengte [mm]	<Wringing> A_{langs} [mm²]	A_{bgl} [mm²/m]	<Dwarskr.> A_{bgl} [mm²/m]	A_{opg} [mm²]	V_{Ed} [kN]	T_{Ed} [kNm]	Opm.
1	S44-1216	S44-508	Ø8-200	708	0	0	0	0	24.5	16	59
2	S44-508	S44+0	Ø8-200	508	408	33	274	0	181.7	16	6,59
3	S44+0	S45-741	Ø8-200	3542	83	7	0	0	95.8	26	
4	S45-741	S45+0	Ø8-200	742	356	29	199	0	144.4	14	6
5	S45+0	S46+0	Ø8-200	4283	281	23	0	0	79.6	11	
6	S46+0	S46+318	Ø8-200	318	0	0	0	0	29.1	13	59

Opmerkingen
[6] 9.2.2 (4) 50% van de dwarskrachtwapening moet uit beugels bestaan.
[58] 6.2.3: Z is berekend m.b.v. 0.9d
[59] 6.2.3: Z is berekend m.b.v. de gedrongen ligger berekening art 6.1 (10)

Wring- en dwarskrachten

Balk 27:27

Geb.	Vanaf [mm]	Tot [mm]	θ [°]	V_{Rd} [kN]	V_{Ed} [kN]	$V_{Rd,C}$ [kN]	$V_{Rd,Max}$ [kN]	T_{Ed} [kNm]	$T_{Rd,C}$ [kNm]	$T_{Rd,Max}$ [kNm]	V_{opg}	Opm.
1	S44-1216	S44-508	21.8	330	25	134	1101	16	93	251	0	59
2	S44-508	S44+0	21.8	360	182	134	1231	16	93	251	0	6,59
3	S44+0	S45-741	21.8	366	96	134	1231	26	93	251	0	
4	S45-741	S45+0	21.8	333	144	134	1218	14	93	251	0	6
5	S45+0	S46+0	21.8	366	80	134	1218	11	93	251	0	
6	S46+0	S46+318	21.8	104	29	134	348	13	93	251	0	59

Opmerkingen
[6] 9.2.2 (4) 50% van de dwarskrachtwapening moet uit beugels bestaan.
[58] 6.2.3: Z is berekend m.b.v. 0.9d
[59] 6.2.3: Z is berekend m.b.v. de gedrongen ligger berekening art 6.1 (10)

Stijfheden (blijvend en quasi-blijvend)

Balk 27:27

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Eg} [kNm]	E_{Eg}^* [N/mm²]	M_{Qb} [kNm]	$E_{Qb;on}^*$ [N/mm²]	$E_{Qb;\infty}^*$ [N/mm²]
1	122	452	565	-19.2	34012	-19.8	34012	10638
1	243	452	565	-20.7	34012	-21.5	34012	10638
1	365	452	565	-22.1	34012	-23.0	34012	10638
1	486	452	565	-23.4	34012	-24.3	34012	10638
1	608	452	565	-24.4	34012	-25.5	34012	10638
1	730	452	565	-25.3	34012	-26.5	34012	10638
1	759	452	565	-25.5	34012	-26.8	34012	10638
1	851	452	565	-18.8	34012	-20.6	34012	10638
1	973	452	565	-9.7	34012	-10.1	34012	10638
1	1216	452	565	9.0	34012	11.2	34012	10638

Stijfheden

Balk

27:27

Veld	A_{bov} [mm²]	A_{ond} [mm²]	E_{totaal} [N/mm²]	E_{on} [N/mm²]	Pos [mm]	M_{Ek} [kNm]	M_{Eqp} [kNm]	M_{Eg} [kNm]	Veld-lengte [mm]
2	428	452	565	-11.3	34012	-11.7	34012		10638
2	857	452	565	-49.4	34012	-51.3	34012		10638
2	1175	452	565	-52.8	34012	-55.8	34012		10638
2	1285	452	565	-53.7	34012	-57.1	34012		10638
2	2142	452	565	-30.3	34012	-35.3	34012		10638
2	2570	452	565	-30.6	34012	-36.0	34012		10638
2	2623	452	565	-30.5	34012	-35.9	34012		10638
2	2998	452	565	-28.9	34012	-34.6	34012		10638
2	3426	452	565	-23.3	34012	-29.5	34012		10638
2	4283	452	565	24.4	34012	25.8	34012		10638
3	0	452	565	24.4	34012	25.8	34012		10638
3	857	452	565	-0.5	34012	-6.4	34012		10638
3	1058	452	565	-5.2	34012	-12.8	34012		10638
3	1285	452	565	-4.0	34012	-11.8	34012		10638
3	2142	452	565	-4.3	34012	-13.3	34012		10638
3	2402	452	565	-4.9	34012	-14.2	34012		10638
3	2570	452	565	-4.8	34012	-14.3	34012		10638
3	3152	452	565	-2.3	34012	-12.4	34012		10638
3	3426	452	565	-3.0	34012	-12.8	34012		10638
3	3855	452	565	0.1	34012	-8.7	34012		10638
4	106	452	565	5.4	34012	-2.1	34012		10638
4	212	452	565	3.3	34012	-4.3	34012		10638
4	318	452	565	1.4	34012	-6.3	34012		10638

Stijfheden (frequent en karakteristiek)

Balk

27:27

Veld	Pos [mm]	A_{boven} [mm²]	A_{onder} [mm²]	M_{Ef} [kNm]	$E_{Ef,on}^{*}$ [N/mm²]	$E_{Ef,\infty}^{*}$ [N/mm²]	M_{Ek} [kNm]	$E_{Ek;on}^{*}$ [N/mm²]	$E_{Ek;\infty}^{*}$ [N/mm²]
1	122	452	565	-21.3	34012	11199	-25.5	34012	12572
1	243	452	565	-23.0	34012	11140	-27.0	34012	12372
1	365	452	565	-24.4	34012	11093	-28.3	34012	12208
1	486	452	565	-25.7	34012	11055	-29.4	34012	12070
1	608	452	565	-26.9	34012	11022	-30.4	34012	11953
1	730	452	565	-27.9	34012	10995	-31.2	34012	11852
1	759	452	565	-28.1	34012	10989	-38.7	34012	13498
1	851	452	565	-22.4	34012	11281	-27.0	34012	12716
1	973	452	565	-11.6	34012	11634	-11.4	34012	11487
1	1216	452	565	12.7	34012	11602	20.3	34012	15410
2	428	452	565	-13.9	34012	11952	-23.2	34012	16112
2	857	452	565	-62.5	34012	12130	-108.6	34012	16683
2	1175	452	565	-66.1	34012	11908	-109.1	34012	16013
2	1285	452	565	-67.1	34012	11844	-109.1	34012	15814
2	2142	452	565	-41.1	34012	11786	-67.7	34012	15861
2	2570	452	565	-41.9	34012	11778	-69.0	34012	15855
2	2623	452	565	-41.8	34012	11781	-69.0	34012	15870
2	2998	452	565	-40.6	34012	11834	-68.2	34012	16084
2	3426	452	565	-35.1	34012	11964	-61.9	34012	16626
2	4283	452	565	28.9	34012	11496	25.8	34012	10656
3	0	452	565	28.9	34012	11496	25.8	34012	10656
3	857	452	565	-10.4	34012	14386	-11.3	34012	15111
3	1058	452	565	-17.8	34012	13202	-18.8	34012	13631
3	1285	452	565	-17.0	34012	13469	-16.4	34012	13181
3	2142	452	565	-19.3	34012	13533	-14.5	34012	11281
3	2402	452	565	-20.4	34012	13455	-14.9	34012	11003
3	2570	452	565	-20.7	34012	13476	-14.7	34012	10841
3	3152	452	565	-19.1	34012	14019	-14.6	34012	11888
3	3426	452	565	-19.3	34012	13869	-12.8	34012	10630
3	3855	452	565	-14.6	34012	14717	-8.1	34012	10155
4	106	452	565	-7.1	34012	20597	-19.5	34012	27516
4	212	452	565	-9.3	34012	16951	-21.9	34012	23828
4	318	452	565	-11.4	34012	15367	-24.2	34012	21629

3.2.4. F002 – Ponscontrole paal Ø400 t.p.v. vloer d= 250 mm

Maximale paalreactie t.p.v. vloer d= 250 mm: $F_{E;d}$ = 320 kN

Technosoft Construct release 6.71a **4 aug 2022**

```
Project          : 15877-014 - Sachem Europe BV - fundatie RTO
Onderdeel        : ponscontrole vloer d= 250
Datum            : 04/08/2022
Eenheden         : kN/m/rad
```

Toegepaste normen volgens Eurocode met Nederlandse NB

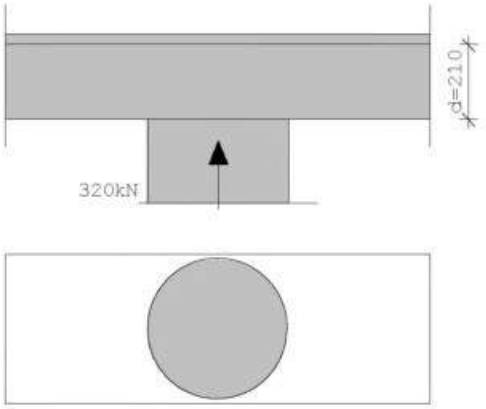
Belastingen	NEN-EN 1990:2002	C2:2010,A1:2019	NB:2019(nl)
	NEN-EN 1991-1-1:2002	C1/C11:2019	NB:2019(nl)
Beton	NEN-EN 1992-1-1:2011(nl)	C2/A1:2015(nl)	NB:2016(nl)

Pons. (B)

GEOMETRIE

```
Kolomvorm                : Rond
Vorm omtrek              : Cirkelvormig
Kolomsoort               : Midden - onder de vloer - art. 6.4.4 (1) (6.47)
Betonkwaliteit           : C30/37
Nuttige hoogte d    [mm]:     210

Kolom
Breedte lastvlak c  [mm]:     400
```



WAPENING

Staalkwaliteit	:	B500A			
Wapeningsratio ρ_{1y}	:	0.00000	Wapeningsratio ρ_{1z}	:	0.00000
Radiale afstand s_r [mm]:		157	Tangentiële afstand s_t [mm]:		315
Beugel diameter [mm]:		7	Hoek α	:	90

BELASTING

Kracht V_{Ed} [kN]: 320.0

RESULTATEN

Ponsomtrek		$V_{Rd,c}$	$V_{Rd,max}$	V_{Ed}	$V_{Rd,s}$	A_{sw}/s_r	A_{sw}	code
	[mm]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[mm²/mm]	[mm²]	
u_0	1257	n.v.t.	4.22	1.39	n.v.t.	n.v.t.	n.v.t.	
u_1	3896	0.53	4.22	0.45	0.00	0.00	0	[42]

Opmerkingen

[42] Er is geen ponswapening nodig (vEd < vRd,c).

Controle-omtrek u_0 (1257 mm)

```
Rekenwaarde schuifspanning volgens art. 6.4.5 (formule 6.53)
Nuttige plaatdikte d [mm]:    210       Omtrek       u0      [mm]:   1257
Factor              β      :   1.15
Schuifsp. vEd     [N/mm²]:    1.39      Schuifsp. vRd,max [N/mm²]:   4.22
```

Controle-omtrek u_1 (3896 mm)

Vorm omtrek		: Cirkelvormig				
Rekenwaarde schuifspanning volgens art. 6.4						
Afstand tot aan kolom[mm]		: 420				
Nuttige plaatdikte d [mm]		: 210	Omtrek	u_1	[mm] :	3896
Factor	β	: 1.15				
Schuifsp. v_{Ed}	[N/mm^2]	: 0.45				
Schuifsp. $v_{Rd,c}$	[N/mm^2]	: 0.53				