

# CORE CONSTRUCTIES

## Statische Berekening

Project: 5.1.2.e  
Onderdeel: Dakopbouw  
Opdrachtgever: Structure Engineering  
T.a.v. 5.1.2.e  
5.1.2.e  
5.1.2.e Amsterdam  
Projectnummer: 18047  
Datum: 26-06-2018  
Gewijzigd: Rev1 14-10-2019

Opgesteld:

5.1.2.e

5.1.2.e

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## 1 Inleiding

### 1.1 Algemeen

Het pand aan de 5.1.2.e wordt verbouwd. Er wordt een dakopbouw en een dakterras geplaatst.

In deze berekening worden de constructieve elementen hiervan beschouwd.

### 1.2 Wijzigingen

Rev1 De dakopbouw bestaat uit 2 lagen

## 2 Aangehouden belastingen

#### *permanent*

|                |                         |
|----------------|-------------------------|
| plat dak       | = 0,60kN/m <sup>2</sup> |
| dak+dakterras  | = 0,90kN/m <sup>2</sup> |
| HSB            | = 0,70kN/m <sup>2</sup> |
| pui            | = 0,70kN/m <sup>2</sup> |
| Houten vloeren | = 0,70kN/m <sup>2</sup> |
| badkamers      | = 1,50kN/m <sup>2</sup> |
| mw             | = 20,0kN/m <sup>3</sup> |
| beton          | = 25,0kN/m <sup>3</sup> |

#### *veranderlijk*

|                   |   |
|-------------------|---|
| vloeren (woning)  | = 2,55kN/m <sup>2</sup> (incl. 0,80kN/m <sup>2</sup> lichte scheidingswanden) |
| Balkons/dakterras | = 2,50kN/m <sup>2</sup>   |

## 3 Materialen

|             |                   |
|-------------|-------------------|
| hout binnen | C24               |
| hout buiten | C24 geïmpregneerd |
| staal       | S235              |
| bouten      | 8.8               |
| beton       | C20/25            |
| wapening    | B500A             |

## 4 Algemene rekenmethodes

Berekeningen conform Eurocodes.

Gevolgklasse CC2

## 5 Beschikbare informatie

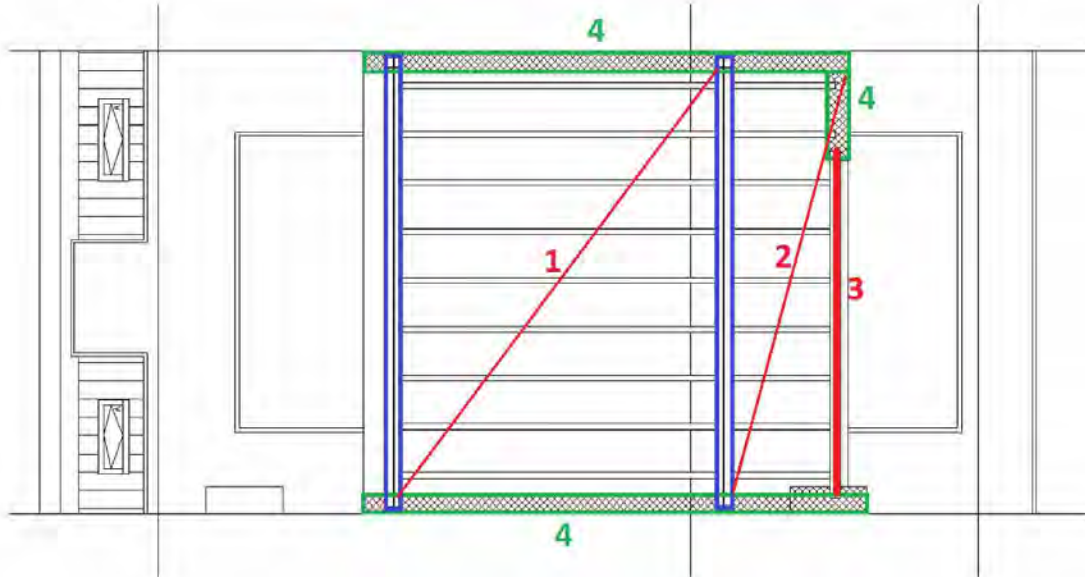
### 5.1 Algemeen

Voor het bepalen van de statische berekening is gebruik gemaakt van de volgende informatie:

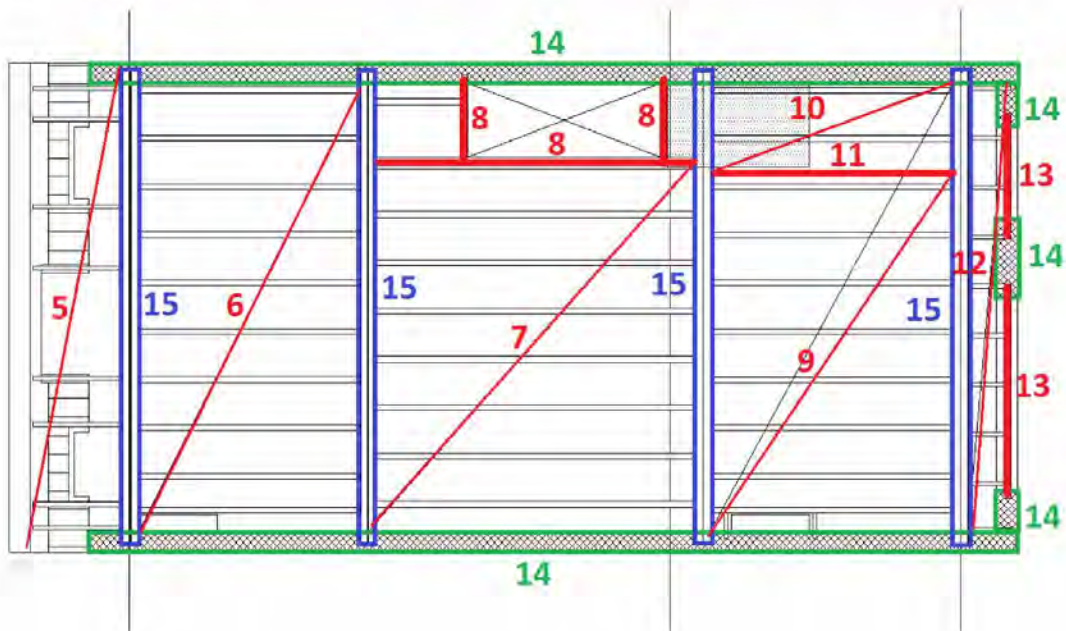
- Tekening LinQ Vastgoed Adviseurs BV 1143 d.d. 09-08-2018
- Principe tekening Structure Engineering CO-18048-hoofdlijnen-rev2
- Inmetingen/foto's/locatiebezoek Structure Engineering

## 6 Plattegrond met posnummers

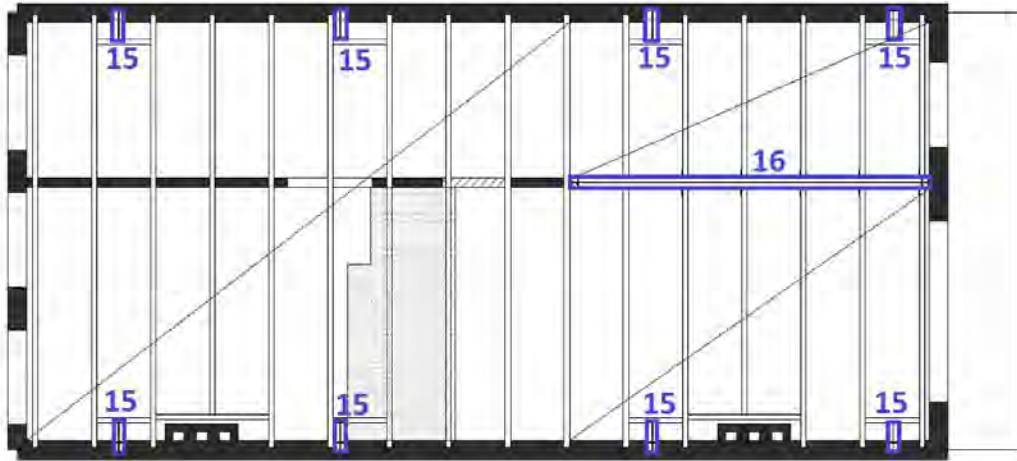
### 6.1 Daklaag



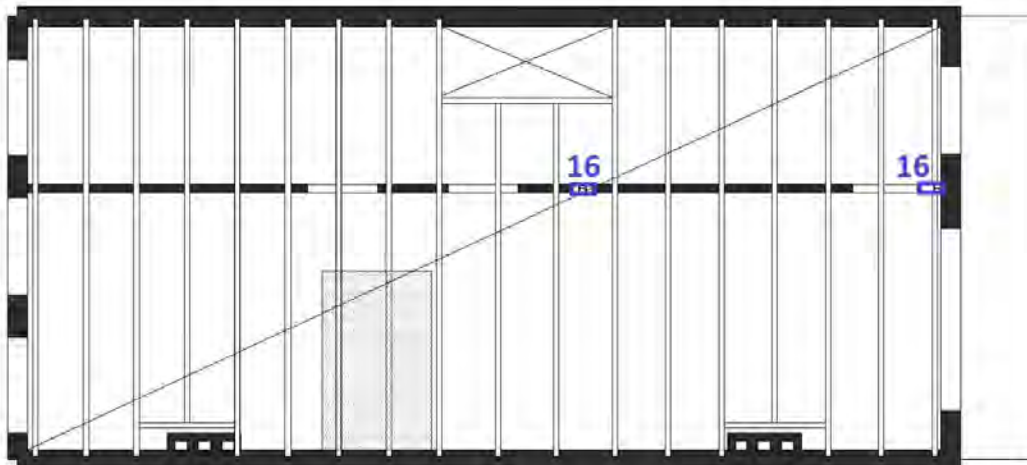
### 6.2 5<sup>e</sup> verdiepingvloer



## 6.3 4<sup>e</sup> verdiepingvloer



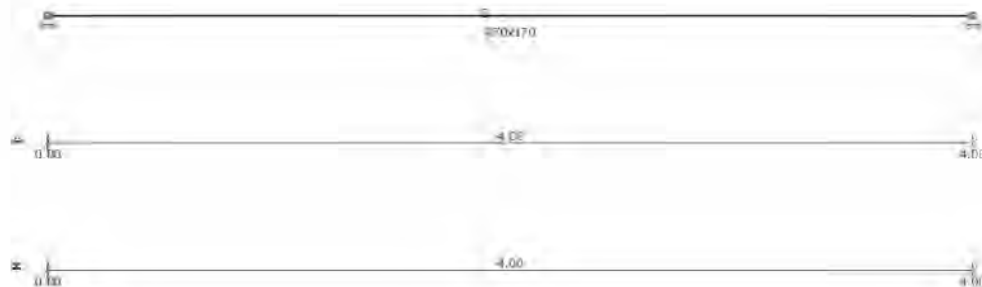
## 6.4 3<sup>e</sup> verdiepingvloer



## 7 Statische berekening

### 7.1 Pos 1

#### 7.1.1 Geometrie



#### 7.1.2 Belastingen

##### Permanent

$Q_{pb,rep}$  plat dak 0,6x0,60 = 0,36kN/m

##### Veranderlijk

$Q_{vb,rep}$  dak 0,6x1,00 = 0,60kN/m  
 sneeuw 0,6x0,56 = 0,34kN/m  
 $F_{vb,rep}$  Opgelegd = 2,00kN

#### 7.1.3 Toegepaste maatregel

70x170mm, h.o.h. 600mm

#### 7.1.4 Uiterste grenstoestand

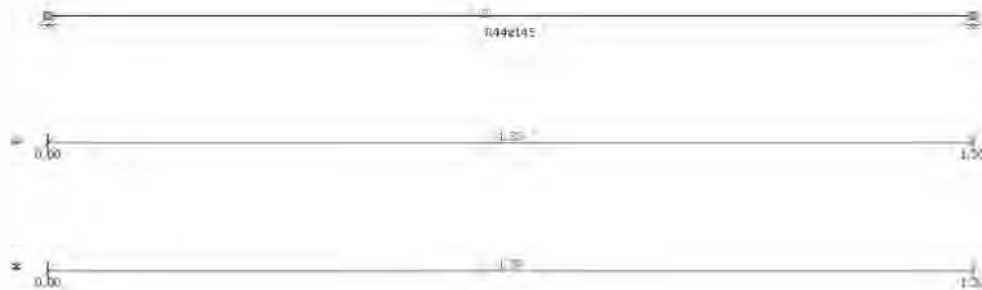
UC Drsn = 0,78, zie uitvoer MatrixFrame >> AKKOORD  
 UC Kip/stab = 0,78, zie uitvoer MatrixFrame >> AKKOORD

#### 7.1.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,78, zie uitvoer MatrixFrame >> AKKOORD  
 UC  $\delta_3$  = 0,54, zie uitvoer MatrixFrame >> AKKOORD

## 7.2 Pos 2

### 7.2.1 Geometrie



### 7.2.2 Belastingen

#### Permanent

$q_{pb,rep}$  plat dak 0,6x0,60 = 0,36kN/m

#### Veranderlijk

$q_{vb,rep}$  dak 0,6x1,00 = 0,60kN/m

sneeuw 0,6x0,56 = 0,34kN/m

$F_{vb,rep}$  Opgelegd = 2,00kN

### 7.2.3 Toegepaste maatregel

44x145mm, h.o.h. 600mm

### 7.2.4 Uiterste grenstoestand

UC Drsn = 0,47, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,47, zie uitvoer MatrixFrame >> AKKOORD

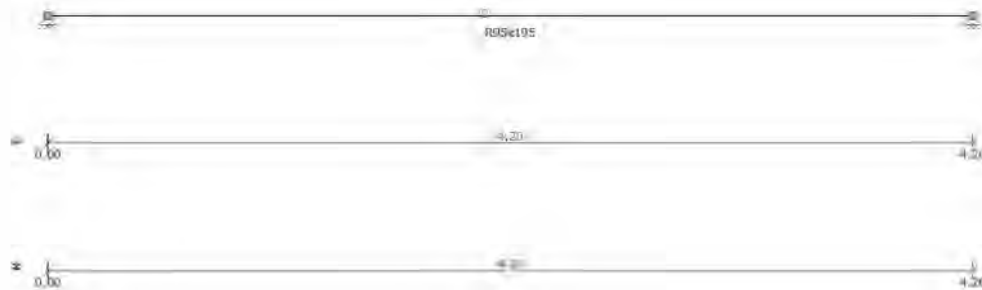
### 7.2.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,07, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,05, zie uitvoer MatrixFrame >> AKKOORD

## 7.3 Pos 3

### 7.3.1 Geometrie



### 7.3.2 Belastingen

#### Permanent

$q_{pb,rep}$  plat dak  $1/2 \times 1,5 \times 0,60 = 0,45 \text{ kN/m}$

#### Veranderlijk

$q_{vb,rep}$  dak  $1/2 \times 1,5 \times 1,00 = 0,75 \text{ kN/m}$

sneeuw  $1/2 \times 1,5 \times 0,56 = 0,42 \text{ kN/m}$

$F_{vb,rep}$  Opgelegd  $= 2,00 \text{ kN}$

### 7.3.3 Toegepaste maatregel

95x195mm

### 7.3.4 Uiterste grenstoestand

UC Drsn = 0,49, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,49, zie uitvoer MatrixFrame >> AKKOORD

### 7.3.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,55, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,38, zie uitvoer MatrixFrame >> AKKOORD



## 7.4 Pos 4

### 7.4.1 Geometrie



### 7.4.2 Belastingen

#### Permanent

|              |          |   |            |
|--------------|----------|---|------------|
| $F_{pb,rep}$ | plat dak | $0,4 \times 1/2 \times 1,5 \times 0,60$ | = 0,18kN   |
| $q_{pb,rep}$ | HSB      | $0,4 \times 0,70$                       | = 0,28kN/m |

#### Veranderlijk

|              |           |   |                       |
|--------------|-----------|---|-----------------------|
| $F_{vb,rep}$ | dakterras | $0,4 \times 1/2 \times 1,5 \times 1,00$ | = 0,30kN              |
|              | Opgelegd  |   | = 2,00kN (maatgevend) |
| $q_{vb,rep}$ | wind      | $0,4 \times (0,8 + 0,3) \times 0,86$    | = 0,38kN/m            |

|                   |         |                   |
|-------------------|---------|-------------------|
| Windgebied        | II      |                   |
| Terreincategorie  | bebouwd |                   |
| Hoogte bouwwerk z | 17.9    | m                 |
| z0                | 0.5     | m                 |
| zmin              | 7       | m                 |
| lv(z)             | 0.28    |                   |
| kr                | 0.22    |                   |
| Cr                | 0.80    |                   |
| C0                | 1       |                   |
| v,b,0             | 27      | m/s               |
| vm(z)             | 21.57   | m/s               |
| qp(z)             | 0.86    | kN/m <sup>2</sup> |

### 7.4.3 Toegepaste maatregel

38x120mm, h.o.h. 400mm. Dubbele stijlen naast alle openingen en onder opleggingen houten balk Pos 3. Aan minimaal 1 zijde beplaten met 12mm multiplex i.v.m. stabiliteit.

#### 7.4.4 Uiterste grenstoestand

UC Drsn = 0,26, zie uitvoer MatrixFrame >> AKKOORD

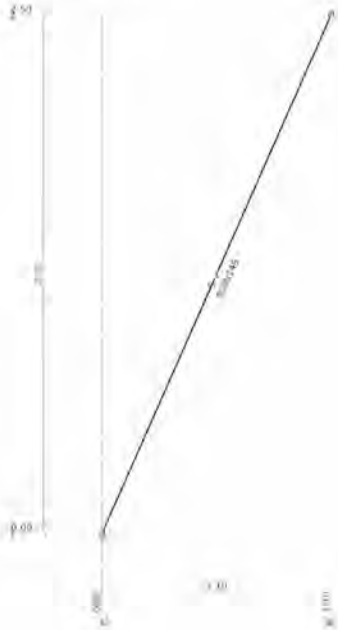
UC Kip/stab = 0,29, zie uitvoer MatrixFrame >> AKKOORD ( $I_{buc}/I_{yy} = 0,1$  in zwakke richting)

#### 7.4.5 Bruikbaarheids grenstoestand

N.v.t.

## 7.5 Pos 5

### 7.5.1 Geometrie



### 7.5.2 Belastingen

#### Permanent

|              |            |                              |             |
|--------------|------------|------------------------------|-------------|
| $q_{pb,rep}$ | schuin dak | $1/2 \times 0,8 \times 0,80$ | = 0,32 kN/m |
|              | plat dak   | $1/2 \times 1,3 \times 0,60$ | = 0,39 kN/m |
|              | HSB        | $2,5 \times 0,70$            | = 1,75 kN/m |

#### Veranderlijk

|              |          |                              |                        |
|--------------|----------|------------------------------|------------------------|
| $Q_{vb,rep}$ | plat dak | $1/2 \times 1,3 \times 1,00$ | = 0,65 kN/m            |
| $F_{vb,rep}$ | Opgelegd |                              | = 2,00 kN (maatgevend) |

#### wind

|              |      |   |             |
|--------------|------|---|-------------|
| $q_{vb,rep}$ | wind | $1/2 \times 0,8 \times (0,8 + 0,3) \times 0,86$ | = 0,38 kN/m |
|              | wind | $1/2 \times 1,3 \times (0,8 + 0,3) \times 0,86$ | = 0,61 kN/m |

|                   |         |                   |
|-------------------|---------|-------------------|
| Windgebied        | II      |                   |
| Terreincategorie  | bebouwd |                   |
| Hoogte bouwwerk z | 17.9    | m                 |
| z0                | 0.5     | m                 |
| zmin              | 7       | m                 |
| lv(z)             | 0.28    |                   |
| kr                | 0.22    |                   |
| Cr                | 0.80    |                   |
| C0                | 1       |                   |
| v,b,0             | 27      | m/s               |
| vm(z)             | 21.57   | m/s               |
| qp(z)             | 0.86    | kN/m <sup>2</sup> |

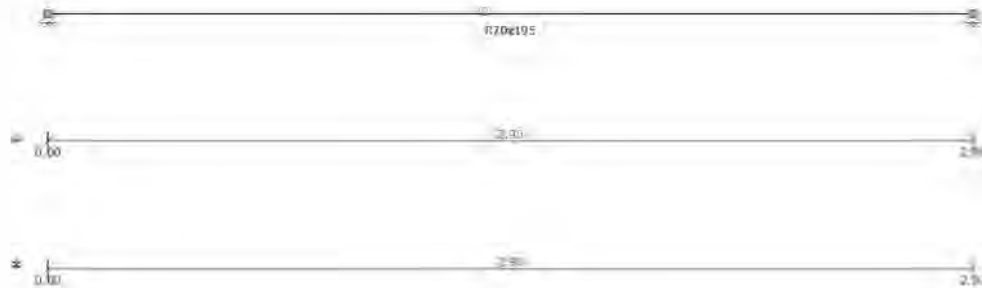
7.5.3 Toegepaste maatregel  
70x145mm, h.o.h. 1,1 gemiddeld.

7.5.4 Uiterste grenstoestand  
UC Drsn = 0,50, zie uitvoer MatrixFrame >> AKKOORD  
UC Kip/stab = 0,56, zie uitvoer MatrixFrame >> AKKOORD ( $I_{buc}/I_{sys} = 0,1$  in zwakke richting)

7.5.5 Bruikbaarheids grenstoestand  
N.v.t.

## 7.6 Pos 6

### 7.6.1 Geometrie



### 7.6.2 Belastingen

#### Permanent

|               |               |              |            |
|---------------|---------------|--------------|------------|
| $q_{1pb;rep}$ | dak+dakterras | 0,6x0,90     | = 0,54kN/m |
| $q_{2pb;rep}$ | vloer         | 0,6x0,70     | = 0,42kN/m |
| $F_{pb;rep}$  | pui           | 0,6x2,4x0,70 | = 1,01kN   |

#### Veranderlijk

|               |               |          |            |
|---------------|---------------|----------|------------|
| $q_{1vb;rep}$ | dak+dakterras | 0,6x2,50 | = 1,50kN/m |
| $q_{2vb;rep}$ | vloer         | 0,6x2,55 | = 1,53kN/m |
| $F_{vb;rep}$  | Opgelegd      |          | = 3,00kN   |

### 7.6.3 Toegepaste maatregel 70x195mm, h.o.h. 600mm

### 7.6.4 Uiterste grenstoestand

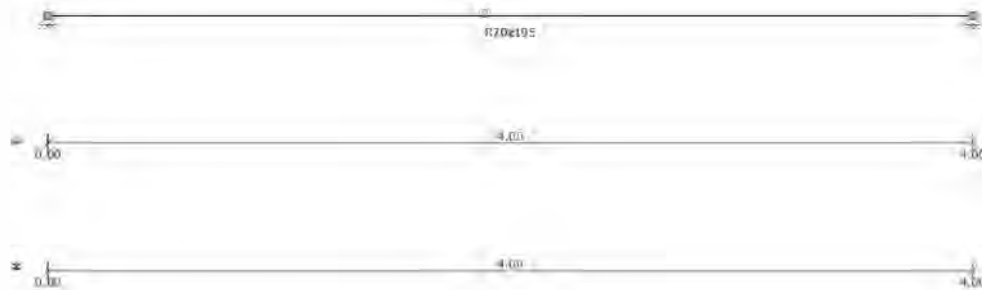
UC Drsn = 0,63, zie uitvoer MatrixFrame >> AKKOORD  
 UC Kip/stab = 0,63, zie uitvoer MatrixFrame >> AKKOORD

### 7.6.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,48, zie uitvoer MatrixFrame >> AKKOORD  
 UC  $\delta_3$  = 0,49, zie uitvoer MatrixFrame >> AKKOORD

## 7.7 Pos 7

### 7.7.1 Geometrie



### 7.7.2 Belastingen

#### Permanent

$q_{pb;rep}$  vloer  $0,4 \times 0,70 = 0,28 \text{ kN/m}$

#### Veranderlijk

$q_{vb;rep}$  vloer  $0,4 \times 2,55 = 1,02 \text{ kN/m}$

$F_{vb;rep}$  Opgelegd  $= 3,00 \text{ kN}$

### 7.7.3 Toegepaste maatregel

70x195mm, h.o.h. 400mm

### 7.7.4 Uiterste grenstoestand

UC Drsn = 0,79, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,79, zie uitvoer MatrixFrame >> AKKOORD

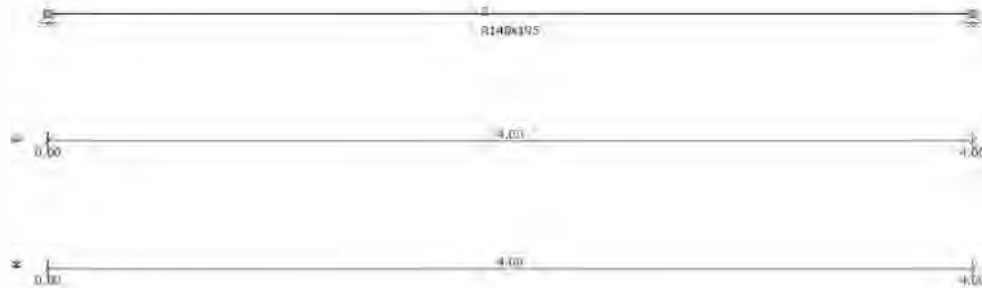
### 7.7.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,72, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,80, zie uitvoer MatrixFrame >> AKKOORD

## 7.8 Pos 8

### 7.8.1 Geometrie



### 7.8.2 Belastingen

#### Permanent

|                      |                  |              |            |
|----------------------|------------------|--------------|------------|
| q1 <sub>pb,rep</sub> | vloer            | 0,4x0,70     | = 0,28kN/m |
| q2 <sub>pb,rep</sub> | vloer            | 1/2x1,4x0,70 | = 0,49kN/m |
| q3 <sub>pb,rep</sub> | vloer            | 1/2x1,4x0,70 | = 0,49kN/m |
|                      | badkamer (extra) | 1/2x1,0x0,80 | = 0,40kN/m |
|                      | TOTAAL           |              | = 0,89kN/m |

#### Veranderlijk

|                      |          |              |            |
|----------------------|----------|--------------|------------|
| q1 <sub>vb,rep</sub> | vloer    | 0,4x2,55     | = 1,02kN/m |
| q2 <sub>vb,rep</sub> | vloer    | 1/2x1,4x2,55 | = 1,79kN/m |
| q2 <sub>vb,rep</sub> | vloer    | 1/2x1,4x2,55 | = 1,79kN/m |
| F <sub>vb,rep</sub>  | Opgelegd |              | = 3,00kN   |

### 7.8.3 Toegepaste maatregel

Dubbele 70x195mm (ravelingen 70x195mm, praktisch)

### 7.8.4 Uiterste grenstoestand

UC Drsn = 0,41, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,41, zie uitvoer MatrixFrame >> AKKOORD

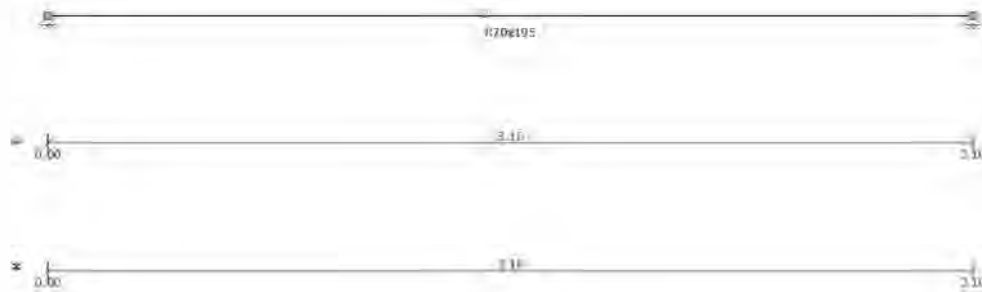
### 7.8.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,43, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,71, zie uitvoer MatrixFrame >> AKKOORD (scheurgevoelig)

## 7.9 Pos 9

### 7.9.1 Geometrie



### 7.9.2 Belastingen

#### Permanent

|               |               |              |            |
|---------------|---------------|--------------|------------|
| $q_{1pb;rep}$ | dak+dakterras | 0,6x0,90     | = 0,54kN/m |
| $q_{2pb;rep}$ | vloer         | 0,6x0,70     | = 0,42kN/m |
| $F_{pb;rep}$  | pui           | 0,6x2,4x0,70 | = 1,01kN   |

#### Veranderlijk

|               |               |          |            |
|---------------|---------------|----------|------------|
| $q_{1vb;rep}$ | dak+dakterras | 0,6x2,50 | = 1,50kN/m |
| $q_{2vb;rep}$ | vloer         | 0,6x2,55 | = 1,53kN/m |
| $F_{vb;rep}$  | Opgelegd      |          | = 3,00kN   |

### 7.9.3 Toegepaste maatregel 70x195mm, h.o.h. 600mm

### 7.9.4 Uiterste grenstoestand

UC Drsn = 0,77, zie uitvoer MatrixFrame >> AKKOORD  
UC Kip/stab = 0,77, zie uitvoer MatrixFrame >> AKKOORD

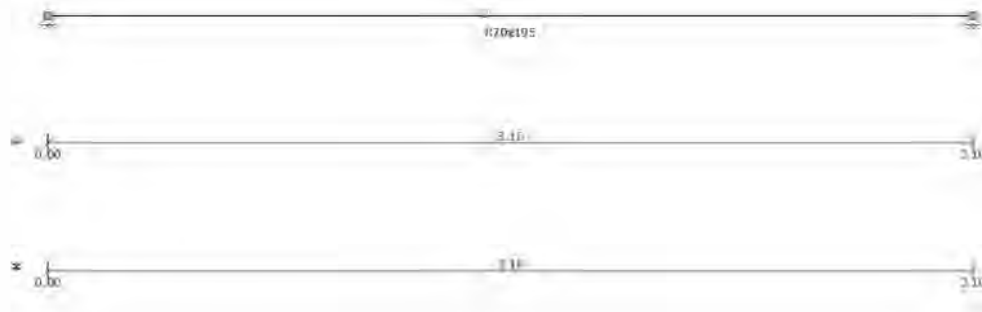
### 7.9.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,69, zie uitvoer MatrixFrame >> AKKOORD  
UC  $\delta_3$  = 0,65, zie uitvoer MatrixFrame >> AKKOORD



## 7.10 Pos 10

### 7.10.1 Geometrie



### 7.10.2 Belastingen

#### Permanent

|               |               |                  |            |
|---------------|---------------|------------------|------------|
| $q_{1pb,rep}$ | dak+dakterras | 0,4x0,90         | = 0,36kN/m |
| $q_{2pb,rep}$ | badkamer      | 0,4x1,50         | = 0,60kN/m |
| $F_{pb,rep}$  | HSB           | 0,4x2,4x0,70     | = 0,67kN   |
|               | Plat dak      | 0,4x1/2x1,5x0,60 | = 0,18kN   |
|               | TOTAAL        |                  | = 0,85kN   |

#### Veranderlijk

|               |               |          |            |
|---------------|---------------|----------|------------|
| $q_{1vb,rep}$ | dak+dakterras | 0,4x2,50 | = 1,00kN/m |
| $q_{2vb,rep}$ | vloer         | 0,4x2,55 | = 1,02kN/m |
| $F_{vb,rep}$  | Opgelegd      |          | = 3,00kN   |

### 7.10.3 Toegepaste maatregel

70x195mm, h.o.h. 400mm

### 7.10.4 Uiterste grenstoestand

UC Drsn = 0,74, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,74, zie uitvoer MatrixFrame >> AKKOORD

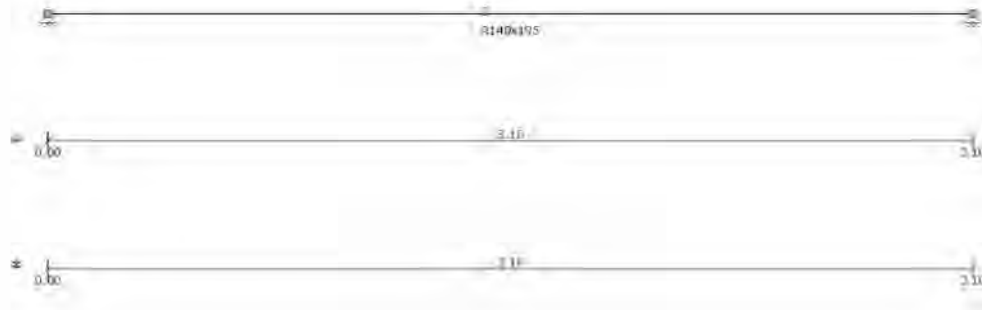
### 7.10.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,53, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,70, zie uitvoer MatrixFrame >> AKKOORD (scheurgevoelig)

## 7.11 Pos 11

### 7.11.1 Geometrie



### 7.11.2 Belastingen

#### Permanent

|                      |               |                  |            |
|----------------------|---------------|------------------|------------|
| q1 <sub>pb,rep</sub> | dak+dakterras | 0,5x0,90         | = 0,45kN/m |
| q2 <sub>pb,rep</sub> | badkamer      | 0,5x1,50         | = 0,75kN/m |
| F <sub>pb,rep</sub>  | uit Pos 3     |                  | = 0,95kN   |
|                      | HSB           | 0,2x2,4x0,70     | = 0,34kN   |
|                      | Plat dak      | 0,2x1/2x1,5x0,60 | = 0,09kN   |
|                      | TOTAAL        |                  | = 1,38kN   |

#### Veranderlijk

|                      |               |          |            |
|----------------------|---------------|----------|------------|
| q1 <sub>vb,rep</sub> | dak+dakterras | 0,5x2,50 | = 1,25kN/m |
| q2 <sub>vb,rep</sub> | vloer         | 0,5x2,55 | = 1,28kN/m |
| F <sub>vb,rep</sub>  | Opgelegd      |          | = 3,00kN   |

### 7.11.3 Toegepaste maatregel

Dubbele 70x195mm (h.o.h. 400mm/600mm = h.o.h. 500mm gemiddeld)

### 7.11.4 Uiterste grenstoestand

UC Drsn = 0,42, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,42, zie uitvoer MatrixFrame >> AKKOORD

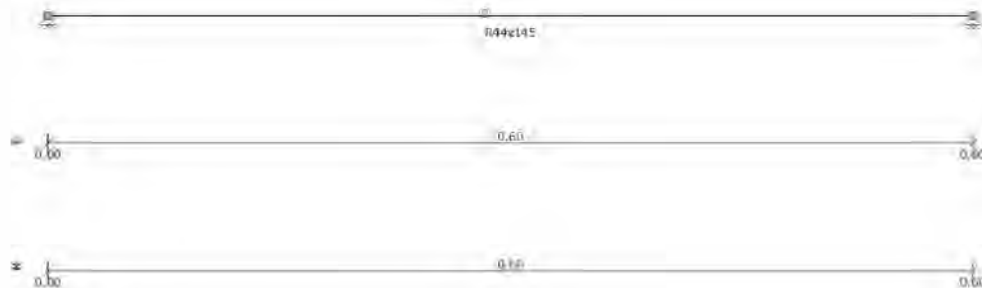
### 7.11.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,36, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,46, zie uitvoer MatrixFrame >> AKKOORD (scheurgevoelig)

## 7.12 Pos 12

### 7.12.1 Geometrie



### 7.12.2 Belastingen

#### Permanent

$q_{1pb;rep}$  plat dak      0,6x0,60      = 0,36kN/m

#### Veranderlijk

$q_{1vb;rep}$  dak      0,6x1,00      = 0,60kN/m

sneeuw      0,6x0,56      = 0,34kN/m

$F_{vb;rep}$  Opgelegd      = 2,00kN

### 7.12.3 Toegepaste maatregel

44x145mm, h.o.h. 600mm

### 7.12.4 Uiterste grenstoestand

UC Drsn = 0,20, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,20, zie uitvoer MatrixFrame >> AKKOORD

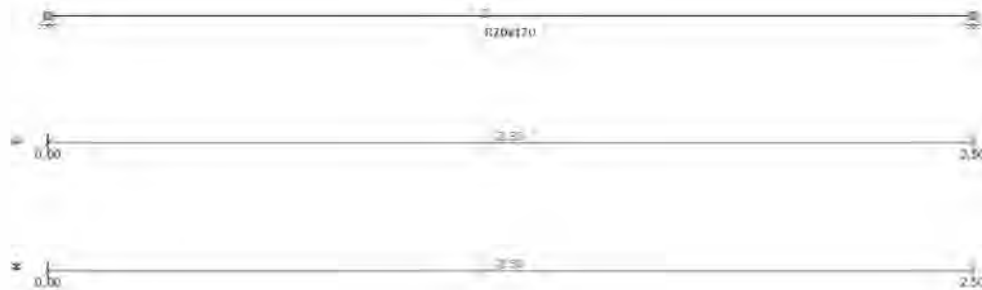
### 7.12.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,01, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,00, zie uitvoer MatrixFrame >> AKKOORD

## 7.13 Pos 13

### 7.13.1 Geometrie



### 7.13.2 Belastingen

#### Permanent

$q_{1pb;rep}$  plat dak  $1/2 \times 0,8 \times 0,60 = 0,24 \text{ kN/m}$

#### Veranderlijk

$q_{1vb;rep}$  dak  $1/2 \times 0,8 \times 1,00 = 0,40 \text{ kN/m}$

sneeuw  $1/2 \times 0,8 \times 0,56 = 0,22 \text{ kN/m}$

$F_{vb;rep}$  Opgelegd  $= 2,00 \text{ kN}$

### 7.13.3 Toegepaste maatregel

70x170mm

### 7.13.4 Uiterste grenstoestand

UC Drsn = 0,42, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,42, zie uitvoer MatrixFrame >> AKKOORD

### 7.13.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,13, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,09, zie uitvoer MatrixFrame >> AKKOORD

## 7.14 Pos 14

### 7.14.1 Geometrie



### 7.14.2 Belastingen

#### Permanent

|              |          |   |          |
|--------------|----------|---|----------|
| $F_{pb;rep}$ | plat dak | $0,4 \times 1/2 \times 0,6 \times 0,60$ | = 0,07kN |
|              | vloer    | $0,4 \times 1/2 \times 0,6 \times 0,70$ | = 0,08kN |
|              | HSB      | $0,4 \times 2,4 \times 0,70$            | = 0,67kN |
|              | TOTAAL   |   | = 0,82kN |

|              |     |                   |            |
|--------------|-----|-------------------|------------|
| $q_{pb;rep}$ | HSB | $0,4 \times 0,70$ | = 0,28kN/m |
|--------------|-----|-------------------|------------|

#### Veranderlijk

|              |          |   |                       |
|--------------|----------|---|-----------------------|
| $F_{vb;rep}$ | vloer    | $0,4 \times 1/2 \times 0,6 \times 2,55$ | = 0,31kN              |
|              | Opgelegd |   | = 3,00kN (maatgevend) |
| $q_{vb;rep}$ | wind     | $0,4 \times (0,8 + 0,3) \times 0,86$    | = 0,38kN/m            |

|                   |         |                   |
|-------------------|---------|-------------------|
| Windgebied        | II      |                   |
| Terreincategorie  | bebouwd |                   |
| Hoogte bouwwerk z | 17.9    | m                 |
| $z_0$             | 0.5     | m                 |
| $z_{min}$         | 7       | m                 |
| $lv(z)$           | 0.28    |                   |
| $kr$              | 0.22    |                   |
| $C_r$             | 0.80    |                   |
| $C_0$             | 1       |                   |
| $v_{b,0}$         | 27      | m/s               |
| $v_m(z)$          | 21.57   | m/s               |
| $q_p(z)$          | 0.86    | kN/m <sup>2</sup> |

#### 7.14.3 Toegepaste maatregel

38x120mm, h.o.h. 400mm. Dubbele stijlen naast alle openingen. Aan minimaal 1 zijde beplaten met 12mm multiplex i.v.m. stabiliteit.

#### 7.14.4 Uiterste grenstoestand

UC Drsn = 0,28, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,33, zie uitvoer MatrixFrame >> AKKOORD ( $l_{buc}/l_{sys} = 0,1$  in zwakke richting)

#### 7.14.5 Bruikbaarheids grenstoestand

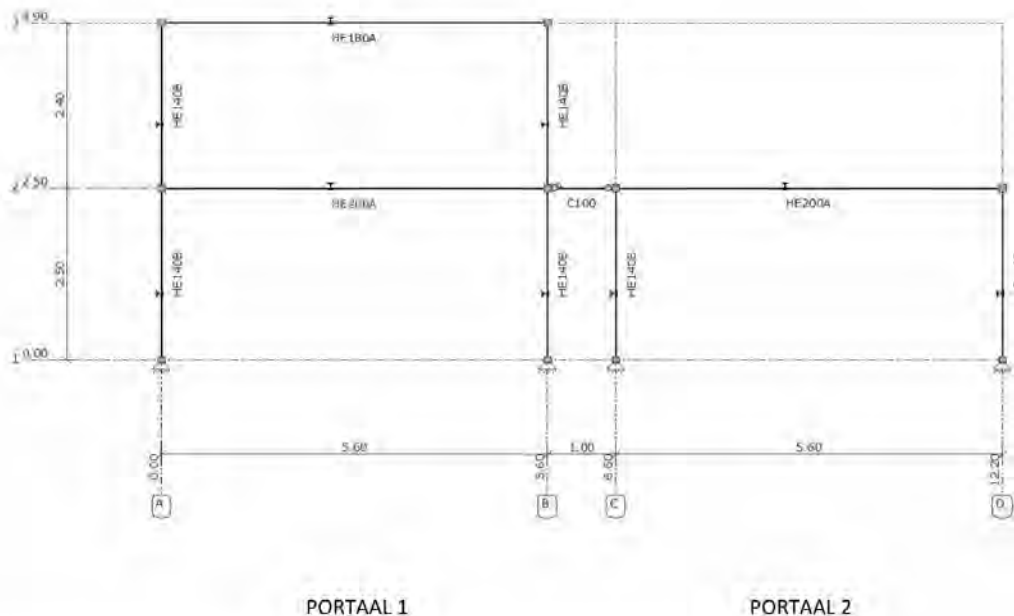
N.v.t.

## 7.15 Pos 15

### 7.15.1 Uitgangspunten

De 4 portalen vangen 100% van de windbelasting op. De 2 maatgevende portalen worden beschouwd.

### 7.15.2 Geometrie



LET OP: Beide portalen 2x uitvoeren. De staaf C100 is enkel een rekentechnische koppelstaaf.

### 7.15.3 Belastingen

Permanent

PORTAAL 1

|               |                 |                              |  |
|---------------|-----------------|------------------------------|--|
| $q_{1pb,rep}$ | dak             | $1/2 \times 5,6 \times 0,60$ | = 1,7kN/m  |
| $q_{2pb,rep}$ | vloer/dakterras | $1/2 \times 7,2 \times 1,00$ | = 3,6kN/m (er wordt met 1,0kN/m <sup>2</sup> gerekend) |
|               | HSB/pui         | $2,7 \times 0,70$            | = 1,9kN/m  |
|               | TOTAAL          |                              | = 5,5kN/m  |

PORTAAL 2

|               |                 |                               |  |
|---------------|-----------------|-------------------------------|--|
| $q_{1pb,rep}$ | vloer/dakterras | $1/2 \times 3,7 \times 1,00$  | = 1,9kN/m (er wordt met 1,0kN/m <sup>2</sup> gerekend) |
|               | HSB/pui         | $50\% \times 2,7 \times 0,70$ | = 1,4kN/m  |
|               | TOTAAL          |                               | = 3,3kN/m  |

Veranderlijk

PORTAAL 1

|               |                 |                              |           |
|---------------|-----------------|------------------------------|-----------|
| $q_{1vb,rep}$ | dak             | $1/2 \times 5,6 \times 1,00$ | = 2,8kN/m |
| $q_{2vb,rep}$ | dakterras/vloer | $1/2 \times 7,2 \times 2,55$ | = 9,2kN/m |

PORTAAL 2

|               |           |                              |           |
|---------------|-----------|------------------------------|-----------|
| $q_{1vb,rep}$ | dakterras | $1/2 \times 3,7 \times 2,50$ | = 4,6kN/m |
|---------------|-----------|------------------------------|-----------|

## Wind

### PORTAAL 1

|        |  |                     |
|--------|--|---------------------|
| A1     | $50\% \times 6,0 \times 1/2 \times 2,4$  | $= 3,6 \text{ m}^2$ |
| A2     | $50\% \times 6,0 \times 1/2 \times 2,4$  | $= 3,6 \text{ m}^2$ |
|        | $25\% \times 12,0 \times 1/2 \times 2,5$ | $= 3,8 \text{ m}^2$ |
| TOTAAL |  | $= 7,4 \text{ m}^2$ |

|                        |  |                    |
|------------------------|--|--------------------|
| $F_{1, \text{vb;rep}}$ | $3,6 \times 0,85 \times (0,8 + 0,7) \times 0,86$ | $= 3,9 \text{ kN}$ |
| $F_{2, \text{vb;rep}}$ | $7,4 \times 0,85 \times (0,8 + 0,7) \times 0,86$ | $= 8,1 \text{ kN}$ |

### PORTAAL 2

|    |  |                     |
|----|--|---------------------|
| A2 | $25\% \times 12,0 \times 1/2 \times 2,5$ | $= 3,8 \text{ m}^2$ |
|----|--|---------------------|

### PORTAAL

|                        |  |                    |
|------------------------|--|--------------------|
| $F_{1, \text{vb;rep}}$ | $3,8 \times 0,85 \times (0,8 + 0,7) \times 0,86$ | $= 4,2 \text{ kN}$ |
|------------------------|--|--------------------|

|                   |         |                   |
|-------------------|---------|-------------------|
| Windgebied        | II      |                   |
| Terreincategorie  | bebouwd |                   |
| Hoogte bouwwerk z | 17.9    | m                 |
| z0                | 0.5     | m                 |
| zmin              | 7       | m                 |
| lv(z)             | 0.28    |                   |
| kr                | 0.22    |                   |
| Cr                | 0.80    |                   |
| C0                | 1       |                   |
| v,b,0             | 27      | m/s               |
| vm(z)             | 21.57   | m/s               |
| qp(z)             | 0.86    | kN/m <sup>2</sup> |

#### 7.15.4 Toegepaste maatregel

Zie geometrie. LET OP: Beide portalen 2x uitvoeren! Alle verbindingen momentvast.

#### 7.15.5 Uiterste grenstoestand

UC Drsn = 0,46, zie uitvoer MatrixFrame >> AKKOORD

UC Kip/stab = 0,54, zie uitvoer MatrixFrame >> AKKOORD

#### 7.15.6 Bruikbaarheids grenstoestand

UC  $\delta_{\text{max}}$  = 1,19, zie uitvoer MatrixFrame >> NAGENOEG AKKOORD (horizontale verplaatsing)

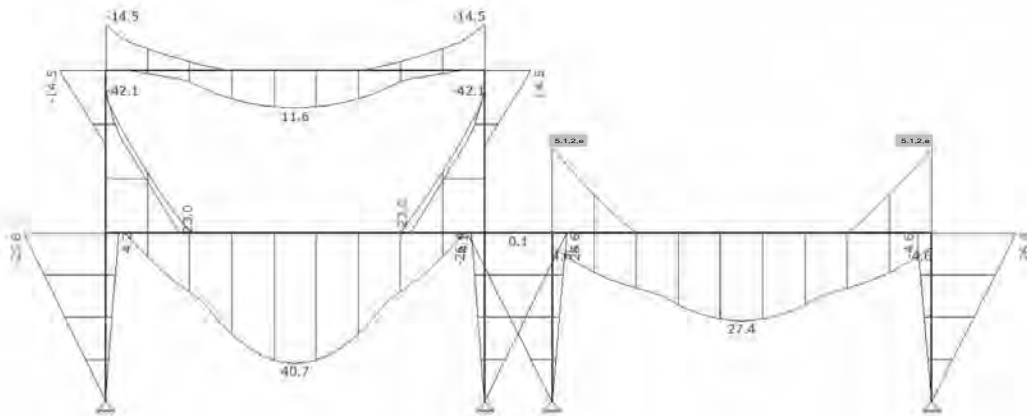
UC  $\delta_{\text{max}}$  = 0,39, zie uitvoer MatrixFrame >> AKKOORD (doorbuging)

UC  $\delta_3$  = 1,33, zie uitvoer MatrixFrame >> NAGENOEG AKKOORD (horizontale verplaatsing)

UC  $\delta_3$  = 0,18, zie uitvoer MatrixFrame >> AKKOORD (doorbuging)



7.15.7 Verbindingen



HEA180 – HEB140

Random lassen. Aan buitenzijde lasplaat, d=12mm toepassen. Verticale schetsplaat boven flens kolom, d=12mm toepassen.

Controle maatgevende las

$$\sigma_d = (14,5/0,14) \times 10^3 / (2 \times 140 \times 1/2 \times 9,5) = 77,9 \text{ N/mm}^2$$

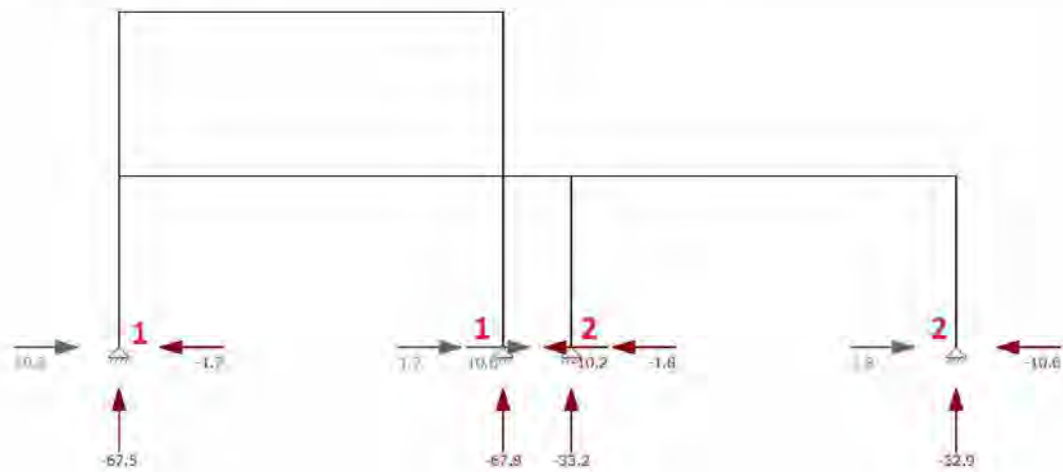
HEA200 – HEB140

Random lassen. Aan buitenzijde lasplaat, d=12mm toepassen. Verticale schetsplaat boven flens kolom, d=12mm toepassen.

Controle maatgevende las

$$\sigma_d = (5,12,0/0,14) \times 10^3 / (2 \times 140 \times 1/2 \times 10) = 134,7 \text{ N/mm}^2$$

## 7.15.8 Opleggingen



### 7.15.8.1 Oplegging 1

HEB140 opleggen op slof HEB140. Slof aan bestaande balklaag verbinden d.m.v. klossen. Slof opleggen op oplegplaat 250.140.10 op mw

Controle oplegdruk  
 $\sigma_d = 67,8 \times 10^3 / (250 \times 140) = 1,94 \text{ N/mm}^2$

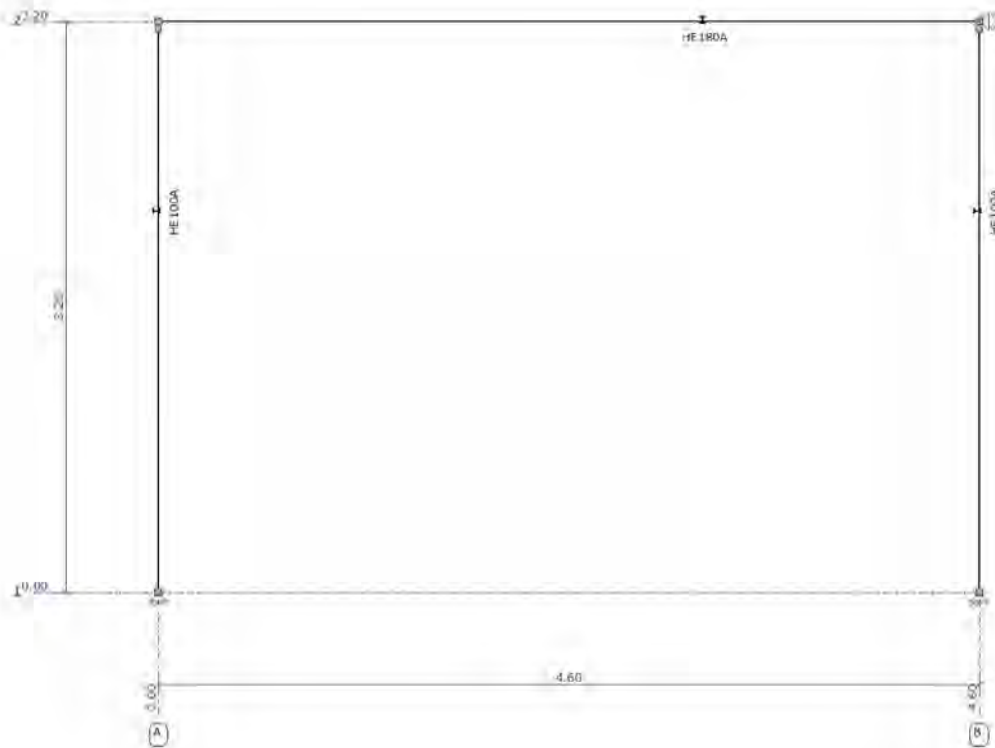
### 7.15.8.2 Oplegging 2

HEB140 opleggen op slof HEB140. Slof aan bestaande balklaag verbinden d.m.v. klossen. Slof minimaal 140mm opleggen op mw.

Controle oplegdruk  
 $\sigma_d = 32,9 \times 10^3 / (140 \times 140) = 1,68 \text{ N/mm}^2$

## 7.16 Pos 16

### 7.16.1 Geometrie



### 7.16.2 Belastingen

Permanent

$q_{pb,rep}$  vloer  $1/2 \times 5,5 \times 1,00 = 2,75 \text{ kN/m}$

Veranderlijk

$q_{vb,rep}$  vloer  $1/2 \times 5,5 \times 2,55 = 7,01 \text{ kN/m}$

### 7.16.3 Toegepaste maatregel

Zie geometrie

### 7.16.4 Uiterste grenstoestand

UC Drsn = 0,49, zie uitvoer MatrixFrame >> AKKOORD

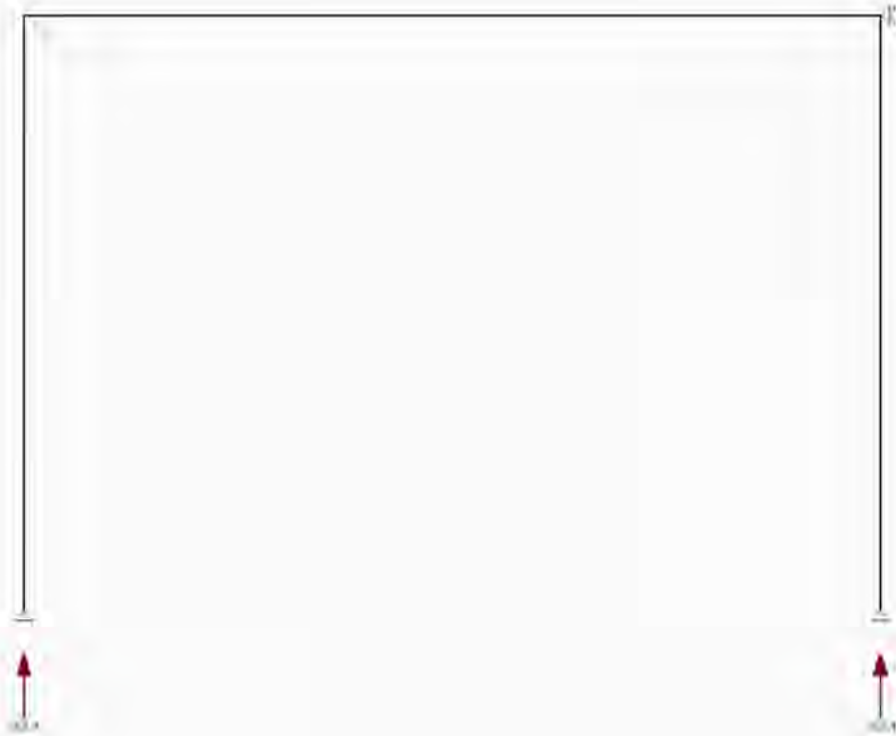
UC Kip/stab = 0,59, zie uitvoer MatrixFrame >> AKKOORD

### 7.16.5 Bruikbaarheids grenstoestand

UC  $\delta_{max}$  = 0,31, zie uitvoer MatrixFrame >> AKKOORD

UC  $\delta_3$  = 0,28, zie uitvoer MatrixFrame >> AKKOORD

## 7.16.6 Opleggingen



Kolommen opleggen op slof 100.200.15mm

Controle mw

$$\sigma_d = 33,4 \times 10^3 / (100 \times 200) = 1,67 \text{ N/mm}^2$$

Controle slof

$$\sigma_d = (1/2 \times 100 \times 1,67 \times 100^2) / (1/6 \times 100 \times 15^3) = 222,7 \text{ N/mm}^2$$

**7.17 Pos 17 - belastingtoename**

7.17.1 Uitgangspunten

De belastingtoename is gebaseerd op de volgende uitgangspunten, deze dienen aan de hand van constructie tekeningen / inmetingen te worden gecontroleerd:

De bouwmuren zijn gedeelde bouwmuren.

7.17.2 Belastingen bouwmuur brede beuk

| Bouwmuur brede beuk bestaand |        |       |      |      |       |       |               |       |       |              |                        |
|------------------------------|--------|-------|------|------|-------|-------|---------------|-------|-------|--------------|------------------------|
| q                            | aantal | L     | b    | h    | PB    |       |               | VB    |       |              |                        |
| Onderdeel                    | stuks  | m     | m    | m    | kN/m3 | kN/m2 | kN            | stuks | kN/m2 | kN           |                        |
| mw                           | 1      | 12.25 | 0.25 | 15.2 | 20    |       | 931.0         |       |       |              |                        |
| vloeren BG tm 3e             | 4      | 12.25 | 1.7  |      |       | 0.7   | 58.3          | 2.8   | 2.55  | 148.7        | 2 extreem, 2 momentaan |
| dak                          | 1      | 12.25 | 1.7  |      |       | 0.6   | 12.5          |       |       |              |                        |
| vloeren buren BG tm 3e       | 4      | 12.25 | 1.7  |      |       | 0.7   | 58.3          | 2.8   | 2.55  | 148.7        | 2 extreem, 2 momentaan |
| dak buren                    | 1      | 12.25 | 1.7  |      |       | 0.6   | 12.5          |       |       |              |                        |
| <b>TOTAAL</b>                |        |       |      |      |       |       | <b>1072.6</b> |       |       | <b>297.4</b> |                        |

| Bouwmuur brede beuk nieuw |        |       |      |      |       |       |               |       |       |              |                        |
|---------------------------|--------|-------|------|------|-------|-------|---------------|-------|-------|--------------|------------------------|
| q                         | aantal | L     | b    | h    | PB    |       |               | VB    |       |              |                        |
| Onderdeel                 | stuks  | m     | m    | m    | kN/m3 | kN/m2 | kN            | stuks | kN/m2 | kN           |                        |
| mw                        | 1      | 12.25 | 0.25 | 15.2 | 20    |       | 931.0         |       |       |              |                        |
| vloeren BG tm 3e          | 4      | 12.25 | 1.7  |      |       | 0.7   | 58.3          | 2.8   | 2.55  | 148.7        | 2 extreem, 2 momentaan |
| vloeren buren BG tm 3e    | 4      | 12.25 | 1.7  |      |       | 0.7   | 58.3          | 2.8   | 2.55  | 148.7        | 2 extreem, 2 momentaan |
| dak buren                 | 1      | 12.25 | 1.7  |      |       | 0.6   | 12.5          |       |       |              |                        |
| H5B 4e                    | 1      | 11.7  |      | 2.5  |       | 0.7   | 20.5          |       |       |              |                        |
| vloer 4e                  | 4      | 11.7  | 1.7  |      |       | 0.7   | 55.7          | 0.4   | 2.55  | 20.3         | momentaan              |
| H5B 5e                    | 1      | 11.7  |      | 2.4  |       | 0.7   | 19.7          |       |       |              |                        |
| vloer 5e                  | 1      | 6     | 2.7  |      |       | 0.7   | 11.3          | 0.4   | 2.55  | 16.5         | momentaan              |
| dakterras 5e              | 1      | 3     | 2.7  |      |       | 0.7   | 5.7           | 0.4   | 2.55  | 8.3          | momentaan              |
| plat dak 5e               | 1      | 2.7   | 2.7  |      |       | 0.6   | 4.4           |       |       |              |                        |
| plat dak 6e               | 1      | 6     | 2.7  |      |       | 0.6   | 9.7           |       |       |              |                        |
| <b>TOTAAL</b>             |        |       |      |      |       |       | <b>1187.0</b> |       |       | <b>342.5</b> |                        |

7.17.3 Belastingen bouwmuur smalle beuk

| Bouwmuur smalle beuk bestaand |        |       |      |      |                   |                   |               |       |                   |              |
|-------------------------------|--------|-------|------|------|-------------------|-------------------|---------------|-------|-------------------|--------------|
| q                             | aantal | L     | b    | h    | PB                |                   |               | VB    |                   |              |
| Onderdeel                     | stuks  | m     | m    | m    | kN/m <sup>3</sup> | kN/m <sup>2</sup> | kN            | stuks | kN/m <sup>2</sup> | kN           |
| mw                            | 1      | 12.25 | 0.25 | 15.2 | 20                |                   | 931.0         |       |                   |              |
| vloeren BG tm 3e              | 4      | 12.25 | 1.1  |      |                   | 0.7               | 37.7          | 2.8   | 2.55              | 96.2         |
| dak                           | 1      | 12.25 | 1.1  |      |                   | 0.6               | 8.1           |       |                   |              |
| vloeren buren BG tm 3e        | 4      | 12.25 | 1.1  |      |                   | 0.7               | 37.7          | 2.8   | 2.55              | 96.2         |
| dak buren                     | 1      | 12.25 | 1.1  |      |                   | 0.6               | 8.1           |       |                   |              |
| <b>TOTAAL</b>                 |        |       |      |      |                   |                   | <b>1022.6</b> |       |                   | <b>192.4</b> |

2 extreem, 2 momentaan

2 extreem, 2 momentaan

| Bouwmuur smalle beuk nieuw |        |       |      |      |                   |                   |               |       |                   |              |
|----------------------------|--------|-------|------|------|-------------------|-------------------|---------------|-------|-------------------|--------------|
| q                          | aantal | L     | b    | h    | PB                |                   |               | VB    |                   |              |
| Onderdeel                  | stuks  | m     | m    | m    | kN/m <sup>3</sup> | kN/m <sup>2</sup> | kN            | stuks | kN/m <sup>2</sup> | kN           |
| mw                         | 1      | 12.25 | 0.25 | 15.2 | 20                |                   | 931.0         |       |                   |              |
| vloeren BG tm 3e           | 4      | 12.25 | 1    |      |                   | 0.7               | 34.3          | 2.8   | 2.55              | 87.5         |
| vloeren buren BG tm 3e     | 4      | 12.25 | 1    |      |                   | 0.7               | 34.3          | 2.8   | 2.55              | 87.5         |
| dak buren                  | 1      | 12.25 | 1    |      |                   | 0.6               | 7.4           |       |                   |              |
| HSB 4e                     | 1      | 11.7  |      | 2.5  |                   | 0.7               | 20.5          |       |                   |              |
| vloer 4e                   | 4      | 11.7  | 1    |      |                   | 0.7               | 32.8          | 0.4   | 2.55              | 11.9         |
| HSB 5e                     | 1      | 11.7  |      | 2.4  |                   | 0.7               | 19.7          |       |                   |              |
| vloer 5e                   | 1      | 6     | 2.7  |      |                   | 0.7               | 11.3          | 0.4   | 2.55              | 16.5         |
| dakterras 5e               | 1      | 3     | 2.7  |      |                   | 0.7               | 5.7           | 0.4   | 2.55              | 8.3          |
| plat dak 5e                | 1      | 2.7   | 2.7  |      |                   | 0.6               | 4.4           |       |                   |              |
| plat dak 6e                | 1      | 6     | 2.7  |      |                   | 0.6               | 9.7           |       |                   |              |
| <b>TOTAAL</b>              |        |       |      |      |                   |                   | <b>1110.9</b> |       |                   | <b>211.7</b> |

2 extreem, 2 momentaan

2 extreem, 2 momentaan

momentaan

momentaan

momentaan

7.17.4 Belastingen tussenmuur

| Tussenmuur bestaand |        |   |       |      |       |       |             |       |       |             |
|---------------------|--------|---|-------|------|-------|-------|-------------|-------|-------|-------------|
| q                   | aantal | L | b     | h    | PB    |       |             | VB    |       |             |
| Onderdeel           | stuks  | m | m     | m    | kN/m3 | kN/m2 | kN          | stuks | kN/m2 | kN          |
| mw                  | 1      | 1 | 0.125 | 15.2 | 20    |       | 38.0        |       |       |             |
| vloeren BG tm 3e    | 4      | 1 | 3.4   |      |       | 0.7   | 9.5         | 2.8   | 2.55  | 24.3        |
| dak                 | 1      | 1 | 3.4   |      |       | 0.6   | 2.0         |       |       |             |
| <b>TOTAAL</b>       |        |   |       |      |       |       | <b>49.6</b> |       |       | <b>24.3</b> |

2 extreem, 2 momentaan

| Tussenmuur nieuw |        |   |       |      |       |       |             |       |       |             |
|------------------|--------|---|-------|------|-------|-------|-------------|-------|-------|-------------|
| q                | aantal | L | b     | h    | PB    |       |             | VB    |       |             |
| Onderdeel        | stuks  | m | m     | m    | kN/m3 | kN/m2 | kN          | stuks | kN/m2 | kN          |
| mw               | 1      | 1 | 0.125 | 15.2 | 20    |       | 38.0        |       |       |             |
| vloeren BG tm 4e | 5      | 1 | 3.4   |      |       | 0.7   | 11.9        | 3.2   | 2.55  | 27.7        |
| <b>TOTAAL</b>    |        |   |       |      |       |       | <b>49.9</b> |       |       | <b>27.7</b> |

2 extreem, 3 momentaan

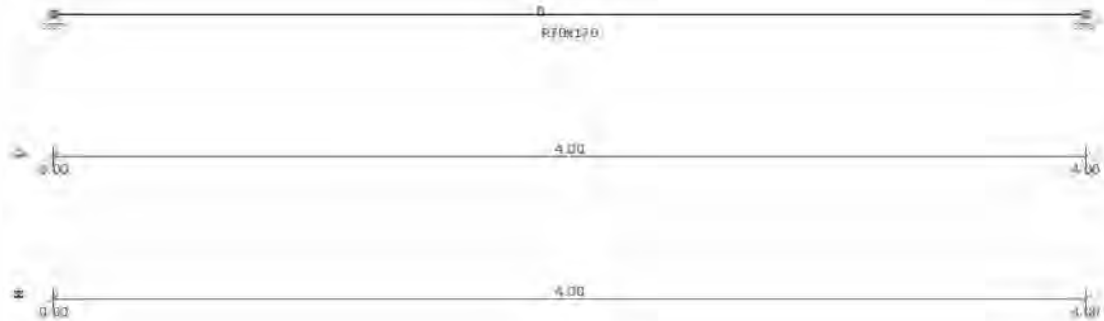
7.17.5 Belastingtoename

|                      | Bestaande toestand |        |         | Nieuwe toestand |        |         | Toename     |               |        |
|----------------------|--------------------|--------|---------|-----------------|--------|---------|-------------|---------------|--------|
|                      | PB                 | VB     | rep     | PB              | VB     | rep     | 1.2PB+1.5VB | 1.35PB+0.60VB | rep    |
| Bouwmuur brede beuk  | 1072.61            | 297.38 | 1369.99 | 1187.04         | 342.45 | 1529.50 | 11.82%      | 11.16%        | 11.64% |
| Bouwmuur smalle beuk | 1022.63            | 192.42 | 1215.05 | 1110.95         | 211.65 | 1322.60 | 8.89%       | 8.74%         | 8.85%  |
| Tussenmuur           | 49.56              | 24.28  | 73.84   | 49.90           | 27.74  | 77.64   | 5.85%       | 3.12%         | 5.16%  |

## 8 Bijlagen

### 8.1 Bijlage uitraai MatrixFrame berekening Pos 1

AFB. GEOMETRIE LIGGER



#### BALKGEOMETRIE

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus         | Uitzettingcoëff |
|------------------|-------------|---------|------------------|-----------|-------------------|-----------------|
| 0.000 - L(4.000) | R70x170     | 0       | 2.8659e-05       | C24       | 1.1000e+07        | 50.0000e-07     |
| 0.05             | m -         | 0       | m <sup>4</sup> - |           | kN/m <sup>2</sup> | C°m k           |
| N/m              |             |         |                  |           |                   |                 |

#### PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. | Hoogte    |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-----------|
| P1      | Nee   | 0,170 | 0,170 | 0,0000 | 0,0000 | 0,0000 | 0,070 | 0,000 | 0,000  | Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m -    | m         |

#### MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus         | Uitzettingcoëff |
|---------------|--------|-------------------|-------------------|-----------------|
| C24           | 0.40   | 4.20              | 1.1000e+07        | 50.0000e-07     |
| -             | -      | kN/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

#### OPLEGGINGEN

| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(4.000) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

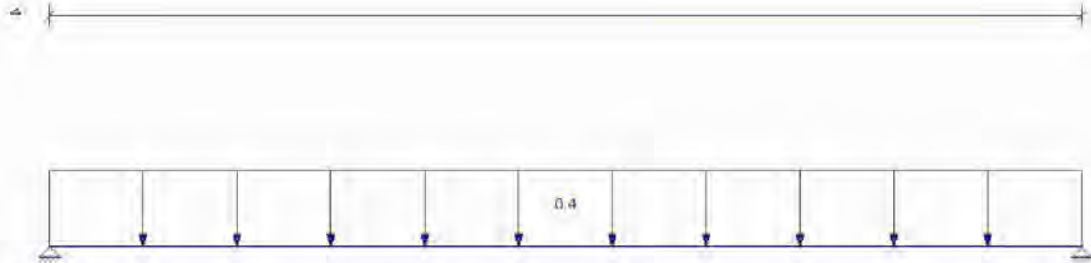
#### BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven                  | 5.1.2.e                 | Gunstig/Ong.Element | 5.1.2.e                 | Psi0      | Psi1   | Cprob |
|---------|-------------------------|-------------------------|---------------------|-------------------------|-----------|--------|-------|
| Psi2    | UGT/GGT                 |                         |                     |                         |           |        |       |
| B.G.1   | Permanent               | Permanent               | -                   | N.v.t.                  | N.v.t.    |        |       |
| B.G.2   | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. H) Ontoegankelijke |           |        |       |
| 1       | 1                       | belasting               |                     | daken                   | 1.00/1.00 |        |       |
| B.G.3   | Geconcentreerde         | veranderlijke belasting | -                   | Cat. H) Ontoegankelijke | N.v.t.    | N.v.t. |       |
|         | veranderlijke belasting | veranderlijke           |                     | daken                   |           |        |       |

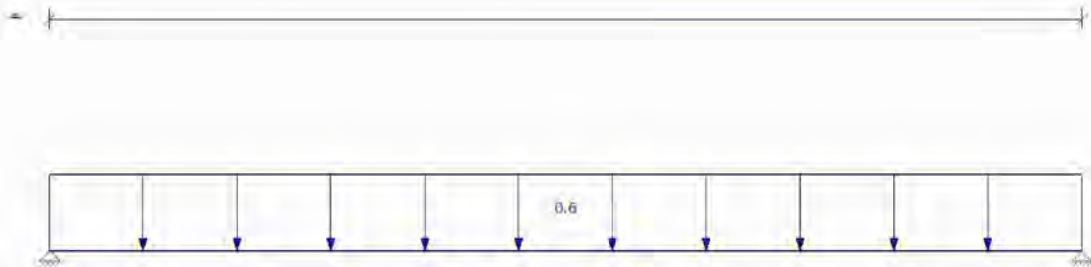


|               |   |   |   |                                  |           |        |
|---------------|---|---|---|----------------------------------|-----------|--------|
| B.G.4<br>0,20 | Sneeuwbelasting                           | belasting<br>Sneeuwbelasting<br>1.00/1.00   | - |                                  | N.v.t.    | N.v.t. |
| B.G.2.1<br>1  | Verdeelde veranderlijke<br>1<br>belasting | Verdeelde<br><br>veranderlijke<br>belasting | - | Cat. H) Ontoegankelijke<br>daken | 1.00/1.00 |        |

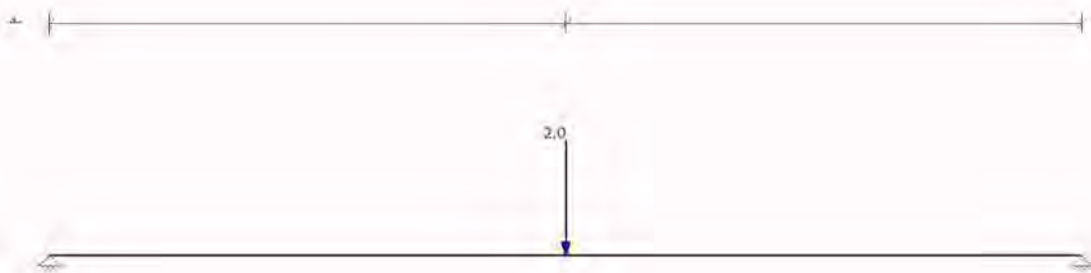
## AFB. LASTEN B.G.1 PERMANENT



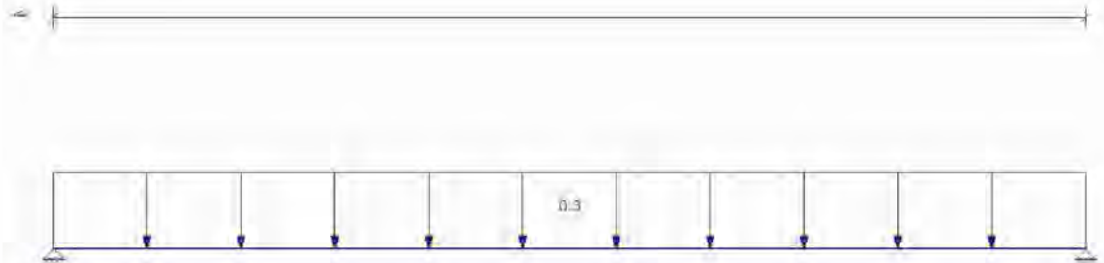
## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



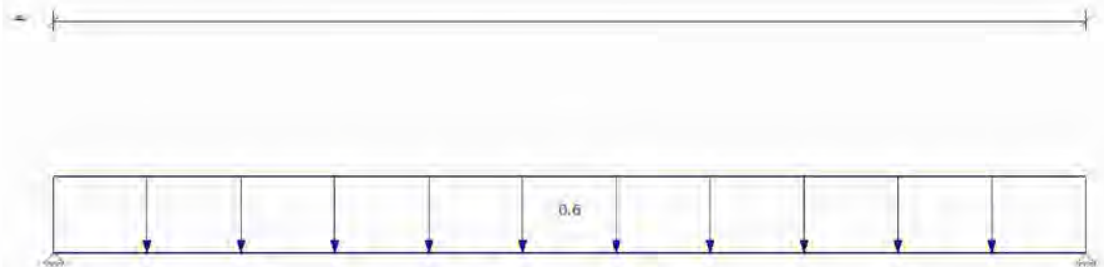
## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.4 SNEEUWBELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.20   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | -      | 1.50   | -      |
| B.G.4   | Sneeuwbelasting                         | -      | 1.50   | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | -      | -      |

### 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   | Verdeelde veranderlijke belasting       | -         | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      | -      |
| B.G.4   | Sneeuwbelasting                         | -         | -      | -      | 1.00   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | -      | 1.00   | -      |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |
|-------|---|-----------|--------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.4 | Sneeuwbelasting                         | -         | -      | 0.20   |

B.G.2.1 Verdeelde veranderlijke belasting - - -

## QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

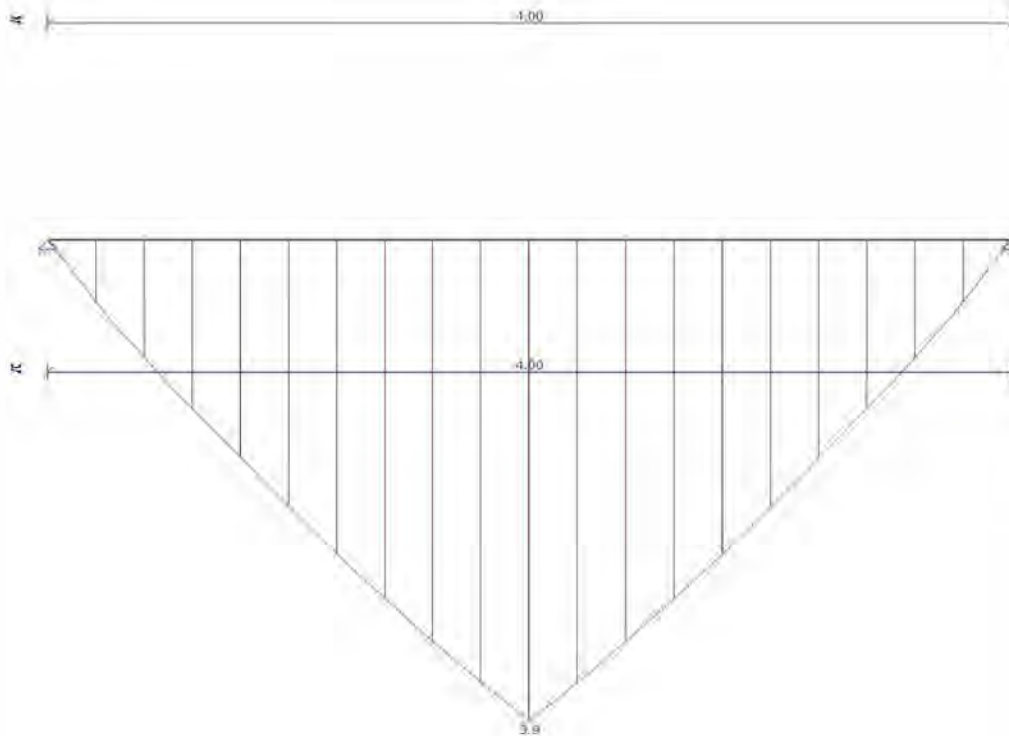
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.4   | Sneeuwbelasting                         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -      |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

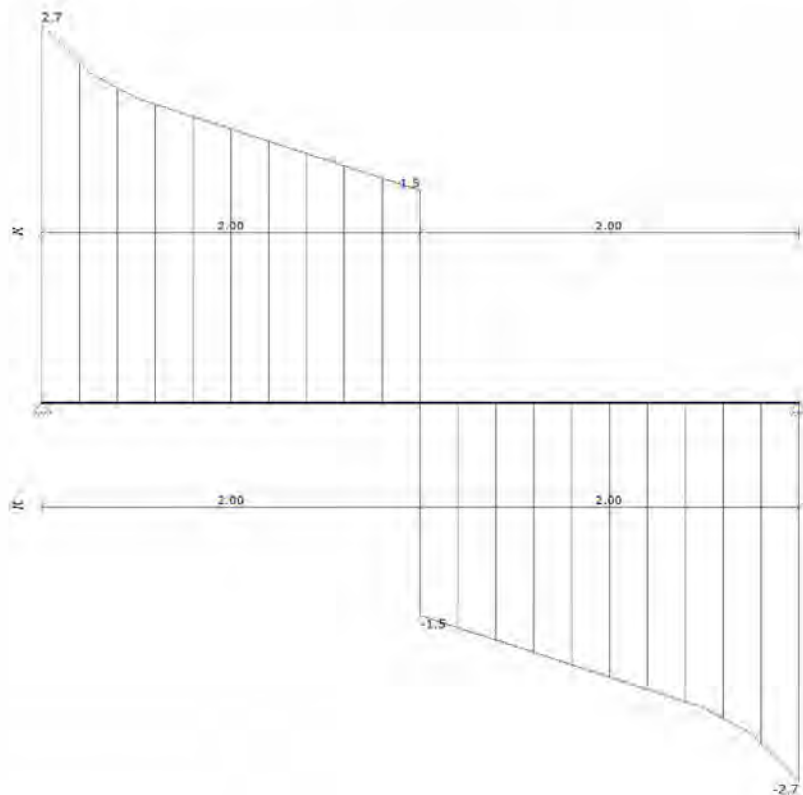
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingscombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties



### FU.C. STAAFKRACHTEN

| Veld      | Positie B.G.<br>Ve   | Mb         | Mmax       | xMmax    | Me         | x-M0     | x-M0     | Vb        |
|-----------|----------------------|------------|------------|----------|------------|----------|----------|-----------|
| Veld 1    | 0.000 - 4.000 Fu.C.1 | 0.00       | 2.67       | 2.000    | 0.00       | 0.000    | 0.000    |           |
| 2.67      | 2.67 -2.67           |            |            |          |            |          |          |           |
|           | 0.000 - 4.000 Fu.C.2 | 0.00       | 1.89       | 2.000    | 0.00       | 0.000    | 0.000    |           |
| 1.89      | 1.89 -1.89           |            |            |          |            |          |          |           |
|           | 0.000 - 4.000 Fu.C.3 | 0.00       | 3.87       | 2.000    | 0.00       | 0.000    | 0.000    |           |
| 2.37      | 2.37 -2.37           |            |            |          |            |          |          |           |
|           | 0.000 - 4.000 Fu.C.4 | 0.00       | 0.97       | 2.000    | 0.00       | 0.000    | 0.000    |           |
| 0.97      | 0.97 -0.97           |            |            |          |            |          |          |           |
| -         | m -                  | <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>            |            |            |          |            |          |          |           |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



### FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|--------|---------------------|---------|------|---------|--------------|------|
| Fu.C.1 | O1                  | 0.000   | vast | vrij    | -2.67        | 0.00 |
| Fu.C.1 | O2                  | 4.000   | vast | vrij    | -2.67        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-5.33</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>5.33</b>  |      |
| Fu.C.2 | O1                  | 0.000   | vast | vrij    | -1.89        | 0.00 |
| Fu.C.2 | O2                  | 4.000   | vast | vrij    | -1.89        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-3.77</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>3.77</b>  |      |
| Fu.C.3 | O1                  | 0.000   | vast | vrij    | -2.37        | 0.00 |
| Fu.C.3 | O2                  | 4.000   | vast | vrij    | -2.37        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-4.73</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>4.73</b>  |      |
| Fu.C.4 | O1                  | 0.000   | vast | vrij    | -0.97        | 0.00 |
| Fu.C.4 | O2                  | 4.000   | vast | vrij    | -0.97        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-1.94</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>1.94</b>  |      |
| -      | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

### B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|---------|---------------------|---------|------|---------|--------------|------|
| B.G.1   | O1                  | 0.000   | vast | vrij    | -0.72        | 0.00 |
| B.G.1   | O2                  | 4.000   | vast | vrij    | -0.72        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-1.44</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>1.44</b>  |      |
| B.G.2.1 | O1                  | 0.000   | vast | vrij    | -1.20        | 0.00 |
| B.G.2.1 | O2                  | 4.000   | vast | vrij    | -1.20        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-2.40</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>2.40</b>  |      |
| B.G.3   | O1                  | 0.000   | vast | vrij    | -1.00        | 0.00 |
| B.G.3   | O2                  | 4.000   | vast | vrij    | -1.00        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-2.00</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>2.00</b>  |      |
| B.G.4   | O1                  | 0.000   | vast | vrij    | -0.68        | 0.00 |
| B.G.4   | O2                  | 4.000   | vast | vrij    | -0.68        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-1.36</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>1.36</b>  |      |
| -       | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties





**KA.C. KNOOPVERPLAATSINGEN**

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0.0000 | -3.045e-03 |
|       | Ka.C.1    | 0.0000 | -3.045e-03 |
|       | Ka.C.2    | 0.0000 | -8.121e-03 |
|       | Ka.C.3    | 0.0000 | -5.921e-03 |
| K2    | Ka.C.(w1) | 0.0000 | 3.045e-03  |
|       | Ka.C.1    | 0.0000 | 3.045e-03  |
|       | Ka.C.2    | 0.0000 | 8.121e-03  |
|       | Ka.C.3    | 0.0000 | 5.921e-03  |
| -     | -         | m      | rad        |

**KA.C. DOORBUIGINGEN**

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld   |             | Veld Eind |        |
|------|-------------------------|------------|--------|--------|-------------|-----------|--------|
|      |                         |            |        | Z'     | Z' glb dist | Z' glb    |        |
| S1   | 0.000 - 4.000 Ka.C.(w1) | 0,0000     | 2.000  | 0,0038 | 2.000       | 0.0038    | 0,0000 |
| S1   | 0.000 - 4.000 Ka.C.1    | 0,0000     | 2.000  | 0,0038 | 2.000       | 0.0038    | 0,0000 |
| S1   | 0.000 - 4.000 Ka.C.2    | 0,0000     | 2.000  | 0,0102 | 2.000       | 0.0102    | 0,0000 |
| S1   | 0.000 - 4.000 Ka.C.3    | 0,0000     | 2.000  | 0,0074 | 2.000       | 0.0074    | 0,0000 |
| -    | m -                     | m          | m      | m      | m           | m         | m      |

AFB. HOUTCONTROLE



**SAMENSTELLING CONSTRUCTIEDELEN**

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

**STABILITEITSGEGEVENS**

| Staaft                | Profiel | Y-As (assenstelsel) |              |       | Z-As(assenstelsel) |              |
|-----------------------|---------|---------------------|--------------|-------|--------------------|--------------|
|                       |         | Lsys                | Methode      | Lkip  | Lkip/Lsys          | Methode      |
| kip/Lsys              |         |                     |              |       |                    |              |
| C1 - V1 (0.000-4.000) | P1      | 4.000               | Conservatief | 4.000 | 1.00               | Conservatief |
| 4.000                 | 1.00    |                     |              |       |                    |              |
| -                     | -       | m                   | geschoord    | m     | -                  | geschoord    |
|                       |         |                     |              |       |                    | m            |

## KIPSTEUNENGEGEVENS

| Staaflast             | Profiel | Begin         | Eind          | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|---------------|---------------|------------------|------------------|--------------|
| C1 - V1 (0.000-4.000) | P1      | inklemming    | inklemming    |                  |                  | Neutraal     |
| -                     | -       | Volledig vast | Volledig vast | m                | m                | -            |

## DOORBUIGINGGEGEVENS

| Staaflast             | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-4.000) | Dak         | Algemeen      | 0       | 0       | Parabolisch | L/250 |
| L/250                 | -           | -             | mm      | mm      | -           | -     |

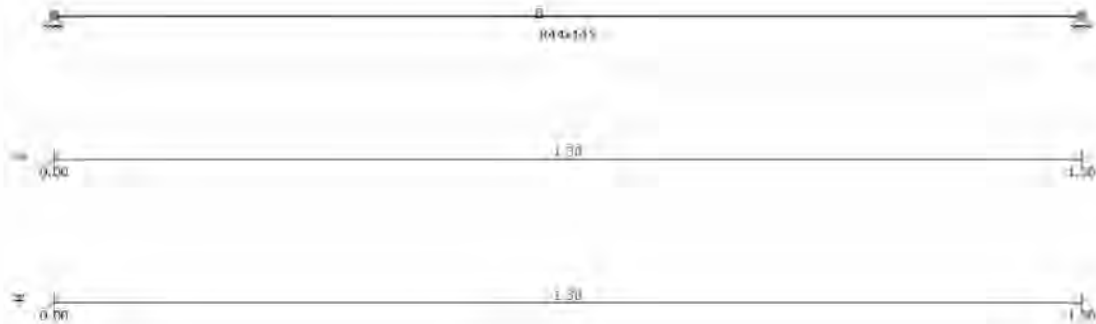
## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu,C.3     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.78   |
|       | Kip         | Fu,C.3     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.78   |
|       | Doorbuiging | Ka,C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.78   |



**8.2 Bijlage ultraai MatrixFrame berekening Pos 2**

AFB. GEOMETRIE LIGGER



**BALKGEOMETRIE**

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|------------|-------------------|
| 0.000 - L(1.300) | R44x145     | 0       | 1.1178e-05       | C24       | 1.1000e+07 | 50.0000e-07       |
| 0.03             | m -         | 0       | m4 -             |           | kN/m2      | C°m k             |
| N/m              |             |         |                  |           |            |                   |

**PROFIELVORMEN**

| Profiel | Verl. hB | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. Hoogte   |
|---------|----------|-------|-------|--------|--------|--------|-------|-------|-----------------|
| P2      | Nee      | 0,145 | 0,145 | 0,0000 | 0,0000 | 0,0000 | 0,044 | 0,000 | 0,000 Nee 0,000 |
| -       | -        | m     | m     | m      | m      | m      | m     | m     | m - m           |

**MATERIALEN**

| Materiaalnaam | Poison | Dichtheid | E-Modulus  | Uitzettingcoëff |
|---------------|--------|-----------|------------|-----------------|
| C24           | 0.40   | 4.20      | 1.1000e+07 | 50.0000e-07     |
| -             | -      | kN/m3     | kN/m2      | C°m             |

**OPLEGGINGEN**

| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(1.300) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

**BELASTINGSGEVALLEN TYPEN**

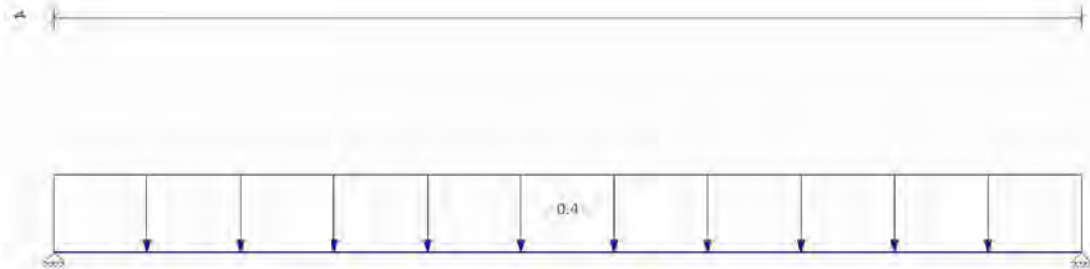
| Oplegg. Psi2 | Staven UGT/GGT          | 5.1.2.e                 | Gunstig/Ong. Element | 5.1.2.e                 | Psi0      | Psi1   | Cprob |
|--------------|-------------------------|-------------------------|----------------------|-------------------------|-----------|--------|-------|
| B.G.1        | Permanent               | Permanent               | -                    | N.v.t.                  | N.v.t.    |        |       |
| B.G.2        | Verdeelde veranderlijke | Verdeelde               | -                    | Cat. H) Ontoegankelijke |           |        |       |
| 1            | 1                       | belasting               |                      | daken                   | 1.00/1.00 |        |       |
| B.G.3        | Geconcentreerde         | veranderlijke belasting | -                    | Cat. H) Ontoegankelijke | N.v.t.    | N.v.t. |       |
|              | 1                       | Geconcentreerde         |                      | daken                   |           |        |       |
| B.G.4        | Sneeuwbelasting         | veranderlijke belasting | -                    |                         | N.v.t.    | N.v.t. |       |
| 0.20         | 1                       | Sneeuwbelasting         |                      |                         | 1.00/1.00 |        |       |
| B.G.2.1      | Verdeelde veranderlijke | Verdeelde               | -                    | Cat. H) Ontoegankelijke |           |        |       |
| 1            | 1                       | belasting               |                      | daken                   | 1.00/1.00 |        |       |

bélasting

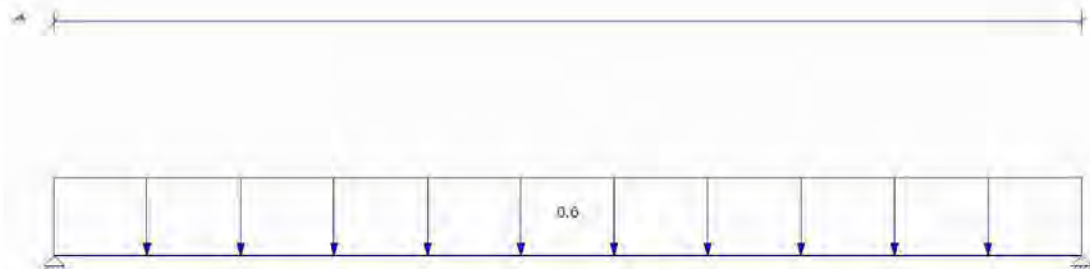
veranderlijke  
belasting

daken

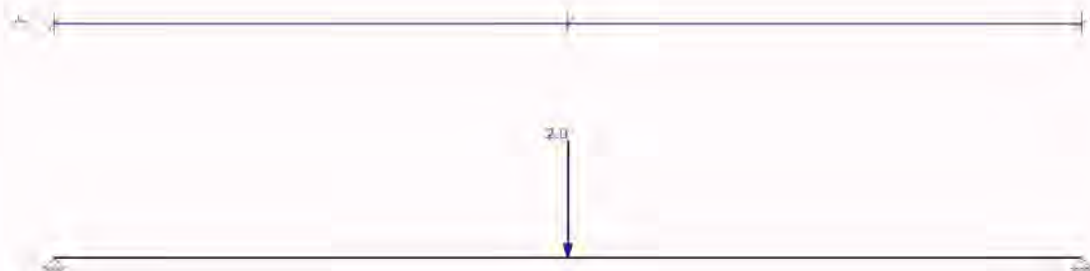
## AFB. LASTEN B.G.1 PERMANENT



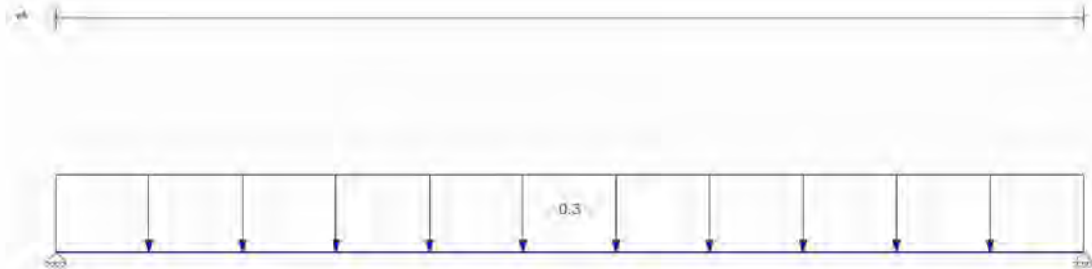
## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



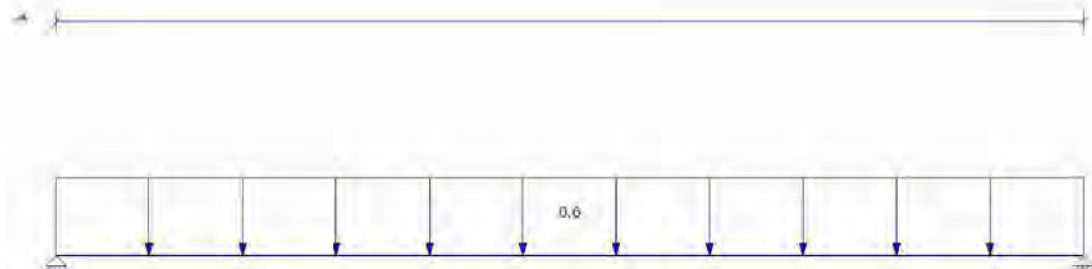
## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.4 SNEEUWBELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.20   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | -      | 1.50   | -      |
| B.G.4   | Sneeuwbelasting                         | -      | 1.50   | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | -      | -      |

### 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   | Verdeelde veranderlijke belasting       | -         | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      | -      |
| B.G.4   | Sneeuwbelasting                         | -         | -      | -      | 1.00   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | -      | 1.00   | -      |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |
|-------|---|-----------|--------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.4 | Sneeuwbelasting                         | -         | -      | 0.20   |

B.G.2.1 Verdeelde veranderlijke belasting - - -

## QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

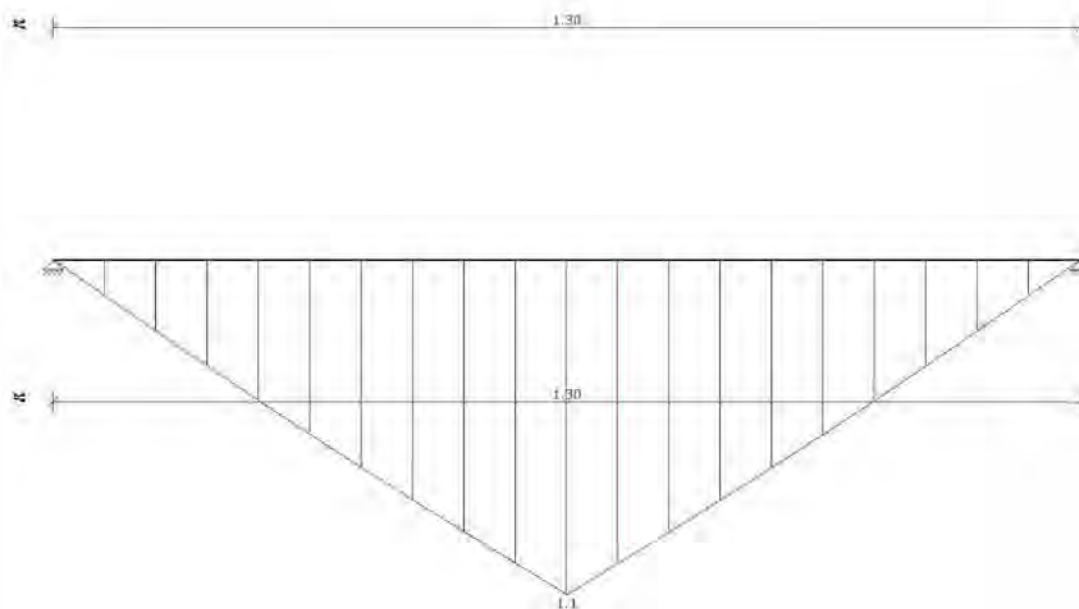
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.4   | Sneeuwbelasting                         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -      |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

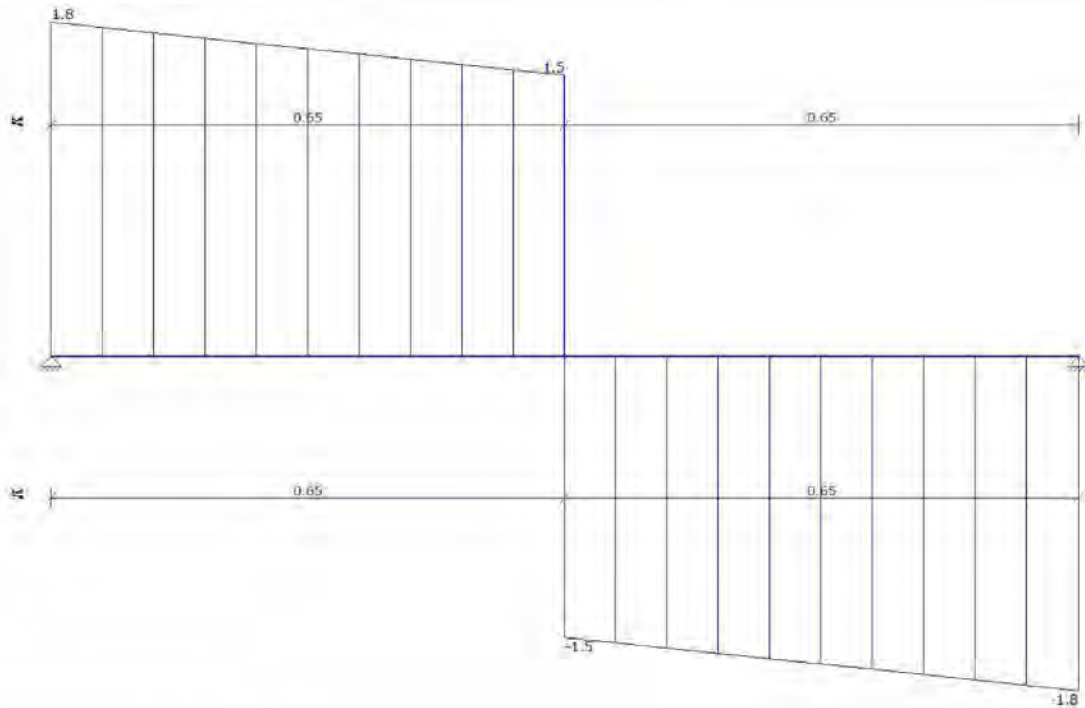
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingcombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingcombinaties



### FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax   | Ve                   |      |      |       |      |       |       |    |
| Veld 1 | 0.000 - 1.300 Fu.C.1 | 0.00 | 0.28 | 0.650 | 0.00 | 0.000 | 0.000 |    |
| 0.87   | 0.87 - 0.87          |      |      |       |      |       |       |    |
|        | 0.000 - 1.300 Fu.C.2 | 0.00 | 0.20 | 0.650 | 0.00 | 0.000 | 0.000 |    |
| 0.61   | -0.61 - 0.61         |      |      |       |      |       |       |    |
|        | 0.000 - 1.300 Fu.C.3 | 0.00 | 1.07 | 0.650 | 0.00 | 0.000 | 0.000 |    |
| 1.78   | -1.78 - 1.78         |      |      |       |      |       |       |    |
|        | 0.000 - 1.300 Fu.C.4 | 0.00 | 0.10 | 0.650 | 0.00 | 0.000 | 0.000 |    |
| 0.32   | 0.32 - 0.32          |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



**FU.C. OPLEGREACTIES**

| B.C.   | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|--------|---------------------|---------|------|---------|--------------|------|
| Fu.C.1 | O1                  | 0.000   | vast | vrij    | -0.87        | 0.00 |
| Fu.C.1 | O2                  | 1.300   | vast | vrij    | -0.87        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-1.73</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>1.73</b>  |      |
| Fu.C.2 | O1                  | 0.000   | vast | vrij    | -0.61        | 0.00 |
| Fu.C.2 | O2                  | 1.300   | vast | vrij    | -0.61        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-1.23</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>1.23</b>  |      |
| Fu.C.3 | O1                  | 0.000   | vast | vrij    | -1.78        | 0.00 |
| Fu.C.3 | O2                  | 1.300   | vast | vrij    | -1.78        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-3.56</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>3.56</b>  |      |
| Fu.C.4 | O1                  | 0.000   | vast | vrij    | -0.32        | 0.00 |
| Fu.C.4 | O2                  | 1.300   | vast | vrij    | -0.32        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-0.63</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>0.63</b>  |      |
| -      | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

**B.G. OPLEGREACTIES**

| B.C.    | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|---------|---------------------|---------|------|---------|--------------|------|
| B.G.1   | O1                  | 0.000   | vast | vrij    | -0.23        | 0.00 |
| B.G.1   | O2                  | 1.300   | vast | vrij    | -0.23        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-0.47</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>0.47</b>  |      |
| B.G.2.1 | O1                  | 0.000   | vast | vrij    | -0.39        | 0.00 |
| B.G.2.1 | O2                  | 1.300   | vast | vrij    | -0.39        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-0.78</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>0.78</b>  |      |
| B.G.3   | O1                  | 0.000   | vast | vrij    | -1.00        | 0.00 |
| B.G.3   | O2                  | 1.300   | vast | vrij    | -1.00        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-2.00</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>2.00</b>  |      |
| B.G.4   | O1                  | 0.000   | vast | vrij    | -0.22        | 0.00 |
| B.G.4   | O2                  | 1.300   | vast | vrij    | -0.22        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-0.44</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>0.44</b>  |      |
| -       | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingscombinaties



**KA.C. KNOOPVERPLAATSINGEN**

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0.0000 | -0.268e-03 |
|       | Ka.C.1    | 0.0000 | -0.268e-03 |
|       | Ka.C.2    | 0.0000 | -0.715e-03 |



| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.3    | 0.0000 | -0.521e-03 |
| K2    | Ka.C.(w1) | 0.0000 | 0.268e-03  |
|       | Ka.C.1    | 0.0000 | 0.268e-03  |
|       | Ka.C.2    | 0.0000 | 0.715e-03  |
|       | Ka.C.3    | 0.0000 | 0.521e-03  |
| -     | -         | m      | rad        |

## KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld   |              | Veld Eind |         |
|------|-------------------------|------------|--------|--------|--------------|-----------|---------|
|      |                         |            |        | Z'     | Z' glib dist | Z' glib   | Z' glib |
| S1   | 0.000 - 1.300 Ka.C.(w1) | 0,0000     | 0.650  | 0,0001 | 0.650        | 0.0001    | 0,0000  |
| S1   | 0.000 - 1.300 Ka.C.1    | 0,0000     | 0.650  | 0,0001 | 0.650        | 0.0001    | 0,0000  |
| S1   | 0.000 - 1.300 Ka.C.2    | 0,0000     | 0.650  | 0,0003 | 0.650        | 0.0003    | 0,0000  |
| S1   | 0.000 - 1.300 Ka.C.3    | 0,0000     | 0.650  | 0,0002 | 0.650        | 0.0002    | 0,0000  |
| -    | m -                     | m          | m      | m      | m            | m         | m       |

AFB. HOUTCONTROLE

CL - %/ds/bq

## SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

## STABILITEITSGEGEVENS

| Staaft                | Profiel | Y-As (assenstelsel) |              |       | Z-As(assenstelsel) |              |       |
|-----------------------|---------|---------------------|--------------|-------|--------------------|--------------|-------|
|                       |         | Lsys                | Methode      | Lkip  | Lkip/Lsys          | Methode      | LkipL |
| C1 - V1 (0.000-1.300) | P2      | 1.300               | Conservatief | 1.300 | 1.00               | Conservatief |       |
| 1.300                 | 1.00    |                     |              |       |                    |              |       |
| -                     | -       | m                   | geschoord    | m     | -                  | geschoord    | m     |

## KIPSTEUNENGEDEVENS

| Staaft last           | Profiel | Begin      | Eind       | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|------------|------------|------------------|------------------|--------------|
| C1 - V1 (0.000-1.300) | P2      | Inklemming | Inklemming |                  |                  | Neutraal     |
| -                     | -       | -          | -          | m                | m                | -            |

## DOORBUIGINGSGEGEVENS

| Staaft w;2+w;3        | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-1.300) | Dak         | Algemeen      | 0       | 0       | Parabolisch | L/250 |
| L/250                 |             |               |         |         |             |       |
| -                     | -           | -             | mm      | mm      | -           | -     |

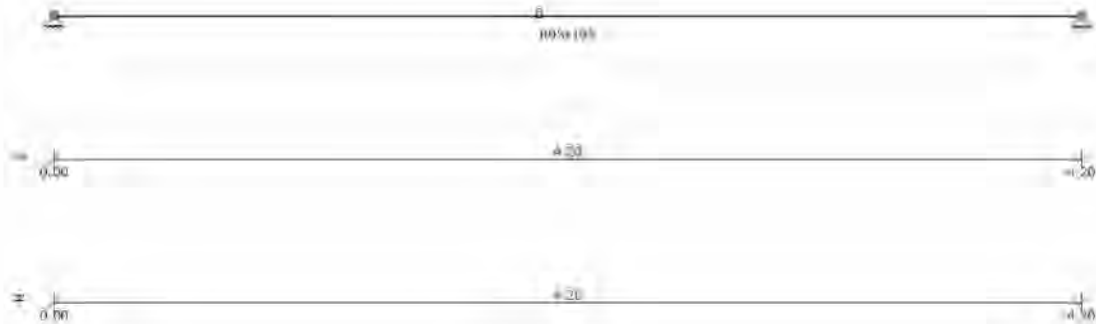
## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.3     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.47   |
|       | Kip         | Fu.C.3     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.47   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.07   |



## 8.3 Bijlage ultraai MatrixFrame berekening Pos 3

AFB. GEOMETRIE LIGGER



### BALKGEOMETRIE

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus         | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|-------------------|-------------------|
| 0.000 - L(4.200) | R95x195     | 0       | 5.8701e-05       | C24       | 1.1000e+07        | 50.0000e-07       |
| 0.08             |             |         |                  |           |                   |                   |
|                  | m -         |         | m <sup>4</sup> - |           | kN/m <sup>2</sup> | C°m k             |
| N/m              |             |         |                  |           |                   |                   |

### PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. | Hoogte    |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-----------|
| P6      | Nee   | 0,195 | 0,195 | 0,0000 | 0,0000 | 0,0000 | 0,095 | 0,000 | 0,000  | Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m -    | m         |

### MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus         | Uitzettingcoëff |
|---------------|--------|-------------------|-------------------|-----------------|
| C24           | 0.40   | 4.20              | 1.1000e+07        | 50.0000e-07     |
| -             | -      | kN/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

### OPLEGGINGEN

| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(4.200) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

### BELASTINGSGEVALLEN TYPEN

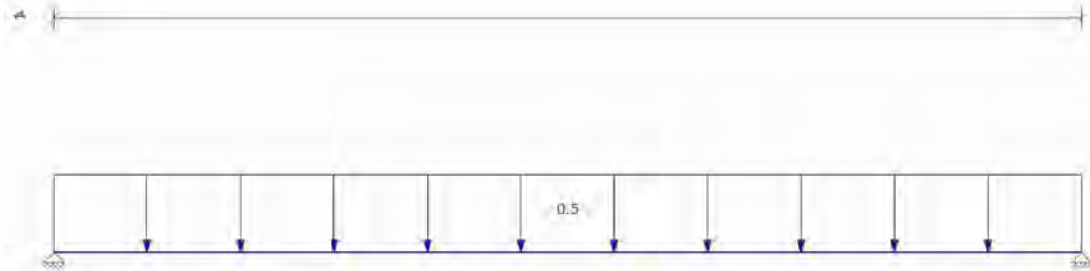
| Oplegg. | Staven                  | 5.1.2.e                 | Gunstig/Ong.Element | 5.1.2.e                 | Psi0      | Psi1   | Cprob |
|---------|-------------------------|-------------------------|---------------------|-------------------------|-----------|--------|-------|
| Psi2    | UGT/GGT                 |                         |                     |                         |           |        |       |
| B.G.1   | Permanent               | Permanent               | -                   | N.v.t.                  | N.v.t.    |        |       |
| B.G.2   | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. H) Ontoegankelijke |           |        |       |
| 1       | 1                       | belasting               |                     | daken                   | 1.00/1.00 |        |       |
| B.G.3   | Geconcentreerde         | veranderlijke belasting | -                   | Cat. H) Ontoegankelijke | N.v.t.    | N.v.t. |       |
|         | 1                       | Geconcentreerde         |                     | daken                   |           |        |       |
| B.G.4   | Sneeuwbelasting         | veranderlijke belasting | -                   |                         | N.v.t.    | N.v.t. |       |
| 0.20    | 1                       | Sneeuwbelasting         |                     |                         | 1.00/1.00 |        |       |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. H) Ontoegankelijke |           |        |       |
| 1       | 1                       | 1                       |                     |                         | 1.00/1.00 |        |       |

bélasting

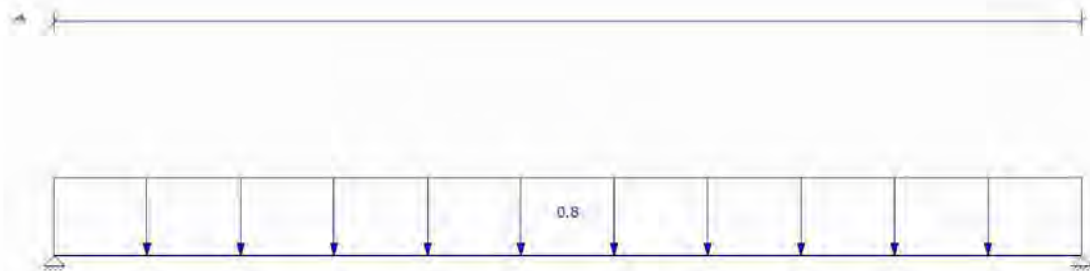
veranderlijke  
belasting

daken

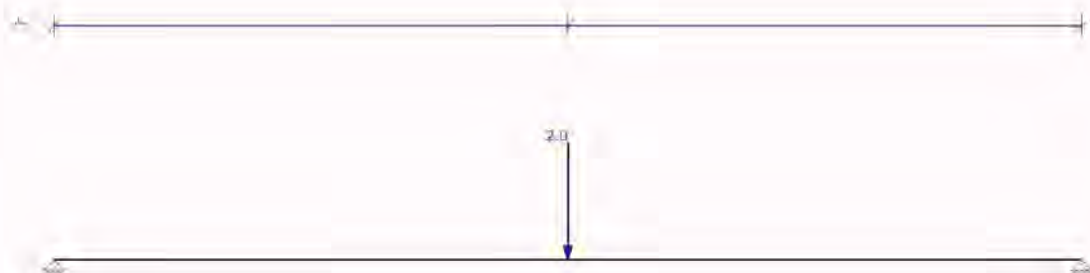
## AFB. LASTEN B.G.1 PERMANENT



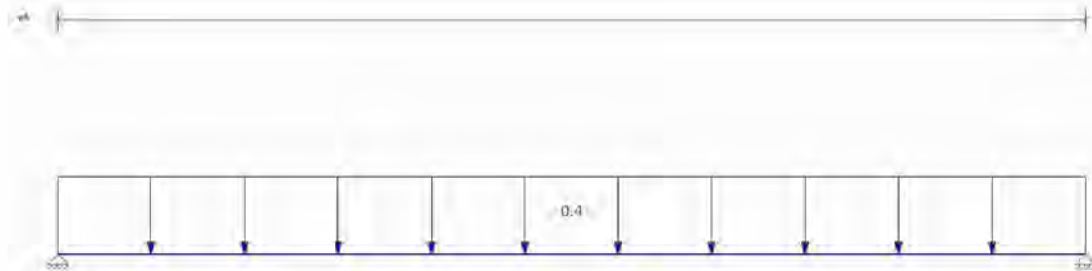
## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



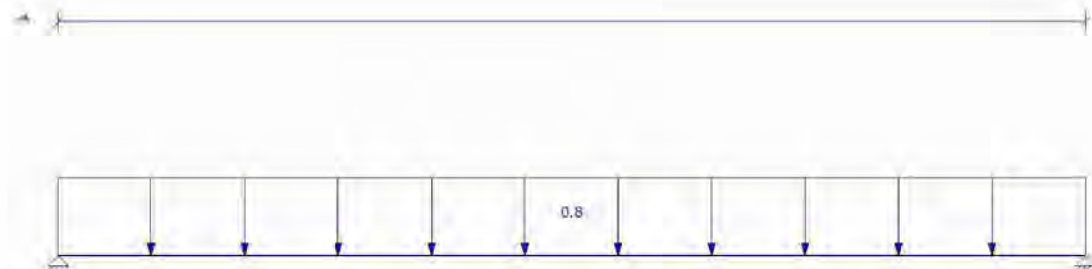
## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.4 SNEEUWBELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.20   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | -      | 1.50   | -      |
| B.G.4   | Sneeuwbelasting                         | -      | 1.50   | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | -      | -      |

### 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   | Verdeelde veranderlijke belasting       | -         | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      | -      |
| B.G.4   | Sneeuwbelasting                         | -         | -      | -      | 1.00   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | -      | 1.00   | -      |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |
|-------|---|-----------|--------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.4 | Sneeuwbelasting                         | -         | -      | 0.20   |

B.G.2.1 Verdeelde veranderlijke belasting - - -

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

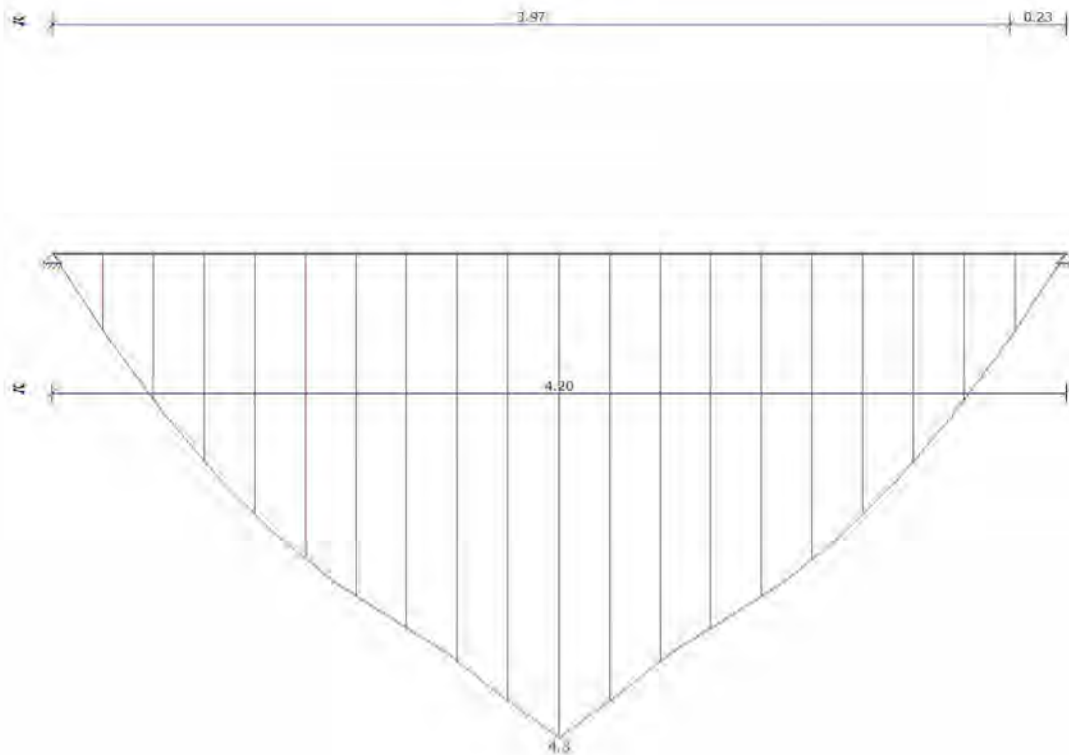
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.4   | Sneeuwbelasting                         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -      |

### UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

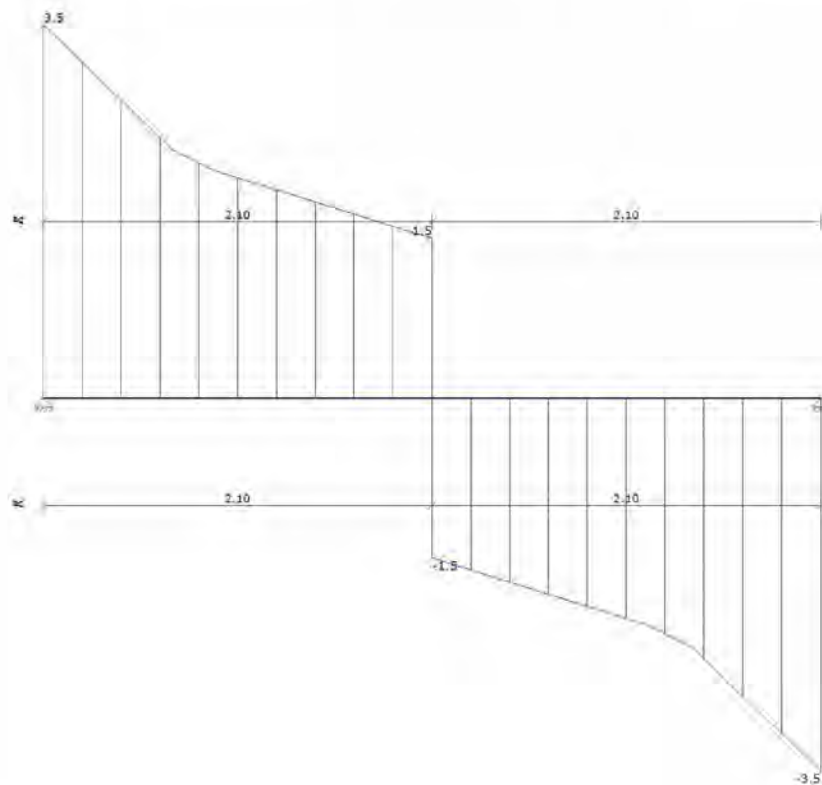
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingcombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingcombinaties



### FU.C. STAAFKRACHTEN

| Veld    | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|---------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax    | Ve                   |      |      |       |      |       |       |    |
| Veld 1  | 0.000 - 4.200 Fu.C.1 | 0.00 | 3.67 | 2.100 | 0.00 | 0.000 | 0.000 |    |
| 3.50    | 3.50 -3.50           |      |      |       |      |       |       |    |
|         | 0.000 - 4.200 Fu.C.2 | 0.00 | 2.58 | 2.100 | 0.00 | 0.000 | 0.000 |    |
| 2.46    | 2.46 -2.46           |      |      |       |      |       |       |    |
|         | 0.000 - 4.200 Fu.C.3 | 0.00 | 4.34 | 2.100 | 0.00 | 0.000 | 0.000 |    |
| 5.1.2.e | 5.1.2.e 5.1.2.e      |      |      |       |      |       |       |    |
|         | 0.000 - 4.200 Fu.C.4 | 0.00 | 1.34 | 2.100 | 0.00 | 0.000 | 0.000 |    |
| 1.28    | 1.28 -1.28           |      |      |       |      |       |       |    |
| -       | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN      | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie  | Z           | Yr             | Z            | My         |
|--------|---------------------|----------|-------------|----------------|--------------|------------|
| Fu.C.1 | 01                  | 0.000    | vast        | vrij           | -3.50        | 0.00       |
| Fu.C.1 | 02                  | 4.200    | vast        | vrij           | -3.50        | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-7.00</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>7.00</b>  |            |
| Fu.C.2 | 01                  | 0.000    | vast        | vrij           | -2.46        | 0.00       |
| Fu.C.2 | 02                  | 4.200    | vast        | vrij           | -2.46        | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-4.92</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>4.92</b>  |            |
| Fu.C.3 | 01                  | 0.000    | vast        | vrij           | 5.1.2.e      | 0.00       |
| Fu.C.3 | 02                  | 4.200    | vast        | vrij           | 5.1.2.e      | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-5.27</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>5.27</b>  |            |
| Fu.C.4 | 01                  | 0.000    | vast        | vrij           | -1.28        | 0.00       |
| Fu.C.4 | 02                  | 4.200    | vast        | vrij           | -1.28        | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-2.55</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>2.55</b>  |            |
| -      | -                   | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>    | <b>kNm</b> |

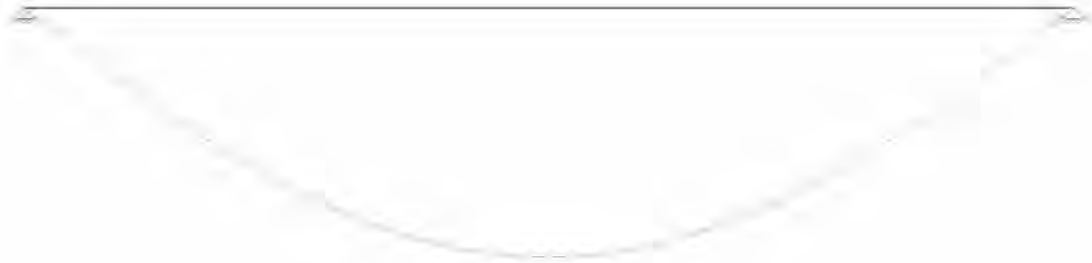
## B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie  | Z           | Yr             | Z            | My         |
|---------|---------------------|----------|-------------|----------------|--------------|------------|
| B.G.1   | 01                  | 0.000    | vast        | vrij           | -0.95        | 0.00       |
| B.G.1   | 02                  | 4.200    | vast        | vrij           | -0.95        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-1.89</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>1.89</b>  |            |
| B.G.2.1 | 01                  | 0.000    | vast        | vrij           | -1.58        | 0.00       |
| B.G.2.1 | 02                  | 4.200    | vast        | vrij           | -1.58        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-3.15</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>3.15</b>  |            |
| B.G.3   | 01                  | 0.000    | vast        | vrij           | -1.00        | 0.00       |
| B.G.3   | 02                  | 4.200    | vast        | vrij           | -1.00        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-2.00</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>2.00</b>  |            |
| B.G.4   | 01                  | 0.000    | vast        | vrij           | -0.88        | 0.00       |
| B.G.4   | 02                  | 4.200    | vast        | vrij           | -0.88        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-1.76</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>1.76</b>  |            |
| -       | -                   | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>    | <b>kNm</b> |

AFB, KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties





### KA.C. KNOOPVERPLAATSINGEN

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0.0000 | -2.151e-03 |
|       | Ka.C.1    | 0.0000 | -2.151e-03 |
|       | Ka.C.2    | 0.0000 | -5.737e-03 |
|       | Ka.C.3    | 0.0000 | -4.159e-03 |
| K2    | Ka.C.(w1) | 0.0000 | 2.151e-03  |
|       | Ka.C.1    | 0.0000 | 2.151e-03  |
|       | Ka.C.2    | 0.0000 | 5.737e-03  |
|       | Ka.C.3    | 0.0000 | 4.159e-03  |
| -     | -         | m      | rad        |

### KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld   |             | Veld Eind |        |
|------|-------------------------|------------|--------|--------|-------------|-----------|--------|
|      |                         |            |        | Z'     | Z' glb dist | Z' glb    |        |
| S1   | 0.000 - 4.200 Ka.C.(w1) | 0,0000     | 2.100  | 0,0028 | 2.100       | 0.0028    | 0,0000 |
| S1   | 0.000 - 4.200 Ka.C.1    | 0,0000     | 2.100  | 0,0028 | 2.100       | 0.0028    | 0,0000 |
| S1   | 0.000 - 4.200 Ka.C.2    | 0,0000     | 2.100  | 0,0075 | 2.100       | 0.0075    | 0,0000 |
| S1   | 0.000 - 4.200 Ka.C.3    | 0,0000     | 2.100  | 0,0055 | 2.100       | 0.0055    | 0,0000 |
| -    | m -                     | m          | m      | m      | m           | m         | m      |

AFB. HOUTCONTROLE



### SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staal/staven |
|-----------------|--------------|
| C1              | S1           |

### STABILITEITSGEGEVENS

| Staal                 | Profiel | Y-As (assenstelsel) |              |       | Z-As(assenstelsel) |              |       |
|-----------------------|---------|---------------------|--------------|-------|--------------------|--------------|-------|
|                       |         | Lsys                | Methode      | Lkip  | Lkip/Lsys          | Methode      | LkipL |
| kip/Lsys              |         |                     |              |       |                    |              |       |
| C1 - V1 (0.000-4.200) | P6      | 4.200               | Conservatief | 4.200 | 1.00               | Conservatief |       |
| 4.200                 | 1.00    |                     | geschoord    |       |                    | geschoord    |       |
| -                     | -       | m -                 |              | m     | -                  |              | m -   |



## KIPSTEUNENGEGEVENS

| Staaflast             | Profiel | Begin         | Eind          | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|---------------|---------------|------------------|------------------|--------------|
| C1 - V1 (0.000-4.200) | P6      | inklemming    | inklemming    |                  |                  | Neutraal     |
| -                     | -       | Volledig vast | Volledig vast | m                | m                | -            |

## DOORBUIGINGGEGEVENS

| Staaflast             | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-4.200) | Dak         | Algemeen      | 0       | 0       | Parabolisch | L/250 |
| L/250                 | -           | -             | mm      | mm      | -           | -     |

## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu,C.3     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.49   |
|       | Kip         | Fu,C.3     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.49   |
|       | Doorbuiging | Ka,C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.55   |

8.4 Bijlage ultraai MatrixFrame berekening Pos 4

AFB. GEOMETRIE RAAMWERK



STAVEN

| Staat | Knoop B | Knoop | X-E   | Z-E   | Lengte | Profiel | Positie                  |
|-------|---------|-------|-------|-------|--------|---------|--------------------------|
| E     | X-B     | Z-B   |       |       |        |         |                          |
| S1    | K1      | K2    | 0.000 | 0.000 | 0.000  | -2.400  | 2.400 P10.000 = L(2,400) |
| -     | -       | -     | m     | m     | m      | m       | m -                      |

PROFIELEN

| Profiel | Profielnaam | Oppervlakte    | Iy             | Materiaal | 5.1.2.e |
|---------|-------------|----------------|----------------|-----------|---------|
| P1      | R38x120     | 4.5600e-03     | 5.4720e-06     | C24       | 0.0     |
| -       | -           | m <sup>2</sup> | m <sup>4</sup> | -         | °       |

PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raatl. Hoogte   |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|-----------------|
| h.      | hB    |       |       |        |        |        |       |       |                 |
| P1      | Nee   | 0,120 | 0,120 | 0,0000 | 0,0000 | 0,0000 | 0,038 | 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/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

OPLEGGINGEN

| Oplegging | Object | Positie | Z              | Yr   | HoekYr    |
|-----------|--------|---------|----------------|------|-----------|
| O1        | K1     | 0.000   | vast           | vast | vrij 0    |
| O2        | K2     | 0.000   | vast 0.00:0.00 | vrij | 0         |
| -         | -      | m       | kN/m           | kN/m | kNm/rad ° |

BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven                    | 5.1.2.e                 | Gunstig/Ong.Element | 5.1.2.e                 | Psi0   | Psi1   | Cprob |
|---------|---------------------------|-------------------------|---------------------|-------------------------|--------|--------|-------|
| Psi2    | UGT/GGT                   |                         |                     |                         |        |        |       |
| B.G.1   | Permanent                 | Permanent               | -                   |                         | N.v.t. | N.v.t. |       |
| B.G.2   | Geconcentreerde           | Geconcentreerde         | -                   | Cat. H) Ontoegankelijke | N.v.t. | N.v.t. |       |
|         | veranderlijke belasting   | veranderlijke belasting |                     | daken                   |        |        |       |
| B.G.3   | Windbelasting             | Windbelasting           | -                   |                         | N.v.t. | N.v.t. |       |
| 0,20    |                           | 1.00/1.00               |                     |                         |        |        |       |
| B.G.4   | Kniklengte (Assymetrisch) | Kniklengte              |                     |                         | N.v.t. | N.v.t. |       |
| B.G.5   | Kniklengte (Symmetrisch)  | Kniklengte              |                     |                         | N.v.t. | N.v.t. |       |

FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 |
|-------|---|--------|--------|--------|
| B.G.1 | Permanent                               | 1.20   | 1.20   | 1.35   |
| B.G.2 | Geconcentreerde veranderlijke belasting | -      | 1.50   | -      |
| B.G.3 | Windbelasting                           | 1.50   | -      | -      |
| B.G.4 | Kniklengte (Assymetrisch)               | -      | -      | -      |
| B.G.5 | Kniklengte (Symmetrisch)                | -      | -      | -      |

KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G. | Omschrijving | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|------|--------------|-----------|--------|--------|
|------|--------------|-----------|--------|--------|

|       |   |      |      |      |
|-------|---|------|------|------|
| B.G.1 | Permanent                               | 1.00 | 1.00 | 1.00 |
| B.G.2 | Geconcentreerde veranderlijke belasting | -    | -    | -    |
| B.G.3 | Windbelasting                           | -    | -    | 1.00 |
| B.G.4 | Kniklengte (Assymetrisch)               | -    | -    | -    |
| B.G.5 | Kniklengte (Symmetrisch)                | -    | -    | -    |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|-------|---|-----------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   |
| B.G.2 | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.3 | Windbelasting                           | -         | 0.20   |
| B.G.4 | Kniklengte (Assymetrisch)               | -         | -      |
| B.G.5 | Kniklengte (Symmetrisch)                | -         | -      |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Qu.C.1 |
|-------|---|--------|
| B.G.1 | Permanent                               | 1.00   |
| B.G.2 | Geconcentreerde veranderlijke belasting | -      |
| B.G.3 | Windbelasting                           | -      |
| B.G.4 | Kniklengte (Assymetrisch)               | -      |
| B.G.5 | Kniklengte (Symmetrisch)                | -      |

### UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

AFB. HOUTCONTROLE



## SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staal/staven |
|-----------------|--------------|
| C1              | S1           |

## STABILITEITSGEGEVENS

| Staal                 | Profiel | Y-As (assenstelsel) |           |       | Z-As(assenstelsel) |            |       |
|-----------------------|---------|---------------------|-----------|-------|--------------------|------------|-------|
|                       |         | Lsys                | Methode   | Lkip  | Lkip/Lsys          | Methode    | LkipL |
| kip/Lsys              |         |                     |           |       |                    |            |       |
| C1 - V1 (0.000-2.400) | P1      | 2.400               | Geschoord | 2.310 | 0.96               | Handmatige |       |
| Invoer                | 0.240   | 0.10                |           |       |                    |            |       |
| -                     | -       | m                   |           | m     | -                  | -          | m     |

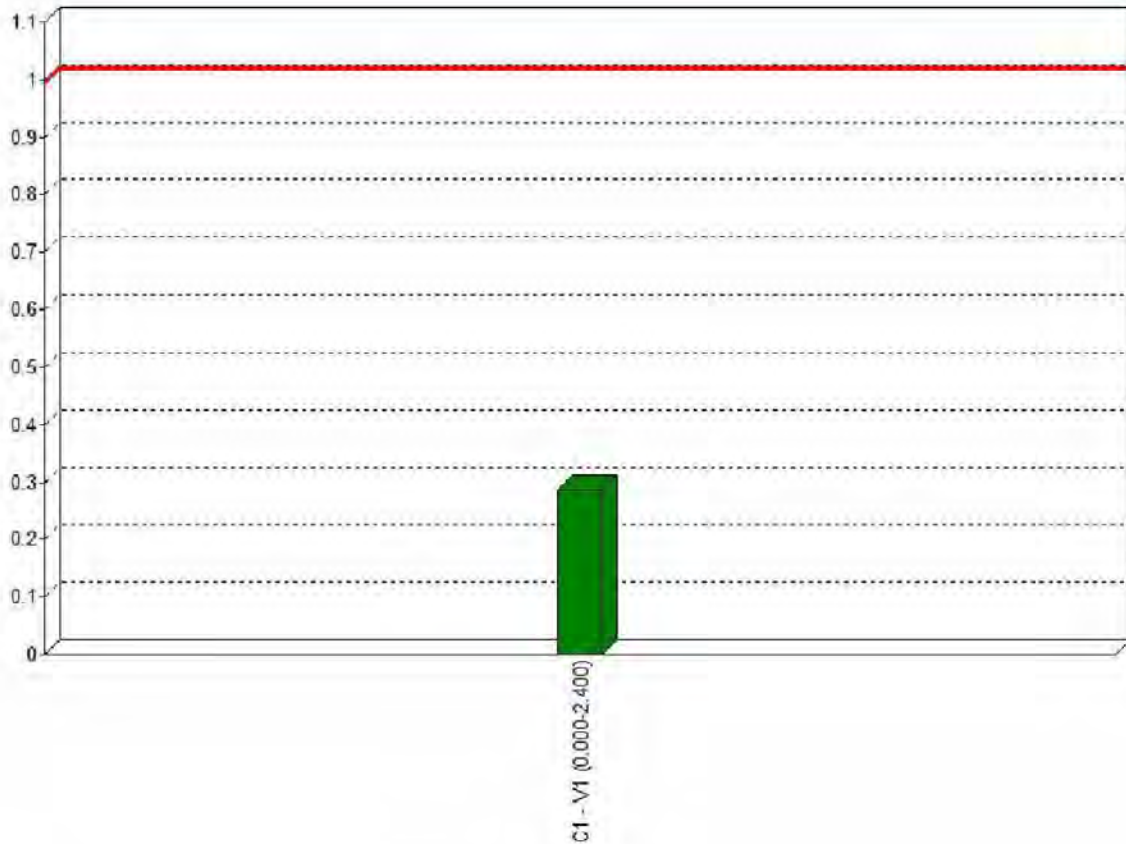
## KIPSTEUNENGEDEVENS

| Staal last            | Profiel | Begin                 | Eind          | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|-----------------------|---------------|------------------|------------------|--------------|
| C1 - V1 (0.000-2.400) | P1      | Inklemming inklemming |               |                  |                  |              |
|                       |         | Volledig vast         | Volledig vast |                  |                  | Neutraal     |
| -                     | -       | -                     | -             | m                | m                | -            |

## DOORBUIGINGGEGEVENS

| Staal w;2+w;3         | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-2.400) | Kolom       | 1 bouwlaag    |         |         | Parabolisch | H/300 |
| -                     | -           | -             | mm      | mm      | -           | N/B   |

## AFB. HOUT UC DIAGRAM



### UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                     | UC max |
|-------|-------------|------------|-----------------------------|--------|
| C1    | Doorsnede   | Fu.C.1     | NEN-EN1995-1-1#6.2.4 (6.19) | 0.26   |
|       | Kip         | Fu.C.1     | NEN-EN1995-1-1#6.3.3 (6.35) | 0.10   |
|       | Stabiliteit | Fu.C.1     | NEN-EN1995-1-1#6.3.2 (6.23) | 0.29   |

## 8.5 Bijlage ultraai MatrixFrame berekening Pos 5

### AFB. GEOMETRIE RAAMWERK



### STAVEN

| Staat | Knoop B | Knoop | X-E   | Z-E   | Lengte | Profiel | Positie              |
|-------|---------|-------|-------|-------|--------|---------|----------------------|
| E     | X-B     | Z-B   |       |       |        |         |                      |
| S1    | K1      | K2    | 0.000 | 0.000 | 1.100  | -2.500  | 2.731 P10.000 - L(2. |
| 731)  |         |       |       |       |        |         |                      |
| -     | -       | -     | m     | m     | m      | m       | m -                  |

### PROFIELEN

| Profiel | Profielnaam | Oppervlakte    | Iy             | Materiaal | 5.1.2.e |
|---------|-------------|----------------|----------------|-----------|---------|
| P1      | R70x145     | 1.0150e-02     | 1,7784e-05     | C24       | 0,0     |
| -       | -           | m <sup>2</sup> | m <sup>4</sup> | -         | °       |

### PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raatl. Hoogte   |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|-----------------|
| h.      | hB    |       |       |        |        |        |       |       |                 |
| P1      | Nee   | 0,145 | 0,145 | 0,0000 | 0,0000 | 0,0000 | 0,070 | 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/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

### OPLEGGINGEN

| Oplegging | Object | Positie | Z    | Yr        | HoekYr  |
|-----------|--------|---------|------|-----------|---------|
| O1        | K1     | 0.000   | vast | vast      | vrij    |
| O2        | K2     | 0.000   | vast | 0.00:0.00 | vrij    |
| -         | -      | m       | kN/m | kN/m      | kNm/rad |

### BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven                    | 5.1.2.e                 | Gunstig/Ong. | Element                 | 5.1.2.e   | Psi0   | Psi1 | Cprob |
|---------|---------------------------|-------------------------|--------------|-------------------------|-----------|--------|------|-------|
| Psi2    | UGT/GGT                   |                         |              |                         |           |        |      |       |
| B.G.1   | Permanent                 | Permanent               | -            |                         | N.v.t.    | N.v.t. |      |       |
| B.G.2   | Verdeelde veranderlijke   | Verdeelde               | -            | Cat. H) Ontoegankelijke | 1.00/1.00 |        |      |       |
| 1       | 1                         |                         |              | daken                   |           |        |      |       |
| B.G.3   | Geconcentreerde           | veranderlijke belasting | -            | Cat. H) Ontoegankelijke | N.v.t.    | N.v.t. |      |       |
|         | veranderlijke belasting   | veranderlijke belasting |              | daken                   |           |        |      |       |
| B.G.4   | Windbelasting             | Windbelasting           | -            |                         | N.v.t.    | N.v.t. |      |       |
| 0.20    |                           | 1.00/1.00               |              |                         |           |        |      |       |
| B.G.5   | Kniklengte (Assymetrisch) | Kniklengte              |              |                         | N.v.t.    | N.v.t. |      |       |

B.G.6 Kniklengte (Symmetrisch) Kniklengte

N.v.t. N.v.t.

**FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)**

| B.G.  | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|-------|---|--------|--------|--------|--------|
| B.G.1 | Permanent                               | 1.20   | 1.20   | 1.20   | 1.35   |
| B.G.2 | Verdeelde veranderlijke belasting       | 1.50   | -      | -      | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -      | -      | 1.50   | -      |
| B.G.4 | Windbelasting                           | -      | 1.50   | -      | -      |
| B.G.5 | Kniklengte (Assymetrisch)               | -      | -      | -      | -      |
| B.G.6 | Kniklengte (Symmetrisch)                | -      | -      | -      | -      |

**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 | Verdeelde veranderlijke belasting       | -         | -      | 1.00   | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -         | -      | -      | -      |
| B.G.4 | Windbelasting                           | -         | -      | -      | 1.00   |
| B.G.5 | Kniklengte (Assymetrisch)               | -         | -      | -      | -      |
| B.G.6 | Kniklengte (Symmetrisch)                | -         | -      | -      | -      |

**FREQUENT BELASTINGSCOMBINATIES (TABEL)**

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |
|-------|---|-----------|--------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.4 | Windbelasting                           | -         | -      | 0.20   |
| B.G.5 | Kniklengte (Assymetrisch)               | -         | -      | -      |
| B.G.6 | Kniklengte (Symmetrisch)                | -         | -      | -      |

**QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)**

| B.G.  | Omschrijving                            | Qu.C.1 |
|-------|---|--------|
| B.G.1 | Permanent                               | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting       | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -      |
| B.G.4 | Windbelasting                           | -      |
| B.G.5 | Kniklengte (Assymetrisch)               | -      |
| B.G.6 | Kniklengte (Symmetrisch)                | -      |

**UITGANGSPUNTEN VAN DE ANALYSE**

Lineaire Elastische Analyse uitgevoerd

## AFB. HOUTCONTROLE



### SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

### STABILITEITSGEGEVENS

| Staaft                | Profiel | Y-As (assenstelsel) |           |       | Z-As(assenstelsel) |            |       |
|-----------------------|---------|---------------------|-----------|-------|--------------------|------------|-------|
|                       |         | Lsys                | Methode   | Lkip  | Lkip/Lsys          | Methode    | LkipL |
| C1 - V1 (0.000-2.731) | P1      | 2,731               | Geschoord | 2.629 | 0.96               | Handmatige |       |
| Invoer                | 0.273   | 0.10                |           |       |                    |            |       |
| -                     | -       | m                   |           | m     | -                  | -          | m     |

### KIPSTEUNENGEDEVENS

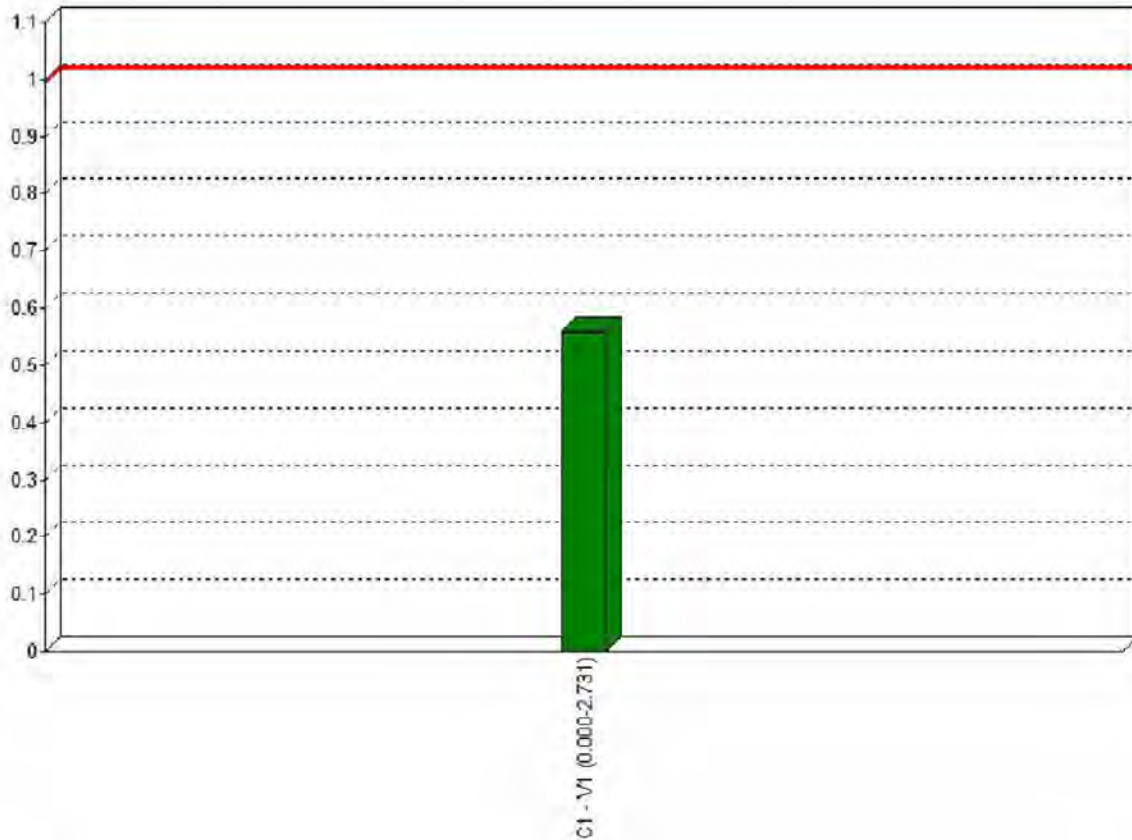
| Staaft last           | Profiel | Begin | Eind | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|-------|------|------------------|------------------|--------------|
| C1 - V1 (0.000-2.731) | P1      |       |      |                  |                  | Neutraal     |
| -                     | -       | -     | -    | m                | m                | -            |

### DOORBUIGINGSGEGEVENS

| Staaft w;2+w;3        | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-2.731) | Dak         | N.v.t.        | 0       | 0       | Parabolisch | N/B   |
| -                     | -           | -             | mm      | mm      | -           | -     |



## AFB. HOUT UC DIAGRAM

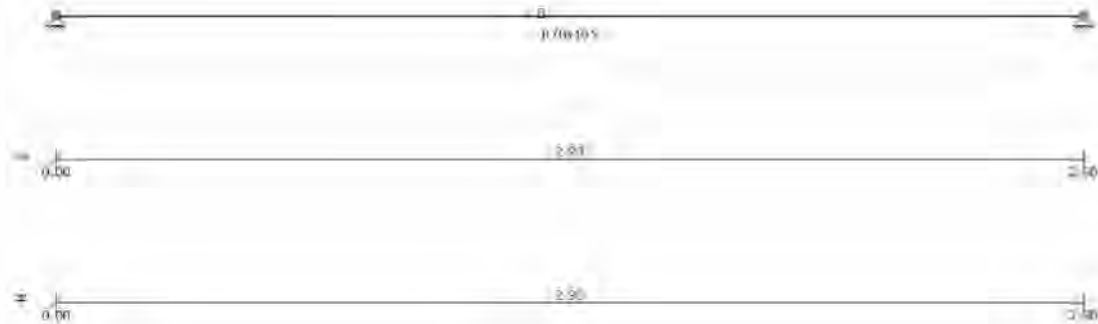


### UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                     | UC max |
|-------|-------------|------------|-----------------------------|--------|
| C1    | Doorsnede   | Fu.C.2     | NEN-EN1995-1-1#6.2.4 (6.19) | 0.50   |
|       | Kip         | Fu.C.2     | NEN-EN1995-1-1#6.3.3 (6.35) | 0.29   |
|       | Stabiliteit | Fu.C.2     | NEN-EN1995-1-1#6.3.2 (6.23) | 0.56   |

## 8.6 Bijlage ultraai MatrixFrame berekening Pos 6

AFB. GEOMETRIE LIGGER



### BALKGEOMETRIE

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|------------|-------------------|
| 0.000 - L(2.900) | R70x195     | 0       | 4.3253e-05       | C24       | 1.1000e+07 | 50.0000e-07       |
| 0.06             | m -         | 0       | m4 -             |           | kN/m2      | C°m k             |
| N/m              |             |         |                  |           |            |                   |

### PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. | Hoogte    |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-----------|
| P3      | Nee   | 0,195 | 0,195 | 0,0000 | 0,0000 | 0,0000 | 0,070 | 0,000 | 0,000  | Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m -    | m         |

### MATERIALEN

| Materiaalnaam | Poison | Dichtheid | E-Modulus  | Uitzettingcoëff |
|---------------|--------|-----------|------------|-----------------|
| C24           | 0.40   | 4.20      | 1.1000e+07 | 50.0000e-07     |
| -             | -      | kN/m3     | kN/m2      | C°m             |

### OPLEGGINGEN

| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(2.900) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

### BELASTINGSGEVALLEN TYPEN

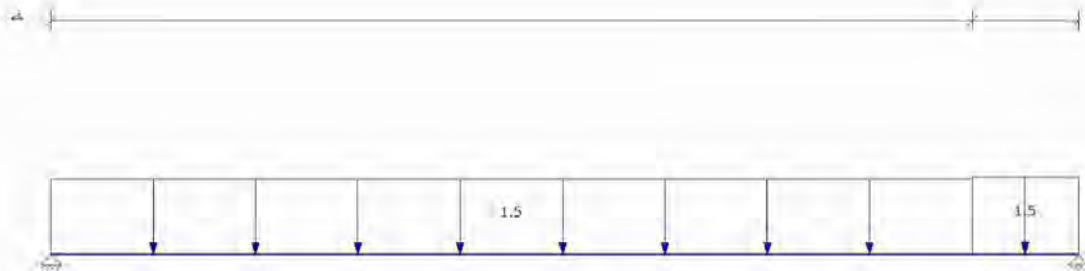
| Oplegg. | Staven                  | 5.1.2.e                    | Gunstig/Ong.Element | 5.1.2.e         | Psi0   | Psi1   | Cprob     |
|---------|-------------------------|----------------------------|---------------------|-----------------|--------|--------|-----------|
| Psi2    | UGT/GGT                 |                            |                     |                 |        |        |           |
| B.G.1   | Permanent               | Permanent                  | -                   | N.v.t.          | N.v.t. |        |           |
| B.G.2   | Verdeelde veranderlijke | Verdeelde                  | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00<br>belasting  | veranderlijke<br>belasting |                     |                 |        |        |           |
| B.G.3   | Geconcentreerde         | Geconcentreerde            | -                   | Cat. A) Vloeren | N.v.t. | N.v.t. | 0.40 0.50 |
| 0.30    | veranderlijke belasting | veranderlijke<br>belasting |                     |                 |        |        |           |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde                  | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00<br>belasting  | veranderlijke<br>belasting |                     |                 |        |        |           |



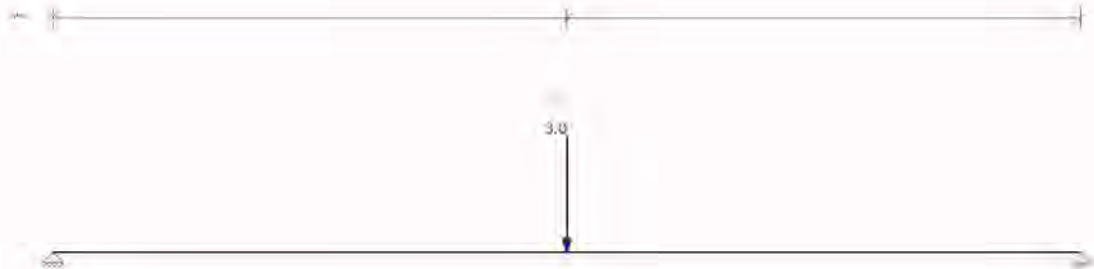
## AFB. LASTEN B.G.1 PERMANENT



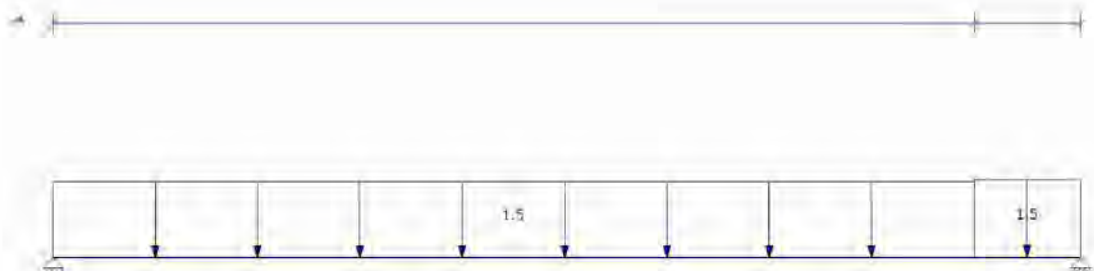
## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.35   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | 1.50   | -      | 0.60   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | 0.60   | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|---------|---|-----------|--------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.40   | 1.00   |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|---------|---|-----------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.50   |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

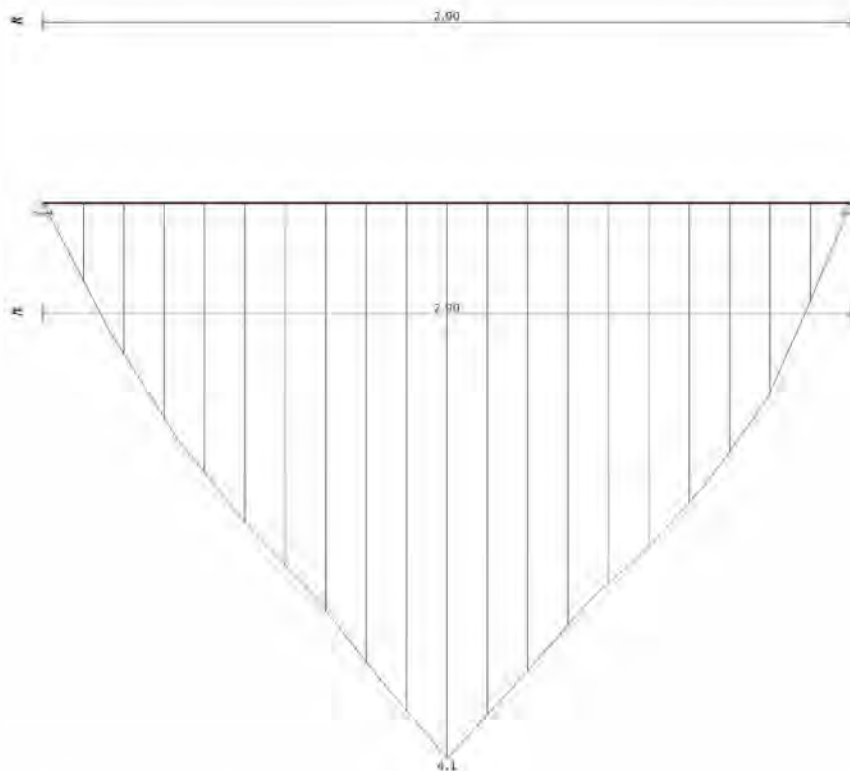
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 0.30   |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

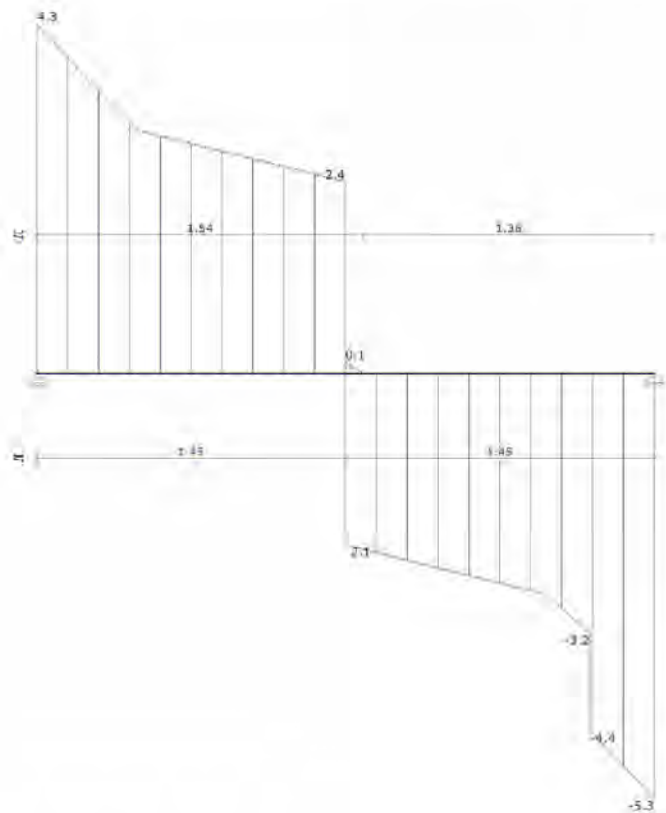
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingscombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax   | Ve                   |      |      |       |      |       |       |    |
| Veld 1 | 0.000 - 2.900 Fu.C.1 | 0.00 | 3.23 | 1.493 | 0.00 | 0.000 | 0.000 |    |
| 4.33   | -5.26 -5.26          |      |      |       |      |       |       |    |
|        | 0.000 - 2.900 Fu.C.2 | 0.00 | 4.12 | 1.450 | 0.00 | 0.000 | 0.000 |    |
| 3.31   | -4.24 -4.24          |      |      |       |      |       |       |    |
|        | 0.000 - 2.900 Fu.C.3 | 0.00 | 1.92 | 1.535 | 0.00 | 0.000 | 0.000 |    |
| 2.50   | -3.54 -3.54          |      |      |       |      |       |       |    |
|        | 0.000 - 2.900 Fu.C.4 | 0.00 | 2.27 | 1.450 | 0.00 | 0.000 | 0.000 |    |
| 2.10   | -3.13 -3.13          |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties





### FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|--------|---------------------|---------|------|---------|--------------|------|
| Fu.C.1 | 01                  | 0.000   | vast | vrij    | -4.33        | 0.00 |
| Fu.C.1 | 02                  | 2.900   | vast | vrij    | -5.26        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-9.59</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>9.59</b>  |      |
| Fu.C.2 | 01                  | 0.000   | vast | vrij    | -3.31        | 0.00 |
| Fu.C.2 | 02                  | 2.900   | vast | vrij    | -4.24        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-7.55</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>7.55</b>  |      |
| Fu.C.3 | 01                  | 0.000   | vast | vrij    | -2.50        | 0.00 |
| Fu.C.3 | 02                  | 2.900   | vast | vrij    | -3.54        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-6.04</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>6.04</b>  |      |
| Fu.C.4 | 01                  | 0.000   | vast | vrij    | -2.10        | 0.00 |
| Fu.C.4 | 02                  | 2.900   | vast | vrij    | -3.13        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-5.23</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>5.23</b>  |      |
| -      | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

### B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|---------|---------------------|---------|------|---------|--------------|------|
| B.G.1   | 01                  | 0.000   | vast | vrij    | -0.89        | 0.00 |
| B.G.1   | 02                  | 2.900   | vast | vrij    | -1.65        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-2.54</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>2.54</b>  |      |
| B.G.2.1 | 01                  | 0.000   | vast | vrij    | -2.18        | 0.00 |
| B.G.2.1 | 02                  | 2.900   | vast | vrij    | -2.18        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-4.36</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>4.36</b>  |      |
| B.G.3   | 01                  | 0.000   | vast | vrij    | -1.50        | 0.00 |
| B.G.3   | 02                  | 2.900   | vast | vrij    | -1.50        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-3.00</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>3.00</b>  |      |
| -       | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties





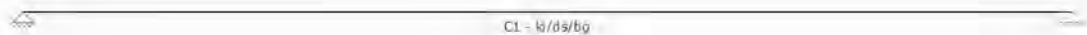
### KA.C. KNOOPVERPLAATSINGEN

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0.0000 | -1.452e-03 |
|       | Ka.C.1    | 0.0000 | -2.734e-03 |
|       | Ka.C.2    | 0.0000 | -4.658e-03 |
| K2    | Ka.C.(w1) | 0.0000 | 1.667e-03  |
|       | Ka.C.1    | 0.0000 | 2.949e-03  |
|       | Ka.C.2    | 0.0000 | 4.873e-03  |
| -     | -         | m      | rad        |

### KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld   |             | Veld Eind |        |
|------|-------------------------|------------|--------|--------|-------------|-----------|--------|
|      |                         |            |        | Z'     | Z' glb dist | Z' glb    | Z' glb |
| S1   | 0.000 - 2.900 Ka.C.(w1) | 0,0000     | 1.498  | 0,0014 | 1.498       | 0.0014    | 0,0000 |
| S1   | 0.000 - 2.900 Ka.C.1    | 0,0000     | 1.476  | 0,0025 | 1.476       | 0.0025    | 0,0000 |
| S1   | 0.000 - 2.900 Ka.C.2    | 0,0000     | 1.465  | 0,0043 | 1.465       | 0.0043    | 0,0000 |
| -    | m -                     | m          | m      | m      | m           | m         | m      |

AFB. HOUTCONTROLE



### SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

### STABILITEITSGEGEVENS

| Staaft                | Profiel | Y-As (assenstelsel) |              |       | Z-As(assenstelsel) |              |       |
|-----------------------|---------|---------------------|--------------|-------|--------------------|--------------|-------|
|                       |         | Lsys                | Methode      | Lkip  | Lkip/Lsys          | Methode      | LkipL |
| C1 - V1 (0.000-2.900) | P3      | 2.900               | Conservatief | 2.900 | 1.00               | Conservatief |       |
| 2.900                 | 1.00    |                     | geschoord    |       |                    | geschoord    |       |

- - m - m - - - m -

## KIPSTEUNENGEGEVENS

| Staaflast             | Profiel | Begin         | Eind          | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|---------------|---------------|------------------|------------------|--------------|
| C1 - V1 (0.000-2.900) | P3      | Inklemming    | Inklemming    |                  |                  | Neutraal     |
|                       |         | Volledig vast | Volledig vast | m                | m                |              |

## DOORBUIGINGGEGEVENS

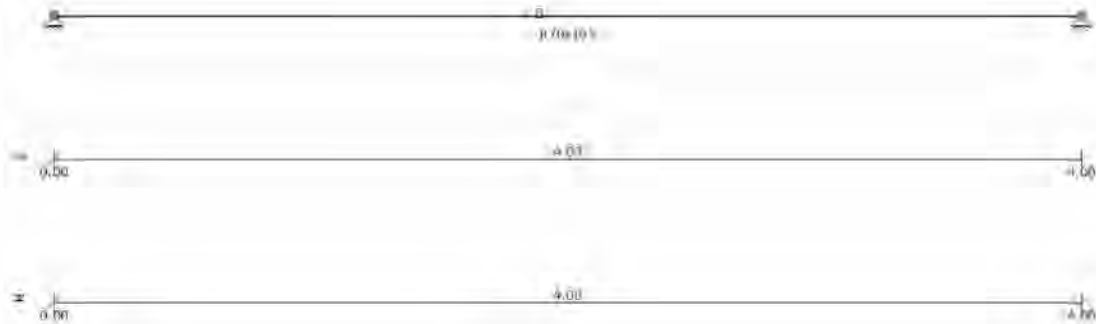
| Staaflast             | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-2.900) | Vloer       | Algemeen      | 0       | 0       | Parabolisch | L/250 |
| L/333                 |             |               | mm      | mm      |             |       |

## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.2     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.63   |
|       | Kip         | Fu.C.2     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.63   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.49   |

8.7 Bijlage ultraai MatrixFrame berekening Pos 7

AFB. GEOMETRIE LIGGER



**BALKGEOMETRIE**

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|------------|-------------------|
| 0.000 - L(4.000) | R70x195     | 0       | 4.3253e-05       | C24       | 1.1000e+07 | 50.0000e-07       |
| 0.06             | m -         | 0       | m4 -             |           | kN/m2      | C°m k             |
| N/m              |             |         |                  |           |            |                   |

**PROFIELVORMEN**

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. | Hoogte    |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-----------|
| P3      | Nee   | 0,195 | 0,195 | 0,0000 | 0,0000 | 0,0000 | 0,070 | 0,000 | 0,000  | Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m -    | m         |

**MATERIALEN**

| Materiaalnaam | Poison | Dichtheid | E-Modulus  | Uitzettingcoëff |
|---------------|--------|-----------|------------|-----------------|
| C24           | 0.40   | 4.20      | 1.1000e+07 | 50.0000e-07     |
| -             | -      | kN/m3     | kN/m2      | C°m             |

**OPLEGGINGEN**

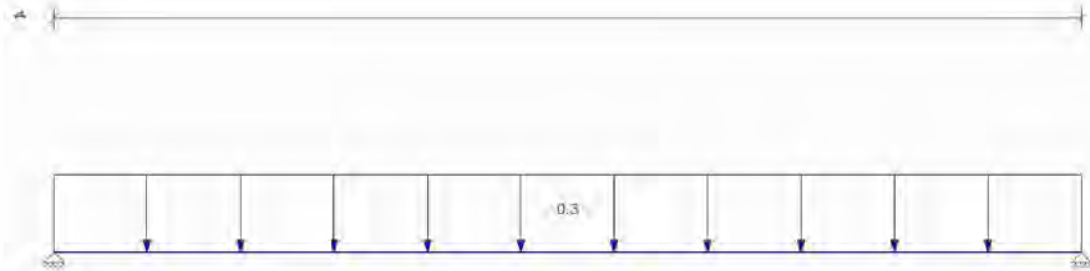
| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(4.000) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

**BELASTINGSGEVALLEN TYPEN**

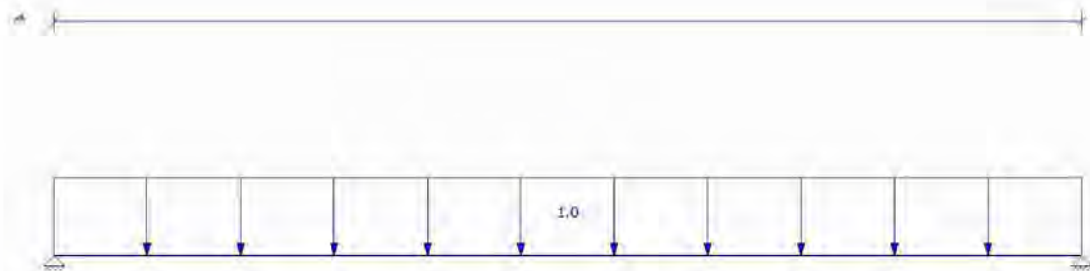
| Oplegg. | Staven                  | 5.1.2.e                    | Gunstig/Ong.Element | 5.1.2.e         | Psi0   | Psi1   | Cprob     |
|---------|-------------------------|----------------------------|---------------------|-----------------|--------|--------|-----------|
| Psi2    | UGT/GGT                 |                            |                     |                 |        |        |           |
| B.G.1   | Permanent               | Permanent                  | -                   | N.v.t.          | N.v.t. |        |           |
| B.G.2   | Verdeelde veranderlijke | Verdeelde                  | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00<br>belasting  | veranderlijke<br>belasting |                     |                 |        |        |           |
| B.G.3   | Geconcentreerde         | Geconcentreerde            | -                   | Cat. A) Vloeren | N.v.t. | N.v.t. | 0.40 0.50 |
| 0.30    | veranderlijke belasting | veranderlijke<br>belasting |                     |                 |        |        |           |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde                  | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00<br>belasting  | veranderlijke<br>belasting |                     |                 |        |        |           |



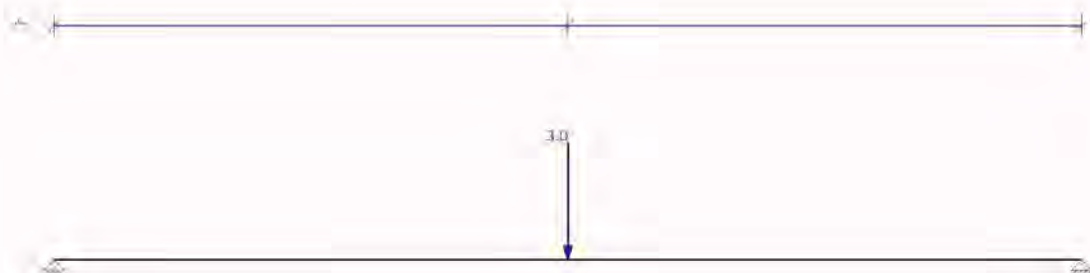
## AFB. LASTEN B.G.1 PERMANENT



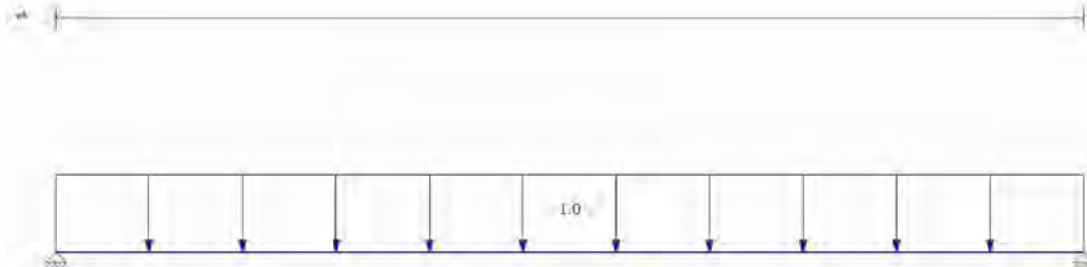
## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.35   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | 1.50   | -      | 0.60   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | 0.60   | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|---------|---|-----------|--------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.40   | 1.00   |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|---------|---|-----------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.50   |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

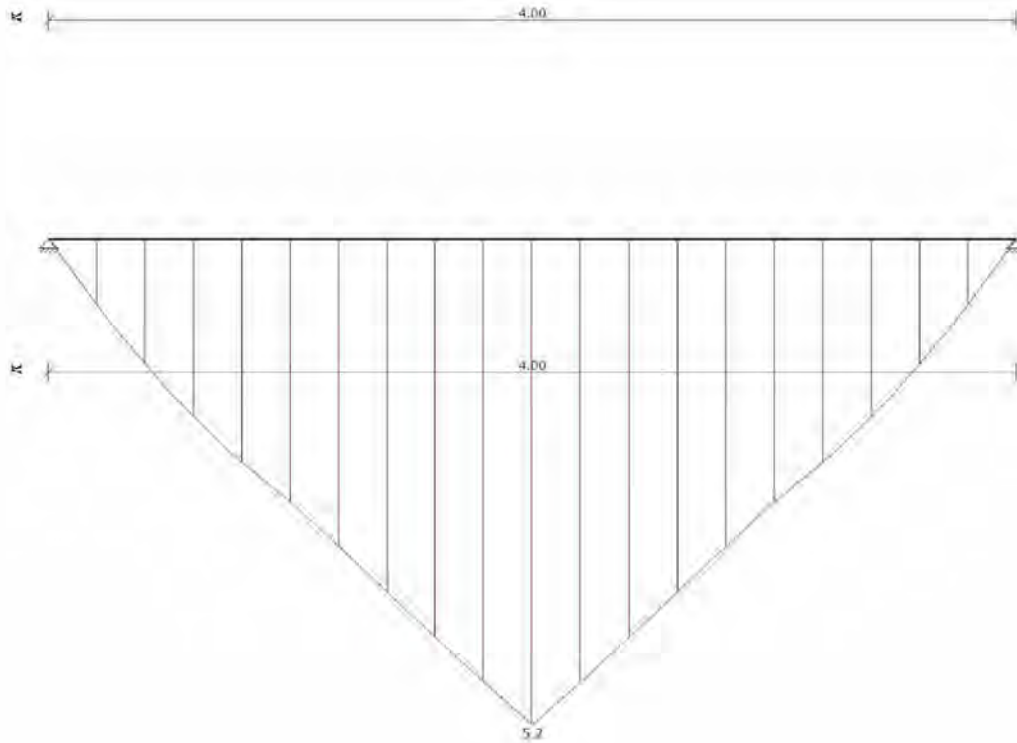
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 0.30   |

### UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

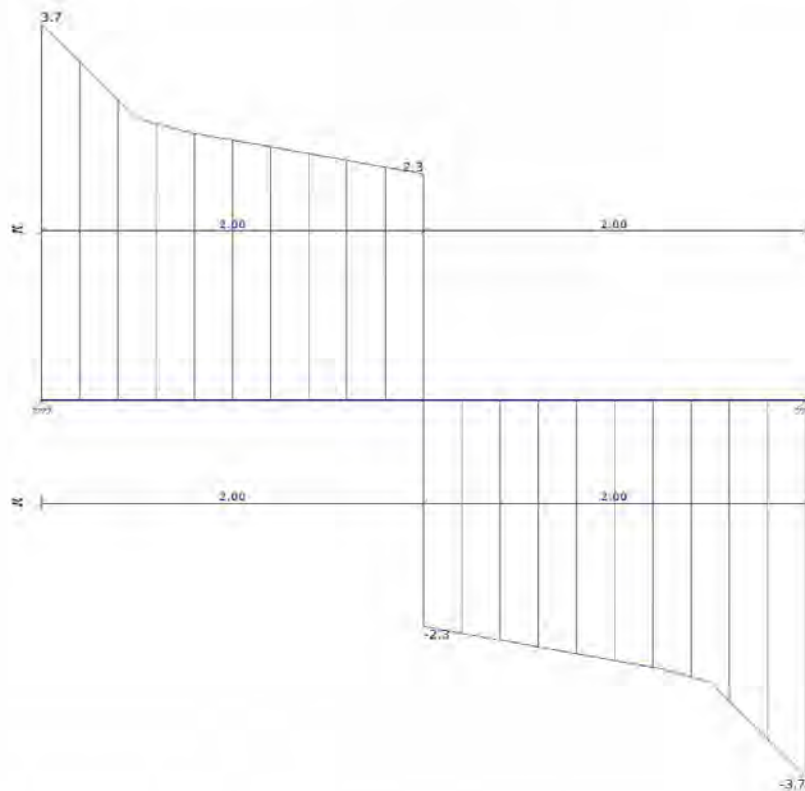
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingcombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties



### FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax   | Ve                   |      |      |       |      |       |       |    |
| Veld 1 | 0.000 - 4.000 Fu.C.1 | 0.00 | 3.73 | 2.000 | 0.00 | 0.000 | 0.000 |    |
| 3.73   | 3.73 -3.73           |      |      |       |      |       |       |    |
|        | 0.000 - 4.000 Fu.C.2 | 0.00 | 5.17 | 2.000 | 0.00 | 0.000 | 0.000 |    |
| 2.92   | 2.92 -2.92           |      |      |       |      |       |       |    |
|        | 0.000 - 4.000 Fu.C.3 | 0.00 | 1.98 | 2.000 | 0.00 | 0.000 | 0.000 |    |
| 1.98   | 1.98 -1.98           |      |      |       |      |       |       |    |
|        | 0.000 - 4.000 Fu.C.4 | 0.00 | 2.56 | 2.000 | 0.00 | 0.000 | 0.000 |    |
| 1.66   | 1.66 -1.66           |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties





### FU.C. OPLEGREACTIES

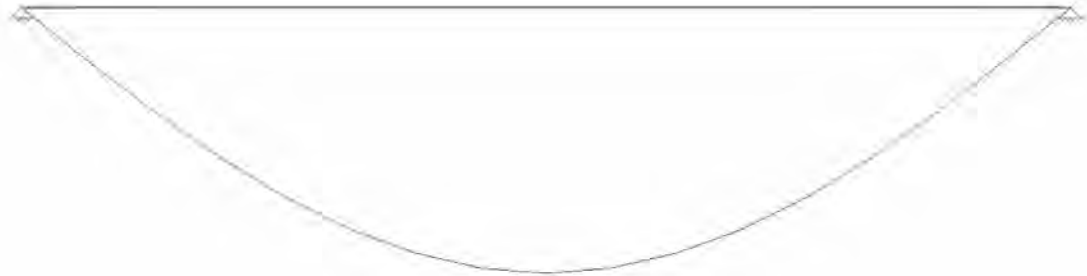
| B.C.   | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|--------|---------------------|---------|------|---------|--------------|------|
| Fu.C.1 | 01                  | 0.000   | vast | vrij    | -3.73        | 0.00 |
| Fu.C.1 | 02                  | 4.000   | vast | vrij    | -3.73        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-7.47</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>7.47</b>  |      |
| Fu.C.2 | 01                  | 0.000   | vast | vrij    | -2.92        | 0.00 |
| Fu.C.2 | 02                  | 4.000   | vast | vrij    | -2.92        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-5.85</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>5.85</b>  |      |
| Fu.C.3 | 01                  | 0.000   | vast | vrij    | -1.98        | 0.00 |
| Fu.C.3 | 02                  | 4.000   | vast | vrij    | -1.98        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-3.96</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>3.96</b>  |      |
| Fu.C.4 | 01                  | 0.000   | vast | vrij    | -1.66        | 0.00 |
| Fu.C.4 | 02                  | 4.000   | vast | vrij    | -1.66        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-3.31</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>3.31</b>  |      |
| -      | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

### B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|---------|---------------------|---------|------|---------|--------------|------|
| B.G.1   | 01                  | 0.000   | vast | vrij    | -0.56        | 0.00 |
| B.G.1   | 02                  | 4.000   | vast | vrij    | -0.56        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-1.12</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>1.12</b>  |      |
| B.G.2.1 | 01                  | 0.000   | vast | vrij    | -2.04        | 0.00 |
| B.G.2.1 | 02                  | 4.000   | vast | vrij    | -2.04        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-4.08</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>4.08</b>  |      |
| B.G.3   | 01                  | 0.000   | vast | vrij    | -1.50        | 0.00 |
| B.G.3   | 02                  | 4.000   | vast | vrij    | -1.50        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-3.00</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>3.00</b>  |      |
| -       | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties



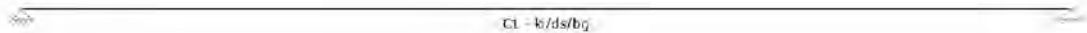
### KA.C. KNOOPVERPLAATSINGEN

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0,0000 | -1,569e-03 |
|       | Ka.C.1    | 0,0000 | -3,856e-03 |
|       | Ka.C.2    | 0,0000 | -7,286e-03 |
| K2    | Ka.C.(w1) | 0,0000 | 1,569e-03  |
| Knoop | B.C.      | Z      | Yr         |
| K2    | Ka.C.1    | 0,0000 | 3,856e-03  |
|       | Ka.C.2    | 0,0000 | 7,286e-03  |
| -     | -         | m      | rad        |

### KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld Z' | Z' glb dist | Veld Eind Z' glb |
|------|-------------------------|------------|--------|---------|-------------|------------------|
| S1   | 0,000 - 4,000 Ka.C.(w1) | 0,0000     | 2,000  | 0,0020  | 2,000       | 0,0020 0,0000    |
| S1   | 0,000 - 4,000 Ka.C.1    | 0,0000     | 2,000  | 0,0048  | 2,000       | 0,0048 0,0000    |
| S1   | 0,000 - 4,000 Ka.C.2    | 0,0000     | 2,000  | 0,0091  | 2,000       | 0,0091 0,0000    |
| -    | m -                     | m          | m      | m       | m           | m m              |

AFB. HOUTCONTROLE



### SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staal/staven |
|-----------------|--------------|
| C1              | S1           |

### STABILITEITSGEGEVENS

| Staal                 | Profiel | Y-As (assenstelsel) |              |           | Z-As(assenstelsel) |              |       |
|-----------------------|---------|---------------------|--------------|-----------|--------------------|--------------|-------|
|                       |         | Lsys                | Method       | Lkip      | Lkip/Lsys          | Method       | LkipL |
| kip/Lsys              |         |                     |              |           |                    |              |       |
| C1 - V1 (0,000-4,000) | P3      | 4,000               | Conservatief | 4,000     | 1,00               | Conservatief |       |
| 4,000                 | 1,00    |                     |              |           |                    |              |       |
| -                     | -       | geschoord           |              | geschoord |                    |              | m -   |
|                       |         | m -                 |              | m         | -                  |              |       |

## KIPSTEUNENGEGEVENS

| Staaflast             | Profiel | Begin   | Eind | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|---|------|------------------|------------------|--------------|
| C1 - V1 (0.000-4.000) | P3      | <b>inklemming inklemming</b><br>Volledig vast Volledig vast |      | m                | m                | Neutraal     |
| -                     | -       | -   | -    | -                | -                | -            |

## DOORBUIGINGGEGEVENS

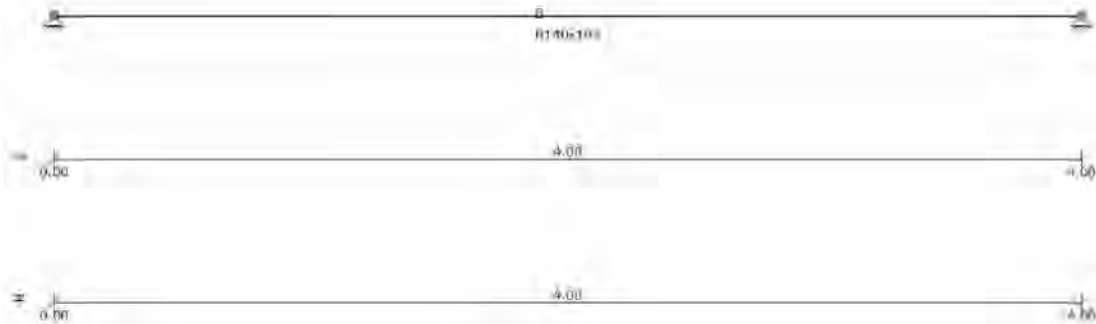
| Staaflast<br>w;2+w;3           | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|--------------------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-4.000)<br>L/333 | Vloer       | Algemeen      | 0       | 0       | Parabolisch | L/250 |
| -                              | -           | -             | mm      | mm      | -           | -     |

## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.2     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.79   |
|       | Kip         | Fu.C.2     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.79   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.80   |

**8.8 Bijlage ultraai MatrixFrame berekening Pos 8**

AFB. GEOMETRIE LIGGER



**BALKGEOMETRIE**

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|------------|-------------------|
| 0.000 - L(4.000) | R140x195    | 0       | 8.6507e-05       | C24       | 1.1000e+07 | 50.0000e-07       |
| 0.11             | m -         | 0       | m4 -             |           | kN/m2      | C°m k             |
| N/m              |             |         |                  |           |            |                   |

**PROFIELVORMEN**

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. | Hoogte    |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-----------|
| P4      | Nee   | 0,195 | 0,195 | 0,0000 | 0,0000 | 0,0000 | 0,140 | 0,000 | 0,000  | Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m -    | m         |

**MATERIALEN**

| Materiaalnaam | Poison | Dichtheid | E-Modulus  | Uitzettingcoëff |
|---------------|--------|-----------|------------|-----------------|
| C24           | 0.40   | 4.20      | 1.1000e+07 | 50.0000e-07     |
| -             | -      | kN/m3     | kN/m2      | C°m             |

**OPLEGGINGEN**

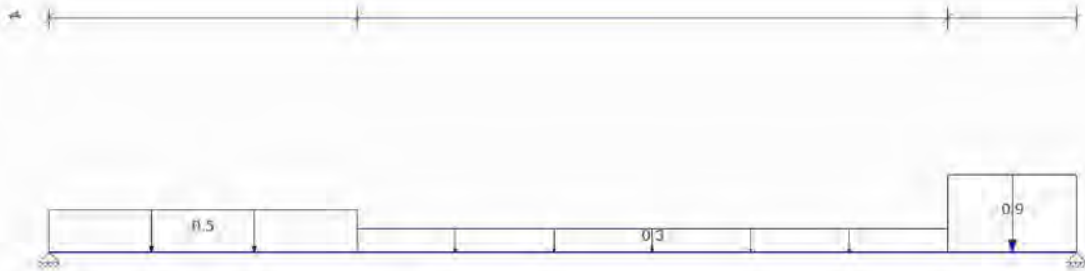
| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(4.000) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

**BELASTINGSGEVALLEN TYPEN**

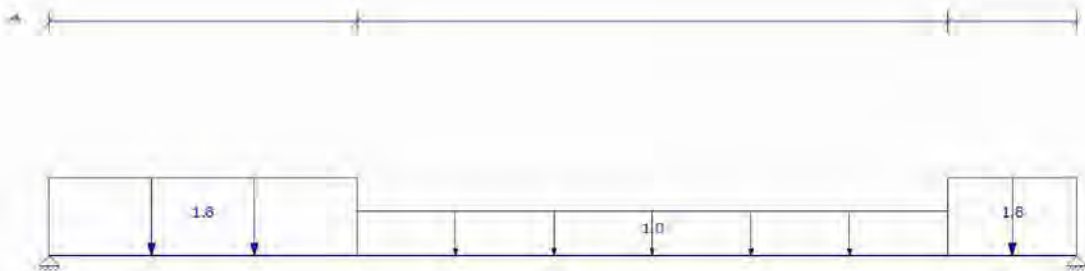
| Oplegg. | Staven                  | 5.1.2.e                 | Gunstig/Ong.Element | 5.1.2.e         | Psi0   | Psi1   | Cprob     |
|---------|-------------------------|-------------------------|---------------------|-----------------|--------|--------|-----------|
| Psi2    | UGT/GGT                 |                         |                     |                 |        |        |           |
| B.G.1   | Permanent               | Permanent               | -                   | N.v.t.          | N.v.t. |        |           |
| B.G.2   | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00 belasting     | veranderlijke belasting |                     |                 |        |        |           |
| B.G.3   | Geconcentreerde         | Geconcentreerde         | -                   | Cat. A) Vloeren | N.v.t. | N.v.t. | 0.40 0.50 |
| 0.30    | veranderlijke belasting | veranderlijke belasting |                     |                 |        |        |           |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00 belasting     | veranderlijke belasting |                     |                 |        |        |           |



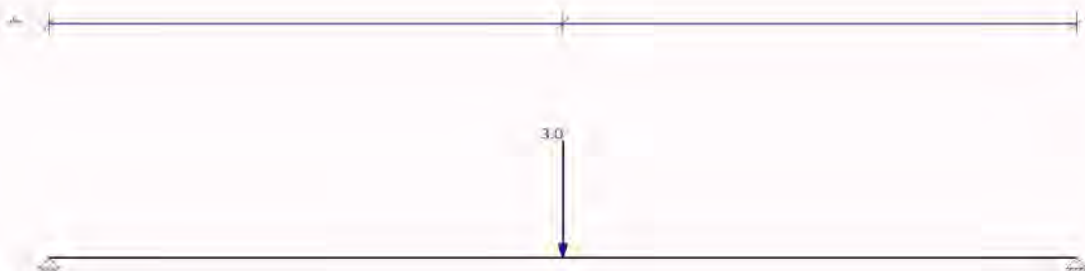
## AFB. LASTEN B.G.1 PERMANENT



## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.35   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | 1.50   | -      | 0.60   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | 0.60   | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|---------|---|-----------|--------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.40   | 1.00   |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|---------|---|-----------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.50   |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

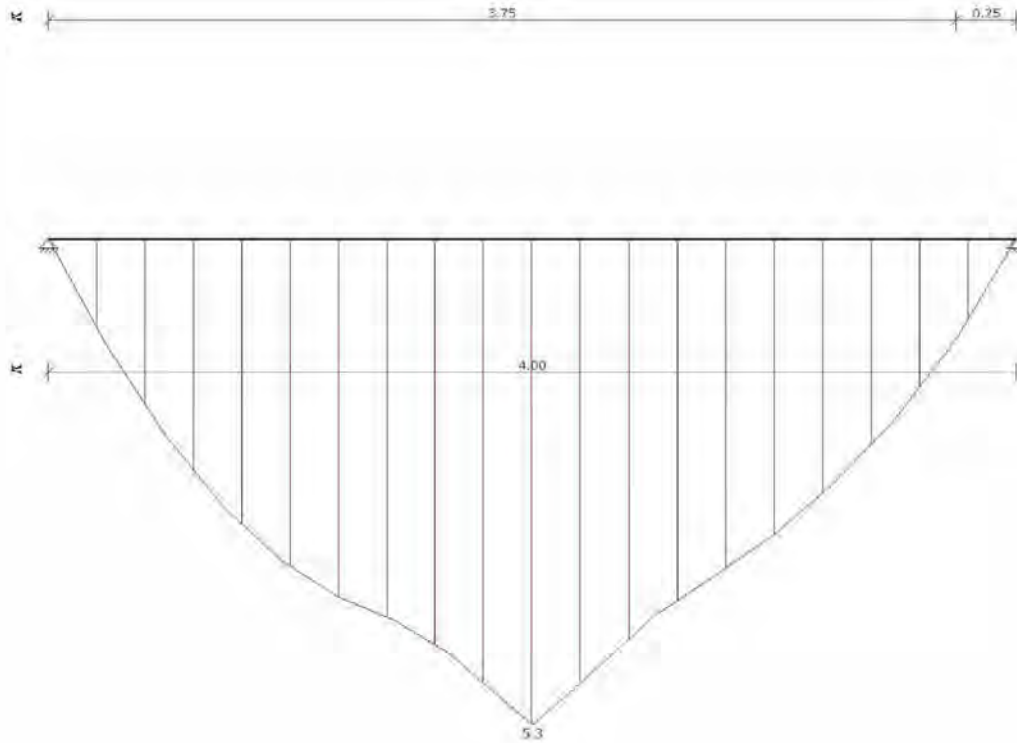
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 0.30   |

### UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

AFB. FU.C. MOMENT (MY) OMHULLENDE

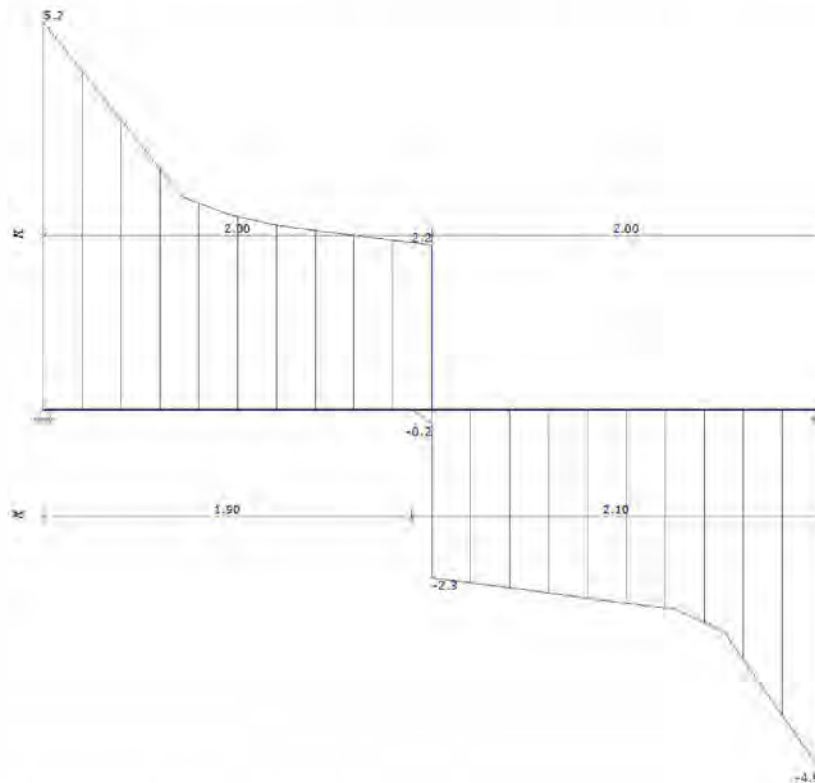
Fundamenteel Belastingcombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties





### FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax   | Ve                   |      |      |       |      |       |       |    |
| Veld 1 | 0.000 - 4.000 Fu.C.1 | 0.00 | 4.37 | 1.896 | 0.00 | 0.000 | 0.000 |    |
| 5.23   | 5.23 -4.87           |      |      |       |      |       |       |    |
|        | 0.000 - 4.000 Fu.C.2 | 0.00 | 5.31 | 2.000 | 0.00 | 0.000 | 0.000 |    |
| 3.20   | -3.31 -3.31          |      |      |       |      |       |       |    |
|        | 0.000 - 4.000 Fu.C.3 | 0.00 | 2.33 | 1.905 | 0.00 | 0.000 | 0.000 |    |
| 2.78   | 2.78 -2.72           |      |      |       |      |       |       |    |
|        | 0.000 - 4.000 Fu.C.4 | 0.00 | 2.71 | 2.000 | 0.00 | 0.000 | 0.000 |    |
| 1.97   | -2.09 -2.09          |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



### FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie | Z    | Yr      | Z             | My   |
|--------|---------------------|---------|------|---------|---------------|------|
| Fu.C.1 | 01                  | 0.000   | vast | vrij    | -5.23         | 0.00 |
| Fu.C.1 | 02                  | 4.000   | vast | vrij    | -4.87         | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-10.10</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>10.10</b>  |      |
| Fu.C.2 | 01                  | 0.000   | vast | vrij    | -3.20         | 0.00 |
| Fu.C.2 | 02                  | 4.000   | vast | vrij    | -3.31         | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-6.51</b>  |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>6.51</b>   |      |
| Fu.C.3 | 01                  | 0.000   | vast | vrij    | -2.78         | 0.00 |
| Fu.C.3 | 02                  | 4.000   | vast | vrij    | -2.72         | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-5.50</b>  |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>5.50</b>   |      |
| Fu.C.4 | 01                  | 0.000   | vast | vrij    | -1.97         | 0.00 |
| Fu.C.4 | 02                  | 4.000   | vast | vrij    | -2.09         | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-4.06</b>  |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>4.06</b>   |      |
| -      | -                   | m       | kN/m | kNm/rad | kN            | kNm  |

### B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|---------|---------------------|---------|------|---------|--------------|------|
| B.G.1   | 01                  | 0.000   | vast | vrij    | -0.79        | 0.00 |
| B.G.1   | 02                  | 4.000   | vast | vrij    | -0.88        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-1.68</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>1.68</b>  |      |
| B.G.2.1 | 01                  | 0.000   | vast | vrij    | -2.85        | 0.00 |
| B.G.2.1 | 02                  | 4.000   | vast | vrij    | -2.54        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-5.39</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>5.39</b>  |      |
| B.G.3   | 01                  | 0.000   | vast | vrij    | -1.50        | 0.00 |
| B.G.3   | 02                  | 4.000   | vast | vrij    | -1.50        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-3.00</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>3.00</b>  |      |
| -       | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties



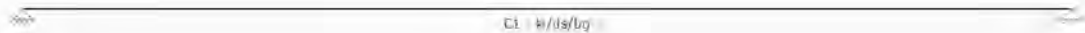
**KA.C. KNOOPVERPLAATSINGEN**

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0,0000 | -0,991e-03 |
|       | Ka.C.1    | 0,0000 | -2,385e-03 |
|       | Ka.C.2    | 0,0000 | -4,477e-03 |
| K2    | Ka.C.(w1) | 0,0000 | 0,980e-03  |
| Knoop | B.C.      | Z      | Yr         |
| K2    | Ka.C.1    | 0,0000 | 2,319e-03  |
|       | Ka.C.2    | 0,0000 | 4,328e-03  |
| -     | -         | m      | rad        |

**KA.C. DOORBUIGINGEN**

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld Z' | Z' glb dist | Veld Eind Z' glb |
|------|-------------------------|------------|--------|---------|-------------|------------------|
| S1   | 0,000 - 4,000 Ka.C.(w1) | 0,0000     | 1,988  | 0,0012  | 1,988       | 0,0012 0,0000    |
| S1   | 0,000 - 4,000 Ka.C.1    | 0,0000     | 1,980  | 0,0029  | 1,980       | 0,0029 0,0000    |
| S1   | 0,000 - 4,000 Ka.C.2    | 0,0000     | 1,977  | 0,0054  | 1,977       | 0,0054 0,0000    |
| -    | m -                     | m          | m      | m       | m           | m m              |

AFB. HOUTCONTROLE



**SAMENSTELLING CONSTRUCTIEDELEN**

| Constructiedeel | Staal/staven |
|-----------------|--------------|
| C1              | S1           |

**STABILITEITSGEGEVENS**

| Staal                 | Profiel | Y-As (assenstelsel) |              |           | Z-As(assenstelsel) |              |
|-----------------------|---------|---------------------|--------------|-----------|--------------------|--------------|
|                       |         | Lsys                | Methode      | Lkip      | Lkip/Lsys          | Methode      |
| kip/Lsys              |         |                     |              |           |                    |              |
| C1 - V1 (0,000-4,000) | P4      | 4,000               | Conservatief | 4,000     | 1,00               | Conservatief |
| 4,000                 | 1,00    |                     |              |           |                    |              |
| -                     | -       | geschoord           |              | geschoord |                    |              |
|                       |         | m -                 |              | m         | -                  | m -          |

## KIPSTEUNENGEGEVENS

| Staaflast             | Profiel | Begin              | Eind               | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|--------------------|--------------------|------------------|------------------|--------------|
| C1 - V1 (0.000-4.000) | P4      | <b>in-klemming</b> | <b>in-klemming</b> |                  |                  | Neutraal     |
| -                     | -       | Volledig vast      | Volledig vast      | m                | m                | -            |

## DOORBUIGINGGEGEVENS

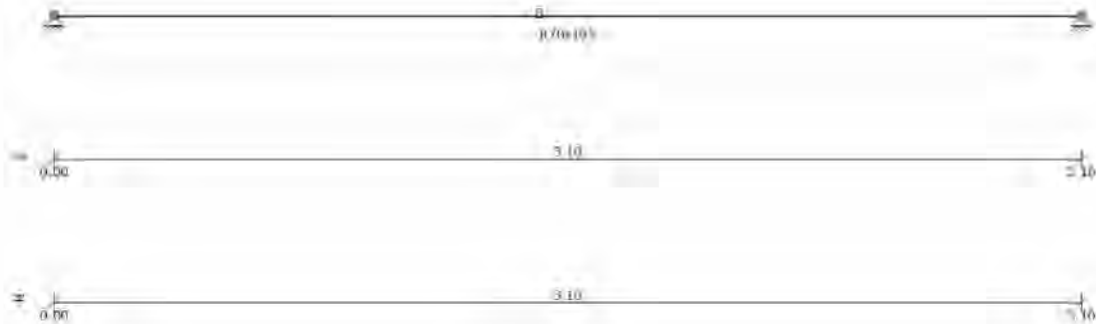
| Staaflast<br>w;2+w;3           | Constr.type | Toetsingstype    | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|--------------------------------|-------------|------------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-4.000)<br>L/500 | Vloer       | Scheurvorming    | 0       | 0       | Parabolisch | L/250 |
| -                              | -           | gevoelige wanden | mm      | mm      | -           | -     |

## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.2     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.41   |
|       | Kip         | Fu.C.2     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.41   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.71   |

**8.9 Bijlage ultraai MatrixFrame berekening Pos 9**

AFB. GEOMETRIE LIGGER



**BALKGEOMETRIE**

| Positie | Profielnaam      | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoëff G |
|---------|------------------|---------|------------------|-----------|------------|-------------------|
| 0.000   | L(3.100) R70x195 | 0       | 4.3253e-05       | C24       | 1.1000e+07 | 50.0000e-07       |
| 0.06    |                  |         |                  |           |            |                   |
|         | m -              |         | m4 -             |           | kN/m2      | C°m k             |

N/m

**PROFIELVORMEN**

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. | Hoogte    |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-----------|
| P3      | Nee   | 0,195 | 0,195 | 0,0000 | 0,0000 | 0,0000 | 0,070 | 0,000 | 0,000  | Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m -    | m         |

**MATERIALEN**

| Materiaalnaam | Poison | Dichtheid | E-Modulus  | Uitzettingcoëff |
|---------------|--------|-----------|------------|-----------------|
| C24           | 0.40   | 4.20      | 1.1000e+07 | 50.0000e-07     |
| -             | -      | kN/m3     | kN/m2      | C°m             |

**OPLEGGINGEN**

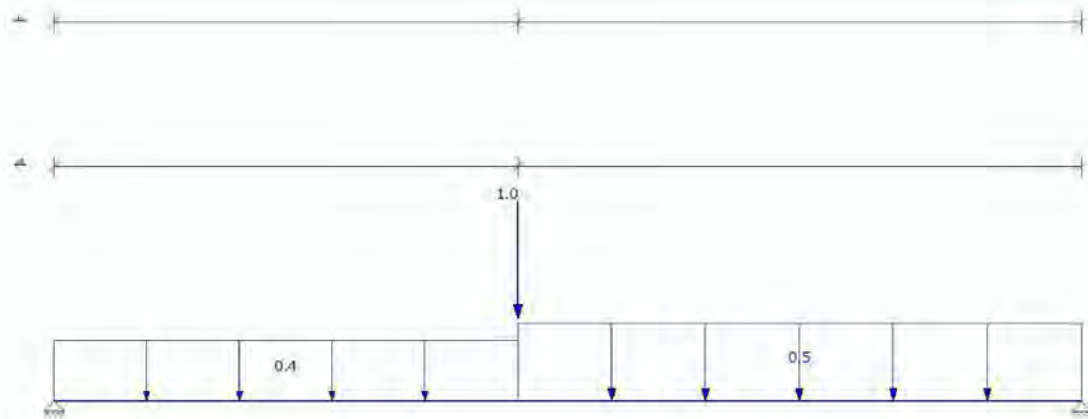
| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(3.100) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

**BELASTINGSGEVALLEN TYPEN**

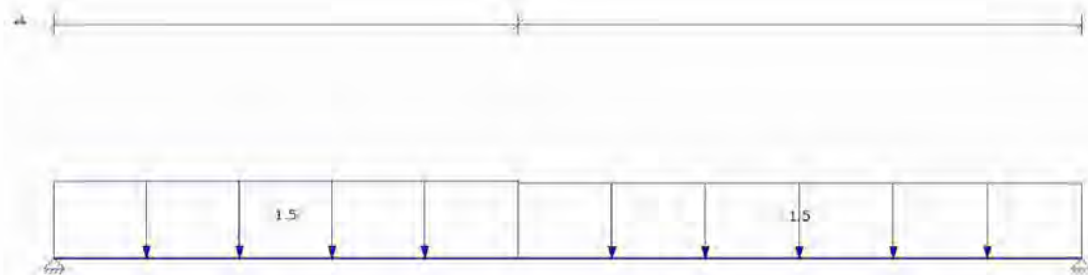
| Oplegg. | Staven                  | 5.1.2.e                                 | Gunstig/Ong.Element | 5.1.2.e         | Psi0   | Psi1   | Cprob     |
|---------|-------------------------|---|---------------------|-----------------|--------|--------|-----------|
| Psi2    | UGT/GGT                 |   |                     |                 |        |        |           |
| B.G.1   | Permanent               | Permanent                               | -                   | N.v.t.          | N.v.t. |        |           |
| B.G.2   | Verdeelde veranderlijke | Verdeelde                               | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00 belasting     |   |                     |                 |        |        |           |
| B.G.3   | Geconcentreerde         | veranderlijke belasting Geconcentreerde | -                   | Cat. A) Vloeren | N.v.t. | N.v.t. | 0.40 0.50 |
| 0.30    | veranderlijke belasting |   |                     |                 |        |        |           |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde                               | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00 belasting     | veranderlijke belasting                 |                     |                 |        |        |           |



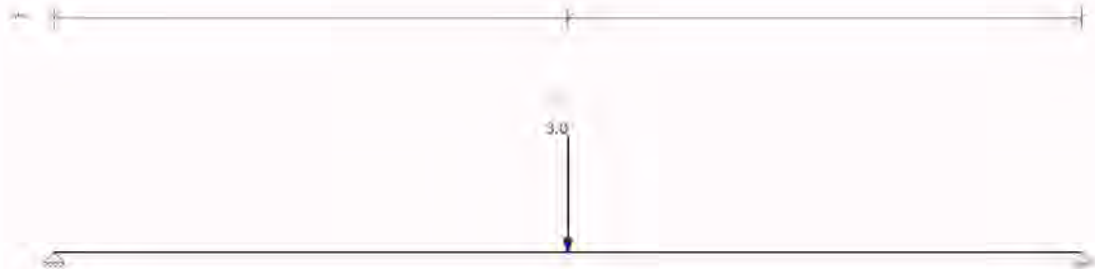
## AFB. LASTEN B.G.1 PERMANENT



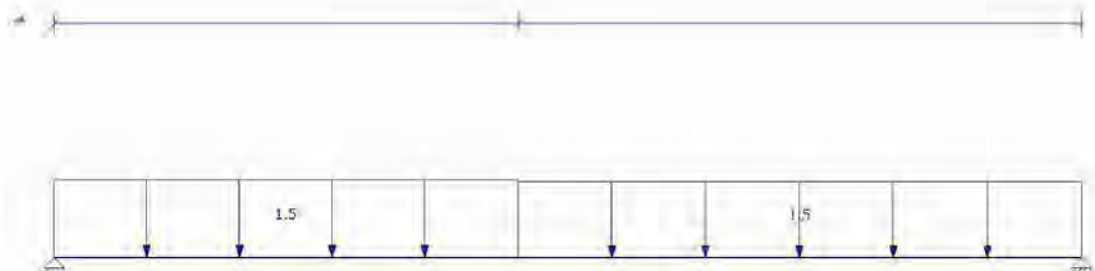
## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.35   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | 1.50   | -      | 0.60   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | 0.60   | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|---------|---|-----------|--------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.40   | 1.00   |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|---------|---|-----------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.50   |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)



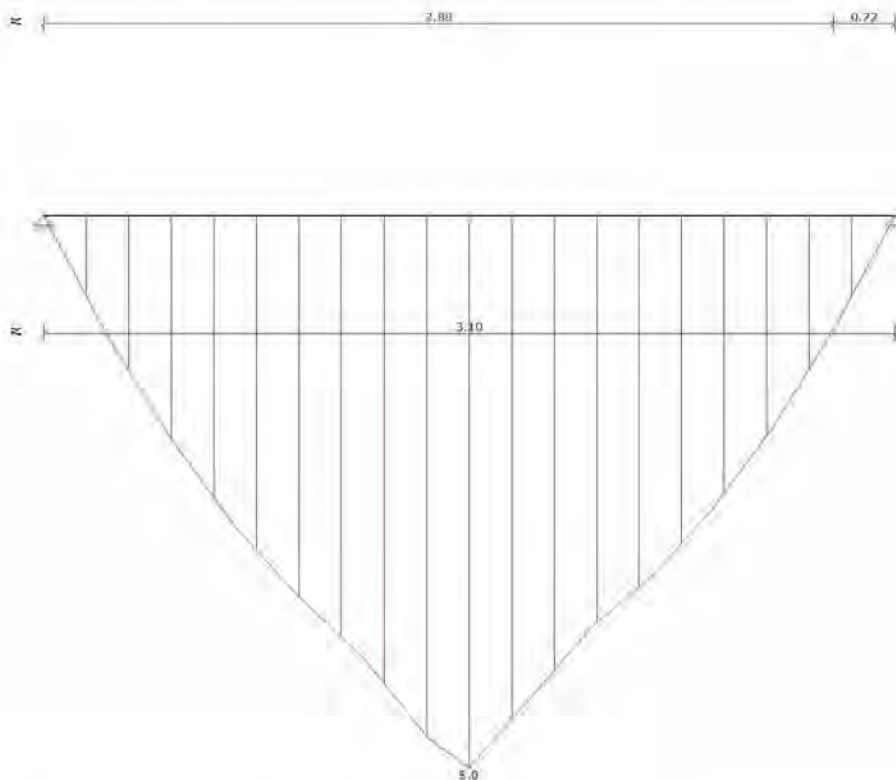
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 0.30   |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

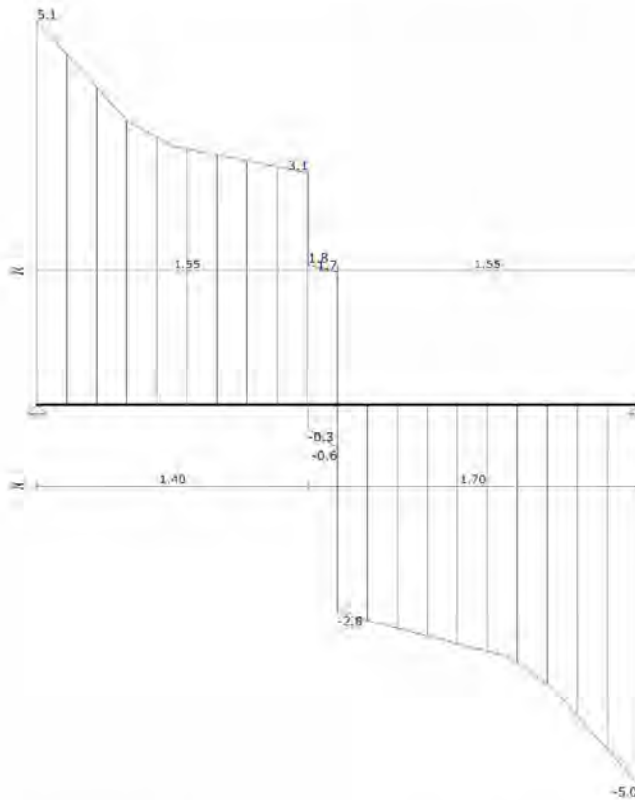
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingscombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties

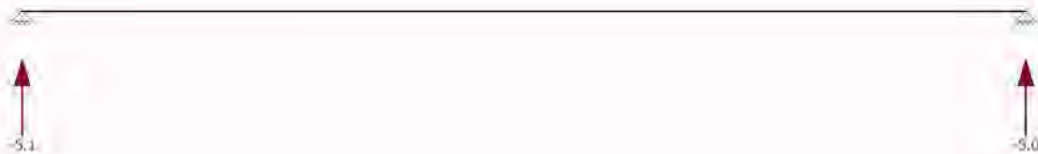


## FU.C. STAAFKRACHTEN

| Veld<br>Vmax   | Positie B.G.<br>Ve                  | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|----------------|-------------------------------------|------|------|-------|------|-------|-------|----|
| Veld 1<br>5.05 | 0.000 - 3.100 Fu.C.1<br>5.05 - 5.01 | 0.00 | 4.33 | 1.400 | 0.00 | 0.000 | 0.000 |    |
| 3.76           | 0.000 - 3.100 Fu.C.2<br>3.76 - 3.76 | 0.00 | 5.05 | 1.550 | 0.00 | 0.000 | 0.000 |    |
| 3.12           | 0.000 - 3.100 Fu.C.3<br>3.12 - 3.10 | 0.00 | 2.91 | 1.400 | 0.00 | 0.000 | 0.000 |    |
| 2.60           | 0.000 - 3.100 Fu.C.4<br>2.60 - 2.59 | 0.00 | 3.15 | 1.550 | 0.00 | 0.000 | 0.000 |    |
| -<br>kN        | m -<br>kN                           | kNm  | kNm  | m     | kNm  | m     | m     | kN |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie | Z        | Yr          | Z              | My         |
|--------|---------------------|---------|----------|-------------|----------------|------------|
| Fu.C.1 | O1                  | 0.000   | vast     | vrij        | -5.05          | 0.00       |
| Fu.C.1 | O2                  | 3.100   | vast     | vrij        | -5.01          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-10.06</b>  |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>10.06</b>   |            |
| Fu.C.2 | O1                  | 0.000   | vast     | vrij        | -3.76          | 0.00       |
| Fu.C.2 | O2                  | 3.100   | vast     | vrij        | -3.76          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-7.52</b>   |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>7.52</b>    |            |
| Fu.C.3 | O1                  | 0.000   | vast     | vrij        | -3.12          | 0.00       |
| Fu.C.3 | O2                  | 3.100   | vast     | vrij        | -3.10          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-6.21</b>   |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>6.21</b>    |            |
| Fu.C.4 | O1                  | 0.000   | vast     | vrij        | -2.60          | 0.00       |
| Fu.C.4 | O2                  | 3.100   | vast     | vrij        | -2.59          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-5.20</b>   |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>5.20</b>    |            |
| -      | -                   |         | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>  |
|        |                     |         |          |             | <b>kN</b>      | <b>kNm</b> |

## B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie | Z        | Yr          | Z              | My         |
|---------|---------------------|---------|----------|-------------|----------------|------------|
| B.G.1   | O1                  | 0.000   | vast     | vrij        | -1.26          | 0.00       |
| B.G.1   | O2                  | 3.100   | vast     | vrij        | -1.26          | 0.00       |
|         | <b>Som Reacties</b> |         |          |             | <b>-2.52</b>   |            |
|         | <b>Som Lasten</b>   |         |          |             | <b>2.52</b>    |            |
| B.G.2.1 | O1                  | 0.000   | vast     | vrij        | -2.36          | 0.00       |
| B.G.2.1 | O2                  | 3.100   | vast     | vrij        | -2.33          | 0.00       |
|         | <b>Som Reacties</b> |         |          |             | <b>-4.69</b>   |            |
|         | <b>Som Lasten</b>   |         |          |             | <b>4.69</b>    |            |
| B.G.3   | O1                  | 0.000   | vast     | vrij        | -1.50          | 0.00       |
| B.G.3   | O2                  | 3.100   | vast     | vrij        | -1.50          | 0.00       |
|         | <b>Som Reacties</b> |         |          |             | <b>-3.00</b>   |            |
|         | <b>Som Lasten</b>   |         |          |             | <b>3.00</b>    |            |
| -       | -                   |         | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>  |
|         |                     |         |          |             | <b>kN</b>      | <b>kNm</b> |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingscombinaties



## KA.C. KNOOPVERPLAATSINGEN

| Knoop | B.C. | Z | Yr |
|-------|------|---|----|
|-------|------|---|----|

|    |           |          |            |
|----|-----------|----------|------------|
| K1 | Ka.C.(w1) | 0.0000   | -2.560e-03 |
|    | Ka.C.1    | 0.0000   | -4.140e-03 |
|    | Ka.C.2    | 0.0000   | -6.511e-03 |
| K2 | Ka.C.(w1) | 0.0000   | 2.516e-03  |
|    | Ka.C.1    | 0.0000   | 4.093e-03  |
|    | Ka.C.2    | 0.0000   | 6.459e-03  |
| -  | -         | <b>m</b> | <b>rad</b> |

## KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst   | Veld     |             | Veld Eind |          |
|------|-------------------------|------------|----------|----------|-------------|-----------|----------|
|      |                         |            |          | Z'       | Z' glb dist | Z' glb    |          |
| S1   | 0.000 - 3.100 Ka.C.(w1) | 0,0000     | 1.531    | 0,0025   | 1.531       | 0.0025    | 0,0000   |
| S1   | 0.000 - 3.100 Ka.C.1    | 0,0000     | 1.537    | 0,0041   | 1.537       | 0.0041    | 0,0000   |
| S1   | 0.000 - 3.100 Ka.C.2    | 0,0000     | 1.541    | 0,0064   | 1.541       | 0.0064    | 0,0000   |
| -    | <b>m -</b>              | <b>m</b>   | <b>m</b> | <b>m</b> | <b>m</b>    | <b>m</b>  | <b>m</b> |

AFB. HOUTCONTROLE

CL - &/us/kg

## SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

## STABILITEITSGEGEVENS

| Staaft                | Profiel | Y-As (assenstelsel) |              |          | Z-As(assenstelsel) |              |
|-----------------------|---------|---------------------|--------------|----------|--------------------|--------------|
|                       |         | Lsys                | Methode      | Lkip     | Lkip/Lsys          | Methode      |
| kip/Lsys              |         |                     |              |          |                    |              |
| C1 - V1 (0.000-3.100) | P3      | 3.100               | Conservatief | 3.100    | 1.00               | Conservatief |
| 3.100                 | 1.00    |                     |              |          |                    |              |
| -                     | -       | <b>m</b>            | geschoord    | <b>m</b> | -                  | geschoord    |
|                       |         |                     |              |          |                    | <b>m -</b>   |

## KIPSTEUNENGEDEVENS

| Staaft last           | Profiel | Begin             | Eind              | Kipsteunen boven     | Kipsteunen onder     | Aangrijppunt |
|-----------------------|---------|-------------------|-------------------|----------------------|----------------------|--------------|
| C1 - V1 (0.000-3.100) | P3      | <b>inklemming</b> | <b>inklemming</b> |                      |                      |              |
| -                     | -       | -                 | -                 | <b>Volledig vast</b> | <b>Volledig vast</b> | Neutraal     |
|                       |         |                   |                   | <b>m</b>             | <b>m</b>             | -            |

## DOORBUIGINGSGEGEVENS

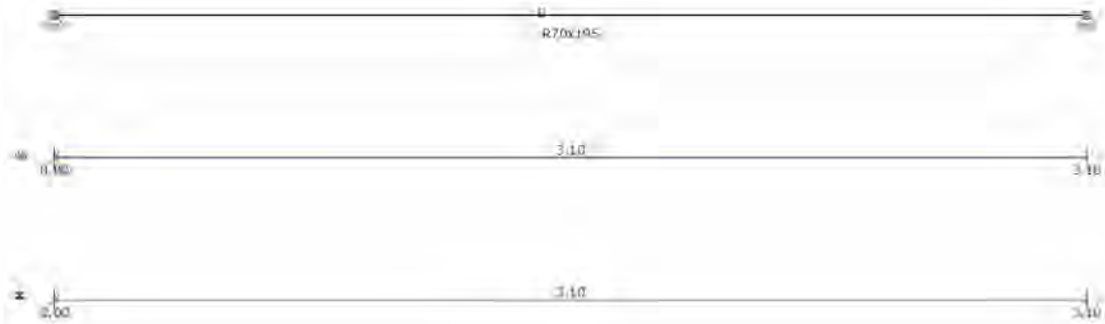
| Staaft                | Constr.type | Toetsingstype | Zeeg Y'   | Zeeg Z'   | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|-----------|-----------|-------------|-------|
| w;2+w;3               |             |               |           |           |             |       |
| C1 - V1 (0.000-3.100) | Vloer       | Algemeen      | 0         | 0         | Parabolisch | L/250 |
| L/333                 |             |               | <b>mm</b> | <b>mm</b> | -           | -     |

## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.2     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.77   |
|       | Kip         | Fu.C.2     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.77   |
|       | Doorbulging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.69   |

## 8.10 Bijlage ultraai MatrixFrame berekening Pos 10

AFB. GEOMETRIE LIGGER



### BALKGEOMETRIE

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus         | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|-------------------|-------------------|
| 0.000 - L(3.100) | R70x195     | 0       | 4.3253e-05       | C24       | 1.1000e+07        | 50.0000e-07       |
| 0.06             | m -         | 0       | m <sup>4</sup> - |           | kN/m <sup>2</sup> | C°m k             |
| N/m              |             |         |                  |           |                   |                   |

### PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raatl. Hoogte   |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|-----------------|
| P3      | Nee   | 0,195 | 0,195 | 0,0000 | 0,0000 | 0,0000 | 0,070 | 0,000 | 0,000 Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m - m           |

### MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus         | Uitzettingcoëff |
|---------------|--------|-------------------|-------------------|-----------------|
| C24           | 0.40   | 4.20              | 1.1000e+07        | 50.0000e-07     |
| -             | -      | kN/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

### OPLEGGINGEN

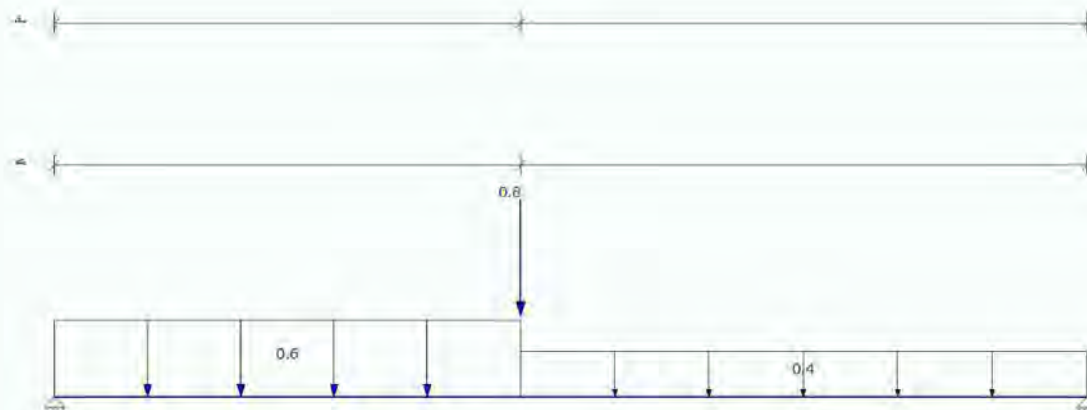
| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(3.100) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

### BELASTINGSGEVALLEN TYPEN

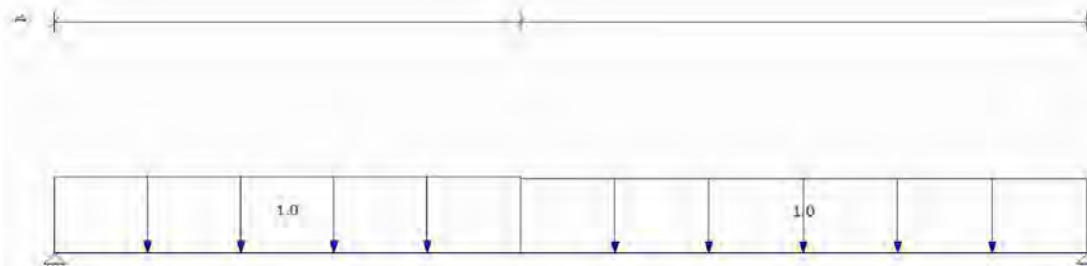
| Oplegg. | Staven                  | 5.1.2.e                 | Gunstig/Ong. Element | 5.1.2.e         | Psi0   | Psi1   | Cprob     |
|---------|-------------------------|-------------------------|----------------------|-----------------|--------|--------|-----------|
| Psi2    | UGT/GGT                 |                         |                      |                 |        |        |           |
| B.G.1   | Permanent               | Permanent               | -                    | N.v.t.          | N.v.t. |        |           |
| B.G.2   | Verdeelde veranderlijke | Verdeelde               | -                    | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00 belasting     | veranderlijke belasting |                      |                 |        |        |           |
| B.G.3   | Geconcentreerde         | Geconcentreerde         | -                    | Cat. A) Vloeren | N.v.t. | N.v.t. | 0.40 0.50 |
| 0.30    | veranderlijke belasting | veranderlijke belasting |                      |                 |        |        |           |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde               | -                    | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00 belasting     | veranderlijke belasting |                      |                 |        |        |           |



## AFB. LASTEN B.G.1 PERMANENT

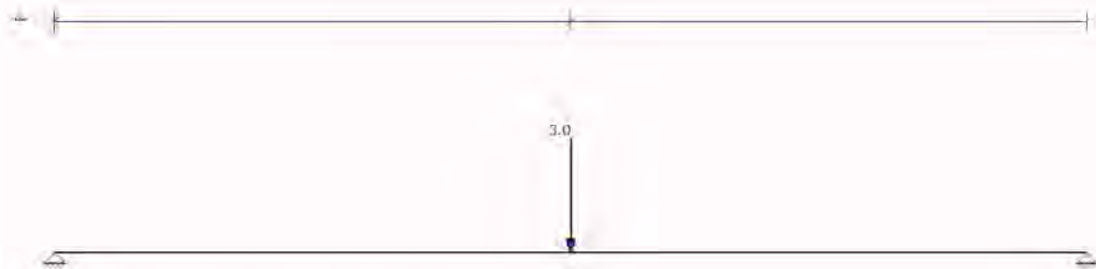


## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING

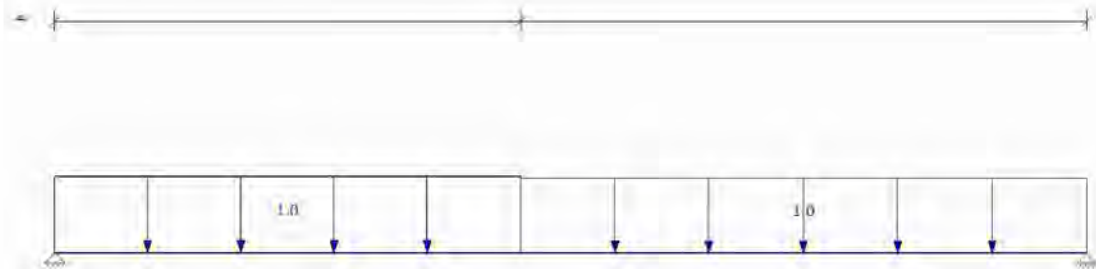




## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.35   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | 1.50   | -      | 0.60   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | 0.60   | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|---------|---|-----------|--------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.40   | 1.00   |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|---------|---|-----------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.50   |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)



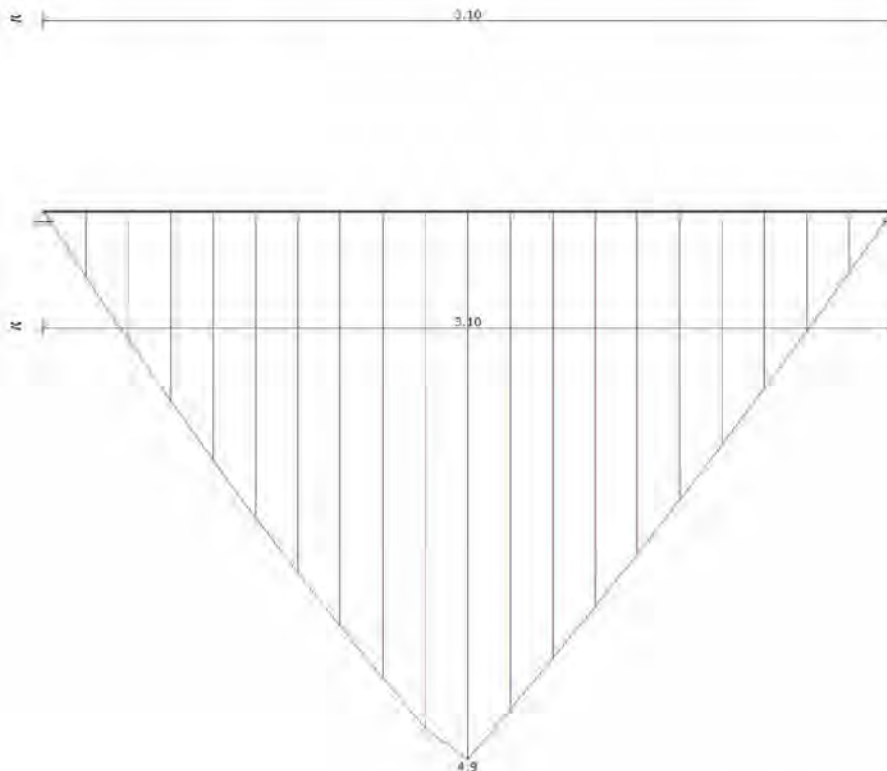
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 0.30   |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

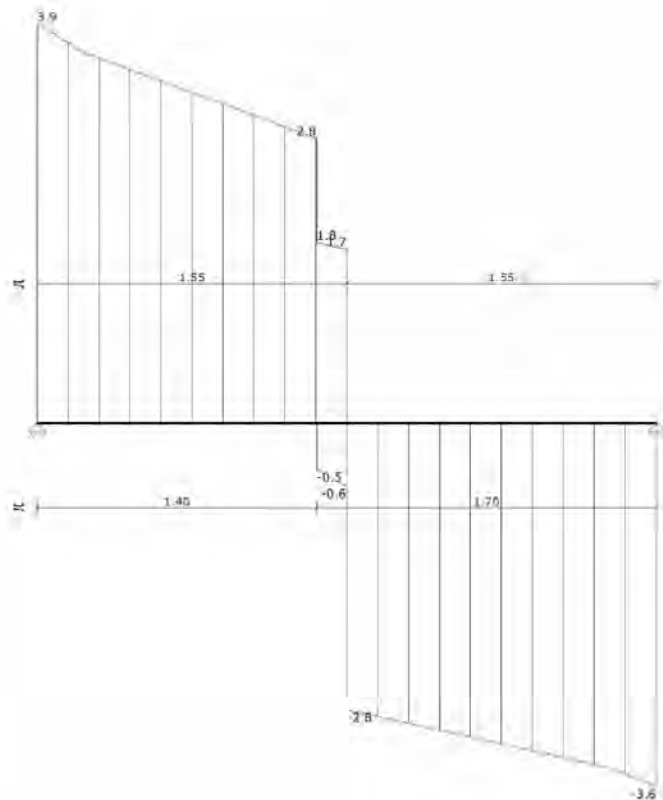
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingscombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax   | Ve                   |      |      |       |      |       |       |    |
| Veld 1 | 0.000 - 3.100 Fu.C.1 | 0.00 | 3.25 | 1.400 | 0.00 | 0.000 | 0.000 |    |
| 3.90   | 3.90 - 3.56          |      |      |       |      |       |       |    |
|        | 0.000 - 3.100 Fu.C.2 | 0.00 | 4.86 | 1.550 | 0.00 | 0.000 | 0.000 |    |
| 3.79   | 3.79 - 3.47          |      |      |       |      |       |       |    |
|        | 0.000 - 3.100 Fu.C.3 | 0.00 | 2.35 | 1.400 | 0.00 | 0.000 | 0.000 |    |
| 2.68   | 2.68 - 2.31          |      |      |       |      |       |       |    |
|        | 0.000 - 3.100 Fu.C.4 | 0.00 | 2.94 | 1.550 | 0.00 | 0.000 | 0.000 |    |
| 2.63   | 2.63 - 2.27          |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|--------|---------------------|---------|------|---------|--------------|------|
| Fu.C.1 | O1                  | 0.000   | vast | vrij    | -3.90        | 0.00 |
| Fu.C.1 | O2                  | 3.100   | vast | vrij    | -3.56        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-7.46</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>7.46</b>  |      |
| Fu.C.2 | O1                  | 0.000   | vast | vrij    | -3.79        | 0.00 |
| Fu.C.2 | O2                  | 3.100   | vast | vrij    | -3.47        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-7.27</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>7.27</b>  |      |
| Fu.C.3 | O1                  | 0.000   | vast | vrij    | -2.68        | 0.00 |
| Fu.C.3 | O2                  | 3.100   | vast | vrij    | -2.31        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-4.98</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>4.98</b>  |      |
| Fu.C.4 | O1                  | 0.000   | vast | vrij    | -2.63        | 0.00 |
| Fu.C.4 | O2                  | 3.100   | vast | vrij    | -2.27        | 0.00 |
|        | <b>Som Reacties</b> |         |      |         | <b>-4.91</b> |      |
|        | <b>Som Lasten</b>   |         |      |         | <b>4.91</b>  |      |
| -      | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

## B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie | Z    | Yr      | Z            | My   |
|---------|---------------------|---------|------|---------|--------------|------|
| B.G.1   | O1                  | 0.000   | vast | vrij    | -1.28        | 0.00 |
| B.G.1   | O2                  | 3.100   | vast | vrij    | -1.02        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-2.30</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>2.30</b>  |      |
| B.G.2.1 | O1                  | 0.000   | vast | vrij    | -1.57        | 0.00 |
| B.G.2.1 | O2                  | 3.100   | vast | vrij    | -1.56        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-3.13</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>3.13</b>  |      |
| B.G.3   | O1                  | 0.000   | vast | vrij    | -1.50        | 0.00 |
| B.G.3   | O2                  | 3.100   | vast | vrij    | -1.50        | 0.00 |
|         | <b>Som Reacties</b> |         |      |         | <b>-3.00</b> |      |
|         | <b>Som Lasten</b>   |         |      |         | <b>3.00</b>  |      |
| -       | -                   | m       | kN/m | kNm/rad | kN           | kNm  |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingscombinaties



**KA.C. KNOOPVERPLAATSINGEN**

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0.0000 | -2.343e-03 |
|       | Ka.C.1    | 0.0000 | -3.396e-03 |
|       | Ka.C.2    | 0.0000 | -4.977e-03 |
| K2    | Ka.C.(w1) | 0.0000 | 2.197e-03  |
|       | Ka.C.1    | 0.0000 | 3.248e-03  |
|       | Ka.C.2    | 0.0000 | 4.825e-03  |
| -     | -         | m      | rad        |

**KA.C. DOORBUIGINGEN**

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld   |             | Veld Eind |        |
|------|-------------------------|------------|--------|--------|-------------|-----------|--------|
|      |                         |            |        | Z'     | Z' glb dist | Z' glb    |        |
| S1   | 0.000 - 3.100 Ka.C.(w1) | 0,0000     | 1.510  | 0,0023 | 1.510       | 0.0023    | 0,0000 |
| S1   | 0.000 - 3.100 Ka.C.1    | 0,0000     | 1.521  | 0,0033 | 1.521       | 0.0033    | 0,0000 |
| S1   | 0.000 - 3.100 Ka.C.2    | 0,0000     | 1.530  | 0,0048 | 1.530       | 0.0048    | 0,0000 |
| -    | m -                     | m          | m      | m      | m           | m         | m      |

AFB. HOUTCONTROLE



**SAMENSTELLING CONSTRUCTIEDELEN**

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

**STABILITEITSGEGEVENS**

| Staaft                | Profiel | Y-As (assenstelsel) |              |       | Z-As(assenstelsel) |              |       |
|-----------------------|---------|---------------------|--------------|-------|--------------------|--------------|-------|
|                       |         | Lsys                | Methode      | Lkip  | Lkip/Lsys          | Methode      | LkipL |
| kip/Lsys              |         |                     |              |       |                    |              |       |
| C1 - V1 (0.000-3.100) | P3      | 3.100               | Conservatief | 3.100 | 1.00               | Conservatief |       |
| 3.100                 | 1.00    |                     | geschoord    |       |                    | geschoord    |       |
| -                     | -       | m                   |              | m     |                    |              | m     |

## KIPSTEUNENGEGEVENS

| Staal last            | Profiel | Begin         | Eind          | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|---------------|---------------|------------------|------------------|--------------|
| C1 - V1 (0.000-3.100) | P3      | inklemming    | inklemming    |                  |                  | Neutraal     |
| -                     | -       | Volledig vast | Volledig vast | m                | m                | -            |

## DOORBUIGINGGEGEVENS

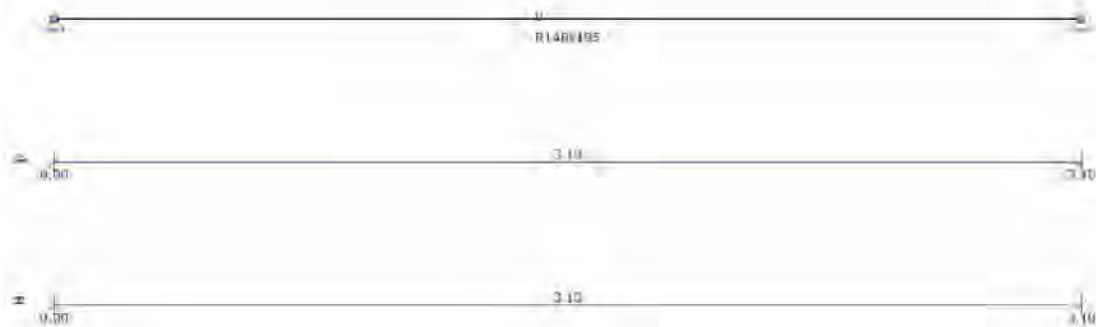
| Staal w;2+w;3         | Constr.type | Toetsingstype    | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|------------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-3.100) | Vloer       | Scheurvorming    | 0       | 0       | Parabolisch | L/250 |
| L/500                 | -           | gevoelige wanden | mm      | mm      | -           | -     |

## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.2     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0,74   |
|       | Kip         | Fu.C.2     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0,74   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0,70   |

## 8.11 Bijlage ultraai MatrixFrame berekening Pos 11

### AFB. GEOMETRIE LIGGER



### BALKGEOMETRIE

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus         | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|-------------------|-------------------|
| 0.000 - L(3.100) | R140x195    | 0       | 8.6507e-05       | C24       | 1.1000e+07        | 50.0000e-07       |
| 0.11             |             |         |                  |           |                   |                   |
|                  | m -         |         | m <sup>4</sup> - |           | kN/m <sup>2</sup> | C°m k             |

### PROFIELVORMEN

| Profiel | Verf. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raatl. Hoogte   |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|-----------------|
| P4      | Nee   | 0,195 | 0,195 | 0,0000 | 0,0000 | 0,0000 | 0,140 | 0,000 | 0,000 Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m - m           |

### MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus         | Uitzettingcoëff |
|---------------|--------|-------------------|-------------------|-----------------|
| C24           | 0.40   | 4.20              | 1.1000e+07        | 50.0000e-07     |
| -             | -      | kN/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

### OPLEGGINGEN

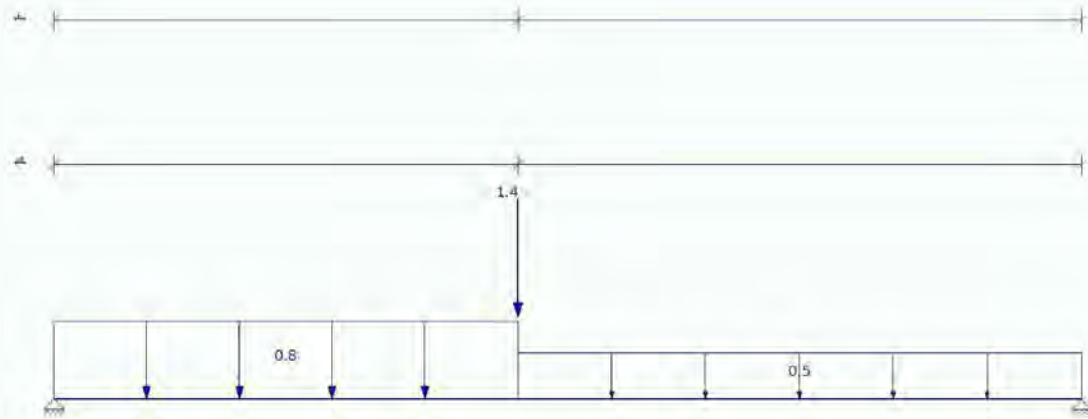
| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(3.100) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

### BELASTINGSGEVALLEN TYPEN

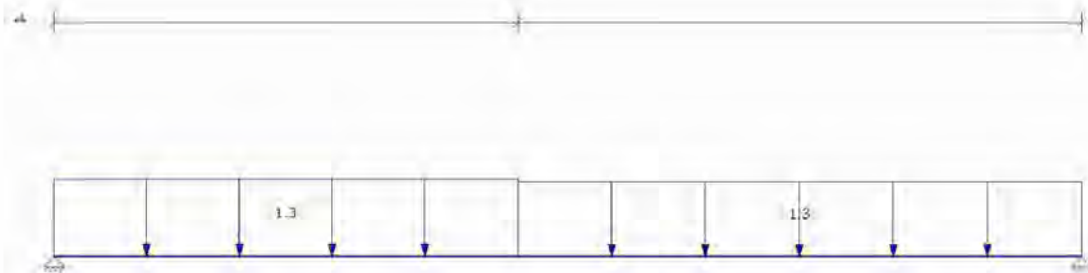
| Oplegg. | Staven                  | 5.1.2.e         | Gunstig/Ong.Element | 5.1.2.e         | Psi0   | Psi1   | Cprob     |
|---------|-------------------------|-----------------|---------------------|-----------------|--------|--------|-----------|
| Psi2    | UGT/GGT                 |                 |                     |                 |        |        |           |
| B.G.1   | Permanent               | Permanent       | -                   | N.v.t.          | N.v.t. |        |           |
| B.G.2   | Verdeelde veranderlijke | Verdeelde       | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00               |                 |                     |                 |        |        |           |
|         | belasting               | veranderlijke   |                     |                 |        |        |           |
|         |                         | belasting       |                     |                 |        |        |           |
| B.G.3   | Geconcentreerde         | Geconcentreerde | -                   | Cat. A) Vloeren | N.v.t. | N.v.t. | 0.40 0.50 |
| 0.30    |                         |                 |                     |                 |        |        |           |
|         | veranderlijke belasting | veranderlijke   |                     |                 |        |        |           |
|         |                         | belasting       |                     |                 |        |        |           |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde       | -                   | Cat. A) Vloeren | 1      | 1      | 0.40 0.50 |
| 0.30    | 1.00/1.00               |                 |                     |                 |        |        |           |
|         | belasting               | veranderlijke   |                     |                 |        |        |           |

belasting

## AFB. LASTEN B.G.1 PERMANENT

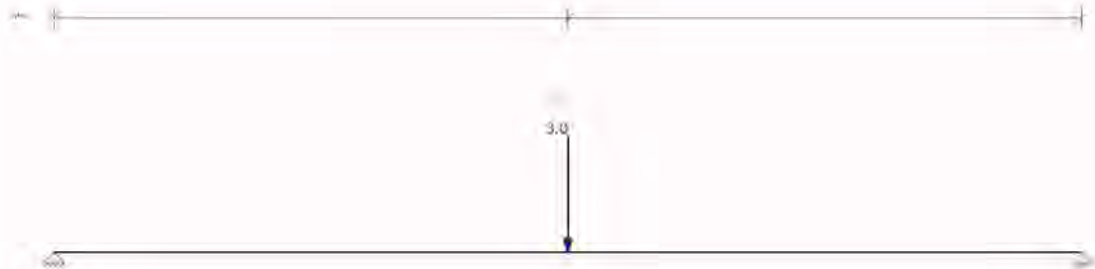


## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING

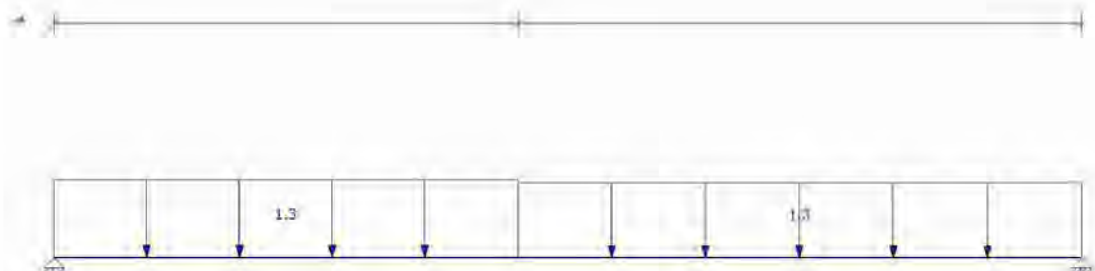




## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.35   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | 1.50   | -      | 0.60   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | 0.60   | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|---------|---|-----------|--------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.40   | 1.00   |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|---------|---|-----------|--------|
| B.G.1   | Permanent                               | 1.00      | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -         | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | 0.50   |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

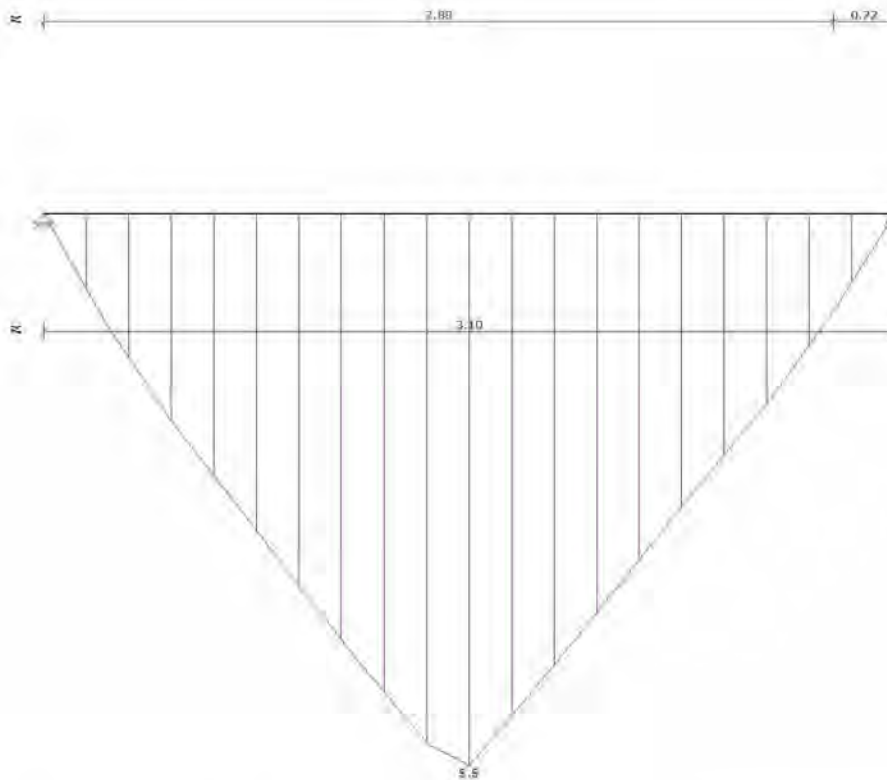
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 0.30   |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

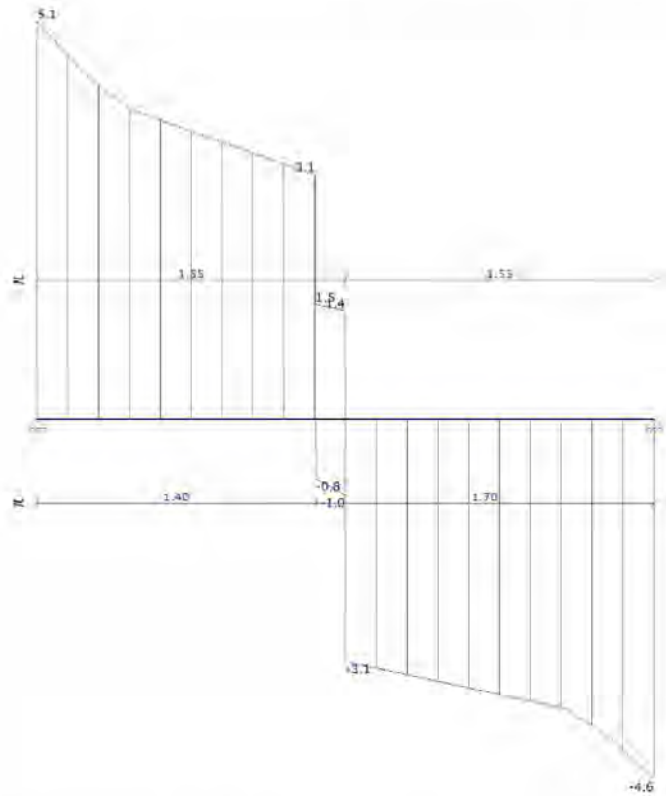
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingscombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties



### FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax   | Ve                   |      |      |       |      |       |       |    |
| Veld 1 | 0.000 - 3.100 Fu.C.1 | 0.00 | 4.37 | 1.400 | 0.00 | 0.000 | 0.000 |    |
| 5.09   | 5.09 -4.62           |      |      |       |      |       |       |    |
|        | 0.000 - 3.100 Fu.C.2 | 0.00 | 5.47 | 1.550 | 0.00 | 0.000 | 0.000 |    |
| 4.39   | 4.39 -3.95           |      |      |       |      |       |       |    |
|        | 0.000 - 3.100 Fu.C.3 | 0.00 | 3.27 | 1.400 | 0.00 | 0.000 | 0.000 |    |
| 3.58   | 3.58 -3.08           |      |      |       |      |       |       |    |
|        | 0.000 - 3.100 Fu.C.4 | 0.00 | 3.63 | 1.436 | 0.00 | 0.000 | 0.000 |    |
| 3.30   | 3.30 -2.81           |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie | Z        | Yr          | Z              | My         |
|--------|---------------------|---------|----------|-------------|----------------|------------|
| Fu.C.1 | O1                  | 0.000   | vast     | vrij        | -5.09          | 0.00       |
| Fu.C.1 | O2                  | 3.100   | vast     | vrij        | -4.62          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-9.71</b>   |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>9.71</b>    |            |
| Fu.C.2 | O1                  | 0.000   | vast     | vrij        | -4.39          | 0.00       |
| Fu.C.2 | O2                  | 3.100   | vast     | vrij        | -3.95          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-8.34</b>   |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>8.34</b>    |            |
| Fu.C.3 | O1                  | 0.000   | vast     | vrij        | -3.58          | 0.00       |
| Fu.C.3 | O2                  | 3.100   | vast     | vrij        | -3.08          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-6.66</b>   |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>6.66</b>    |            |
| Fu.C.4 | O1                  | 0.000   | vast     | vrij        | -3.30          | 0.00       |
| Fu.C.4 | O2                  | 3.100   | vast     | vrij        | -2.81          | 0.00       |
|        | <b>Som Reacties</b> |         |          |             | <b>-6.11</b>   |            |
|        | <b>Som Lasten</b>   |         |          |             | <b>6.11</b>    |            |
| -      | -                   |         | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>  |
|        |                     |         |          |             | <b>kN</b>      | <b>kNm</b> |

## B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie | Z        | Yr          | Z              | My         |
|---------|---------------------|---------|----------|-------------|----------------|------------|
| B.G.1   | O1                  | 0.000   | vast     | vrij        | -1.78          | 0.00       |
| B.G.1   | O2                  | 3.100   | vast     | vrij        | -1.42          | 0.00       |
|         | <b>Som Reacties</b> |         |          |             | <b>-3.19</b>   |            |
|         | <b>Som Lasten</b>   |         |          |             | <b>3.20</b>    |            |
| B.G.2.1 | O1                  | 0.000   | vast     | vrij        | -1.97          | 0.00       |
| B.G.2.1 | O2                  | 3.100   | vast     | vrij        | -1.95          | 0.00       |
|         | <b>Som Reacties</b> |         |          |             | <b>-3.92</b>   |            |
|         | <b>Som Lasten</b>   |         |          |             | <b>3.92</b>    |            |
| B.G.3   | O1                  | 0.000   | vast     | vrij        | -1.50          | 0.00       |
| B.G.3   | O2                  | 3.100   | vast     | vrij        | -1.50          | 0.00       |
|         | <b>Som Reacties</b> |         |          |             | <b>-3.00</b>   |            |
|         | <b>Som Lasten</b>   |         |          |             | <b>3.00</b>    |            |
| -       | -                   |         | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>  |
|         |                     |         |          |             | <b>kN</b>      | <b>kNm</b> |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingscombinaties

## KA.C. KNOOPVERPLAATSINGEN

| Knoop | B.C. | Z | Yr |
|-------|------|---|----|
|-------|------|---|----|

|    |           |          |            |
|----|-----------|----------|------------|
| K1 | Ka.C.(w1) | 0.0000   | -1.669e-03 |
|    | Ka.C.1    | 0.0000   | -2.329e-03 |
|    | Ka.C.2    | 0.0000   | -3.319e-03 |
| K2 | Ka.C.(w1) | 0.0000   | 1.565e-03  |
|    | Ka.C.1    | 0.0000   | 2.223e-03  |
|    | Ka.C.2    | 0.0000   | 3.210e-03  |
| -  | -         | <b>m</b> | <b>rad</b> |

## KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst   | Veld     |             | Veld Eind |          |
|------|-------------------------|------------|----------|----------|-------------|-----------|----------|
|      |                         |            |          | Z'       | Z' glb dist | Z' glb    |          |
| S1   | 0.000 - 3.100 Ka.C.(w1) | 0,0000     | 1.509    | 0,0016   | 1.509       | 0.0016    | 0,0000   |
| S1   | 0.000 - 3.100 Ka.C.1    | 0,0000     | 1.519    | 0,0023   | 1.519       | 0.0023    | 0,0000   |
| S1   | 0.000 - 3.100 Ka.C.2    | 0,0000     | 1.528    | 0,0032   | 1.528       | 0.0032    | 0,0000   |
| -    | <b>m -</b>              | <b>m</b>   | <b>m</b> | <b>m</b> | <b>m</b>    | <b>m</b>  | <b>m</b> |

AFB. HOUTCONTROLE

CL - &/us/kg

## SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

## STABILITEITSGEGEVENS

| Staaft                | Profiel | Y-As (assenstelsel) |              |          | Z-As(assenstelsel) |              |
|-----------------------|---------|---------------------|--------------|----------|--------------------|--------------|
|                       |         | Lsys                | Methode      | Lkip     | Lkip/Lsys          | Methode      |
| kip/Lsys              |         |                     |              |          |                    |              |
| C1 - V1 (0.000-3.100) | P4      | 3.100               | Conservatief | 3.100    | 1.00               | Conservatief |
| 3.100                 | 1.00    |                     |              |          |                    |              |
| -                     | -       | <b>m</b>            | geschoord    | <b>m</b> | -                  | geschoord    |
|                       |         |                     |              |          |                    | <b>m</b>     |

## KIPSTEUNENGEDEVENS

| Staaft last           | Profiel | Begin | Eind | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|-------|------|------------------|------------------|--------------|
| C1 - V1 (0.000-3.100) | P4      |       |      |                  |                  |              |
| -                     | -       | -     | -    | <b>m</b>         | <b>m</b>         | Neutraal     |

## DOORBUIGINGSGEGEVENS

| Staaft                | Constr.type | Toetsingstype    | Zeeg Y'   | Zeeg Z'   | Zeegvorm    | w;max |
|-----------------------|-------------|------------------|-----------|-----------|-------------|-------|
| w;2+w;3               |             |                  |           |           |             |       |
| C1 - V1 (0.000-3.100) | Vloer       | Scheurvorming    | 0         | 0         | Parabolisch | L/250 |
| L/500                 |             | gevoelige wanden |           |           |             |       |
| -                     | -           |                  | <b>mm</b> | <b>mm</b> | -           | -     |

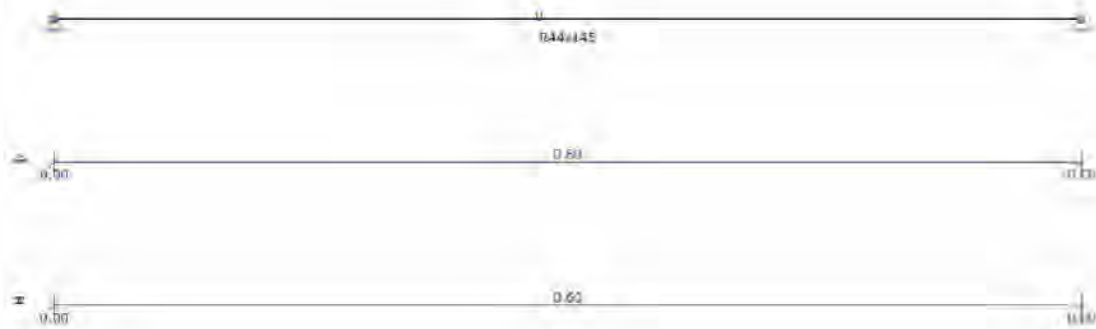
## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.2     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.42   |
|       | Kip         | Fu.C.2     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.42   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.46   |



**8.12 Bijlage ultraai MatrixFrame berekening Pos 12**

AFB. GEOMETRIE LIGGER



**BALKGEOMETRIE**

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|------------|-------------------|
| 0.000 - L(0.600) | R44x145     | 0       | 1.1178e-05       | C24       | 1.1000e+07 | 50.0000e-07       |
| 0.03             |             |         |                  |           |            |                   |
|                  | m -         | °       | m4 -             |           | kN/m2      | C°m k             |

N/m

**PROFIELVORMEN**

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raatl. Hoogte   |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|-----------------|
| P2      | Nee   | 0,145 | 0,145 | 0,0000 | 0,0000 | 0,0000 | 0,044 | 0,000 | 0,000 Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m - m           |

**MATERIALEN**

| Materiaalnaam | Poison | Dichtheid | E-Modulus  | Uitzettingcoëff |
|---------------|--------|-----------|------------|-----------------|
| C24           | 0.40   | 4.20      | 1.1000e+07 | 50.0000e-07     |
| -             | -      | kN/m3     | kN/m2      | C°m             |

**OPLEGGINGEN**

| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(0.600) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

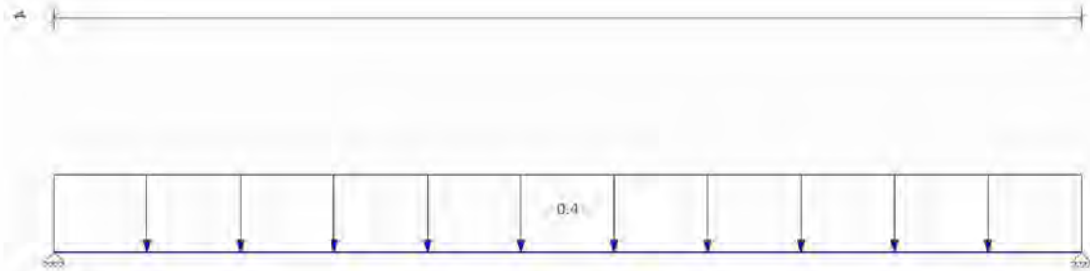
**BELASTINGSGEVALLEN TYPEN**

| Oplegg. | Staven                  | 5.1.2.e                 | Gunstig/Ong.Element | 5.1.2.e                 | Psi0   | Psi1   | Cprob |
|---------|-------------------------|-------------------------|---------------------|-------------------------|--------|--------|-------|
| B.G.1   | Permanent               | Permanent               | -                   | N.v.t.                  | N.v.t. |        |       |
| B.G.2   | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. H) Ontoegankelijke |        |        |       |
| 1       | 1                       |                         |                     | 1.00/1.00               |        |        |       |
|         | belasting               | veranderlijke belasting |                     | daken                   |        |        |       |
| B.G.3   | Geconcentreerde         | Geconcentreerde         | -                   | Cat. H) Ontoegankelijke | N.v.t. | N.v.t. |       |
|         | veranderlijke belasting | veranderlijke belasting |                     | daken                   |        |        |       |
| B.G.4   | Sneeuwbelasting         | Sneeuwbelasting         | -                   | 1.00/1.00               | N.v.t. | N.v.t. |       |
| 0.20    |                         |                         |                     |                         |        |        |       |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. H) Ontoegankelijke |        |        |       |

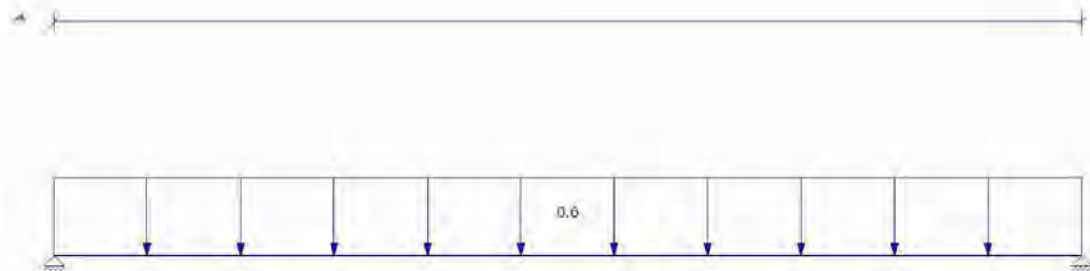
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|   |           |                            |       |           |
|---|-----------|----------------------------|-------|-----------|
| 1 | 1         |                            |       | 1.00/1.00 |
|   | belasting | veranderlijke<br>belasting | daken |           |

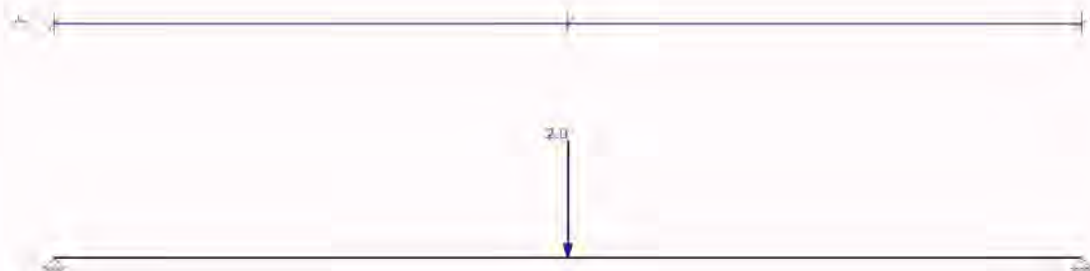
## AFB. LASTEN B.G.1 PERMANENT



## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING

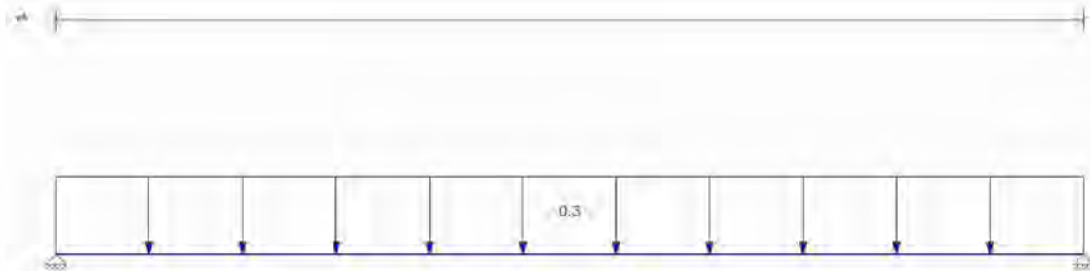


## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING

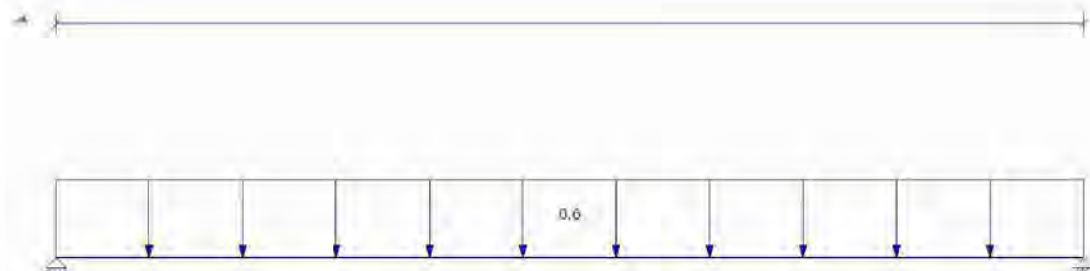




## AFB. LASTEN B.G.4 SNEEUWBELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.20   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | -      | 1.50   | -      |
| B.G.4   | Sneeuwbelasting                         | -      | 1.50   | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | -      | -      |

### 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   | Verdeelde veranderlijke belasting       | -         | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      | -      |
| B.G.4   | Sneeuwbelasting                         | -         | -      | -      | 1.00   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | -      | 1.00   | -      |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |
|-------|---|-----------|--------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.4 | Sneeuwbelasting                         | -         | -      | 0.20   |

B.G.2.1 Verdeelde veranderlijke belasting - - -

## QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

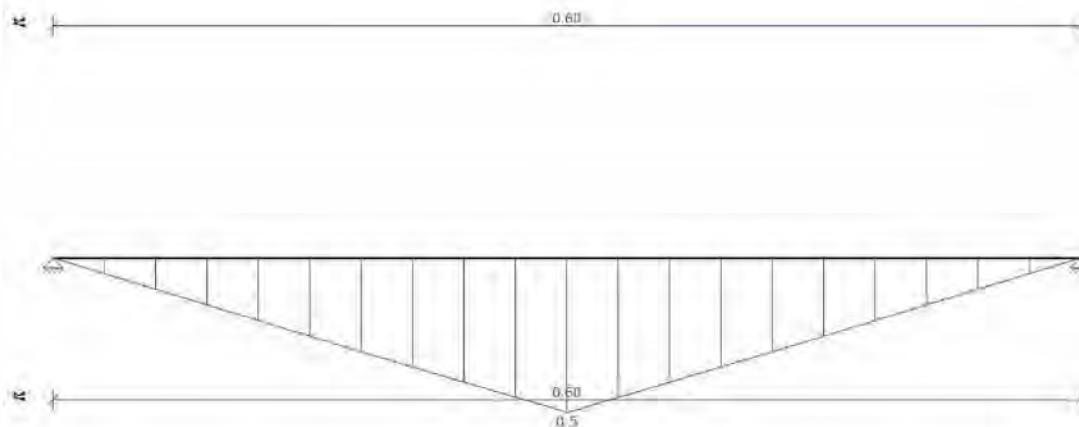
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.4   | Sneeuwbelasting                         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -      |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

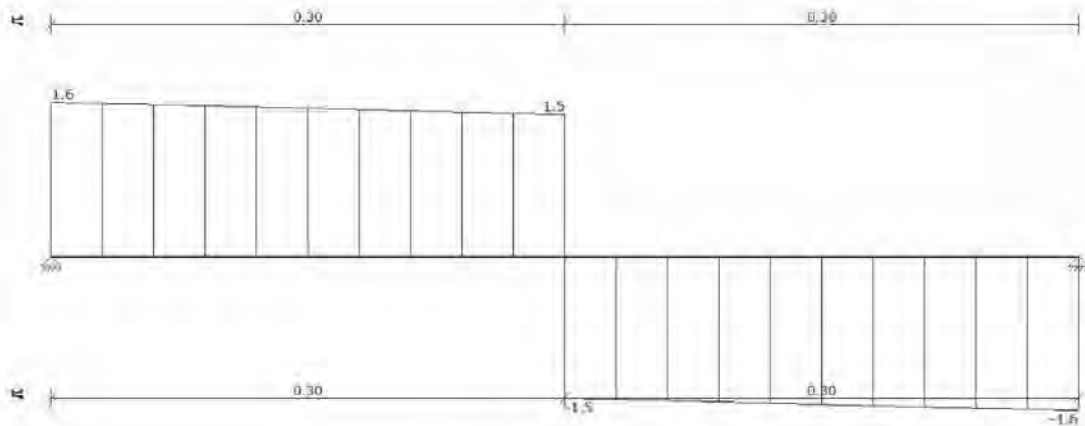
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingcombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingcombinaties



## FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.         | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Vmax   | Ve                   |      |      |       |      |       |       |    |
| Veld 1 | 0.000 - 0.600 Fu.C.1 | 0.00 | 0.06 | 0.300 | 0.00 | 0.000 | 0.000 |    |
| 0.40   | 0.40 - 0.40          |      |      |       |      |       |       |    |
|        | 0.000 - 0.600 Fu.C.2 | 0.00 | 0.04 | 0.300 | 0.00 | 0.000 | 0.000 |    |
| 0.28   | 0.28 - 0.28          |      |      |       |      |       |       |    |
|        | 0.000 - 0.600 Fu.C.3 | 0.00 | 0.47 | 0.300 | 0.00 | 0.000 | 0.000 |    |
| 1.63   | 1.63 - 1.63          |      |      |       |      |       |       |    |
|        | 0.000 - 0.600 Fu.C.4 | 0.00 | 0.02 | 0.300 | 0.00 | 0.000 | 0.000 |    |
| 0.15   | 0.15 - 0.15          |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingcombinaties



## FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie | Z    | Yr   | Z            | My   |
|--------|---------------------|---------|------|------|--------------|------|
| Fu.C.1 | O1                  | 0.000   | vast | vrij | -0.40        | 0.00 |
| Fu.C.1 | O2                  | 0.600   | vast | vrij | -0.40        | 0.00 |
|        | <b>Som Reacties</b> |         |      |      | <b>-0.80</b> |      |
|        | <b>Som Lasten</b>   |         |      |      | <b>0.80</b>  |      |
| Fu.C.2 | O1                  | 0.000   | vast | vrij | -0.28        | 0.00 |
| Fu.C.2 | O2                  | 0.600   | vast | vrij | -0.28        | 0.00 |
|        | <b>Som Reacties</b> |         |      |      | <b>-0.57</b> |      |

| <b>Som Lasten</b>   |    |          |             |                |              | <b>0.57</b> |  |
|---------------------|----|----------|-------------|----------------|--------------|-------------|--|
| Fu.C.3              | O1 | 0.000    | vast        | vrij           | -1.63        | 0.00        |  |
| Fu.C.3              | O2 | 0.600    | vast        | vrij           | -1.63        | 0.00        |  |
| <b>Som Reacties</b> |    |          |             |                | <b>-3.26</b> |             |  |
| <b>Som Lasten</b>   |    |          |             |                | <b>3.26</b>  |             |  |
| Fu.C.4              | O1 | 0.000    | vast        | vrij           | -0.15        | 0.00        |  |
| Fu.C.4              | O2 | 0.600    | vast        | vrij           | -0.15        | 0.00        |  |
| <b>Som Reacties</b> |    |          |             |                | <b>-0.29</b> |             |  |
| <b>Som Lasten</b>   |    |          |             |                | <b>0.29</b>  |             |  |
| -                   | -  | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>    | <b>kNm</b>  |  |

## B.G. OPLEGREACTIES

| B.C.                | Oplegging | Positie  | Z           | Yr             | Z            | My         |
|---------------------|-----------|----------|-------------|----------------|--------------|------------|
| B.G.1               | O1        | 0.000    | vast        | vrij           | -0.11        | 0.00       |
| B.G.1               | O2        | 0.600    | vast        | vrij           | -0.11        | 0.00       |
| <b>Som Reacties</b> |           |          |             |                | <b>-0.22</b> |            |
| <b>Som Lasten</b>   |           |          |             |                | <b>0.22</b>  |            |
| B.G.2.1             | O1        | 0.000    | vast        | vrij           | -0.18        | 0.00       |
| B.G.2.1             | O2        | 0.600    | vast        | vrij           | -0.18        | 0.00       |
| <b>Som Reacties</b> |           |          |             |                | <b>-0.36</b> |            |
| <b>Som Lasten</b>   |           |          |             |                | <b>0.36</b>  |            |
| B.G.3               | O1        | 0.000    | vast        | vrij           | -1.00        | 0.00       |
| B.G.3               | O2        | 0.600    | vast        | vrij           | -1.00        | 0.00       |
| <b>Som Reacties</b> |           |          |             |                | <b>-2.00</b> |            |
| <b>Som Lasten</b>   |           |          |             |                | <b>2.00</b>  |            |
| B.G.4               | O1        | 0.000    | vast        | vrij           | -0.10        | 0.00       |
| B.G.4               | O2        | 0.600    | vast        | vrij           | -0.10        | 0.00       |
| <b>Som Reacties</b> |           |          |             |                | <b>-0.20</b> |            |
| B.C.                | Oplegging | Positie  | Z           | Yr             | Z            | My         |
| -                   | -         | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>    | <b>kNm</b> |
| <b>Som Lasten</b>   |           |          |             |                | <b>0.20</b>  |            |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties



## KA.C. KNOOPVERPLAATSINGEN

| Knoop | B.C.      | Z        | Yr         |
|-------|-----------|----------|------------|
| K1    | Ka.C.(w1) | 0.0000   | -0.026e-03 |
|       | Ka.C.1    | 0.0000   | -0.026e-03 |
|       | Ka.C.2    | 0.0000   | -0.070e-03 |
|       | Ka.C.3    | 0.0000   | -0.051e-03 |
| K2    | Ka.C.(w1) | 0.0000   | 0.026e-03  |
|       | Ka.C.1    | 0.0000   | 0.026e-03  |
|       | Ka.C.2    | 0.0000   | 0.070e-03  |
|       | Ka.C.3    | 0.0000   | 0.051e-03  |
| -     | -         | <b>m</b> | <b>rad</b> |

## KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld Z' | Z' glb dist | Veld Eind Z' glb |
|------|-------------------------|------------|--------|---------|-------------|------------------|
| S1   | 0.000 - 0.600 Ka.C.(w1) | 0,0000     | 0.300  | 0,0000  | 0.300       | 0.0000 0,0000    |

|    |               |        |        |       |        |       |        |        |
|----|---------------|--------|--------|-------|--------|-------|--------|--------|
| S1 | 0,000 - 0,600 | Ka.C.1 | 0,0000 | 0,300 | 0,0000 | 0,300 | 0,0000 | 0,0000 |
| S1 | 0,000 - 0,600 | Ka.C.2 | 0,0000 | 0,300 | 0,0000 | 0,300 | 0,0000 | 0,0000 |
| S1 | 0,000 - 0,600 | Ka.C.3 | 0,0000 | 0,300 | 0,0000 | 0,300 | 0,0000 | 0,0000 |
| -  |               | m -    | m      | m     | m      | m     | m      | m      |

AFB. HOUTCONTROLE

CL =  $l_0/(w/b_{ij})$

## SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

## STABILITEITSGEGEVENS

| Staaft                | Profiel | Y-As (assenstelsel) |              |       | Z-As(assenstelsel) |              |
|-----------------------|---------|---------------------|--------------|-------|--------------------|--------------|
|                       |         | Lsys                | Methode      | Lkip  | Lkip/Lsys          | Methode      |
| kip/Lsys              |         |                     |              |       |                    |              |
| C1 - V1 (0,000-0,600) | P2      | 0,600               | Conservatief | 0,600 | 1,00               | Conservatief |
| 0,600                 | 1,00    |                     |              |       |                    |              |
| -                     | -       | geschoord           |              | m     | -                  | geschoord    |
|                       |         | m -                 |              |       |                    | m -          |

## KIPSTEUNENGEDEVENS

| Staaft last           | Profiel | Begin         | Eind          | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|---------------|---------------|------------------|------------------|--------------|
| C1 - V1 (0,000-0,600) | P2      | inklemming    | inklemming    |                  |                  | Neutraal     |
| -                     | -       | Volledig vast | Volledig vast | m                | m                | -            |

## DOORBUIGINGSGEGEVENS

| Staaft                | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| w;2+w;3               |             |               |         |         |             |       |
| C1 - V1 (0,000-0,600) | Dak         | Algemeen      | 0       | 0       | Parabolisch | L/250 |
| L/250                 |             |               | mm      | mm      |             |       |
| -                     | -           | -             |         |         |             |       |

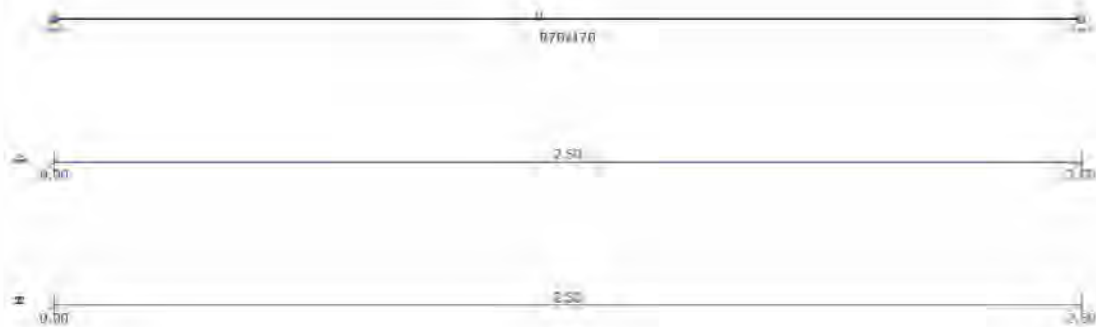
## UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.3     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.20   |
|       | Kip         | Fu.C.3     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.20   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.01   |



## 8.13 Bijlage ultraai MatrixFrame berekening Pos 13

### AFB. GEOMETRIE LIGGER



### BALKGEOMETRIE

| Positie          | Profielnaam | 5.1.2.e | Traagheidsmoment | Materiaal | E-Modulus         | Uitzettingcoëff G |
|------------------|-------------|---------|------------------|-----------|-------------------|-------------------|
| 0.000 - L(2.500) | R70x170     | 0       | 2.8659e-05       | C24       | 1.1000e+07        | 50.0000e-07       |
| 0.05             | m -         | °       | m <sup>4</sup> - |           | kN/m <sup>2</sup> | C°m k             |
| N/m              |             |         |                  |           |                   |                   |

### PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raatl. Hoogte   |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|-----------------|
| P6      | Nee   | 0,170 | 0,170 | 0,0000 | 0,0000 | 0,0000 | 0,070 | 0,000 | 0,000 Nee 0,000 |
| -       | -     | m     | m     | m      | m      | m      | m     | m     | m - m           |

### MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus         | Uitzettingcoëff |
|---------------|--------|-------------------|-------------------|-----------------|
| C24           | 0.40   | 4.20              | 1.1000e+07        | 50.0000e-07     |
| -             | -      | kN/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

### OPLEGGINGEN

| Oplegging | Positie  | Z    | Yr      |
|-----------|----------|------|---------|
| O1        | 0.000    | vast | vrij    |
| O2        | L(2.500) | vast | vrij    |
| -         | m        | kN/m | kNm/rad |

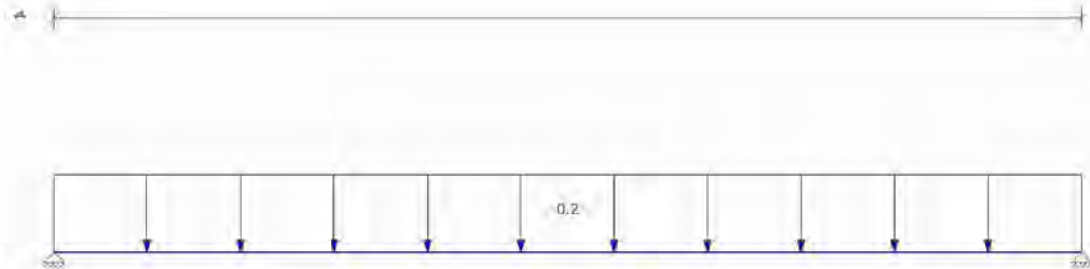
### BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven                  | 5.1.2.e                 | Gunstig/Ong.Element | 5.1.2.e                 | Psi0   | Psi1   | Cprob |
|---------|-------------------------|-------------------------|---------------------|-------------------------|--------|--------|-------|
| B.G.1   | Permanent               | Permanent               | -                   | N.v.t.                  | N.v.t. |        |       |
| B.G.2   | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. H) Ontoegankelijke |        |        |       |
| 1       | 1                       |                         |                     | 1.00/1.00               |        |        |       |
|         | belasting               | veranderlijke belasting |                     | daken                   |        |        |       |
| B.G.3   | Geconcentreerde         | Geconcentreerde         | -                   | Cat. H) Ontoegankelijke | N.v.t. | N.v.t. |       |
|         | veranderlijke belasting | veranderlijke belasting |                     | daken                   |        |        |       |
| B.G.4   | Sneeuwbelasting         | Sneeuwbelasting         | -                   | 1.00/1.00               | N.v.t. | N.v.t. |       |
| 0.20    |                         |                         |                     |                         |        |        |       |
| B.G.2.1 | Verdeelde veranderlijke | Verdeelde               | -                   | Cat. H) Ontoegankelijke |        |        |       |

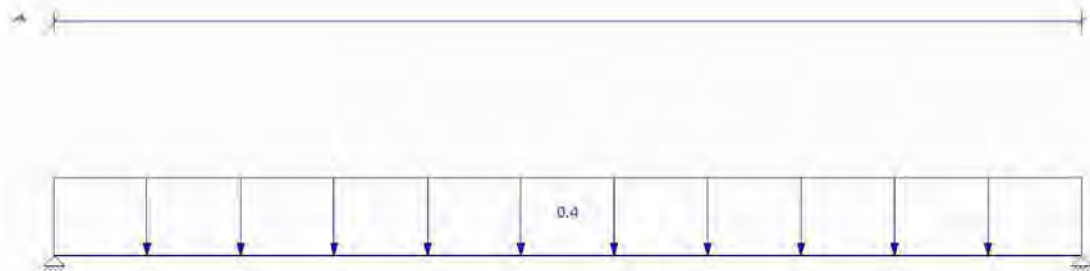
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|   |           |                            |       |           |
|---|-----------|----------------------------|-------|-----------|
| 1 | 1         |                            |       | 1.00/1.00 |
|   | belasting | veranderlijke<br>belasting | daken |           |

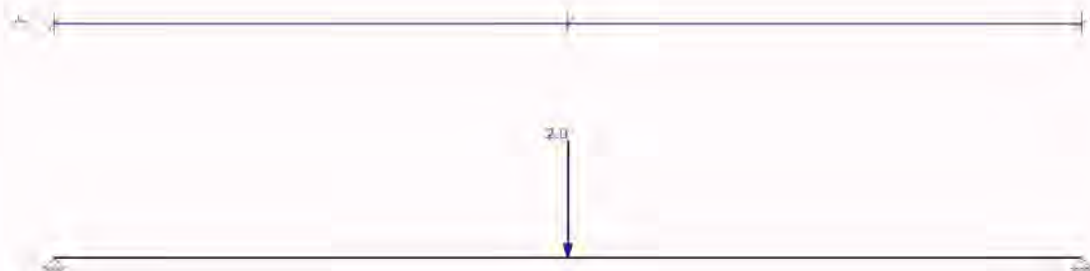
## AFB. LASTEN B.G.1 PERMANENT



## AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING

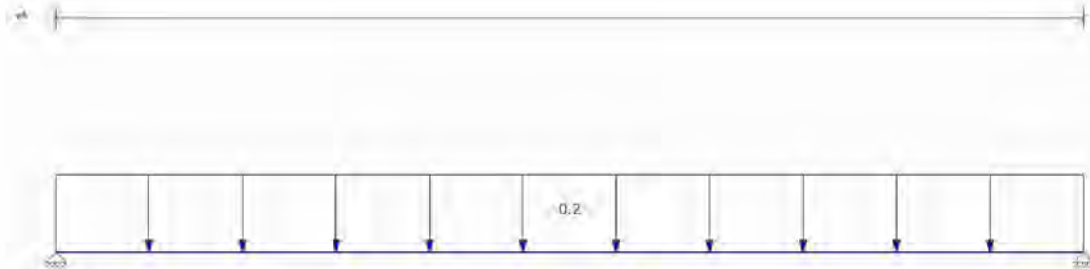


## AFB. LASTEN B.G.3 GECONCENTREERDE VERANDERLIJKE BELASTING

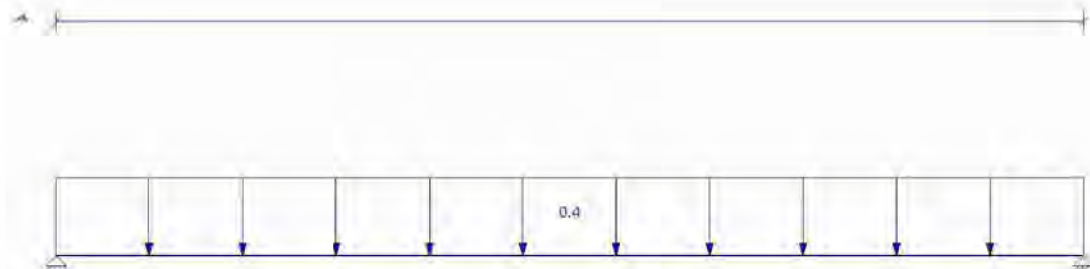




## AFB. LASTEN B.G.4 SNEEUWBELASTING



## AFB. LASTEN B.G.2.1 VERDEELDE VERANDERLIJKE BELASTING



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.    | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|---------|---|--------|--------|--------|--------|
| B.G.1   | Permanent                               | 1.20   | 1.20   | 1.20   | 1.35   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      | -      | 1.50   | -      |
| B.G.4   | Sneeuwbelasting                         | -      | 1.50   | -      | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | 1.50   | -      | -      | -      |

### 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   | Verdeelde veranderlijke belasting       | -         | -      | -      | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -         | -      | -      | -      |
| B.G.4   | Sneeuwbelasting                         | -         | -      | -      | 1.00   |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -         | -      | 1.00   | -      |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |
|-------|---|-----------|--------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting       | -         | -      | -      |
| B.G.3 | Geconcentreerde veranderlijke belasting | -         | -      | -      |
| B.G.4 | Sneeuwbelasting                         | -         | -      | 0.20   |

B.G.2.1 Verdeelde veranderlijke belasting - - -

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

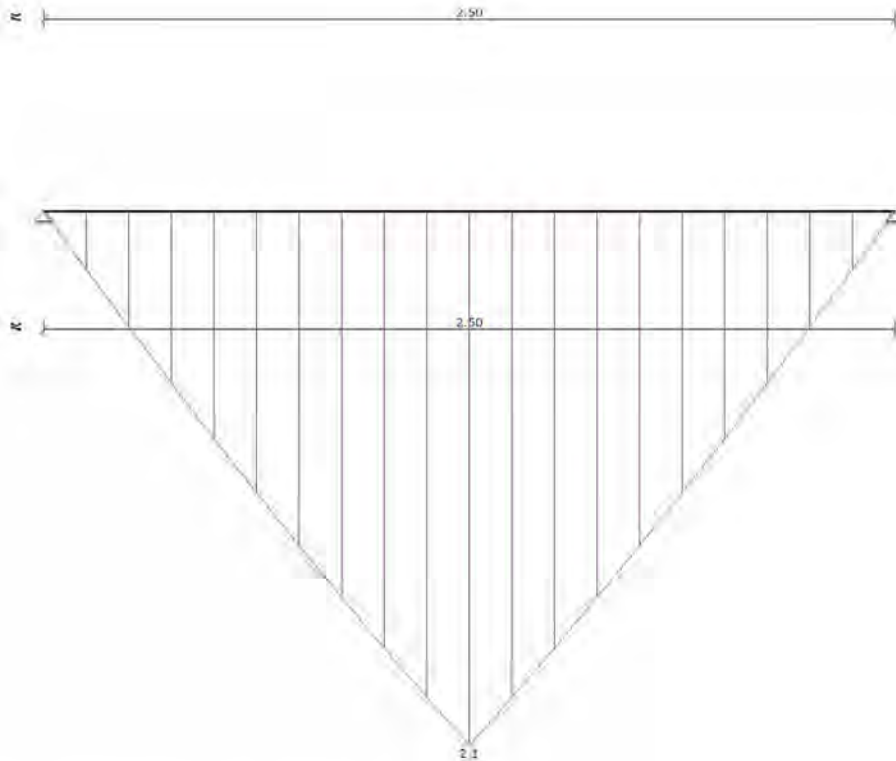
| B.G.    | Omschrijving                            | Qu.C.1 |
|---------|---|--------|
| B.G.1   | Permanent                               | 1.00   |
| B.G.2   | Verdeelde veranderlijke belasting       | -      |
| B.G.3   | Geconcentreerde veranderlijke belasting | -      |
| B.G.4   | Sneeuwbelasting                         | -      |
| B.G.2.1 | Verdeelde veranderlijke belasting       | -      |

### UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

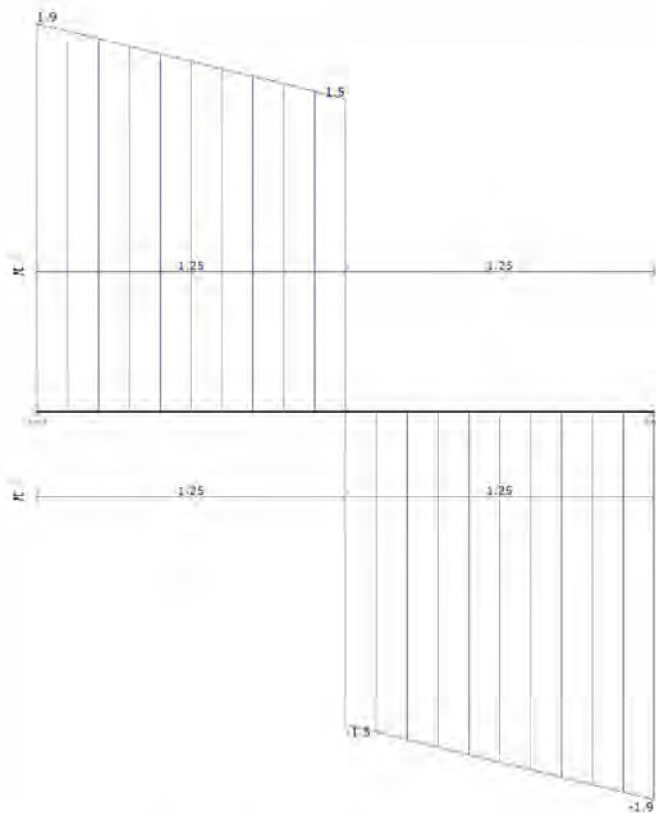
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingcombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingcombinaties



## FU.C. STAAFKRACHTEN

| Veld   | Positie B.G.<br>Ve   | Mb   | Mmax | xMmax | Me   | x-M0  | x-M0  | Vb |
|--------|----------------------|------|------|-------|------|-------|-------|----|
| Veld 1 | 0.000 - 2.500 Fu.C.1 | 0.00 | 0.69 | 1.250 | 0.00 | 0.000 | 0.000 |    |
| 1.11   | 1.11 -1.11           |      |      |       |      |       |       |    |
|        | 0.000 - 2.500 Fu.C.2 | 0.00 | 0.48 | 1.250 | 0.00 | 0.000 | 0.000 |    |
| 0.77   | 0.77 -0.77           |      |      |       |      |       |       |    |
|        | 0.000 - 2.500 Fu.C.3 | 0.00 | 2.10 | 1.250 | 0.00 | 0.000 | 0.000 |    |
| 1.86   | 1.86 -1.86           |      |      |       |      |       |       |    |
|        | 0.000 - 2.500 Fu.C.4 | 0.00 | 0.25 | 1.250 | 0.00 | 0.000 | 0.000 |    |
| 0.41   | 0.41 -0.41           |      |      |       |      |       |       |    |
| -      | m -                  | kNm  | kNm  | m     | kNm  | m     | m     | kN |
| kN     | kN                   |      |      |       |      |       |       |    |

AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. OPLEGREACTIES

| B.C.   | Oplegging           | Positie  | Z           | Yr             | Z            | My         |
|--------|---------------------|----------|-------------|----------------|--------------|------------|
| Fu.C.1 | 01                  | 0.000    | vast        | vrij           | -1.11        | 0.00       |
| Fu.C.1 | 02                  | 2.500    | vast        | vrij           | -1.11        | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-2.22</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>2.22</b>  |            |
| Fu.C.2 | 01                  | 0.000    | vast        | vrij           | -0.77        | 0.00       |
| Fu.C.2 | 02                  | 2.500    | vast        | vrij           | -0.77        | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-1.55</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>1.55</b>  |            |
| Fu.C.3 | 01                  | 0.000    | vast        | vrij           | -1.86        | 0.00       |
| Fu.C.3 | 02                  | 2.500    | vast        | vrij           | -1.86        | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-3.72</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>3.72</b>  |            |
| Fu.C.4 | 01                  | 0.000    | vast        | vrij           | -0.41        | 0.00       |
| Fu.C.4 | 02                  | 2.500    | vast        | vrij           | -0.41        | 0.00       |
|        | <b>Som Reacties</b> |          |             |                | <b>-0.81</b> |            |
|        | <b>Som Lasten</b>   |          |             |                | <b>0.81</b>  |            |
| -      | -                   | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>    | <b>kNm</b> |

## B.G. OPLEGREACTIES

| B.C.    | Oplegging           | Positie  | Z           | Yr             | Z            | My         |
|---------|---------------------|----------|-------------|----------------|--------------|------------|
| B.G.1   | 01                  | 0.000    | vast        | vrij           | -0.30        | 0.00       |
| B.G.1   | 02                  | 2.500    | vast        | vrij           | -0.30        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-0.60</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>0.60</b>  |            |
| B.G.2.1 | 01                  | 0.000    | vast        | vrij           | -0.50        | 0.00       |
| B.G.2.1 | 02                  | 2.500    | vast        | vrij           | -0.50        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-1.00</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>1.00</b>  |            |
| B.G.3   | 01                  | 0.000    | vast        | vrij           | -1.00        | 0.00       |
| B.G.3   | 02                  | 2.500    | vast        | vrij           | -1.00        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-2.00</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>2.00</b>  |            |
| B.G.4   | 01                  | 0.000    | vast        | vrij           | -0.28        | 0.00       |
| B.G.4   | 02                  | 2.500    | vast        | vrij           | -0.28        | 0.00       |
|         | <b>Som Reacties</b> |          |             |                | <b>-0.55</b> |            |
|         | <b>Som Lasten</b>   |          |             |                | <b>0.55</b>  |            |
| -       | -                   | <b>m</b> | <b>kN/m</b> | <b>kNm/rad</b> | <b>kN</b>    | <b>kNm</b> |

AFB, KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties



### KA.C. KNOOPVERPLAATSINGEN

| Knoop | B.C.      | Z      | Yr         |
|-------|-----------|--------|------------|
| K1    | Ka.C.(w1) | 0.0000 | -0.496e-03 |
|       | Ka.C.1    | 0.0000 | -0.496e-03 |
|       | Ka.C.2    | 0.0000 | -1.322e-03 |
|       | Ka.C.3    | 0.0000 | -0.950e-03 |
| K2    | Ka.C.(w1) | 0.0000 | 0.496e-03  |
|       | Ka.C.1    | 0.0000 | 0.496e-03  |
|       | Ka.C.2    | 0.0000 | 1.322e-03  |
|       | Ka.C.3    | 0.0000 | 0.950e-03  |
| -     | -         | m      | rad        |

### KA.C. DOORBUIGINGEN

| Veld | Positie B.C.            | Veld Begin | Z'afst | Veld   |             | Veld Eind |        |
|------|-------------------------|------------|--------|--------|-------------|-----------|--------|
|      |                         |            |        | Z'     | Z' glb dist | Z' glb    | Z' glb |
| S1   | 0.000 - 2.500 Ka.C.(w1) | 0,0000     | 1.250  | 0,0004 | 1.250       | 0.0004    | 0,0000 |
| S1   | 0.000 - 2.500 Ka.C.1    | 0,0000     | 1.250  | 0,0004 | 1.250       | 0.0004    | 0,0000 |
| S1   | 0.000 - 2.500 Ka.C.2    | 0,0000     | 1.250  | 0,0010 | 1.250       | 0.0010    | 0,0000 |
| S1   | 0.000 - 2.500 Ka.C.3    | 0,0000     | 1.250  | 0,0007 | 1.250       | 0.0007    | 0,0000 |
| -    | m -                     | m          | m      | m      | m           | m         | m      |

AFB. HOUTCONTROLE



### SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaft/staven |
|-----------------|---------------|
| C1              | S1            |

### STABILITEITSGEGEVENS

| Staaft                | Profiel | Y-As (assenstelsel) |       |           | Z-As(assenstelsel) |       |
|-----------------------|---------|---------------------|-------|-----------|--------------------|-------|
|                       |         | Lsys Methode        | Lkip  | Lkip/Lsys | Methode            | LkipL |
| kip/Lsys              |         |                     |       |           |                    |       |
| C1 - V1 (0.000-2.500) | P6      | 2.500 Conservatief  | 2.500 | 1.00      | Conservatief       |       |

2.500 1.00  
 - - geschoord m - geschoord m -

### KIPSTEUNENGEGEVENS

| Staaflast             | Profiel | Begin                 | Eind | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|-----------------------|------|------------------|------------------|--------------|
| C1 - V1 (0.000-2.500) | P6      | Inklemming inklemming |      |                  |                  | Neutraal     |
| -                     | -       | -                     | -    | m                | m                | -            |

### DOORBUIGINGGEGEVENS

| Staaflast             | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-2.500) | Dak         | Algemeen      | 0       | 0       | Parabolisch | L/250 |
| -                     | -           | -             | mm      | mm      | -           | -     |

### UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                             | UC max |
|-------|-------------|------------|-------------------------------------|--------|
| C1    | Doorsnede   | Fu.C.3     | NEN-EN1995-1-1#6.1.6 (6.11)         | 0.42   |
|       | Kip         | Fu.C.3     | NEN-EN1995-1-1#6.3.3 (6.33)         | 0.42   |
|       | Doorbuiging | Ka.C.2     | NEN-EN1995#7.2 NEN-EN1990#A1.4.3(4) | 0.13   |

8.14 Bijlage ultraai MatrixFrame berekening Pos 14

AFB. GEOMETRIE RAAMWERK



STAVEN

| Staf | Knoop B | Knoop | X-E   | Z-E   | Lengte | Profiel | Positie                  |
|------|---------|-------|-------|-------|--------|---------|--------------------------|
| E    | X-B     | Z-B   |       |       |        |         |                          |
| S1   | K1      | K2    | 0,000 | 0,000 | 0,000  | -2,500  | 2,500 P10,000 - L(2,500) |
| -    | -       | -     | m     | m     | m      | m       | m -                      |

PROFIELEN

| Profiel | Profielnaam | Oppervlakte    | Iy             | Materiaal |
|---------|-------------|----------------|----------------|-----------|
| P1      | R38x120     | 4,5600e-03     | 5,4720e-06     | C24       |
| -       | -           | m <sup>2</sup> | m <sup>4</sup> | -         |

PROFIELVORMEN

| Profiel | Verl. | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raati. | Hoogte    |
|---------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-----------|
| P1      | Nee   | 0,120 | 0,120 | 0,0000 | 0,0000 | 0,0000 | 0,038 | 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/m <sup>3</sup> | kN/m <sup>2</sup> | C <sup>o</sup> m |

OPLEGGINGEN

| Oplegging | Object | Positie | Z    | Yr        | HoekYr    |
|-----------|--------|---------|------|-----------|-----------|
| O1        | K1     | 0,000   | vast | vast      | vrij 0    |
| O2        | K2     | 0,000   | vast | 0,00:0,00 | vrij 0    |
| -         | -      | m       | kN/m | kN/m      | kNm/rad ° |

BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven                    | 5.1.2.e                 | Gunstig/Ong.Element | 5.1.2.e         | Psi0   | Psi1   | Cprob     |
|---------|---------------------------|-------------------------|---------------------|-----------------|--------|--------|-----------|
| Psi2    | UGT/GGT                   |                         |                     |                 |        |        |           |
| B.G.1   | Permanent                 | Permanent               | -                   |                 | N.v.t. | N.v.t. |           |
| B.G.2   | Geconcentreerde           | Geconcentreerde         | -                   | Cat. A) Vloeren | N.v.t. | N.v.t. | 0.40 0.50 |
| 0.30    | veranderlijke belasting   | veranderlijke belasting |                     |                 |        |        |           |
| B.G.3   | Windbelasting             | Windbelasting           | -                   |                 | N.v.t. | N.v.t. |           |
| 0.20    |                           | 1.00/1.00               |                     |                 |        |        |           |
| B.G.4   | Kniklengte (Assymetrisch) | Kniklengte              |                     |                 | N.v.t. | N.v.t. |           |
| B.G.5   | Kniklengte (Symmetrisch)  | Kniklengte              |                     |                 | N.v.t. | N.v.t. |           |

FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 |
|-------|---|--------|--------|--------|--------|
| B.G.1 | Permanent                               | 1,20   | 1,20   | 1,35   | 1,35   |
| B.G.2 | Geconcentreerde veranderlijke belasting | -      | 1,50   | -      | 0,60   |
| B.G.3 | Windbelasting                           | 1,50   | -      | -      | -      |
| B.G.4 | Kniklengte (Assymetrisch)               | -      | -      | -      | -      |
| B.G.5 | Kniklengte (Symmetrisch)                | -      | -      | -      | -      |

KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G. | Omschrijving | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|------|--------------|-----------|--------|--------|
|------|--------------|-----------|--------|--------|



|       |   |      |      |      |
|-------|---|------|------|------|
| B.G.1 | Permanent                               | 1.00 | 1.00 | 1.00 |
| B.G.2 | Geconcentreerde veranderlijke belasting | -    | -    | -    |
| B.G.3 | Windbelasting                           | -    | -    | 1.00 |
| B.G.4 | Kniklengte (Assymetrisch)               | -    | -    | -    |
| B.G.5 | Kniklengte (Symmetrisch)                | -    | -    | -    |

## FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Fr.C.(w1) | Fr.C.1 |
|-------|---|-----------|--------|
| B.G.1 | Permanent                               | 1.00      | 1.00   |
| B.G.2 | Geconcentreerde veranderlijke belasting | -         | -      |
| B.G.3 | Windbelasting                           | -         | 0.20   |
| B.G.4 | Kniklengte (Assymetrisch)               | -         | -      |
| B.G.5 | Kniklengte (Symmetrisch)                | -         | -      |

## QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                            | Qu.C.1 |
|-------|---|--------|
| B.G.1 | Permanent                               | 1.00   |
| B.G.2 | Geconcentreerde veranderlijke belasting | -      |
| B.G.3 | Windbelasting                           | -      |
| B.G.4 | Kniklengte (Assymetrisch)               | -      |
| B.G.5 | Kniklengte (Symmetrisch)                | -      |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd



AFB. HOUTCONTROLE



## SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staal/staven |
|-----------------|--------------|
| C1              | S1           |

## STABILITEITSGEGEVENS

| Staal                 | Profiel | Y-As (assenstelsel) |           |       | Z-As(assenstelsel) |            |
|-----------------------|---------|---------------------|-----------|-------|--------------------|------------|
|                       |         | Lsys                | Methode   | Lkip  | Lkip/Lsys          | Methode    |
| kip/Lsys              |         |                     |           |       |                    |            |
| C1 - V1 (0.000-2.500) | P1      | 2.500               | Geschoord | 2.406 | 0.96               | Handmatige |
| Invoer                | 0.250   | 0.10                |           |       |                    |            |
| -                     | -       | m                   | -         | m     | -                  | m          |

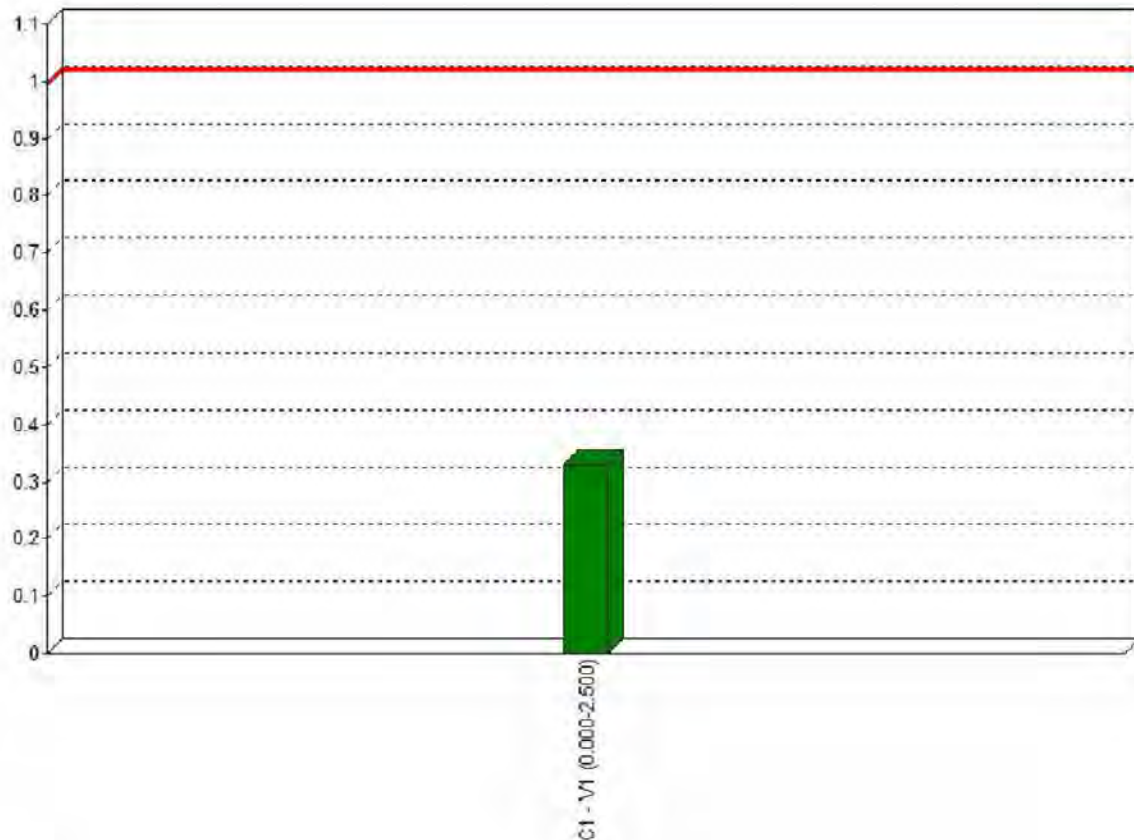
## KIPSTEUNENGEDEVENS

| Staal last            | Profiel | Begin         | Eind          | Kipsteunen boven | Kipsteunen onder | Aangrijppunt |
|-----------------------|---------|---------------|---------------|------------------|------------------|--------------|
| C1 - V1 (0.000-2.500) | P1      | Inklemming    | Inklemming    |                  |                  | Neutraal     |
| -                     | -       | Volledig vast | Volledig vast | m                | m                | -            |

## DOORBUIGINGGEGEVENS

| Staal w;2+w;3         | Constr.type | Toetsingstype | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------|-------------|---------------|---------|---------|-------------|-------|
| C1 - V1 (0.000-2.500) | Kolom       | 1 bouwlaag    |         |         | Parabolisch | H/300 |
| -                     | -           | -             | mm      | mm      | -           | N/B   |

## AFB. HOUT UC DIAGRAM



### UNITY CHECK

| Label | Toetsing    | Combinatie | Artikel                     | UC max |
|-------|-------------|------------|-----------------------------|--------|
| C1    | Doorsnede   | Fu.C.1     | NEN-EN1995-1-1#6.2.4 (6.19) | 0.28   |
|       | Kip         | Fu.C.1     | NEN-EN1995-1-1#6.3.3 (6.35) | 0.13   |
|       | Stabiliteit | Fu.C.1     | NEN-EN1995-1-1#6.3.2 (6.23) | 0.33   |

## 8.15 Bijlage ultraai MatrixFrame berekening Pos 15

### AFB. GEOMETRIE 1 STAVEN EN KNOPEN



#### STAVEN

| Staat | Knoop B | Knoop | X-E    | Z-E    | Lengte | Profiel | Positie                  |
|-------|---------|-------|--------|--------|--------|---------|--------------------------|
| E     | X-B     | Z-B   |        |        |        |         |                          |
| S1    | K1      | K2    | 0.000  | 0.000  | 0.000  | -2.500  | 2.500 P30.000 - L(2.500) |
| S2    | K2      | K3    | 0.000  | -2.500 | 0.000  | -4.900  |                          |
| S3    | K4      | K5    | 5.600  | 0.000  | 5.600  | -2.500  | 2.500 P30.000 - L(2.500) |
| S4    | K5      | K6    | 5.600  | -2.500 | 5.600  | -4.900  |                          |
| S5    | K2      | K5    | 0.000  | -2.500 | 5.600  | -2.500  | 5.600 P10.000 - L(5.600) |
| S6    | K3      | K6    | 0.000  | -4.900 | 5.600  | -4.900  |                          |
| S7    | K7      | K8    | 6.600  | 0.000  | 6.600  | -2.500  | 2.500 P30.000 - L(2.500) |
| S8    | K9      | K10   | 12.200 | 0.000  | 12.200 | -2.500  |                          |
| S9    | K8      | K10   | 6.600  | -2.500 | 12.200 | -2.500  | 5.600 P10.000 - L(5.600) |
| S10   | K5      | K8    | 5.600  | -2.500 | 6.600  | -2.500  |                          |
|       |         |       | m      | m      | m      | m       | m - -                    |

#### PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy Materiaal    | 5.1.2.e |
|---------|-------------|-------------|-----------------|---------|
| P1      | HE200A      | 5.3831e-03  | 3.6922e-05 S235 | 0.0     |
| P2      | HE180A      | 4.5251e-03  | 2.5103e-05 S235 | 0.0     |
| P3      | HE140B      | 4.2956e-03  | 1.5092e-05 S235 | 0.0     |
| P4      | HE140B      | 4.2956e-03  | 1.5092e-05 S235 | 0.0     |
| P5      | C100        | 7.8540e-03  | 4.9087e-06 S235 | 0.0     |

- - m2 m4 - °

## PROFIELVORMEN

| Profiel | Verl. hB | hE    | tf    | tw     | tf2    | B      | bL    | bR    | Raatl. Hoogte |           |
|---------|----------|-------|-------|--------|--------|--------|-------|-------|---------------|-----------|
| P5      | Nee      | 0,100 | 0,100 | 0,0000 | 0,0000 | 0,0000 | 0,100 | 0,000 | 0,000         | Nee 0,000 |
| -       | -        | m     | m     | m      | m      | m      | m     | m     | m             | m         |

## MATERIALEN

| Materiaal | Dichtheid | E-Modulus  | Uitzettingcoeff |
|-----------|-----------|------------|-----------------|
| S235      | 78.50     | 2.1000e+08 | 12.0000e-06     |
| -         | kN/m3     | kN/m2      | C°m             |

## AFB. GEOMETRIE 2 STAVEN EN KNOPEN



## SCHARNIEREN

| StAAF | Positie  | Oplegg. | Scharnier |      | Yr      |
|-------|----------|---------|-----------|------|---------|
| S10   | 0.000    | A1      | vast      | vast | vrij    |
| -     | L(1.000) | A1      | vast      | vast | vrij    |
| -     | m        | -       | kN/m      | kN/m | kNm/rad |

## OPLEGGINGEN

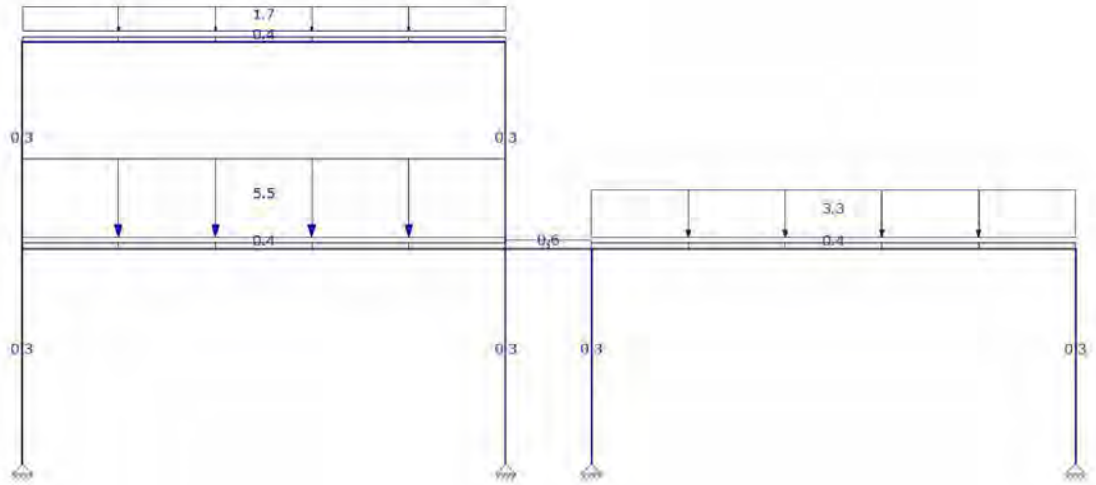
| Oplegging | Object | Positie | Z    | Yr   | HoekYr  |
|-----------|--------|---------|------|------|---------|
| O1        | K1     | 0.000   | vast | vast | vrij    |
| O2        | K4     | 0.000   | vast | vast | vrij    |
| O3        | K7     | 0.000   | vast | vast | vrij    |
| O4        | K9     | 0.000   | vast | vast | vrij    |
| -         | -      | m       | kN/m | kN/m | kNm/rad |

## BELASTINGSGEVALLEN TYPEN

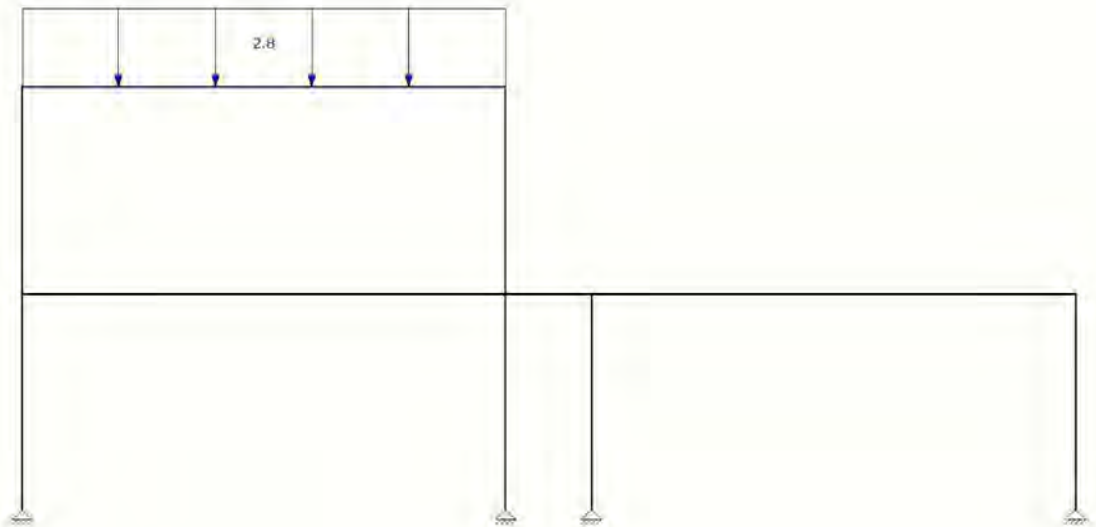
| Oplegg. | Staven                  | 5.1.2.e   | Gunstig/Ong. Element | 5.1.2.e                 | Cprob     |
|---------|-------------------------|-----------|----------------------|-------------------------|-----------|
| Psi2    | UGT/GGT                 |           |                      |                         | Psi0 Psi1 |
| B.G.1   | Permanent               | Permanent | -                    | N.v.t.                  | N.v.t.    |
| B.G.2   | Verdeelde veranderlijke | Verdeelde | -                    | Cat. H) Ontoegankelijke |           |
| 1       | 1                       |           |                      | 1.00/1.00               |           |

|               | bélasting   | veranderlijke<br>belasting                               |   | daken           |        |        |      |      |
|---------------|---|--|---|-----------------|--------|--------|------|------|
| B.G.3<br>0,30 | Verdeelde veranderlijke<br>1,00/1,00<br>belasting | Verdeelde  | - | Cat. A) Vloeren | 2      | 1      | 0,40 | 0,50 |
| B.G.4<br>0,20 | Wind links  | veranderlijke<br>belasting<br>Windbelasting<br>1,00/1,00 | - |                 | N.v.t. | N.v.t. |      |      |
| B.G.5<br>0,20 | Wind rechts                                       | Windbelasting<br>1,00/1,00                               | - |                 | N.v.t. | N.v.t. |      |      |
| B.G.6         | Kniklengte (Assymetrisch)                         | Kniklengte   |   |                 | N.v.t. | N.v.t. |      |      |
| B.G.7         | Kniklengte (Symmetrisch)                          | Kniklengte   |   |                 | N.v.t. | N.v.t. |      |      |

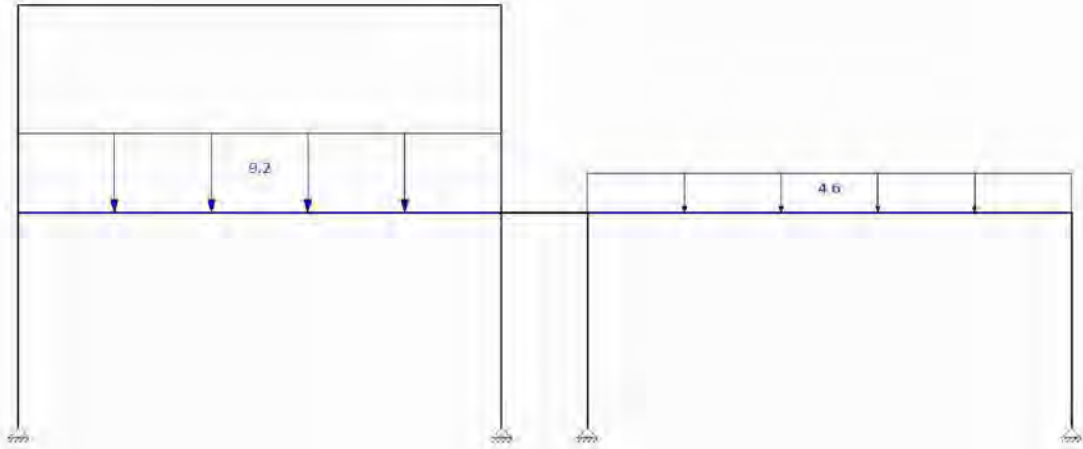
AFB. LASTEN B.G.1 PERMANENT



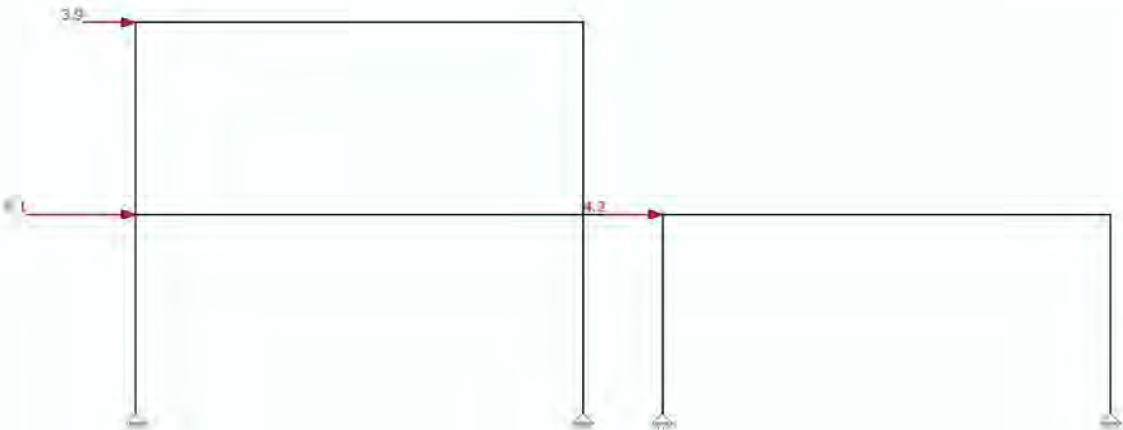
AFB. LASTEN B.G.2 VERDEELDE VERANDERLIJKE BELASTING



## AFB. LASTEN B.G.3 VERDEELDE VERÄNDERLIJKE BELASTING

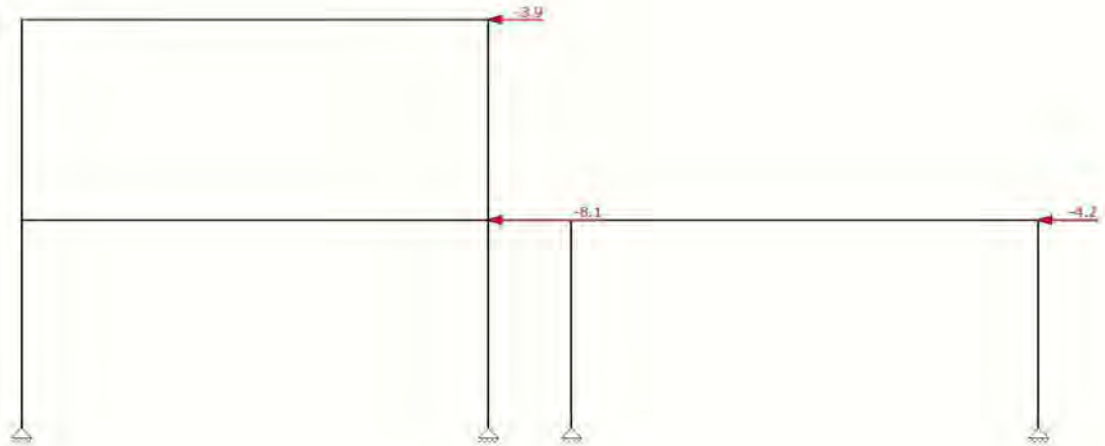


## AFB. LASTEN B.G.4 WIND LINKS

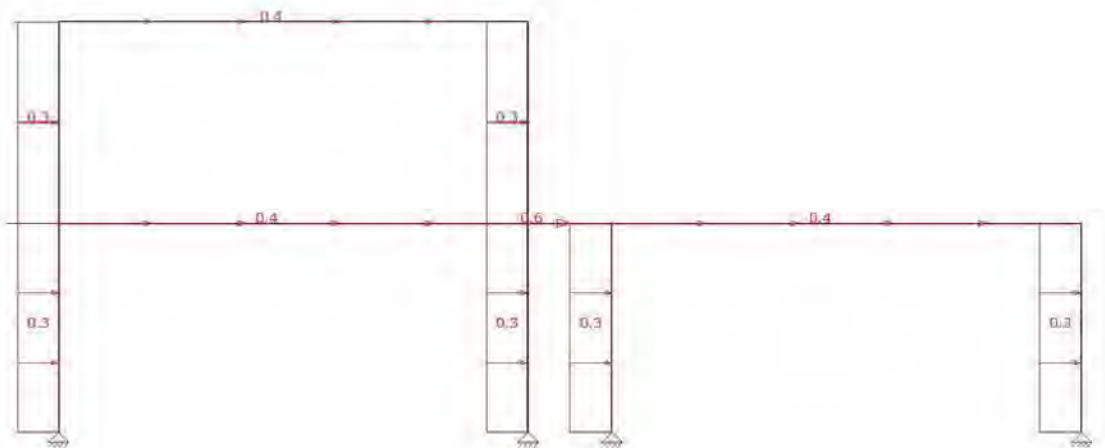




## AFB. LASTEN B.G.5 WIND RECHTS

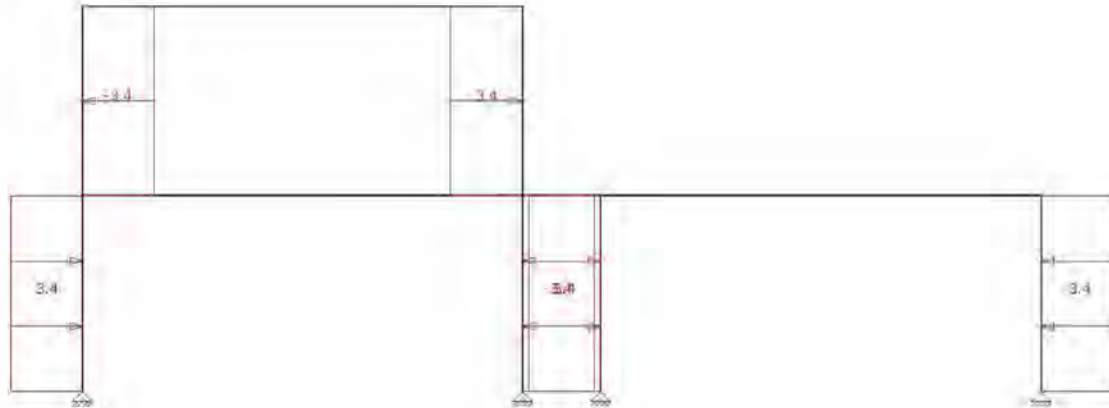


## AFB. LASTEN B.G.6 KNIKLENGTE (ASSYMETRISCH)





## AFB. LASTEN B.G.7 KNIKLENGTE (SYMMETRISCH)



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 | Fu.C.5 |
|-------|-----------------------------------|--------|--------|--------|--------|--------|
| B.G.1 | Permanent                         | 1.20   | 1.20   | 1.20   | 1.20   | 1.35   |
| B.G.2 | Verdeelde veranderlijke belasting | 1.50   | -      | -      | -      | -      |
| B.G.3 | Verdeelde veranderlijke belasting | 0.60   | 1.50   | 0.60   | 0.60   | 0.60   |
| B.G.4 | Wind links                        | -      | -      | 1.50   | -      | -      |
| B.G.5 | Wind rechts                       | -      | -      | -      | 1.50   | -      |
| B.G.6 | Kniklengte (Assymetrisch)         | -      | -      | -      | -      | -      |
| B.G.7 | Kniklengte (Symmetrisch)          | -      | -      | -      | -      | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Ka.C.(w1) | Ka.C.1 | Ka.C.2 | Ka.C.3 | Ka.C.4 | Ka.C.5 |
|-------|-----------------------------------|-----------|--------|--------|--------|--------|--------|
| B.G.1 | Permanent                         | 1.00      | 1.00   | 1.00   | 1.00   | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting | -         | -      | 1.00   | -      | -      | -      |
| B.G.3 | Verdeelde veranderlijke belasting | -         | 0.40   | 0.40   | 1.00   | 0.40   | 0.40   |
| B.G.4 | Wind links                        | -         | -      | -      | -      | 1.00   | -      |
| B.G.5 | Wind rechts                       | -         | -      | -      | -      | -      | 1.00   |
| B.G.6 | Kniklengte (Assymetrisch)         | -         | -      | -      | -      | -      | -      |
| B.G.7 | Kniklengte (Symmetrisch)          | -         | -      | -      | -      | -      | -      |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Fr.C.(w1) | Fr.C.1 | Fr.C.2 | Fr.C.3 | Fr.C.4 |
|-------|-----------------------------------|-----------|--------|--------|--------|--------|
| B.G.1 | Permanent                         | 1.00      | 1.00   | 1.00   | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting | -         | -      | -      | -      | -      |
| B.G.3 | Verdeelde veranderlijke belasting | -         | 0.30   | 0.50   | 0.30   | 0.30   |
| B.G.4 | Wind links                        | -         | -      | -      | 0.20   | -      |
| B.G.5 | Wind rechts                       | -         | -      | -      | -      | 0.20   |
| B.G.6 | Kniklengte (Assymetrisch)         | -         | -      | -      | -      | -      |
| B.G.7 | Kniklengte (Symmetrisch)          | -         | -      | -      | -      | -      |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Qu.C.1 |
|-------|-----------------------------------|--------|
| B.G.1 | Permanent                         | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting | -      |
| B.G.3 | Verdeelde veranderlijke belasting | 0.30   |
| B.G.4 | Wind links                        | -      |
| B.G.5 | Wind rechts                       | -      |
| B.G.6 | Kniklengte (Assymetrisch)         | -      |

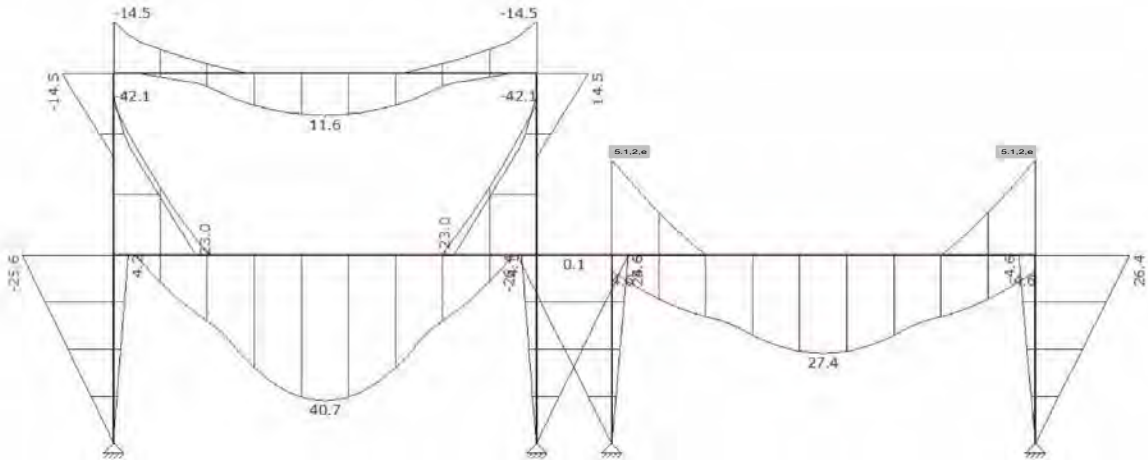
B.G.7 Kniklengte (Symmetrisch)

## UITGANGSPUNTEN VAN DE ANALYSE

Geavanceerde Analyse

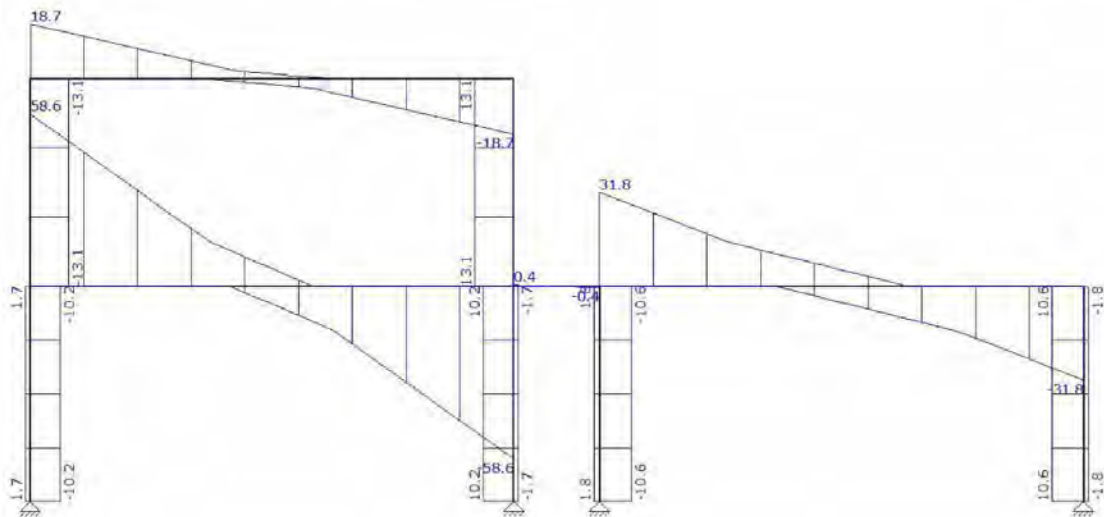
AFB. FU.C. MOMENT (MY) OMHULLENDE

Fundamenteel Belastingscombinaties



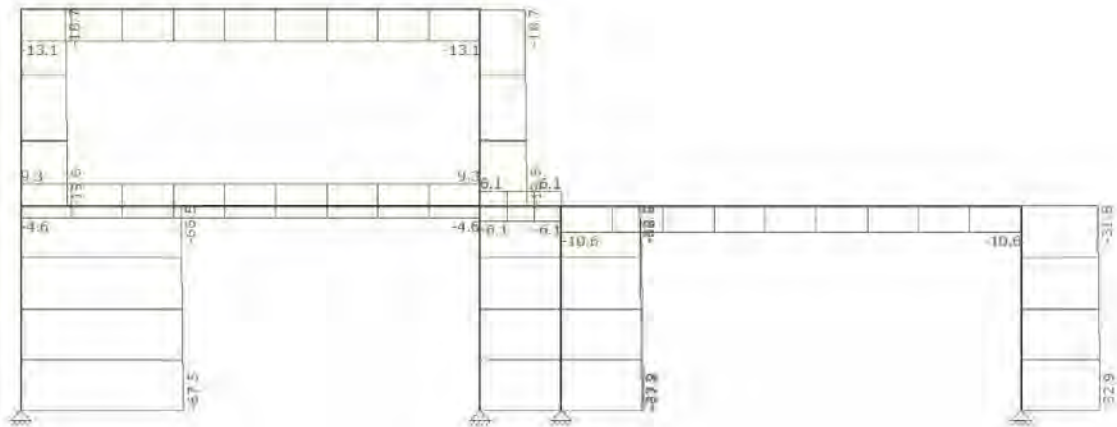
AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

Fundamenteel Belastingscombinaties



AFB. FU.C. NORMAALKRACHT (NX) OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. STAAFKRACHTEN

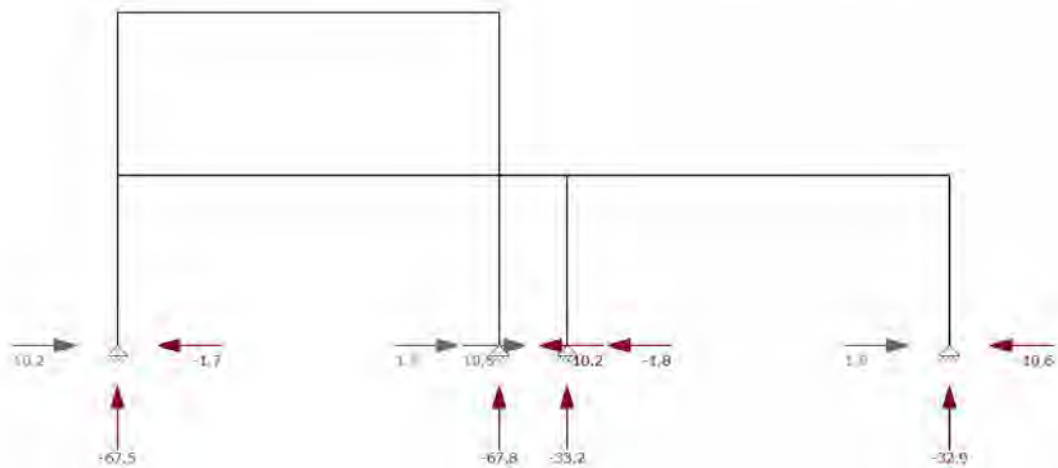
| Staal | B.C.   | Mb     | Mmax  | xMmax | Me     | x-M0  | x-M0 T/D | Nmax   | Vb     | Vmax   | Ve     |
|-------|--------|--------|-------|-------|--------|-------|----------|--------|--------|--------|--------|
| S1    | Fu.C.1 | 0.00   |       |       | -9.37  | 0.000 | 0.000 D  | -56.04 | -3.75  | -3.75  | -3.75  |
|       | Fu.C.2 | 0.00   |       |       | -18.32 | 0.000 | 0.000 D  | -67.46 | -7.33  | -7.33  | -7.33  |
|       | Fu.C.3 | 0.00   |       |       | 4.17   | 0.000 | 0.000 D  | -36.45 | 1.67   | 1.67   | 1.67   |
|       | Fu.C.4 | 0.00   |       |       | -25.61 | 0.000 | 0.000 D  | -52.10 | -10.24 | -10.24 | -10.24 |
|       | Fu.C.5 | 0.00   |       |       | -11.45 | 0.000 | 0.000 D  | -47.84 | -4.58  | -4.58  | -4.58  |
| S2    | Fu.C.1 | 16.86  |       |       | -14.50 | 1.291 | 0.000 D  | -19.65 | -13.07 | -13.07 | -13.07 |
|       | Fu.C.2 | 23.01  |       |       | -8.05  | 1.778 | 0.000 D  | -7.89  | -12.94 | -12.94 | -12.94 |
|       | Fu.C.3 | 12.49  |       |       | -1.68  | 2.116 | 0.000 D  | -6.09  | -5.90  | -5.90  | -5.90  |
|       | Fu.C.4 | 16.47  |       |       | -11.70 | 1.403 | 0.000 D  | -9.68  | -11.74 | -11.74 | -11.74 |
|       | Fu.C.5 | 15.54  |       |       | -7.40  | 1.626 | 0.000 D  | -8.86  | -9.56  | -9.56  | -9.56  |
| S3    | Fu.C.1 | 0.00   |       |       | 9.36   | 0.000 | 0.000 D  | -56.41 | 3.74   | 3.74   | 3.74   |
|       | Fu.C.2 | 0.00   |       |       | 18.33  | 0.000 | 0.000 D  | -67.83 | 7.33   | 7.33   | 7.33   |
|       | Fu.C.3 | 0.00   |       |       | 25.61  | 0.000 | 0.000 D  | -52.48 | 10.24  | 10.24  | 10.24  |
|       | Fu.C.4 | 0.00   |       |       | -4.13  | 0.000 | 0.000 D  | -36.83 | -1.65  | -1.65  | -1.65  |
|       | Fu.C.5 | 0.00   |       |       | 11.45  | 0.000 | 0.000 D  | -48.26 | 4.58   | 4.58   | 4.58   |
| S4    | Fu.C.1 | -16.87 |       |       | 14.50  | 1.291 | 0.000 D  | -19.65 | 13.07  | 13.07  | 13.07  |
|       | Fu.C.2 | -23.01 |       |       | 8.05   | 1.778 | 0.000 D  | -7.89  | 12.94  | 12.94  | 12.94  |
|       | Fu.C.3 | -16.49 |       |       | 11.72  | 1.403 | 0.000 D  | -9.68  | 11.75  | 11.75  | 11.75  |
|       | Fu.C.4 | -12.46 |       |       | 1.67   | 2.117 | 0.000 D  | -6.09  | 5.89   | 5.89   | 5.89   |
|       | Fu.C.5 | -15.54 |       |       | 7.40   | 1.626 | 0.000 D  | -8.86  | 9.56   | 9.56   | 9.56   |
| S5    | Fu.C.1 | -26.24 | 23.30 | 2.800 | -26.22 | 0.880 | 4.721 T  | 9.32   | 35.38  | 35.38  | -35.38 |
|       | Fu.C.2 | -41.33 | 40.66 | 2.800 | -41.33 | 0.828 | 4.772 T  | 5.61   | 58.56  | -58.57 | -58.57 |
|       | Fu.C.3 | -8.31  | 25.77 | 2.323 | -42.10 | 0.303 | 4.342 D  | -4.58  | 29.35  | -41.41 | -41.41 |
|       | Fu.C.4 | -42.08 | 25.76 | 3.277 | -8.33  | 1.257 | 5.296 T  | 1.49   | 41.41  | 41.41  | -29.36 |
|       | Fu.C.5 | -27.00 | 25.99 | 2.800 | -26.99 | 0.839 | 4.761 T  | 4.98   | 37.84  | 37.84  | -37.84 |
| S6    | Fu.C.1 | -14.50 | 11.65 | 2.800 | -14.50 | 0.931 | 4.669 D  | -13.07 | 18.67  | 18.67  | -18.67 |
|       | Fu.C.2 | -8.05  | 1.63  | 2.800 | -8.05  | 1.652 | 3.948 D  | -12.94 | 6.91   | -6.91  | -6.91  |
|       | Fu.C.3 | -1.68  | 3.63  | 2.074 | -11.72 | 0.358 | 3.790 D  | -11.75 | 5.12   | -8.71  | -8.71  |
|       | Fu.C.4 | -11.70 | 3.65  | 3.526 | -1.67  | 1.807 | 5.244 D  | -11.74 | 8.71   | 8.71   | -5.12  |
|       | Fu.C.5 | -7.40  | 3.48  | 2.800 | -7.40  | 1.216 | 4.384 D  | -9.56  | 7.77   | 7.77   | -7.77  |
| S7    | Fu.C.1 | 0.00   |       |       | -10.92 | 0.000 | 0.000 D  | -21.63 | -4.37  | -4.37  | -4.37  |
|       | Fu.C.2 | 0.00   |       |       | -17.19 | 0.000 | 0.000 D  | -33.23 | -6.88  | -6.88  | -6.88  |
|       | Fu.C.3 | 0.00   |       |       | 4.56   | 0.000 | 0.000 D  | -16.10 | 1.83   | 1.83   | 1.83   |
|       | Fu.C.4 | 0.00   |       |       | -26.44 | 0.000 | 0.000 D  | -27.17 | -10.57 | -10.57 | -10.57 |
|       | Fu.C.5 | 0.00   |       |       | -11.77 | 0.000 | 0.000 D  | -23.35 | -4.71  | -4.71  | -4.71  |



|     |        |            |            |          |            |          |          |   |           |           |           |           |
|-----|--------|------------|------------|----------|------------|----------|----------|---|-----------|-----------|-----------|-----------|
| S8  | Fu.C.1 | 0.00       |            |          | 10.94      | 0.000    | 0.000    | D | -21.27    | 4.38      | 4.38      | 4.38      |
|     | Fu.C.2 | 0.00       |            |          | 17.19      | 0.000    | 0.000    | D | -32.86    | 6.87      | 6.87      | 6.87      |
|     | Fu.C.3 | 0.00       |            |          | 26.40      | 0.000    | 0.000    | D | -26.79    | 10.56     | 10.56     | 10.56     |
|     | Fu.C.4 | 0.00       |            |          | -4.58      | 0.000    | 0.000    | D | -15.73    | -1.83     | -1.83     | -1.83     |
|     | Fu.C.5 | 0.00       |            |          | 11.77      | 0.000    | 0.000    | D | -22.94    | 4.71      | 4.71      | 4.71      |
| S9  | Fu.C.1 | -10.92     | 17.42      | 2.800    | -10.94     | 0.605    | 4.995    | D | -4.38     | 20.25     | -20.25    | -20.25    |
|     | Fu.C.2 | -17.19     | 27.39      | 2.800    | -17.19     | 0.605    | 4.995    | D | -6.87     | 31.84     | 31.84     | -31.84    |
|     | Fu.C.3 | 4.56       | 19.55      | 2.035    | -26.40     | 4.360    | 0.000    | D | -10.56    | 14.72     | -25.78    | -25.78    |
|     | Fu.C.4 | -26.44     | 19.54      | 3.566    | 4.58       | 1.241    | 0.000    | D | -4.47     | 25.79     | 25.79     | -14.71    |
|     | Fu.C.5 | -11.77     | 18.75      | 2.800    | -11.77     | 0.605    | 4.995    | D | -4.71     | 21.80     | -21.80    | -21.80    |
| S10 | Fu.C.1 | 0.00       | 0.09       | 0.500    | 0.00       | 0.000    | 0.000    | D | -0.01     | 0.37      | 0.37      | -0.37     |
|     | Fu.C.2 | 0.00       | 0.09       | 0.500    | 0.00       | 0.000    | 0.000    | T | 0.00      | 0.37      | 0.37      | -0.37     |
|     | Fu.C.3 | 0.00       | 0.09       | 0.500    | 0.00       | 0.000    | 0.000    | D | -6.09     | 0.37      | 0.37      | -0.37     |
|     | Fu.C.4 | 0.00       | 0.09       | 0.500    | 0.00       | 0.000    | 0.000    | T | 6.11      | 0.37      | 0.37      | -0.37     |
|     | Fu.C.5 | 0.00       | 0.10       | 0.500    | 0.00       | 0.000    | 0.000    | D | 0.00      | 0.42      | 0.42      | -0.42     |
| -   | -      | <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. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingcombinaties



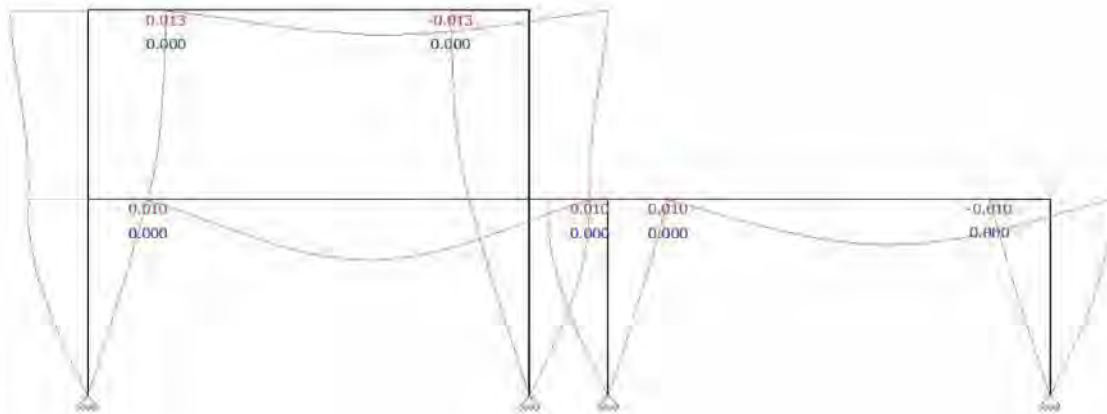
## FU.C. OPLEGREACTIES

| B.C.        | Oplegging           | Knoop        | X           | Z              | My        |
|-------------|---------------------|--------------|-------------|----------------|-----------|
| Fu.C.1      | O1                  | K1           | 3.75        | -56.04         | 0.00      |
|             | O2                  | K4           | -3.74       | -56.41         | 0.00      |
|             | O3                  | K7           | 4.37        | -21.63         | 0.00      |
|             | O4                  | K9           | -4.38       | -21.27         | 0.00      |
|             | <b>Som Reacties</b> |              | <b>0.00</b> | <b>-155.35</b> |           |
|             | <b>Som Lasten</b>   |              | <b>0.00</b> | <b>155.35</b>  |           |
| Fu.C.2      | O1                  | K1           | 7.33        | -67.46         | 0.00      |
|             | O2                  | K4           | -7.33       | -67.83         | 0.00      |
|             | O3                  | K7           | 6.88        | -33.23         | 0.00      |
|             | O4                  | K9           | -6.87       | -32.86         | 0.00      |
|             | <b>Som Reacties</b> |              | <b>0.00</b> | <b>-201.38</b> |           |
|             | <b>Som Lasten</b>   |              | <b>0.00</b> | <b>201.38</b>  |           |
| Fu.C.3      | O1                  | K1           | -1.67       | -36.45         | 0.00      |
|             | O2                  | K4           | -10.24      | -52.48         | 0.00      |
|             | O3                  | K7           | -1.83       | -16.10         | 0.00      |
| <b>B.C.</b> | <b>Oplegging</b>    | <b>Knoop</b> | <b>X</b>    | <b>Z</b>       | <b>My</b> |
| Fu.C.3      | O4                  | K9           | -10.56      | -26.79         | 0.00      |

|        |                     |    |               |                |            |
|--------|---------------------|----|---------------|----------------|------------|
|        | <b>Som Reacties</b> |    | <b>-24.30</b> | <b>-131.83</b> |            |
|        | <b>Som Lasten</b>   |    | <b>24.30</b>  | <b>131.83</b>  |            |
| Fu.C.4 | O1                  | K1 | 10.24         | -52.10         | 0.00       |
|        | O2                  | K4 | 1.65          | -36.83         | 0.00       |
|        | O3                  | K7 | 10.57         | -27.17         | 0.00       |
|        | O4                  | K9 | 1.83          | -15.73         | 0.00       |
|        | <b>Som Reacties</b> |    | <b>24.30</b>  | <b>-131.83</b> |            |
|        | <b>Som Lasten</b>   |    | <b>-24.30</b> | <b>131.83</b>  |            |
| Fu.C.5 | O1                  | K1 | 4.58          | -47.84         | 0.00       |
|        | O2                  | K4 | -4.58         | -48.26         | 0.00       |
|        | O3                  | K7 | 4.71          | -23.35         | 0.00       |
|        | O4                  | K9 | -4.71         | -22.94         | 0.00       |
|        | <b>Som Reacties</b> |    | <b>0.00</b>   | <b>-142.39</b> |            |
|        | <b>Som Lasten</b>   |    | <b>0.00</b>   | <b>142.39</b>  |            |
| -      | -                   | -  | <b>kN</b>     | <b>kN</b>      | <b>kNm</b> |

## B.G. OPLEGREACTIES

| B.C.  | Oplegging           | Knoop | X             | Z             | My         |
|-------|---------------------|-------|---------------|---------------|------------|
| B.G.1 | O1                  | K1    | 1.90          | -23.99        | 0.00       |
|       | O2                  | K4    | -1.90         | -24.30        | 0.00       |
|       | O3                  | K7    | 2.25          | -11.57        | 0.00       |
|       | O4                  | K9    | -2.25         | -11.27        | 0.00       |
|       | <b>Som Reacties</b> |       | <b>0.00</b>   | <b>-71.13</b> |            |
|       | <b>Som Lasten</b>   |       | <b>0.00</b>   | <b>71.13</b>  |            |
| B.G.2 | O1                  | K1    | -0.37         | -7.84         | 0.00       |
|       | O2                  | K4    | 0.37          | -7.84         | 0.00       |
|       | O3                  | K7    | 0.00          | 0.00          | 0.00       |
|       | O4                  | K9    | 0.00          | 0.00          | 0.00       |
|       | <b>Som Reacties</b> |       | <b>0.00</b>   | <b>-15.68</b> |            |
|       | <b>Som Lasten</b>   |       | <b>0.00</b>   | <b>15.68</b>  |            |
| B.G.3 | O1                  | K1    | 3.37          | -25.76        | 0.00       |
|       | O2                  | K4    | -3.37         | -25.76        | 0.00       |
|       | O3                  | K7    | 2.78          | -12.88        | 0.00       |
|       | O4                  | K9    | -2.78         | -12.88        | 0.00       |
|       | <b>Som Reacties</b> |       | <b>0.00</b>   | <b>-77.28</b> |            |
|       | <b>Som Lasten</b>   |       | <b>0.00</b>   | <b>77.28</b>  |            |
| B.G.4 | O1                  | K1    | -3.98         | 5.22          | 0.00       |
|       | O2                  | K4    | -3.96         | -5.22         | 0.00       |
|       | O3                  | K7    | -4.13         | 3.69          | 0.00       |
|       | O4                  | K9    | -4.13         | -3.69         | 0.00       |
|       | <b>Som Reacties</b> |       | <b>-16.20</b> | <b>0.00</b>   |            |
|       | <b>Som Lasten</b>   |       | <b>16.20</b>  | <b>0.00</b>   |            |
| B.G.5 | O1                  | K1    | 3.96          | -5.21         | 0.00       |
|       | O2                  | K4    | 3.97          | 5.21          | 0.00       |
|       | O3                  | K7    | 4.14          | -3.69         | 0.00       |
|       | O4                  | K9    | 4.14          | 3.69          | 0.00       |
|       | <b>Som Reacties</b> |       | <b>16.20</b>  | <b>0.00</b>   |            |
|       | <b>Som Lasten</b>   |       | <b>-16.20</b> | <b>0.00</b>   |            |
| B.G.6 | O1                  | K1    | -3.01         | 3.51          | 0.00       |
|       | O2                  | K4    | -3.01         | -3.51         | 0.00       |
|       | O3                  | K7    | -3.15         | 2.44          | 0.00       |
|       | O4                  | K9    | -3.15         | -2.44         | 0.00       |
|       | <b>Som Reacties</b> |       | <b>-12.33</b> | <b>0.00</b>   |            |
|       | <b>Som Lasten</b>   |       | <b>12.33</b>  | <b>0.00</b>   |            |
| B.G.7 | O1                  | K1    | -3.85         | 0.00          | 0.00       |
|       | O2                  | K4    | 3.84          | 0.00          | 0.00       |
|       | O3                  | K7    | -3.77         | 0.00          | 0.00       |
|       | O4                  | K9    | 3.78          | 0.00          | 0.00       |
|       | <b>Som Reacties</b> |       | <b>0.00</b>   | <b>0.00</b>   |            |
|       | <b>Som Lasten</b>   |       | <b>0.00</b>   | <b>0.00</b>   |            |
| -     | -                   | -     | <b>kN</b>     | <b>kN</b>     | <b>kNm</b> |



### KA.C. KNOOPVERPLAATSINGEN

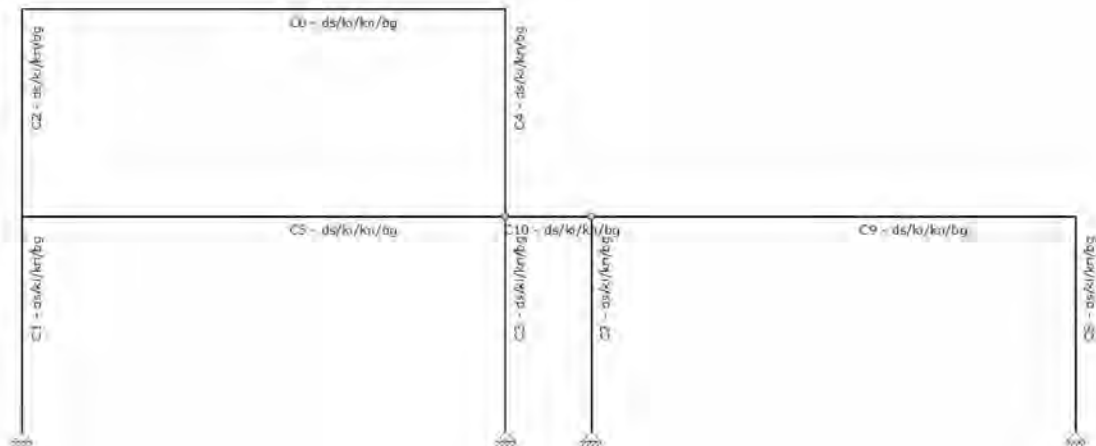
| Knoop        | B.C.        | X        | Z        | Yr         |
|--------------|-------------|----------|----------|------------|
| K1           | Ka.C.(w1)   | 0.0000   | 0.0000   | 0.627e-03  |
|              | Ka.C.1      | 0.0000   | 0.0000   | 1.070e-03  |
|              | Ka.C.2      | 0.0000   | 0.0000   | 0.954e-03  |
|              | Ka.C.3      | 0.0000   | 0.0000   | 1.734e-03  |
|              | Ka.C.4      | 0.0000   | 0.0000   | -4.215e-03 |
| K2           | Ka.C.5      | 0.0000   | 0.0000   | 6.336e-03  |
|              | Ka.C.(w1)   | 0.0000   | 0.0001   | -1.244e-03 |
|              | Ka.C.1      | 0.0000   | 0.0001   | -2.129e-03 |
|              | Ka.C.2      | 0.0000   | 0.0001   | -1.882e-03 |
|              | Ka.C.3      | 0.0000   | 0.0001   | -3.456e-03 |
| K3           | Ka.C.4      | 0.0099   | 0.0001   | -3.490e-03 |
|              | Ka.C.5      | -0.0099  | 0.0001   | -0.771e-03 |
|              | Ka.C.(w1)   | 0.0000   | 0.0001   | -0.302e-03 |
|              | Ka.C.1      | 0.0000   | 0.0001   | 0.021e-03  |
|              | Ka.C.2      | 0.0000   | 0.0002   | -1.098e-03 |
| K4           | Ka.C.3      | 0.0000   | 0.0002   | 0.506e-03  |
|              | Ka.C.4      | 0.0130   | 0.0001   | -0.573e-03 |
|              | Ka.C.5      | -0.0129  | 0.0001   | 0.620e-03  |
|              | Ka.C.(w1)   | 0.0000   | 0.0000   | -0.626e-03 |
|              | Ka.C.1      | 0.0000   | 0.0000   | -1.069e-03 |
| K5           | Ka.C.2      | 0.0000   | 0.0000   | -0.949e-03 |
|              | Ka.C.3      | 0.0000   | 0.0000   | -1.735e-03 |
|              | Ka.C.4      | 0.0000   | 0.0000   | -6.337e-03 |
|              | Ka.C.5      | 0.0000   | 0.0000   | 4.201e-03  |
|              | Ka.C.(w1)   | 0.0000   | 0.0001   | 1.244e-03  |
| K6           | Ka.C.1      | 0.0000   | 0.0001   | 2.129e-03  |
|              | Ka.C.2      | 0.0000   | 0.0001   | 1.883e-03  |
|              | Ka.C.3      | 0.0000   | 0.0001   | 3.456e-03  |
|              | Ka.C.4      | 0.0099   | 0.0001   | 0.768e-03  |
|              | Ka.C.5      | -0.0099  | 0.0001   | 3.489e-03  |
| K7           | Ka.C.(w1)   | 0.0000   | 0.0001   | 0.301e-03  |
|              | Ka.C.1      | 0.0000   | 0.0001   | -0.022e-03 |
|              | Ka.C.2      | 0.0000   | 0.0002   | 1.098e-03  |
|              | Ka.C.3      | 0.0000   | 0.0002   | -0.506e-03 |
|              | Ka.C.4      | 0.0130   | 0.0001   | -0.625e-03 |
| K7           | Ka.C.5      | -0.0130  | 0.0001   | 0.577e-03  |
|              | Ka.C.(w1)   | 0.0000   | 0.0000   | 0.737e-03  |
| <b>Knoop</b> | <b>B.C.</b> | <b>X</b> | <b>Z</b> | <b>Yr</b>  |
| K7           | Ka.C.1      | 0.0000   | 0.0000   | 1.102e-03  |
|              | Ka.C.2      | 0.0000   | 0.0000   | 1.099e-03  |

|     |           |          |          |            |
|-----|-----------|----------|----------|------------|
|     | Ka.C.3    | 0.0000   | 0.0000   | 1.649e-03  |
|     | Ka.C.4    | 0.0000   | 0.0000   | -4.220e-03 |
|     | Ka.C.5    | 0.0000   | 0.0000   | 6.427e-03  |
| K8  | Ka.C.(w1) | 0.0000   | 0.0000   | -1.482e-03 |
|     | Ka.C.1    | 0.0000   | 0.0000   | -2.214e-03 |
|     | Ka.C.2    | 0.0000   | 0.0000   | -2.214e-03 |
|     | Ka.C.3    | 0.0000   | 0.0001   | -3.312e-03 |
|     | Ka.C.4    | 0.0099   | 0.0000   | -3.462e-03 |
|     | Ka.C.5    | -0.0099  | 0.0001   | -0.966e-03 |
| K9  | Ka.C.(w1) | 0.0000   | 0.0000   | -0.738e-03 |
|     | Ka.C.1    | 0.0000   | 0.0000   | -1.102e-03 |
|     | Ka.C.2    | 0.0000   | 0.0000   | -1.104e-03 |
|     | Ka.C.3    | 0.0000   | 0.0000   | -1.648e-03 |
|     | Ka.C.4    | 0.0000   | 0.0000   | -6.414e-03 |
|     | Ka.C.5    | 0.0000   | 0.0000   | 4.223e-03  |
| K10 | Ka.C.(w1) | 0.0000   | 0.0000   | 1.481e-03  |
|     | Ka.C.1    | 0.0000   | 0.0000   | 2.214e-03  |
|     | Ka.C.2    | 0.0000   | 0.0000   | 2.213e-03  |
|     | Ka.C.3    | 0.0000   | 0.0001   | 3.312e-03  |
|     | Ka.C.4    | 0.0099   | 0.0001   | 0.970e-03  |
|     | Ka.C.5    | -0.0099  | 0.0000   | 3.462e-03  |
| -   | -         | <b>m</b> | <b>m</b> | <b>rad</b> |

## KA.C. EXTREME DOORBUIGINGEN

| Staaf | B.C.   | Knoop Begin |          | Staaf    |                | Knoop Eind |          |
|-------|--------|-------------|----------|----------|----------------|------------|----------|
|       |        | Z           | Z'       | Z'afst   | Z'             | Z          | Z'       |
| S1    | Ka.C.4 | 0.000       | 0.000    | 1.443    | <b>0.0002</b>  | 0.010      | 0.000    |
| S1    | Ka.C.5 | 0.000       | 0.000    | 1.443    | <b>-0.0023</b> | -0.010     | 0.000    |
| S2    | Ka.C.3 | 0.000       | 0.000    | 0.863    | <b>0.0013</b>  | 0.000      | 0.000    |
| S3    | Ka.C.4 | 0.000       | 0.000    | 1.443    | <b>0.0023</b>  | 0.010      | 0.000    |
| S3    | Ka.C.5 | 0.000       | 0.000    | 1.443    | <b>-0.0002</b> | -0.010     | 0.000    |
| S4    | Ka.C.3 | 0.000       | 0.000    | 0.863    | <b>-0.0013</b> | 0.000      | 0.000    |
| S5    | Ka.C.3 | 0.000       | 0.000    | 2.800    | <b>0.0098</b>  | 0.000      | 0.000    |
| S6    | Ka.C.2 | 0.000       | 0.000    | 2.800    | <b>0.0039</b>  | 0.000      | 0.000    |
| S7    | Ka.C.4 | 0.000       | 0.000    | 1.443    | <b>0.0002</b>  | 0.010      | 0.000    |
| S7    | Ka.C.5 | 0.000       | 0.000    | 1.443    | <b>-0.0024</b> | -0.010     | 0.000    |
| S8    | Ka.C.4 | 0.000       | 0.000    | 1.443    | <b>0.0024</b>  | 0.010      | 0.000    |
| S8    | Ka.C.5 | 0.000       | 0.000    | 1.443    | <b>-0.0002</b> | -0.010     | 0.000    |
| S9    | Ka.C.3 | 0.000       | 0.000    | 2.800    | <b>0.0074</b>  | 0.000      | 0.000    |
| S10   | Ka.C.5 | -0.010      | 0.000    | 0.500    | <b>0.0000</b>  | -0.010     | 0.000    |
| -     | -      | <b>m</b>    | <b>m</b> | <b>m</b> | <b>m</b>       | <b>m</b>   | <b>m</b> |

## AFB. STAALCONTOLE



### SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staaf/staven |
|-----------------|--------------|
| C1              | S1           |
| C2              | S2           |
| C3              | S3           |
| C4              | S4           |
| C5              | S5           |
| C6              | S6           |
| C7              | S7           |
| C8              | S8           |
| C9              | S9           |
| C10             | S10          |

### KNIKLENGTEGEVEENS

| Staaf                  | Profiel | Lokale Y-as |             |        | Lokale Z-as |              |            |
|------------------------|---------|-------------|-------------|--------|-------------|--------------|------------|
|                        |         | Lsys        | methode     | Lbuc   | Lbuc/Lsys   | methode      | Lbuc Lbuc/ |
| C1 - V1 (0.000-2.500)  | P3      | 2.500       | Ongeschoord | 8.377  | 3.35        | Cons. gesch. | 2.500 1.00 |
| C2 - V1 (0.000-2.400)  | P4      | 2.400       | Ongeschoord | 3.701  | 1.54        | Cons. gesch. | 2.400 1.00 |
| C3 - V1 (0.000-2.500)  | P3      | 2.500       | Ongeschoord | 5.684  | 2.27        | Cons. gesch. | 2.500 1.00 |
| C4 - V1 (0.000-2.400)  | P4      | 2.400       | Ongeschoord | 3.501  | 1.46        | Cons. gesch. | 2.400 1.00 |
| C5 - V1 (0.000-5.600)  | P1      | 5.600       | Ongeschoord | 8.636  | 1.54        | Cons. gesch. | 5.600 1.00 |
| C6 - V1 (0.000-5.600)  | P2      | 5.600       | Ongeschoord | 8.169  | 1.46        | Cons. gesch. | 5.600 1.00 |
| C7 - V1 (0.000-2.500)  | P3      | 2.500       | Ongeschoord | 12.625 | 5.05        | Cons. gesch. | 2.500 1.00 |
| C8 - V1 (0.000-2.500)  | P3      | 2.500       | Ongeschoord | 5.684  | 2.27        | Cons. gesch. | 2.500 1.00 |
| C9 - V1 (0.000-5.600)  | P1      | 5.600       | Ongeschoord | 12.731 | 2.27        | Cons. gesch. | 5.600 1.00 |
| C10 - V1 (0.000-1.000) | P5      | 1.000       | Ongeschoord | 5.050  | 5.05        | Cons. gesch. | 1.000 1.00 |
| -                      | -       | m           | -           | m      | -           | -            | m -        |

### KIPSTEUNENGEVEENS

| Staaf                 | Profiel | Begin:   | Eind:    | Kipsteunen boven | Kipsteunen onder |
|-----------------------|---------|----------|----------|------------------|------------------|
| C1 - V1 (0.000-2.500) | P3      | Gesteund | Gesteund |                  | Centrum          |



| Staaft<br>Aangrijphoogte | Profiel | Begin:   | Eind:    | Kipsteunen boven | Kipsteunen onder |
|--------------------------|---------|----------|----------|------------------|------------------|
| C2 - V1 (0.000-2.400)    | P4      | Gesteund | Gesteund |                  | Centrum          |
| C3 - V1 (0.000-2.500)    | P3      | Gesteund | Gesteund |                  | Centrum          |
| C4 - V1 (0.000-2.400)    | P4      | Gesteund | Gesteund |                  | Centrum          |
| C5 - V1 (0.000-5.600)    | P1      | Gesteund | Gesteund |                  | Centrum          |
| C6 - V1 (0.000-5.600)    | P2      | Gesteund | Gesteund |                  | Centrum          |
| C7 - V1 (0.000-2.500)    | P3      | Gesteund | Gesteund |                  | Centrum          |
| C8 - V1 (0.000-2.500)    | P3      | Gesteund | Gesteund |                  | Centrum          |
| C9 - V1 (0.000-5.600)    | P1      | Gesteund | Gesteund |                  | Centrum          |
| C10 - V1 (0.000-1.000)   | P5      | Gesteund | Gesteund |                  | Centrum          |
| -                        | -       | -        | -        | m                | m                |

## DOORBUIGINGGEGEVENS

| Staaft<br>w;2+w;3                 | Constructietype | Toetsing                               | Zeeg Y' | Zeeg Z' | Zeegvorm    | w;max |
|-----------------------------------|-----------------|--|---------|---------|-------------|-------|
| C1 - V1 (0.000-2.500)<br>Htot/500 | Kolom           | Verdiepingsgebou                       |         |         | 3-punt      | H/300 |
| C2 - V1 (0.000-2.400)<br>Htot/500 | Kolom           | w: elke verdieping<br>Verdiepingsgebou |         |         | 3-punt      | H/300 |
| C3 - V1 (0.000-2.500)<br>Htot/500 | Kolom           | w: elke verdieping<br>Verdiepingsgebou |         |         | 3-punt      | H/300 |
| C4 - V1 (0.000-2.400)<br>Htot/500 | Kolom           | w: elke verdieping<br>Verdiepingsgebou |         |         | 3-punt      | H/300 |
| C5 - V1 (0.000-5.600)<br>L/333    | Vloer           | w: elke verdieping<br>Algemeen         | 0       | 0       | 3-punt      | L/250 |
| C6 - V1 (0.000-5.600)<br>L/250    | Dak             | Algemeen                               | 0       | 0       | 3-punt      | L/250 |
| C7 - V1 (0.000-2.500)<br>Htot/500 | Kolom           | Verdiepingsgebou                       |         |         | 3-punt      | H/300 |
| C8 - V1 (0.000-2.500)<br>Htot/500 | Kolom           | w: elke verdieping<br>Verdiepingsgebou |         |         | 3-punt      | H/300 |
| C9 - V1 (0.000-5.600)<br>L/333    | Vloer           | w: elke verdieping<br>Algemeen         | 0       | 0       | 3-punt      | L/250 |
| C10 - V1 (0.000-1.000)<br>L/250   | Dak             | Algemeen                               | 0       | 0       | Parabolisch | L/250 |
| -                                 | -               | -                                      | mm      | mm      | -           | -     |

## STAALTOETS RESULTATEN MET PROFIELGEGEVENS NEN-EN1993-1-1:2016/NB:2016

### Uitgangspunten berekening voor staalcontrole

5.1.2.e; cr = 19.02 > 10;

#### Profielgegevens staaf C1-V1 (0.000-2.500)

|                          |                               |                                   |  |
|--------------------------|-------------------------------|-----------------------------------|--|
| HE140B                   | Analyse                       | Staal S235                        | fyd(toegepast) = 235 N/mm <sup>2</sup> |
| h = 140.0 mm             | A = 4.30e-03 m <sup>2</sup>   | Wy;el = 215.6e-06 m <sup>3</sup>  | Wy;pl =                                |
| 245.4e-06 m <sup>3</sup> | Iy = 150.9e-07 m <sup>4</sup> | Wz;el = 785.2e-07 m <sup>3</sup>  | Wz;pl =                                |
| b = 140.0 mm             | Iz = 549.7e-08 m <sup>4</sup> | Aw;y;el = 3.48e-03 m <sup>2</sup> | Aw;y;pl =                              |
| 119.8e-06 m <sup>3</sup> | Massa/m = 33.7 kg/m           | Aw;z;el = 1.31e-03 m <sup>2</sup> | Aw;z;pl =                              |
| tf = 12.0 mm             |                               | It = 200.6e-09 m <sup>4</sup>     | Iwa = 224.8e-10                        |
| 3.48e-03 m <sup>2</sup>  |                               |                                   |  |
| tw = 7.0 mm              |                               |                                   |  |
| 1.31e-03 m <sup>2</sup>  |                               |                                   |  |
| r = 12.0 mm              |                               |                                   |  |
| m6                       |                               |                                   |  |

#### Doorsnedetoetsing C1-V1 (0.000-2.500)

|   |                   |
|---|-------------------|
| Maatgevende combinatie: Fu.C.4 op 2.500 m | Profielklasse = 1 |
| N;Ed = -51.1 kN                           | My;Ed = -25.6 kNm |
| Vy;Ed = 0.0 kN                            |                   |

$N;Rd = 1,009.5 \text{ kN}$   
 $Vz;Ed = -10.2 \text{ kN}$   
 $Vy;Rd = 472.6 \text{ kN}$   
 $Vz;Rd = 177.4 \text{ kN}$   
 $Mz;Ed = 0.0 \text{ kNm}$   
 $MyRd = 57.7 \text{ kNm}$   
 $MzRd = 28.1 \text{ kNm}$

NEN-EN1993-1-1(6.12): UC = 0.44 < 1

### Kiptoetsing C1-V1 (0.000-2.500)

Equi. profiel: HE140B

Maatgevende combinatie: Fu.C.5

Aangrijphoogte van de last: 0.000 m vanaf hart profiel

Kipsteun bovenflens: N.v.t.

Kipsteun onderflens: N.v.t.

Inklem. begin: Gesteund  
 0.000

Beperk. eind: Gesteund

Instab. curve Kip:a

b-eff(Begin) = 0.000

b-eff(Eind) =

Tabel gebruikt NB.NB.1 (1)

M = -11.5kN/m

MBeta = 0.0

Onderflens maatgevend  
 Lsys = 2.500 m

Xb;lst = 0.000 m  
 Lg = 2.500 m

Xe;lst = 2.500 m  
 S = 0.540 m

lst = 2.500 m  
 Iwa = 2.2479e-08

m6

C1 = 1.75

C2 = 0.00 (tabel)

C2(toegepast) = 0.00

C = 6.64

Mcr = 363.4 kNm

kred = 1.0

Lam-rel = 0.40

Profielklasse 1

Chi;LT(Fu.C.5) = 0.95

M;Ed = 11.5 kNm

UC(y) = 0.00

Chi;LT,Z = 1.00

lkip = 2.500 m

UC(z) = 0.00

My;begin = 0.0 kNm

My;eind = -11.5 kNm

NEN-EN1993-1-1(6.54): UC = 0.00 < 1 Kip N/B, ivm Lambda;LT <= 0.4 NEN-EN 1993-1-1 #6.3.2.2(4)

### Stabiliteitstoetsing C1-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.4

N;Ed = -52.1 kN

Nb;Rd;y = 343.7 kN

Nb;Rd;z = 703.8 kN

Methode Y = Ongeschoord

Ca(y) = 5.000

Cb(y) = 1.198

Lknik Y = 8.377

m

Methode Z = Cons. gesch.

Ca(z) = N/B

Cb(z) = N/B

Lbuc Z = 2.500 m

Xy = 0.34

Knikcurve: B

Xz = 0.70

Knikcurve: C

NEN-EN1993-1-1(6.46): UC = 0.15 < 1

### Buiging & Druk C1-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.4

N;Ed = -52.1 kN

Kipgevoelig Ja

Profielklasse = 1

My;Ed = 11.5 kNm

Mz;Ed = 0.0 kNm

Delta;My;Ed = 0.0 kNm

Delta;Mz;Ed = 0.0 kNm

My = -25.6 kNm

My;Psi = 0.0 kNm

My;s = -12.8 kNm

Mz = 0.0 kNm

Mz;Psi = 0.0 kNm

Mz;s = 0.0 kNm

Cmy = 0.60

Cmz = 0.90

CmLT = 0.90

Kyy = 0.673

Kyz = 0.576

Kzy = 0.992

Kzz = 0.959

Ksi;y = 0.34

Ksi;z = 0.70

Ksi;LT = 0.95

NEN-EN1993-1-1(6.61&6.62): UC = 0.54 < 1

### Doorbuigingstoetsing X C1-V1 (0.000-2.500)

Constructietype : Kolom

u;i;3 = 9.9 mm (Ka.C.4 )

Limiet u;i;max = H/300 = 8.3 mm

UC(u;i;max) = 1.19

NEN-EN|NEN-EN1990/NB A1.4.2: UC = 1.33 > 1

Toets type: Verdiepingsgebouw: elke verdieping

u;3 = 13.0 mm (Ka.C.4 )

Limiet u;max = Htot/500 = 9.8 mm

UC(u;max) = 1.33

### Profielgegevens staaf C2-V1 (0.000-2.400)

HE140B

Analyse

Staal S235 fyd(toegepast) = 235 N/mm2

h = 140.0 mm

A = 4.30e-03 m2

Wy;el = 215.6e-06 m3

Wy;pl =

245.4e-06 m3

b = 140.0 mm

Iy = 150.9e-07 m4

Wz;el = 785.2e-07 m3

Wz;pl =

119.8e-06 m3  
 $t_f = 12.0$  mm  
 $3.48e-03$  m2  
 $tw = 7.0$  mm  
 $1.31e-03$  m2  
 $r = 12.0$  mm  
 m6

$I_z = 549.7e-08$  m4  
 Massa/m = 33.7 kg/m

$Aw; y; el = 3.48e-03$  m2  
 $Aw; z; el = 1.31e-03$  m2  
 $I_t = 200.6e-09$  m4

$Aw; y; pl =$   
 $Aw; z; pl =$   
 $I_{wa} = 224.8e-10$

### Doorsnedetoetsing C2-V1 (0.000-2.400)

Maatgevende combinatie: Fu.C.2 op 0.000 m  
 N;Ed = -7.9 kN  
 N;Rd = 1,009.5 kN  
 NEN-EN1993-1-1(6.12): UC = 0.40 < 1

$V_y; Ed = 0.0$  kN  
 $V_z; Ed = -12.9$  kN  
 $V_y; Rd = 472.6$  kN  
 $V_z; Rd = 177.4$  kN

Profielklasse = 1  
 $M_y; Ed = 23.0$  kNm  
 $M_z; Ed = 0.0$  kNm  
 $M_y; Rd = 57.7$  kNm  
 $M_z; Rd = 28.1$  kNm

### Kiptoetsing C2-V1 (0.000-2.400)

Equi. profiel: HE140B  
 Maatgevende combinatie: Fu.C.5  
 Aangrijphoogte van de last: 0.000 m vanaf hart profiel

Instab. curve Kip:a

Kipsteun bovenflens: N.v.t.  
 Kipsteun onderflens: N.v.t.  
 Inklem. begin: Gesteund  
 0.000  
 Tabel gebruikt NB.NB.1 (1)  
 Bovenflens maatgevend  
 $L_{sys} = 2.400$  m  
 m6

Beperk. eind: Gesteund  
 $M = 15.5$  kN/m  
 $X_b; l_{st} = 0.000$  m  
 $L_g = 2.400$  m

$b_{-eff}(Begin) = 0.000$   
 $MBeta = -7.4$   
 $X_e; l_{st} = 2.400$  m  
 $S = 0.540$  m  
 $b_{-eff}(Eind) =$

$C_1 = 2.30$   
 $M_{cr} = 504.1$  kNm  
 $Chi; LT(Fu.C.5) = 0.97$   
 $Chi; LT, Z = 1.00$   
 $M_y; begin = 15.5$  kNm  
 NEN-EN1993-1-1(6.54): UC = 0.00 < 1 Kip N/B, ivm Lambda; LT <= 0.4 NEN-EN 1993-1-1 #6.3.2.2(4)

$C_2 = 0.00$  (tabel)  
 $k_{red} = 1.0$   
 $M; Ed = 15.5$  kNm  
 $l_{kip} = 2.400$  m  
 $M_y; eind = -7.4$  kNm

$C_2(\text{toegepast}) = 0.00$   
 $Lam_{-rel} = 0.34$   
 $C = 8.85$   
 Profielklasse 1  
 $UC(y) = 0.00$   
 $UC(z) = 0.00$

### Stabiliteitstoetsing C2-V1 (0.000-2.400)

Maatgevende combinatie: Fu.C.2  
 N;Ed = -7.9 kN  
 Methode Y = Ongeschoord  
 m  
 Methode Z = Cons. gesch.  
 $X_y = 0.80$   
 $X_z = 0.72$   
 NEN-EN1993-1-1(6.46): UC = 0.01 < 1

$N_b; Rd; y = 810.8$  kN  
 $Ca(y) = 0.360$

$N_b; Rd; z = 722.5$  kN  
 $Cb(y) = 0.250$   
 $L_{knik} Y = 3.701$

$Ca(z) = N/B$   
 $Cb(z) = N/B$   
 Knikcurve: B  
 Knikcurve: C  
 $L_{buc} Z = 2.400$  m

### Buiging & Druk C2-V1 (0.000-2.400)

Maatgevende combinatie: Fu.C.2  
 N;Ed = -7.9 kN  
 $M_y = 23.0$  kNm  
 $M_z = 0.0$  kNm  
 $C_{my} = 0.46$   
 $K_{yy} = 0.462$   
 $K_{si; y} = 0.80$   
 NEN-EN1993-1-1(6.61&6.62): UC = 0.42 < 1

Klipgevoelig Ja  
 $M_y; Ed = 15.5$  kNm  
 $\Delta; M_y; Ed = 0.0$  kNm  
 $M_y; Psi = -8.1$  kNm  
 $M_z; Psi = 0.0$  kNm  
 $C_{mz} = 0.90$   
 $K_{yz} = 0.545$   
 $K_{si; z} = 0.72$

Profielklasse = 1  
 $M_z; Ed = 0.0$  kNm  
 $\Delta; M_z; Ed = 0.0$  kNm  
 $M_y; s = 7.5$  kNm  
 $M_z; s = 0.0$  kNm  
 $C_{mLT} = 0.90$   
 $K_{zy} = 0.999$   
 $K_{si; LT} = 0.97$   
 $K_{zz} = 0.908$

### Doorbuigingstoetsing X C2-V1 (0.000-2.400)

Constructietype : Kolom  
 $u;3 = 3.1 \text{ mm (Ka.C.4)}$   
 Limiet  $u;3 \text{max} = H/300 = 8.0 \text{ mm}$   
 $UC(u;3 \text{max}) = 0.39$

Toets type: Verdiepingsgebouw: elke verdieping  
 $u;3 = 13.0 \text{ mm (Ka.C.4)}$   
 Limiet  $u;3 \text{max} = H_{tot}/500 = 9.8 \text{ mm}$   
 $UC(u;3 \text{max}) = 1.33$

**NEN-EN|NEN-EN1990/NB A1.4.2: UC = 1.33 > 1**

### Profielgegevens staaf C3-V1 (0.000-2.500)

HE140B Analyse  
 $h = 140.0 \text{ mm}$   
 $245.4e-06 \text{ m}^3$   
 $b = 140.0 \text{ mm}$   
 $119.8e-06 \text{ m}^3$   
 $t_f = 12.0 \text{ mm}$   
 $3.48e-03 \text{ m}^2$   
 $t_w = 7.0 \text{ mm}$   
 $1.31e-03 \text{ m}^2$   
 $r = 12.0 \text{ mm}$   
 $m^6$

$A = 4.30e-03 \text{ m}^2$   
 $I_y = 150.9e-07 \text{ m}^4$   
 $I_z = 549.7e-08 \text{ m}^4$   
 Massa/m = 33.7 kg/m

Staal S235  $f_{yd}(\text{toegepast}) = 235 \text{ N/mm}^2$   
 $W_y;el = 215.6e-06 \text{ m}^3$   $W_y;pl =$   
 $W_z;el = 785.2e-07 \text{ m}^3$   $W_z;pl =$   
 $A_w;y;el = 3.48e-03 \text{ m}^2$   $A_w;y;pl =$   
 $A_w;z;el = 1.31e-03 \text{ m}^2$   $A_w;z;pl =$   
 $I_t = 200.6e-09 \text{ m}^4$   $I_{wa} = 224.8e-10$

### Doorsnedetoetsing C3-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.3 op 2.500 m  
 $N;Ed = -51.5 \text{ kN}$   $V_y;Ed = 0.0 \text{ kN}$   
 $V_z;Ed = 10.2 \text{ kN}$   
 $N;Rd = 1,009.5 \text{ kN}$   $V_y;Rd = 472.6 \text{ kN}$   
 $V_z;Rd = 177.4 \text{ kN}$

Profielklasse = 1  
 $M_y;Ed = 25.6 \text{ kNm}$   
 $M_z;Ed = 0.0 \text{ kNm}$   
 $M_y;Rd = 57.7 \text{ kNm}$   
 $M_z;Rd = 28.1 \text{ kNm}$

NEN-EN1993-1-1(6.12):  $UC = 0.44 < 1$

### Kiptoetsing C3-V1 (0.000-2.500)

Equi. profiel: HE140B  
 Maatgevende combinatie: Fu.C.5  
 Aangrijphoogte van de last: 0.000 m vanaf hart profiel  
 Kipsteun bovenflens: N.v.t.  
 Kipsteun onderflens: N.v.t.  
 Inklem. begin: Gesteund Beperk. eind: Gesteund  
 $0.003$   
 Tabel gebruikt NB.NB.1 (1)  $M = 11.5 \text{ kN/m}$   
 Bovenflens maatgevend  $X_b;lst = 0.000 \text{ m}$   
 $L_{sys} = 2.500 \text{ m}$   $L_g = 2.500 \text{ m}$

Instab. curve Kip:a

$b\text{-eff}(\text{Begin}) = 0.003$   $b\text{-eff}(\text{Eind}) =$   
 $MBeta = 0.0$   
 $X_e;lst = 2.500 \text{ m}$   $lst = 2.500 \text{ m}$   
 $S = 0.540 \text{ m}$   $I_{wa} = 2.2479e-08$

$C1 = 1.75$   $C2 = 0.00$  (tabel)  $C2(\text{toegepast}) = 0.00$   $C = 6.64$   
 $M_{cr} = 363.4 \text{ kNm}$   $k_{red} = 1.0$   $Lam\text{-rel} = 0.40$   $Profielklasse 1$   
 $\chi_{i;LT}(Fu.C.5) = 0.95$   $M;Ed = 11.5 \text{ kNm}$   $UC(y) = 0.00$   
 $\chi_{i;LT,Z} = 1.00$   $l_{kip} = 2.500 \text{ m}$   $UC(z) = 0.00$   
 $M_y;begin = 0.0 \text{ kNm}$   $M_y;eind = 11.5 \text{ kNm}$

NEN-EN1993-1-1(6.54):  $UC = 0.00 < 1$  Kip N/B, ivm  $\Lambda;LT \leq 0.4$  NEN-EN 1993-1-1 #6.3.2.2(4)

### Stabiliteitstoetsing C3-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.3  
 $N;Ed = -52.5 \text{ kN}$   $N_b;Rd;y = 589.3 \text{ kN}$   
 Methode Y = Ongeschoord  $Ca(y) = 5.000$   
 Methode Z = Cons. gesch.  $Ca(z) = N/B$   
 $X_y = 0.58$   
 $X_z = 0.70$   
 NEN-EN1993-1-1(6.46):  $UC = 0.09 < 1$

$N_b;Rd;z = 703.8 \text{ kN}$   
 $Cb(y) = 0.250$   $L_{knik Y} = 5.684$   
 $Cb(z) = N/B$   $L_{buc Z} = 2.500 \text{ m}$   
 Knikcurve: B  
 Knikcurve: C

### Buiging & Druk C3-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.3 Kipgevoelig Ja

Profielklasse = 1

|  |                       |                       |             |
|--|-----------------------|-----------------------|-------------|
| N;Ed = -52.5 kN                          | My;Ed = 11.5 kNm      | Mz;Ed = 0.0 kNm       |             |
|  | Delta;My;Ed = 0.0 kNm | Delta;Mz;Ed = 0.0 kNm |             |
| My = 25.6 kNm                            | My;Psi = 0.0 kNm      | My;s = 12.8 kNm       |             |
| Mz = 0.0 kNm                             | Mz;Psi = 0.0 kNm      | Mz;s = 0.0 kNm        |             |
| Cmy = 0.60                               | Cmz = 0.90            | CmLT = 0.90           |             |
| Kyy = 0.643                              | Kyz = 0.576           | Kzy = 0.991           | Kzz = 0.960 |
| Ksi;y = 0.58                             | Ksi;z = 0.70          | Ksi;LT = 0.95         |             |
| NEN-EN1993-1-1(6.61&6.62): UC = 0.54 < 1 |                       |                       |             |

### Doorbuigingstoetsing X C3-V1 (0.000-2.500)

Constructietype : Kolom

u;i;3 = 9.9 mm (Ka.C.4 )

Limiet u;i;max = H/300 = 8.3 mm

UC(u;i;max) = 1.19

**NEN-EN|NEN-EN1990/NB A1.4.2: UC = 1.33 > 1**

Toets type: Verdiepingsgebouw: elke verdieping

u;3 = 13.0 mm (Ka.C.4 )

Limiet u;max = Htot/500 = 9.8 mm

UC(u;max) = 1.33

### Profielgegevens staaf C4-V1 (0.000-2.400)

HE140B

Analyse

Staal S235 fyd(toegepast) = 235 N/mm<sup>2</sup>

h = 140.0 mm

A = 4.30e-03 m<sup>2</sup>

Wy;el = 215.6e-06 m<sup>3</sup>

Wy;pl =

245.4e-06 m<sup>3</sup>

b = 140.0 mm

Iy = 150.9e-07 m<sup>4</sup>

Wz;el = 785.2e-07 m<sup>3</sup>

Wz;pl =

119.8e-06 m<sup>3</sup>

tf = 12.0 mm

Iz = 549.7e-08 m<sup>4</sup>

Aw;y;el = 3.48e-03 m<sup>2</sup>

Aw;y;pl =

3.48e-03 m<sup>2</sup>

tw = 7.0 mm

Massa/m = 33.7 kg/m

Aw;z;el = 1.31e-03 m<sup>2</sup>

Aw;z;pl =

1.31e-03 m<sup>2</sup>

r = 12.0 mm

It = 200.6e-09 m<sup>4</sup>

Iwa = 224.8e-10

m<sup>6</sup>

### Doorsnedetoetsing C4-V1 (0.000-2.400)

Maatgevende combinatie: Fu.C.2 op 0.000 m

Profielklasse = 1

N;Ed = -7.9 kN

Vy;Ed = 0.0 kN

My;Ed = -23.0 kNm

Vz;Ed = 12.9 kN

Mz;Ed = 0.0 kNm

N;Rd = 1,009.5 kN

Vy;Rd = 472.6 kN

MyRd = 57.7 kNm

Vz;Rd = 177.4 kN

MzRd = 28.1 kNm

NEN-EN1993-1-1(6.12): UC = 0.40 < 1

### Kiptoetsing C4-V1 (0.000-2.400)

Equi. profiel: HE140B

Instab. curve Kip:a

Maatgevende combinatie: Fu.C.5

Aangrijphoogte van de last: 0.000 m vanaf hart profiel

Kipsteun bovenflens: N.v.t.

Kipsteun onderflens: N.v.t.

Inklem. begin: Gesteund  
0.000

Beperk. eind: Gesteund

b-eff(Begin) = 0.000

b-eff(Eind) =

Tabel gebruikt NB.NB.1 (1)

M = -15.5kN/m

MBeta = 7.4

Bovenflens maatgevend

Xb;lst = 0.000 m

Xe;lst = 2.400 m

lst = 2.400 m

Lsys = 2.400 m

Lg = 2.400 m

S = 0.540 m

Iwa = 2.2479e-08

m<sup>6</sup>

C1 = 2.30

C2 = 0.00 (tabel)

C2(toegepast) = 0.00

C = 8.85

Mcr = 504.1 kNm

kred = 1.0

Lam-rel = 0.34

Profielklasse 1

Chi;LT(Fu.C.5) = 0.97

M;Ed = 7.4 kNm

UC(y) = 0.00

Chi;LT,Z = 1.00

lkip = 2.400 m

UC(z) = 0.00

My;begin = -15.5 kNm

My;eind = 7.4 kNm

NEN-EN1993-1-1(6.54): UC = 0.00 < 1 Kip N/B, ivm Lambda;LT <= 0.4 NEN-EN 1993-1-1 #6.3.2.2(4)

### Stabiliteitstoetsing C4-V1 (0.000-2.400)

Maatgevende combinatie: Fu.C.2

N;Ed = -7.9 kN Nb;Rd;y = 830.1 kN Nb;Rd;z = 722.5 kN  
 Methode Y = Ongeschoord Ca(y) = 0.250 Cb(y) = 0.250 Lknik Y = 3.501  
 m  
 Methode Z = Cons. gesch. Ca(z) = N/B Cb(z) = N/B Lbuc Z = 2.400 m  
 Xy = 0.82 Knikcurve: B  
 Xz = 0.72 Knikcurve: C  
 NEN-EN1993-1-1(6.46): UC = 0.01 < 1

### Buiging & Druk C4-V1 (0.000-2.400)

Maatgevende combinatie: Fu.C.2

N;Ed = -7.9 kN Kipgevoelig Ja Profielklasse = 1  
 My;Ed = 7.4 kNm Mz;Ed = 0.0 kNm Delta;Mz;Ed = 0.0 kNm  
 Delta;My;Ed = 0.0 kNm  
 My = -23.0 kNm My;Psi = 8.1 kNm My;s = -7.5 kNm  
 Mz = 0.0 kNm Mz;Psi = 0.0 kNm Mz;s = 0.0 kNm  
 CmY = 0.46 Cmz = 0.90 CmLT = 0.90  
 Kyy = 0.462 Kyz = 0.545 Kzy = 0.999 Kzz = 0.908  
 Ksi;y = 0.82 Ksi;z = 0.72 Ksi;LT = 0.97  
 NEN-EN1993-1-1(6.61&6.62): UC = 0.42 < 1

### Doorbuigingstoetsing X C4-V1 (0.000-2.400)

Constructietype : Kolom

u;3 = -3.1 mm (Ka.C.5 )

Limiet u;max = H/300 = 8.0 mm

UC(u;max) = 0.39

NEN-EN|NEN-EN1990/NB A1.4.2: UC = 1.33 > 1

Toets type: Verdiepingsgebouw: elke verdieping

u;3 = 13.0 mm (Ka.C.4 )

Limiet u;max = Htot/500 = 9.8 mm

UC(u;max) = 1.33

### Profielgegevens staaf C5-V1 (0.000-5.600)

HE200A Analyse Staal S235 fyd(toegepast) = 235 N/mm2  
 h = 190.0 mm A = 5.38e-03 m2 Wy;el = 388.6e-06 m3 Wy;pl =  
 429.5e-06 m3  
 b = 200.0 mm Iy = 369.2e-07 m4 Wz;el = 133.6e-06 m3 Wz;pl =  
 203.8e-06 m3 Iz = 133.6e-07 m4 Aw;y;el = 4.28e-03 m2 Aw;y;pl =  
 tf = 10.0 mm Massa/m = 42.3 kg/m Aw;z;el = 1.81e-03 m2 Aw;z;pl =  
 4.28e-03 m2 tw = 6.5 mm It = 209.8e-09 m4 Iwa = 108.0e-09  
 1.81e-03 m2 r = 18.0 mm  
 m6

### Doorsnedetoetsing C5-V1 (0.000-5.600)

Maatgevende combinatie: Fu.C.3 op 5.600 m

N;Ed = -4.6 kN Vy;Ed = 0.0 kN My;Ed = -42.1 kNm  
 Vz;Ed = -41.4 kN Mz;Ed = 0.0 kNm  
 N;Rd = 1,265.0 kN Vy;Rd = 580.4 kN MyRd = 100.9 kNm  
 Vz;Rd = 245.3 kN MzRd = 47.9 kNm

NEN-EN1993-1-1(6.12): UC = 0.42 < 1

### Kiptoetsing C5-V1 (0.000-5.600)

Equi. profiel: HE200A

Maatgevende combinatie: Fu.C.2

Aangrijphoogte van de last: 0.000 m vanaf hart profiel

Kipsteun bovenflens: N.v.t.

Kipsteun onderflens: N.v.t.

Inklem. begin: Gesteund Beperk. eind: Gesteund b-eff(Begin) = 0.000 b-eff(Eind) = 0.046

Instab. curve Kip:a



Tabel gebruikt NB.NB.4  
 Onderflens maatgevend  
 Lsys = 5.600 m  
 m6  
 C1 = 1.28  
 Mcr = 186.8 kNm  
 Chi;LT(Fu.C.2) = 0.83  
 Chi;LT,Z = 1.00  
 My;begin = -41.3 kNm  
 NEN-EN1993-1-1(6.54): UC = 0.49 < 1

M = -41.3kN/m  
 Xb;lst = 0.000 m  
 Lg = 5.600 m  
 C2 = 1.02 (tabel)  
 kred = 1.0  
 M;Ed = 41.3 kNm  
 lkip = 5.600 m  
 My;eind = -41.3 kNm

MBeta = -41.3  
 Xe;lst = 5.600 m  
 S = 1.157 m  
 C2(toegepast) = 0.00  
 Lam-rel = 0.74

q = 20.9  
 lst = 5.600 m  
 Iwa = 1.0800e-07  
 C = 4.80  
 Profielklasse 1  
 UC(y) = 0.49  
 UC(z) = 0.00

### Stabiliteitstoetsing C5-V1 (0.000-5.600)

Maatgevende combinatie: Fu.C.3

N;Ed = -4.6 kN  
 Methode Y = Ongeschoord  
 m  
 Methode Z = Cons. gesch.  
 Xy = 0.53  
 Xz = 0.44  
 NEN-EN1993-1-1(6.46): UC = 0.01 < 1

Nb;Rd;y = 669.2 kN  
 Ca(y) = 0.361  
 Ca(z) = N/B

Nb;Rd;z = 550.4 kN  
 Cb(y) = 0.250  
 Cb(z) = N/B

Lknik Y = 8.636  
 Lbuc Z = 5.600 m  
 Knikcurve: B  
 Knikcurve: C

### Buiging & Druk C5-V1 (0.000-5.600)

Maatgevende combinatie: Fu.C.3

N;Ed = -4.6 kN  
 My = -42.1 kNm  
 Mz = 0.0 kNm  
 CmY = 0.56  
 Kyy = 0.565  
 Ksi;y = 0.53  
 NEN-EN1993-1-1(6.61&6.62): UC = 0.48 < 1

Kipgevoelig Ja  
 Mz;Ed = 41.3 kNm  
 Delta;My;Ed = 0.0 kNm  
 My;Psi = -8.3 kNm  
 Mz;Psi = 0.0 kNm  
 Cmz = 0.90  
 Kyz = 0.546  
 Ksi;z = 0.44

Profielklasse = 1  
 Mz;Ed = 0.0 kNm  
 Delta;Mz;Ed = 0.0 kNm  
 My;s = 24.3 kNm  
 Mz;s = 0.0 kNm  
 CmLT = 0.90  
 Kzy = 0.999  
 Ksi;LT = 0.89

Kzz = 0.910

### Doorbuigingstoetsing Z' C5-V1 (0.000-5.600)

Constructietype : Vloer

w;c = 0.0 mm  
 w;1 = 3.7 mm (x = 2.800 mm; Fr.C.(w1) )  
 w;3 = 1.8 mm (x = 2.800 mm; Qu.C.1 )  
 w;tot; = 5.5 mm  
 w;max = 5.5 mm  
 Limiet w;max = L/250 = 22.4 mm  
 UC(w;max) = 0.25  
 NEN-EN1990/NB A1.4.2: UC = 0.25 < 1

Toets type: Algemeen  
 Zeegvorm 3-punt  
 w;2 = 0.0 mm  
 w;3 = 3.1 mm (x = 2.839 mm; Fr.C.2 )  
 (w;2+w;3) = 3.1 mm  
 Limiet (w;2+w;3) = L/333 = 16.8 mm  
 UC(w;2+w;3) = 0.18

### Doorbuigingstoetsing Z" C5-V1 (0.000-5.600)

Constructietype : Vloer

w;c = 0.0 mm  
 w;1 = 3.7 mm (x = 2.800 mm; Fr.C.(w1) )  
 w;3 = 1.8 mm (x = 2.800 mm; Qu.C.1 )  
 w;tot; = 5.5 mm  
 w;max = 5.5 mm  
 Limiet w;max = L/250 = 22.4 mm  
 UC(w;max) = 0.25  
 NEN-EN1990/NB A1.4.2: UC = 0.25 < 1

Toets type: Algemeen  
 Zeegvorm 3-punt  
 w;2 = 0.0 mm  
 w;3 = 3.1 mm (x = 2.800 mm; Fr.C.2 )  
 (w;2+w;3) = 3.1 mm  
 Limiet (w;2+w;3) = L/333 = 16.8 mm  
 UC(w;2+w;3) = 0.18

### Profielgegevens staaf C6-V1 (0.000-5.600)

HE180A  
 h = 171.0 mm

Analyse  
 A = 4.53e-03 m2

Staal S235 fyd(toegepast) = 235 N/mm2  
 Wy;el = 293.6e-06 m3  
 Wy;pl =

324.9e-06 m3  
 b = 180.0 mm  
 156.5e-06 m3  
 tf = 9.5 mm  
 3.61e-03 m2  
 tw = 6.0 mm  
 1.45e-03 m2  
 r = 15.0 mm  
 m6

Iy = 251.0e-07 m4  
 Iz = 924.6e-08 m4  
 Massa/m = 35.5 kg/m

Wz;el = 102.7e-06 m3  
 Aw;y;el = 3.61e-03 m2  
 Aw;z;el = 1.45e-03 m2  
 It = 148.0e-09 m4

Wz;pl =  
 Aw;y;pl =  
 Aw;z;pl =  
 Iwa = 602.1e-10

### Doorsnedetoetsing C6-V1 (0.000-5.600)

Maatgevende combinatie: Fu.C.1 op 0.000 m  
 N;Ed = -13.1 kN  
 N;Rd = 1,063.4 kN  
 Vy;Ed = 0.0 kN  
 Vz;Ed = 18.7 kN  
 Vy;Rd = 490.2 kN  
 Vz;Rd = 196.3 kN  
 NEN-EN1993-1-1(6.12): UC = 0.19 < 1

Profielklasse = 1  
 My;Ed = -14.5 kNm  
 Mz;Ed = 0.0 kNm  
 MyRd = 76.3 kNm  
 MzRd = 36.8 kNm

### Kiptoetsing C6-V1 (0.000-5.600)

Equi. profiel: HE180A  
 Maatgevende combinatie: Fu.C.1  
 Aangrijphoogte van de last: 0.000 m vanaf hart profiel  
 Kipsteun bovenflens: N.v.t.  
 Kipsteun onderflens: N.v.t.  
 Inkleem. begin: Gesteund  
 Beperk. eind: Gesteund  
 0.000  
 Tabel gebruikt NB.NB.4  
 Onderflens maatgevend  
 Lsys = 5.600 m  
 m6  
 C1 = 1.57  
 Mcr = 155.1 kNm  
 Chi;LT(Fu.C.1) = 0.85  
 Chi;LT,Z = 1.00  
 My;begin = -14.5 kNm  
 NEN-EN1993-1-1(6.54): UC = 0.22 < 1

Instab. curve Kip:a  
 b-eff(Begin) = 0.000  
 b-eff(Eind) =  
 MBeta = -14.5  
 Xe;lst = 5.600 m  
 S = 1.029 m  
 C2(toegepast) = 0.00  
 Lam-rel = 0.70  
 C = 5.70  
 Profielklasse 1  
 UC(y) = 0.22  
 UC(z) = 0.00

q = 6.7  
 lst = 5.600 m  
 Iwa = 6.0211e-08

### Stabiliteitstoetsing C6-V1 (0.000-5.600)

Maatgevende combinatie: Fu.C.1  
 N;Ed = -13.1 kN  
 Methode Y = Ongeschoord  
 m  
 Methode Z = Cons. gesch.  
 Xy = 0.50  
 Xz = 0.38  
 NEN-EN1993-1-1(6.46): UC = 0.03 < 1

Nb;Rd;y = 527.3 kN  
 Ca(y) = 0.250  
 Ca(z) = N/B

Nb;Rd;z = 405.0 kN  
 Cb(y) = 0.250  
 Cb(z) = N/B  
 Knikcurve: B  
 Knikcurve: C

Lknik Y = 8.169  
 Lbuc Z = 5.600 m

### Buiging & Druk C6-V1 (0.000-5.600)

Maatgevende combinatie: Fu.C.1  
 N;Ed = -13.1 kN  
 My = -14.5 kNm  
 Mz = 0.0 kNm  
 CmY = 0.74  
 Kyy = 0.757  
 Ksi;y = 0.50  
 NEN-EN1993-1-1(6.61&6.62): UC = 0.26 < 1

Kippevoelig Ja  
 My;Ed = 14.5 kNm  
 Delta;My;Ed = 0.0 kNm  
 My;Psi = -14.5 kNm  
 Mz;Psi = 0.0 kNm  
 Cmz = 0.90  
 Kyz = 0.564  
 Ksi;z = 0.38

Profielklasse = 1  
 Mz;Ed = 0.0 kNm  
 Delta;Mz;Ed = 0.0 kNm  
 My;s = 11.6 kNm  
 Mz;s = 0.0 kNm  
 CmLT = 0.90  
 Kzy = 0.995  
 Ksi;LT = 0.85

Kzz = 0.941



**Doorbuigingstoetsing Z' C6-V1 (0.000-5.600)**

Constructietype : Dak  
w;c = 0.0 mm  
w;1 = 1.4 mm (x = 2.800 mm; Ka.C.(w1) )  
w;3 = 2.5 mm (x = 2.800 mm; Ka.C.2 )  
w;tot; = 3.9 mm  
w;max = 3.9 mm  
Limiet w;max = L/250 = 22.4 mm  
UC(w;max) = 0.17  
NEN-EN|NEN-EN1990/NB A1.4.2: UC = 0.17 < 1

Toets type: Algemeen  
Zeegvorm 3-punt  
w;2 = 0.0 mm  
  
(w;2+w;3) = 2.5 mm  
Limiet (w;2+w;3) = L/250 = 22.4 mm  
UC(w;2+w;3) = 0.11

**Doorbuigingstoetsing Z'' C6-V1 (0.000-5.600)**

Constructietype : Dak  
w;c = 0.0 mm  
w;1 = 1.4 mm (x = 2.800 mm; Ka.C.(w1) )  
w;3 = 2.5 mm (x = 2.800 mm; Ka.C.2 )  
w;tot; = 3.9 mm  
w;max = 3.9 mm  
Limiet w;max = L/250 = 22.4 mm  
UC(w;max) = 0.17  
NEN-EN|NEN-EN1990/NB A1.4.2: UC = 0.17 < 1

Toets type: Algemeen  
Zeegvorm 3-punt  
w;2 = 0.0 mm  
  
(w;2+w;3) = 2.5 mm  
Limiet (w;2+w;3) = L/250 = 22.4 mm  
UC(w;2+w;3) = 0.11

**Profielgegevens staaf C7-V1 (0.000-2.500)**

|                          |   |  |   |
|--------------------------|---|--|---|
| HE140B                   | Analyse                                   | Staal S235                                   | f <sub>yd</sub> (toegepast) = 235 N/mm <sup>2</sup> |
| h = 140.0 mm             | A = 4.30e-03 m <sup>2</sup>               | W <sub>y;el</sub> = 215.6e-06 m <sup>3</sup> | W <sub>y;pl</sub> =                                 |
| 245.4e-06 m <sup>3</sup> | I <sub>y</sub> = 150.9e-07 m <sup>4</sup> | W <sub>z;el</sub> = 785.2e-07 m <sup>3</sup> | W <sub>z;pl</sub> =                                 |
| b = 140.0 mm             | I <sub>z</sub> = 549.7e-08 m <sup>4</sup> | Aw;y;el = 3.48e-03 m <sup>2</sup>            | Aw;y;pl =   |
| 119.8e-06 m <sup>3</sup> | Massa/m = 33.7 kg/m                       | Aw;z;el = 1.31e-03 m <sup>2</sup>            | Aw;z;pl =   |
| t <sub>f</sub> = 12.0 mm |   | It = 200.6e-09 m <sup>4</sup>                | I <sub>wa</sub> = 224.8e-10                         |
| 3.48e-03 m <sup>2</sup>  |   |  |   |
| tw = 7.0 mm              |   |  |   |
| 1.31e-03 m <sup>2</sup>  |   |  |   |
| r = 12.0 mm              |   |  |   |
| m <sup>6</sup>           |   |  |   |

**Doorsnedetoetsing C7-V1 (0.000-2.500)**

|   |                     |
|---|---------------------|
| Maatgevende combinatie: Fu.C.4 op 2.500 m | Profielklasse = 1   |
| N;Ed = -26.2 kN                           | My;Ed = 5.1.2.e kNm |
|   | Mz;Ed = 0.0 kNm     |
| N;Rd = 1,009.5 kN                         | MyRd = 57.7 kNm     |
|   | MzRd = 28.1 kNm     |
|   |                     |
| NEN-EN1993-1-1(6.12): UC = 0.46 < 1       |                     |

**Kiptoetsing C7-V1 (0.000-2.500)**

|  |                        |                              |
|--|------------------------|------------------------------|
| Equi. profiel: HE140B                                  |                        | Instab. curve Kip:a          |
| Maatgevende combinatie: Fu.C.5                         |                        |                              |
| Aangrijphoogte van de last: 0.000 m vanaf hart profiel |                        |                              |
| Kipsteun bovenflens: N.v.t.                            |                        |                              |
| Kipsteun onderflens: N.v.t.                            |                        |                              |
| Inklem. begin: Gesteund                                | Beperk. eind: Gesteund | b-eff(Begin) = 0.003         |
| 0.003  |                        | b-eff(Eind) =                |
| Tabel gebruikt NB.NB.1 (1)                             | M = -11.8kN/m          | MBeta = 0.0                  |
| Onderflens maatgevend                                  | Xb;lst = 0.000 m       | Xe;lst = 2.500 m             |
| Lsys = 2.500 m   | Lg = 2.500 m           | S = 0.540 m                  |
| m <sup>6</sup>   |                        | I <sub>wa</sub> = 2.2479e-08 |
| C1 = 1.75  | C2 = 0.00 (tabel)      | C2(toegepast) = 0.00         |
|  |                        | C = 6.64                     |

Mcr = 363.4 kNm      kred = 1.0      Lam-rel = 0.40      Profielklasse 1  
 Chi;LT(Fu.C.5) = 0.95      M;Ed = 11.8 kNm      UC(y) = 0.00  
 Chi;LT,Z = 1.00      lkip = 2.500 m      UC(z) = 0.00  
 My;begin = 0.0 kNm      My;eind = -11.8 kNm  
 NEN-EN1993-1-1(6.54): UC = 0,00 < 1 Kip N/B, ivm Lambda;LT <= 0.4 NEN-EN 1993-1-1 #6.3.2.2(4)

### Stabiliteitstoetsing C7-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.4

N;Ed = -27.2 kN      Nb;Rd;y = 168.6 kN      Nb;Rd;z = 703.8 kN  
 Methode Y = Ongeschoord      Ca(y) = 5.000      Cb(y) = 5.000      Lknik Y = 12.625  
 m  
 Methode Z = Cons. gesch.      Ca(z) = N/B      Cb(z) = N/B      Lbuc Z = 2.500 m  
 Xy = 0.17      Knikcurve: B  
 Xz = 0.70      Knikcurve: C  
 NEN-EN1993-1-1(6.46): UC = 0.16 < 1

### Buiging & Druk C7-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.4

N;Ed = -27.2 kN      My;Ed = 11.8 kNm      Mz;Ed = 0.0 kNm  
 Delta;My;Ed = 0.0 kNm      Delta;Mz;Ed = 0.0 kNm  
 My = 5.12.e kNm      My;Psi = 0.0 kNm      My;s = -13.2 kNm  
 Mz = 0.0 kNm      Mz;Psi = 0.0 kNm      Mz;s = 0.0 kNm  
 CmY = 0.60      CmZ = 0.90      CmLT = 0.90  
 Kyy = 0.677      Kyz = 0.559      Kzy = 0.996      Kzz = 0.931  
 Ksi;y = 0.17      Ksi;z = 0.70      Ksi;LT = 0.95  
 NEN-EN1993-1-1(6.61&6.62): UC = 0.52 < 1

### Doorbuigingstoetsing X C7-V1 (0.000-2.500)

Constructietype : Kolom

u;3 = 9.9 mm (Ka.C.4 )      Toets type: Verdiepingsgebouw: elke verdieping  
 Limiet u;3 = H/300 = 8.3 mm      u;3 = 13.0 mm (Ka.C.4 )  
 UC(u;3;max) = 1.19      Limiet u;max = Htot/500 = 9.8 mm  
 UC(u;max) = 1.33  
 NEN-EN|NEN-EN1990/NB A1.4.2: UC = 1.33 > 1

### Profielgegevens staaf C8-V1 (0.000-2.500)

HE140B      Analyse      Staal S235 fy(d,toegepast) = 235 N/mm<sup>2</sup>  
 h = 140.0 mm      A = 4.30e-03 m<sup>2</sup>      Wy;el = 215.6e-06 m<sup>3</sup>      Wy;pl =  
 245.4e-06 m<sup>3</sup>  
 b = 140.0 mm      Iy = 150.9e-07 m<sup>4</sup>      Wz;el = 785.2e-07 m<sup>3</sup>      Wz;pl =  
 119.8e-06 m<sup>3</sup>  
 tf = 12.0 mm      Iz = 549.7e-08 m<sup>4</sup>      Aw;y;el = 3.48e-03 m<sup>2</sup>      Aw;y;pl =  
 3.48e-03 m<sup>2</sup>  
 tw = 7.0 mm      Massa/m = 33.7 kg/m      Aw;z;el = 1.31e-03 m<sup>2</sup>      Aw;z;pl =  
 1.31e-03 m<sup>2</sup>  
 r = 12.0 mm      It = 200.6e-09 m<sup>4</sup>      Iwa = 224.8e-10  
 m<sup>6</sup>

### Doorsnedetoetsing C8-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.3 op 2.500 m

N;Ed = -25.8 kN      Vy;Ed = 0.0 kN      Profielklasse = 1  
 Vz;Ed = 10.6 kN      My;Ed = 5.12.e kNm  
 N;Rd = 1,009.5 kN      Vy;Rd = 472.6 kN      Mz;Ed = 0.0 kNm  
 Vz;Rd = 177.4 kN      MyRd = 57.7 kNm  
 MzRd = 28.1 kNm  
 NEN-EN1993-1-1(6.12): UC = 0.46 < 1

### Kiptoetsing C8-V1 (0.000-2.500)

Equi. profiel: HE140B

Maatgevende combinatie: Fu.C.5  
 Aangrijphoogte van de last: 0.000 m vanaf hart profiel  
 Kipsteun bovenflens: N.v.t.  
 Kipsteun onderflens: N.v.t.  
 Inkleem. begin: Gesteund      Beperk. eind: Gesteund      Instab. curve Kip:a  
 0.000  
 Tabel gebruikt NB.NB.1 (1)      M = 11.8kN/m      MBeta = 0.0  
 Bovenflens maatgevend      Xb;lst = 0.000 m      Xe;lst = 2.500 m      b-eff(Begin) = 0,000      b-eff(Eind) =  
 lsys = 2.500 m      Lg = 2.500 m      S = 0.540 m      Iwa = 2.2479e-08  
 m6  
 C1 = 1.75      C2 = 0.00 (tabel)      C2(toegepast) = 0.00      C = 6.64  
 Mcr = 363.4 kNm      kred = 1.0      Lam-rel = 0.40      Profielklasse 1  
 Chi;LT(Fu.C.5) = 0.95      M;Ed = 11.8 kNm      UC(y) = 0.00  
 Chi;LT,Z = 1.00      lkip = 2.500 m      UC(z) = 0.00  
 My;begin = 0.0 kNm      My;eind = 11.8 kNm  
 NEN-EN1993-1-1(6.54): UC = 0.00 < 1 Kip N/B, ivm Lambda;LT <= 0.4 NEN-EN 1993-1-1 #6.3.2.2(4)

### Stabiliteitstoetsing C8-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.3  
 N;Ed = -26.8 kN      Nb;Rd;y = 589.3 kN      Nb;Rd;z = 703.8 kN  
 Methode Y = Ongeschoord      Ca(y) = 5.000      Cb(y) = 0.250      Lknik Y = 5.684  
 m  
 Methode Z = Cons. gesch.      Ca(z) = N/B      Cb(z) = N/B      Lbuc Z = 2.500 m  
 Xy = 0.58      Knikcurve: B  
 Xz = 0.70      Knikcurve: C  
 NEN-EN1993-1-1(6.46): UC = 0.05 < 1

### Buiging & Druk C8-V1 (0.000-2.500)

Maatgevende combinatie: Fu.C.3      Kipgevoelig Ja      Profielklasse = 1  
 N;Ed = -26.8 kN      My;Ed = 11.8 kNm      Mz;Ed = 0.0 kNm  
 Delta;My;Ed = 0.0 kNm      Delta;Mz;Ed = 0.0 kNm  
 My = 5.12.e kNm      My;Psi = 0.0 kNm      My;s = 13.2 kNm  
 Mz = 0.0 kNm      Mz;Psi = 0.0 kNm      Mz;s = 0.0 kNm  
 CmY = 0.60      Cmz = 0.90      CmLT = 0.90  
 KyY = 0.622      Kyz = 0.558      Kzy = 0.996      Kzz = 0.930  
 Ksi;y = 0.58      Ksi;z = 0.70      Ksi;LT = 0.95  
 NEN-EN1993-1-1(6.61&6.62): UC = 0.52 < 1

### Doorbuigingstoetsing X C8-V1 (0.000-2.500)

Constructietype : Kolom      Toets type: Verdiepingsgebouw; elke verdieping  
 u;i;3 = -9.9 mm (Ka.C.5 )      u;3 = 13.0 mm (Ka.C.4 )  
 Limiet u;i;max = H/300 = 8.3 mm      Limiet u;max = Htot/500 = 9.8 mm  
 UC(u;i;max) = 1.19      UC(u;max) = 1.33  
 NEN-EN|NEN-EN1990/NB A1.4.2: UC = 1.33 > 1

### Profielgegevens staaf C9-V1 (0.000-5.600)

HE200A      Analyse      Staal S235      fyd(toegepast) = 235 N/mm2  
 h = 190.0 mm      A = 5.38e-03 m2      Wy;el = 388.6e-06 m3      Wy;pl =  
 429.5e-06 m3  
 b = 200.0 mm      Iy = 369.2e-07 m4      Wz;el = 133.6e-06 m3      Wz;pl =  
 203.8e-06 m3  
 tf = 10.0 mm      Iz = 133.6e-07 m4      Aw;y;el = 4.28e-03 m2      Aw;y;pl =  
 4.28e-03 m2  
 tw = 6.5 mm      Massa/m = 42.3 kg/m      Aw;z;el = 1.81e-03 m2      Aw;z;pl =  
 1.81e-03 m2  
 r = 18.0 mm      It = 209.8e-09 m4      Iwa = 108.0e-09  
 m6

**Doorsnedetoetsing C9-V1 (0.000-5.600)**

Maatgevende combinatie: Fu.C.2 op 2.800 m  
 N;Ed = -6.9 kN Vy;Ed = 0.0 kN My;Ed = 27.4 kNm  
 Vz;Ed = 0.0 kN Mz;Ed = 0.0 kNm  
 N;Rd = 1,265.0 kN Vy;Rd = 580.4 kN MyRd = 100.9 kNm  
 Vz;Rd = 245.3 kN MzRd = 47.9 kNm  
 NEN-EN1993-1-1(6.12): UC = 0.27 < 1

**Kiptoetsing C9-V1 (0.000-5.600)**

Equi. profiel: HE200A  
 Maatgevende combinatie: Fu.C.2 Instab. curve Kip:a  
 Aangrijphoogte van de last: 0.000 m vanaf hart profiel  
 Kipsteun bovenflens: N.v.t.

Kipsteun onderflens: N.v.t.  
 Inklem. begin: Gesteund Beperk. eind: Gesteund b-eff(Begin) = 0.000 b-eff(Eind) =  
 0.000  
 Tabel gebruikt NB.NB.4 M = -17.2kN/m MBeta = -17.2 q = 11.4  
 Bovenflens maatgevend Xb;lst = 0.000 m Xe;lst = 5.600 m lst = 5.600 m  
 Lsys = 5.600 m Lg = 5.600 m S = 1.157 m Iwa = 1.0800e-07  
 m6  
 C1 = 1.20 C2 = 0.80 (tabel) C2(toegepast) = 0.00 C = 4.50  
 Mcr = 175.4 kNm kred = 1.0 Lam-rel = 0.76 Profielklasse 1  
 Chi;LT(Fu.C.2) = 0.82 M;Ed = 27.4 kNm UC(y) = 0.33  
 Chi;LT,Z = 1.00 Ikip = 5.600 m UC(z) = 0.00  
 My;begin = -17.2 kNm My;eind = -17.2 kNm  
 NEN-EN1993-1-1(6.54): UC = 0.33 < 1

**Stabiliteitstoetsing C9-V1 (0.000-5.600)**

Maatgevende combinatie: Fu.C.2  
 N;Ed = -6.9 kN Nb;Rd;y = 375.0 kN Nb;Rd;z = 550.4 kN  
 Methode Y = Ongeschoord Ca(y) = 5.000 Cb(y) = 0.250 Lknik Y = 12.731  
 m  
 Methode Z = Cons. gesch. Ca(z) = N/B Cb(z) = N/B Lbuc Z = 5.600 m  
 Xy = 0.30 Knikcurve: B  
 Xz = 0.44 Knikcurve: C  
 NEN-EN1993-1-1(6.46): UC = 0.02 < 1

**Buiging & Druk C9-V1 (0.000-5.600)**

Maatgevende combinatie: Fu.C.2 Kipgevoelig Ja Profielklasse = 1  
 N;Ed = -6.9 kN My;Ed = 27.4 kNm Mz;Ed = 0.0 kNm  
 Delta;My;Ed = 0.0 kNm Delta;Mz;Ed = 0.0 kNm  
 My = -17.2 kNm My;Psi = -17.2 kNm My;s = 27.4 kNm  
 Mz = 0.0 kNm Mz;Psi = 0.0 kNm Mz;s = 0.0 kNm  
 CmY = 0.92 Cmz = 0.90 CmLT = 0.90  
 Kyy = 0.932 Kyz = 0.549 Kzy = 0.998 Kzz = 0.916  
 Ksi;y = 0.30 Ksi;z = 0.44 Ksi;LT = 0.82  
 NEN-EN1993-1-1(6.61&6.62): UC = 0.34 < 1

**Doorbuigingstoetsing Z' C9-V1 (0.000-5.600)**

Constructietype : Vloer Toets type: Algemeen  
 w;c = 0.0 mm Zeegvorm 3-punt  
 w;1 = 3.3 mm (x = 2.800 mm; Fr.C.(w1) ) w;2 = 0.0 mm  
 w;3 = 1.2 mm (x = 2.800 mm; Qu.C.1 ) w;3 = 2.0 mm (x = 2.846 mm; Fr.C.2 )  
 w;tot; = 4.5 mm  
 w;max = 4.5 mm (w;2+w;3) = 2.0 mm

Limiet  $w;max = L/250 = 22.4$  mm  
 $UC(w;max) = 0.20$   
 NEN-EN|NEN-EN1990/NB A1.4.2:  $UC = 0.20 < 1$

Limiet  $(w;2+w;3) = L/333 = 16.8$  mm  
 $UC(w;2+w;3) = 0.12$

### Doorbuigingstoetsing Z" C9-V1 (0.000-5.600)

Constructietype : Vloer  
 $w;c = 0.0$  mm  
 $w;1 = 3.3$  mm ( $x = 2.800$  mm; Fr.C.(w1) )  
 $w;3 = 1.2$  mm ( $x = 2.800$  mm; Qu.C.1 )  
 $w;tot; = 4.5$  mm  
 $w;max = 4.5$  mm  
 Limiet  $w;max = L/250 = 22.4$  mm  
 $UC(w;max) = 0.20$   
 NEN-EN|NEN-EN1990/NB A1.4.2:  $UC = 0.20 < 1$

Toets type: Algemeen  
 Zeegvorm 3-punt  
 $w;2 = 0.0$  mm  
 $w;3 = 2.0$  mm ( $x = 2.800$  mm; Fr.C.2 )  
 $(w;2+w;3) = 2.0$  mm  
 Limiet  $(w;2+w;3) = L/333 = 16.8$  mm  
 $UC(w;2+w;3) = 0.12$

### Profielgegevens staaf C10-V1 (0.000-1.000)

|                            |                                  |                                      |   |
|----------------------------|----------------------------------|--------------------------------------|---|
| C100                       | Analyse                          | Staal S235                           | $f_{yd}(toegepast) = 215$ N/mm <sup>2</sup> |
| $h = 100.0$ mm             | $A = 7.85e-03$ m <sup>2</sup>    | $W_y;el = 981.7e-07$ m <sup>3</sup>  | $W_y;pl =$                                  |
| $166.7e-06$ m <sup>3</sup> |                                  | $W_z;el = 981.7e-07$ m <sup>3</sup>  | $W_z;pl =$                                  |
| $b = 100.0$ mm             | $I_y = 490.9e-08$ m <sup>4</sup> | $A_w;y;el = 5.89e-03$ m <sup>2</sup> | $A_w;y;pl =$                                |
| $166.7e-06$ m <sup>3</sup> | $I_z = 490.9e-08$ m <sup>4</sup> | $A_w;z;el = 5.89e-03$ m <sup>2</sup> | $A_w;z;pl =$                                |
| $t_f = 0.0$ mm             |                                  | $I_t = 981.7e-08$ m <sup>4</sup>     | $I_{wa} = 0.0e-02$ m <sup>6</sup>           |
| $5.89e-03$ m <sup>2</sup>  | Massa/m = 61.7 kg/m              |                                      |   |
| $t_w = 0.0$ mm             |                                  |                                      |   |
| $5.89e-03$ m <sup>2</sup>  |                                  |                                      |   |
| $r = 0.0$ mm               |                                  |                                      |   |

### Doorsnedetoetsing C10-V1 (0.000-1.000)

|   |                    |
|---|--------------------|
| Maatgevende combinatie: Fu.C.4 op 0.000 m | Profielklasse = 1  |
| $N;Ed = 6.1$ kN                           | $M_y;Ed = 0.0$ kNm |
|   | $M_z;Ed = 0.0$ kNm |
| $N;Rd = 1,688.6$ kN                       | $M_yRd = 35.8$ kNm |
|   | $M_zRd = 35.8$ kNm |
|   |                    |
| NEN-EN1993-1-1(6.5): $UC = 0.00 < 1$      |                    |

### Kiptoetsing C10-V1 (0.000-1.000)

|   |                        |                          |                   |
|---|------------------------|--------------------------|-------------------|
| Equi. profiel: C100   |                        | Instab. curve Kip;d      |                   |
| Maatgevende combinatie: Fu.C.5  |                        |                          |                   |
| Aangrijphoogte van de last: 0.000 m vanaf hart profiel                      |                        |                          |                   |
| Kipsteun bovenflens: N.v.t.   |                        |                          |                   |
| Kipsteun onderflens: N.v.t.   |                        |                          |                   |
| Inklem. begin: Gesteund   | Beperk. eind: Gesteund | $b_{eff}(Begin) = 0.000$ | $b_{eff}(Eind) =$ |
| 0.000   |                        | $= 0.0$                  |                   |
| Tabel gebruikt NB.NB.1 (2)  | $q = 0.8$ kN/m         | $X_e;lst = 1.000$ m      | $lst = 1.000$ m   |
| Bovenflens maatgevend   | $X_b;lst = 0.000$ m    | $S = 0.000$ m            | $I_{wa} =$        |
| $L_{sys} = 1.000$ m   | $L_g = 1.000$ m        |                          |                   |
| $0.0000e+00$ m <sup>6</sup>   |                        | $C2(toegepast) = 0.00$   | $C = 0.00$        |
| $C1 = 1.13$   | $C2 = 0.45$ (tabel)    | $Lam_{rel} = 0.00$       | Profielklasse 1   |
| $M_{cr} = 0.0$ kNm  | $k_{red} = 1.0$        |                          | $UC(y) = 0.00$    |
| $Chi;LT(Fu.C.5) = 1.00$   | $M;Ed = 0.1$ kNm       |                          | $UC(z) = 0.00$    |
| $Chi;LT,Z = 1.00$   | $I_{kip} = 1.000$ m    |                          |                   |
| $M_y;begin = 0.0$ kNm   | $M_y;eind = 0.0$ kNm   |                          |                   |
| NEN-EN1993-1-1(6.54): $UC = 0.00 < 1$ Kip N/B, ivm buis/koker met $h/b < 3$ |                        |                          |                   |

### Stabiliteitstoetsing C10-V1 (0.000-1.000)

|                                |                       |                         |                      |
|--------------------------------|-----------------------|-------------------------|----------------------|
| Maatgevende combinatie: Fu.C.3 |                       |                         |                      |
| $N;Ed = -6.1$ kN               | $N_b;Rd;y = 315.5$ kN | $N_b;Rd;z = 1,508.6$ kN |                      |
| Methode Y = Ongeschoord        | $Ca(y) = 5.000$       | $Cb(y) = 5.000$         | $L_{knik} Y = 5.050$ |
| m                              |                       |                         |                      |

Methode Z = Cons. gesch. Ca(z) = N/B Cb(z) = N/B Lbuc Z = 1.000 m  
 Xy = 0.19 Knikcurve: C  
 Xz = 0.89 Knikcurve: C  
 NEN-EN1993-1-1(6.46): UC = 0.02 < 1

### Buiging & Druk C10-V1 (0.000-1.000)

Maatgevende combinatie: Fu.C.3 Kipgevoelig Ja Profielklasse = 1  
 N;Ed = -6.1 kN My;Ed = 0.1 kNm Mz;Ed = 0.0 kNm  
 Delta;My;Ed = 0.0 kNm Delta;Mz;Ed = 0.0 kNm  
 My = 0.0 kNm My;Psi = 0.0 kNm My;s = 0.1 kNm  
 Mz = 0.0 kNm Mz;Psi = 0.0 kNm Mz;s = 0.0 kNm  
 CmY = 0.95 Cmz = 0.90 CmLT = 0.90  
 Kyy = 0.965 Kyz = 0.540 Kzy = 1.000 Kzz = 0.901  
 Ksi;y = 0.19 Ksi;z = 0.89 Ksi;LT = 1.00  
 NEN-EN1993-1-1(6.61&6.62): UC = 0.02 < 1

### Doorbuigingstoetsing Z' C10-V1 (0.000-1.000)

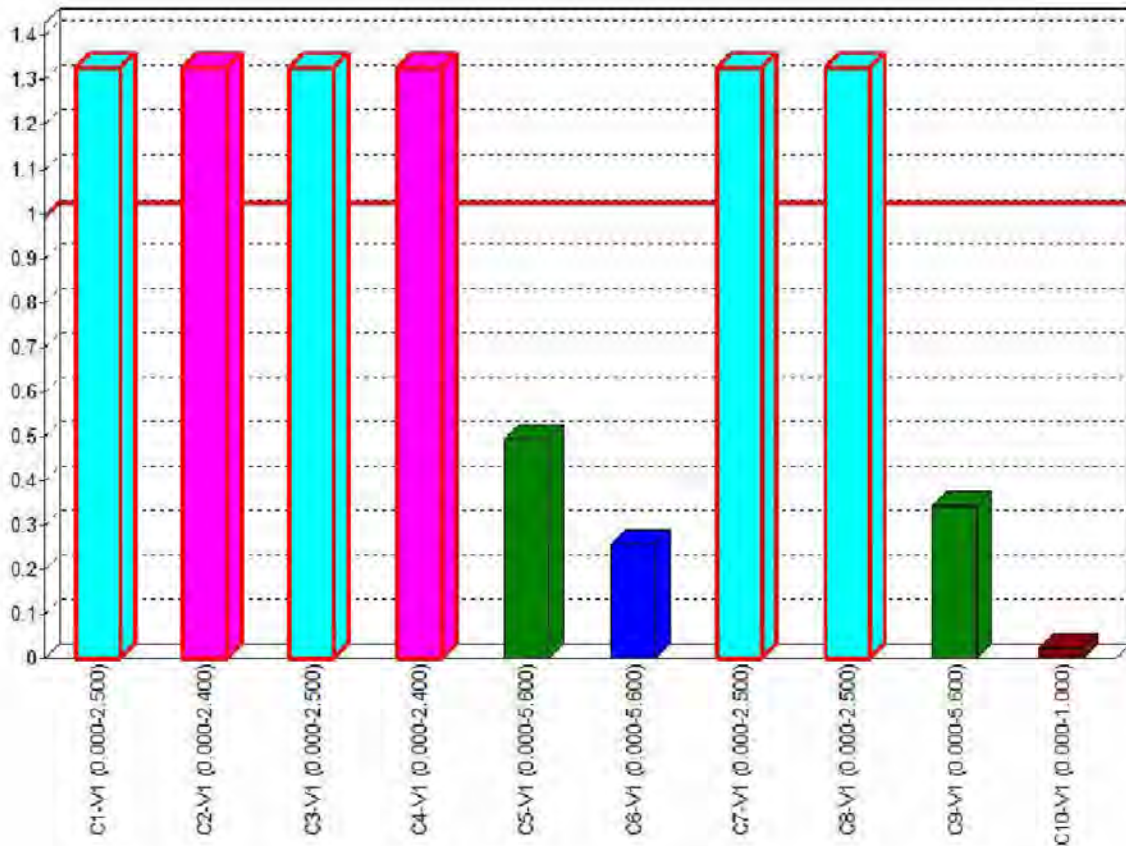
Constructietype : Dak Toets type: Algemeen  
 Zeegvorm Parabolisch  
 w;c = 0.0 mm w;2 = 0.0 mm  
 w;1 = 0.0 mm (x = 0.500 mm; Ka.C.(w1) )  
 w;3 = 0.0 mm (x = 0.500 mm; Ka.C.5 )  
 w;tot; = 0.0 mm  
 w;max = 0.0 mm (w;2+w;3) = 0.0 mm  
 Limiet w;max = L/250 = 4.0 mm  
 UC(w;max) = 0.00 Limiet (w;2+w;3) = L/250 = 4.0 mm  
 NEN-EN|NEN-EN1990/NB A1.4.2: UC = 0.00<1 UC(w;2+w;3) = 0.00

### Doorbuigingstoetsing Z'' C10-V1 (0.000-1.000)

Constructietype : Dak Toets type: Algemeen  
 Zeegvorm Parabolisch  
 w;c = 0.0 mm w;2 = 0.0 mm  
 w;1 = 0.0 mm (x = 0.500 mm; Ka.C.(w1) )  
 w;3 = 0.0 mm (x = 0.500 mm; Ka.C.5 )  
 w;tot; = 0.0 mm (w;2+w;3) = 0.0 mm  
 w;max = 0.0 mm Limiet (w;2+w;3) = L/250 = 4.0 mm  
 Limiet w;max = L/250 = 4.0 mm Limiet (w;2+w;3) = L/250 = 4.0 mm  
 UC(w;max) = 0.00 UC(w;2+w;3) = 0.00  
 NEN-EN|NEN-EN1990/NB A1.4.2: UC = 0.00<1

AFB. STAAL UC DIAGRAM





## UNITY CHECK NEN-EN1993-1-1:2016/NB:2016

| Veld                | Toetsing             | Combinatie        | Artikel                     | UC max        |
|---------------------|----------------------|-------------------|-----------------------------|---------------|
| C1-V1 (0.000-2.500) | Doorsnede            | Fu.C.4            | NEN-EN1993-1-1(6.12)        | 0.44          |
| C1-V1 (0.000-2.500) | Stabiliteit          | Fu.C.4            | NEN-EN1993-1-1(6.46)        | 0.15          |
| C1-V1 (0.000-2.500) | Stabiliteit          | Fu.C.4            | NEN-EN1993-1-1(6.46)        | 0.07          |
| C1-V1 (0.000-2.500) | Stabiliteit          | Fu.C.4            | NEN-EN1993-1-1(6.61&6.62)   | 0.54          |
| <b>Veld</b>         | <b>Toetsing</b>      | <b>Combinatie</b> | <b>Artikel</b>              | <b>UC max</b> |
| C1-V1 (0.000-2.500) | Kiptoetsing          | Fu.C.5            | NEN-EN1993-1-1(6.54)        | 0.00          |
| C1-V1 (0.000-2.500) | Doorbuigingstoetsing | Ka.C.4            | NEN-EN NEN-EN1990/NB A1.4.2 | <b>1.33</b>   |
| C2-V1 (0.000-2.400) | Doorsnede            | Fu.C.2            | NEN-EN1993-1-1(6.12)        | 0.40          |
| C2-V1 (0.000-2.400) | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.46)        | 0.01          |
| C2-V1 (0.000-2.400) | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.46)        | 0.01          |
| C2-V1 (0.000-2.400) | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.61&6.62)   | 0.42          |
| C2-V1 (0.000-2.400) | Kiptoetsing          | Fu.C.5            | NEN-EN1993-1-1(6.54)        | 0.00          |
| C2-V1 (0.000-2.400) | Doorbuigingstoetsing | Ka.C.4            | NEN-EN NEN-EN1990/NB A1.4.2 | <b>1.33</b>   |
| C3-V1 (0.000-2.500) | Doorsnede            | Fu.C.3            | NEN-EN1993-1-1(6.12)        | 0.44          |
| C3-V1 (0.000-2.500) | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.09          |
| C3-V1 (0.000-2.500) | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.07          |
| C3-V1 (0.000-2.500) | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.61&6.62)   | 0.54          |
| C3-V1 (0.000-2.500) | Kiptoetsing          | Fu.C.5            | NEN-EN1993-1-1(6.54)        | 0.00          |
| C3-V1 (0.000-2.500) | Doorbuigingstoetsing | Ka.C.4            | NEN-EN NEN-EN1990/NB A1.4.2 | <b>1.33</b>   |
| C4-V1 (0.000-2.400) | Doorsnede            | Fu.C.2            | NEN-EN1993-1-1(6.12)        | 0.40          |
| C4-V1 (0.000-2.400) | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.46)        | 0.01          |
| C4-V1 (0.000-2.400) | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.46)        | 0.01          |

|                      |                      |                   |                             |               |
|----------------------|----------------------|-------------------|-----------------------------|---------------|
| C4-V1 (0.000-2.400)  | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.61&6.62)   | 0.42          |
| C4-V1 (0.000-2.400)  | Kiptoetsing          | Fu.C.5            | NEN-EN1993-1-1(6.54)        | 0.00          |
| C4-V1 (0.000-2.400)  | Doorbuigingstoetsing | Ka.C.4            | NEN-EN NEN-EN1990/NB A1.4.2 | <b>1.33</b>   |
| C5-V1 (0.000-5.600)  | Doorsnede            | Fu.C.3            | NEN-EN1993-1-1(6.12)        | 0.42          |
| C5-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.01          |
| C5-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.01          |
| C5-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.61&6.62)   | 0.48          |
| C5-V1 (0.000-5.600)  | Kiptoetsing          | Fu.C.2            | NEN-EN1993-1-1(6.54)        | 0.49          |
| C5-V1 (0.000-5.600)  | Doorbuigingstoetsing | Qu.C.1            | NEN-EN NEN-EN1990/NB A1.4.2 | 0.25          |
| C6-V1 (0.000-5.600)  | Doorsnede            | Fu.C.1            | NEN-EN1993-1-1(6.12)        | 0.19          |
| C6-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.1            | NEN-EN1993-1-1(6.46)        | 0.02          |
| C6-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.1            | NEN-EN1993-1-1(6.46)        | 0.03          |
| C6-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.1            | NEN-EN1993-1-1(6.61&6.62)   | 0.26          |
| C6-V1 (0.000-5.600)  | Kiptoetsing          | Fu.C.1            | NEN-EN1993-1-1(6.54)        | 0.22          |
| C6-V1 (0.000-5.600)  | Doorbuigingstoetsing | Ka.C.2            | NEN-EN NEN-EN1990/NB A1.4.2 | 0.17          |
| C7-V1 (0.000-2.500)  | Doorsnede            | Fu.C.4            | NEN-EN1993-1-1(6.12)        | 0.46          |
| C7-V1 (0.000-2.500)  | Stabiliteit          | Fu.C.4            | NEN-EN1993-1-1(6.46)        | 0.16          |
| C7-V1 (0.000-2.500)  | Stabiliteit          | Fu.C.4            | NEN-EN1993-1-1(6.46)        | 0.04          |
| C7-V1 (0.000-2.500)  | Stabiliteit          | Fu.C.4            | NEN-EN1993-1-1(6.61&6.62)   | 0.52          |
| C7-V1 (0.000-2.500)  | Kiptoetsing          | Fu.C.5            | NEN-EN1993-1-1(6.54)        | 0.00          |
| C7-V1 (0.000-2.500)  | Doorbuigingstoetsing | Ka.C.4            | NEN-EN NEN-EN1990/NB A1.4.2 | <b>1.33</b>   |
| C8-V1 (0.000-2.500)  | Doorsnede            | Fu.C.3            | NEN-EN1993-1-1(6.12)        | 0.46          |
| C8-V1 (0.000-2.500)  | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.05          |
| C8-V1 (0.000-2.500)  | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.04          |
| C8-V1 (0.000-2.500)  | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.61&6.62)   | 0.52          |
| C8-V1 (0.000-2.500)  | Kiptoetsing          | Fu.C.5            | NEN-EN1993-1-1(6.54)        | 0.00          |
| C8-V1 (0.000-2.500)  | Doorbuigingstoetsing | Ka.C.4            | NEN-EN NEN-EN1990/NB A1.4.2 | <b>1.33</b>   |
| C9-V1 (0.000-5.600)  | Doorsnede            | Fu.C.2            | NEN-EN1993-1-1(6.12)        | 0.27          |
| C9-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.46)        | 0.02          |
| C9-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.46)        | 0.01          |
| C9-V1 (0.000-5.600)  | Stabiliteit          | Fu.C.2            | NEN-EN1993-1-1(6.61&6.62)   | 0.34          |
| C9-V1 (0.000-5.600)  | Kiptoetsing          | Fu.C.2            | NEN-EN1993-1-1(6.54)        | 0.33          |
| C9-V1 (0.000-5.600)  | Doorbuigingstoetsing | Qu.C.1            | NEN-EN NEN-EN1990/NB A1.4.2 | 0.20          |
| C10-V1 (0.000-1.000) | Doorsnede            | Fu.C.4            | NEN-EN1993-1-1(6.5)         | 0.00          |
| C10-V1 (0.000-1.000) | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.02          |
| C10-V1 (0.000-1.000) | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.46)        | 0.00          |
| <b>Veld</b>          | <b>Toetsing</b>      | <b>Combinatie</b> | <b>Artikel</b>              | <b>UC max</b> |
| C10-V1 (0.000-1.000) | Stabiliteit          | Fu.C.3            | NEN-EN1993-1-1(6.61&6.62)   | 0.02          |
| C10-V1 (0.000-1.000) | Kiptoetsing          | Fu.C.5            | NEN-EN1993-1-1(6.54)        | 0.00          |
| C10-V1 (0.000-1.000) | Doorbuigingstoetsing | Ka.C.5            | NEN-EN NEN-EN1990/NB A1.4.2 | 0.00          |

## GEWICHT STAALCONSTRUCTIE

| Staf                 | Profiel       | Lsys          | Massa          |
|----------------------|---------------|---------------|----------------|
| C10-V1 (0.000-1.000) | C100          | 1.000         | 61.654         |
| <b>Subtotaal:</b>    | <b>C100</b>   | <b>1.000</b>  | <b>61.654</b>  |
| C1-V1 (0.000-2.500)  | HE140B        | 2.500         | 84.301         |
| C2-V1 (0.000-2.400)  | HE140B        | 2.400         | 80.929         |
| C3-V1 (0.000-2.500)  | HE140B        | 2.500         | 84.301         |
| C4-V1 (0.000-2.400)  | HE140B        | 2.400         | 80.929         |
| C7-V1 (0.000-2.500)  | HE140B        | 2.500         | 84.301         |
| C8-V1 (0.000-2.500)  | HE140B        | 2.500         | 84.301         |
| <b>Subtotaal:</b>    | <b>HE140B</b> | <b>14.800</b> | <b>499.064</b> |
| C6-V1 (0.000-5.600)  | HE180A        | 5.600         | 198.925        |
| <b>Subtotaal:</b>    | <b>HE180A</b> | <b>5.600</b>  | <b>198.925</b> |
| C5-V1 (0.000-5.600)  | HE200A        | 5.600         | 236.642        |
| C9-V1 (0.000-5.600)  | HE200A        | 5.600         | 236.642        |

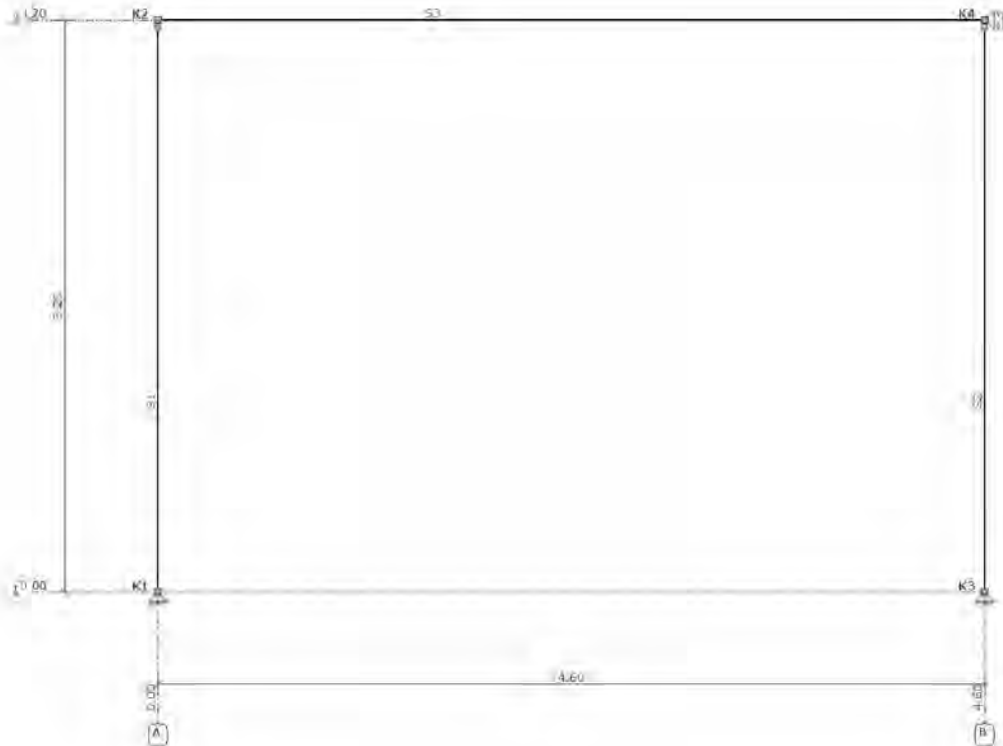


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|                   |               |               |                  |
|-------------------|---------------|---------------|------------------|
| <b>Subtotaal:</b> | <b>HE200A</b> | <b>11.200</b> | <b>473.284</b>   |
| <b>Totaal:</b>    |               | <b>32.600</b> | <b>1.232.927</b> |
|                   |               | m             | kg               |

## 8.16 Bijlage ultraai MatrixFrame berekening Pos 16

### AFB. GEOMETRIE 1 STAVEN EN KNOPEN



#### STAVEN

| Staad E | Knoop B X-B | Knoop Z-B | X-E   | Z-E    | Lengte | Profiel | Positie                  |
|---------|-------------|-----------|-------|--------|--------|---------|--------------------------|
| S1      | K1          | K2        | 0.000 | 0.000  | 0.000  | -3.200  | 3.200 P10.000 - L(3.200) |
| S2      | K3          | K4        | 4.600 | 0.000  | 4.600  | -3.200  |                          |
| S3      | K2          | K4        | 0.000 | -3.200 | 4.600  | -3.200  | 4.600 P20.000 - L(4.600) |
| -       | -           | -         | m     | m      | m      | m       | m -                      |

#### SCHARNIEREN

| Staad | Positie Oplegg. | Scharnier | Yr      |
|-------|-----------------|-----------|---------|
| S1    | 0.000 A1        | vast      | vast    |
|       | L(3.200) A2     | vast      | vast    |
| S2    | 0.000 A1        | vast      | vast    |
|       | L(3.200) A2     | vast      | vast    |
| S3    | 0.000 A1        | vast      | vast    |
|       | L(4.600) A1     | vast      | vast    |
| -     | m -             | kN/m      | kN/m    |
|       |                 |           | kNm/rad |

## AFB. GEOMETRIË 2 STAVEN EN KNOPEN



### PROFIELEN

| Profiel | Profielnaam | Oppervlakte    | Iy             | Materiaal | 5.1.2.e |
|---------|-------------|----------------|----------------|-----------|---------|
| P1      | HE100A      | 2.1236e-03     | 3.4923e-06     | S235      | 0.0     |
| P2      | HE180A      | 4.5251e-03     | 2.5103e-05     | S235      | 0.0     |
| -       | -           | m <sup>2</sup> | m <sup>4</sup> | -         | °       |

### MATERIALEN

| Materiaal | Dichtheid         | E-Modulus         | Uitzettingcoeff |
|-----------|-------------------|-------------------|-----------------|
| S235      | 78.50             | 2.1000e+08        | 12.0000e-06     |
| -         | kN/m <sup>3</sup> | kN/m <sup>2</sup> | C°m             |

### OPLEGGINGEN

| Oplegging | Object | Positie | Z    | Yr        | HoekYr  |   |
|-----------|--------|---------|------|-----------|---------|---|
| O1        | K1     | 0.000   | vast | vast      | vrij    | 0 |
| O2        | K3     | 0.000   | vast | vast      | vrij    | 0 |
| O3        | K4     | 0.000   | vast | 0.00:0.00 | vrij    | 0 |
| -         | -      | m       | kN/m | kN/m      | kNm/rad | ° |

### BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven                  | 5.1.2.e                    | Gunstig/Ong. Element | 5.1.2.e         | Cprob  | Psi0 | Psi1      |
|---------|-------------------------|----------------------------|----------------------|-----------------|--------|------|-----------|
| Psi2    | UGT/GGT                 |                            |                      |                 |        |      |           |
| B.G.1   | Permanent               | Permanent                  | -                    | N.V.T.          | N.V.T. |      |           |
| B.G.2   | Verdeelde veranderlijke | Verdeelde                  | -                    | Cat. A) Vloeren | 1      | 1    | 0.40 0.50 |
| 0.30    | 1.00/1.00<br>belasting  | veranderlijke<br>belasting |                      |                 |        |      |           |

| Oplegg. Psi2 | Staven UGT/GGT            | 5.1.2.e    | Gunstig/Ong.Element | 5.1.2.e | Psi0   | Psi1   | Cprob |
|--------------|---------------------------|------------|---------------------|---------|--------|--------|-------|
| B.G.3        | Kniklengte (Assymetrisch) | Kniklengte |                     |         | N.v.t. | N.v.t. |       |
| B.G.4        | Kniklengte (Symmetrisch)  | Kniklengte |                     |         | N.v.t. | N.v.t. |       |

AFB. LASTEN B.G.1 PERMANENT



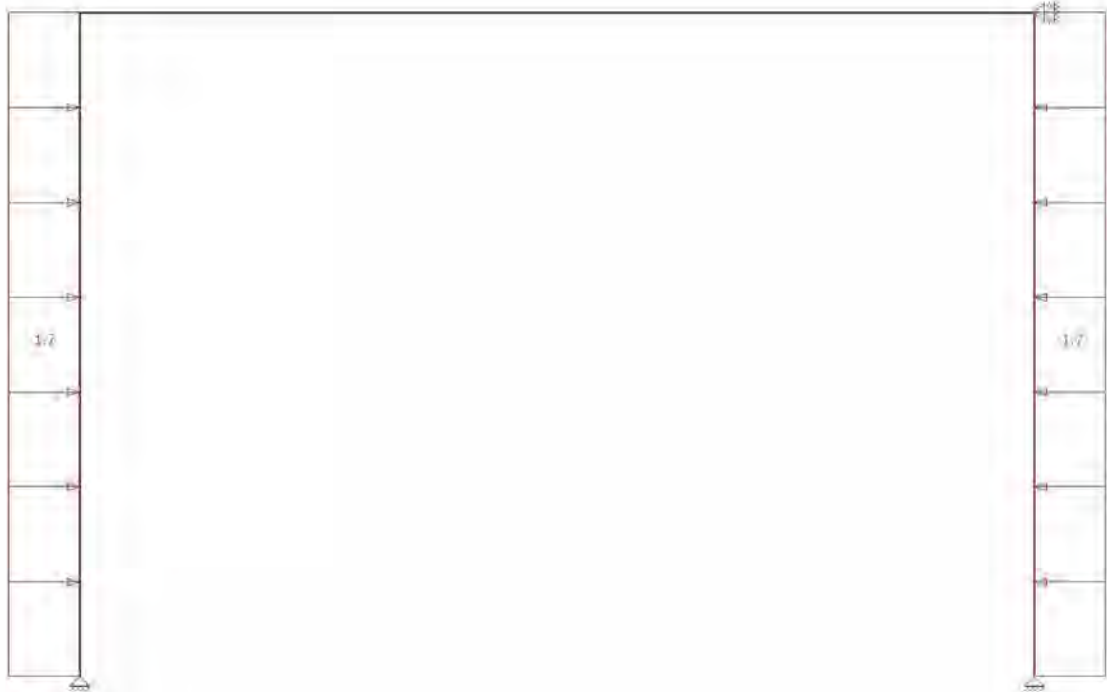
AFB. LASTEN B.G.2 VERDEELDE VERÄNDERLIJKE BELASTING



AFB. LASTEN B.G.3 KNIKLINGTE (ASSYMETRISCH)



## AFB. LASTEN B.G.4 KNIKLENGTE (SYMMETRISCH)



### FUNDAMENTEEL BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Fu.C.1 | Fu.C.2 |
|-------|-----------------------------------|--------|--------|
| B.G.1 | Permanent                         | 1.20   | 1.35   |
| B.G.2 | Verdeelde veranderlijke belasting | 1.50   | 0.60   |
| B.G.3 | Kniklengte (Assymetrisch)         | -      | -      |
| B.G.4 | Kniklengte (Symmetrisch)          | -      | -      |

### KARAKTERISTIEK BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|-------|-----------------------------------|-----------|--------|--------|
| B.G.1 | Permanent                         | 1.00      | 1.00   | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting | -         | 0.40   | 1.00   |
| B.G.3 | Kniklengte (Assymetrisch)         | -         | -      | -      |
| B.G.4 | Kniklengte (Symmetrisch)          | -         | -      | -      |

### FREQUENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Fr.C.(w1) | Fr.C.1 |
|-------|-----------------------------------|-----------|--------|
| B.G.1 | Permanent                         | 1.00      | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting | -         | 0.50   |
| B.G.3 | Kniklengte (Assymetrisch)         | -         | -      |
| B.G.4 | Kniklengte (Symmetrisch)          | -         | -      |

### QUASI-PERMANENT BELASTINGSCOMBINATIES (TABEL)

| B.G.  | Omschrijving                      | Qu.C.1 |
|-------|-----------------------------------|--------|
| B.G.1 | Permanent                         | 1.00   |
| B.G.2 | Verdeelde veranderlijke belasting | 0.30   |
| B.G.3 | Kniklengte (Assymetrisch)         | -      |

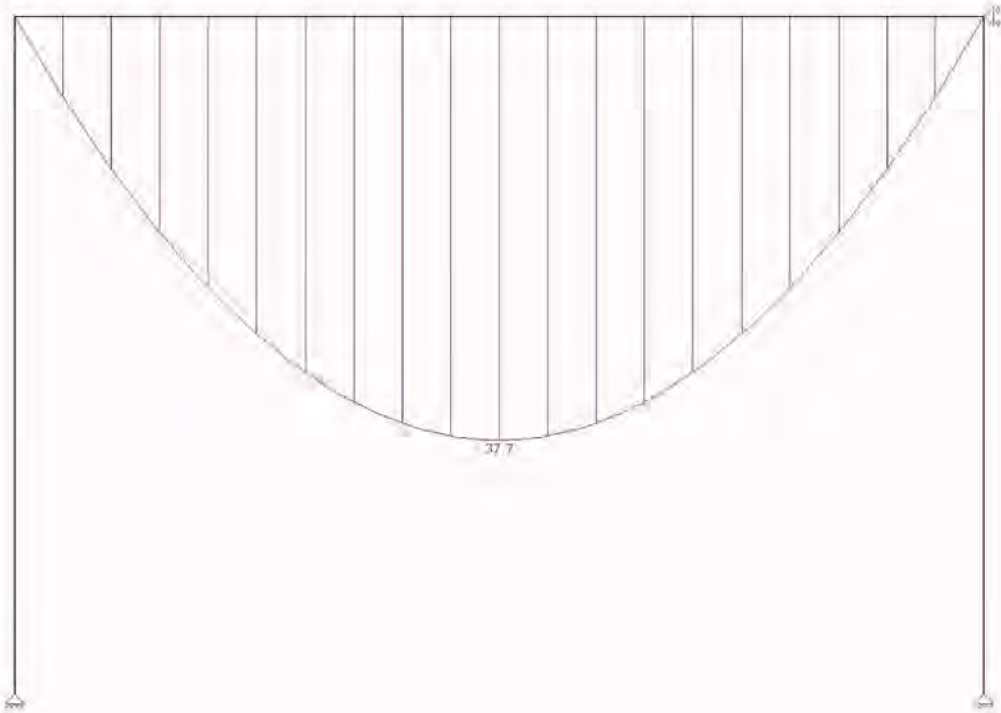
B.G.4 Kniklengte (Symmetrisch)

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

AFB. FU.C. MOMENT (MY) OMHULLENDE

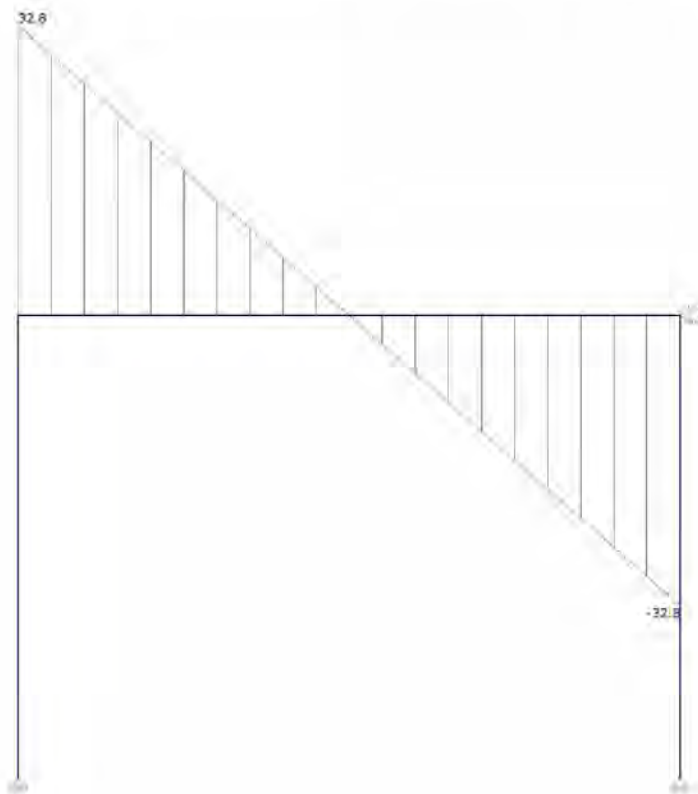
Fundamenteel Belastingscombinaties



AFB. FU.C. DWARSKRACHT (VZ) OMHULLENDE

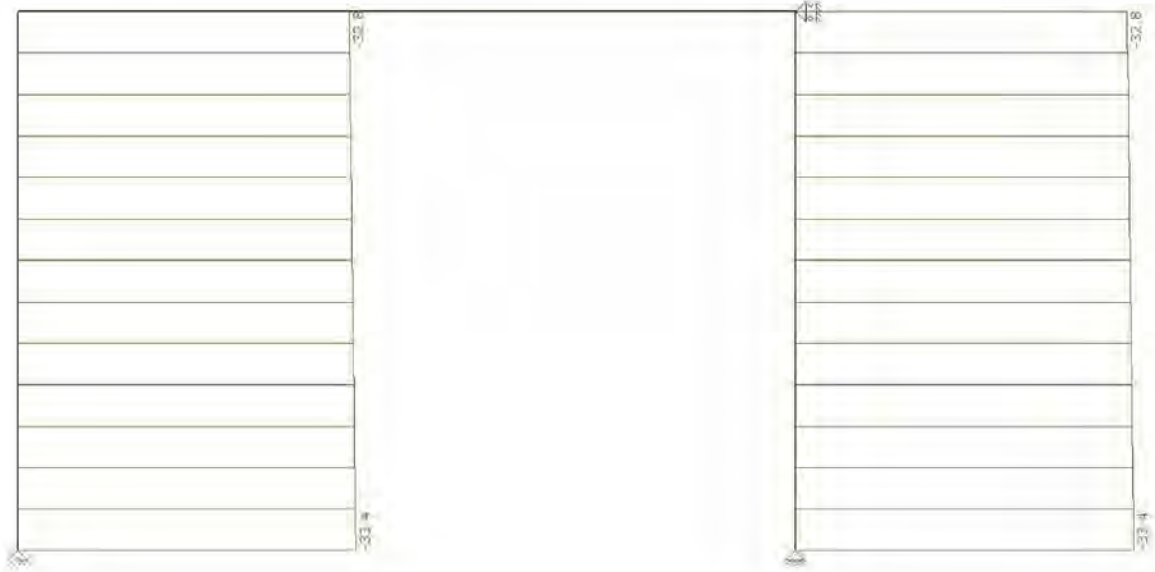
Fundamenteel Belastingscombinaties





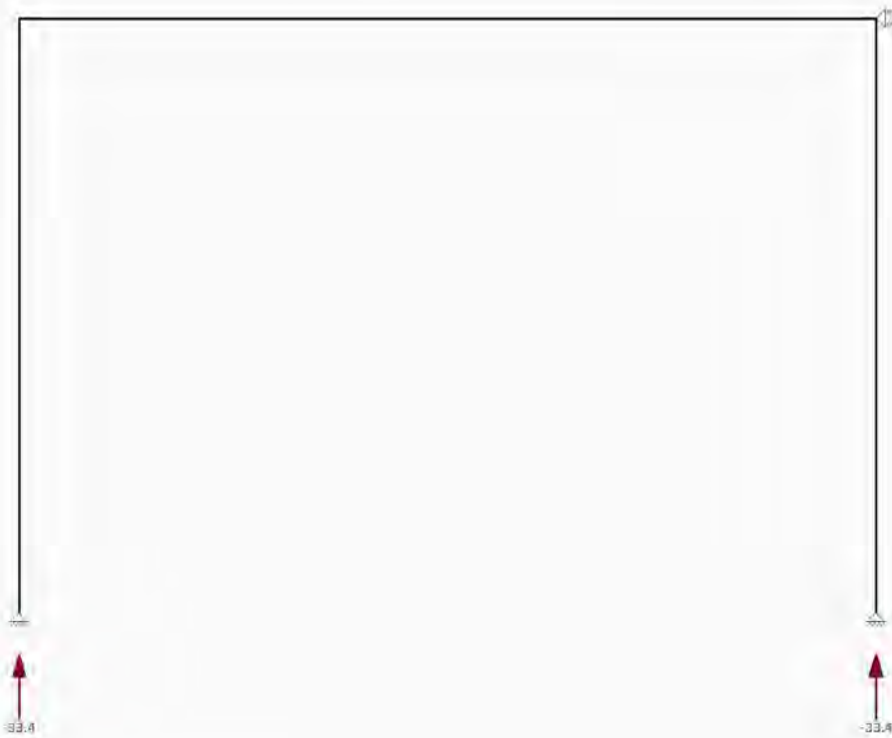
AFB. FU.C. NORMAALKRACHT (NX) OMHULLENDE

Fundamenteel Belastingscombinaties



AFB. FU.C. OPLEGREACTIES OMHULLENDE

Fundamenteel Belastingscombinaties



## FU.C. EXTREME OPLEGREACTIES

| 5.1.2.e                        | B.C. | Mymax | B.C. | Xmax | My     | B.C. | Zmax   | My   |     |    |   |
|--------------------------------|------|-------|------|------|--------|------|--------|------|-----|----|---|
| O1                             | K1   |       |      |      | Fu.C.1 | 0.00 | -33.41 |      |     |    |   |
| 0.00                           |      |       |      |      |        |      |        |      |     |    |   |
| O2                             | K3   |       |      |      | Fu.C.1 | 0.00 | -33.41 |      |     |    |   |
| 0.00                           |      |       |      |      |        |      |        |      |     |    |   |
| <b>Globale extreme waarden</b> |      |       |      |      |        |      |        |      |     |    |   |
| O2                             | K3   |       |      |      | Fu.C.1 | 0.00 | -33.41 | 0.00 |     |    |   |
| -                              | -    | -     | kN   | kN   | kNm    | -    | kN     | kN   | kNm | kN | k |
| N                              | kNm  |       |      |      |        |      |        |      |     |    |   |

AFB. KA.C. VERPLAATSINGEN OMHULLENDE

Karakteristiek Belastingcombinaties



## KA.C. EXTREME DOORBUIGINGEN

| Staat | B.C.   | Knoop Begin |       | Staat  |        | Knoop Eind |       |
|-------|--------|-------------|-------|--------|--------|------------|-------|
|       |        |             |       | Z'afst | Z'     |            |       |
| S3    | Ka.C.2 | 0.000       | 0.000 | 2.300  | 0.0112 | 0.000      | 0.000 |
| -     | -      | m           | m     | m      | m      | m          | m     |

## AFB. STAALCONTROLE



### SAMENSTELLING CONSTRUCTIEDELEN

| Constructiedeel | Staal/staven |
|-----------------|--------------|
| C1              | S1           |
| C2              | S2           |
| C3              | S3           |

### KNIKLENGTEGEGEVENS

| Staal                 | Profiel | Lokale Y-as |           |       |           | Lokale Z-as  |       |       |  |
|-----------------------|---------|-------------|-----------|-------|-----------|--------------|-------|-------|--|
|                       |         | Lsys        | methode   | Lbuc  | Lbuc/Lsys | methode      | Lbuc  | Lbuc/ |  |
| C1 - V1 (0.000-3.200) | P1      | 3.200       | Geschoord | 3.080 | 0.96      | Cons. gesch. | 3.200 | 1.00  |  |
| C2 - V1 (0.000-3.200) | P1      | 3.200       | Geschoord | 3.080 | 0.96      | Cons. gesch. | 3.200 | 1.00  |  |
| -                     | -       | m           | -         | m     | -         | -            | m     | -     |  |

### KIPSTEUNENGEDEVENS

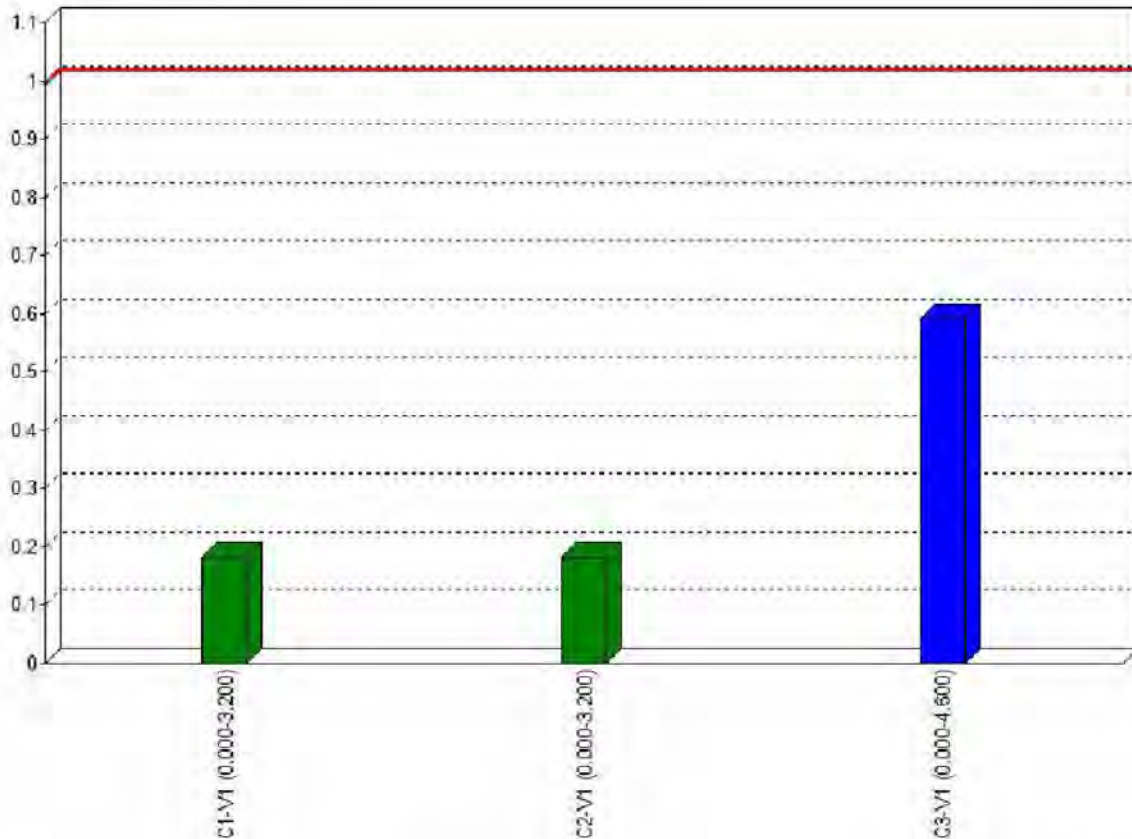
| Staal                 | Profiel | Begin:   | Eind:    | Kipsteunen boven | Kipsteunen onder |
|-----------------------|---------|----------|----------|------------------|------------------|
| C1 - V1 (0.000-3.200) | P1      | Gesteund | Gesteund |                  | Centrum          |
| C2 - V1 (0.000-3.200) | P1      | Gesteund | Gesteund |                  | Centrum          |
| C3 - V1 (0.000-4.600) | P2      | Gesteund | Gesteund |                  | Centrum          |
| -                     | -       | -        | -        | m                | m                |

### DOORBUIGINGGEGEVENS

| Staal   | Constructietype | Toetsing | Zeeg Y' | Zeeg Z' | Zeegvorm | w;max |
|---------|-----------------|----------|---------|---------|----------|-------|
| w;2+w;3 |                 |          |         |         |          |       |

|                                      |            |   |          |       |
|--------------------------------------|------------|---|----------|-------|
| C1 - V1 (0.000-3.200) Kolom<br>N/B   | 1 bouwlaag |   | 3-punt   | H/300 |
| C2 - V1 (0.000-3.200) Kolom<br>N/B   | 1 bouwlaag |   | 3-punt   | H/300 |
| C3 - V1 (0.000-4.600) Vloer<br>L/333 | Algemeen   | 0 | 0 3-punt | L/250 |
| -                                    | -          | - | mm       | mm -  |

## AFB. STAAL UC DIAGRAM



## UNITY CHECK NEN-EN1993-1-1:2016/NB:2016

| Veld                | Toetsing             | Combinatie | Artikel                     | UC max |
|---------------------|----------------------|------------|-----------------------------|--------|
| C1-V1 (0.000-3.200) | Doorsnede            | Fu.C.1     | NEN-EN1993-1-1(6.9)         | 0.07   |
| C1-V1 (0.000-3.200) | Stabiliteit          | Fu.C.1     | NEN-EN1993-1-1(6.46)        | 0.09   |
| C1-V1 (0.000-3.200) | Stabiliteit          | Fu.C.1     | NEN-EN1993-1-1(6.46)        | 0.18   |
| C1-V1 (0.000-3.200) | Stabiliteit          | Fu.C.1     | NEN-EN1993-1-1(6.61&6.62)   | 0.18   |
| C1-V1 (0.000-3.200) | Kiptoetsing          | Fu.C.2     | NEN-EN1993-1-1(6.54)        | 0.00   |
| C1-V1 (0.000-3.200) | Doorbuigingstoetsing | Ka.C.1     | NEN-EN NEN-EN1990/NB A1.4.2 | 0.00   |
| C2-V1 (0.000-3.200) | Doorsnede            | Fu.C.1     | NEN-EN1993-1-1(6.9)         | 0.07   |
| C2-V1 (0.000-3.200) | Stabiliteit          | Fu.C.1     | NEN-EN1993-1-1(6.46)        | 0.09   |
| C2-V1 (0.000-3.200) | Stabiliteit          | Fu.C.1     | NEN-EN1993-1-1(6.46)        | 0.18   |
| C2-V1 (0.000-3.200) | Stabiliteit          | Fu.C.1     | NEN-EN1993-1-1(6.61&6.62)   | 0.18   |
| C2-V1 (0.000-3.200) | Kiptoetsing          | Fu.C.2     | NEN-EN1993-1-1(6.54)        | 0.00   |
| C2-V1 (0.000-3.200) | Doorbuigingstoetsing | Ka.C.1     | NEN-EN NEN-EN1990/NB A1.4.2 | 0.00   |

| Veld                | Toetsing             | Combinatie | Artikel                     | UC max |
|---------------------|----------------------|------------|-----------------------------|--------|
| C3-V1 (0.000-4.600) | Doorsnede            | Fu.C.1     | NEN-EN1993-1-1(6.12)        | 0.49   |
| C3-V1 (0.000-4.600) | Kiptoetsing          | Fu.C.1     | NEN-EN1993-1-1(6.54)        | 0.59   |
| C3-V1 (0.000-4.600) | Doorbuigingstoetsing | Qu.C.1     | NEN-EN NEN-EN1990/NB A1.4.2 | 0.31   |

## GEWICHT STAALCONSTRUCTIE

| Staf                | Profiel       | Lsys          | Massa          |
|---------------------|---------------|---------------|----------------|
| C1-V1 (0.000-3.200) | HE100A        | 3.200         | 53.345         |
| C2-V1 (0.000-3.200) | HE100A        | 3.200         | 53.345         |
| <b>Subtotaal:</b>   | <b>HE100A</b> | <b>6.400</b>  | <b>106.690</b> |
| C3-V1 (0.000-4.600) | HE180A        | 4.600         | 163.403        |
| <b>Subtotaal:</b>   | <b>HE180A</b> | <b>4.600</b>  | <b>163.403</b> |
| <b>Totaal:</b>      |               | <b>11.000</b> | <b>270.093</b> |
|                     |               | m             | kg             |