



**constructieadviesbureau ing. F. Wiggers**  
ingenieursbureau voor beton-, staal- en houtconstructies

*Varsseveld - Emmerich (D)*

Varsseveld, **17-03-2017**

Werknr. : **21734-IK**

**Woning en kapschuur fam. Kramer  
aan de Keijenborgseweg 12 te Zelhem.**

## **Statische Berekening**

Onderdeel **A** : **Totaal** (woning)

Constructeur : ing. J.E. Veldhuis paraaf HC:  
E-mail: j.veldhuis@fwiggers.com

Opdrachtgever : **T2 Ontwerp & Advies B.V.**  
**Kruisbergseweg 9**  
**7255 AG Hengelo (Gld.)**

Oranjestraat 11  
7051 AG Varsseveld

Postbus 20  
7050 AA Varsseveld

Tel.: (0315) 270340  
Fax.: (0315) 242650

Internet: [www.fwiggers.nl](http://www.fwiggers.nl)



## Aangehouden voorschriften, kwaliteitseisen:

De statische berekening is uitgevoerd volgens de constructie voorschriften uit de NEN-EN 1990 - serie.

Indien niet anders is aangegeven is uitgegaan van :

|                                  |                                                 |
|----------------------------------|-------------------------------------------------|
| voor gewapende betonconstructies | : betonkwaliteit C20/25<br>staalkwaliteit B500A |
| voor staalconstructies           | : staalkwaliteit S235                           |
| voor houtconstructies            | : houtkwaliteit C18                             |
| voor steenconstructies           | : BIA Beton lijmelementen (grind).              |

## Toelaatbare gronddrukspanningen:

Indien niet anders is aangegeven, wordt bij een fundering op staal, bij een gronddekking van 200 mm en een hoogste grondwaterstand van 600 mm onder aanlegniveau van de fundering, uitgegaan van de volgende toelaatbare rekenwaarden:

| <i>strookbreedte in mm<sup>1</sup></i> | <i>Q<sub>Rd</sub> in kN/m<sup>1</sup></i> | <i>strookbreedte in mm<sup>1</sup></i> | <i>Q<sub>Rd</sub> in kN/m<sup>1</sup></i> |
|----------------------------------------|-------------------------------------------|----------------------------------------|-------------------------------------------|
| 400                                    | 33                                        | 500                                    | 45                                        |
| 600                                    | 60                                        | 700                                    | 75                                        |
| 800                                    | 90                                        | 900                                    | 110                                       |
| 1000                                   | 130                                       | 1100                                   | 150                                       |
| 1200                                   | 175                                       | 1400                                   | 225                                       |
| 1600                                   | 285                                       | 1800                                   | 350                                       |

## Gevolgklasse, Betrouwbaarheidsklasse en ontwerplevensduur:

|                                               |                         |                |
|-----------------------------------------------|-------------------------|----------------|
| Het project is ingedeeld in                   | Gevolgklasse:           | <b>CC1</b>     |
|                                               | Betrouwbaarheidsklasse: | <b>RC1</b>     |
|                                               | Ontwerplevensduur:      | <b>50</b> jaar |
| Geadviseerde Uitvoeringsklasse vlg EN 1090-2: |                         | <b>EXC2</b>    |

## Gebruikte eenheden:

Indien niet anders wordt aangegeven zijn de volgende eenheden aangehouden:

|                |                                                                    |
|----------------|--------------------------------------------------------------------|
| overspanningen | in m <sup>1</sup>                                                  |
| belastingen    | in kN/m <sup>2</sup> of in kN/m <sup>1</sup> of in kN              |
| afmetingen     | in mm <sup>1</sup>                                                 |
| spanningen     | in N/mm <sup>2</sup>                                               |
| wapening       | in mm <sup>2</sup> of mm <sup>2</sup> /m <sup>1</sup> plaatbreedte |

## Bouwkundige tekening(en):

Bij de uitwerking van de statische berekening is gewerkt van de volgende tekening(en):

tekening: -B1-01, B2-01 & B5-01      d.d.: 22-02-2017



## **Algemene gegevens:** Tenzij anders aangegeven

### **Staalconstructie:**

- dakranden voorzien van noodoverlaten, afmeting en plaats in overleg te bepalen
- blijvend hemelwaterafschot min. 20mm/m
- dakplaten verspringend aanbrengen i.v.m. gelijkmatige belastingafdracht
- bevestiging dak- en wandplaten volgens berekening leverancier
- de dakplaten dienen als kipsteun voor de dakliggers dit is d.m.v. een berekening door de dakplaatleverancier aan te tonen
- bij de dakplaatberekening rekening houden met verhoogde sneeuwbelasting door opwaaien en afglijden
- bij alle randen en hoeken van dak-, en wandplaten rekening houden met verhoogde windbelasting
- aangegeven zegen zijn exclusief hemelwaterafschot
- voorzieningen t.b.v. valbeveiliging volgens opgaaf leverancier
- deze staalconstructieberekening omvat alleen de hoofddraagconstructie
- detailberekening staalconstructie volgens leverancier staalconstructie
- staalconstructie in een vochtige omgeving conserveren
- lichtstraten die haaks op de afschotrichting lopen niet langer dan twee stramienen
- in overleg met de plaatselijke brandweer de staalconstructie evt. brandwerend beschermen
- het aanbrengen van een staalconstructie onder een scheurgevoelige gevel dient onder voorspanning te gebeuren

### **Daken**

- kanaalplaatvloeren waarop muurplaten worden verankerd welke evenwijdig lopen aan de kanaalplaat dienen voldoende door spatstrippen gekoppeld te worden om wijken van de vloerelementen te voorkomen

### **Wanden**

- i.v.m. de verwachte krimp-scheuren kalkzandsteen wanden pas na twee stookseizoenen voorzien van een eventueel harde afwerking
- kalkzandsteenwanden dilateren conform advies C.V.K.
- geveldilataties aanbrengen volgens advies leverancier
- dragende kozijnen dienen ondersteund te worden door GB puisteunen o.g.
- in deze berekening zijn alleen de dragende lateien berekend
- dragend metselwerk en metselwerk t.b.v. van stabiliteit (indien niet anders aangegeven) op de hoeken altijd in verband metselen
- aansluitingen bestaande buitenspouwbladen met nieuwe buitenspouwbladen indien niet anders aangegeven dilateren

### **Vloeren**

- bij scheurgevoelige wanden op de vloer:  $f_{bijk} = 1/500l$  met een maximum van 12mm
- eindopleggingen dakvloer op glijdfolie storten
- tekeningen met het leidingverloop in vloeren ter controle sturen aan vloeren leverancier
- i.v.m. de vocht-huishouding dakvloeren: binnenwanden onder kanaalplaatvloeren flexibel aansluiten
- indien op een kanaalplaatvloer een steenachtige afwerking komt, deze voorzien van een druklaag C20/25, met een op hoogte gebracht kruisnet R8-100 (B500A)
- vloeren zijn niet gecontroleerd op trilling tenzij anders aangegeven

### **Fundering / vloeren op zand:**

- bij niet vrijdragende betonvloeren zullen altijd zettingverschillen in de vloer ontstaan in overleg met opdrachtgever eventueel advies aanvragen bij een grondmechanisch adviseur
- beton dient gestort te worden op een voorbereide ondergrond (inclusief schraalbeton)

### **Kelders:**

- i.v.m. verhinderde krimp van de kelderwand is het raadzaam min. 2x10R10(B500A) extra horizontaal in de kelderwand aan te brengen



## **Technische omschrijving:**

Het project dat in navolgende berekening wordt behandeld, betreft de bouw van een woning en kapschuur te Zelhem. Deze berekening bestaat uit de berekening van de bovenbouw en fundering van de woning. Voor de berekening van de fundering is geen gebruik gemaakt van een geotechnisch advies.

---

|                        |                                                                                                                            |
|------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Stabiliteit:           | De stabiliteit in dwars- en langsrichting wordt verzorgd door het metselwerk i.c.m. de schijfwerking uit de vloeren en kap |
| Fundering:             | Fundering op staal. Funderen op vaste grondslag, dit i.h.w. (laten) controleren.                                           |
| Begane grondvloer:     | Ps-isolatievloer, e.e.a. volgens opgave leverancier                                                                        |
| Verdiepingsvloeren:    | Schilvloer, e.e.a. volgens opgave leverancier                                                                              |
| Kap:                   | Prefab systeemkap, e.e.a. volgens opgave leverancier.<br>Houten sporen.                                                    |
| Plat dak:              | N.v.t.                                                                                                                     |
| Gevel:                 | Spouwmuur met een BIA beton binnenblad                                                                                     |
| Woningscheidende wand: | N.v.t.                                                                                                                     |
| Brand:                 | Onder brandomstandigheden is er geen sprake van een hoofddraagconstructie.                                                 |

---

**Gewichten en belastingen:****Wanden – Gevels**

|                                                   |       |                        |
|---------------------------------------------------|-------|------------------------|
|                                                   | $G_k$ |                        |
| ½ steens schoon metselwerk                        | =     | 2,00 kN/m <sup>2</sup> |
| steens schoon metselwerk                          | =     | 4,40 kN/m <sup>2</sup> |
| 100mm S.B.S. wanden                               | =     | 2,20 kN/m <sup>2</sup> |
| 120mm S.B.S. wanden                               | =     | 2,60 kN/m <sup>2</sup> |
| 150mm S.B.S. wanden                               | =     | 3,30 kN/m <sup>2</sup> |
| 100mm S.B.S. - spouw - ½ steens schoon metselwerk | =     | 4,20 kN/m <sup>2</sup> |
| 120mm S.B.S. - spouw - ½ steens schoon metselwerk | =     | 4,60 kN/m <sup>2</sup> |
| 150mm S.B.S. - spouw - ½ steens schoon metselwerk | =     | 5,30 kN/m <sup>2</sup> |
| kozijnen inclusief isolerende beglazing           | =     | 0,50 kN/m <sup>2</sup> |
| houten gevel-puien inclusief kozijnen e.d.        | =     | 0,50 kN/m <sup>2</sup> |

**Sporenkap  $\alpha = 17^\circ$** 

|                |   |                                                          |   |                        |
|----------------|---|----------------------------------------------------------|---|------------------------|
| $G_k$          | = | Sporen + dakbeschot + pannen                             | = | 0,75 kN/m <sup>2</sup> |
|                |   | In het grondvlak gemeten = $0,75 / \cos(17)$             | = | 0,79 kN/m <sup>2</sup> |
| $q_{k;sneeuw}$ | = | 0,70 x 0,80                                              | = | 0,56 kN/m <sup>2</sup> |
| $q_{k;wind}$   | = | Gebied III, Onbebouwd, $H \leq 7170\text{mm}$            | = | 0,63 kN/m <sup>2</sup> |
| $q_k$          | = | 1,00 kN/m <sup>2</sup> ( $\psi_0 = 0,0$ )                |   |                        |
| $Q_k$          | = | 1,50 kN ( $\psi_0 = 0,0$ )                               |   |                        |
| $C_{pe}$       | = | Druk / Zuiging Conform drukcoëfficiënten NEN-EN 1991-1-4 |   |                        |
| $C_{pi}$       | = | +0,2 en -0,3                                             |   |                        |

**Sporenkap  $\alpha = 40^\circ$** 

|                |   |                                                          |   |                        |
|----------------|---|----------------------------------------------------------|---|------------------------|
| $G_k$          | = | Sporen + dakbeschot + pannen                             | = | 0,75 kN/m <sup>2</sup> |
|                |   | In het grondvlak gemeten = $0,75 / \cos(40)$             | = | 0,98 kN/m <sup>2</sup> |
| $q_{k;sneeuw}$ | = | 0,70 x 0,53                                              | = | 0,37 kN/m <sup>2</sup> |
| $q_{k;wind}$   | = | Gebied III, Onbebouwd, $H \leq 7170\text{mm}$            | = | 0,63 kN/m <sup>2</sup> |
| $C_{pe}$       | = | Druk / Zuiging Conform drukcoëfficiënten NEN-EN 1991-1-4 |   |                        |
| $C_{pi}$       | = | +0,2 en -0,3                                             |   |                        |

**Verdieping**

|       |   |            |                                     |   |                                                      |
|-------|---|------------|-------------------------------------|---|------------------------------------------------------|
| $G_k$ | = | schilvloer | $h = 230 \text{ mm}$                | = | 5,75 kN/m <sup>2</sup>                               |
|       |   | afwerking  | $h = 50 \text{ mm}$                 | = | $\frac{1,00 \text{ kN/m}^2 + 6,75 \text{ kN/m}^2}{}$ |
| $q_k$ | = | Klasse A   | ( $\psi_0 = 0,4$ )                  | = | 1,75 kN/m <sup>2</sup>                               |
|       |   | separaties | eg. $> 2,0 \leq 3,0 \text{ kN/m}^1$ | = | $\frac{1,20 \text{ kN/m}^2 + 2,95 \text{ kN/m}^2}{}$ |



werknr: 21734-IK  
datum: 17-03-2017

blad: 6

### Beganegrand

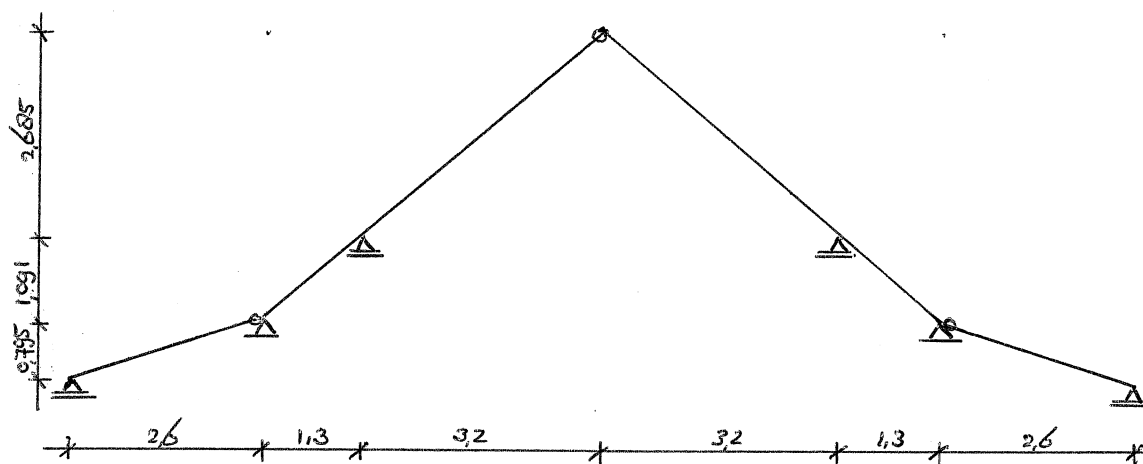
|       |   |                     |                                     |                            |
|-------|---|---------------------|-------------------------------------|----------------------------|
| $G_k$ | = | ps-isolatievloer    | =                                   | 2,70 kN/m <sup>2</sup>     |
|       |   | isolatie            | =                                   | 0,10 kN/m <sup>2</sup>     |
|       |   | afwerking           | =                                   | 1,60 kN/m <sup>2</sup> +   |
|       |   | $h = 80 \text{ mm}$ | =                                   | 4,40 kN/m <sup>2</sup>     |
| $q_k$ | = | Klasse A            | ( $\psi_0 = 0,4$ )                  | = 1,75 kN/m <sup>2</sup>   |
|       |   | separaties          | eg. $> 1,0 \leq 2,0 \text{ kN/m}^1$ | = 0,80 kN/m <sup>2</sup> + |
|       |   |                     |                                     | 2,55 kN/m <sup>2</sup>     |



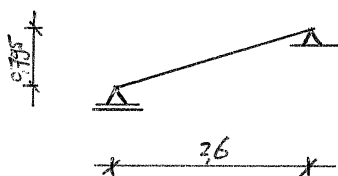
Nr. 21734IK

Bl. 7

d.d. 17-03-2017

Bepalen kaplasten:

\* Zie uitvoer in de bijlage

Pos. 1: Sporen; h.o.h. 610 mm;  $\alpha = 17^\circ$ Kies 59 x 156 mm<sup>2</sup>

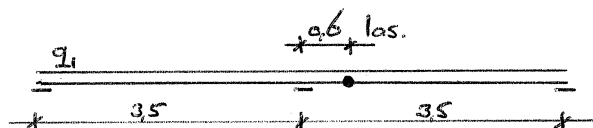
\* Gehele dakvlak voorzien van underlayment, deze verspringend aanbrengen en goed schroeven (schijfwerving)



Nr. 21734 IK

Bl. 8

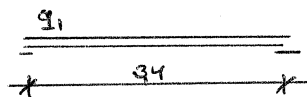
d.d. 17-03-2017

Pos. 2: Houten onderslag $q_{ki} : - \text{kap}$ 

$$= \begin{matrix} G & W & SH \\ 1,1 & 0,9/1,3 & 0,8 \end{matrix} \text{ kN/m}$$

Kies  $96 \times 221 \text{ mm}^2$  (rechttop)

\* Zie uitvoer in de bijlage

Pos. 3: Gording; gelamineerd GL32C $q_{ki} : - \text{kap}$ 

$$= \begin{matrix} G & W & SH \\ 3,4 & 2,6 & 1,3 \end{matrix} \text{ kN/m}$$

Kies  $150 \times 250 \text{ mm}^2$  (rechttop)

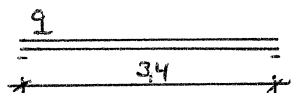
\* Zie uitvoer in de bijlage.



Nr. 21734 IK

Bl. 9

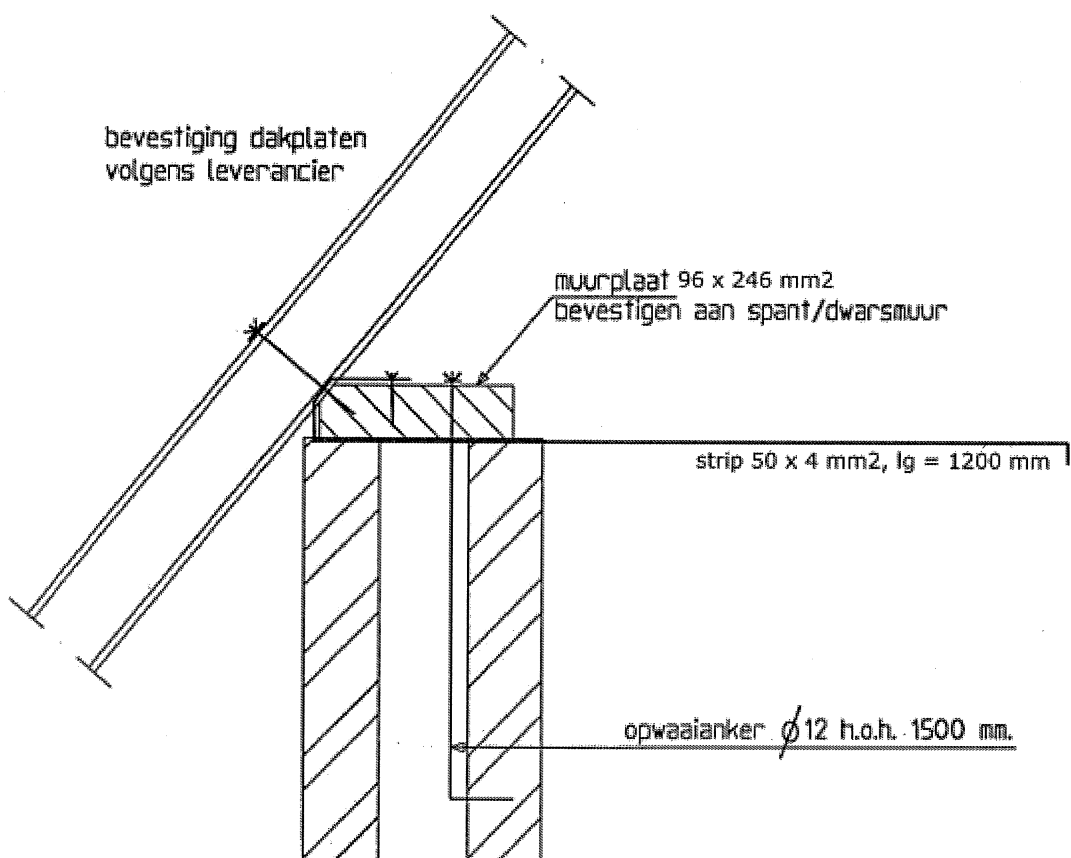
d.d. 17-03-2017

Pos. 4: Muurplaat $q_{k1} : - \text{kap}$  $G \quad W \quad S_H$   
 $= 1,6 \quad 0,9 \quad 0,6 \text{ kN/m}$ Kies  $96 \times 246 \text{ mm}^2$  C24

- \* Zie uitvoer in de bijlage
- \* Zie detail blz 10



Pos. 4:





Nr. 21734 IK

Bl. II

d.d. 17-03-2017

Pos. 5:

9  
10  
+ 10 +

Binnenblad:

Kies zelfdragende betonlaten Vebo

\* E.e.a. vlg. opgave leverancier.

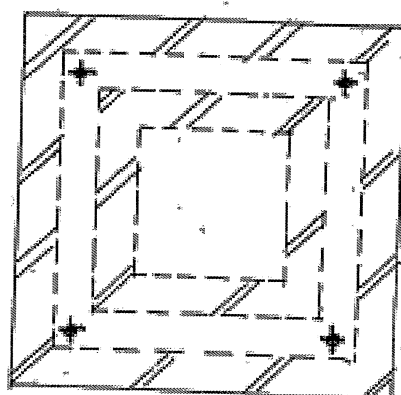
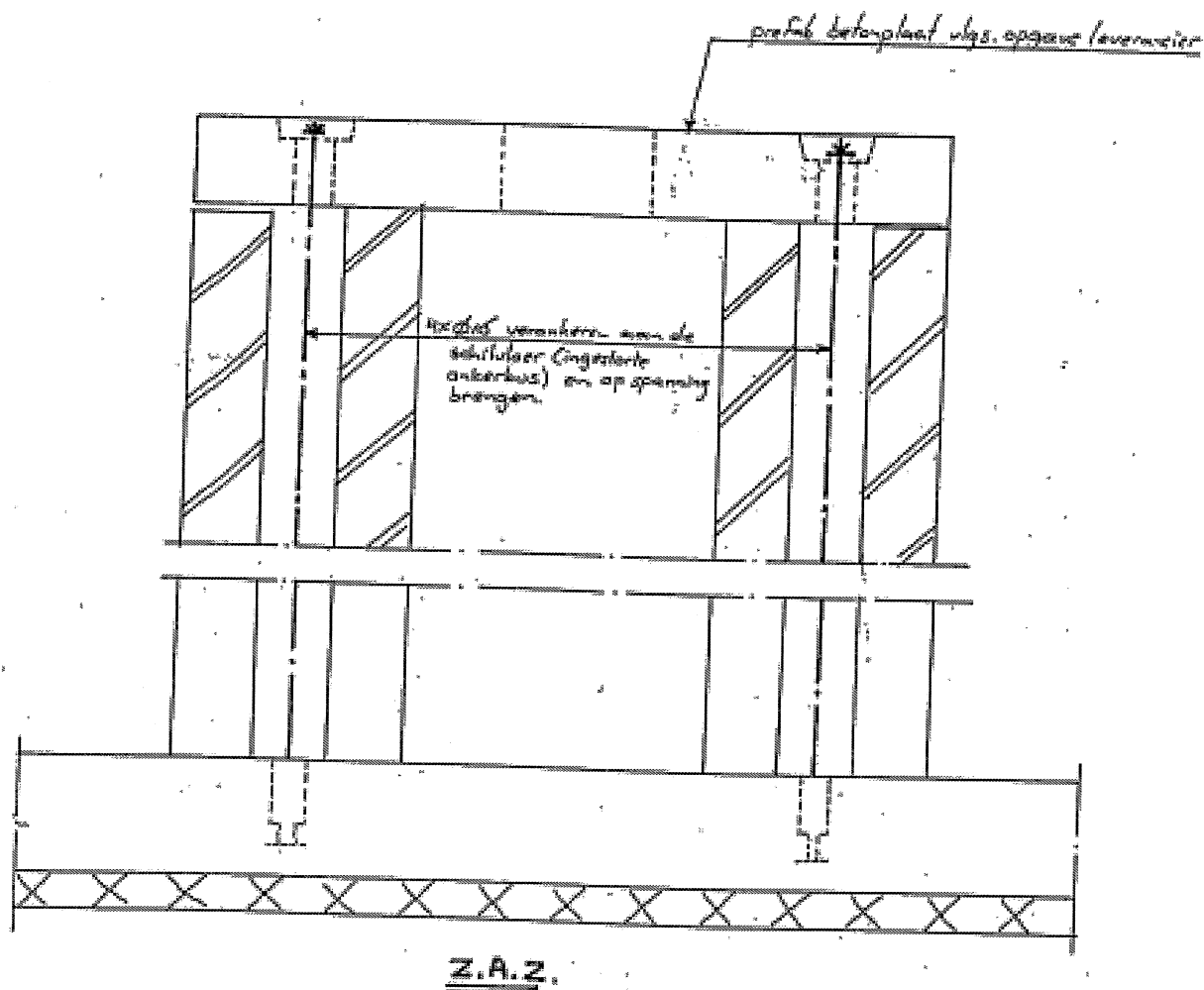
Buitenblad:

Kies L100 x 100 x 10

\* Oplegging  $\geq 100$  mm



**Pos. 4:** Schoorteen



B.A.Z.



Nr. 21734 IK

Bl. 13

d.d. 17-03-2017

Pos. 6:
$$\frac{q_1}{\frac{1}{30}}$$
Binnenblad:Versterkte strook.

\* E.e.a. vlg. opgave leverancier.

BuitenbladKies L150 x 100 x 10\* Oplegging  $\geq 150$  mmPos. 7:
$$\frac{q}{\frac{1}{11}}$$
Binnenblad:Versterkte strook

\* E.e.a. vlg. opgave leverancier.

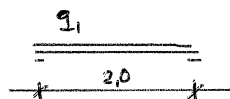
Buitenblad:Kies L100 x 100 x 10\* Oplegging  $\geq 100$  mm



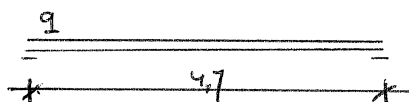
Nr. 21734 IK

Bl. 14

d.d. 17-03-2017

Pos. 8:Binnenblad:Kies zelfdragende betonlaten Vebo 1g

\* E.e.a. vlg. opgave leverancier.

Buitenblad:Kies L150x100x10\* Oplegging  $\geq 150$  mm.Pos. 9:

$q_{ki}$ : - verdieping : 6,75 (2,95)  $\times 57/2$   
 - lijnlast  $q_2$  : 2,3 (1,2)  $\times 46/5,7$   
 - lijnlast  $q_1$  : 4,4 (2,7)  $\times 33/5,7$   
 - eg :

|   | G    | Q   |      |
|---|------|-----|------|
| = | 19,3 | 8,4 | kN/m |
| = | 1,9  | 1,0 | "    |
| = | 2,6  | 1,6 | "    |
| = | 1,0  | -   | " +  |

24,8 11,0 kN/m

 $q_d = 42,1 \text{ kN/m}$      $M_d = 116,3 \text{ kNm}$      $W_{ben} \geq 496 \cdot 10^3 \text{ mm}^3$ 
 $q_k = 35,8 \text{ kN/m}$      $M_k = 98,9 \text{ kNm}$      $I_{ben} \geq 11500 \cdot 10^4 \text{ mm}^4$  (1500 l)
Kies HE240B\* Oplegging d.m.v. hamerstuk L120x120x12  $l_g = 400$  mm

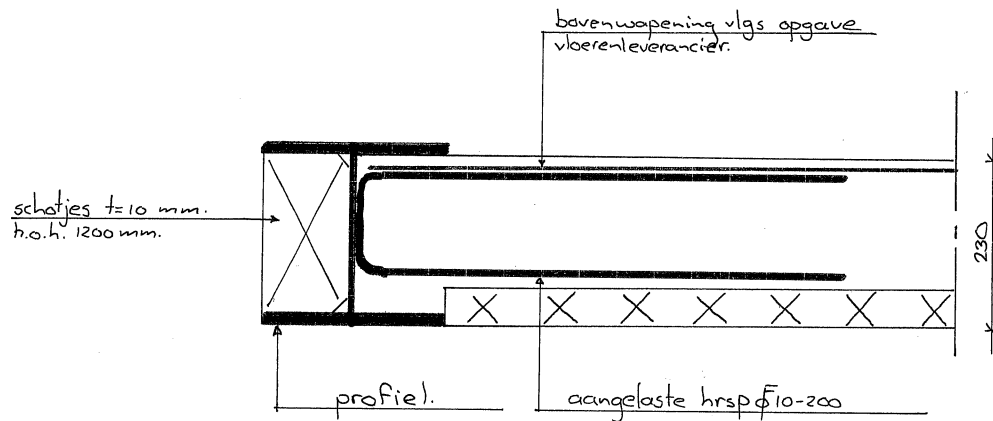
\* Zie detail blz 15.



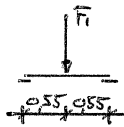
Nr. 21734 IK  
d.d. 17-03-2017

Bl. 15

Pos. g:



Pos. 10:



Binnenblad:

$$F_{k1} : - \text{pos. } g \quad : \quad 24,8 \text{ (11,0)} \times 4,7/2 \quad \begin{matrix} G & Q \\ = 58,3 & 25,9 \text{ kN} \end{matrix}$$

Kies zelfdragende betonlatei Vebo 8

\* E.e.a. vlg opgaue leverancier

Buitenblad:

Kies L100 x 100 x 10

\* Oplegging  $\geq 100 \text{ mm}$



Nr. 21734 IK

Bl. 16

d.d. 17-03-2017

Pos K1

$$l_g = 2,6 \text{ m}$$

$$N_{c:s:d} = 10,3 \text{ kN.}$$

Kies  $\varnothing 120 \times 120 \text{ mm}$ 

\* Centrisch onder de liqer

\* Pos K1A: kies  $\varnothing 70 \times 70 \times 4$  (in de spouw, i.v.m. opwaaien)Pos. W1:

$$l_g = 2,9 \text{ m}$$

|                      |                  |   |            |   |     |   |     |   |      |     |     |
|----------------------|------------------|---|------------|---|-----|---|-----|---|------|-----|-----|
| N <sub>c:s:k</sub> : | - verdieping     | : | 6,75 (395) | x | 0,9 | x | 1/2 | = | 12,2 | 5,3 | kN. |
|                      | - lijnlast $q_3$ | : | 9,1        | x | 1,2 |   |     | = | 10,9 | -   | "   |
|                      |                  |   |            |   |     |   |     |   | 23,1 | 5,3 | kN. |

Kies min  $320 \times 120 \text{ mm}$ 

\* Zie uitvoer in de bijlage

\* Geen verzwakkingen (steunen, e.d.) in aanbrengen.



Nr. 21734 JK

Bl. 17

d.d. 17-03-2017

Pos. S1

|            |                      |   | G                                                              | Q        |                       |
|------------|----------------------|---|----------------------------------------------------------------|----------|-----------------------|
| $q_{k1}$ : | - verdieping         | : | $6,75 (295) \times \frac{8^2}{2} \times 1,25$                  | $= 34,6$ | $15,1 \text{ kN/m}^2$ |
|            | - lijnlast $q_1/q_2$ | : | $(6,7 (39 \times 0,0) \times \frac{8^2}{2} \times 1,25) / 7,0$ | $= 5,0$  | - "                   |
|            | - beg.gr             | : | $4,4 (2,55) \times \frac{8^2}{2}$                              | $= 18,0$ | $19,5$ "              |
|            | - mw                 | : | $2,6 \times 3,4$                                               | $= 8,9$  | - "                   |
|            | - strook             | : | $25,0 \times 0,2 \times 1,0$                                   | $= 5,0$  | - " +                 |

 $71,5 \quad 25,6 \text{ kN/m}^2$ 

$$q_d = 113,2 \text{ kN/m}^2$$

Kies  $1000 \times 200 \text{ mm}$ \* Wapening # $\phi 8-150$ 

\* Zie uitvoer in de bijlage.

Pos. S2:

|            |                  |   | G                             | Q          |                   |
|------------|------------------|---|-------------------------------|------------|-------------------|
| $q_{k1}$ : | - verdieping     | : | 6,75 (295) x 4,6 x 5/10       | = 19,4 8,5 | kN/m <sup>2</sup> |
|            | - lijnlast $q_1$ | : | 4,4 (2,7) x 14/4,6            | = 1,4 9,9  | "                 |
|            | - lijnlast $q_3$ | : | (9,1 x 4,6 x 5/10) / 3,0      | = 8,7 -    | "                 |
|            | - beg.gr         | : | 4,4 (2,55) x 4,6 <sup>2</sup> | = 10,1 5,9 | "                 |
|            | - mw             | : | 2,6 x 3,4                     | = 8,9 -    | "                 |
|            | - strook         | : | 25,0 x 0,2 x 1,0              | = 5,0 -    | " +               |

 $53,5 \quad 15,3 \text{ kN/m}^2$ 

$$q_d = 79,5 \text{ kN/m}^2$$

Kies  $800 \times 200 \text{ mm}$ \* Wapening # $\phi 8-150$



Nr. 21734IK

Bl. 10

d.d. 17-03-2017

Pos. 53:

Kies 600 x 200 mm

\* Wapening # $\Phi$ 6-150

Pos. 54:

|                  |   | G      | Q    |       |
|------------------|---|--------|------|-------|
| $q_{k1}$ : - kap | : | = 23   | -    | kN/L' |
| - verdieping     | : | = 15,5 | 6,8  | "     |
| - lijnlast $q_1$ | : | = 31   | 1,9  | "     |
| - lijnlast $q_3$ | : | = 7,0  | -    | "     |
| - beg.gr.        | : | = 10,1 | 5,9  | "     |
| - mw             | : | = 15,6 | -    | "     |
| - strook         | : | = 4,0  | -    | " +   |
|                  |   | 57,6   | 14,6 | kN/L' |

$q_d = 83,1 \text{ kN/L'}$

Kies 800 x 200 mm

\* Wapening # $\Phi$ 8-150

Pos. 55:

|                  |   | G      | Q    |       |
|------------------|---|--------|------|-------|
| $q_{k1}$ - pos g | : | = 29,2 | 13,0 | kN/L' |
| - beg.gr.        | : | = 10,3 | 6,0  | "     |
| - mw             | : | = 15,6 | -    | "     |
| - strook         | : | = 4,0  | -    | " +   |
|                  |   | 59,1   | 19,0 | kN/L' |

$q_d = 90,7 \text{ kN/L'}$

Kies 900 x 200 mm

\* Wapening # $\Phi$ 8-150.



Nr. 21734 IK

Bl. 19

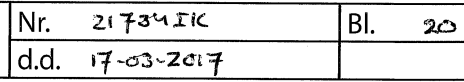
d.d. 17-03-2017

Pos. 56:

|                         |   |                                                    |        |      |                   |
|-------------------------|---|----------------------------------------------------|--------|------|-------------------|
| $q_{ki}$ : - verdieping | : | 6,75 (295) $\times \frac{40}{2}$                   | = 135  | 5,0  | kN/m <sup>2</sup> |
| - lijnlast $q_1/q_2$    | : | (6,7 (39 $\times$ 90) $\times \frac{40}{2}$ ) / 30 | = 45   | -    | "                 |
| - beg.gr                | : | 44 (255) $\times \frac{40}{2}$                     | = 88   | 5,1  | "                 |
| - mw                    | : | 46 $\times 7,0$                                    | = 322  | -    | "                 |
| - strook                | : | 25,0 $\times 9,2 \times 9,9$                       | = 23,5 | -    | " +               |
|                         |   |                                                    | 635    | 10,1 | kN/m <sup>2</sup> |

$$q_d = 835 \text{ kN/m}^2$$

Kies 800 x 200 mm\* Wapening # $\phi$ 8-150Pos. 57:Kies 600 x 200 mm\* Wapening # $\phi$ 6-150Pos. P1:Kies 900 x 900 x 200 mm\* Wapening # $\phi$ 8-150 %\* Stiep 17350 mm, wapening 4 $\phi$ 12 + bgl's  $\phi$ 8-150





**constructieadviesbureau ing. F. Wiggers**

Ingenieursbureau voor beton-, staal- en houtconstructies

*Varsseveld - Emmerich (D)*

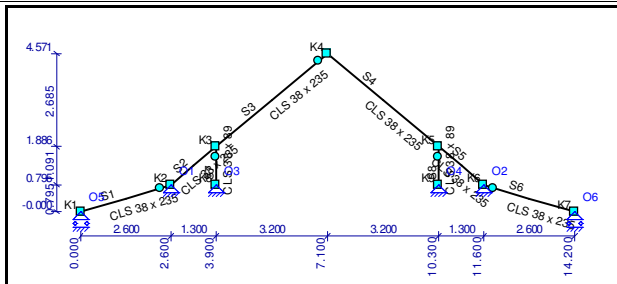
---

# Bijlage

---

|                         |                                                                        |                 |               |                    |  |
|-------------------------|------------------------------------------------------------------------|-----------------|---------------|--------------------|--|
| Constructieadviesbureau |                                                                        | ing. F. Wiggers |               | Varsseveld         |  |
| Bepalen kaplasten       |                                                                        |                 |               |                    |  |
| Projectnaam             |                                                                        |                 | Projectnummer | 21734IK            |  |
| Omschrijving            | A                                                                      |                 | Constructeur  | ing. J.E. Veldhuis |  |
| Opdrachtgever           |                                                                        |                 | Eenheden      | m, kN, kNm         |  |
| Bestand                 | N:\21600\21734-IK\Constructie\Berekeningen\Onderdeel A\Kaplasteren.mxf |                 |               |                    |  |

#### AFB. GEOMETRIE 1



#### STAVEN

| Staaf | Knoop |     | Scharnier | Knoop | Profiel | X-B    | Z-B    | X-E    | Z-E    | Lengte |
|-------|-------|-----|-----------|-------|---------|--------|--------|--------|--------|--------|
|       | B     | B   | E         | E     |         |        |        |        |        |        |
| S1    | K1    | NVM | NV-       | K2    | P1      | 0,000  | 0,000  | 2,600  | -0,795 | 2,719  |
| S2    | K2    | NVM | NVM       | K3    | P1      | 2,600  | -0,795 | 3,900  | -1,886 | 1,697  |
| S3    | K3    | NVM | NV-       | K4    | P1      | 3,900  | -1,886 | 7,100  | -4,571 | 4,177  |
| S4    | K4    | NVM | NVM       | K5    | P1      | 7,100  | -4,571 | 10,300 | -1,886 | 4,177  |
| S5    | K5    | NVM | NVM       | K6    | P1      | 10,300 | -1,886 | 11,600 | -0,795 | 1,697  |
| S6    | K6    | NV- | NVM       | K7    | P1      | 11,600 | -0,795 | 14,200 | 0,000  | 2,719  |
| S7    | K8    | NVM | NV-       | K3    | P2      | 3,900  | -0,795 | 3,900  | -1,886 | 1,091  |
| S8    | K9    | NVM | NV-       | K5    | P2      | 10,300 | -0,795 | 10,300 | -1,886 | 1,091  |
| -     | -     | -   | -         | -     | -       | m      | m      | m      | m      | m      |

#### OPLEGGINGEN

| Oplegging | Knoop | X    | Z    | Yr     | HoekYr |
|-----------|-------|------|------|--------|--------|
| O1        | K2    | vast | vast | vrij   | 0      |
| O2        | K6    | vast | vast | vrij   | 0      |
| O3        | K8    | vast | vast | vrij   | 0      |
| O4        | K9    | vast | vast | vrij   | 0      |
| O5        | K1    | vrij | vast | vrij   | 0      |
| O6        | K7    | vrij | vast | vrij   | 0      |
| -         | -     | kN/m | kN/m | kNmrad | °      |

#### GEWICHTSBEREKENING

| Index                                                                 | Staven                                            | Berekening | Waarde | Eenheden |
|-----------------------------------------------------------------------|---------------------------------------------------|------------|--------|----------|
| n                                                                     |                                                   |            |        |          |
| Lsys1                                                                 | Belastingen en vervormingen                       | NEN-EN1991 |        |          |
| Height1                                                               | Systeemmaat                                       | 1.00       | 1,00   | [m]      |
| Width1                                                                | Totale hoogte van constructie                     | 4.57       | 4,57   | [m]      |
| LR1                                                                   | Totale breedte van constructie                    | 14.20      | 14,20  | [m]      |
| NEN-EN1991-1-1:2011/NB:2011                                           |                                                   |            |        |          |
| Pp1                                                                   | Permanente Belasting                              |            |        |          |
| q1                                                                    | Hellend dak (S1,S2,S3,S4,S5,S6)                   | 0.75       | 0,75   | [kN/m²]  |
| LR2                                                                   | Pannen, dakbes + sporen                           | Pp1*Lsys1  | 0,75   | [kN/m]   |
| NEN-EN1991-1-4:2011/NB:2011                                           |                                                   |            |        |          |
| Height2                                                               | Windbelasting van Links + Overdruk                |            |        |          |
| Width2                                                                | Totale hoogte (incl. gedeelte boven de grond) (h) | 7.17       | 7,17   | [m]      |
| Width3                                                                | Gemiddelde breedte (b)                            | 12.00      | 12,00  | [m]      |
| A1                                                                    | Constructie diepte (d)                            | 14.20      | 14,20  | [m]      |
| Co1                                                                   | Belast oppervlak (A)                              | 86.05      | 86,05  | [m²]     |
| CsCd1                                                                 | Orthografie factor (C0)                           | 1.00       | 1,00   |          |
| NEN-EN1991-1-4#6(b=Width2,h=Height2,Terrein=Onbebouwd,Regio=3,C0=Co1) |                                                   |            |        |          |
| Cpe1                                                                  | Constructie factor (CsCd)                         |            | 0,85   |          |
| NEN-EN1991-1-4#7.2(Dak=Wand, Zone=D,hd=0.50)                          |                                                   |            |        |          |
| Cpi1                                                                  | Uitwendige druk; Druk coefficient (Cpe)           |            | 0,80   |          |
| EN1991-1-4#7.2.9(Cpe=Cpe1,Ope ningen=0.00,Over=True)                  |                                                   |            |        |          |
| Cpi1                                                                  | Interne druk; Druk coefficient (Cpi)              |            | 0,20   |          |

|                                |                        |                   |
|--------------------------------|------------------------|-------------------|
| <b>Constructieadviesbureau</b> | <b>ing. F. Wiggers</b> | <b>Varsseveld</b> |
|--------------------------------|------------------------|-------------------|

| Index      | Staven                                              | Berekening                                                            | Waarde Eenheden |
|------------|-----------------------------------------------------|-----------------------------------------------------------------------|-----------------|
| <b>LR2</b> |                                                     |                                                                       |                 |
| Z1         | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                  | 7,17 [m]        |
| Qp1        | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z1,Terrein=Onbebouwd,Regio=3,C0=Co1)               | 0,62 [kN/m²]    |
| q2         | Interne druk; Verdeelde element belasting (q)       | (Cpi1*Qp1) * Lsys1                                                    | 0,12 [kN/m]     |
| Cpe2       | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00)                    | -0,07           |
| q3         | Zadeldak S2; Verdeelde element belasting (q)        | (Qp1*Cpe2*CsCd1) * Lsys1                                              | -0,04 [kN/m]    |
| Cpe3       | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00)                    | -0,37           |
| q4         | Zadeldak S4; Verdeelde element belasting (q)        | (Qp1*Cpe3*CsCd1) * Lsys1                                              | -0,19 [kN/m]    |
| Cpe4       | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00)                    | -0,27           |
| q5         | Zadeldak S4; Verdeelde element belasting (q)        | (Qp1*Cpe4*CsCd1) * Lsys1                                              | -0,14 [kN/m]    |
| Cpe5       | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=17.00)                    | -0,40           |
| q6         | Zadeldak S6; Verdeelde element belasting (q)        | (Qp1*Cpe5*CsCd1) * Lsys1                                              | -0,21 [kN/m]    |
| <b>LR3</b> |                                                     |                                                                       |                 |
|            | Windbelasting van Links + Overdruk (2e Cpe)         | NEN-EN1991-1-4:2011/NB:2011                                           |                 |
| Height3    | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                  | 7,17 [m]        |
| Width4     | Gemiddelde breedte (b)                              | 12.00                                                                 | 12,00 [m]       |
| Width5     | Constructie diepte (d)                              | 14.20                                                                 | 14,20 [m]       |
| A2         | Belast oppervlak (A)                                | 86.05                                                                 | 86,05 [m²]      |
| Co2        | Orthografie factor (C0)                             | 1.00                                                                  | 1,00            |
| CsCd2      | Constructie factor (CsCd)                           | NEN-EN1991-1-4#6(b=Width4,h=Height3,Terrein=Onbebouwd,Regio=3,C0=Co2) | 0,85            |
| Cpe6       | Uitwendige druk; Druk coefficient (Cpe)             | NEN-EN1991-1-4#7.2(Dak=Wand,Zone=D,hd=0.50)                           | 0,80            |
| Cpi2       | Interne druk; Druk coefficient (Cpi)                | EN1991-1-4#7.2.9(Cpe=Cpe6,Openingen=0.00,Over=True)                   | 0,20            |
| Z2         | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                  | 7,17 [m]        |
| Qp2        | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z2,Terrein=Onbebouwd,Regio=3,C0=Co2)               | 0,62 [kN/m²]    |
| q7         | Interne druk; Verdeelde element belasting (q)       | (Cpi2*Qp2) * Lsys1                                                    | 0,12 [kN/m]     |
| Cpe7       | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00,Eerst=False)        | 0,53            |
| q8         | Zadeldak S2; Verdeelde element belasting (q)        | (Qp2*Cpe7*CsCd2) * Lsys1                                              | 0,28 [kN/m]     |
| Cpe8       | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00,Eerst=False)        | 0,00            |
| q9         | Zadeldak S4; Verdeelde element belasting (q)        | (Qp2*Cpe8*CsCd2) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe9       | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00,Eerst=False)        | 0,00            |
| q10        | Zadeldak S4; Verdeelde element belasting (q)        | (Qp2*Cpe9*CsCd2) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe10      | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=17.00,Eerst=False)        | 0,00            |
| q11        | Zadeldak S6; Verdeelde element belasting (q)        | (Qp2*Cpe10*CsCd2) * Lsys1                                             | 0,00 [kN/m]     |
| <b>LR4</b> |                                                     |                                                                       |                 |
|            | Windbelasting van Links + Onderdruk                 | NEN-EN1991-1-4:2011/NB:2011                                           |                 |
| Height4    | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                  | 7,17 [m]        |
| Width6     | Gemiddelde breedte (b)                              | 12.00                                                                 | 12,00 [m]       |
| Width7     | Constructie diepte (d)                              | 14.20                                                                 | 14,20 [m]       |
| A3         | Belast oppervlak (A)                                | 86.05                                                                 | 86,05 [m²]      |
| Co3        | Orthografie factor (C0)                             | 1.00                                                                  | 1,00            |
| CsCd3      | Constructie factor (CsCd)                           | NEN-EN1991-1-4#6(b=Width6,h=Height4,Terrein=Onbebouwd,Regio=3,C0=Co3) | 0,85            |
| Cpe11      | Uitwendige druk; Druk coefficient (Cpe)             | NEN-EN1991-1-4#7.2(Dak=Wand,Zone=E,hd=0.50)                           | -0,50           |
| Cpi3       | Interne druk; Druk coefficient (Cpi)                | EN1991-1-4#7.2.9(Cpe=Cpe11,Openingen=0.00,Over=False)                 | -0,30           |
| Z3         | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                  | 7,17 [m]        |

| Index      | Staven                                              | Berekening                                                             | Waarde Eenheden |
|------------|-----------------------------------------------------|------------------------------------------------------------------------|-----------------|
| <b>LR4</b> |                                                     |                                                                        |                 |
| Qp3        | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z3,Terrein=Onbebouwd,Regio=3,C0=Co3)                | 0,62 [kN/m²]    |
| q12        | Interne druk; Verdeelde element belasting (q)       | (Cpi3*Qp3) * Lsys1                                                     | -0,19 [kN/m]    |
| Cpe12      | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00)                     | -0,07           |
| q13        | Zadeldak S2; Verdeelde element belasting (q)        | (Qp3*Cpe12*CsCd3) * Lsys1                                              | -0,04 [kN/m]    |
| Cpe13      | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00)                     | -0,37           |
| q14        | Zadeldak S4; Verdeelde element belasting (q)        | (Qp3*Cpe13*CsCd3) * Lsys1                                              | -0,19 [kN/m]    |
| Cpe14      | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00)                     | -0,27           |
| q15        | Zadeldak S4; Verdeelde element belasting (q)        | (Qp3*Cpe14*CsCd3) * Lsys1                                              | -0,14 [kN/m]    |
| Cpe15      | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=17.00)                     | -0,40           |
| q16        | Zadeldak S6; Verdeelde element belasting (q)        | (Qp3*Cpe15*CsCd3) * Lsys1                                              | -0,21 [kN/m]    |
| <b>LR5</b> |                                                     |                                                                        |                 |
|            | Windbelasting van Links + Onderdruk (2e Cpe)        | NEN-EN1991-1-4:2011/NB:2011                                            |                 |
| Height5    | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                   | 7,17 [m]        |
| Width8     | Gemiddelde breedte (b)                              | 12.00                                                                  | 12,00 [m]       |
| Width9     | Constructie diepte (d)                              | 14.20                                                                  | 14,20 [m]       |
| A4         | Belast oppervlak (A)                                | 86.05                                                                  | 86,05 [m²]      |
| Co4        | Orthografie factor (C0)                             | 1.00                                                                   | 1,00            |
| CsCd4      | Constructie factor (CsCd)                           | NEN-EN1991-1-4#6(b=Width8,h=Height5,Terrein=Onbebouwd,Regio=3,C0=Co4)  | 0,85            |
| Cpe16      | Uitwendige druk; Druk coefficient (Cpe)             | NEN-EN1991-1-4#7.2(Dak=Wand,Zone=E,hd=0.50)                            | -0,50           |
| Cpi4       | Interne druk; Druk coefficient (Cpi)                | EN1991-1-4#7.2.9(Cpe=Cpe16,Openingen=0.00,Over=False)                  | -0,30           |
| Z4         | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                   | 7,17 [m]        |
| Qp4        | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z4,Terrein=Onbebouwd,Regio=3,C0=Co4)                | 0,62 [kN/m²]    |
| q17        | Interne druk; Verdeelde element belasting (q)       | (Cpi4*Qp4) * Lsys1                                                     | -0,19 [kN/m]    |
| Cpe17      | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00,Eerst=False)         | 0,53            |
| q18        | Zadeldak S2; Verdeelde element belasting (q)        | (Qp4*Cpe17*CsCd4) * Lsys1                                              | 0,28 [kN/m]     |
| Cpe18      | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00,Eerst=False)         | 0,00            |
| q19        | Zadeldak S4; Verdeelde element belasting (q)        | (Qp4*Cpe18*CsCd4) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe19      | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00,Eerst=False)         | 0,00            |
| q20        | Zadeldak S4; Verdeelde element belasting (q)        | (Qp4*Cpe19*CsCd4) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe20      | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=17.00,Eerst=False)         | 0,00            |
| q21        | Zadeldak S6; Verdeelde element belasting (q)        | (Qp4*Cpe20*CsCd4) * Lsys1                                              | 0,00 [kN/m]     |
| <b>LR6</b> |                                                     |                                                                        |                 |
|            | Windbelasting van Rechts + Overdruk                 | NEN-EN1991-1-4:2011/NB:2011                                            |                 |
| Height6    | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                   | 7,17 [m]        |
| Width10    | Gemiddelde breedte (b)                              | 12.00                                                                  | 12,00 [m]       |
| Width11    | Constructie diepte (d)                              | 14.20                                                                  | 14,20 [m]       |
| A5         | Belast oppervlak (A)                                | 86.05                                                                  | 86,05 [m²]      |
| Co5        | Orthografie factor (C0)                             | 1.00                                                                   | 1,00            |
| CsCd5      | Constructie factor (CsCd)                           | NEN-EN1991-1-4#6(b=Width10,h=Height6,Terrein=Onbebouwd,Regio=3,C0=Co5) | 0,85            |
| Cpe21      | Uitwendige druk; Druk coefficient (Cpe)             | NEN-EN1991-1-4#7.2(Dak=Wand,Zone=D,hd=0.50)                            | 0,80            |
| Cpi5       | Interne druk; Druk coefficient (Cpi)                | EN1991-1-4#7.2.9(Cpe=Cpe21,Openingen=0.00,Over=True)                   | 0,20            |
| Z5         | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                   | 7,17 [m]        |
| Qp5        | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z5,Terrein=Onbebouwd,Regio=3,C0=Co5)                | 0,62 [kN/m²]    |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

| Index                                        | Staven                                              | Berekening                                                             | Waarde Eenheden |
|----------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------|-----------------|
| <b>LR6</b>                                   |                                                     |                                                                        |                 |
| q22                                          | Interne druk; Verdeelde element belasting (q)       | (Cpi5*Qp5) * Lsys1                                                     | 0,12 [kN/m]     |
| Cpe22                                        | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00)                     | -0,27           |
| q23                                          | Zadeldak S2; Verdeelde element belasting (q)        | (Qp5*Cpe22*CsCd5) * Lsys1                                              | -0,14 [kN/m]    |
| Cpe23                                        | Zadeldak S3; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00)                     | -0,37           |
| q24                                          | Zadeldak S3; Verdeelde element belasting (q)        | (Qp5*Cpe23*CsCd5) * Lsys1                                              | -0,19 [kN/m]    |
| Cpe24                                        | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00)                     | -0,07           |
| q25                                          | Zadeldak S4; Verdeelde element belasting (q)        | (Qp5*Cpe24*CsCd5) * Lsys1                                              | -0,04 [kN/m]    |
| Cpe25                                        | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=17.00)                     | -0,29           |
| q26                                          | Zadeldak S6; Verdeelde element belasting (q)        | (Qp5*Cpe25*CsCd5) * Lsys1                                              | -0,15 [kN/m]    |
| Cpe26                                        | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=F,Hoek=17.00)                     | -0,85           |
| q27                                          | Zadeldak S6; Verdeelde element belasting (q)        | (Qp5*Cpe26*CsCd5) * Lsys1                                              | -0,45 [kN/m]    |
| <b>LR7</b>                                   |                                                     |                                                                        |                 |
| Windbelasting van Rechts + Overdruk (2e Cpe) |                                                     | NEN-EN1991-1-4:2011/NB:2011                                            |                 |
| Height7                                      | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                   | 7,17 [m]        |
| Width12                                      | Gemiddelde breedte (b)                              | 12.00                                                                  | 12,00 [m]       |
| Width13                                      | Constructie diepte (d)                              | 14.20                                                                  | 14,20 [m]       |
| A6                                           | Belast oppervlak (A)                                | 86.05                                                                  | 86,05 [m²]      |
| Co6                                          | Orthografie factor (C0)                             | 1.00                                                                   | 1,00            |
| CsCd6                                        | Constructie factor (CsCd)                           | NEN-EN1991-1-4#6(b=Width12,h=Height7,Terrein=Onbebouwd,Regio=3,C0=Co6) | 0,85            |
| Cpe27                                        | Uitwendige druk; Druk coefficient (Cpe)             | NEN-EN1991-1-4#7.2(Dak=Wand,Zone=D,hd=0.50)                            | 0,80            |
| Cpi6                                         | Interne druk; Druk coefficient (Cpi)                | EN1991-1-4#7.2.9(Cpe=Cpe27,Openingen=0.00,Over=True)                   | 0,20            |
| Z6                                           | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                   | 7,17 [m]        |
| Qp6                                          | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z6,Terrein=Onbebouwd,Regio=3,C0=Co6)                | 0,62 [kN/m²]    |
| q28                                          | Interne druk; Verdeelde element belasting (q)       | (Cpi6*Qp6) * Lsys1                                                     | 0,12 [kN/m]     |
| Cpe28                                        | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00,Eerst=Falso)         | 0,00            |
| q29                                          | Zadeldak S2; Verdeelde element belasting (q)        | (Qp6*Cpe28*CsCd6) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe29                                        | Zadeldak S3; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00,Eerst=Falso)         | 0,00            |
| q30                                          | Zadeldak S3; Verdeelde element belasting (q)        | (Qp6*Cpe29*CsCd6) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe30                                        | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00,Eerst=Falso)         | 0,53            |
| q31                                          | Zadeldak S4; Verdeelde element belasting (q)        | (Qp6*Cpe30*CsCd6) * Lsys1                                              | 0,28 [kN/m]     |
| Cpe31                                        | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=17.00,Eerst=Falso)         | 0,23            |
| q32                                          | Zadeldak S6; Verdeelde element belasting (q)        | (Qp6*Cpe31*CsCd6) * Lsys1                                              | 0,12 [kN/m]     |
| Cpe32                                        | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=F,Hoek=17.00,Eerst=Falso)         | 0,27            |
| q33                                          | Zadeldak S6; Verdeelde element belasting (q)        | (Qp6*Cpe32*CsCd6) * Lsys1                                              | 0,14 [kN/m]     |
| <b>LR8</b>                                   |                                                     |                                                                        |                 |
| Windbelasting van Rechts + Onderdruk         |                                                     | NEN-EN1991-1-4:2011/NB:2011                                            |                 |
| Height8                                      | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                   | 7,17 [m]        |
| Width14                                      | Gemiddelde breedte (b)                              | 12.00                                                                  | 12,00 [m]       |
| Width15                                      | Constructie diepte (d)                              | 14.20                                                                  | 14,20 [m]       |
| A7                                           | Belast oppervlak (A)                                | 86.05                                                                  | 86,05 [m²]      |
| Co7                                          | Orthografie factor (C0)                             | 1.00                                                                   | 1,00            |
| CsCd7                                        | Constructie factor (CsCd)                           | NEN-EN1991-1-4#6(b=Width14,h=Height8,Terrein=Onbebouwd,Regio=3,C0=Co7) | 0,85            |
| Cpe33                                        | Uitwendige druk; Druk coefficient (Cpe)             | NEN-EN1991-1-4#7.2(Dak=Wand,Zone=E,hd=0.50)                            | -0,50           |

| Index       | Staven                                              | Berekening                                                             | Waarde Eenheden |
|-------------|-----------------------------------------------------|------------------------------------------------------------------------|-----------------|
| <b>LR8</b>  |                                                     |                                                                        |                 |
| Cpi7        | Interne druk; Druk coefficient (Cpi)                | EN1991-1-4#7.2.9(Cpe=Cpe33,Openingen=0.00,Over=False)                  | -0,30           |
| Z7          | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                   | 7,17 [m]        |
| Qp7         | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z7,Terrein=Onbebouwd,Regio=3,C0=Co7)                | 0,62 [kN/m²]    |
| q34         | Interne druk; Verdeelde element belasting (q)       | (Cpi7*Qp7) * Lsys1                                                     | -0,19 [kN/m]    |
| Cpe34       | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00)                     | -0,27           |
| q35         | Zadeldak S2; Verdeelde element belasting (q)        | (Qp7*Cpe34*CsCd7) * Lsys1                                              | -0,14 [kN/m]    |
| Cpe35       | Zadeldak S3; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00)                     | -0,37           |
| q36         | Zadeldak S3; Verdeelde element belasting (q)        | (Qp7*Cpe35*CsCd7) * Lsys1                                              | -0,19 [kN/m]    |
| Cpe36       | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00)                     | -0,07           |
| q37         | Zadeldak S4; Verdeelde element belasting (q)        | (Qp7*Cpe36*CsCd7) * Lsys1                                              | -0,04 [kN/m]    |
| Cpe37       | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=17.00)                     | -0,29           |
| q38         | Zadeldak S6; Verdeelde element belasting (q)        | (Qp7*Cpe37*CsCd7) * Lsys1                                              | -0,15 [kN/m]    |
| Cpe38       | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=F,Hoek=17.00)                     | -0,85           |
| q39         | Zadeldak S6; Verdeelde element belasting (q)        | (Qp7*Cpe38*CsCd7) * Lsys1                                              | -0,45 [kN/m]    |
| <b>LR9</b>  |                                                     |                                                                        |                 |
|             | Windbelasting van Rechts + Onderdruk (2e Cpe)       | NEN-EN1991-1-4:2011/NB:2011                                            |                 |
| Height9     | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                   | 7,17 [m]        |
| Width16     | Gemiddelde breedte (b)                              | 12.00                                                                  | 12,00 [m]       |
| Width17     | Constructie diepte (d)                              | 14.20                                                                  | 14,20 [m]       |
| A8          | Belast oppervlak (A)                                | 86.05                                                                  | 86,05 [m²]      |
| Co8         | Orthografie factor (C0)                             | 1.00                                                                   | 1,00            |
| CsCd8       | Constructie factor (CsCd)                           | NEN-EN1991-1-4#6(b=Width16,h=Height9,Terrein=Onbebouwd,Regio=3,C0=Co8) | 0,85            |
| Cpe39       | Uitwendige druk; Druk coefficient (Cpe)             | NEN-EN1991-1-4#7.2(Dak=Wand,Zone=E,hd=0.50)                            | -0,50           |
| Cpi8        | Interne druk; Druk coefficient (Cpi)                | EN1991-1-4#7.2.9(Cpe=Cpe39,Openingen=0.00,Over=False)                  | -0,30           |
| Z8          | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9 | 7.17                                                                   | 7,17 [m]        |
| Qp8         | Pieksnelheids druk (Qp voor referentieperiode 50)   | NEN-EN1991-1-4#4(Z=Z8,Terrein=Onbebouwd,Regio=3,C0=Co8)                | 0,62 [kN/m²]    |
| q40         | Interne druk; Verdeelde element belasting (q)       | (Cpi8*Qp8) * Lsys1                                                     | -0,19 [kN/m]    |
| Cpe40       | Zadeldak S2; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=I,Hoek=40.00,Eerst=False)         | 0,00            |
| q41         | Zadeldak S2; Verdeelde element belasting (q)        | (Qp8*Cpe40*CsCd8) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe41       | Zadeldak S3; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=J,Hoek=40.00,Eerst=False)         | 0,00            |
| q42         | Zadeldak S3; Verdeelde element belasting (q)        | (Qp8*Cpe41*CsCd8) * Lsys1                                              | 0,00 [kN/m]     |
| Cpe42       | Zadeldak S4; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=40.00,Eerst=False)         | 0,53            |
| q43         | Zadeldak S4; Verdeelde element belasting (q)        | (Qp8*Cpe42*CsCd8) * Lsys1                                              | 0,28 [kN/m]     |
| Cpe43       | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=H,Hoek=17.00,Eerst=False)         | 0,23            |
| q44         | Zadeldak S6; Verdeelde element belasting (q)        | (Qp8*Cpe43*CsCd8) * Lsys1                                              | 0,12 [kN/m]     |
| Cpe44       | Zadeldak S6; Druk coefficient (Cpe)                 | NEN-EN1991-1-4#7.2(Dak=Zadeldak,Zone=F,Hoek=17.00,Eerst=False)         | 0,27            |
| q45         | Zadeldak S6; Verdeelde element belasting (q)        | (Qp8*Cpe44*CsCd8) * Lsys1                                              | 0,14 [kN/m]     |
| <b>LR10</b> |                                                     |                                                                        |                 |
|             | Windbelasting (enkele luifel)                       | NEN-EN1991-1-4:2011/NB:2011                                            |                 |
| Height10    | Totale hoogte (incl. gedeelte boven de grond) (h)   | 7.17                                                                   | 7,17 [m]        |
| Width18     | Gemiddelde breedte (b)                              | 12.00                                                                  | 12,00 [m]       |
| Width19     | Constructie diepte (d)                              | 14.20                                                                  | 14,20 [m]       |
| A9          | Belast oppervlak (A)                                | 86.05                                                                  | 86,05 [m²]      |
| Co9         | Orthografie factor (C0)                             | 1.00                                                                   | 1,00            |

| Index       | Staven                                                                          | Berekening                                                                      | Waarde Eenheden |
|-------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------|
| <b>LR10</b> |                                                                                 |                                                                                 |                 |
| CsCd9       | Constructie factor (CsCd)                                                       | NEN-EN1991-1-4#6(b=Width18,h=Height10,Terrein=Onbebouwd,Regio=3,C0=Co9)         | 0,85            |
| Z9          | z=h; (h<=b) voor knopen: K1,K2,K3,K4,K5,K6,K7,K8,K9                             | 7.17                                                                            | 7,17 [m]        |
| Qp9         | Pieksnelheids druk (Qp voor referentieperiode 50)                               | NEN-EN1991-1-4#4(Z=Z9,Terrein=Onbebouwd,Regio=3,C0=Co9)                         | 0,62 [kN/m²]    |
| Cpnet1      | Eenzijdige overkappingen S1<br>Druk coefficient (Cpnet)                         | NEN-EN1991-1-4#7.3(Dak=EenzijdigeOverkappingen,Zone=CF,Hoek=17.00)              | 0,74            |
| F1          | Geconcentreerde element belasting (F)                                           | (Qp9*Cpnet1*CsCd9) * Lsys1*2.72                                                 | 1,07 [kN]       |
| Cpnet2      | Druk coefficient (Cpnet)                                                        | NEN-EN1991-1-4#7.3(Dak=EenzijdigeOverkappingen,Zone=CF,Hoek=17.00,Obstructie=1) | -1,18           |
| F2          | Geconcentreerde element belasting (F)                                           | (Qp9*Cpnet2*CsCd9) * Lsys1*2.72                                                 | -1,70 [kN]      |
| <b>LR11</b> |                                                                                 |                                                                                 |                 |
|             | Sneeuwbelasting                                                                 | NEN-EN1991-1-3:2011/NB:2011                                                     |                 |
| Sk1         | Karakteristiek waarde van de sneeuwlast op de grond (Sk)                        | NEN-EN1991-1-3#4.1(Zone=1)                                                      | 0,70 [kN/m²]    |
| Ce1         | De milieucoefficient (Ce)                                                       | NEN-EN1991-1-3#5.2.7()                                                          | 1,00            |
| Ct1         | De thermische coefficient (Ct)                                                  | NEN-EN1991-1-3#5.2.8()                                                          | 1,00            |
| Mu1         | Zadeldak, Mu1 Hoek: 17.00; S1,S6<br>Mu1; Sneeuwbelasting coefficient (Mu)       | EN1991-1-3#5.3(Dak=Hellend,Hoek=17.00,Mu=Mu1,Sk=Sk1)                            | 0,80            |
| q46         | Verdeelde element belasting (q)                                                 | (Sk1*Ce1*Ct1*Mu1) * Lsys1                                                       | 0,56 [kN/m]     |
| q47         | Verdeelde element belasting (q)                                                 | q46*0.50                                                                        | 0,28 [kN/m]     |
| Mu2         | Zadeldak, Mu1 Hoek: 40.00; S2,S3,S4,S5<br>Mu1; Sneeuwbelasting coefficient (Mu) | EN1991-1-3#5.3(Dak=Hellend,Hoek=40.00,Mu=Mu1,Sk=Sk1)                            | 0,53            |
| q48         | Verdeelde element belasting (q)                                                 | (Sk1*Ce1*Ct1*Mu2) * Lsys1                                                       | 0,37 [kN/m]     |
| q49         | Verdeelde element belasting (q)                                                 | q48*0.50                                                                        | 0,19 [kN/m]     |

## BELASTINGSGEVALLEN

| Type                                                      | Beginwaarde  | Eindwaarde     | Beginafstand    | Eindafstand | Richting Staaf of knoop |
|-----------------------------------------------------------|--------------|----------------|-----------------|-------------|-------------------------|
| <b>B.G.1: Permanente Belasting</b>                        |              |                |                 |             |                         |
| qG                                                        | 0,03 (1.00x) | 0,03 (1.00x)   | 0,000           | 2,719(L)    | Z" S1,S6                |
| qG                                                        | 0,03 (1.00x) | 0,03 (1.00x)   | 0,000           | 1,697(L)    | Z" S2,S5                |
| qG                                                        | 0,03 (1.00x) | 0,03 (1.00x)   | 0,000           | 4,177(L)    | Z" S3-S4                |
| qG                                                        | 0,01 (1.00x) | 0,01 (1.00x)   | 0,000           | 1,091(L)    | Z" S7-S8                |
| q                                                         | 0,75 (q1)    | 0,75 (q1)      | 0,000           | 2,719(L)    | Z" S1-S6                |
| <b>Som lasten</b>                                         | <b>X</b>     | <b>0,00 kN</b> | <b>Z: 13,50</b> | <b>kN</b>   |                         |
| <b>B.G.2: Windbelasting van Links + Overdruk</b>          |              |                |                 |             |                         |
| q                                                         | -0,04 (q3)   | -0,04 (q3)     | 0,000           | 1,697(L)    | Z' S2-S3                |
| q                                                         | -0,12 (-q2)  | -0,12 (-q2)    | 0,000           | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                         | -0,19 (q4)   | -0,19 (q4)     | 0,000           | 1,566       | Z' S4                   |
| q                                                         | -0,12 (-q2)  | -0,12 (-q2)    | 0,000           | 1,566       | Z' S4                   |
| q                                                         | -0,14 (q5)   | -0,14 (q5)     | 1,566           | 4,177(L)    | Z' S4                   |
| q                                                         | -0,12 (-q2)  | -0,12 (-q2)    | 1,566           | 4,177(L)    | Z' S4                   |
| q                                                         | -0,14 (q5)   | -0,14 (q5)     | 0,000           | 1,697(L)    | Z' S5                   |
| q                                                         | -0,21 (q6)   | -0,21 (q6)     | 0,000           | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                         | <b>X</b>     | <b>0,72 kN</b> | <b>Z: -2,85</b> | <b>kN</b>   |                         |
| <b>B.G.3: Windbelasting van Links + Overdruk (2e Cpe)</b> |              |                |                 |             |                         |
| q                                                         | 0,28 (q8)    | 0,28 (q8)      | 0,000           | 1,697(L)    | Z' S2-S3                |
| q                                                         | -0,12 (-q7)  | -0,12 (-q7)    | 0,000           | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                         | 0,00 (q9)    | 0,00 (q9)      | 0,000           | 1,566       | Z' S4                   |
| q                                                         | -0,12 (-q7)  | -0,12 (-q7)    | 0,000           | 1,566       | Z' S4                   |
| q                                                         | 0,00 (q10)   | 0,00 (q10)     | 1,566           | 4,177(L)    | Z' S4                   |
| q                                                         | -0,12 (-q7)  | -0,12 (-q7)    | 1,566           | 4,177(L)    | Z' S4                   |
| q                                                         | 0,00 (q10)   | 0,00 (q10)     | 0,000           | 1,697(L)    | Z' S5                   |
| q                                                         | 0,00 (q11)   | 0,00 (q11)     | 0,000           | 2,719(L)    | Z' S6                   |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

| Type                                                                                | Beginwaarde | Eindwaarde               | Beginafstand | Eindafstand | Richting Staaf of knoop |
|-------------------------------------------------------------------------------------|-------------|--------------------------|--------------|-------------|-------------------------|
| <b>Som lasten</b>                                                                   | <b>X</b>    | <b>1,16 kN Z: -0,17</b>  | <b>kN</b>    |             |                         |
| :                                                                                   |             |                          |              |             |                         |
| <b>B.G.4: Windbelasting van Links + Overdruk (Zadeldak FGH 1e Cpe + IJ 2e Cpe)</b>  |             |                          |              |             |                         |
| q                                                                                   | -0,04 (q3)  | -0,04 (q3)               | 0,000        | 1,697(L)    | Z' S2-S3                |
| q                                                                                   | -0,12 (-q2) | -0,12 (-q2)              | 0,000        | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                                                   | 0,00 (q9)   | 0,00 (q9)                | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | -0,12 (-q2) | -0,12 (-q2)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | 0,00 (q10)  | 0,00 (q10)               | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | -0,12 (-q2) | -0,12 (-q2)              | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | 0,00 (q10)  | 0,00 (q10)               | 0,000        | 1,697(L)    | Z' S5                   |
| q                                                                                   | 0,00 (q11)  | 0,00 (q11)               | 0,000        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                   | <b>X</b>    | <b>-0,03 kN Z: -1,60</b> | <b>kN</b>    |             |                         |
| :                                                                                   |             |                          |              |             |                         |
| <b>B.G.5: Windbelasting van Links + Overdruk (Zadeldak FGH 2e Cpe + IJ 1e Cpe)</b>  |             |                          |              |             |                         |
| q                                                                                   | 0,28 (q8)   | 0,28 (q8)                | 0,000        | 1,697(L)    | Z' S2-S3                |
| q                                                                                   | -0,12 (-q2) | -0,12 (-q2)              | 0,000        | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                                                   | -0,19 (q4)  | -0,19 (q4)               | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | -0,12 (-q2) | -0,12 (-q2)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | -0,14 (q5)  | -0,14 (q5)               | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | -0,12 (-q2) | -0,12 (-q2)              | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | -0,14 (q5)  | -0,14 (q5)               | 0,000        | 1,697(L)    | Z' S5                   |
| q                                                                                   | -0,21 (q6)  | -0,21 (q6)               | 0,000        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                   | <b>X</b>    | <b>1,92 kN Z: -1,42</b>  | <b>kN</b>    |             |                         |
| :                                                                                   |             |                          |              |             |                         |
| <b>B.G.6: Windbelasting van Links + Onderdruk</b>                                   |             |                          |              |             |                         |
| q                                                                                   | -0,04 (q13) | -0,04 (q13)              | 0,000        | 1,697(L)    | Z' S2-S3                |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 0,000        | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                                                   | -0,19 (q14) | -0,19 (q14)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | -0,14 (q15) | -0,14 (q15)              | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | -0,14 (q15) | -0,14 (q15)              | 0,000        | 1,697(L)    | Z' S5                   |
| q                                                                                   | -0,21 (q16) | -0,21 (q16)              | 0,000        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                   | <b>X</b>    | <b>0,47 kN Z: 0,76</b>   | <b>kN</b>    |             |                         |
| :                                                                                   |             |                          |              |             |                         |
| <b>B.G.7: Windbelasting van Links + Onderdruk (2e Cpe)</b>                          |             |                          |              |             |                         |
| q                                                                                   | 0,28 (q18)  | 0,28 (q18)               | 0,000        | 1,697(L)    | Z' S2-S3                |
| q                                                                                   | 0,19 (-q17) | 0,19 (-q17)              | 0,000        | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                                                   | 0,00 (q19)  | 0,00 (q19)               | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | 0,19 (-q17) | 0,19 (-q17)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | 0,00 (q20)  | 0,00 (q20)               | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | 0,19 (-q17) | 0,19 (-q17)              | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | 0,00 (q20)  | 0,00 (q20)               | 0,000        | 1,697(L)    | Z' S5                   |
| q                                                                                   | 0,00 (q21)  | 0,00 (q21)               | 0,000        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                   | <b>X</b>    | <b>0,92 kN Z: 3,44</b>   | <b>kN</b>    |             |                         |
| :                                                                                   |             |                          |              |             |                         |
| <b>B.G.8: Windbelasting van Links + Onderdruk (Zadeldak FGH 1e Cpe + IJ 2e Cpe)</b> |             |                          |              |             |                         |
| q                                                                                   | -0,04 (q13) | -0,04 (q13)              | 0,000        | 1,697(L)    | Z' S2-S3                |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 0,000        | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                                                   | 0,00 (q19)  | 0,00 (q19)               | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | 0,00 (q20)  | 0,00 (q20)               | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                   | 0,00 (q20)  | 0,00 (q20)               | 0,000        | 1,697(L)    | Z' S5                   |
| q                                                                                   | 0,00 (q21)  | 0,00 (q21)               | 0,000        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                   | <b>X</b>    | <b>-0,28 kN Z: 2,01</b>  | <b>kN</b>    |             |                         |
| :                                                                                   |             |                          |              |             |                         |
| <b>B.G.9: Windbelasting van Links + Onderdruk (Zadeldak FGH 2e Cpe + IJ 1e Cpe)</b> |             |                          |              |             |                         |
| q                                                                                   | 0,28 (q18)  | 0,28 (q18)               | 0,000        | 1,697(L)    | Z' S2-S3                |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 0,000        | 1,697(L)    | Z' S2-S3,S5-S6          |
| q                                                                                   | -0,19 (q14) | -0,19 (q14)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | 0,19 (-q12) | 0,19 (-q12)              | 0,000        | 1,566       | Z' S4                   |
| q                                                                                   | -0,14 (q15) | -0,14 (q15)              | 1,566        | 4,177(L)    | Z' S4                   |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

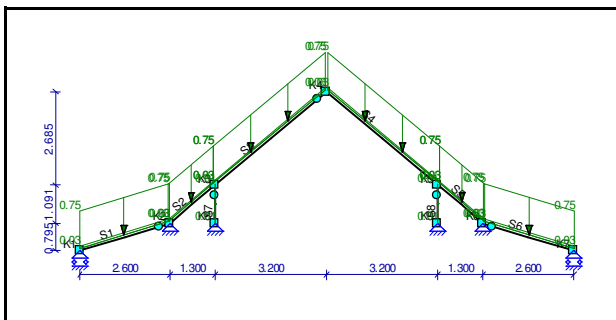
| Type                                                                                 | Beginwaarde  | Eindwaarde               | Beginafstand | Eindafstand | Richting Staaf of knoop |
|--------------------------------------------------------------------------------------|--------------|--------------------------|--------------|-------------|-------------------------|
| <b>B.G.9: Windbelasting van Links + Onderdruk (Zadeldak FGH 2e Cpe + IJ 1e Cpe)</b>  |              |                          |              |             |                         |
| q                                                                                    | 0,19 (-q12)  | 0,19 (-q12)              | 1,566        | 4,177(L)    | Z' S4                   |
| q                                                                                    | -0,14 (q15)  | -0,14 (q15)              | 0,000        | 1,697(L)    | Z' S5                   |
| q                                                                                    | -0,21 (q16)  | -0,21 (q16)              | 0,000        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                    | <b>X</b>     | <b>1,67 kN Z: 2,19</b>   | <b>kN</b>    |             |                         |
| <b>B.G.10: Windbelasting van Rechts + Overdruk</b>                                   |              |                          |              |             |                         |
| q                                                                                    | -0,14 (q23)  | -0,14 (q23)              | 0,000        | 1,697(L)    | Z' S2                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                    | -0,14 (q23)  | -0,14 (q23)              | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | -0,19 (q24)  | -0,19 (q24)              | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | -0,04 (q25)  | -0,04 (q25)              | 0,000        | 4,177(L)    | Z' S4-S5                |
| q                                                                                    | -0,15 (q26)  | -0,15 (q26)              | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | -0,45 (q27)  | -0,45 (q27)              | 1,464        | 2,719(L)    | Z' S6                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 1,464        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                    | <b>X</b>     | <b>-0,12 kN Z: -3,05</b> | <b>kN</b>    |             |                         |
| <b>B.G.11: Windbelasting van Rechts + Overdruk (2e Cpe)</b>                          |              |                          |              |             |                         |
| q                                                                                    | 0,00 (q29)   | 0,00 (q29)               | 0,000        | 1,697(L)    | Z' S2                   |
| q                                                                                    | -0,12 (-q28) | -0,12 (-q28)             | 0,000        | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                    | 0,00 (q29)   | 0,00 (q29)               | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | -0,12 (-q28) | -0,12 (-q28)             | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | 0,00 (q30)   | 0,00 (q30)               | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | -0,12 (-q28) | -0,12 (-q28)             | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | 0,28 (q31)   | 0,28 (q31)               | 0,000        | 4,177(L)    | Z' S4-S5                |
| q                                                                                    | 0,12 (q32)   | 0,12 (q32)               | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | -0,12 (-q28) | -0,12 (-q28)             | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | 0,14 (q33)   | 0,14 (q33)               | 1,464        | 2,719(L)    | Z' S6                   |
| q                                                                                    | -0,12 (-q28) | -0,12 (-q28)             | 1,464        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                    | <b>X</b>     | <b>-1,07 kN Z: 0,16</b>  | <b>kN</b>    |             |                         |
| <b>B.G.12: Windbelasting van Rechts + Overdruk (Zadeldak FGH 1e Cpe + IJ 2e Cpe)</b> |              |                          |              |             |                         |
| q                                                                                    | 0,00 (q29)   | 0,00 (q29)               | 0,000        | 1,697(L)    | Z' S2                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                    | 0,00 (q29)   | 0,00 (q29)               | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | 0,00 (q30)   | 0,00 (q30)               | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | -0,04 (q25)  | -0,04 (q25)              | 0,000        | 4,177(L)    | Z' S4-S5                |
| q                                                                                    | -0,15 (q26)  | -0,15 (q26)              | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | -0,45 (q27)  | -0,45 (q27)              | 1,464        | 2,719(L)    | Z' S6                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 1,464        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                    | <b>X</b>     | <b>0,46 kN Z: -2,35</b>  | <b>kN</b>    |             |                         |
| <b>B.G.13: Windbelasting van Rechts + Overdruk (Zadeldak FGH 2e Cpe + IJ 1e Cpe)</b> |              |                          |              |             |                         |
| q                                                                                    | -0,14 (q23)  | -0,14 (q23)              | 0,000        | 1,697(L)    | Z' S2                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                    | -0,14 (q23)  | -0,14 (q23)              | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 2,611       | Z' S3                   |
| q                                                                                    | -0,19 (q24)  | -0,19 (q24)              | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 2,611        | 4,177(L)    | Z' S3                   |
| q                                                                                    | 0,28 (q31)   | 0,28 (q31)               | 0,000        | 4,177(L)    | Z' S4-S5                |
| q                                                                                    | 0,12 (q32)   | 0,12 (q32)               | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 0,000        | 1,464       | Z' S6                   |
| q                                                                                    | 0,14 (q33)   | 0,14 (q33)               | 1,464        | 2,719(L)    | Z' S6                   |
| q                                                                                    | -0,12 (-q22) | -0,12 (-q22)             | 1,464        | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                    | <b>X</b>     | <b>-1,66 kN Z: -0,54</b> | <b>kN</b>    |             |                         |
| <b>B.G.14: Windbelasting van Rechts + Onderdruk</b>                                  |              |                          |              |             |                         |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

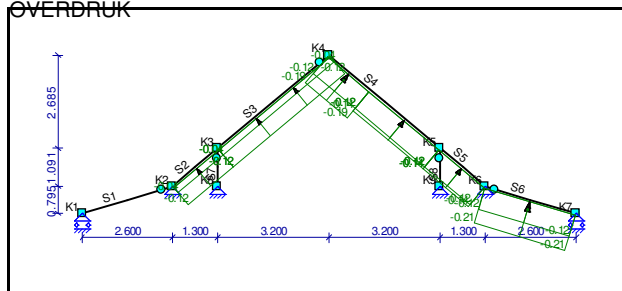
| Type                                                                                  | Beginwaarde | Eindwaarde   | Beginafstand      | Eindafstand | Richting Staaf of knoop |
|---------------------------------------------------------------------------------------|-------------|--------------|-------------------|-------------|-------------------------|
| <b>B.G.14: Windbelasting van Rechts + Onderdruk</b>                                   |             |              |                   |             |                         |
| q                                                                                     | -0,14 (q35) | -0,14 (q35)  | 0,000             | 1,697(L)    | Z' S2                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                     | -0,14 (q35) | -0,14 (q35)  | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | -0,19 (q36) | -0,19 (q36)  | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | -0,04 (q37) | -0,04 (q37)  | 0,000             | 4,177(L)    | Z' S4-S5                |
| q                                                                                     | -0,15 (q38) | -0,15 (q38)  | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | -0,45 (q39) | -0,45 (q39)  | 1,464             | 2,719(L)    | Z' S6                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 1,464             | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                     | <b>X</b>    | <b>-0,37</b> | <b>kN Z: 0,56</b> | <b>kN</b>   |                         |
| :                                                                                     |             |              |                   |             |                         |
| <b>B.G.15: Windbelasting van Rechts + Onderdruk (2e Cpe)</b>                          |             |              |                   |             |                         |
| q                                                                                     | 0,00 (q41)  | 0,00 (q41)   | 0,000             | 1,697(L)    | Z' S2                   |
| q                                                                                     | 0,19 (-q40) | 0,19 (-q40)  | 0,000             | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                     | 0,00 (q41)  | 0,00 (q41)   | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | 0,19 (-q40) | 0,19 (-q40)  | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | 0,00 (q42)  | 0,00 (q42)   | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | 0,19 (-q40) | 0,19 (-q40)  | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | 0,28 (q43)  | 0,28 (q43)   | 0,000             | 4,177(L)    | Z' S4-S5                |
| q                                                                                     | 0,12 (q44)  | 0,12 (q44)   | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | 0,19 (-q40) | 0,19 (-q40)  | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | 0,14 (q45)  | 0,14 (q45)   | 1,464             | 2,719(L)    | Z' S6                   |
| q                                                                                     | 0,19 (-q40) | 0,19 (-q40)  | 1,464             | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                     | <b>X</b>    | <b>-1,32</b> | <b>kN Z: 3,77</b> | <b>kN</b>   |                         |
| :                                                                                     |             |              |                   |             |                         |
| <b>B.G.16: Windbelasting van Rechts + Onderdruk (Zadeldak FGH 1e Cpe + IJ 2e Cpe)</b> |             |              |                   |             |                         |
| q                                                                                     | 0,00 (q41)  | 0,00 (q41)   | 0,000             | 1,697(L)    | Z' S2                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                     | 0,00 (q41)  | 0,00 (q41)   | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | 0,00 (q42)  | 0,00 (q42)   | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | -0,04 (q37) | -0,04 (q37)  | 0,000             | 4,177(L)    | Z' S4-S5                |
| q                                                                                     | -0,15 (q38) | -0,15 (q38)  | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | -0,45 (q39) | -0,45 (q39)  | 1,464             | 2,719(L)    | Z' S6                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 1,464             | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                     | <b>X</b>    | <b>0,21</b>  | <b>kN Z: 1,26</b> | <b>kN</b>   |                         |
| :                                                                                     |             |              |                   |             |                         |
| <b>B.G.17: Windbelasting van Rechts + Onderdruk (Zadeldak FGH 2e Cpe + IJ 1e Cpe)</b> |             |              |                   |             |                         |
| q                                                                                     | -0,14 (q35) | -0,14 (q35)  | 0,000             | 1,697(L)    | Z' S2                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 1,697(L)    | Z' S2,S4-S5             |
| q                                                                                     | -0,14 (q35) | -0,14 (q35)  | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 2,611       | Z' S3                   |
| q                                                                                     | -0,19 (q36) | -0,19 (q36)  | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 2,611             | 4,177(L)    | Z' S3                   |
| q                                                                                     | 0,28 (q43)  | 0,28 (q43)   | 0,000             | 4,177(L)    | Z' S4-S5                |
| q                                                                                     | 0,12 (q44)  | 0,12 (q44)   | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 0,000             | 1,464       | Z' S6                   |
| q                                                                                     | 0,14 (q45)  | 0,14 (q45)   | 1,464             | 2,719(L)    | Z' S6                   |
| q                                                                                     | 0,19 (-q34) | 0,19 (-q34)  | 1,464             | 2,719(L)    | Z' S6                   |
| <b>Som lasten</b>                                                                     | <b>X</b>    | <b>-1,90</b> | <b>kN Z: 3,08</b> | <b>kN</b>   |                         |
| :                                                                                     |             |              |                   |             |                         |
| <b>B.G.18: Windbelasting (enkele luifel) [1/4]</b>                                    |             |              |                   |             |                         |
| F                                                                                     | 1,07 (F1)   |              | 0,680             |             | Z' S1                   |
| <b>Som lasten</b>                                                                     | <b>X</b>    | <b>0,31</b>  | <b>kN Z: 1,02</b> | <b>kN</b>   |                         |
| :                                                                                     |             |              |                   |             |                         |
| <b>B.G.19: Windbelasting (enkele luifel) [2/4]</b>                                    |             |              |                   |             |                         |
| F                                                                                     | 1,07 (F1)   |              | 2,040             |             | Z' S1                   |

| Type                                        | Beginwaarde | Eindwaarde        | Beginafstand | Eindafstand | Richting Staaf of knoop |
|---------------------------------------------|-------------|-------------------|--------------|-------------|-------------------------|
| Som lasten                                  | X           | 0,31 kN Z: 1,02   | kN           |             |                         |
| :                                           |             |                   |              |             |                         |
| B.G.20: Windbelasting (enkele luifel) [3/4] |             |                   |              |             |                         |
| F                                           | -1,70 (F2)  |                   | 0,680        |             | Z' S1                   |
| Som lasten                                  | X           | -0,50 kN Z: -1,62 | kN           |             |                         |
| :                                           |             |                   |              |             |                         |
| B.G.21: Windbelasting (enkele luifel) [4/4] |             |                   |              |             |                         |
| F                                           | -1,70 (F2)  |                   | 2,040        |             | Z' S1                   |
| Som lasten                                  | X           | -0,50 kN Z: -1,62 | kN           |             |                         |
| :                                           |             |                   |              |             |                         |
| B.G.22: Sneeuwbelasting 1                   |             |                   |              |             |                         |
| q                                           | 0,56 (q46)  | 0,56 (q46)        | 0,000        | 2,600(L)    | Z S1,S6                 |
| q                                           | 0,37 (q48)  | 0,37 (q48)        | 0,000        | 1,300(L)    | Z S2-S5                 |
| Som lasten                                  | X           | 0,00 kN Z: 6,27   | kN           |             |                         |
| :                                           |             |                   |              |             |                         |
| B.G.23: Sneeuwbelasting 2                   |             |                   |              |             |                         |
| q                                           | 0,28 (q47)  | 0,28 (q47)        | 0,000        | 2,600(L)    | Z S1                    |
| q                                           | 0,19 (q49)  | 0,19 (q49)        | 0,000        | 1,300(L)    | Z S2-S3                 |
| q                                           | 0,37 (q48)  | 0,37 (q48)        | 0,000        | 3,200(L)    | Z S4-S5                 |
| q                                           | 0,56 (q46)  | 0,56 (q46)        | 0,000        | 2,600(L)    | Z S6                    |
| Som lasten                                  | X           | 0,00 kN Z: 4,70   | kN           |             |                         |
| :                                           |             |                   |              |             |                         |
| B.G.24: Sneeuwbelasting 3                   |             |                   |              |             |                         |
| q                                           | 0,56 (q46)  | 0,56 (q46)        | 0,000        | 2,600(L)    | Z S1                    |
| q                                           | 0,37 (q48)  | 0,37 (q48)        | 0,000        | 1,300(L)    | Z S2-S3                 |
| q                                           | 0,19 (q49)  | 0,19 (q49)        | 0,000        | 3,200(L)    | Z S4-S5                 |
| q                                           | 0,28 (q47)  | 0,28 (q47)        | 0,000        | 2,600(L)    | Z S6                    |
| Som lasten                                  | X           | 0,00 kN Z: 4,70   | kN           |             |                         |
| :                                           |             |                   |              |             |                         |
| -                                           | -           | -                 | m            | m           | - -                     |

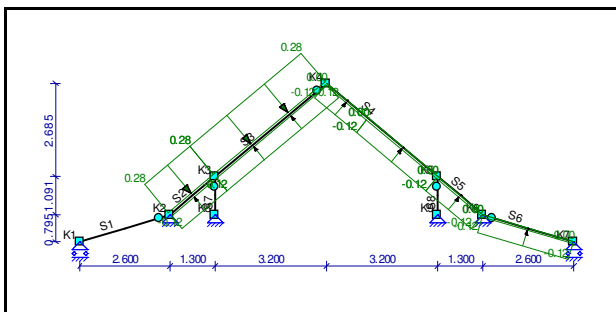
AFB. LASTEN B.G.1 PERMANENTE BELASTING



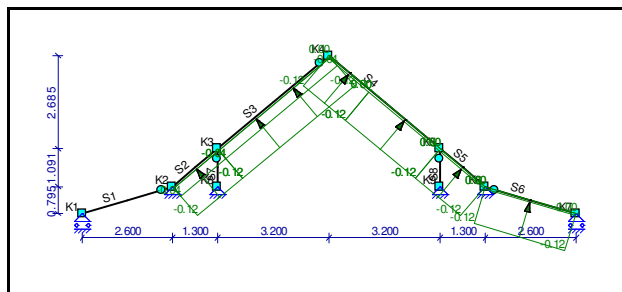
AFB. LASTEN B.G.2 WINDBELASTING VAN LINKS + OVERDRUK

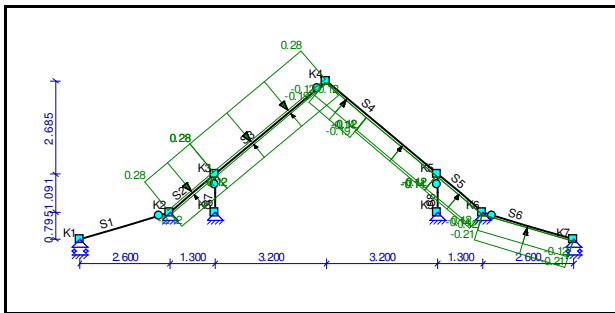
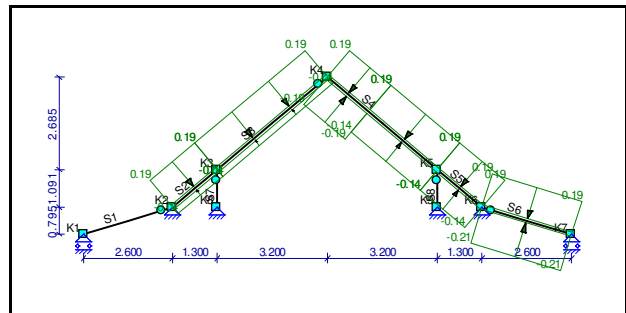
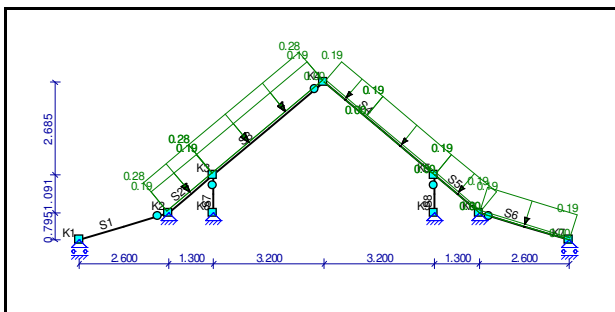
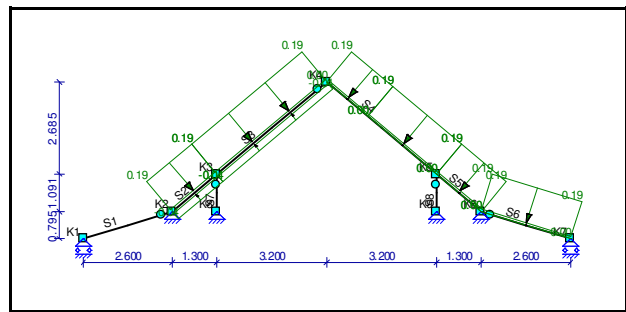
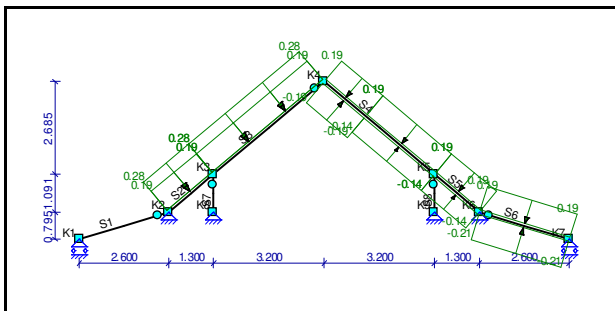
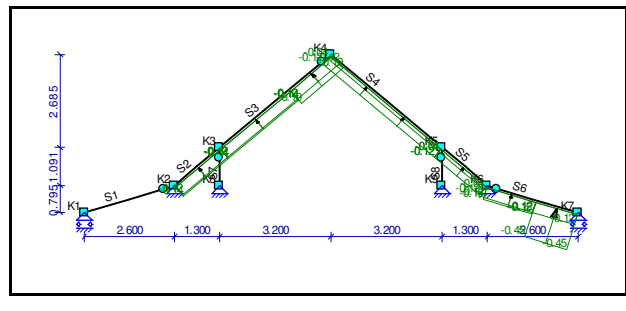
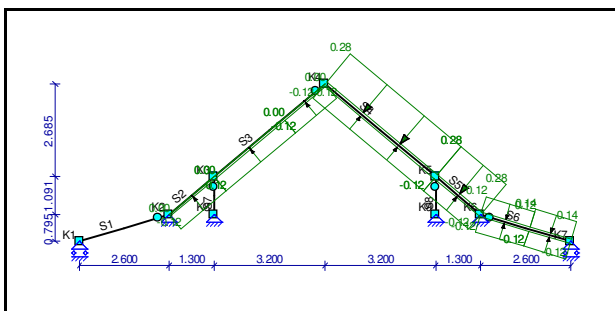
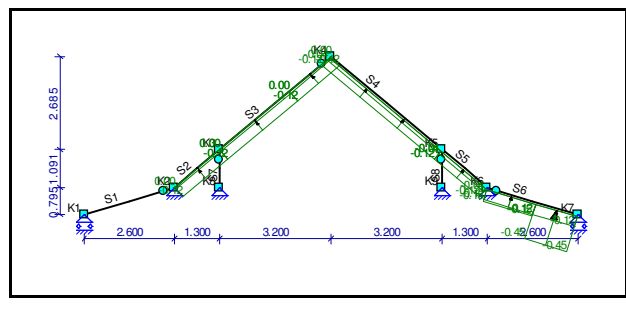


AFB. LASTEN B.G.3 WINDBELASTING VAN LINKS + OVERDRUK (2E CPE)

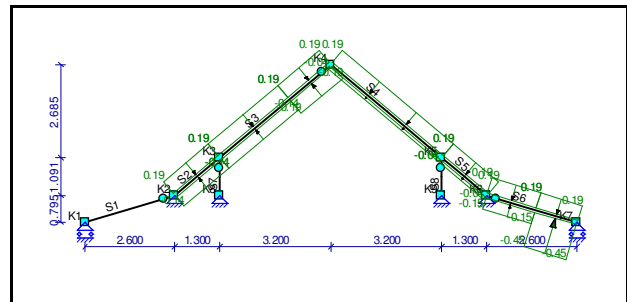
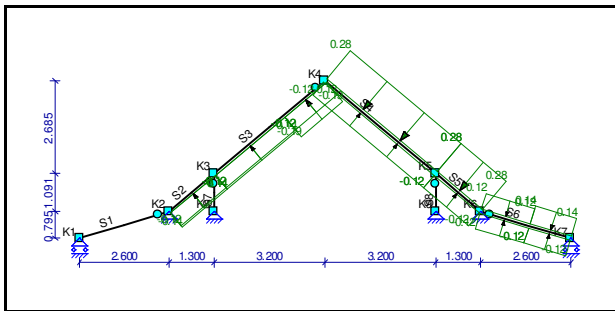


AFB. LASTEN B.G.4 WINDBELASTING VAN LINKS + OVERDRUK (ZADELDAK FGH 1E CPE + IJ 2E CPE)

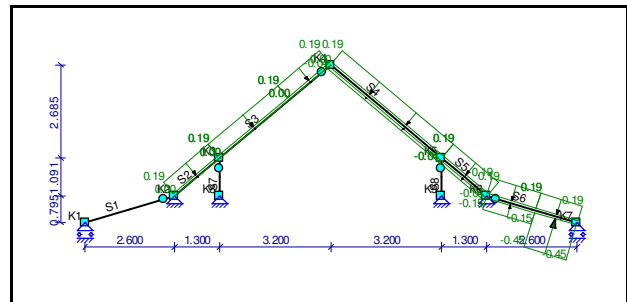
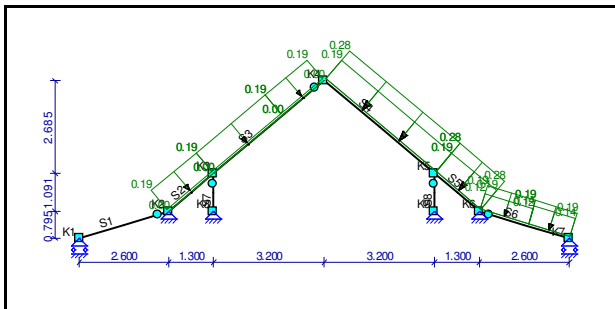


AFB. LASTEN B.G.5 WINDBELASTING VAN LINKS +  
OVERDRUK (ZADELDAK FGH 2E CPE + IJ 1E CPE)AFB. LASTEN B.G.6 WINDBELASTING VAN LINKS +  
ONDERDRUKAFB. LASTEN B.G.7 WINDBELASTING VAN LINKS +  
ONDERDRUK (2E CPE)AFB. LASTEN B.G.8 WINDBELASTING VAN LINKS +  
ONDERDRUK (ZADELDAK FGH 1E CPE + IJ 2E CPE)AFB. LASTEN B.G.9 WINDBELASTING VAN LINKS +  
ONDERDRUK (ZADELDAK FGH 2E CPE + IJ 1E CPE)AFB. LASTEN B.G.10 WINDBELASTING VAN RECHTS +  
OVERDRUKAFB. LASTEN B.G.11 WINDBELASTING VAN RECHTS +  
OVERDRUK (2E CPE)AFB. LASTEN B.G.12 WINDBELASTING VAN RECHTS +  
OVERDRUK (ZADELDAK FGH 1E CPE + IJ 2E CPE)

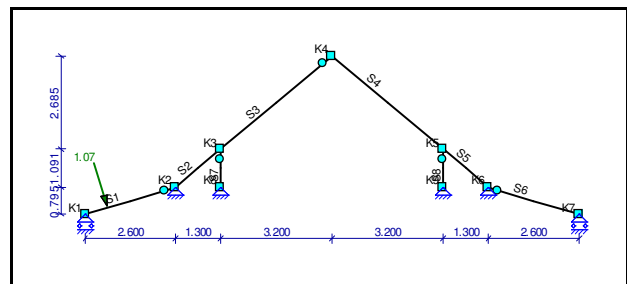
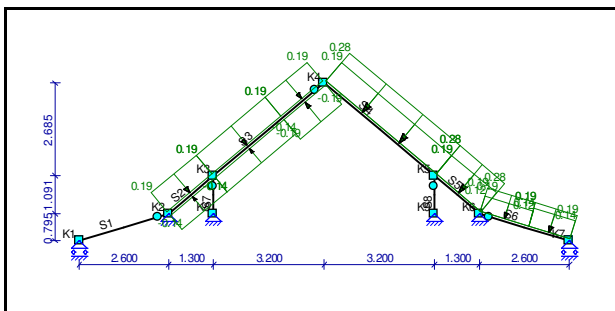
AFB. LASTEN B.G.14 WINDBELASTING VAN RECHTS + ONDERDRUK



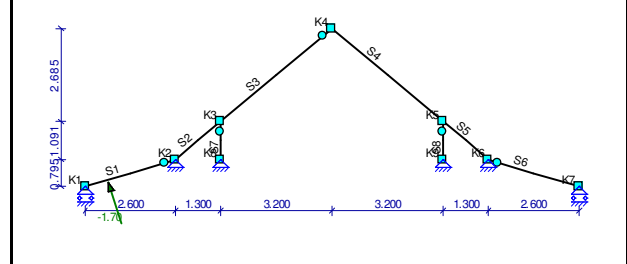
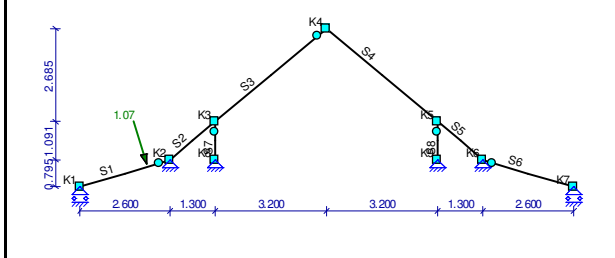
AFB. LASTEN B.G.16 WINDBELASTING VAN RECHTS +  
ONDERDRUK (ZADELDAK FGH 1E CPE + IJ 2E CPE)



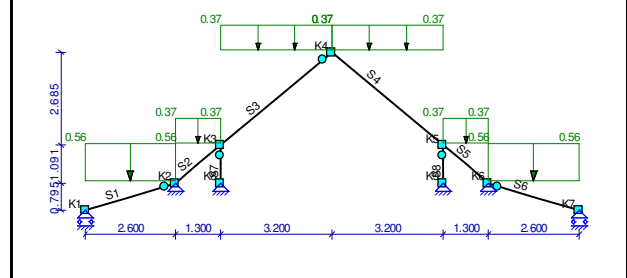
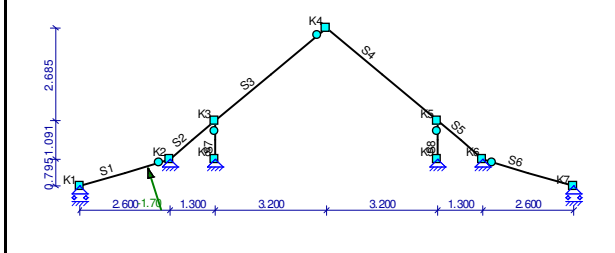
AFB. LASTEN B.G.18 WINDBELASTING (ENKELE LUIFEL)  
[1/4]



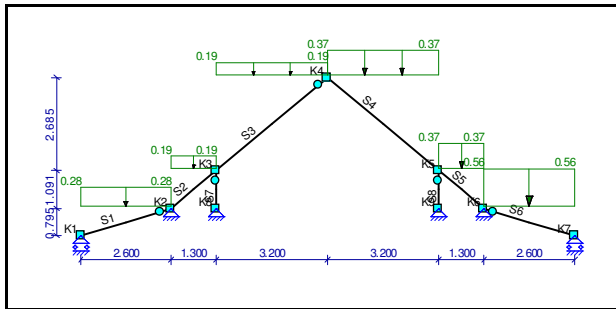
AFB. LASTEN B.G.20 WINDBELASTING (ENKELE LUIFEL)



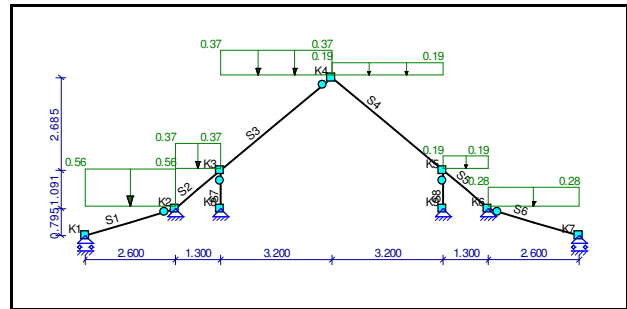
AFB. LASTEN B.G.22 SNEEUWBELASTING 1



AFB. LASTEN B.G.23 SNEEUWBELASTING 2



AFB. LASTEN B.G.24 SNEEUWBELASTING 3

**B.G. OPLEGREACTIES**

| B.C.  | Oplegging           | Knoop | X            | Z             | My   |
|-------|---------------------|-------|--------------|---------------|------|
| B.G.1 | O1                  | K2    | 1.59         | -2.31         | 0.00 |
|       | O2                  | K6    | -1.59        | -2.31         | 0.00 |
|       | O3                  | K8    | 0.00         | -3.38         | 0.00 |
|       | O4                  | K9    | 0.00         | -3.38         | 0.00 |
|       | O5                  | K1    | 0.00         | -1.07         | 0.00 |
|       | O6                  | K7    | 0.00         | -1.07         | 0.00 |
|       | <b>Som Reacties</b> |       | <b>0.00</b>  | <b>-13,50</b> |      |
| B.G.2 | <b>Som Lasten</b>   |       | <b>0.00</b>  | <b>13,50</b>  |      |
|       | O1                  | K2    | -0.01        | -0.01         | 0.00 |
|       | O2                  | K6    | -0.71        | -0.03         | 0.00 |
|       | O3                  | K8    | 0.00         | 0.89          | 0.00 |
|       | O4                  | K9    | 0.00         | 1.53          | 0.00 |
|       | O5                  | K1    | 0.00         | 0.00          | 0.00 |
|       | O6                  | K7    | 0.00         | 0.48          | 0.00 |
| B.G.3 | <b>Som Reacties</b> |       | <b>-0.72</b> | <b>2,85</b>   |      |
|       | <b>Som Lasten</b>   |       | <b>0.72</b>  | <b>-2,85</b>  |      |
|       | O1                  | K2    | -0.55        | 0.48          | 0.00 |
|       | O2                  | K6    | -0.61        | -0.30         | 0.00 |
|       | O3                  | K8    | 0.00         | -0.88         | 0.00 |
|       | O4                  | K9    | 0.00         | 0.69          | 0.00 |
|       | O5                  | K1    | 0.00         | 0.00          | 0.00 |
| B.G.4 | O6                  | K7    | 0.00         | 0.18          | 0.00 |
|       | <b>Som Reacties</b> |       | <b>-1.16</b> | <b>0,17</b>   |      |
|       | <b>Som Lasten</b>   |       | <b>1.16</b>  | <b>-0,17</b>  |      |
|       | O1                  | K2    | 0.23         | -0.21         | 0.00 |
|       | O2                  | K6    | -0.19        | 0.05          | 0.00 |
|       | O3                  | K8    | 0.00         | 0.89          | 0.00 |
|       | O4                  | K9    | 0.00         | 0.70          | 0.00 |
| B.G.5 | O5                  | K1    | 0.00         | 0.00          | 0.00 |
|       | O6                  | K7    | 0.00         | 0.18          | 0.00 |
|       | <b>Som Reacties</b> |       | <b>0.03</b>  | <b>1,60</b>   |      |
|       | <b>Som Lasten</b>   |       | <b>-0.03</b> | <b>-1,60</b>  |      |
|       | O1                  | K2    | -0.79        | 0.68          | 0.00 |
|       | O2                  | K6    | -1.13        | -0.38         | 0.00 |
|       | O3                  | K8    | 0.00         | -0.88         | 0.00 |
| B.G.6 | O4                  | K9    | 0.00         | 1.52          | 0.00 |
|       | O5                  | K1    | 0.00         | 0.00          | 0.00 |
|       | O6                  | K7    | 0.00         | 0.48          | 0.00 |
|       | <b>Som Reacties</b> |       | <b>-1.92</b> | <b>1,42</b>   |      |
|       | <b>Som Lasten</b>   |       | <b>1.92</b>  | <b>-1,42</b>  |      |
|       | O1                  | K2    | -0.36        | 0.32          | 0.00 |
|       | O2                  | K6    | -0.11        | -0.06         | 0.00 |
| B.G.7 | O3                  | K8    | 0.00         | -0.84         | 0.00 |
|       | O4                  | K9    | 0.00         | -0.21         | 0.00 |
|       | O5                  | K1    | 0.00         | 0.00          | 0.00 |
|       | O6                  | K7    | 0.00         | 0.04          | 0.00 |
|       | <b>Som Reacties</b> |       | <b>-0.47</b> | <b>-0,76</b>  |      |
|       | <b>Som Lasten</b>   |       | <b>0.47</b>  | <b>0,76</b>   |      |
|       | O1                  | K2    | -0.90        | 0.82          | 0.00 |
| B.G.7 | O2                  | K6    | -0.01        | -0.33         | 0.00 |
|       | O3                  | K8    | 0.00         | -2.62         | 0.00 |
|       | O4                  | K9    | 0.00         | -1.04         | 0.00 |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

| B.C.                | Oplegging           | Knoop | X            | Z            | My   |
|---------------------|---------------------|-------|--------------|--------------|------|
| B.G.7               | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | -0.27        | 0.00 |
| B.G.8               | <b>Som Reacties</b> |       | <b>-0.92</b> | <b>-3,44</b> |      |
|                     | <b>Som Lasten</b>   |       | <b>0.92</b>  | <b>3.44</b>  |      |
|                     | O1                  | K2    | -0.12        | 0.12         | 0.00 |
|                     | O2                  | K6    | 0.41         | 0.02         | 0.00 |
|                     | O3                  | K8    | 0.00         | -0.85        | 0.00 |
|                     | O4                  | K9    | 0.00         | -1.04        | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | -0.27        | 0.00 |
| B.G.9               | <b>Som Reacties</b> |       | <b>0.28</b>  | <b>-2,01</b> |      |
|                     | <b>Som Lasten</b>   |       | <b>-0.28</b> | <b>2.01</b>  |      |
|                     | O1                  | K2    | -1.14        | 1.02         | 0.00 |
|                     | O2                  | K6    | -0.53        | -0.41        | 0.00 |
|                     | O3                  | K8    | 0.00         | -2.62        | 0.00 |
|                     | O4                  | K9    | 0.00         | -0.21        | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | 0.04         | 0.00 |
| B.G.10              | <b>Som Reacties</b> |       | <b>-1.67</b> | <b>-2,19</b> |      |
|                     | <b>Som Lasten</b>   |       | <b>1.67</b>  | <b>2.19</b>  |      |
|                     | O1                  | K2    | 0.44         | -0.42        | 0.00 |
|                     | O2                  | K6    | -0.32        | 0.37         | 0.00 |
|                     | O3                  | K8    | 0.00         | 1.53         | 0.00 |
|                     | O4                  | K9    | 0.00         | 0.89         | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | 0.69         | 0.00 |
| B.G.11              | <b>Som Reacties</b> |       | <b>0.12</b>  | <b>3,05</b>  |      |
|                     | <b>Som Lasten</b>   |       | <b>-0.12</b> | <b>-3.05</b> |      |
|                     | O1                  | K2    | 0.51         | -0.45        | 0.00 |
|                     | O2                  | K6    | 0.56         | 0.48         | 0.00 |
|                     | O3                  | K8    | 0.00         | 0.69         | 0.00 |
|                     | O4                  | K9    | 0.00         | -0.88        | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | -0.01        | 0.00 |
| B.G.12              | <b>Som Reacties</b> |       | <b>1.07</b>  | <b>-0,16</b> |      |
|                     | <b>Som Lasten</b>   |       | <b>-1.07</b> | <b>0.16</b>  |      |
|                     | O1                  | K2    | 0.09         | -0.10        | 0.00 |
|                     | O2                  | K6    | -0.56        | 0.17         | 0.00 |
|                     | O3                  | K8    | 0.00         | 0.70         | 0.00 |
|                     | O4                  | K9    | 0.00         | 0.89         | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | 0.69         | 0.00 |
| B.G.13              | <b>Som Reacties</b> |       | <b>-0.46</b> | <b>2,35</b>  |      |
|                     | <b>Som Lasten</b>   |       | <b>0.46</b>  | <b>-2.35</b> |      |
|                     | O1                  | K2    | 0.87         | -0.78        | 0.00 |
|                     | O2                  | K6    | 0.79         | 0.68         | 0.00 |
|                     | O3                  | K8    | 0.00         | 1.52         | 0.00 |
|                     | O4                  | K9    | 0.00         | -0.88        | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | -0.01        | 0.00 |
| B.G.14              | <b>Som Reacties</b> |       | <b>1.66</b>  | <b>0,54</b>  |      |
|                     | <b>Som Lasten</b>   |       | <b>-1.66</b> | <b>-0.54</b> |      |
|                     | O1                  | K2    | 0.09         | -0.09        | 0.00 |
|                     | O2                  | K6    | 0.28         | 0.34         | 0.00 |
|                     | O3                  | K8    | 0.00         | -0.21        | 0.00 |
|                     | O4                  | K9    | 0.00         | -0.84        | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | 0.25         | 0.00 |
| B.G.15              | <b>Som Reacties</b> |       | <b>0.37</b>  | <b>-0,56</b> |      |
|                     | <b>Som Lasten</b>   |       | <b>-0.37</b> | <b>0.56</b>  |      |
|                     | O1                  | K2    | 0.16         | -0.11        | 0.00 |
|                     | O2                  | K6    | 1.15         | 0.45         | 0.00 |
|                     | O3                  | K8    | 0.00         | -1.04        | 0.00 |
|                     | O4                  | K9    | 0.00         | -2.62        | 0.00 |
|                     | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|                     | O6                  | K7    | 0.00         | -0.46        | 0.00 |
| <b>Som Reacties</b> |                     |       | <b>1.32</b>  | <b>-3,77</b> |      |
| <b>Som Lasten</b>   |                     |       | <b>-1.32</b> | <b>3.77</b>  |      |

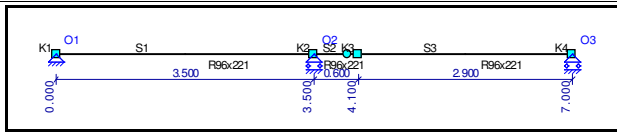
|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

| B.C.   | Oplegging           | Knoop | X            | Z            | My   |
|--------|---------------------|-------|--------------|--------------|------|
| B.G.16 | O1                  | K2    | -0.26        | 0.24         | 0.00 |
|        | O2                  | K6    | 0.04         | 0.14         | 0.00 |
|        | O3                  | K8    | 0.00         | -1.04        | 0.00 |
|        | O4                  | K9    | 0.00         | -0.85        | 0.00 |
|        | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|        | O6                  | K7    | 0.00         | 0.25         | 0.00 |
| B.G.17 | <b>Som Reacties</b> |       | <b>-0.21</b> | <b>-1,26</b> |      |
|        | <b>Som Lasten</b>   |       | <b>0.21</b>  | <b>1.26</b>  |      |
|        | O1                  | K2    | 0.51         | -0.44        | 0.00 |
|        | O2                  | K6    | 1.39         | 0.65         | 0.00 |
|        | O3                  | K8    | 0.00         | -0.21        | 0.00 |
|        | O4                  | K9    | 0.00         | -2.62        | 0.00 |
|        | O5                  | K1    | 0.00         | 0.00         | 0.00 |
|        | O6                  | K7    | 0.00         | -0.46        | 0.00 |
| B.G.18 | <b>Som Reacties</b> |       | <b>1.90</b>  | <b>-3,08</b> |      |
|        | <b>Som Lasten</b>   |       | <b>-1.90</b> | <b>3.08</b>  |      |
|        | O1                  | K2    | -0.31        | -0.18        | 0.00 |
|        | O2                  | K6    | 0.00         | 0.00         | 0.00 |
|        | O3                  | K8    | 0.00         | 0.00         | 0.00 |
|        | O4                  | K9    | 0.00         | 0.00         | 0.00 |
|        | O5                  | K1    | 0.00         | -0.84        | 0.00 |
|        | O6                  | K7    | 0.00         | 0.00         | 0.00 |
| B.G.19 | <b>Som Reacties</b> |       | <b>-0.31</b> | <b>-1,02</b> |      |
|        | <b>Som Lasten</b>   |       | <b>0.31</b>  | <b>1.02</b>  |      |
|        | O1                  | K2    | -0.31        | -0.74        | 0.00 |
|        | O2                  | K6    | 0.00         | 0.00         | 0.00 |
|        | O3                  | K8    | 0.00         | 0.00         | 0.00 |
|        | O4                  | K9    | 0.00         | 0.00         | 0.00 |
|        | O5                  | K1    | 0.00         | -0.28        | 0.00 |
|        | O6                  | K7    | 0.00         | 0.00         | 0.00 |
| B.G.20 | <b>Som Reacties</b> |       | <b>-0.31</b> | <b>-1,02</b> |      |
|        | <b>Som Lasten</b>   |       | <b>0.31</b>  | <b>1.02</b>  |      |
|        | O1                  | K2    | 0.50         | 0.29         | 0.00 |
|        | O2                  | K6    | 0.00         | 0.00         | 0.00 |
|        | O3                  | K8    | 0.00         | 0.00         | 0.00 |
|        | O4                  | K9    | 0.00         | 0.00         | 0.00 |
|        | O5                  | K1    | 0.00         | 1.33         | 0.00 |
|        | O6                  | K7    | 0.00         | 0.00         | 0.00 |
| B.G.21 | <b>Som Reacties</b> |       | <b>0.50</b>  | <b>1,62</b>  |      |
|        | <b>Som Lasten</b>   |       | <b>-0.50</b> | <b>-1.62</b> |      |
|        | O1                  | K2    | 0.50         | 1.18         | 0.00 |
|        | O2                  | K6    | 0.00         | 0.00         | 0.00 |
|        | O3                  | K8    | 0.00         | 0.00         | 0.00 |
|        | O4                  | K9    | 0.00         | 0.00         | 0.00 |
|        | O5                  | K1    | 0.00         | 0.44         | 0.00 |
|        | O6                  | K7    | 0.00         | 0.00         | 0.00 |
| B.G.22 | <b>Som Reacties</b> |       | <b>0.50</b>  | <b>1,62</b>  |      |
|        | <b>Som Lasten</b>   |       | <b>-0.50</b> | <b>-1.62</b> |      |
|        | O1                  | K2    | 0.58         | -1.18        | 0.00 |
|        | O2                  | K6    | -0.58        | -1.18        | 0.00 |
|        | O3                  | K8    | 0.00         | -1.23        | 0.00 |
|        | O4                  | K9    | 0.00         | -1.23        | 0.00 |
|        | O5                  | K1    | 0.00         | -0.73        | 0.00 |
|        | O6                  | K7    | 0.00         | -0.73        | 0.00 |
| B.G.23 | <b>Som Reacties</b> |       | <b>0.00</b>  | <b>-6,27</b> |      |
|        | <b>Som Lasten</b>   |       | <b>0.00</b>  | <b>6.27</b>  |      |
|        | O1                  | K2    | 0.43         | -0.71        | 0.00 |
|        | O2                  | K6    | -0.43        | -1.06        | 0.00 |
|        | O3                  | K8    | 0.00         | -0.62        | 0.00 |
|        | O4                  | K9    | 0.00         | -1.23        | 0.00 |
|        | O5                  | K1    | 0.00         | -0.36        | 0.00 |
|        | O6                  | K7    | 0.00         | -0.73        | 0.00 |
| B.G.24 | <b>Som Reacties</b> |       | <b>0.00</b>  | <b>-4,70</b> |      |
|        | <b>Som Lasten</b>   |       | <b>0.00</b>  | <b>4.70</b>  |      |
|        | O1                  | K2    | 0.43         | -1.06        | 0.00 |
|        | O2                  | K6    | -0.43        | -0.71        | 0.00 |
|        | O3                  | K8    | 0.00         | -1.23        | 0.00 |
|        | O4                  | K9    | 0.00         | -0.62        | 0.00 |

| Constructieadviesbureau |                     | ing. F. Wiggers | Varsseveld  |              |            |
|-------------------------|---------------------|-----------------|-------------|--------------|------------|
| B.C.                    | Oplegging           | Knoop           | X           | Z            | My         |
| B.G.24                  | O5                  | K1              | 0.00        | -0.73        | 0.00       |
|                         | O6                  | K7              | 0.00        | -0.36        | 0.00       |
|                         | <b>Som Reacties</b> |                 | <b>0.00</b> | <b>-4,70</b> |            |
|                         | <b>Som Lasten</b>   |                 | <b>0.00</b> | <b>4.70</b>  |            |
| -                       | -                   | -               | <b>kN</b>   | <b>kN</b>    | <b>kNm</b> |

| Constructieadviesbureau |                                                                   | ing. F. Wiggers |               | Varsseveld         |  |
|-------------------------|-------------------------------------------------------------------|-----------------|---------------|--------------------|--|
| Pos. 2                  |                                                                   |                 |               |                    |  |
| Projectnaam             |                                                                   |                 | Projectnummer | 21734IK            |  |
| Omschrijving            | A                                                                 |                 | Constructeur  | ing. J.E. Veldhuis |  |
| Opdrachtgever           |                                                                   |                 | Eenheden      | m, kN, kNm         |  |
| Bestand                 | N:\21600\21734-IK\Constructie\Berekeningen\Onderdeel A\Pos. 2.mxf |                 |               |                    |  |

#### AFB. GEOMETRIE 1



#### STAVEN

| Staaf | Knoop |     | Scharnier | Knoop | Profiel | X-B   | Z-B   | X-E   | Z-E   | Lengte |
|-------|-------|-----|-----------|-------|---------|-------|-------|-------|-------|--------|
|       | B     | B   | E         | E     |         |       |       |       |       |        |
| S1    | K1    | NVM | NVM       | K2    | P1      | 0,000 | 0,000 | 3,500 | 0,000 | 3,500  |
| S2    | K2    | NVM | NV-       | K3    | P1      | 3,500 | 0,000 | 4,100 | 0,000 | 0,600  |
| S3    | K3    | NVM | NVM       | K4    | P1      | 4,100 | 0,000 | 7,000 | 0,000 | 2,900  |
| -     | -     | -   | -         | -     | -       | m     | m     | m     | m     | m      |

#### PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy Materiaal   | Hoek |
|---------|-------------|-------------|----------------|------|
| P1      | R96x221     | 2.1216e-02  | 8.6351e-05 C18 | 0    |
| -       | -           | m2          | m4 -           | °    |

#### PROFIELVORMEN

| Profiel | Verl. h. | hB    | hE    | tf    | tw    | tf2   | B     | bL    | bR Raatl. | Hoogte |
|---------|----------|-------|-------|-------|-------|-------|-------|-------|-----------|--------|
| P1      | Nee      | 0.221 | 0.221 | 0.000 | 0.000 | 0.000 | 0.096 | 0.000 | 0.000 Nee | 0.000  |
| -       | -        | m     | m     | m     | m     | m     | m     | m     | m -       | m      |

#### MATERIALEN

| Materiaal | Dichtheid | E-Modulus  | Uitzettingcoeff |
|-----------|-----------|------------|-----------------|
| C18       | 3.80      | 9.0000e+06 | 50.0000e-07     |
| -         | kN/m3     | kN/m2      | C°m             |

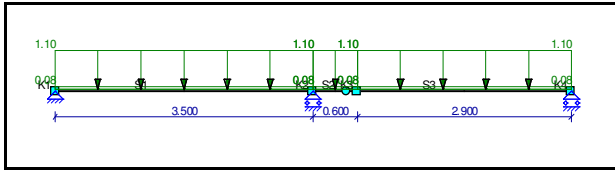
#### OPLEGGINGEN

| Oplegging | Knoop | X    | Z    | Yr     | HoekYr |
|-----------|-------|------|------|--------|--------|
| O1        | K1    | vast | vast | vrij   | 0      |
| O2        | K2    | vrij | vast | vrij   | 0      |
| O3        | K4    | vrij | vast | vrij   | 0      |
| -         | -     | kN/m | kN/m | kNmrad | °      |

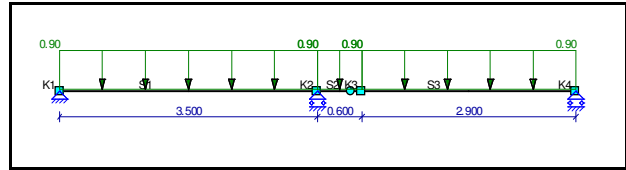
#### BELASTINGSGEVALLEN

| Type                          | Beginwaarde  | Eindwaarde   | Beginafstand | Eindafstand | Richting Staaf of knoop |
|-------------------------------|--------------|--------------|--------------|-------------|-------------------------|
| <b>B.G.1: Permanent</b>       |              |              |              |             |                         |
| qG                            | 0,08 (1.00x) | 0,08 (1.00x) | 0,000        | 3,500(L)    | Z" S1                   |
| qG                            | 0,08 (1.00x) | 0,08 (1.00x) | 0,000        | 0,600(L)    | Z" S2                   |
| qG                            | 0,08 (1.00x) | 0,08 (1.00x) | 0,000        | 2,900(L)    | Z" S3                   |
| q                             | 1,10         | 1,10         | 0,000        | 3,500(L)    | Z' S1-S3                |
| Som lasten                    | X            | 0,00 kN      | Z: 8,26      | kN          |                         |
| <b>B.G.2: Windbelasting</b>   |              |              |              |             |                         |
| q                             | 0,90         | 0,90         | 0,000        | 3,500(L)    | Z' S1-S3                |
| Som lasten                    | X            | 0,00 kN      | Z: 6,30      | kN          |                         |
| <b>B.G.3: Windbelasting</b>   |              |              |              |             |                         |
| q                             | -1,30        | -1,30        | 0,000        | 3,500(L)    | Z' S1-S3                |
| Som lasten                    | X            | 0,00 kN      | Z: -9,10     | kN          |                         |
| <b>B.G.4: Sneeuwbelasting</b> |              |              |              |             |                         |
| q                             | 0,80         | 0,80         | 0,000        | 3,500(L)    | Z' S1-S3                |
| Som lasten                    | X            | 0,00 kN      | Z: 5,60      | kN          |                         |
| -                             | -            | -            | m            | m           | - -                     |

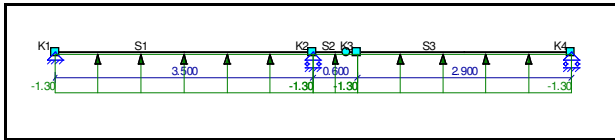
AFB. LASTEN B.G.1 PERMANENT



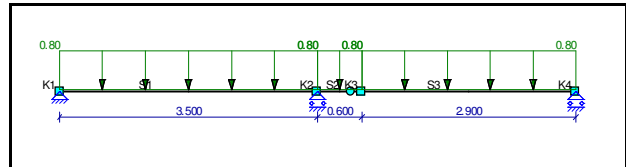
AFB. LASTEN B.G.2 WINDBELASTING



AFB. LASTEN B.G.3 WINDBELASTING



AFB. LASTEN B.G.4 SNEEUWBELASTING

**B.G. OPLEGREACTIES**

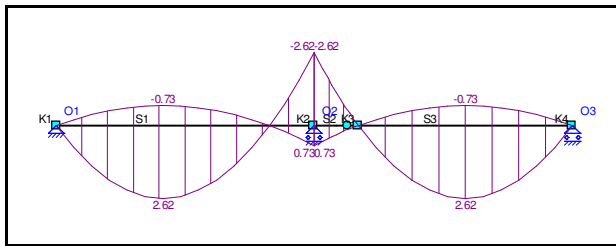
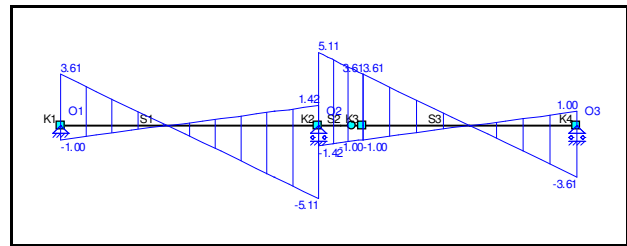
| B.C.  | Oplegging    | Knoop | X    | Z     | My   |
|-------|--------------|-------|------|-------|------|
| B.G.1 | O1           | K1    | 0.00 | -1.71 | 0.00 |
|       | O2           | K2    | 0.00 | -4.84 | 0.00 |
|       | O3           | K4    | 0.00 | -1.71 | 0.00 |
|       | Som Reacties |       | 0.00 | -8,26 |      |
| B.G.2 | Som Lasten   |       | 0.00 | 8.26  |      |
|       | O1           | K1    | 0.00 | -1.31 | 0.00 |
|       | O2           | K2    | 0.00 | -3.69 | 0.00 |
|       | O3           | K4    | 0.00 | -1.31 | 0.00 |
| B.G.3 | Som Reacties |       | 0.00 | -6,30 |      |
|       | Som Lasten   |       | 0.00 | 6.30  |      |
|       | O1           | K1    | 0.00 | 1.89  | 0.00 |
|       | O2           | K2    | 0.00 | 5.33  | 0.00 |
| B.G.4 | O3           | K4    | 0.00 | 1.89  | 0.00 |
|       | Som Reacties |       | 0.00 | 9,10  |      |
|       | Som Lasten   |       | 0.00 | -9,10 |      |
|       | O1           | K1    | 0.00 | -1.16 | 0.00 |
|       | O2           | K2    | 0.00 | -3.28 | 0.00 |
|       | O3           | K4    | 0.00 | -1.16 | 0.00 |
|       | Som Reacties |       | 0.00 | -5,60 |      |
|       | Som Lasten   |       | 0.00 | 5.60  |      |
| -     | -            | -     | kN   | kN    | kNm  |

**FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)**

| B.G.  | Omschrijving    | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|-------|-----------------|--------|--------|--------|--------|
| B.G.1 | Permanent       | 1.08   | 0.90   | 1.08   | 1.22   |
| B.G.2 | Windbelasting   | 1.35   | -      | -      | -      |
| B.G.3 | Windbelasting   | -      | 1.35   | -      | -      |
| B.G.4 | Sneeuwbelasting | -      | -      | 1.35   | -      |

**FU.C. EXTREME STAAFKRACHTEN**

| Staat | B.C.   | Mb    | Mmax  | xMmax | Me    | x-M0  | x-M0 T/D | Nmax | Vb    | Vmax  | Ve    |
|-------|--------|-------|-------|-------|-------|-------|----------|------|-------|-------|-------|
| S1    | Fu.C.1 | 0.00  | 2.62  | 1.450 | -2.62 | 2.900 | 0.000 -  | 0.00 | 3.61  | -5.11 | -5.11 |
|       | Fu.C.2 | 0.00  | -0.73 | 1.450 | 0.73  | 2.900 | 0.000 -  | 0.00 | -1.00 | 1.42  | 1.42  |
| S2    | Fu.C.1 | -2.62 | 0.00  | 0.000 | 0.00  | 0.000 | 0.000 -  | 0.00 | 5.11  | 5.11  | 3.61  |
|       | Fu.C.2 | 0.73  | 0.00  | 0.000 | 0.00  | 0.000 | 0.000 -  | 0.00 | -1.42 | -1.42 | -1.00 |
| S3    | Fu.C.1 | 0.00  | 2.62  | 1.450 | 0.00  | 0.000 | 0.000 -  | 0.00 | 3.61  | 3.61  | -3.61 |
|       | Fu.C.2 | 0.00  | -0.73 | 1.450 | 0.00  | 0.000 | 0.000 -  | 0.00 | -1.00 | -1.00 | 1.00  |
| -     | -      | kNm   | kNm   | m     | kNm   | m     | m -      | kN   | kN    | kN    | kN    |

AFB. FU.C. MOMENTEN (MY)  
OMHULLENDEFundamenteel  
BelastingscombinatiesAFB. FU.C. DWARSKRACHT (VZ)  
OMHULLENDEFundamenteel  
Belastingscombinaties**FU.C. EXTREME OPLEGREACTIES**

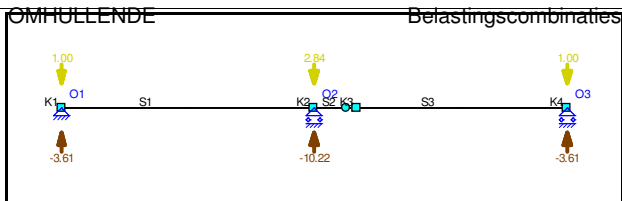
| Opleggin g | Knoop | B.C. | Xmax | Z | My B.C. | X    | Zmax   | My B.C. | X | Z Mymax |
|------------|-------|------|------|---|---------|------|--------|---------|---|---------|
| O1         | K1    |      |      |   | Fu.C.2  | 0.00 | 1.00   | 0.00    |   |         |
| O1         | K1    |      |      |   | Fu.C.1  | 0.00 | -3.61  | 0.00    |   |         |
| O2         | K2    |      |      |   | Fu.C.2  | 0.00 | 2.84   | 0.00    |   |         |
| O2         | K2    |      |      |   | Fu.C.1  | 0.00 | -10.22 | 0.00    |   |         |
| O3         | K4    |      |      |   | Fu.C.2  | 0.00 | 1.00   | 0.00    |   |         |
| O3         | K4    |      |      |   | Fu.C.1  | 0.00 | -3.61  | 0.00    |   |         |

**Globale extreme waarden**

|    |    |   |    |    |        |      |        |      |     |  |
|----|----|---|----|----|--------|------|--------|------|-----|--|
| O2 | K2 |   |    |    | Fu.C.2 | 0.00 | 2.84   | 0.00 |     |  |
| O2 | K2 |   |    |    | Fu.C.1 | 0.00 | -10.22 | 0.00 |     |  |
| -  | -  | - | kN | kN | kNm    | -    | kN     | kN   | kNm |  |

AFB. FU.C. OPLEGREACTIES

Fundamenteel

**KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)**

| B.G.  | Omschrijving    | Ka.C. (w1) | Ka.C.1 | Ka.C.2 | Ka.C.3 |
|-------|-----------------|------------|--------|--------|--------|
| B.G.1 | Permanent       | 1.00       | 1.00   | 1.00   | 1.00   |
| B.G.2 | Windbelasting   | -          | 1.00   | -      | -      |
| B.G.3 | Windbelasting   | -          | -      | 1.00   | -      |
| B.G.4 | Sneeuwbelasting | -          | -      | -      | 1.00   |

**KA.C. KNOOPVERPLAATSINGEN**

| Knoop | B.C.      | X      | Z       | Yr         |
|-------|-----------|--------|---------|------------|
| K1    | Ka.C.(w1) | 0.0000 | 0.0000  | -1.783e-03 |
|       | Ka.C.1    | 0.0000 | 0.0000  | -3.143e-03 |
|       | Ka.C.2    | 0.0000 | 0.0000  | 0.180e-03  |
|       | Ka.C.3    | 0.0000 | 0.0000  | -2.992e-03 |
| K2    | Ka.C.(w1) | 0.0000 | 0.0000  | 0.853e-03  |
|       | Ka.C.1    | 0.0000 | 0.0000  | 1.503e-03  |
|       | Ka.C.2    | 0.0000 | 0.0000  | -0.086e-03 |
|       | Ka.C.3    | 0.0000 | 0.0000  | 1.431e-03  |
| K3    | Ka.C.(w1) | 0.0000 | -0.0003 | -1.657e-03 |
|       | Ka.C.1    | 0.0000 | -0.0006 | -2.920e-03 |
|       | Ka.C.2    | 0.0000 | 0.0000  | 0.168e-03  |
|       | Ka.C.3    | 0.0000 | -0.0006 | -2.780e-03 |
| K4    | Ka.C.(w1) | 0.0000 | 0.0000  | 1.430e-03  |
|       | Ka.C.1    | 0.0000 | 0.0000  | 2.521e-03  |
|       | Ka.C.2    | 0.0000 | 0.0000  | -0.145e-03 |
|       | Ka.C.3    | 0.0000 | 0.0000  | 2.400e-03  |
| -     | -         | m      | m       | rad        |

**KA.C. DOORBUIGINGEN**

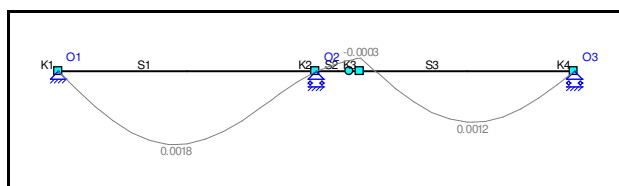
| Staat | B.C. | Knoop Begin X | Z | Z'afst | Staat Z' Z' glb dist | Z' glb | Knoop Eind X | Z |
|-------|------|---------------|---|--------|----------------------|--------|--------------|---|
|-------|------|---------------|---|--------|----------------------|--------|--------------|---|

| Staaf | B.C.      | Knoop Begin |        | Z'afst | Staaf   |             |         | Knoop Eind |        |
|-------|-----------|-------------|--------|--------|---------|-------------|---------|------------|--------|
|       |           | X           | Z      |        | Z'      | Z' glb dist | Z' glb  | X          | Z      |
| S1    | Ka.C.(w1) | 0,000       | 0,000  | 1,601  | 0,0018  | 1.601       | 0.0018  | 0,000      | 0,000  |
|       | Ka.C.1    | 0,000       | 0,000  | 1,601  | 0,0031  | 1.601       | 0.0031  | 0,000      | 0,000  |
|       | Ka.C.2    | 0,000       | 0,000  | 1,601  | -0,0002 | 1.601       | -0.0002 | 0,000      | 0,000  |
|       | Ka.C.3    | 0,000       | 0,000  | 1,601  | 0,0030  | 1.601       | 0.0030  | 0,000      | 0,000  |
| S2    | Ka.C.(w1) | 0,000       | 0,000  | 0,250  | 0,0000  | 0.600       | -0.0003 | 0,000      | 0,000  |
|       | Ka.C.1    | 0,000       | 0,000  | 0,250  | -0,0001 | 0.600       | -0.0006 | 0,000      | -0,001 |
|       | Ka.C.2    | 0,000       | 0,000  | 0,250  | 0,0000  | 0.600       | 0.0000  | 0,000      | 0,000  |
|       | Ka.C.3    | 0,000       | 0,000  | 0,250  | -0,0001 | 0.600       | -0.0006 | 0,000      | -0,001 |
| S3    | Ka.C.(w1) | 0,000       | 0,000  | 1,450  | 0,0014  | 1.521       | 0.0012  | 0,000      | 0,000  |
|       | Ka.C.1    | 0,000       | -0,001 | 1,450  | 0,0025  | 1.521       | 0.0022  | 0,000      | 0,000  |
|       | Ka.C.2    | 0,000       | 0,000  | 1,450  | -0,0001 | 1.521       | -0.0001 | 0,000      | 0,000  |
|       | Ka.C.3    | 0,000       | -0,001 | 1,450  | 0,0023  | 1.521       | 0.0021  | 0,000      | 0,000  |
| -     | -         | m           | m      | m      | m       | m           | m       | m          | m      |

GGT is berekend obv de E-mod. van de UGT

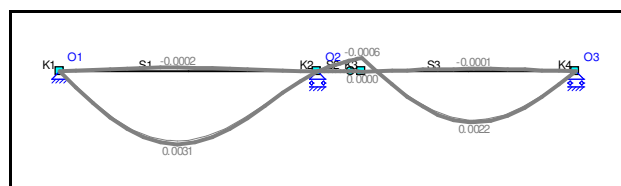
AFB. KA.C.(W1) VERPLAATSINGEN

Ka.C.(w1)  
Belastingscombinaties



AFB. KA.C. VERPLAATSINGEN  
OMHULLENDE

Karakteristiek  
Belastingscombinaties



## HOUTTOETS RESULTATEN NEN-EN1995-1-1:2011/NB:2013

### DOORSNEDE GEGEVENS: R96X221

**C1 - V1**  
**(0.000-3.500)**

|                  |          |                           |                         |         |                         |
|------------------|----------|---------------------------|-------------------------|---------|-------------------------|
| Breedte          | b        | 0,096 m                   | Oppervlakte             | A       | 2122e-05 m <sup>2</sup> |
| Hoogte           | h        | 0,221 m                   | Dwarskracht oppervlakte | A;vy    | 1768e-05 m <sup>2</sup> |
|                  |          |                           | Dwarskracht oppervlakte | A;vz    | 1768e-05 m <sup>2</sup> |
| Weerstandsmoment | Wx       | 5385e-07 m <sup>3</sup>   | Traagheidsmoment        | I;tor   | 4819e-08 m <sup>4</sup> |
| Weerstandsmoment | Wy       | 7815e-07 m <sup>3</sup>   | Traagheidsmoment        | I;y     | 8635e-08 m <sup>4</sup> |
| Weerstandsmoment | Wz       | 3395e-07 m <sup>3</sup>   | Traagheidsmoment        | I;z     | 1629e-08 m <sup>4</sup> |
|                  | C;w      | 5969e-11 m <sup>6</sup>   |                         |         |                         |
| Sterkteklasse    |          |                           |                         |         |                         |
|                  |          | C18                       |                         |         |                         |
|                  | f;m,0,k  | 18,0 N/mm <sup>2</sup>    |                         | f;c,0,k | 18,0 N/mm <sup>2</sup>  |
|                  | f;t,0,k  | 11,0 N/mm <sup>2</sup>    |                         | f;v,0,k | 3,4 N/mm <sup>2</sup>   |
|                  | E0.05    | 6.000,0 N/mm <sup>2</sup> |                         | G0.05   | 375,0 N/mm <sup>2</sup> |
|                  | E;0,mean | 9.000,0 N/mm <sup>2</sup> |                         | G;mean  | 560,0 N/mm <sup>2</sup> |
| E-Modulus        |          |                           |                         |         |                         |
|                  |          | 9.000,0 N/mm <sup>2</sup> |                         |         |                         |

## HOUT: DOORSNEDECONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse            | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h  |
|---------------------------|---------------|---------|--------|-------|------|
| III (Middellange Termijn) | Klasse III    | 1,30    | 0,20   | 0,70  | 1,00 |

| Maatgevende krachten | N;Ed | Mx;Ed | My;Ed | Mz;Ed | Vy;Ed | Vz;Ed |
|----------------------|------|-------|-------|-------|-------|-------|
| Sigma                | 0,00 | 0,00  | 2,62  | 0,00  | 0,00  | 0,00  |
| Tau                  | 0,00 | 0,00  | 0,00  | 0,00  | 0,00  | -5,11 |
|                      | kN   | kN    | kN    | kN    | kN    | kN    |

### Ontwerpspanning

| Sigma;c;0;d       | Sigma;tor;d       | Sigma;m;y;d       | Sigma;m;z;d       | Sigma;v;y;d       | Sigma;v;z;d       |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0,0               | 0,0               | 3,4               | 0,0               | 0,0               | 0,4               |
| N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

### Ontwerpsterte

| f;c;0;d           | f;tor;d           | f;m;y;d           | f;m;z;d           | f;v;0;d           |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| 9,7               | 0,0               | 9,7               | 10,6              | 1,8               |
| N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

| Resultaten | Bel.comb. | Bel.duurkl.        | Positie [m] | UC   | Artikel                        |
|------------|-----------|--------------------|-------------|------|--------------------------------|
| Sigma      | Fu.C.1    | IV (Korte Termijn) | 1,450       | 0,35 | NEN-EN1995-1-1#6.1.6 (6.11)    |
| Tau        | Fu.C.1    | IV (Korte Termijn) | 3,500       | 0,20 | NEN-EN1995-1-1#6.1.7 (6.13) Vz |

NEN-EN1995-1-1#6.1.6 (6.11): UC = 0,35 < 1

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

## HOUT: KIPCONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse            | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h  |
|---------------------------|---------------|---------|--------|-------|------|
| III (Middellange Termijn) | Klasse III    | 1,30    | 0,20   | 0,70  | 1,00 |

Kipsteunen: N.v.t.

| Belastingstyp | Bel.duurkl.        | Bel.comb. | Aangrijppunt last |
|---------------|--------------------|-----------|-------------------|
| Verdeeld      | IV (Korte Termijn) | Fu.C.1    | Boven             |

| Begin inklemming | Eind inklemming | Lsys    | L;eff   | ltor         | Sigma,m,crit    | Lambda;rel;m | k;crit |
|------------------|-----------------|---------|---------|--------------|-----------------|--------------|--------|
| Volledig vast    | Volledig vast   | 3,500 m | 3,592 m | 4819e-08 mm4 | 5.433e+01 N/mm2 | 0,6          | 1,00   |

### Rekenwaarden voor spanning en rek

| Sigma;c;0;d | Sigma;m;y;d | Sigma;m;z;d | f;c;0;d | f;m;y;d | f;m;z;d |
|-------------|-------------|-------------|---------|---------|---------|
| 0,0         | 3,4         | 0,0         | 9,7     | 9,7     | 10,6    |
| N/mm2       | N/mm2       | N/mm2       | N/mm2   | N/mm2   | N/mm2   |

NEN-EN1995-1-1#6.3.3 (6.33): UC = 0,35 < 1

## TOETSING DOORBUIGING HOUT VOLGENS NEN-EN1990#A1.4.2(2):2011

| Lastduurklasse            | Klimaatklasse | Bel.duurkl.               | Toetsingstype | Constr.type |
|---------------------------|---------------|---------------------------|---------------|-------------|
| III (Middellange Termijn) | Klasse III    | III (Middellange Termijn) | Handmatig     | Dak         |

### Doorbuidingen Z'

|                               |             |             |                              |              |             |
|-------------------------------|-------------|-------------|------------------------------|--------------|-------------|
| E;0;ser;d;inst = E;mean       |             | 9.000 N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 9.000 / 2,00 | 4.500 N/mm2 |
| w;c                           |             | 0,0 mm      | E-Mod / E;0;ser;d;cr         | 9.000/4.500  | 2,000       |
| w;1 (x = 1,601 m; Ka.C.(w1) ) | 1,8 * 1,000 | 1,8 mm      |                              |              |             |
| w;2 (x = 1,601 m; Qu.C.1 )    | 1,8 * 2,000 | 3,5 mm      |                              |              |             |
| w;3 (x = 1,601 m; Ka.C.1 )    | 1,3 * 1,000 | 1,3 mm      |                              |              |             |
| w;tot                         |             | 6,6 mm      |                              |              |             |
| w;max                         |             | 6,6 mm      | (w;2+w;3)                    | 3,5 + 1,3    | 4,9 mm      |
| Limiet w;max = L/400          |             | 8,8 mm      | Limiet (w;2+w;3) = L/250     |              | 14,0 mm     |
| UC(w;max)                     | 6,6/8,8     | 0,76        | UC(w;2+w;3)                  | 4,9/14,0     | 0,35        |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,76 < 1

### Doorbuidingen Z''

|                               |             |      |       |                              |              |       |       |
|-------------------------------|-------------|------|-------|------------------------------|--------------|-------|-------|
| E;0;ser;d;inst = E;mean       | 9.000       |      | N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 9.000 / 2,00 | 4.500 | N/mm2 |
| w;c                           |             | 0,0  | mm    | E-Mod / E;0;ser;d;cr         | 9.000/4.500  | 2,000 |       |
| w;1 (x = 1,601 m; Ka.C.(w1) ) | 1,8 * 1,000 | 1,8  | mm    |                              |              |       |       |
| w;2 (x = 1,601 m; Qu.C.1 )    | 1,8 * 2,000 | 3,5  | mm    |                              |              |       |       |
| w;3 (x = 1,601 m; Ka.C.1 )    | 1,3 * 1,000 | 1,3  | mm    |                              |              |       |       |
| w;tot                         |             | 6,6  | mm    |                              |              |       |       |
| w;max                         |             | 6,6  | mm    | (w;2+w;3)                    | 3,5 + 1,3    | 4,9   | mm    |
| Limiet w;max = L/400          |             | 8,8  | mm    | Limiet (w;2+w;3) = L/250     |              | 14,0  | mm    |
| UC(w;max)                     | 6,6/8,8     | 0,76 |       | UC(w;2+w;3)                  | 4,9/14,0     | 0,35  |       |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,76 < 1

## DOORSNEDE GEGEVENS: R96X221

**C2 - V1**  
**(0.000-0.600)**

|                  |     |             |                         |       |             |
|------------------|-----|-------------|-------------------------|-------|-------------|
| Breedte          | b   | 0,096 m     | Oppervlakte             | A     | 2122e-05 m2 |
| Hoogte           | h   | 0,221 m     | Dwarskracht oppervlakte | A;vy  | 1768e-05 m2 |
|                  |     |             | Dwarskracht oppervlakte | A;vz  | 1768e-05 m2 |
| Weerstandsmoment | Wx  | 5385e-07 m3 | Traagheidsmoment        | I;tor | 4819e-08 m4 |
| Weerstandsmoment | Wy  | 7815e-07 m3 | Traagheidsmoment        | I;y   | 8635e-08 m4 |
| Weerstandsmoment | Wz  | 3395e-07 m3 | Traagheidsmoment        | I;z   | 1629e-08 m4 |
|                  | C;w | 5969e-11 m6 |                         |       |             |

Sterkteklasse

C18

|          |               |         |             |
|----------|---------------|---------|-------------|
| f;m,0,k  | 18,0 N/mm2    | f;c,0,k | 18,0 N/mm2  |
| f;t,0,k  | 11,0 N/mm2    | f;v,0,k | 3,4 N/mm2   |
| E0.05    | 6.000,0 N/mm2 | G0.05   | 375,0 N/mm2 |
| E;0,mean | 9.000,0 N/mm2 | G;mean  | 560,0 N/mm2 |

E-Modulus

9.000,0 N/mm2

## HOUT: DOORSNEDECONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse     | Klimaatklasse | Gamma;m              | Beta;c | k;mod | k;h |
|--------------------|---------------|----------------------|--------|-------|-----|
| 16-3-2017 13:50:30 |               | MatrixFrame® 5.2 SP9 |        |       | 5   |

| Constructieadviesbureau     |             | ing. F. Wiggers |              | Varsseveld   |              |              |
|-----------------------------|-------------|-----------------|--------------|--------------|--------------|--------------|
| III (Middellange Termijn)   | Klasse III  | 1,30            | 0,20         | 0,70         | 1,00         |              |
| <b>Maatgevende krachten</b> | <b>N;Ed</b> | <b>Mx;Ed</b>    | <b>My;Ed</b> | <b>Mz;Ed</b> | <b>Vy;Ed</b> | <b>Vz;Ed</b> |
| Sigma                       | 0,00        | 0,00            | -2,62        | 0,00         | 0,00         | 0,00         |
| Tau                         | 0,00        | 0,00            | 0,00         | 0,00         | 0,00         | 5,11         |
|                             | <b>kN</b>   | <b>kN</b>       | <b>kN</b>    | <b>kN</b>    | <b>kN</b>    | <b>kN</b>    |

#### Ontwerpspanning

| Sigma;c;0;d  | Sigma;tor;d  | Sigma;m;y;d  | Sigma;m;z;d  | Sigma;v;y;d  | Sigma;v;z;d  |
|--------------|--------------|--------------|--------------|--------------|--------------|
| 0,0          | 0,0          | 3,3          | 0,0          | 0,0          | 0,4          |
| <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> |

#### Ontwerpsterkte

| f;c;0;d      | f;tor;d      | f;m;y;d      | f;m;z;d      | f;v;0;d      |
|--------------|--------------|--------------|--------------|--------------|
| 9,7          | 0,0          | 9,7          | 10,6         | 1,8          |
| <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> |

| Resultaten | Bel.comb. | Bel.duurkl.        | Positie [m] | UC   | Artikel                        |
|------------|-----------|--------------------|-------------|------|--------------------------------|
| Sigma      | Fu.C.1    | IV (Korte Termijn) | 0,000       | 0,35 | NEN-EN1995-1-1#6.1.6 (6.11)    |
| Tau        | Fu.C.1    | IV (Korte Termijn) | 0,000       | 0,20 | NEN-EN1995-1-1#6.1.7 (6.13) Vz |

NEN-EN1995-1-1#6.1.6 (6.11): UC = 0,35 < 1

### HOUT: KIPCONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse            | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h  |
|---------------------------|---------------|---------|--------|-------|------|
| III (Middellange Termijn) | Klasse III    | 1,30    | 0,20   | 0,70  | 1,00 |

Kipsteunen: N.v.t.

| Belastingstyp | Bel.duurkl.        | Bel.comb. | Aangrijppunt last |
|---------------|--------------------|-----------|-------------------|
| Moment        | IV (Korte Termijn) | Fu.C.1    | Boven             |

| Begin inklemming | Eind inklemming | Lsys     | L;eff    | ltor       | Sigma,m,crit | Lambda;rel;m | k;crit |
|------------------|-----------------|----------|----------|------------|--------------|--------------|--------|
| Volledig vast    | Volledig vast   | 0,600    | 0,490    | 4819e-08   | 3.987e+02    | 0,2          | 1,00   |
|                  |                 | <b>m</b> | <b>m</b> | <b>mm4</b> | <b>N/mm2</b> |              |        |

#### Rekenwaarden voor spanning en rek

| Sigma;c;0;d  | Sigma;m;y;d  | Sigma;m;z;d  | f;c;0;d      | f;m;y;d      | f;m;z;d      |
|--------------|--------------|--------------|--------------|--------------|--------------|
| 0,0          | 3,3          | 0,0          | 9,7          | 9,7          | 10,6         |
| <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> | <b>N/mm2</b> |

NEN-EN1995-1-1#6.3.3 (6.33): UC = 0,35 < 1

### TOETSING DOORBUIGING HOUT VOLGENS NEN-EN1990#A1.4.2(2):2011

| Lastduurklasse            | Klimaatklasse | Bel.duurkl.               | Toetsingstype | Constr.type  |
|---------------------------|---------------|---------------------------|---------------|--------------|
| III (Middellange Termijn) | Klasse III    | III (Middellange Termijn) | Handmatig     | Dak overstek |

#### Doorbuingingen Z'

|                               |              |             |                              |              |             |
|-------------------------------|--------------|-------------|------------------------------|--------------|-------------|
| E;0;ser;d;inst = E;mean       |              | 9.000 N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 9.000 / 2,00 | 4.500 N/mm2 |
| w;c                           |              | 0,0 mm      | E-Mod / E;0;ser;d;cr         | 9.000/4.500  | 2,000       |
| w;1 (x = 0,600 m; Ka.C.(w1) ) | -0,3 * 1,000 | -0,3 mm     |                              |              |             |
| w;2 (x = 0,600 m; Qu.C.1 )    | -0,3 * 2,000 | -0,7 mm     |                              |              |             |
| w;3 (x = 0,600 m; Ka.C.1 )    | -0,3 * 1,000 | -0,3 mm     |                              |              |             |
| w;tot                         |              | -1,2 mm     |                              |              |             |
| w;max                         |              | -1,2 mm     | (w;2+w;3)                    | 0,7 + 0,3    | -0,9 mm     |
| Limiet w;max = L/400          |              | 3,0 mm      | Limiet (w;2+w;3) = L/250     |              | 4,8 mm      |
| UC(w;max)                     | 1,2/3,0      | 0,41        | UC(w;2+w;3)                  | 0,9/4,8      | 0,19        |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,41 < 1

#### Doorbuingingen Z''

|                               |              |      |       |                              |              |       |       |
|-------------------------------|--------------|------|-------|------------------------------|--------------|-------|-------|
| E;0;ser;d;inst = E;mean       | 9.000        |      | N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 9.000 / 2,00 | 4.500 | N/mm2 |
| w;c                           |              | 0,0  | mm    | E-Mod / E;0;ser;d;cr         | 9.000/4.500  | 2,000 |       |
| w;1 (x = 0,600 m; Ka.C.(w1) ) | -0,3 * 1,000 | -0,3 | mm    |                              |              |       |       |
| w;2 (x = 0,600 m; Qu.C.1 )    | -0,3 * 2,000 | -0,7 | mm    |                              |              |       |       |
| w;3 (x = 0,600 m; Ka.C.1 )    | -0,3 * 1,000 | -0,3 | mm    |                              |              |       |       |
| w;tot                         |              | -1,2 | mm    |                              |              |       |       |
| w;max                         |              | -1,2 | mm    | (w;2+w;3)                    | 0,7 + 0,3    | -0,9  | mm    |
| Limiet w;max = L/400          |              | 3,0  | mm    | Limiet (w;2+w;3) = L/250     |              | 4,8   | mm    |
| UC(w;max)                     | 1,2/3,0      | 0,41 |       | UC(w;2+w;3)                  | 0,9/4,8      | 0,19  |       |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,41 < 1

## DOORSNEDE GEGEVENS: R96X221

**C3 - V1**  
**(0.000-2.900)**

|                  |          |                           |                         |         |                         |
|------------------|----------|---------------------------|-------------------------|---------|-------------------------|
| Breedte          | b        | 0,096 m                   | Oppervlakte             | A       | 2122e-05 m <sup>2</sup> |
| Hoogte           | h        | 0,221 m                   | Dwarskracht oppervlakte | A;vy    | 1768e-05 m <sup>2</sup> |
|                  |          |                           | Dwarskracht oppervlakte | A;vz    | 1768e-05 m <sup>2</sup> |
| Weerstandsmoment | Wx       | 5385e-07 m <sup>3</sup>   | Traagheidsmoment        | I;tor   | 4819e-08 m <sup>4</sup> |
| Weerstandsmoment | Wy       | 7815e-07 m <sup>3</sup>   | Traagheidsmoment        | I;y     | 8635e-08 m <sup>4</sup> |
| Weerstandsmoment | Wz       | 3395e-07 m <sup>3</sup>   | Traagheidsmoment        | I;z     | 1629e-08 m <sup>4</sup> |
|                  | C;w      | 5969e-11 m <sup>6</sup>   |                         |         |                         |
| Sterkteklasse    |          | C18                       |                         |         |                         |
|                  | f;m,0,k  | 18,0 N/mm <sup>2</sup>    |                         | f;c,0,k | 18,0 N/mm <sup>2</sup>  |
|                  | f;t,0,k  | 11,0 N/mm <sup>2</sup>    |                         | f;v,0,k | 3,4 N/mm <sup>2</sup>   |
|                  | E0.05    | 6.000,0 N/mm <sup>2</sup> |                         | G0.05   | 375,0 N/mm <sup>2</sup> |
|                  | E;0,mean | 9.000,0 N/mm <sup>2</sup> |                         | G;mean  | 560,0 N/mm <sup>2</sup> |
| E-Modulus        |          | 9.000,0 N/mm <sup>2</sup> |                         |         |                         |

## HOUT: DOORSNEDECONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| HOOFDDEURBEÏNGENDE VERGELIJKINGEN ENKEL- EN MEERWALDDEURS |               |         |        |       |       |       |
|-----------------------------------------------------------|---------------|---------|--------|-------|-------|-------|
| Lastduurklasse                                            | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h   |       |
| III (Middellange Termijn)                                 | Klasse III    | 1,30    | 0,20   | 0,70  | 1,00  |       |
| Maatgevende krachten                                      | N;Ed          | Mx;Ed   | My;Ed  | Mz;Ed | Vy;Ed | Vz;Ed |
| Sigma                                                     | 0,00          | 0,00    | 2,62   | 0,00  | 0,00  | 0,00  |
| Tau                                                       | 0,00          | 0,00    | 0,00   | 0,00  | 0,00  | 3,61  |
|                                                           | kN            | kN      | kN     | kN    | kN    | kN    |

### Ontwerpspanning

| Sigma;c;0;d       | Sigma;tor;d       | Sigma;m;y;d       | Sigma;m;z;d       | Sigma;v;y;d       | Sigma;v;z;d       |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0,0               | 0,0               | 3,4               | 0,0               | 0,0               | 0,3               |
| N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

### Ontwerpsterte

| f;c;0;d           | f;tor;d           | f;m;y;d           | f;m;z;d           | f;v;0;d           |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| 9,7               | 0,0               | 9,7               | 10,6              | 1,8               |
| N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

| Resultaten | Bel.comb. | Bel.duurkl.        | Positie [m] | UC   | Artikel                        |
|------------|-----------|--------------------|-------------|------|--------------------------------|
| Sigma      | Fu.C.1    | IV (Korte Termijn) | 1,450       | 0,35 | NEN-EN1995-1-1#6.1.6 (6.11)    |
| Tau        | Fu.C.1    | IV (Korte Termijn) | 0,000       | 0,14 | NEN-EN1995-1-1#6.1.7 (6.13) Vz |

NEN-EN1995-1-1#6.1.6 (6.11): UC = 0,35 < 1

## HOUT: KIPCONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse            | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h  |
|---------------------------|---------------|---------|--------|-------|------|
| III (Middellange Termijn) | Klasse III    | 1,30    | 0,20   | 0,70  | 1,00 |

Kipsteunen: N.v.t.

| Belastingstyp | Bel.duurkl.        | Bel.comb. | Aangrijppunt last |
|---------------|--------------------|-----------|-------------------|
| Verdeeld      | IV (Korte Termijn) | Fu.C.1    | Boven             |

| Begin inklemming | Eind inklemming | Lsys    | L;eff   | I;tor                    | Sigma,m,crit                | Lambda;rel;m | k;crit |
|------------------|-----------------|---------|---------|--------------------------|-----------------------------|--------------|--------|
| Volledig vast    | Volledig vast   | 2,900 m | 3,052 m | 4819e-08 mm <sup>4</sup> | 6.395e+01 N/mm <sup>2</sup> | 0,5          | 1,00   |

### Rekenwaarden voor spanning en rek

| Sigma;c;0;d       | Sigma;m;y;d       | Sigma;m;z;d       | f;c;0;d           | f;m;y;d           | f;m;z;d           |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0,0               | 3,4               | 0,0               | 9,7               | 9,7               | 10,6              |
| N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

NEN-EN1995-1-1#6.3.3 (6.33): UC = 0,35 < 1

## TOETSING DOORBUIGING HOUT VOLGENS NEN-EN1990#A1.4.2(2):2011

| Lastduurklasse            | Klimaatklasse | Bel.duurkl.               | Toetsingstype | Constr.type |
|---------------------------|---------------|---------------------------|---------------|-------------|
| III (Middellange Termijn) | Klasse III    | III (Middellange Termijn) | Handmatig     | Dak         |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

#### Doorbuigingen Z'

|                               |             |             |                              |              |             |
|-------------------------------|-------------|-------------|------------------------------|--------------|-------------|
| E;0;ser;d;inst = E;mean       |             | 9.000 N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 9.000 / 2,00 | 4.500 N/mm2 |
| w;c                           |             | 0,0 mm      | E-Mod / E;0;ser;d;cr         | 9.000/4.500  | 2,000       |
| w;1 (x = 1,450 m; Ka.C.(w1) ) | 1,4 * 1,000 | 1,4 mm      |                              |              |             |
| w;2 (x = 1,450 m; Qu.C.1 )    | 1,4 * 2,000 | 2,8 mm      |                              |              |             |
| w;3 (x = 1,450 m; Ka.C.1 )    | 1,1 * 1,000 | 1,1 mm      |                              |              |             |
| w;tot                         |             | 5,3 mm      |                              |              |             |
| w;max                         |             | 5,3 mm      | (w;2+w;3)                    | 2,8 + 1,1    | 3,9 mm      |
| Limiet w;max = L/400          |             | 7,3 mm      | Limiet (w;2+w;3) = L/250     |              | 11,6 mm     |
| UC(w;max)                     | 5,3/7,3     | 0,73        | UC(w;2+w;3)                  | 3,9/11,6     | 0,33        |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,73 < 1

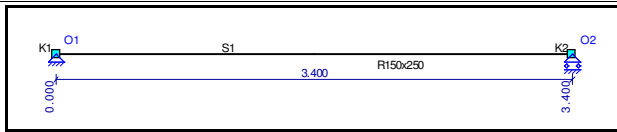
#### Doorbuigingen Z''

|                               |             |      |       |                              |              |       |       |
|-------------------------------|-------------|------|-------|------------------------------|--------------|-------|-------|
| E;0;ser;d;inst = E;mean       | 9.000       |      | N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 9.000 / 2,00 | 4.500 | N/mm2 |
| w;c                           |             | 0,0  | mm    | E-Mod / E;0;ser;d;cr         | 9.000/4.500  | 2,000 |       |
| w;1 (x = 1,450 m; Ka.C.(w1) ) | 1,4 * 1,000 | 1,4  | mm    |                              |              |       |       |
| w;2 (x = 1,450 m; Qu.C.1 )    | 1,4 * 2,000 | 2,8  | mm    |                              |              |       |       |
| w;3 (x = 1,450 m; Ka.C.1 )    | 1,1 * 1,000 | 1,1  | mm    |                              |              |       |       |
| w;tot                         |             | 5,3  | mm    |                              |              |       |       |
| w;max                         |             | 5,3  | mm    | (w;2+w;3)                    | 2,8 + 1,1    | 3,9   | mm    |
| Limiet w;max = L/400          |             | 7,3  | mm    | Limiet (w;2+w;3) = L/250     |              | 11,6  | mm    |
| UC(w;max)                     | 5,3/7,3     | 0,73 |       | UC(w;2+w;3)                  | 3,9/11,6     | 0,33  |       |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,73 < 1

| Constructieadviesbureau |                                                                   | ing. F. Wiggers |               | Varsseveld         |  |
|-------------------------|-------------------------------------------------------------------|-----------------|---------------|--------------------|--|
| Pos. 3                  |                                                                   |                 |               |                    |  |
| Projectnaam             |                                                                   |                 | Projectnummer | 21734IK            |  |
| Omschrijving            | A                                                                 |                 | Constructeur  | ing. J.E. Veldhuis |  |
| Opdrachtgever           |                                                                   |                 | Eenheden      | m, kN, kNm         |  |
| Bestand                 | N:\21600\21734-IK\Constructie\Berekeningen\Onderdeel A\Pos. 3.mxf |                 |               |                    |  |

#### AFB. GEOMETRIE 1



#### STAVEN

| Staaf | Knoop |     | Scharnier | Knoop | Profiel | X-B   | Z-B   | X-E   | Z-E   | Lengte |
|-------|-------|-----|-----------|-------|---------|-------|-------|-------|-------|--------|
| S1    | B     | B   | E         | E     | P1      | 0,000 | 0,000 | 3,400 | 0,000 | 3,400  |
| -     | K1    | NVM | NVM       | K2    | -       | m     | m     | m     | m     | m      |

#### PROFIELEN

| Profiel | Profielnaam | Oppervlakte | ly         | Materiaal | Hoek |
|---------|-------------|-------------|------------|-----------|------|
| P1      | R150x250    | 3.7500e-02  | 1.9531e-04 | GL32c     | 0    |
| -       | -           | m2          | m4         | -         | °    |

#### PROFIELVORMEN

| Profiel | Verl. h. | hB    | hE    | tf    | tw    | tf2   | B     | bL    | bR Raatl. | Hoogte |
|---------|----------|-------|-------|-------|-------|-------|-------|-------|-----------|--------|
| P1      | Nee      | 0.250 | 0.250 | 0.000 | 0.000 | 0.000 | 0.150 | 0.000 | 0.000 Nee | 0.000  |
| -       | -        | m     | m     | m     | m     | m     | m     | m     | m -       | m      |

#### MATERIALEN

| Materiaal | Dichtheid | E-Modulus  | Uitzettingcoeff |
|-----------|-----------|------------|-----------------|
| GL32c     | 4.00      | 1.3700e+07 | 50.0000e-07     |
| -         | kN/m3     | kN/m2      | C°m             |

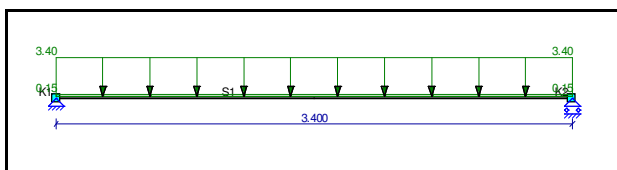
#### OPLEGGINGEN

| Oplegging | Knoop | X    | Z    | Yr     | HoekYr |
|-----------|-------|------|------|--------|--------|
| O1        | K1    | vast | vast | vrij   | 0      |
| O2        | K2    | vrij | vast | vrij   | 0      |
| -         | -     | kN/m | kN/m | kNmrad | °      |

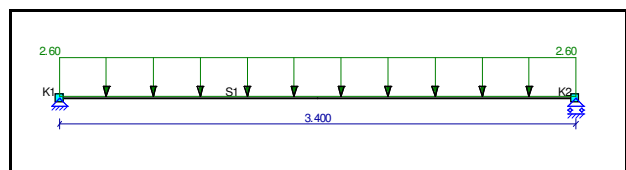
#### BELASTINGSGEVALLEN

| Type                          | Beginwaarde  | Eindwaarde   | Beginafstand | Eindafstand | Richting Staaf of knoop |
|-------------------------------|--------------|--------------|--------------|-------------|-------------------------|
| <b>B.G.1: Permanent</b>       |              |              |              |             |                         |
| qG                            | 0,15 (1.00x) | 0,15 (1.00x) | 0,000        | 3,400(L)    | Z" S1                   |
| q                             | 3,40         | 3,40         | 0,000        | 3,400(L)    | Z' S1                   |
| Som lasten                    | X            | 0,00 kN      | Z: 12,07     | kN          |                         |
| <b>B.G.2: Windbelasting</b>   |              |              |              |             |                         |
| q                             | 2,60         | 2,60         | 0,000        | 3,400(L)    | Z' S1                   |
| Som lasten                    | X            | 0,00 kN      | Z: 8,84      | kN          |                         |
| <b>B.G.3: Sneeuwbelasting</b> |              |              |              |             |                         |
| q                             | 1,30         | 1,30         | 0,000        | 3,400(L)    | Z' S1                   |
| Som lasten                    | X            | 0,00 kN      | Z: 4,42      | kN          |                         |
| -                             | -            | -            | m            | m           | - -                     |

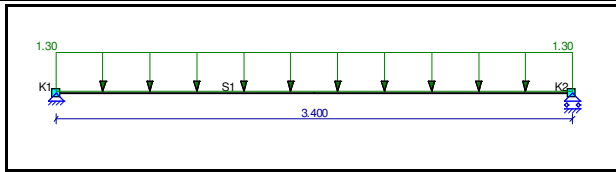
#### AFB. LASTEN B.G.1 PERMANENT



#### AFB. LASTEN B.G.2 WINDBELASTING



## AFB. LASTEN B.G.3 SNEEUWBELASTING



## B.G. OPLEGREACTIES

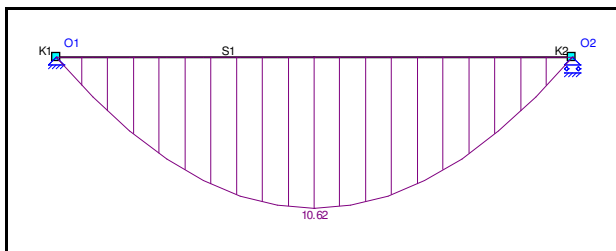
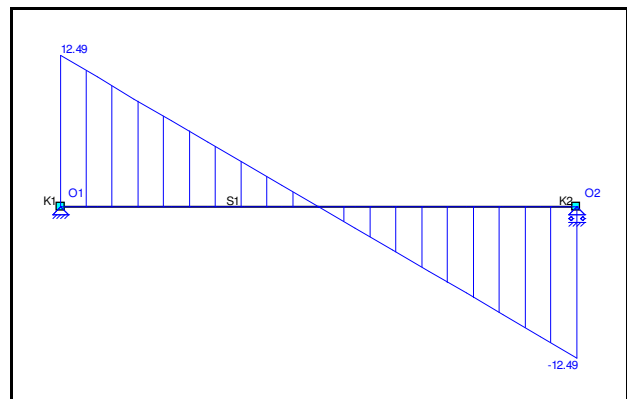
| B.C.  | Oplegging           | Knoop | X           | Z             | My         |
|-------|---------------------|-------|-------------|---------------|------------|
| B.G.1 | O1                  | K1    | 0.00        | -6.04         | 0.00       |
|       | O2                  | K2    | 0.00        | -6.04         | 0.00       |
|       | <b>Som Reacties</b> |       | <b>0.00</b> | <b>-12,07</b> |            |
|       | <b>Som Lasten</b>   |       | <b>0.00</b> | <b>12.07</b>  |            |
| B.G.2 | O1                  | K1    | 0.00        | -4.42         | 0.00       |
|       | O2                  | K2    | 0.00        | -4.42         | 0.00       |
|       | <b>Som Reacties</b> |       | <b>0.00</b> | <b>-8,84</b>  |            |
|       | <b>Som Lasten</b>   |       | <b>0.00</b> | <b>8.84</b>   |            |
| B.G.3 | O1                  | K1    | 0.00        | -2.21         | 0.00       |
|       | O2                  | K2    | 0.00        | -2.21         | 0.00       |
|       | <b>Som Reacties</b> |       | <b>0.00</b> | <b>-4,42</b>  |            |
|       | <b>Som Lasten</b>   |       | <b>0.00</b> | <b>4.42</b>   |            |
| -     | -                   | -     | <b>kN</b>   | <b>kN</b>     | <b>kNm</b> |

## FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving    | Fu.C.1 | Fu.C.2 | Fu.C.3 |
|-------|-----------------|--------|--------|--------|
| B.G.1 | Permanent       | 1.08   | 1.08   | 1.22   |
| B.G.2 | Windbelasting   | 1.35   | -      | -      |
| B.G.3 | Sneeuwbelasting | -      | 1.35   | -      |

## FU.C. EXTREME STAAFKRACHTEN

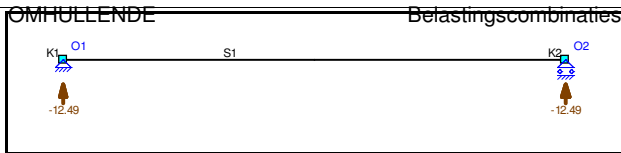
| Staaf | B.C.   | Mb         | Mmax         | xMmax    | Me         | x-M0     | x-M0 T/D   | Nmax      | Vb           | Vmax          | Ve            |
|-------|--------|------------|--------------|----------|------------|----------|------------|-----------|--------------|---------------|---------------|
| S1    | Fu.C.1 | 0.00       | <b>10.62</b> | 1.700    | 0.00       | 0.000    | 0.000 -    | 0.00      | <b>12.49</b> | <b>-12.49</b> | <b>-12.49</b> |
|       | Fu.C.3 | 0.00       | 6.23         | 1.700    | 0.00       | 0.000    | 0.000 -    | 0.00      | 7.33         | <b>7.33</b>   | -7.33         |
| -     | -      | <b>kNm</b> | <b>kNm</b>   | <b>m</b> | <b>kNm</b> | <b>m</b> | <b>m -</b> | <b>kN</b> | <b>kN</b>    | <b>kN</b>     | <b>kN</b>     |

AFB. FU.C. MOMENTEN (MY)  
OMHULLENDEFundamenteel  
Belastingsc combinatiesAFB. FU.C. DWARSKRACHT (VZ)  
OMHULLENDEFundamenteel  
Belastingsc combinaties

## FU.C. EXTREME OPLEGREACTIES

| Opleggin                       | Knoop | B.C. | Xmax      | Z         | My B.C.    | X    | Zmax          | My B.C.   | X          | Z | My B.C. | X         | Z         | My B.C.    |
|--------------------------------|-------|------|-----------|-----------|------------|------|---------------|-----------|------------|---|---------|-----------|-----------|------------|
| O1                             | K1    |      |           |           | Fu.C.1     | 0.00 | <b>-12.49</b> | 0.00      |            |   |         |           |           |            |
| O2                             | K2    |      |           |           | Fu.C.1     | 0.00 | <b>-12.49</b> | 0.00      |            |   |         |           |           |            |
| <b>Globale extreme waarden</b> |       |      |           |           |            |      |               |           |            |   |         |           |           |            |
| O2                             | K2    |      |           |           | Fu.C.1     | 0.00 | <b>-12.49</b> | 0.00      |            |   |         |           |           |            |
| -                              | -     | -    | <b>kN</b> | <b>kN</b> | <b>kNm</b> | -    | <b>kN</b>     | <b>kN</b> | <b>kNm</b> |   |         | <b>kN</b> | <b>kN</b> | <b>kNm</b> |

AFB. FU.C. OPLEGREACTIES Fundamenteel



## KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

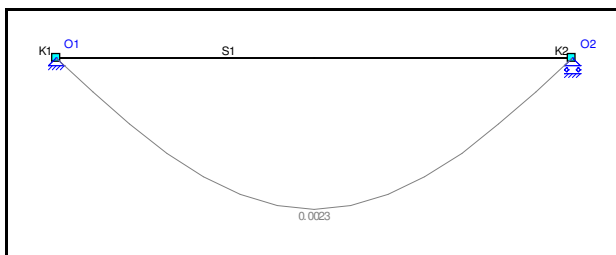
| B.G.  | Omschrijving    | Ka.C.<br>(w1) | Ka.C.1 | Ka.C.2 |
|-------|-----------------|---------------|--------|--------|
| B.G.1 | Permanent       | 1.00          | 1.00   | 1.00   |
| B.G.2 | Windbelasting   | -             | 1.00   | -      |
| B.G.3 | Sneeuwbelasting | -             | -      | 1.00   |

## KA.C. DOORBUIGINGEN

| Staaf | B.C.      | Knoop Begin |       |        | Staaf  |             |        | Knoop Eind |       |
|-------|-----------|-------------|-------|--------|--------|-------------|--------|------------|-------|
|       |           | X           | Z     | Z'afst | Z'     | Z' glb dist | Z' glb | X          | Z     |
| S1    | Ka.C.(w1) | 0,000       | 0,000 | 1,700  | 0,0023 | 1.700       | 0.0023 | 0,000      | 0,000 |
|       | Ka.C.1    | 0,000       | 0,000 | 1,700  | 0,0040 | 1.700       | 0.0040 | 0,000      | 0,000 |
|       | Ka.C.2    | 0,000       | 0,000 | 1,700  | 0,0032 | 1.700       | 0.0032 | 0,000      | 0,000 |
| -     | -         | m           | m     | m      | m      | m           | m      | m          | m     |

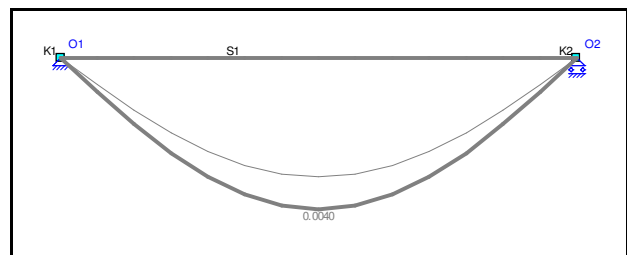
AFB. KA.C.(W1) VERPLAATSINGEN

Ka.C.(w1)  
Belastingscombinaties



AFB. KA.C. VERPLAATSINGEN  
OMHULLENDE

Karakteristiek  
Belastingscombinaties



## HOUTTOETS RESULTATEN NEN-EN1995-1-1:2011/NB:2013 DOORSNEDE GEGEVENS: R150X250

**C1 - V1**  
**(0.000-3.400)**

|                  |          |                            |                         |         |                         |
|------------------|----------|----------------------------|-------------------------|---------|-------------------------|
| Breedte          | b        | 0,150 m                    | Oppervlakte             | A       | 3750e-05 m <sup>2</sup> |
| Hoogte           | h        | 0,250 m                    | Dwarskracht oppervlakte | A;vy    | 3125e-05 m <sup>2</sup> |
|                  |          |                            | Dwarskracht oppervlakte | A;vz    | 3125e-05 m <sup>2</sup> |
| Weerstandsmoment | Wx       | 1379e-06 m <sup>3</sup>    | Traagheidsmoment        | I;tor   | 1800e-07 m <sup>4</sup> |
| Weerstandsmoment | Wy       | 1563e-06 m <sup>3</sup>    | Traagheidsmoment        | I;y     | 1953e-07 m <sup>4</sup> |
| Weerstandsmoment | Wz       | 9375e-07 m <sup>3</sup>    | Traagheidsmoment        | I;z     | 7031e-08 m <sup>4</sup> |
|                  | C;w      | 3296e-10 m <sup>6</sup>    |                         |         |                         |
| Sterkteklasse    |          | GL32c                      |                         |         |                         |
|                  | f;m,0,k  | 32,0 N/mm <sup>2</sup>     |                         | f;c,0,k | 26,5 N/mm <sup>2</sup>  |
|                  | f;t,0,k  | 19,5 N/mm <sup>2</sup>     |                         | f;v,0,k | 3,2 N/mm <sup>2</sup>   |
|                  | E0.05    | 11.100,0 N/mm <sup>2</sup> |                         | G0.05   | 693,8 N/mm <sup>2</sup> |
|                  | E;0,mean | 13.700,0 N/mm <sup>2</sup> |                         | G;mean  | 780,0 N/mm <sup>2</sup> |
| E-Modulus        |          | 13.700,0 N/mm <sup>2</sup> |                         |         |                         |

## HOUT: DOORSNEDECONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse            | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h   |       |       |
|---------------------------|---------------|---------|--------|-------|-------|-------|-------|
| III (Middellange Termijn) | Klasse I      | 1,25    | 0,10   | 0,90  | 1,09  |       |       |
| Maatgevende krachten      |               | N;Ed    | Mx;Ed  | My;Ed | Mz;Ed | Vy;Ed | Vz;Ed |
| Sigma                     |               | 0,00    | 0,00   | 10,62 | 0,00  | 0,00  | 0,00  |
| Tau                       |               | 0,00    | 0,00   | 0,00  | 0,00  | 0,00  | 12,49 |
|                           |               | kN      | kN     | kN    | kN    | kN    | kN    |

### Ontwerpspanning

| Sigma;c;0;d       | Sigma;tor;d       | Sigma;m;y;d       | Sigma;m;z;d       | Sigma;v;y;d       | Sigma;v;z;d       |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0,0               | 0,0               | 6,8               | 0,0               | 0,0               | 0,5               |
| N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

### Ontwerpsterkte

16-3-2017 14:00:53

MatrixFrame® 5.2 SP9

3

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| f;c;0;d | f;tor;d | f;m;y;d | f;m;z;d | f;v;0;d |
| 19,1    | 0,0     | 25,1    | 25,3    | 2,3     |
| N/mm2   | N/mm2   | N/mm2   | N/mm2   | N/mm2   |

| Resultaten | Bel.comb. | Bel.duurkl.        | Positie [m] | UC Artikel                          |
|------------|-----------|--------------------|-------------|-------------------------------------|
| Sigma      | Fu.C.1    | IV (Korte Termijn) | 1,700       | 0,27 NEN-EN1995-1-1#6.1.6 (6.11)    |
| Tau        | Fu.C.1    | IV (Korte Termijn) | 0,000       | 0,22 NEN-EN1995-1-1#6.1.7 (6.13) Vz |

NEN-EN1995-1-1#6.1.6 (6.11): UC = 0,27 < 1

## HOUT: KIPCONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse            | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h  |
|---------------------------|---------------|---------|--------|-------|------|
| III (Middellange Termijn) | Klasse I      | 1,25    | 0,10   | 0,90  | 1,09 |

Kipsteunen: N.v.t.

| Belastingstyp | Bel.duurkl.        | Bel.comb. | Aangrijppunt last |
|---------------|--------------------|-----------|-------------------|
| Verdeeld      | IV (Korte Termijn) | Fu.C.1    | Boven             |

| Begin inklemming | Eind inklemming | Lsys       | L;eff      | ltor            | Sigma,m,crit       | Lambda;rel;m | k;crit |
|------------------|-----------------|------------|------------|-----------------|--------------------|--------------|--------|
| Volledig vast    | Volledig vast   | 3,400<br>m | 3,560<br>m | 1800e-07<br>mm4 | 1.744e+02<br>N/mm2 | 0,4          | 1,00   |

### Rekenwaarden voor spanning en rek

| Sigma;c;0;d | Sigma;m;y;d | Sigma;m;z;d | f;c;0;d | f;m;y;d | f;m;z;d |
|-------------|-------------|-------------|---------|---------|---------|
| 0,0         | 6,8         | 0,0         | 19,1    | 25,1    | 25,3    |
| N/mm2       | N/mm2       | N/mm2       | N/mm2   | N/mm2   | N/mm2   |

NEN-EN1995-1-1#6.3.3 (6.33): UC = 0,27 < 1

## TOETSING DOORBUIGING HOUT VOLGENS NEN-EN1990#A1.4.2(2):2011

| Lastduurklasse            | Klimaatklasse | Bel.duurkl.               | Toetsingstype | Constr.type |
|---------------------------|---------------|---------------------------|---------------|-------------|
| III (Middellange Termijn) | Klasse I      | III (Middellange Termijn) | Handmatig     | Dak         |

### Doorbuigingen Z'

|                               |             |              |                              |               |              |
|-------------------------------|-------------|--------------|------------------------------|---------------|--------------|
| E;0;ser;d;inst = E;mean       |             | 13.700 N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 13.700 / 0,60 | 22.833 N/mm2 |
| w;c                           |             | 0,0 mm       | E-Mod / E;0;ser;d;cr         | 13.700/22.833 | 0,600        |
| w;1 (x = 1,700 m; Ka.C.(w1) ) | 2,3 * 1,000 | 2,3 mm       |                              |               |              |
| w;2 (x = 1,700 m; Qu.C.1 )    | 2,3 * 0,600 | 1,4 mm       |                              |               |              |
| w;3 (x = 1,700 m; Ka.C.1 )    | 1,7 * 1,000 | 1,7 mm       |                              |               |              |
| w;tot                         |             | 5,4 mm       |                              |               |              |
| w;max                         |             | 5,4 mm       | (w;2+w;3)                    | 1,4 + 1,7     | 3,1 mm       |
| Limiet w;max = L/600          |             | 5,7 mm       | Limiet (w;2+w;3) = L/250     |               | 13,6 mm      |
| UC(w;max)                     | 5,4/5,7     | 0,95         | UC(w;2+w;3)                  | 3,1/13,6      | 0,23         |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,95 < 1

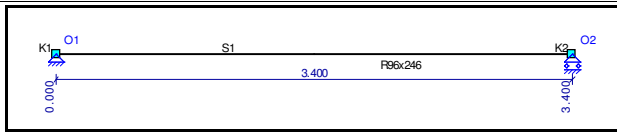
### Doorbuigingen Z''

|                               |             |      |       |                              |               |        |       |
|-------------------------------|-------------|------|-------|------------------------------|---------------|--------|-------|
| E;0;ser;d;inst = E;mean       | 13.700      |      | N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 13.700 / 0,60 | 22.833 | N/mm2 |
| w;c                           |             | 0,0  | mm    | E-Mod / E;0;ser;d;cr         | 13.700/22.833 | 0,600  |       |
| w;1 (x = 1,700 m; Ka.C.(w1) ) | 2,3 * 1,000 | 2,3  | mm    |                              |               |        |       |
| w;2 (x = 1,700 m; Qu.C.1 )    | 2,3 * 0,600 | 1,4  | mm    |                              |               |        |       |
| w;3 (x = 1,700 m; Ka.C.1 )    | 1,7 * 1,000 | 1,7  | mm    |                              |               |        |       |
| w;tot                         |             | 5,4  | mm    |                              |               |        |       |
| w;max                         |             | 5,4  | mm    | (w;2+w;3)                    | 1,4 + 1,7     | 3,1    | mm    |
| Limiet w;max = L/600          |             | 5,7  | mm    | Limiet (w;2+w;3) = L/250     |               | 13,6   | mm    |
| UC(w;max)                     | 5,4/5,7     | 0,95 |       | UC(w;2+w;3)                  | 3,1/13,6      | 0,23   |       |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,95 < 1

|                         |                                                                   |                 |               |                    |  |
|-------------------------|-------------------------------------------------------------------|-----------------|---------------|--------------------|--|
| Constructieadviesbureau |                                                                   | ing. F. Wiggers |               | Varsseveld         |  |
| Bepalen kaplasten       |                                                                   |                 |               |                    |  |
| Projectnaam             |                                                                   |                 | Projectnummer | 21734IK            |  |
| Omschrijving            | A                                                                 |                 | Constructeur  | ing. J.E. Veldhuis |  |
| Opdrachtgever           |                                                                   |                 | Eenheden      | m, kN, kNm         |  |
| Bestand                 | N:\21600\21734-IK\Constructie\Berekeningen\Onderdeel A\Pos. 4.mxf |                 |               |                    |  |

AFB. GEOMETRIE 1



## STAVEN

| Staaf | Knoop |     | Scharnier | Knoop | Profiel | X-B   | Z-B   | X-E   | Z-E   | Lengte |
|-------|-------|-----|-----------|-------|---------|-------|-------|-------|-------|--------|
|       | B     | B   | E         | E     |         |       |       |       |       |        |
| S1    | K1    | NVM | NVM       | K2    | P1      | 0,000 | 0,000 | 3,400 | 0,000 | 3,400  |
| -     | -     | -   | -         | -     | -       | m     | m     | m     | m     | m      |

## PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy         | Materiaal | Hoek |
|---------|-------------|-------------|------------|-----------|------|
| P1      | R96x246     | 2.3616e-02  | 1.1910e-04 | C24       | 0    |
| -       | -           | m2          | m4         | -         | °    |

## PROFIELVORMEN

| Profiel | Verl. h. | hB    | hE    | tf    | tw    | tf2   | B     | bL    | bR    | Raatl. | Hoogte |
|---------|----------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| P1      | Nee      | 0.246 | 0.246 | 0.000 | 0.000 | 0.000 | 0.096 | 0.000 | 0.000 | Nee    | 0.000  |
| -       | -        | m     | m     | m     | m     | m     | m     | m     | m     | -      | m      |

## MATERIALEN

| Materiaal | Dichtheid | E-Modulus  | Uitzettingcoeff |
|-----------|-----------|------------|-----------------|
| C24       | 4.20      | 1.1000e+07 | 50.0000e-07     |
| -         | kN/m3     | kN/m2      | C°m             |

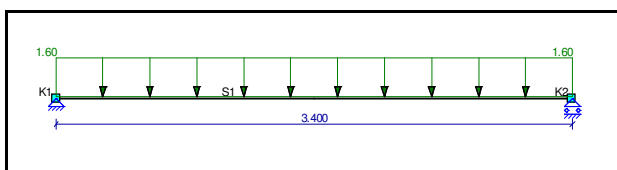
## OPLEGGINGEN

| Oplegging | Knoop | X    | Z    | Yr     | HoekYr |
|-----------|-------|------|------|--------|--------|
| O1        | K1    | vast | vast | vrij   | 0      |
| O2        | K2    | vrij | vast | vrij   | 0      |
| -         | -     | kN/m | kN/m | kNmrad | °      |

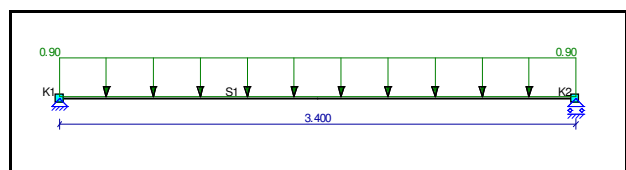
## BELASTINGSGEVALLEN

| Type                          | Beginwaarde | Eindwaarde | Beginafstand | Eindafstand | Richting Staaf of knoop |
|-------------------------------|-------------|------------|--------------|-------------|-------------------------|
| <b>B.G.1: Permanent</b>       |             |            |              |             |                         |
| q                             | 1,60        | 1,60       | 0,000        | 3,400(L)    | Z' S1                   |
| Som lasten                    | X           | 0,00       | kN Z: 5,44   | kN          |                         |
| :                             |             |            |              |             |                         |
| <b>B.G.2: Windbelasting</b>   |             |            |              |             |                         |
| q                             | 0,90        | 0,90       | 0,000        | 3,400(L)    | Z' S1                   |
| Som lasten                    | X           | 0,00       | kN Z: 3,06   | kN          |                         |
| :                             |             |            |              |             |                         |
| <b>B.G.3: Sneeuwbelasting</b> |             |            |              |             |                         |
| q                             | 0,60        | 0,60       | 0,000        | 3,400(L)    | Z' S1                   |
| Som lasten                    | X           | 0,00       | kN Z: 2,04   | kN          |                         |
| :                             |             |            |              |             |                         |
| -                             | -           | -          | m            | m           | - -                     |

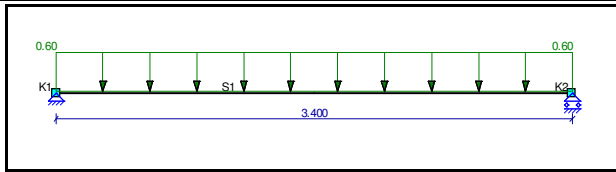
AFB. LASTEN B.G.1 PERMANENT



AFB. LASTEN B.G.2 WINDBELASTING



## AFB. LASTEN B.G.3 SNEEUWBELASTING



## B.G. OPLEGREACTIES

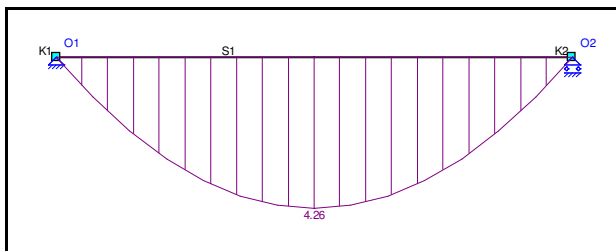
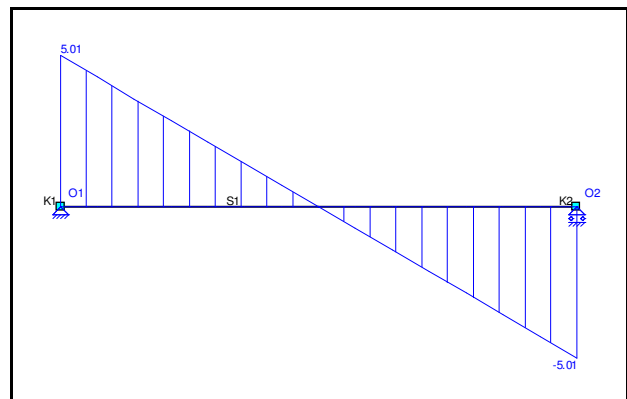
| B.C.  | Oplegging    | Knoop | X    | Z     | My   |
|-------|--------------|-------|------|-------|------|
| B.G.1 | O1           | K1    | 0.00 | -2.72 | 0.00 |
|       | O2           | K2    | 0.00 | -2.72 | 0.00 |
|       | Som Reacties |       | 0.00 | -5.44 |      |
| B.G.2 | Som Lasten   |       | 0.00 | 5.44  |      |
|       | O1           | K1    | 0.00 | -1.53 | 0.00 |
|       | O2           | K2    | 0.00 | -1.53 | 0.00 |
| B.G.3 | Som Reacties |       | 0.00 | -3.06 |      |
|       | Som Lasten   |       | 0.00 | 3.06  |      |
|       | O1           | K1    | 0.00 | -1.02 | 0.00 |
|       | O2           | K2    | 0.00 | -1.02 | 0.00 |
|       | Som Reacties |       | 0.00 | -2.04 |      |
|       | Som Lasten   |       | 0.00 | 2.04  |      |
| -     | -            | -     | kN   | kN    | kNm  |

## FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving    | Fu.C.1 | Fu.C.2 | Fu.C.3 |
|-------|-----------------|--------|--------|--------|
| B.G.1 | Permanent       | 1.08   | 1.08   | 1.22   |
| B.G.2 | Windbelasting   | 1.35   | -      | -      |
| B.G.3 | Sneeuwbelasting | -      | 1.35   | -      |

## FU.C. EXTREME STAAFKRACHTEN

| Staaf | B.C.   | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0 T/D | Nmax | Vb   | Vmax  | Ve    |
|-------|--------|------|------|-------|------|-------|----------|------|------|-------|-------|
| S1    | Fu.C.1 | 0.00 | 4.26 | 1.700 | 0.00 | 0.000 | 0.000 -  | 0.00 | 5.01 | -5.01 | -5.01 |
|       | Fu.C.2 | 0.00 | 3.67 | 1.700 | 0.00 | 0.000 | 0.000 -  | 0.00 | 4.32 | 4.32  | -4.32 |
| -     | -      | kNm  | kNm  | m     | kNm  | m     | m -      | kN   | kN   | kN    | kN    |

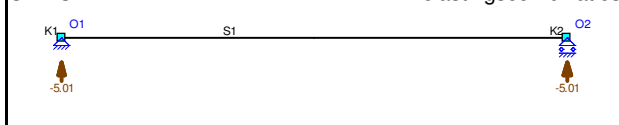
AFB. FU.C. MOMENTEN (MY)  
OMHULLENDEFundamenteel  
BelastingscombinatiesAFB. FU.C. DWARSKRACHT (VZ)  
OMHULLENDEFundamenteel  
Belastingscombinaties

## FU.C. EXTREME OPLEGREACTIES

| Opleggin                | Knoop | B.C. | Xmax | Z  | My B.C. | X    | Zmax  | My B.C. | X   | Z  | My B.C. |
|-------------------------|-------|------|------|----|---------|------|-------|---------|-----|----|---------|
| O1                      | K1    |      |      |    | Fu.C.1  | 0.00 | -5.01 | 0.00    |     |    |         |
| O2                      | K2    |      |      |    | Fu.C.1  | 0.00 | -5.01 | 0.00    |     |    |         |
| Globale extreme waarden |       |      |      |    |         |      |       |         |     |    |         |
| O2                      | K2    |      |      |    | Fu.C.1  | 0.00 | -5.01 | 0.00    |     |    |         |
| -                       | -     | -    | kN   | kN | kNm     | -    | kN    | kN      | kNm | kN | kNm     |

AFB. FU.C. OPLEGREACTIES Fundamenteel

OMHULLENDE Belastingscombinaties



## KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving    | Ka.C.<br>(w1) | Ka.C.1 | Ka.C.2 |
|-------|-----------------|---------------|--------|--------|
| B.G.1 | Permanent       | 1.00          | 1.00   | 1.00   |
| B.G.2 | Windbelasting   | -             | 1.00   | -      |
| B.G.3 | Sneeuwbelasting | -             | -      | 1.00   |

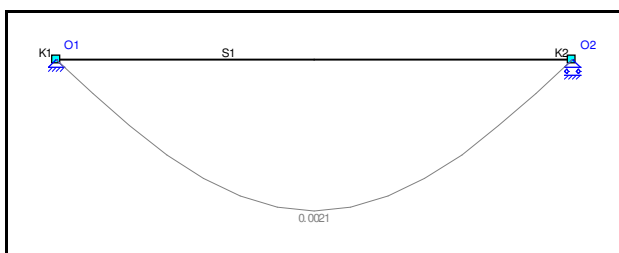
## KA.C. DOORBUIGINGEN

| Staaf | B.C.      | Knoop Begin |       |        | Staaf  |             |        | Knoop Eind |       |
|-------|-----------|-------------|-------|--------|--------|-------------|--------|------------|-------|
|       |           | X           | Z     | Z'afst | Z'     | Z' glb dist | Z' glb | X          | Z     |
| S1    | Ka.C.(w1) | 0,000       | 0,000 | 1,700  | 0,0021 | 1.700       | 0.0021 | 0,000      | 0,000 |
|       | Ka.C.1    | 0,000       | 0,000 | 1,700  | 0,0033 | 1.700       | 0.0033 | 0,000      | 0,000 |
|       | Ka.C.2    | 0,000       | 0,000 | 1,700  | 0,0029 | 1.700       | 0.0029 | 0,000      | 0,000 |
| -     | -         | m           | m     | m      | m      | m           | m      | m          | m     |

GGT is berekend obv de E-mod. van de UGT

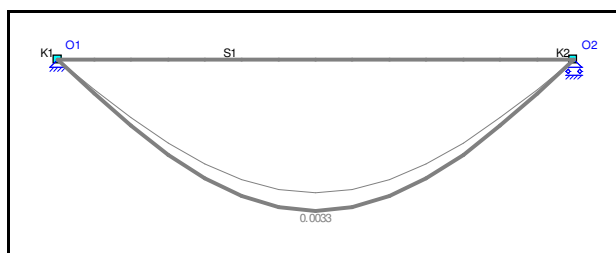
AFB. KA.C.(W1) VERPLAATSINGEN

Ka.C.(w1)  
Belastingscombinaties



AFB. KA.C. VERPLAATSINGEN  
OMHULLENDE

Karakteristiek  
Belastingscombinaties



## HOOUTOETS RESULTATEN NEN-EN1995-1-1:2011/NB:2013 DOORSNEDE GEGEVENS: R96X246

**C1 - V1  
(0.000-3.400)**

|                  |          |                            |                         |         |                         |
|------------------|----------|----------------------------|-------------------------|---------|-------------------------|
| Breedte          | b        | 0,096 m                    | Oppervlakte             | A       | 2362e-05 m <sup>2</sup> |
| Hoogte           | h        | 0,246 m                    | Dwarskracht oppervlakte | A;vy    | 1968e-05 m <sup>2</sup> |
|                  |          |                            | Dwarskracht oppervlakte | A;vz    | 1968e-05 m <sup>2</sup> |
| Weerstandsmoment | Wx       | 6123e-07 m <sup>3</sup>    | Traagheidsmoment        | I;tor   | 5556e-08 m <sup>4</sup> |
| Weerstandsmoment | Wy       | 9683e-07 m <sup>3</sup>    | Traagheidsmoment        | I;y     | 1191e-07 m <sup>4</sup> |
| Weerstandsmoment | Wz       | 3779e-07 m <sup>3</sup>    | Traagheidsmoment        | I;z     | 1814e-08 m <sup>4</sup> |
|                  | C;w      | 8232e-11 m <sup>6</sup>    |                         |         |                         |
| Sterkteklasse    |          | C24                        |                         |         |                         |
|                  | f;m,0,k  | 24,0 N/mm <sup>2</sup>     |                         | f;c,0,k | 21,0 N/mm <sup>2</sup>  |
|                  | f;t,0,k  | 14,0 N/mm <sup>2</sup>     |                         | f;v,0,k | 4,0 N/mm <sup>2</sup>   |
|                  | E0.05    | 7.400,0 N/mm <sup>2</sup>  |                         | G0.05   | 462,5 N/mm <sup>2</sup> |
|                  | E;0,mean | 11.000,0 N/mm <sup>2</sup> |                         | G;mean  | 690,0 N/mm <sup>2</sup> |
| E-Modulus        |          | 11.000,0 N/mm <sup>2</sup> |                         |         |                         |

## HOOUT: DOORSNEDECONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse       | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h   |       |
|----------------------|---------------|---------|--------|-------|-------|-------|
| II (Lange Termijn)   | Klasse I      | 1,30    | 0,20   | 0,90  | 1,00  |       |
| Maatgevende krachten | N;Ed          | Mx;Ed   | My;Ed  | Mz;Ed | Vy;Ed | Vz;Ed |
| Sigma                | 0,00          | 0,00    | 4,26   | 0,00  | 0,00  | 0,00  |
| Tau                  | 0,00          | 0,00    | 0,00   | 0,00  | 0,00  | 5,01  |
|                      | kN            | kN      | kN     | kN    | kN    | kN    |

## Ontwerpspanning

| Sigma;c;0;d       | Sigma;tor;d       | Sigma;m;y;d       | Sigma;m;z;d       | Sigma;v;y;d       | Sigma;v;z;d       |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0,0               | 0,0               | 4,4               | 0,0               | 0,0               | 0,3               |
| N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

|                         |                 |            |
|-------------------------|-----------------|------------|
| Constructieadviesbureau | ing. F. Wiggers | Varsseveld |
|-------------------------|-----------------|------------|

#### Ontwerpsterkte

| f;c;0;d | f;tor;d | f;m;y;d | f;m;z;d | f;v;0;d |
|---------|---------|---------|---------|---------|
| 14,5    | 0,0     | 16,6    | 18,2    | 2,8     |
| N/mm2   | N/mm2   | N/mm2   | N/mm2   | N/mm2   |

| Resultaten | Bel.comb. | Bel.duurkl.        | Positie [m] | UC   | Artikel                        |
|------------|-----------|--------------------|-------------|------|--------------------------------|
| Sigma      | Fu.C.1    | IV (Korte Termijn) | 1,700       | 0,26 | NEN-EN1995-1-1#6.1.6 (6.11)    |
| Tau        | Fu.C.1    | IV (Korte Termijn) | 0,000       | 0,11 | NEN-EN1995-1-1#6.1.7 (6.13) Vz |

NEN-EN1995-1-1#6.1.6 (6.11): UC = 0,26 < 1

#### HOUT: KIPCONTROLE VOLGENS NEN-EN1995-1-1:2011/NB:2013

| Lastduurklasse     | Klimaatklasse | Gamma;m | Beta;c | k;mod | k;h  |
|--------------------|---------------|---------|--------|-------|------|
| II (Lange Termijn) | Klasse I      | 1,30    | 0,20   | 0,90  | 1,00 |

Kipsteunen: N.v.t.

| Belastingstyp | Bel.duurkl.        | Bel.comb. | Aangrijppunt last |
|---------------|--------------------|-----------|-------------------|
| Verdeeld      | IV (Korte Termijn) | Fu.C.1    | Neutraal          |

| Begin inklemming | Eind inklemming | Lsys       | L;eff      | ltor            | Sigma,m,crit       | Lambda;rel;m | k;crit |
|------------------|-----------------|------------|------------|-----------------|--------------------|--------------|--------|
| Volledig vast    | Volledig vast   | 3,400<br>m | 3,060<br>m | 5556e-08<br>mm4 | 7.067e+01<br>N/mm2 | 0,6          | 1,00   |

#### Rekenwaarden voor spanning en rek

| Sigma;c;0;d | Sigma;m;y;d | Sigma;m;z;d | f;c;0;d | f;m;y;d | f;m;z;d |
|-------------|-------------|-------------|---------|---------|---------|
| 0,0         | 4,4         | 0,0         | 14,5    | 16,6    | 18,2    |
| N/mm2       | N/mm2       | N/mm2       | N/mm2   | N/mm2   | N/mm2   |

NEN-EN1995-1-1#6.3.3 (6.33): UC = 0,26 < 1

#### TOETSING DOORBUIGING HOUT VOLGENS NEN-EN1990#A1.4.2(2):2011

| Lastduurklasse     | Klimaatklasse | Bel.duurkl.        | Toetsingstype | Constr.type |
|--------------------|---------------|--------------------|---------------|-------------|
| II (Lange Termijn) | Klasse I      | II (Lange Termijn) | Handmatig     | Dak         |

#### Doorbuigingen Z'

|                               |             |       |                              |               |           |       |
|-------------------------------|-------------|-------|------------------------------|---------------|-----------|-------|
| E;0;ser;d;inst = E;mean       | 11.000      | N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 11.000 / 0,60 | 18.333    | N/mm2 |
| w;c                           | 0,0         | mm    | E-Mod / E;0;ser;d;cr         | 11.000/18.333 | 0,600     |       |
| w;1 (x = 1,700 m; Ka.C.(w1) ) | 2,1 * 1,000 | 2,1   |                              |               |           |       |
| w;2 (x = 1,700 m; Qu.C.1 )    | 2,1 * 0,600 | 1,3   |                              |               |           |       |
| w;3 (x = 1,700 m; Ka.C.1 )    | 1,2 * 1,000 | 1,2   |                              |               |           |       |
| w;tot                         |             | 4,6   |                              |               |           |       |
| w;max                         |             | 4,6   | (w;2+w;3)                    | 1,3 + 1,2     | 2,5       | mm    |
| Limiet w;max = L/600          |             | 5,7   | Limiet (w;2+w;3) = L/0       |               | 1,\$e+000 | mm    |
| UC(w;max)                     | 4,6/5,7     | 0,81  | UC(w;2+w;3)                  | 2,5/1,\$e+000 | 1,#J      |       |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,81 < 1

#### Doorbuigingen Z''

|                               |             |       |                              |               |           |       |
|-------------------------------|-------------|-------|------------------------------|---------------|-----------|-------|
| E;0;ser;d;inst = E;mean       | 11.000      | N/mm2 | E;0;ser;d;cr = E;mean / Kdef | 11.000 / 0,60 | 18.333    | N/mm2 |
| w;c                           | 0,0         | mm    | E-Mod / E;0;ser;d;cr         | 11.000/18.333 | 0,600     |       |
| w;1 (x = 1,700 m; Ka.C.(w1) ) | 2,1 * 1,000 | 2,1   |                              |               |           |       |
| w;2 (x = 1,700 m; Qu.C.1 )    | 2,1 * 0,600 | 1,3   |                              |               |           |       |
| w;3 (x = 1,700 m; Ka.C.1 )    | 1,2 * 1,000 | 1,2   |                              |               |           |       |
| w;tot                         |             | 4,6   |                              |               |           |       |
| w;max                         |             | 4,6   | (w;2+w;3)                    | 1,3 + 1,2     | 2,5       | mm    |
| Limiet w;max = L/600          |             | 5,7   | Limiet (w;2+w;3) = L/0       |               | 1,\$e+000 | mm    |
| UC(w;max)                     | 4,6/5,7     | 0,81  | UC(w;2+w;3)                  | 2,5/1,\$e+000 | 1,#J      |       |

NEN-EN1995#7.2|NEN-EN1990#A1.4.3(4): UC = 0,81 < 1

|                         |                                                                    |                 |               |                    |  |
|-------------------------|--------------------------------------------------------------------|-----------------|---------------|--------------------|--|
| Constructieadviesbureau |                                                                    | ing. F. Wiggers |               | Varsseveld         |  |
| Pos. W1                 |                                                                    |                 |               |                    |  |
| Projectnaam             |                                                                    |                 | Projectnummer | 22048IK            |  |
| Omschrijving            | A                                                                  | Constructeur    |               | ing. J.E. Veldhuis |  |
| Opdrachtgever           |                                                                    |                 | Eenheden      | m, kN, kNm         |  |
| Bestand                 | N:\22000\22048-IK\Constructie\Berekeningen\Onderdeel A\Pos. W1.mxf |                 |               |                    |  |

## 1. Kolom (NEN-EN1996-1-1:2009/NB:2011)

### MATERIAALGEGEVENS

|                           |       |       |                   |                    |                        |
|---------------------------|-------|-------|-------------------|--------------------|------------------------|
| Stenen, cat. I            |       |       |                   | Gevolgklasse       | CC1                    |
| Druksterkte product       | f'b   | 15.00 | N/mm <sup>2</sup> | Druksterkte mortel | f'm                    |
| Drukspanning              | f'rep | 6.68  | N/mm <sup>2</sup> | Em (700 * fk)      | 4678 N/mm <sup>2</sup> |
| fd, red art. 6.1.2.1(6.3) |       |       |                   |                    |                        |

### CONSTRUCTIEGEGEVENS

|                   |   |             |    |                    |   |         |
|-------------------|---|-------------|----|--------------------|---|---------|
| Wandverstijvingen | n | art. (11.i) | -  | Verd. hoogte kolom | h | 2900 mm |
| Kolomdiepte       | L | 320         | mm | Kolomdikte         | t | 120 mm  |

### BEREKENING VOLGENS NEN-EN1996 ART. 6.1.2 & ANNEX G (MID)

|                               |             | Boven      | Mid        | Onder      |
|-------------------------------|-------------|------------|------------|------------|
| Reken moment                  | Mid         | 0.00       | 0.00       | 0.00 kNm   |
| Rekenwaarde vert. belasting   | Nid         | 32.60      | 32.60      | 32.60 kN   |
| Excentriciteit hor. belasting | ehe         | 0          | 0          | 0 mm       |
| Reductie factor               | rn          | 0.75       | 0.75       | 0.75 -     |
| Effectieve hoogte             | hef         | 2175       | 2175       | 2175 mm    |
| Initieele excentriciteit      | einit       | 4.8        | 14.8       | 4.8 mm     |
| Excent. t.g.v. lasten         | ei, em      | 6.0        | 14.8       | 6.0 mm     |
| Slankheid                     | lambda      |            | 18.13      | -          |
|                               | lambda;c    |            | 27.0       | -          |
| Excent. t.g.v. kruip          | ek          |            | 0.00       | mm         |
| Check                         | ei < t/2    | Ok         | Ok         | Ok -       |
| Totale excentriciteit         | e1, emk, e2 | 6.0        | 14.8       | 6.0 mm     |
| Cap. red. factor              | Fi          | 0.90       | 0.43       | 0.90 -     |
| Uiterst opneembaar            | Nrd         | 125.5      | 59.7       | 125.5 kN   |
| art.11.2.3: toetswaarde       | NEd         | 32.6       | 32.6       | 32.6 kN    |
| <b>Unity check</b>            | <b>UC</b>   | <b>0.3</b> | <b>0.5</b> | <b>0.3</b> |

|                         |                                                                    |                 |               |                    |  |
|-------------------------|--------------------------------------------------------------------|-----------------|---------------|--------------------|--|
| Constructieadviesbureau |                                                                    | ing. F. Wiggers |               | Varsseveld         |  |
| Pos. S1                 |                                                                    |                 |               |                    |  |
| Projectnaam             |                                                                    |                 | Projectnummer | 21734IK            |  |
| Omschrijving            | A                                                                  |                 | Constructeur  | ing. J.E. Veldhuis |  |
| Opdrachtgever           |                                                                    |                 | Eenheden      | m, kN, kNm         |  |
| Bestand                 | N:\21600\21734-IK\Constructie\Berekeningen\Onderdeel A\Pos. S1.mxf |                 |               |                    |  |

## 1. Funderingsplaat (NEN-EN1992-1-1+C2:2010/NB:2011)

### STROOKFUNDERING

#### ALGEMEEN

|                                      |   |         |                        |     |         |
|--------------------------------------|---|---------|------------------------|-----|---------|
| Breedte                              | b | 1000 mm | Lengte                 | l   | 1000 mm |
| Dikte                                | h | 200 mm  | Wanddikte              | d;m | 100 mm  |
| Gamma;f;g;gunstig                    | - | 0.90 -  | Betrouwbaarheidsklasse | -   | RC1 -   |
| Psi                                  | - | 0.40 -  |                        |     |         |
| Belastingscategorie: Cat. A) Vloeren |   |         |                        |     |         |

#### BELASTINGEN

##### VERTICAAL

|                      |               |               |               |               |  |
|----------------------|---------------|---------------|---------------|---------------|--|
| Combinatie factoren  |               |               |               |               |  |
| -                    | <b>Fu.C.1</b> | <b>Fu.C.2</b> | <b>Ka.C.1</b> | <b>Ka.C.2</b> |  |
| Eigen gewicht        | 1.08          | 1.22          | 1.00          | 1.00          |  |
| Permanente belasting | 1.08          | 1.22          | 1.00          | 1.00          |  |
| Nuttige belasting    | 1.35          | 0.54          | 0.40          | 1.00          |  |
| -                    | <b>Fu.C.1</b> | <b>Fu.C.2</b> | <b>Ka.C.1</b> | <b>Ka.C.2</b> |  |
| Eigen gewicht        | 5.41          | 6.08          | 5.00          | 5.00          |  |
| Permanente belasting | 77.32         | 86.87         | 71.50         | 71.50         |  |
| Nuttige belasting    | 34.56         | 13.82         | 10.24         | 25.60         |  |
| Reken belasting      | 117.28        | 106.77        | 86.74         | 102.10        |  |
| -                    | <b>kN/m</b>   | <b>kN/m</b>   | <b>kN/m</b>   | <b>kN/m</b>   |  |

##### HORIZONTAAL

|                      |               |               |               |               |  |
|----------------------|---------------|---------------|---------------|---------------|--|
| Combinatie factoren  |               |               |               |               |  |
| -                    | <b>Fu.C.1</b> | <b>Fu.C.2</b> | <b>Ka.C.1</b> | <b>Ka.C.2</b> |  |
| Permanente belasting | 1.08          | 1.22          | 1.00          | 1.00          |  |
| Nuttige belasting    | 1.35          | 0.54          | 0.40          | 1.00          |  |
| -                    | <b>Fu.C.1</b> | <b>Fu.C.2</b> | <b>Ka.C.1</b> | <b>Ka.C.2</b> |  |
| Permanente belasting | -             | -             | -             | -             |  |
| Nuttige belasting    | -             | -             | -             | -             |  |
| Reken belasting      | -             | -             | -             | -             |  |
| -                    | <b>kN/m</b>   | <b>kN/m</b>   | <b>kN/m</b>   | <b>kN/m</b>   |  |

#### GRONDSPANNINGEN UITERSTE GRENSTOESTAND

|                      |            |              |                     |            |           |
|----------------------|------------|--------------|---------------------|------------|-----------|
| Max. vert. belasting | F;z;Ed;max | 117.28 kN/m  | Max. hor. belasting | F;x;Ed;max | 0.00 kN/m |
| Arm                  | a;vert     | 0.00 mm      | Max. moment         | MEd;max    | 0.00 kNm  |
| Weerstandsmoment     | W          | 0.16667 m³   | Oppervlak           | A          | 1.0000 m² |
| Max. gronddruk       | Sigma;max  | 117.28 kN/m² |                     |            |           |

#### KANTELEN UITERSTE GRENSTOESTAND

|                        |            |            |                    |         |           |
|------------------------|------------|------------|--------------------|---------|-----------|
| Min. vert. belasting   | F;z;Ed;min | 68.85 kN/m | Arm                | a;hor   | 500.00 mm |
| Max. hor. belasting    | F;x;Ed;max | 0.00 kN/m  | Arm                | a;vert  | 0.00 mm   |
| Max. kantelmoment      | MEd;max    | 0.00 kNm   | Stabiliteitsmoment | MEd;min | 0.00 kNm  |
| Veiligheidscoefficient | -          | 0.00 -     |                    |         |           |

MEd;min: 0.00 > 0.00 kNm Ok

#### AFSCHUIVING UITERSTE GRENSTOESTAND

|                        |            |          |                     |            |         |
|------------------------|------------|----------|---------------------|------------|---------|
| Min. vert. belasting   | F;z;Ed;min | 68.85 kN | Max. hor. belasting | F;x;Ed;max | 0.00 kN |
| Wrijvingscoefficient   | f;s        | 0.00 -   | Max. wrijv. kracht  | F;Ed;f;max | 0.00 kN |
| Veiligheidscoefficient | -          | 0.00 -   |                     |            |         |

|                                |                        |                   |
|--------------------------------|------------------------|-------------------|
| <b>Constructieadviesbureau</b> | <b>ing. F. Wiggers</b> | <b>Varsseveld</b> |
|--------------------------------|------------------------|-------------------|

F;Ed;f;max: 0.00 > 0.00 kN Ok

## WAPENINGSDETAILS

### PROFIELGEGEVENS: R1000X200

|                |   |          |         |       |                        |
|----------------|---|----------|---------|-------|------------------------|
| Breedte        | b | 1000 mm  | Hoogte  | h     | 200 mm                 |
| Betonkwaliteit |   | C20/25 - |         | f;cd  | 13.3 N/mm <sup>2</sup> |
|                |   |          |         | f;ctm | 2.21 N/mm <sup>2</sup> |
| Staalkwaliteit |   | B500A -  |         | f;yd  | 435 N/mm <sup>2</sup>  |
| Wap. diameter  | - | 8 mm     | Beugels | -     | - -                    |

## DEKKING

| -                  |            | <b>Boven</b> | <b>Onder</b> |
|--------------------|------------|--------------|--------------|
| Constructieklasse  |            | S4           | S4 -         |
| Milieuklasse       |            | XC2          | XC2 -        |
| Nabewerkt          |            | Nee          | Nee -        |
| Meetnauwkeurigheid |            | Normaal      | Normaal -    |
| Minimale dekking   | Cmin       | 30           | 30 mm        |
| Dekkingsafwijking  | Delta Cafw | 5            | 5 mm         |
| Nominale dekking   | Cnom       | 35           | 35 mm        |
| Toegepaste dekking | Ctoe       | 35           | 40 mm        |

## KRACHTEN

|                |      |           |             |      |          |
|----------------|------|-----------|-------------|------|----------|
| Buigend moment | M'Ed | 14.66 kNm | Dwarskracht | V'Ed | 52.78 kN |
|----------------|------|-----------|-------------|------|----------|

## LANGSWAPENING (LIGGER)

|                 |        |                     |                 |        |           |
|-----------------|--------|---------------------|-----------------|--------|-----------|
| Benodigde wap.  | As;ben | 221 mm <sup>2</sup> | Verhouding wap. | w0     | 0.14 %    |
| Hoogte drukzone | Xu     | 9.63 mm             | Nuttige hoogte  | d      | 156.00 mm |
| Xu/d            | kx     | 0.062 -             | Kx;max          | Kx;max | 0.535 -   |

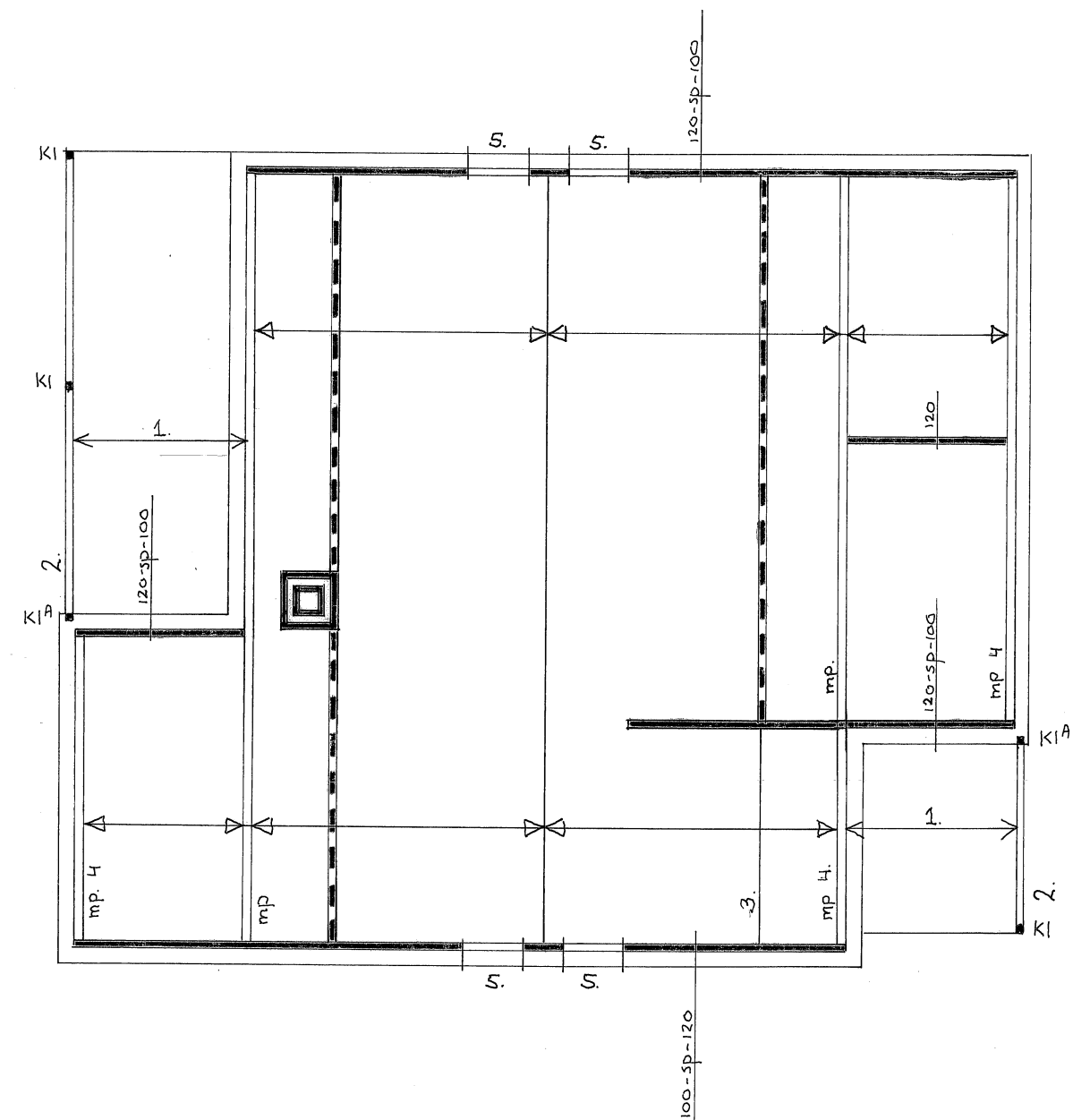
## DWARSKRACHTWAPENING

|                         |        |                   |                  |         |                   |
|-------------------------|--------|-------------------|------------------|---------|-------------------|
| Benodigde wap.          | As;ben | 0 mm <sup>2</sup> | Toegepaste wap.  | Asv;toe | 0 mm <sup>2</sup> |
| Nuttige hoogte          | d      | 156 mm            | Inw. hefboomsarm | z       | 152 mm            |
| Rekenwaarde wap. kracht | V;rd   | 0.00 kN           | Max. dwarskracht | Vrd;M   | 560.30 kN         |
| Dwarskracht weerstand   | V;rdc  | 69.06 kN          | C;rdc            | C;rdc   | 0.12 -            |
| K                       | K      | 2.00 -            | K1               | K1      | 0.15 -            |
| Rho;l                   | Rho;l  | 0.0014 -          | V;min            | V;min   | 0.44 -            |
| Sterkte reductie        | v;1    | 0.55 -            | Alfa;cw          | Alfa;cw | 1.00 -            |

V;rd: 52.78 < 0.00 kN NEN-EN1992-1-1#6.2 Niet OK



|      |                 |       |
|------|-----------------|-------|
| Dak. | Nr. 21734 IK    | Bl. A |
|      | d.d. 17-03-2017 |       |



- ← → Prefab scharnierkap, e.e.a. vlgs. opgave leverancier (sporen, knieschat, muurplaatfied.)  
← → Sporen  
--- Dragend. knieschat.  
mp. Muurplaat.

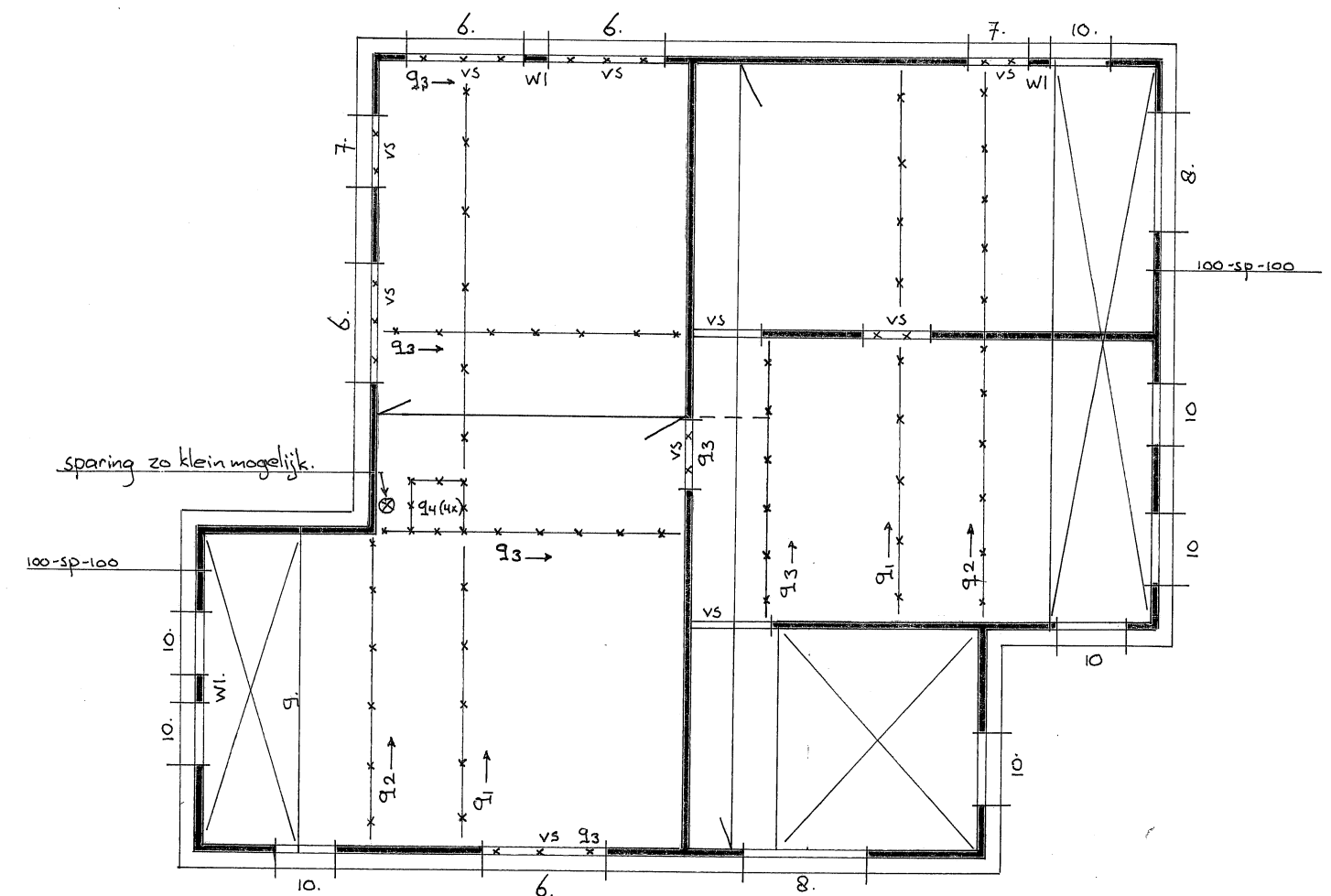


Verdieping.

Nr. 21374 IK

Bl. 3

d.d. 17-03-2017



|                 | G<br>(kN/m <sup>2</sup> ) | Q<br>(kN/m <sup>2</sup> ) |
|-----------------|---------------------------|---------------------------|
| q <sub>k1</sub> | 4,4                       | 2,7                       |
| q <sub>k2</sub> | 2,3                       | 1,2                       |
| q <sub>k3</sub> | 9,1                       | —                         |
| q <sub>k4</sub> | 9,8                       | —                         |

— Schilvloer h=230 mm C30/37  
— vs — Versterkte strook.

Indien niet anders aangegeven: — spouwmuur 120-sp-100  
— binnenwand 120

— — — Lijnlast op de vloer

