

TLK

bouwkundig teken- en adviesbureau

**project bouw van een woning
adres Eindsestraat 27
plaats Drongelen**

**opdrachtgever
werknr. 411
blad C2
betreft ontwerpberkening woning
constructeur**

datum 12-04-17

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2. Algemene gegevens

2.1. Inleiding

Dit rapport betreft een ontwerpberekening voor de woning aan Eindsestraat 27 te Drongelen. In deze berekening worden de benodigde (hoofd)constructieonderdelen bepaald waarbij de breedplaat- en kelderwandwapening, dakkapellen e.d. in een latere fase bij de detailberekeningen bepaald worden. De woning bestaat uit een schuine kap, de 1^e verdieping en begane grond zijn breedplaatvloeren, de gevels zijn uit spouwmuren opgebouwd en de gehele woning is onderkelderd. Gezien de aanwezige grond zal de woning op palen gefundeerd worden, in dit geval prefab heipalen.

2.2. Referenties en gebruikte documenten

- [1] TLK
tekening: plattegronden en gevels, werknr. 411, teknr. 01, rev. B, 20-03-17
- [2] TLK
tekening: constructieblad, werknr. 411, teknr. 03, rev. 0, 12-04-17
- [3] Stichting Centrum Hout
tabellen en grafieken: houtconstructies voor het HTO en HBO+, d.d. december 2001

2.3. Revisies

In deze paragraaf wordt aangegeven wat de aanpassingen of aanvullingen zijn bij de desbetreffende versie.

2.4. Toelichting

3. Constructieve gegevens

De hieronder genoemde gegevens zijn van toepassing op dit document

3.1. Voorschriften

| | |
|-------------------|----------------------------------|
| EC-0, NEN-EN 1990 | grondslagen constructief ontwerp |
| EC-1, NEN-EN 1991 | belastingen op constructies |
| EC-2, NEN-EN 1992 | beton |
| EC-3, NEN-EN 1993 | staal |
| EC-5, NEN-EN 1995 | hout |
| EC-6, NEN-EN 1996 | metselwerk |
| EC-7, NEN-EN 1997 | geotechniek |

3.2. Gebouwgegevens

| | |
|--------------------|---|
| gebouwcategorie: | A: woon- en verblijfsruimte |
| reductiefactor: | $\Psi_0 \quad \Psi_1 \quad \Psi_2$ 0,4 0,5 0,3 |
| ontwerplevensduur: | klasse 4 (50 jaar) |
| gevolgklasse: | CC1 ($K_{FI} = 0,9$) |

3.3. Materialen

| | | |
|--------------------------|--|--|
| betonconstructie: | in het werk gestort beton betonstaal: milieu-omstandigheden: - palen - vloer - funderingsstrook | sterkteklasse C20/25 staalsoort B500 A/B XA2 XC3 XC4 |
| staalconstructie: | profielstaal: ankers: bouten: | staalsoort S235 sterkteklasse 4.6 sterkteklasse 8.8 |
| steenconstructie: | baksteen: betonsteen: metselmortel M5: kalkzandsteen gemetseld: kalkzandsteen gelijmd: | $f_{rep} = 5,00 \text{ N/mm}^2$ $f_{rep} = 15,00 \text{ N/mm}^2$ $f_k = 2,55 \text{ N/mm}^2$ $f_{rep} = 4,0 \text{ N/mm}^2$ $f_{rep} = 6,0 \text{ N/mm}^2$ |
| houtconstructie: | sterkteklasse: klimaatklasse: belastingduurklasse: | C18 1 middellang |

3.4. Windbelasting

| | |
|-----------------|------------------------------------|
| reductiefactor: | $\Psi_0 \quad \Psi_1 \quad \Psi_2$ |
| | 0 0,2 0 |

gebied: III
omgeving: onbebouwd
hoogte: 6,65 m
stuwdruk: 0,60 kN/m²

gevel druk c_{pe}: 0,8
gevel zuiging c_{pe}: 0,5
dak druk c_{pe}: 0,7/-0,5
dak zuiging c_{pe}: 0,0/0,5

3.5. Sneeuwbelasting

reductiefactor: Ψ_0 Ψ_1 Ψ_2
 0 0,2 0

hellend dak: 40°
 μ_1 : 0,53

4. Uitgangspunten

4.1. Belastingen

Alle belastingen in de berekeningen zijn gebaseerd op onderstaande representatieve waarden.

4.1.1 Hellend dak (40°)

Permanente belasting: G_k

$$\begin{array}{lll} \text{Systeemdakplaten + pannen} & = & 0,65 \text{ kN/m}^2 \\ \text{grondvlak} & = & 0,85 \text{ kN/m}^2 \end{array}$$

Veranderlijke belasting: Q_k

$$\text{Sneeuw (grondvlak)} = 0,53 \cdot 0,7 = 0,37 \text{ kN/m}^2$$

$$\text{dakvlak} = 0,28 \text{ kN/m}^2$$

4.1.2 1e verdiepingsvloer

Permanente belasting: G_k

| | | |
|------------------------|--------------|--------------------------|
| Breedplaadvloer 200 mm | = 0,20*25,00 | = 5,00 kN/m ² |
| Afwerking 40 mm | = 0,04*20,00 | = 0,80 kN/m ² |
| | | = 5,80 kN/m ² |

Veranderlijke belasting: Q_k

$$\text{Personen} = 1,75 \text{ kN/m}^2$$

4.1.3 Begane grondvloer

Permanente belasting: G_k

| | | | |
|------------------------|----------------------|----------|-----------------|
| Breedplaadvloer 200 mm | $= 0,20 \cdot 25,00$ | $= 5,00$ | kN/m^2 |
| Afwerking 40 mm | $= 0,04 \cdot 20,00$ | $= 0,80$ | kN/m^2 |
| | | $= 5,80$ | kN/m^2 |

Veranderlijke belasting: Q_k

$$\text{Personen} = 1,75 \text{ kN/m}^2$$

4.1.4 Kelder

Permanente belasting: G_k

Eigen gewicht vloer

Veranderlijke belasting: Q_k

| | | |
|-----------|---|------------------------------|
| Personen | = | 1,75 kN/m ² |
| Separatie | = | 0,80 kN/m ² |
| | = | <u>2,55 kN/m²</u> |

4.1.5 Geconcentreerde belastingen

| | | | |
|--|---|------|----|
| Vloeren | = | 5,00 | kN |
| Daken | = | 1,50 | kN |
| Daken direct onder dakbeschot of dakplaten aanwezige elementen | = | 2,00 | kN |

4.1.6 Bijzondere belastingen

$$\text{Kalkzandsteen} = 0,10 * 20,00 = 2,00 \text{ kN/m}^2$$

Voor de ontwerpberkening worden de kalkzandsteenwanden omgeslagen in een m^2 -belasting van 3,00 kN/ m^2 . Bij de berekeningen van de breedplaatleverancier zullen tzt de juiste belastingen van de kalkzandsteenwanden (soms kapdragend of verdiepingsvloerdragend) gehanteerd worden.

5. Berekeningen

Indien van toepassing wordt het eigen gewicht van een constructieonderdeel verdisconteerd in de berekeningen. De berekende profielafmetingen zijn minimaal vereist of optimaal bepaald. Het is aan de opdrachtgever eventueel zwaardere profielen toe te passen.

5.1. Gewichtsberekening

De belastingen op de kelderwanden uit de kap, vloeren en wanden zijn volgens de nummering van fig. 1 per gevelNAP bepaald.

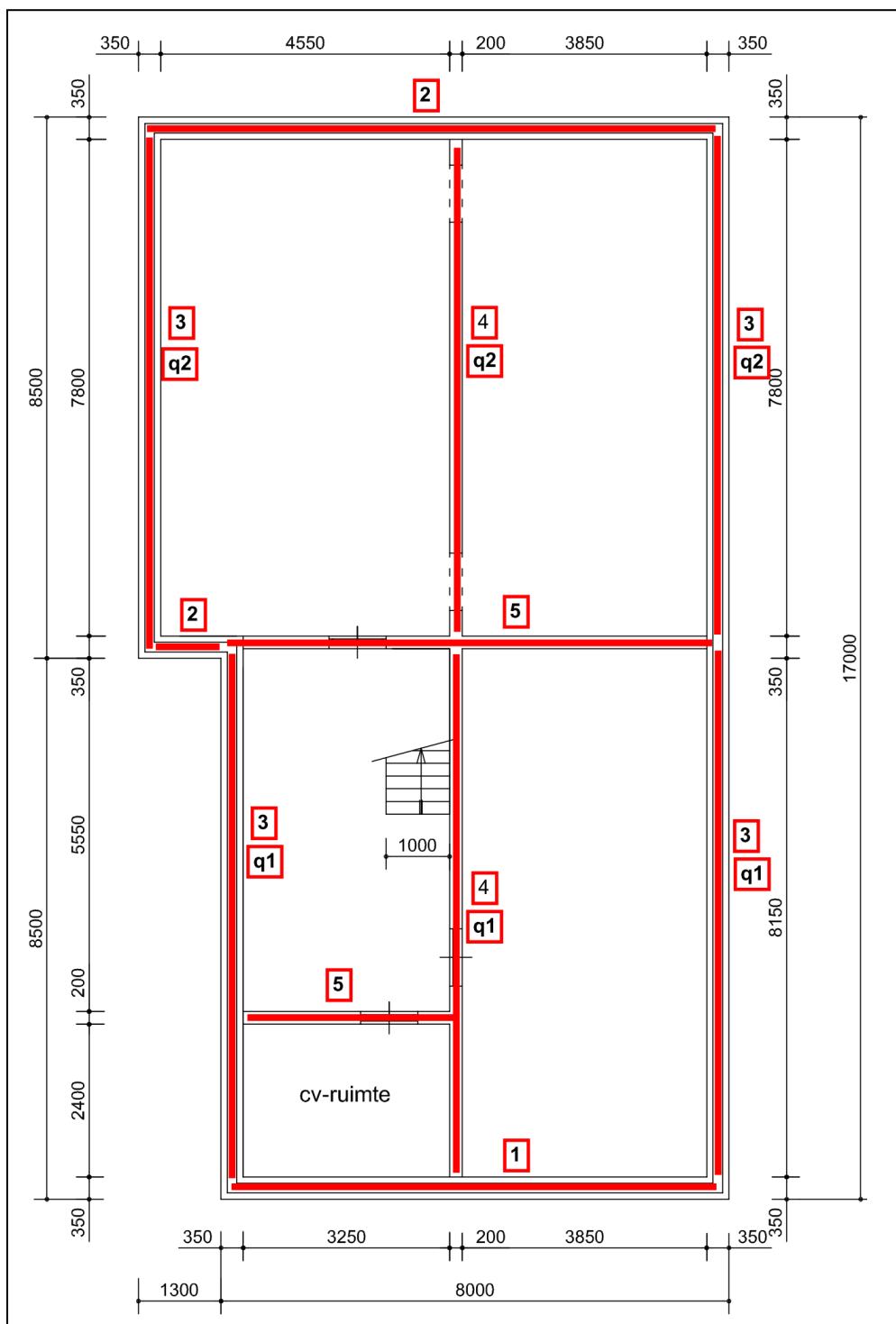


fig. 1: schematisering wanden tbv gewichtsberekening

5.1.1 Gevel 1

permanent:

| | | | |
|---------------------|-----------------------------------|--------|------|
| Hellend dak | = 0,5*1,40*0,85 | = 0,6 | kN/m |
| 1e verdiepingsvloer | = 0,5*4,10*5,80 | = 11,9 | kN/m |
| Begane grondvloer | = 0,50*5,80 | = 2,9 | kN/m |
| Gevel | = 0,20*(0,30+3,70+2/3*2,95*20,00) | = 23,9 | kN/m |
| | | = 39,3 | kN/m |

veranderlijk:

| | | | |
|---------------------|-------------------------|--------|------|
| Hellend dak | = 0,5*1,40*0,37 | = 0,6 | kN/m |
| 1e verdiepingsvloer | = 0,5*4,10*(1,75+3,00)) | = 9,7 | kN/m |
| | | = 10,3 | kN/m |

5.1.2 Gevel 2

permanent:

| | | | |
|---------------------|-----------------------------------|--------|------|
| Hellend dak | = 0,5*1,40*0,85 | = 0,6 | kN/m |
| 1e verdiepingsvloer | = 0,50*5,80 | = 2,9 | kN/m |
| Begane grondvloer | = 0,50*5,80 | = 2,9 | kN/m |
| Gevel | = 0,20*(0,30+3,70+2/3*2,95*20,00) | = 23,9 | kN/m |
| | | = 30,3 | kN/m |

veranderlijk:

| | | | |
|-------------|-----------------|-------|------|
| Hellend dak | = 0,5*1,40*0,37 | = 0,6 | kN/m |
|-------------|-----------------|-------|------|

5.1.3 Gevel 3

Q1

permanent:

| | | | |
|---------------------|--------------------------|--------|------|
| Hellend dak | = 0,5*7,40*0,85 | = 3,1 | kN/m |
| 1e verdiepingsvloer | = 0,5*4,05*5,80 | = 11,7 | kN/m |
| Begane grondvloer | = 0,5*3,95*5,80 | = 11,5 | kN/m |
| Gevel | = 0,20*(0,30+3,70)*20,00 | = 16,0 | kN/m |
| | | = 42,3 | kN/m |

veranderlijk:

| | | | |
|---------------------|------------------------|--------|------|
| Hellend dak | = 0,5*7,40*0,37 | = 1,4 | kN/m |
| 1e verdiepingsvloer | = 0,5*4,05*(1,75+3,00) | = 9,6 | kN/m |
| Begane grondvloer | = 0,5*3,95*(1,75+3,00) | = 9,4 | kN/m |
| | | = 20,4 | kN/m |

Q2

permanent:

| | | | |
|---------------------|--------------------------|--------|------|
| Hellend dak | = 0,5*8,40*0,85 | = 3,6 | kN/m |
| 1e verdiepingsvloer | = 0,5*6,10*5,80 | = 17,7 | kN/m |
| Begane grondvloer | = 0,5*3,95*5,80 | = 11,5 | kN/m |
| Gevel | = 0,20*(0,30+3,70)*20,00 | = 16,0 | kN/m |
| | | = 48,8 | kN/m |

veranderlijk:

| | | | |
|---------------------|------------------------|--------|------|
| Hellend dak | = 0,5*8,40*0,37 | = 1,6 | kN/m |
| 1e verdiepingsvloer | = 0,5*6,10*(1,75+3,00) | = 14,5 | kN/m |

$$\begin{array}{lll} \text{Begane grondvloer} & = 0,5*3,95*(1,75+3,00) & \\ & & = \frac{9,4}{25,5} \quad \text{kN/m} \end{array}$$

5.1.4 Gevel 4

Q1

permanent:

$$\begin{array}{lll} \text{Begane grondvloer} & = 0,5*1,20*7,40*5,80 & = 25,8 \quad \text{kN/m} \end{array}$$

veranderlijk:

$$\begin{array}{lll} \text{Begane grondvloer} & = 0,5*1,20*7,40*(1,75+3,00) & = 21,1 \quad \text{kN/m} \end{array}$$

Q2

permanent:

$$\begin{array}{lll} \text{Begane grondvloer} & = 0,5*1,20*8,40*5,80 & = 29,2 \quad \text{kN/m} \end{array}$$

veranderlijk:

$$\begin{array}{lll} \text{Begane grondvloer} & = 0,5*1,20*8,40*(1,75+3,00) & = 23,9 \quad \text{kN/m} \end{array}$$

5.1.5 Gevel 5

permanent:

$$\begin{array}{lll} \text{Begane grondvloer} & = 2*0,50*5,80 & = 5,8 \quad \text{kN/m} \end{array}$$

5.2. Stabiliteit

Het dak van de woning bestaat uit geïsoleerde dakplaten met een dermate grote stijfheid dat deze, mits voldoende verankerd aan de onderliggende kapconstructie, een stijf dakvlak vormt dat de belasting naar beneden afvoert. De langsgevels zijn van voldoende stijve vlakken voorzien (penanten) dat de dakbelasting en de wind op de kop van de gevel zonder problemen afgevoerd kunnen worden naar de fundering. Ook de wind op de langsgevels kan door de stijve kopgevels naar de fundering afgevoerd worden.

5.3. Houtberekeningen

| LASTSPREIDING BIJ PUNTLASTEN OP BALKEN | | | | | | | | art. 10. 2.3 | | TABEL 8 | |
|---|-------|-------|-------|-------|-------|-------|-------|--------------|------|---------|--------|
| Lastspreiding bij geconcentreerde lasten reductiefactor φ_r voor lastoppervlak 0.1 m x 0.1 m voor lastoppervlak 0.5 m x 0.5 m de waarden verlagen met 0.1 | | | | | | | | | | | |
| vloerhout | | | | | | | | triplex | | | |
| t [mm] | 16 | 18 | 20 | 22 | 25 | 28 | 32 | 16 | 18 | 20 | 22 |
| E [N/mm ²] | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 7000 | 7000 | 7000 | 5600 |
| EI [Nm] | 3400 | 4900 | 6700 | 8900 | 13000 | 18300 | 27300 | 2400 | 3400 | 4700 | 5000 |
| balken hoh [mm] | | | | | | | | | | | |
| 300 | 0,54 | 0,51 | 0,48 | 0,43 | | | | 0,56 | 0,54 | 0,52 | 0,51 |
| 400 | 0,62 | 0,59 | 0,56 | 0,51 | 0,43 | | | 0,64 | 0,62 | 0,60 | 0,59 |
| 500 | 0,70 | 0,67 | 0,64 | 0,59 | 0,51 | 0,40 | | 0,72 | 0,70 | 0,68 | 0,67 |
| 600 | 0,78 | 0,75 | 0,72 | 0,67 | 0,59 | 0,48 | 0,30 | 0,80 | 0,78 | 0,76 | 0,75 |
| 700 | 0,86 | 0,83 | 0,80 | 0,75 | 0,67 | 0,56 | 0,38 | 0,88 | 0,86 | 0,84 | 0,83 |
| 800 | | 0,91 | 0,88 | 0,88 | 0,75 | 0,64 | 0,46 | | 0,94 | 0,92 | 0,91 |
| 900 | | | 0,96 | 0,91 | 0,83 | 0,72 | 0,54 | | | 1,00 | 0,99 |
| 1000 | | | | 0,99 | 0,91 | 0,80 | 0,62 | | | (1,07) | (1,02) |
| 1100 | | | | | 0,99 | 0,88 | 0,70 | | | | (1,05) |
| 1200 | | | | | | 0,96 | 0,78 | | | | (1,02) |

fig. 2: overzicht lastspreiding puntlast op houten balken [3]

5.3.1 Gordingen, L_t = 2300 mm, hoh 1100 mm

permanent:

$$\begin{array}{llll} \text{Hellend dak (haaks):} & = 1,10 \cdot \cos 40^\circ \cdot 0,65 & = 0,55 & \text{kN/m} \\ \text{Hellend dak (evenwijdig):} & = 1,10 \cdot \sin 40^\circ \cdot 0,65 & = 0,46 & \text{kN/m} \end{array}$$

veranderlijk:

$$\begin{array}{llll} \text{Hellend dak (haaks):} & = 1,10 \cdot \cos 40^\circ \cdot 0,28 & = 0,24 & \text{kN/m} \\ \text{Hellend dak (evenwijdig):} & = 1,10 \cdot \sin 40^\circ \cdot 0,28 & = 0,20 & \text{kN/m} \end{array}$$

$$\begin{array}{llll} F \cdot K_{FI} \text{ (haaks):} & = \cos 40^\circ \cdot 2,00 \cdot 0,9 & = 1,38 & \text{kN} \\ F \cdot K_{FI} \text{ (evenwijdig):} & = \sin 40^\circ \cdot 2,00 \cdot 0,9 & = 1,16 & \text{kN} \end{array}$$

Zie bijlage A, blz. 1-22: toepassen 75x150 hoh 1100

Controle gebruikstoestand:

haaks:

$$\begin{array}{ll} U_{inst,G} = 0,1 + 1,1 = 1,2 \text{ mm} & U_{fin,G} = 1,2 \cdot (1 + 0,60) = 1,9 \text{ mm} \\ U_{inst,Q} = 0,5 \text{ mm} & U_{fin,Q} = 0,5 \cdot (1 + 0,60 \cdot 0,60) = 0,7 \text{ mm} \end{array}$$

evenwijdig:

$$\begin{array}{ll} U_{inst,G} = 0,3 + 3,5 = 3,8 \text{ mm} & U_{fin,G} = 3,8 \cdot (1 + 0,60) = 6,1 \text{ mm} \\ U_{inst,Q} = 1,5 \text{ mm} & U_{fin,Q} = 1,5 \cdot (1 + 0,60 \cdot 0,60) = 2,0 \text{ mm} \end{array}$$

$$U_{inst,G} = 1,9 + 6,1 = 8,0 \text{ mm} \quad U_{inst,Q} = 0,7 + 2,0 = 2,7 \text{ mm}$$

$$U_{fin} = \sqrt{(8,0^2 + 2,7^2)} = 8,4 \text{ mm} = 0,0036 \cdot L_t \leq 0,005 \cdot L_t \rightarrow \text{u.c.} = 0,73$$

5.4. Staalberekeningen

Opmerking:

- Eventuele detailberekeningen dienen door de staalleverancier uitgevoerd te worden.

5.4.1 Spant A

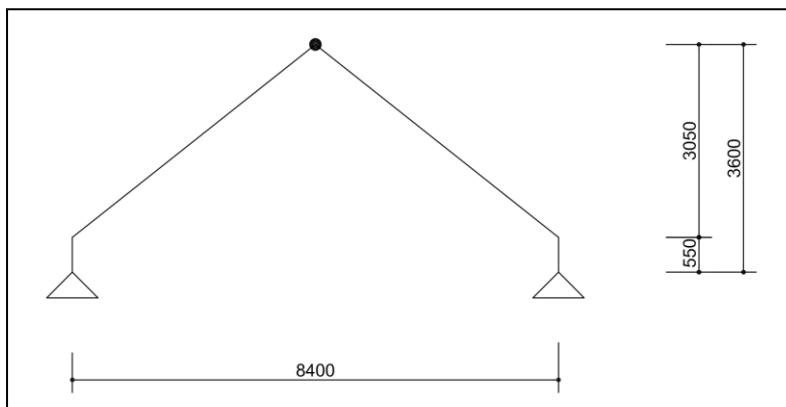


fig. 3: mechanicaalmodel spant

permanent:

$$\text{Hellend dak} = 2,30 \cdot 0,65 = 1,50 \text{ kN/m}$$

veranderlijk:

$$\text{Hellend dak} = 2,30 \cdot 0,28 = 0,64 \text{ kN/m}$$

wind:

$$q_1, \text{druk hellend dak} = 2,30 \cdot 0,7 \cdot 0,60 = 0,97 \text{ kN/m}$$

$$q_1, \text{zuiging hellend dak} = 2,30 \cdot 0,0 \cdot 0,60 = 0,00 \text{ kN/m}$$

$$q_2, \text{druk hellend dak} = 2,30 \cdot 0,7 \cdot 0,60 = 0,97 \text{ kN/m}$$

$$q_2, \text{zuiging hellend dak} = 2,30 \cdot 0,5 \cdot 0,60 = 0,69 \text{ kN/m}$$

$$q_3, \text{druk hellend dak} = 2,30 \cdot -0,5 \cdot 0,60 = -0,69 \text{ kN/m}$$

$$q_3, \text{zuiging hellend dak} = 2,30 \cdot 0,0 \cdot 0,60 = 0,00 \text{ kN/m}$$

$$q_4, \text{druk hellend dak} = 2,30 \cdot -0,5 \cdot 0,60 = -0,69 \text{ kN/m}$$

$$q_4, \text{zuiging hellend dak} = 2,30 \cdot 0,5 \cdot 0,60 = 0,69 \text{ kN/m}$$

$$q, \text{druk gevel} = 2,30 \cdot 0,8 \cdot 0,60 = 1,10 \text{ kN/m}$$

$$q, \text{zuiging gevel} = 2,30 \cdot 0,5 \cdot 0,60 = 0,69 \text{ kN/m}$$

Zie bijlage A, blz. 101-113: toepassen spant HEB140

Controle gebruikstoestand:

- ligger: $U_{fin} = 4,0 \text{ mm} = 0,0008 \cdot L_t \leq 0,004 \cdot L_t \rightarrow \text{u.c.} = 0,21$
- kolom: $U_{fin} = 1,4 \text{ mm} \leq 1/300 \cdot L_t = 1,8 \text{ mm} \rightarrow \text{u.c.} = 0,78$

Opmerkingen:

- voor het halfspant geldt dezelfde belasting: HEB140 aanhouden.

5.4.2 Ligger A: $L_t = 6800 \text{ mm}$

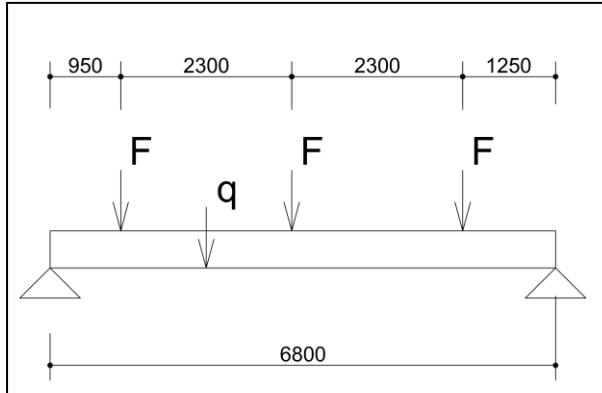


fig. 4: mechanicaalmodel ligger A

permanent:

$$1e \text{ verdieping} = 0,5*1,20*5,80 = 3,48 \text{ kN/m}$$

$$F: \text{kap (par. 5.3.1)} = 1,76+7,13 = 8,89 \text{ kN}$$

veranderlijk:

$$1e \text{ verdieping} = 0,5*1,20*(1,75+3,00) = 2,85 \text{ kN/m}$$

$$F: \text{kap (par. 5.3.1)} = 3,04 \text{ kN}$$

Zie bijlage A, blz. 114-118: toepassen HEB260

Controle gebruikstoestand:

$$U_{\text{vert}} = 11,3 \text{ mm} = 0,0017*L_t \leq 0,002*L_t \rightarrow \text{u.c.} = 0,83$$

5.4.3 Ligger B: $L_t = 4100 \text{ mm}$

permanent:

$$1e \text{ verdieping} = 0,5*1,20*7,40*5,80 = 25,75 \text{ kN/m}$$

veranderlijk:

$$1e \text{ verdieping} = 0,5*1,20*7,40*(1,75+3,00) = 21,09 \text{ kN/m}$$

Zie bijlage A, blz. 119-123: toepassen HEB240

Controle gebruikstoestand:

$$U_{\text{vert}} = 7,4 \text{ mm} = 0,0018*L_t \leq 0,002*L_t \rightarrow \text{u.c.} = 0,90$$

5.5. Betonberekeningen

5.5.1 1^e verdiepingsvloer

De 1e verdiepingsvloer betreft een breedplaatvloer. Voor het ontwerp wordt uitgegaan van een 200 mm dikke vloer (50+150 mm) met een afwerking van 40 mm. De berekening van deze vloer zal tzt door de leverancier aangeleverd worden. Eventuele correcties in belastingafdrachten zullen dan meegenomen worden in aangepaste berekeningen.

5.5.2 Begane grondvloer

Ook de begane grondvloer betreft een breedplaatvloer en hier geldt hetzelfde als voor de 1e verdiepingsvloer.

5.5.3 Kelder

De kelder wordt in het werk gestort waarbij de wanden 350 mm en vloer 300 mm dik zijn. De kelder is op palen gefundeerd, de detailberekening van de wapening zal in een latere fase aangeleverd worden, tegelijk met de berekeningen van de breedplaten.

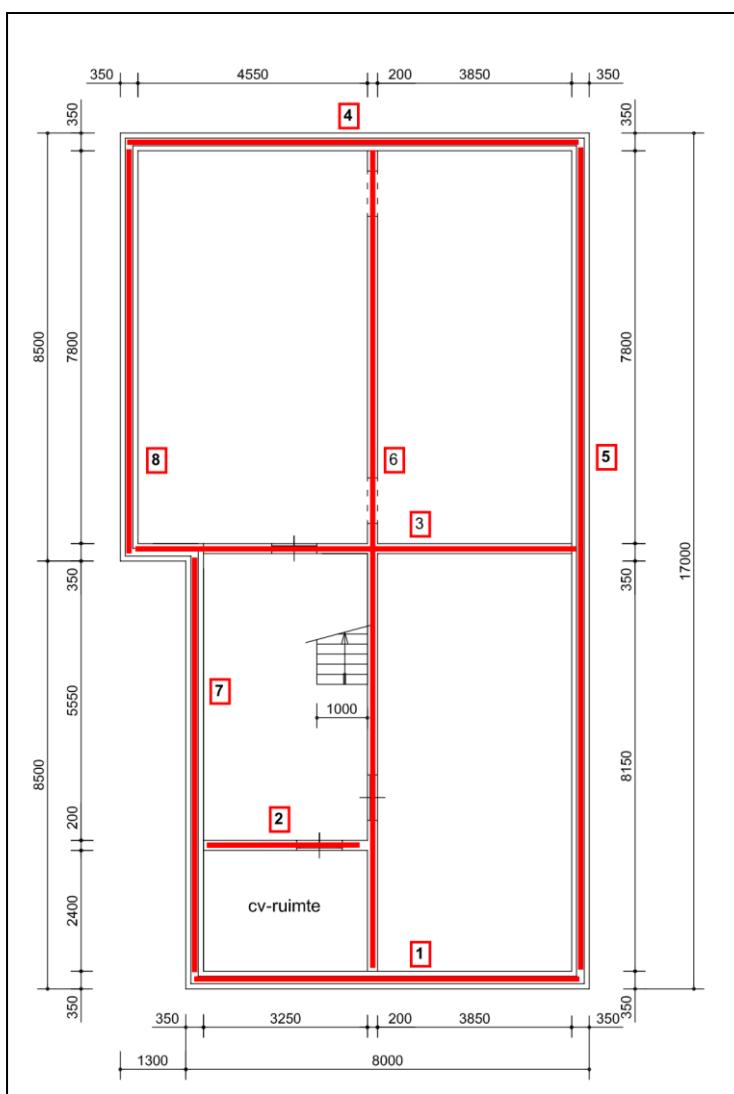


fig. 5: wandnummering tbv paalberekening

5.5.4 Kelderlasten

Voor de paalberekeningen wordt uitgegaan van de gewichtsberekening van par. 5.1.
Zie fig. 5 voor onderstaande wandlasten

5.5.5 Wand 1

permanent:

| | | | |
|--------------------|---|------|------|
| Gewichtsberekening | = | 39,3 | kN/m |
| Kelderwand | = | 22,8 | kN/m |
| Keldervloer | = | 31,5 | kN/m |
| | = | 93,6 | kN/m |

veranderlijk:

| | | | |
|--------------------|---|------|------|
| Gewichtsberekening | = | 10,3 | kN/m |
| Keldervloer | = | 9,8 | kN/m |
| | = | 20,1 | kN/m |

5.5.6 Wand 2

permanent:

| | | | |
|--------------------|---|------|------|
| Gewichtsberekening | = | 5,8 | kN/m |
| Kelderwand | = | 13,0 | kN/m |
| Keldervloer | = | 21,2 | kN/m |
| | = | 40,0 | kN/m |

veranderlijk:

| | | | | | |
|-------------|---|--------------------------|---|-----|------|
| Keldervloer | = | (0,5*2,40+0,5*3,25)*2,55 | = | 7,2 | kN/m |
|-------------|---|--------------------------|---|-----|------|

5.5.7 Wand 3

permanent:

| | | | |
|--------------------|---|------|------|
| Gewichtsberekening | = | 5,8 | kN/m |
| Kelderwand | = | 13,0 | kN/m |
| Keldervloer | = | 58,5 | kN/m |
| | = | 77,3 | kN/m |

veranderlijk:

| | | | | | |
|-------------|---|------------------|---|------|------|
| Keldervloer | = | (3,25+4,55)*2,55 | = | 19,9 | kN/m |
|-------------|---|------------------|---|------|------|

5.5.8 Wand 4

permanent:

| | | | |
|--------------------|---|------|------|
| Gewichtsberekening | = | 30,3 | kN/m |
| Kelderwand | = | 22,8 | kN/m |
| Keldervloer | = | 36,8 | kN/m |
| | = | 89,9 | kN/m |

veranderlijk:

| | | | |
|--------------------|---|-----|------|
| Gewichtsberekening | = | 0,6 | kN/m |
|--------------------|---|-----|------|

$$\begin{array}{lll} \text{Keldervloer} & = 4,55 \cdot 2,55 & \\ & & = \frac{16,2}{16,8} \quad \text{kN/m} \end{array}$$

5.5.9 Wand 5

Q1

permanent:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 42,3 \quad \text{kN/m} \\ \text{Kelderwand} & = 2,60 \cdot 0,35 \cdot 25,00 & = 22,8 \quad \text{kN/m} \\ \text{Keldervloer} & = (0,5 \cdot 3,85 + 0,35) \cdot 0,30 \cdot 25,00 & = \frac{17,1}{82,2} \quad \text{kN/m} \\ & & = 82,2 \quad \text{kN/m} \end{array}$$

veranderlijk:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 20,4 \quad \text{kN/m} \\ \text{Keldervloer} & = 0,5 \cdot 3,85 \cdot 2,55 & = \frac{4,9}{25,3} \quad \text{kN/m} \\ & & = 25,3 \quad \text{kN/m} \end{array}$$

Q2

permanent:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 48,8 \quad \text{kN/m} \\ \text{Kelderwand} & = 2,60 \cdot 0,35 \cdot 25,00 & = 22,8 \quad \text{kN/m} \\ \text{Keldervloer} & = (0,5 \cdot 3,85 + 0,35) \cdot 0,30 \cdot 25,00 & = \frac{17,1}{88,7} \quad \text{kN/m} \\ & & = 88,7 \quad \text{kN/m} \end{array}$$

veranderlijk:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 25,5 \quad \text{kN/m} \\ \text{Keldervloer} & = 0,5 \cdot 3,85 \cdot 2,55 & = \frac{4,9}{30,4} \quad \text{kN/m} \\ & & = 30,4 \quad \text{kN/m} \end{array}$$

5.5.10 Wand 6

Q1

permanent:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 25,8 \quad \text{kN/m} \\ \text{Kelderwand} & = 2,60 \cdot 0,20 \cdot 25,00 & = 13,0 \quad \text{kN/m} \\ \text{Keldervloer} & = 0,5 \cdot (3,25 + 3,85) \cdot 0,30 \cdot 25,00 & = \frac{26,6}{65,4} \quad \text{kN/m} \\ & & = 65,4 \quad \text{kN/m} \end{array}$$

veranderlijk:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 21,1 \quad \text{kN/m} \\ \text{Keldervloer} & = 0,5 \cdot (3,25 + 3,85) \cdot 2,55 & = \frac{8,4}{29,5} \quad \text{kN/m} \\ & & = 29,5 \quad \text{kN/m} \end{array}$$

Q2

permanent:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 29,2 \quad \text{kN/m} \\ \text{Kelderwand} & = 2,60 \cdot 0,20 \cdot 25,00 & = 13,0 \quad \text{kN/m} \\ \text{Keldervloer} & = 0,5 \cdot (4,55 + 3,85) \cdot 0,30 \cdot 25,00 & = \frac{31,5}{73,7} \quad \text{kN/m} \\ & & = 73,7 \quad \text{kN/m} \end{array}$$

veranderlijk:

$$\begin{array}{lll} \text{Gewichtsberekening} & & = 23,9 \quad \text{kN/m} \\ \text{Keldervloer} & = 0,5 \cdot (4,55 + 3,85) \cdot 2,55 & = \frac{10,7}{34,6} \quad \text{kN/m} \\ & & = 34,6 \quad \text{kN/m} \end{array}$$

5.5.11 Wand 7

permanent:

| | | | |
|--------------------|---|----------------------------|------|
| Gewichtsberekening | = | 42,3 | kN/m |
| Kelderwand | = | 22,8 | kN/m |
| Keldervloer | = | (0,5*3,25+0,35)*0,30*25,00 | kN/m |
| | = | 14,8 | kN/m |
| | = | 79,9 | kN/m |

veranderlijk:

| | | | |
|--------------------|---|------|------|
| Gewichtsberekening | = | 20,4 | kN/m |
| Keldervloer | = | 4,1 | kN/m |
| | = | 24,5 | kN/m |

5.5.12 Wand 8

permanent:

| | | | |
|--------------------|---|----------------------------|------|
| Gewichtsberekening | = | 48,8 | kN/m |
| Kelderwand | = | 22,8 | kN/m |
| Keldervloer | = | (0,5*4,55+0,35)*0,30*25,00 | kN/m |
| | = | 19,7 | kN/m |
| | = | 91,3 | kN/m |

veranderlijk:

| | | | |
|--------------------|---|------|------|
| Gewichtsberekening | = | 25,5 | kN/m |
| Keldervloer | = | 5,8 | kN/m |
| | = | 31,3 | kN/m |

De berekeningen zijn terug te vinden in bijlage B.

5.5.13 Paallasten

Uit de berekeningen van bijlage B volgt de paalbelastingen (zie fig. 6). De puntlast op wand 1 volgt uit de wandberekening van balk 6.

Uit de paalberekeningen van bijlage C volgt dat alle prefab heipalen met een diameter van 350 mm uitgevoerd kunnen worden maar dat er 3 verschillende PPN's zijn (zie fig. 6).

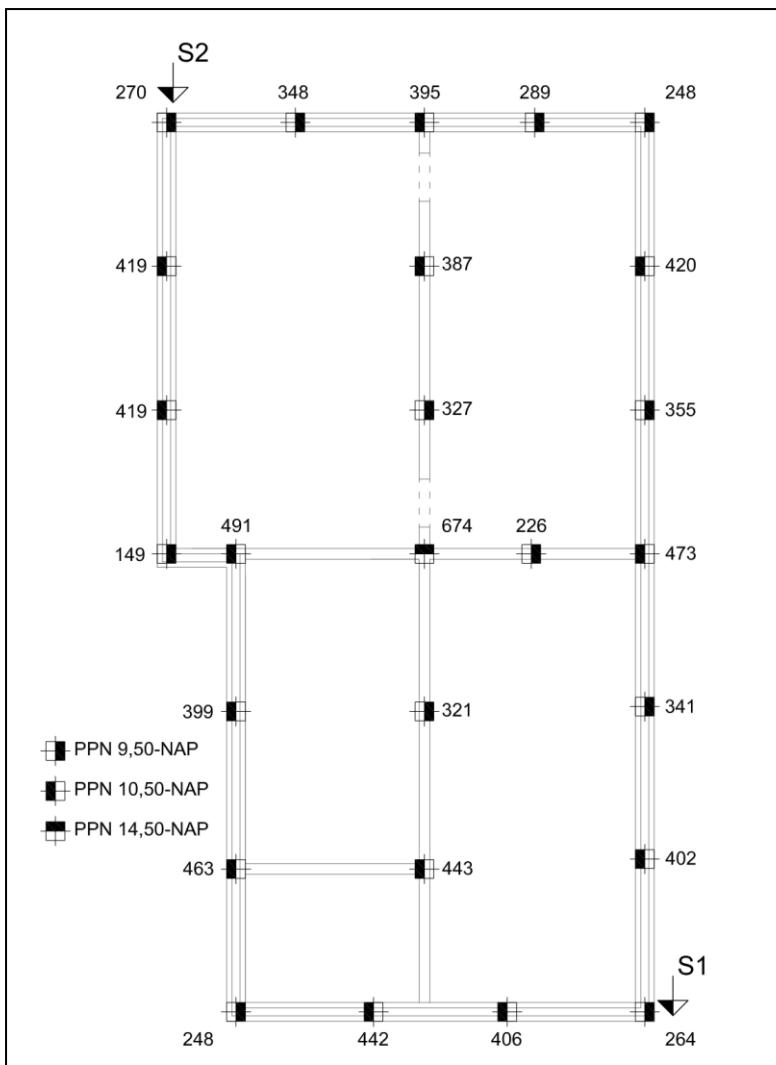


fig. 6: paallasten

5.6. Overige berekeningen

5.6.1 Spatkrachten spant

Uit bijlage A, blz. 111 volgt de maximaal optredende spatkracht uit het spant dat door de vloer opgenomen dient te worden: $H_{d,sp} = 8,27 \text{ kN}$.

Aangezien betonstaal een betere hechting heeft dan een strip aan het spant een aangelast staaf lassen en opnemen in de druklaag van de breedplaatschil.

$$A_{s,ben} = 8,27 / 0,435 = 19 \text{ mm}^2.$$

toepassen betonstaal ø10 (79), lang 600 mm

5.6.2 Oplegdruk ligger B

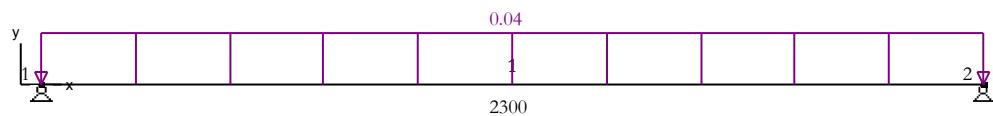
De reactiekracht uit ligger B is maatgevend boven die van ligger A. De ligger ligt op een gelijmde kalkzandsteenwand en de oplegreactie uit de HEB240 is (zie bijlage A, blz. 123) $V_{E,d} = 138,4 \text{ kN}$ oplegvlak: lengte = 100 mm, breedte = 240 mm

$$\sigma_{d,mw} = 138,4 * 10^3 / (100 * 240) = 5,77 \text{ N/mm}^2 < 6,00 \text{ N/mm}^2 \rightarrow \text{akkoord, u.c.} = 0,96$$

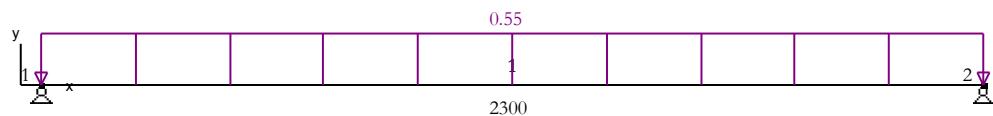
6. Bijlagen

6.1. Bijlage A: berekeningen Buildsoft

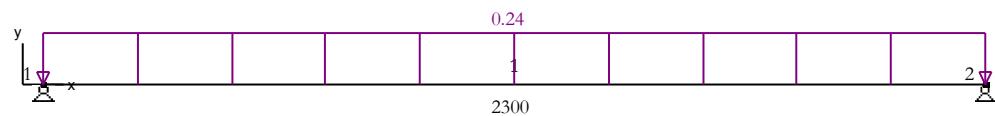
hout haaks: Lasten - eigengewicht (kN, kNm, kN/m)



hout haaks: Lasten - permanent (kN, kNm, kN/m)

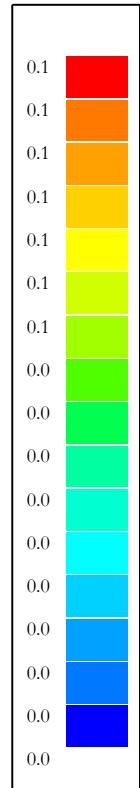
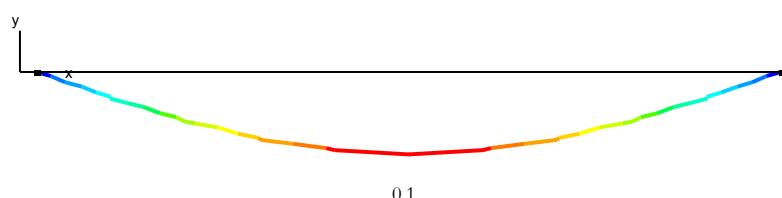


hout haaks: Lasten - gebruikslast (kN, kNm, kN/m)

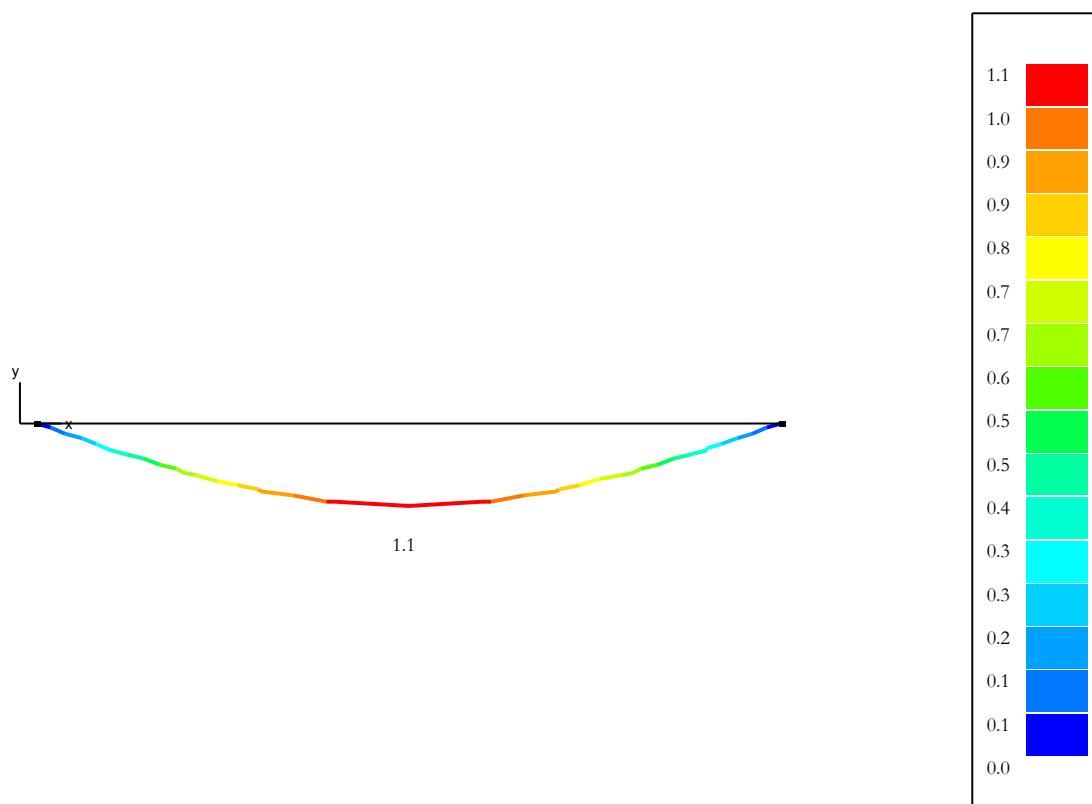


y
x

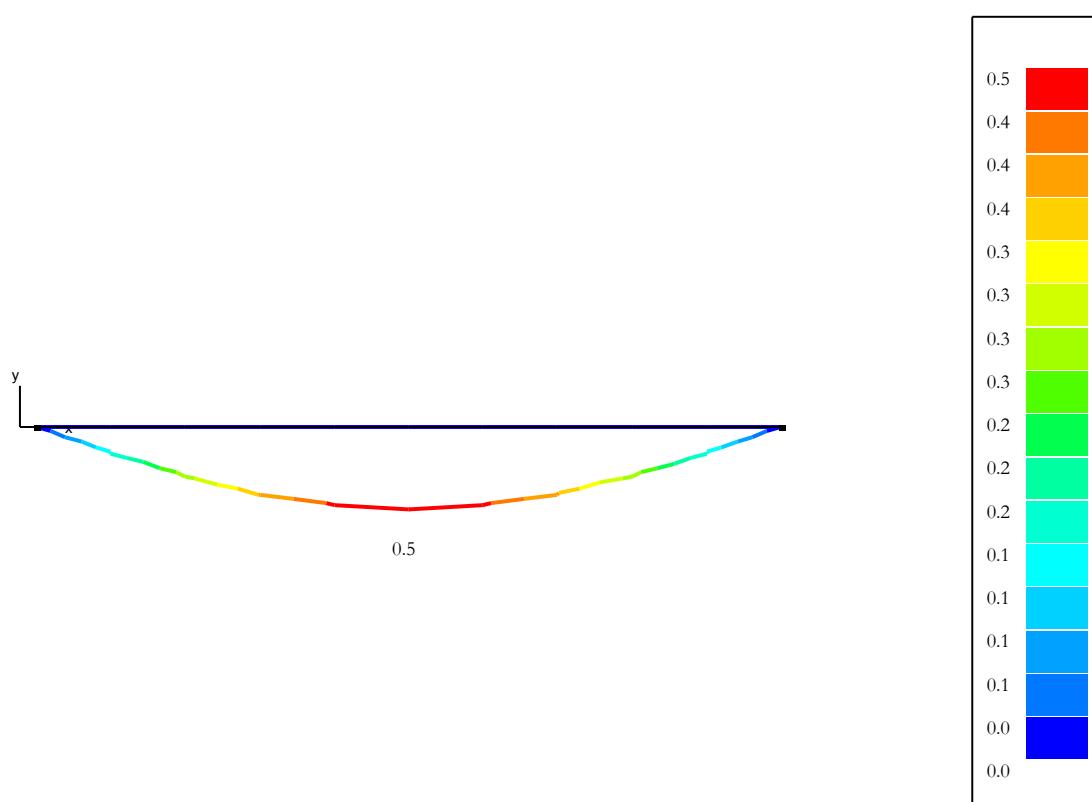
hout haaks: eigengewicht-Vervorming dY (mm)

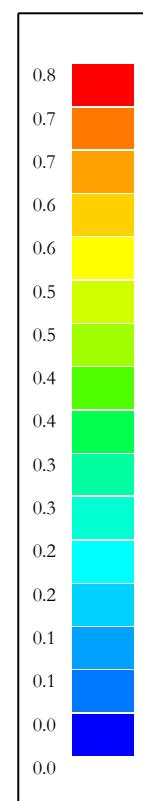
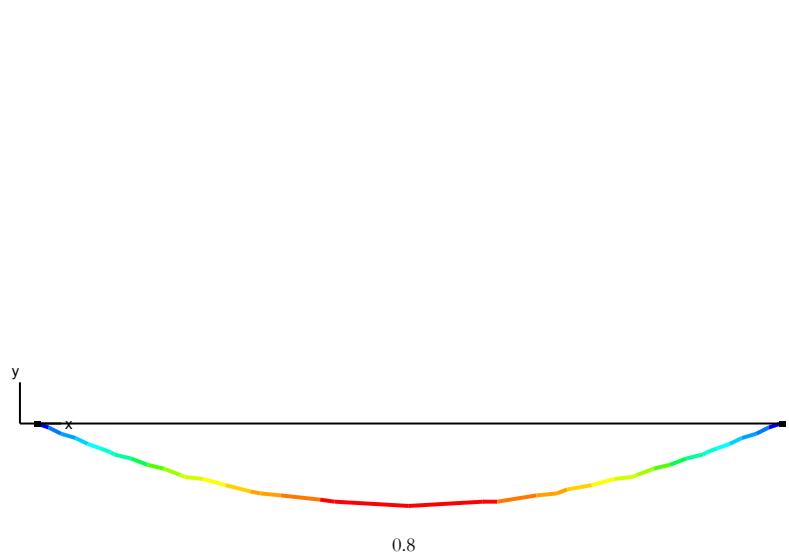
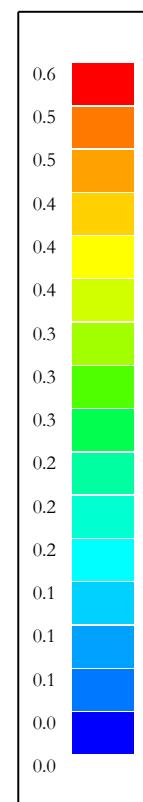
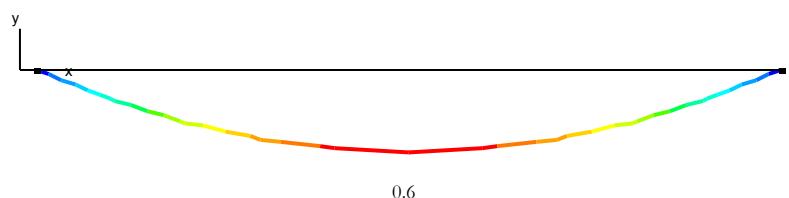


hout haaks: permanent-Vervorming dY (mm)

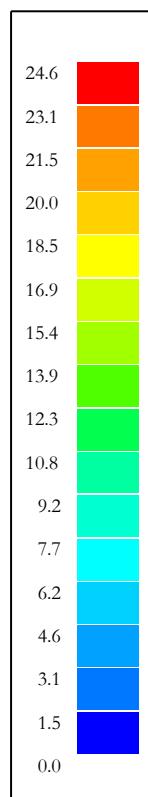
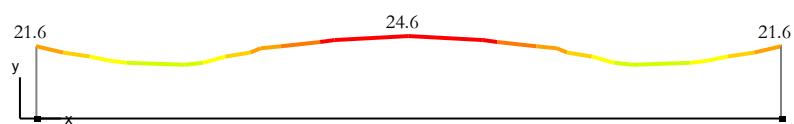


hout haaks: gebruikslast-Vervorming dY (mm)

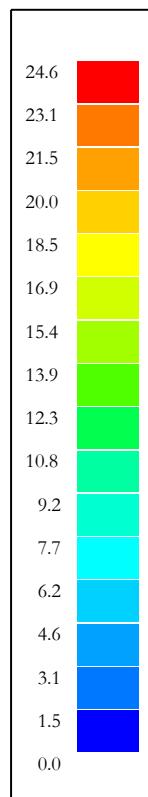
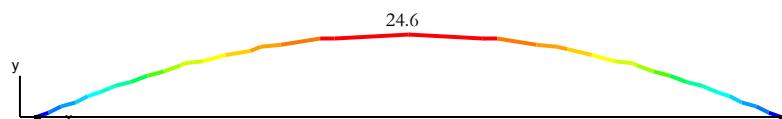


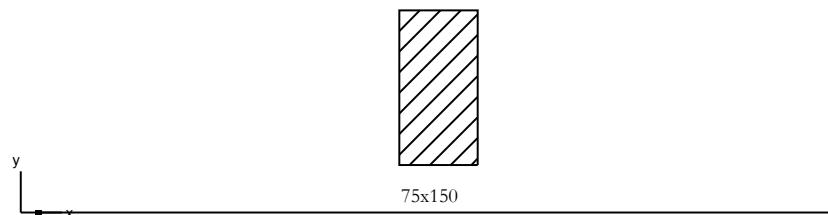
hout haaks: UGT FC-Buigende momenten M_y' (kNm)hout haaks: GGT ZC-Buigende momenten M_y' (kNm)

hout haaks: Weerstandscontrole (%) - EN 1995-1-1

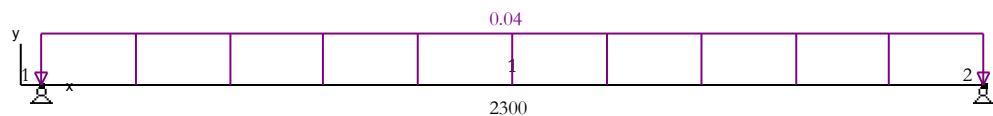


hout haaks: Stabiliteitscontrole (%) - EN 1995-1-1



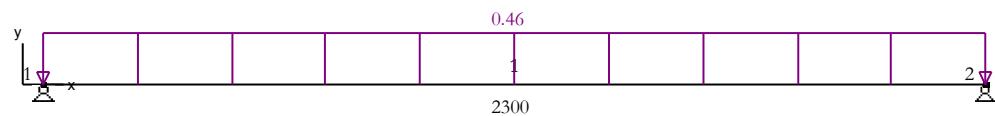
hout haaks: Dimensionering

A coordinate system with a vertical line labeled 'y' and a horizontal line labeled 'x'.

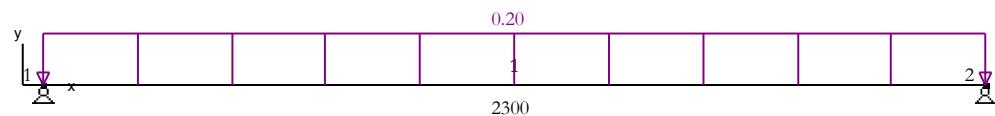
hout evenwijdig: Lasten - eigengewicht (kN, kNm, kN/m)

A coordinate system with a vertical line labeled 'y' and a horizontal line labeled 'x'.

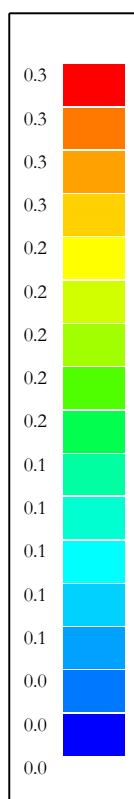
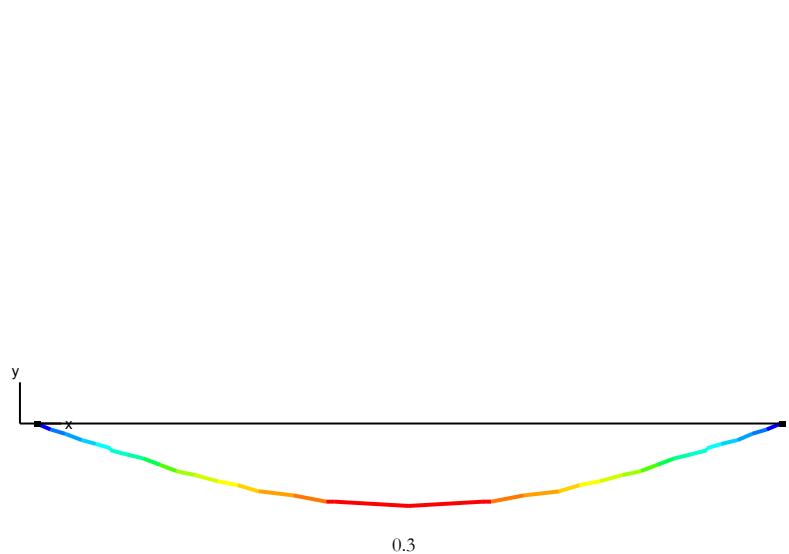
hout evenwijdig: Lasten - permanent (kN, kNm, kN/m)



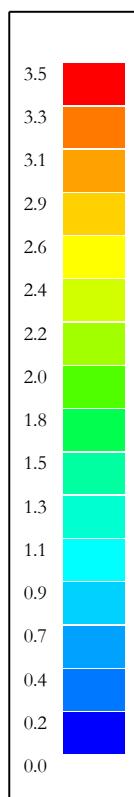
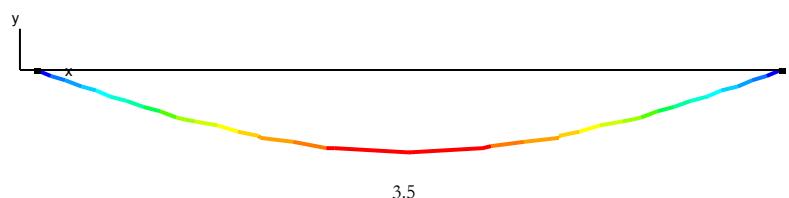
hout evenwijdig: Lasten - gebruikslast (kN, kNm, kN/m)



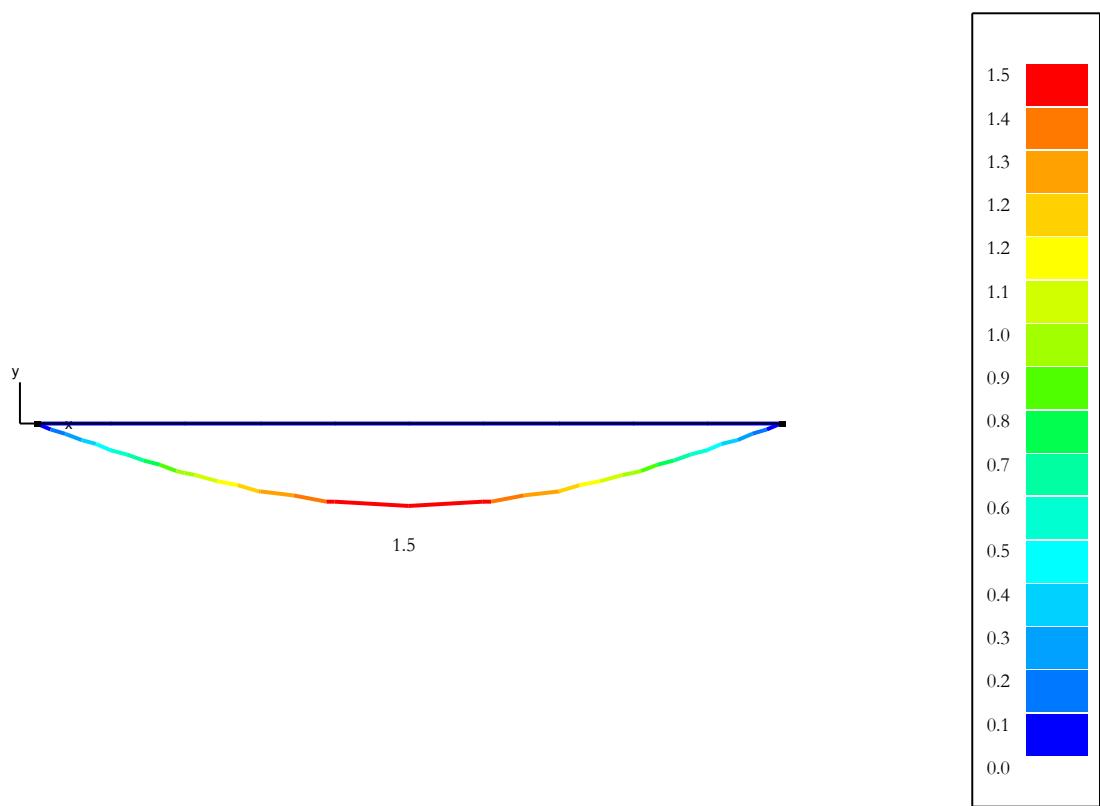
hout evenwijdig: eigengewicht-Vervorming dY (mm)



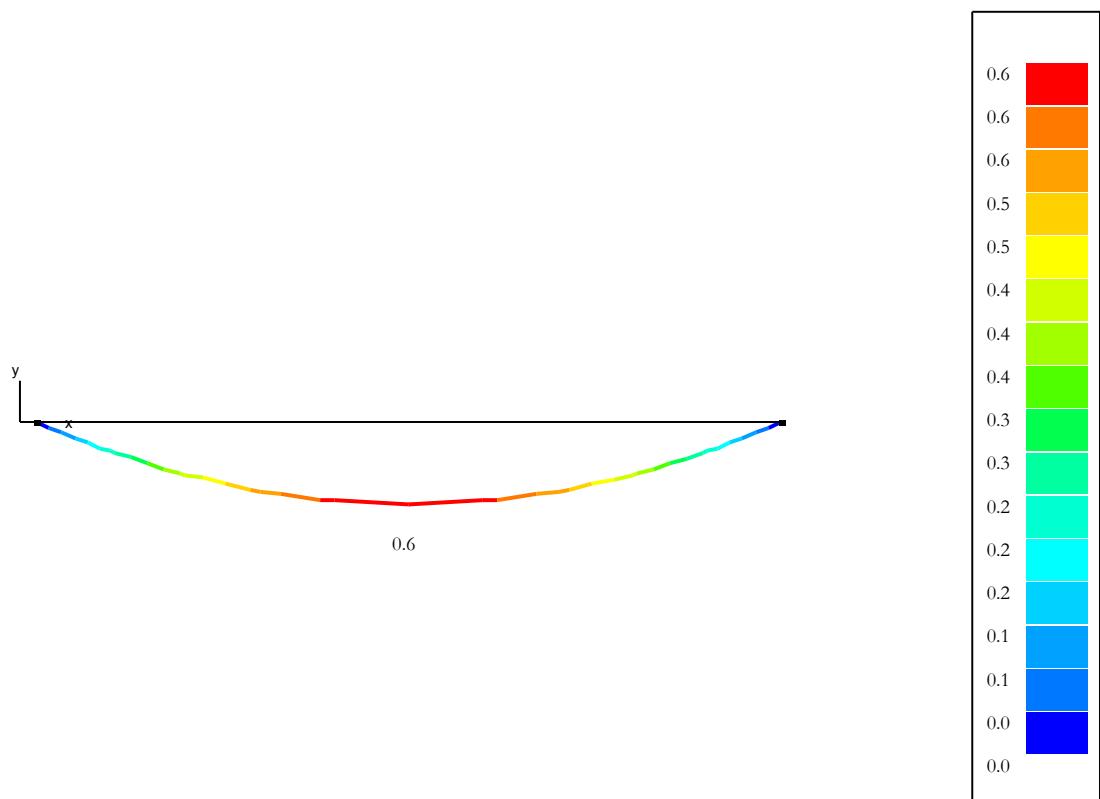
hout evenwijdig: permanent-Vervorming dY (mm)

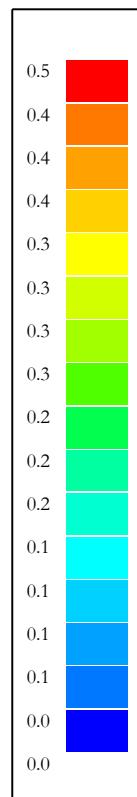
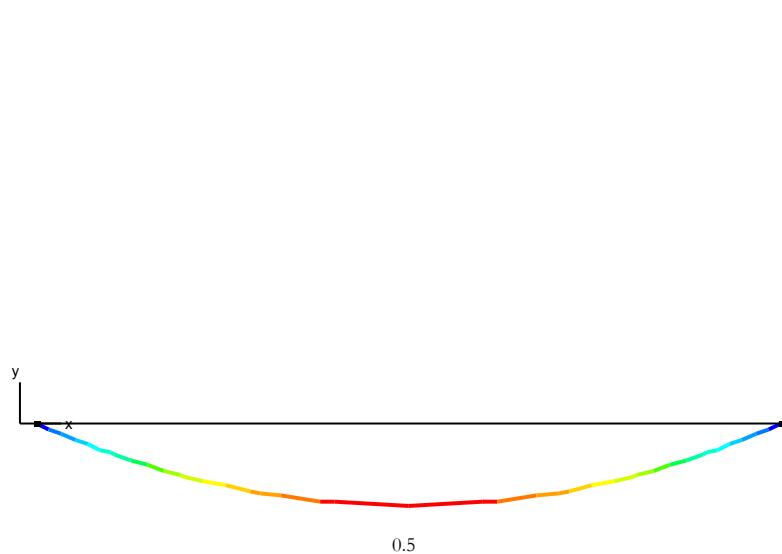


hout evenwijdig: gebruikslast-Vervorming dY (mm)

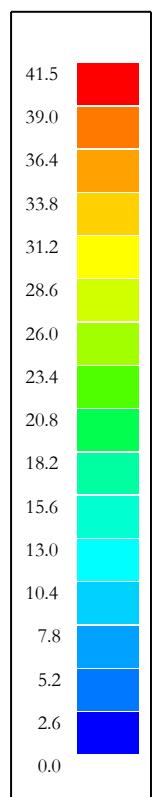


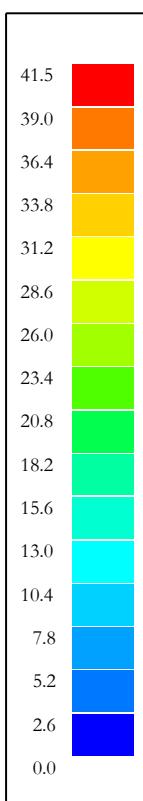
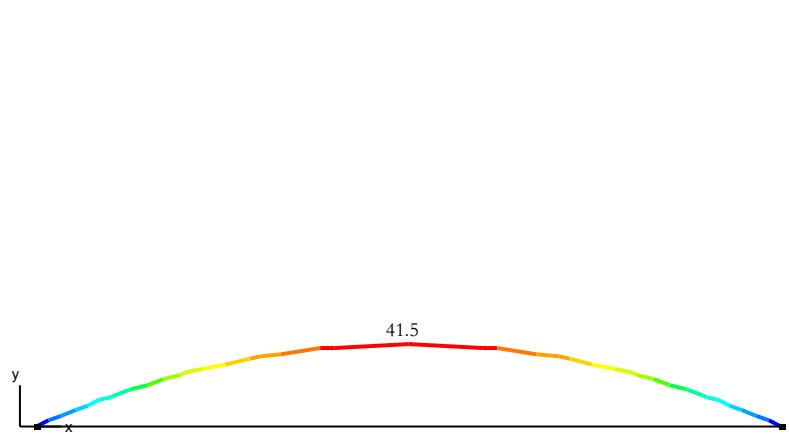
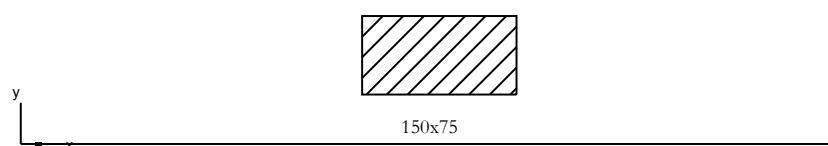
hout evenwijdig: UGT FC-Buigende momenten My' (kNm)



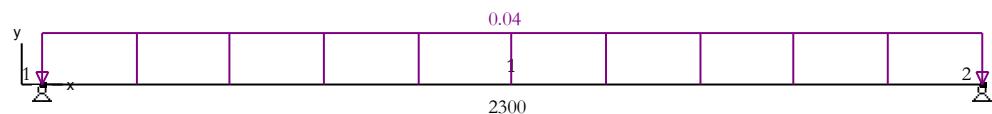
hout evenwijdig: GGT ZC-Buigende momenten M_y' (kNm)

hout evenwijdig: Weerstandscontrole (%) - EN 1995-1-1

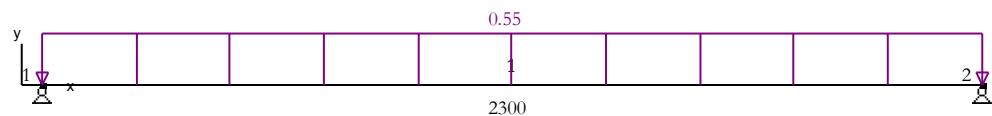


hout evenwijdig: Stabiliteitscontrole (%) - EN 1995-1-1**hout evenwijdig: Dimensionering**

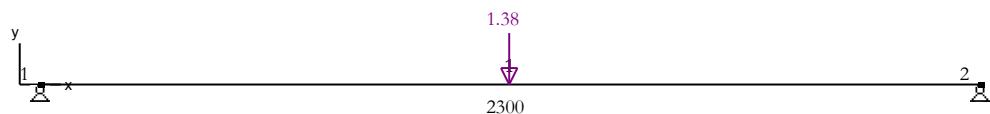
hout haaks: Lasten - eigengewicht (kN, kNm, kN/m)



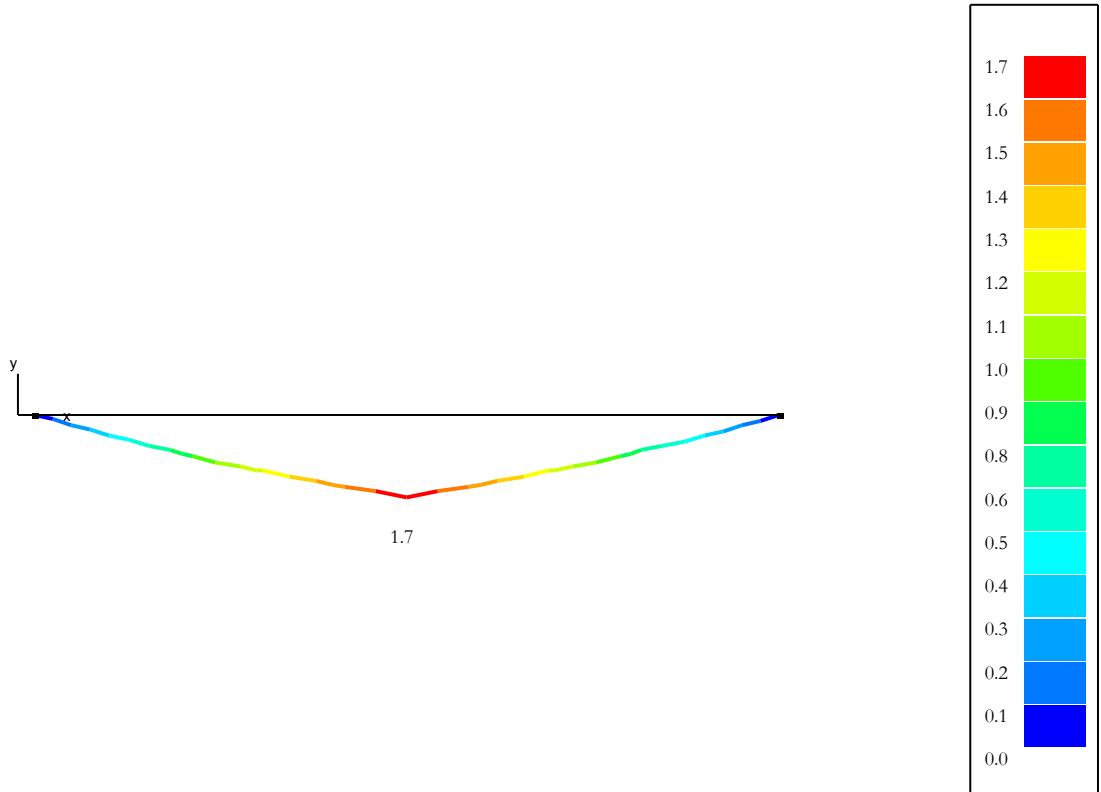
hout haaks: Lasten - permanent (kN, kNm, kN/m)

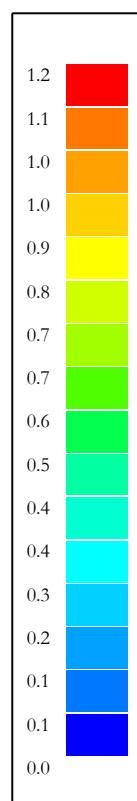
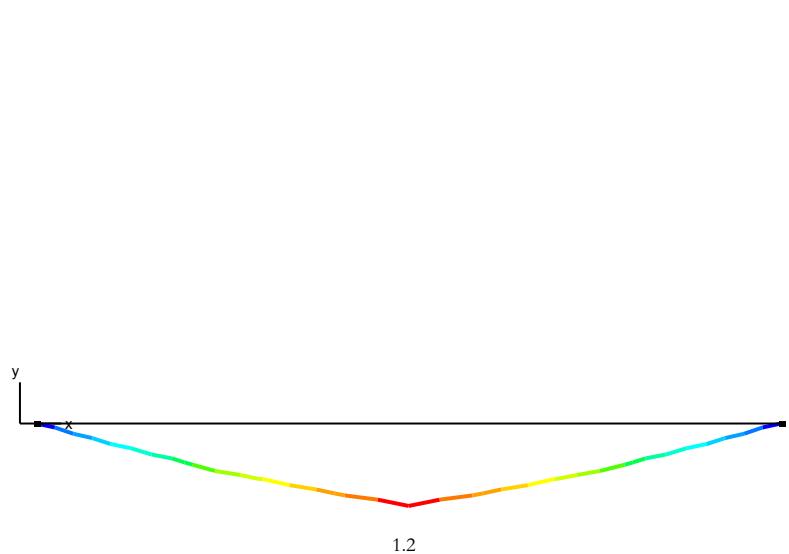


hout haaks: Lasten - gebruikslast (kN, kNm, kN/m)

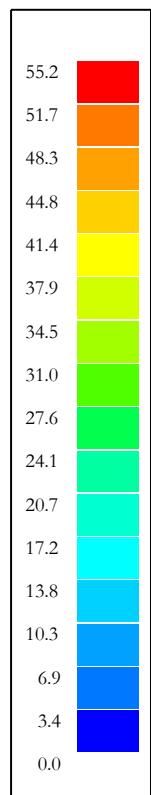


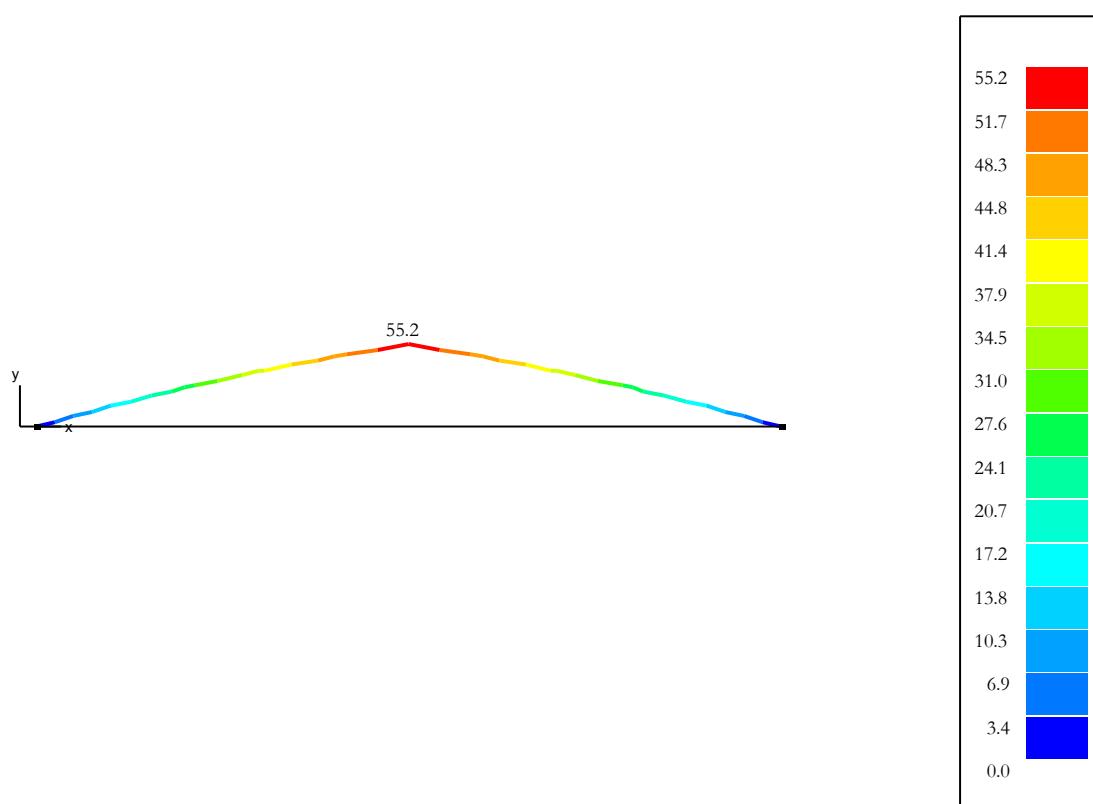
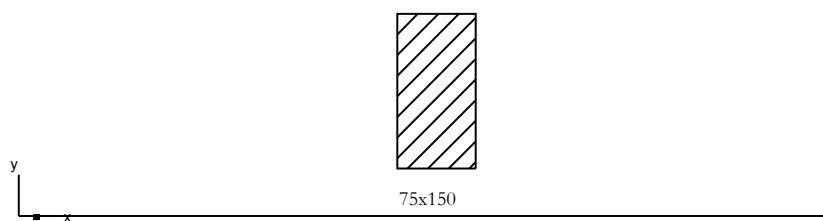
hout haaks: UGT FC-Buigende momenten M_y' (kNm)



hout haaks: GGT ZC-Buigende momenten M_y' (kNm)

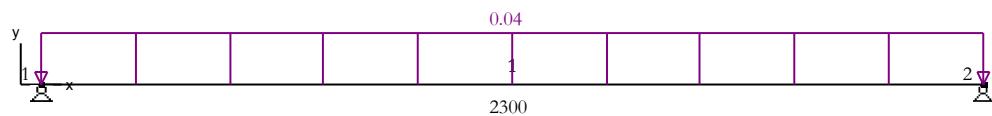
hout haaks: Weerstandscontrole (%) - EN 1995-1-1



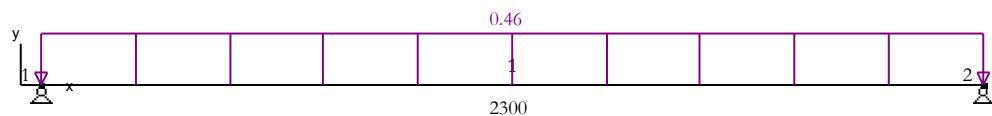
hout haaks: Stabiliteitscontrole (%) - EN 1995-1-1**hout haaks: Dimensionering**

A small coordinate system symbol consisting of a horizontal line with a vertical tick and a perpendicular line extending downwards.

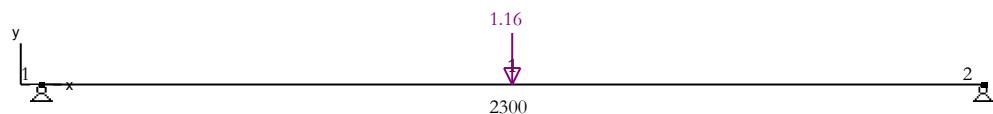
hout evenwijdig: Lasten - eigengewicht (kN, kNm, kN/m)



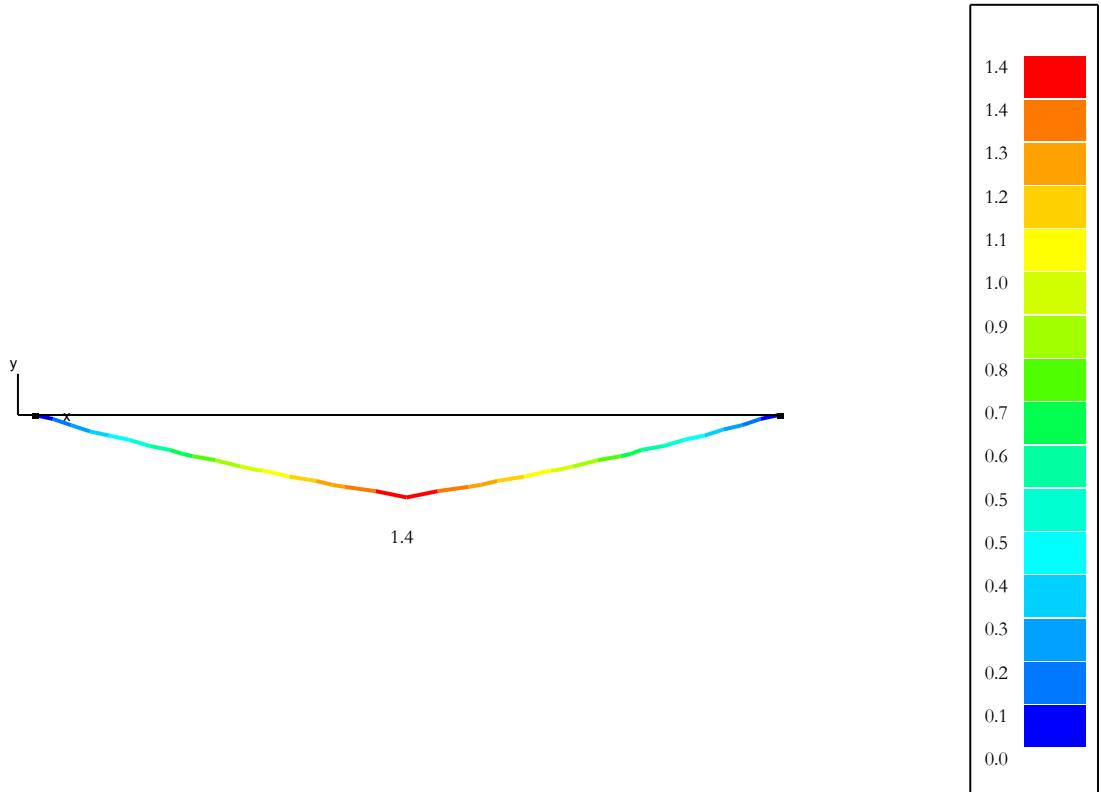
hout evenwijdig: Lasten - permanent (kN, kNm, kN/m)

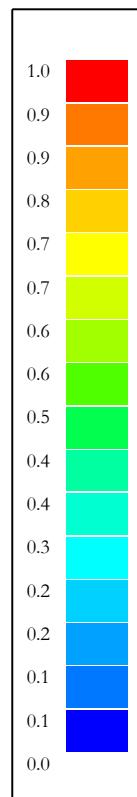
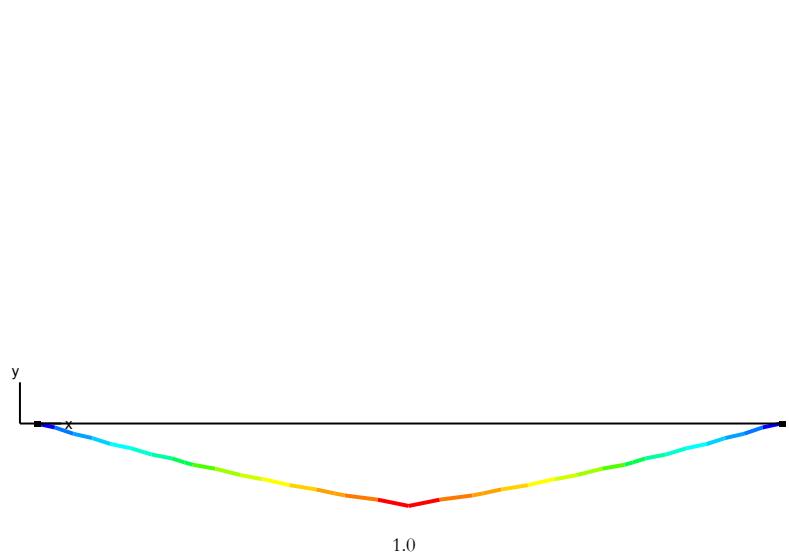


hout evenwijdig: Lasten - gebruikslast (kN, kNm, kN/m)

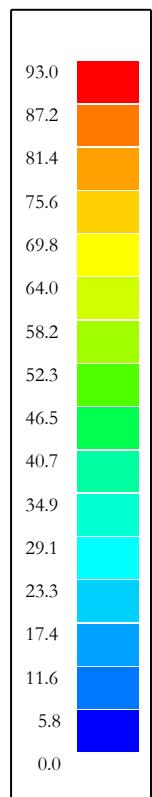
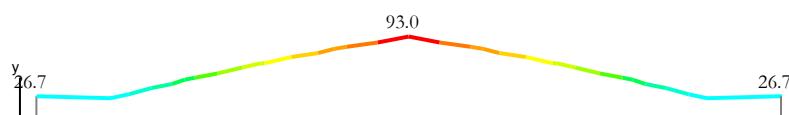


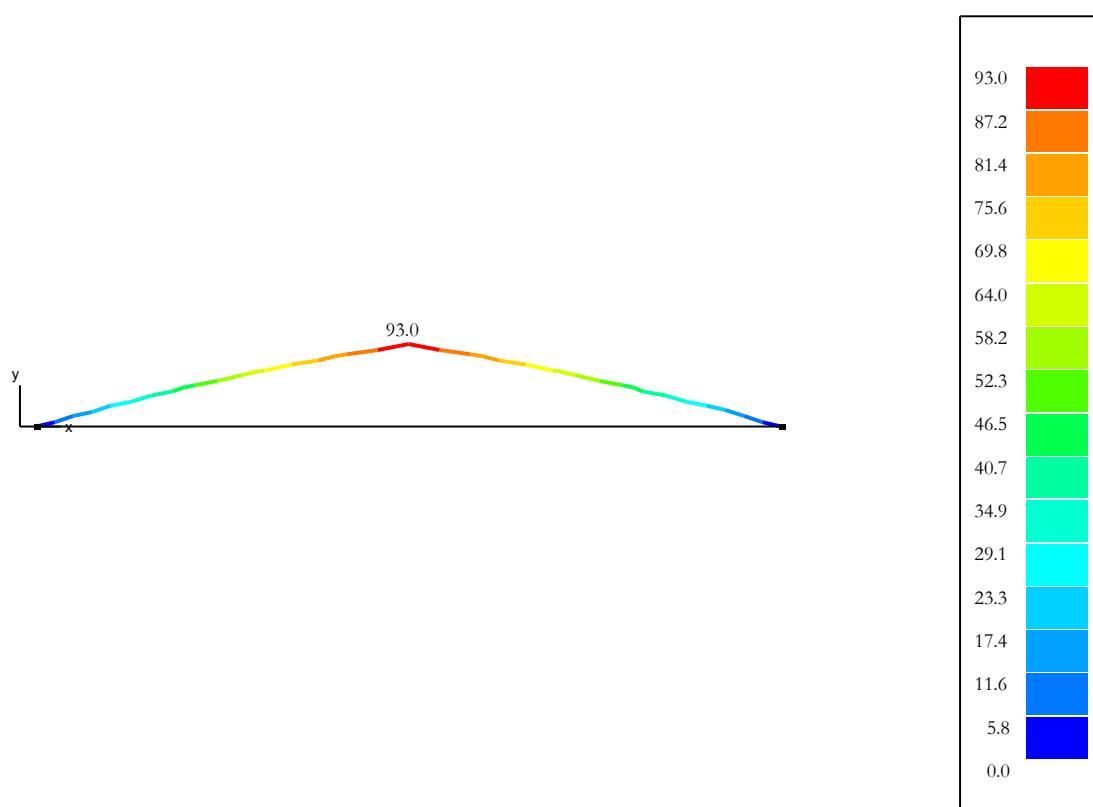
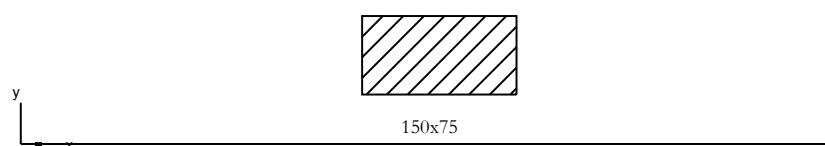
hout evenwijdig: UGT FC-Buigende momenten M_y' (kNm)



hout evenwijdig: GGT ZC-Buigende momenten M_y' (kNm)

hout evenwijdig: Weerstandscontrole (%) - EN 1995-1-1



hout evenwijdig: Stabiliteitscontrole (%) - EN 1995-1-1**hout evenwijdig: Dimensionering**

hout haaks: Data - Samenstelling Lastencombinaties

| Naam combinatie | Eigengewicht | Permanente last | Nuttige last |
|-----------------|--------------|-----------------|----------------------|
| eigengewicht | 1,00 x 1,00 | 0,00 | 0,00 |
| permanent | 0,00 | 1,00 x 1,00 | 0,00 |
| gebruikslast | 0,00 | 0,00 | 1,00 x (1,00 ~ 0,00) |
| UGT FC 1 | 1,00 x 1,35 | 1,00 x 1,35 | 1,00 x (1,50 ~ 0,00) |
| UGT FC 2 | 1,00 x 1,00 | 1,00 x 1,35 | 1,00 x (1,50 ~ 0,00) |
| UGT FC 3 | 1,00 x 1,35 | 1,00 x 1,00 | 1,00 x (1,50 ~ 0,00) |
| UGT FC 4 | 1,00 x 1,00 | 1,00 x 1,00 | 1,00 x (1,50 ~ 0,00) |
| GGT ZC 1 | 1,00 x 1,00 | 1,00 x 1,00 | 1,00 x (1,00 ~ 0,00) |
| GGT QP 1 | 1,00 x 1,00 | 1,00 x 1,00 | 0,30 x (1,00 ~ 0,00) |

hout evenwijdig: Data - Samenstelling Lastencombinaties

| Naam combinatie | Eigengewicht | Permanente last | Nuttige last |
|-----------------|--------------|-----------------|----------------------|
| eigengewicht | 1,00 x 1,00 | 0,00 | 0,00 |
| permanent | 0,00 | 1,00 x 1,00 | 0,00 |
| gebruikslast | 0,00 | 0,00 | 1,00 x (1,00 ~ 0,00) |
| UGT FC 1 | 1,00 x 1,35 | 1,00 x 1,35 | 1,00 x (1,50 ~ 0,00) |
| UGT FC 2 | 1,00 x 1,00 | 1,00 x 1,35 | 1,00 x (1,50 ~ 0,00) |
| UGT FC 3 | 1,00 x 1,35 | 1,00 x 1,00 | 1,00 x (1,50 ~ 0,00) |
| UGT FC 4 | 1,00 x 1,00 | 1,00 x 1,00 | 1,00 x (1,50 ~ 0,00) |
| GGT ZC 1 | 1,00 x 1,00 | 1,00 x 1,00 | 1,00 x (1,00 ~ 0,00) |
| GGT QP 1 | 1,00 x 1,00 | 1,00 x 1,00 | 0,30 x (1,00 ~ 0,00) |

Data - Parameters hout

Toegepaste houtnorm : EN 1995-1-1

karakteristieken :

elasticiteitsmodulus = 9000 N/mm²

coëfficiënt v. Poisson = 7.0

soortelijke massa = 3.8 kN/m³

therm. uitzettingscoëff. = 0.000005 /°C

Karakteristieke doorsneden :

C18:

Treksterkte in vezelrichting = 11.0 N/mm²

Druksterkte in vezelrichting = 18.0 N/mm²

Buigsterkte = 18.0 N/mm²

Schuifsterkte = 2.0 N/mm²

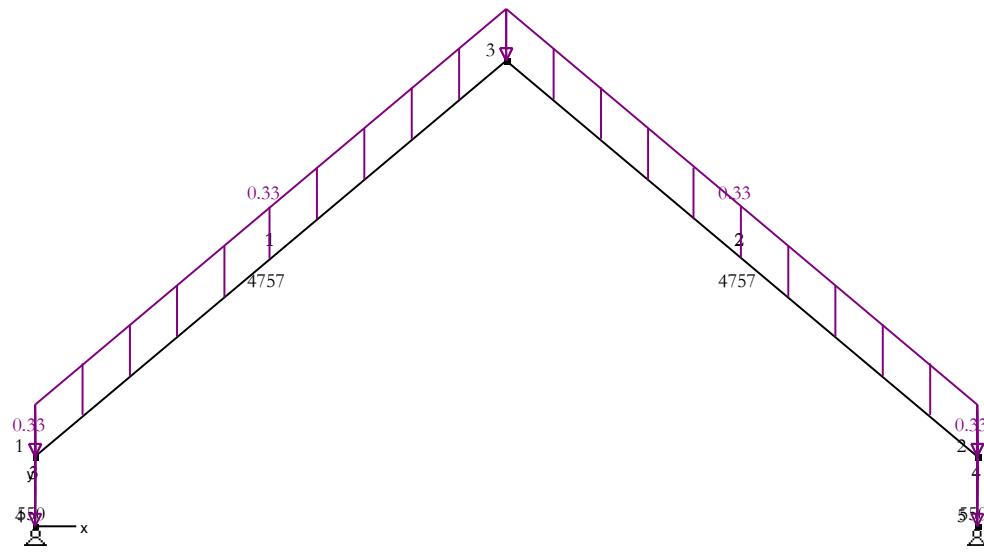
Elasticiteitsmodulus E = 9000 N/mm²

Glijdingsmodulus G = 560 N/mm²

Faktor voor de vochtigheidsgraad en de langdurigheid van de lasten : k_{MOD} = 0.8

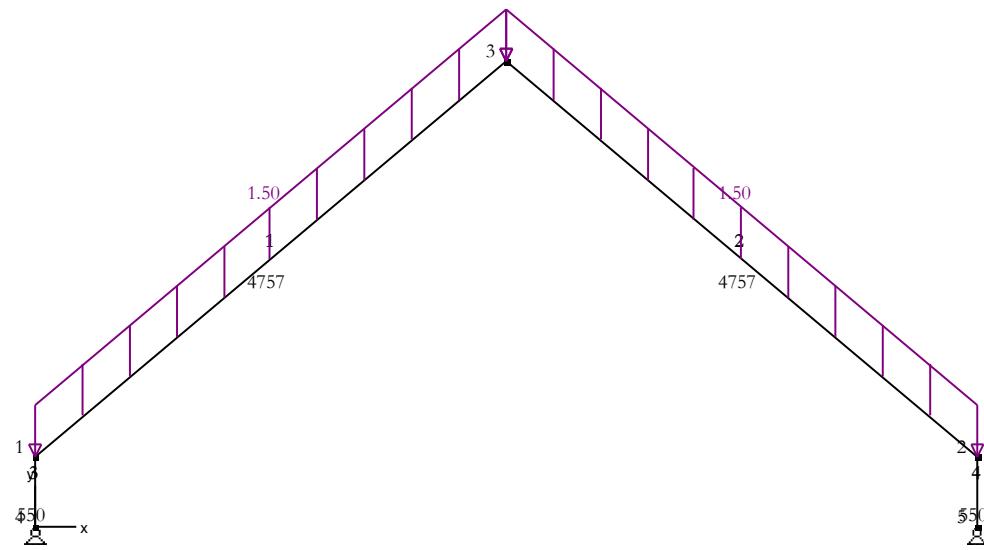
Partiële veiligheidscoëfficiënt : γ_M = 1.3

staal: Lasten - eigengewicht (kN, kNm, kN/m)



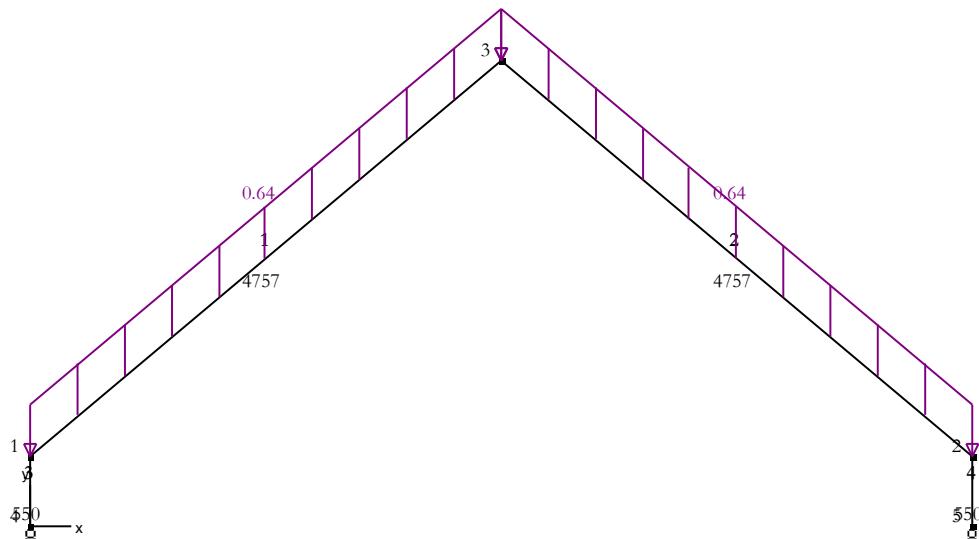
y
x

staal: Lasten - permanent (kN, kNm, kN/m)



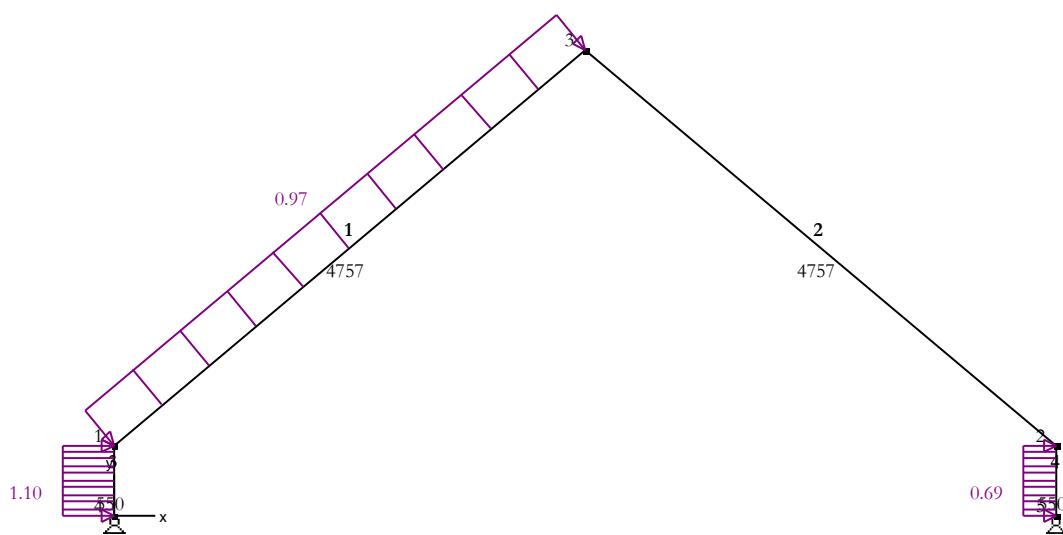
y
x

staal: Lasten - gebruikslast (kN, kNm, kN/m)



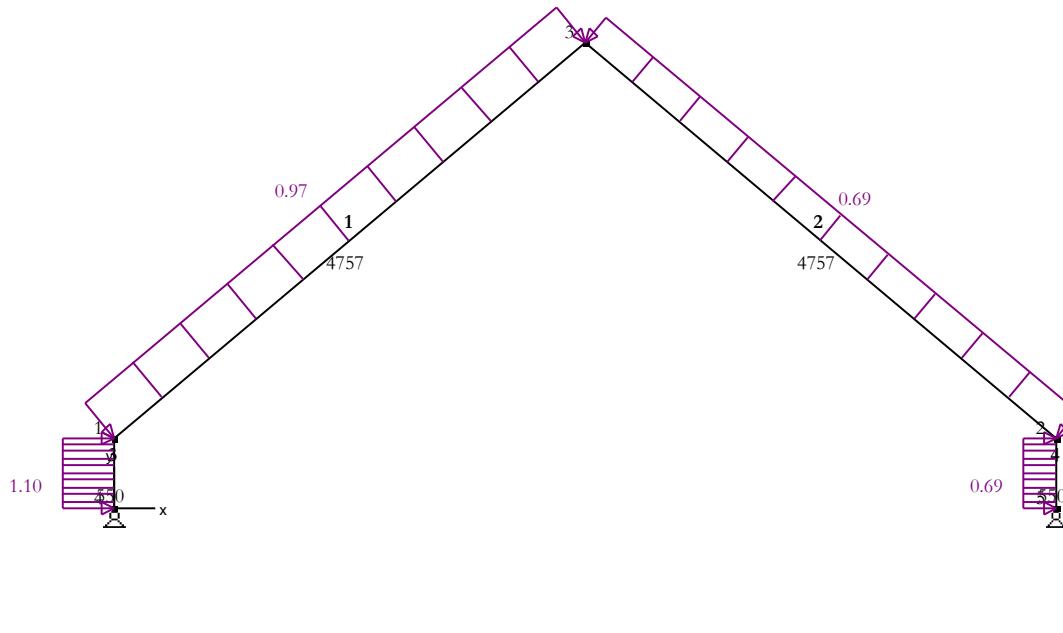
y
x

staal: Lasten - wind 1 (kN, kNm, kN/m)

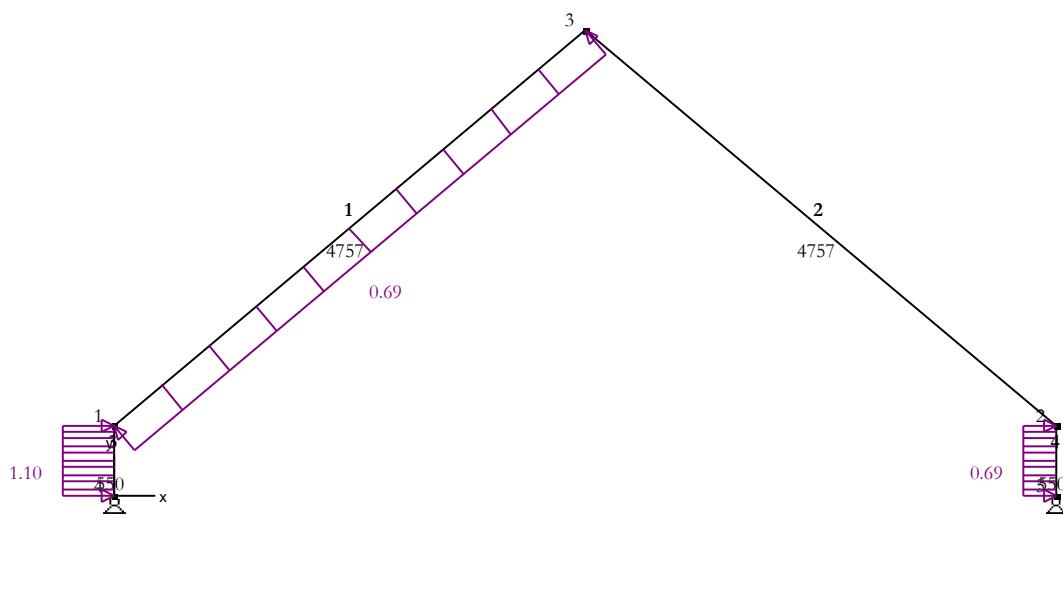


y
x

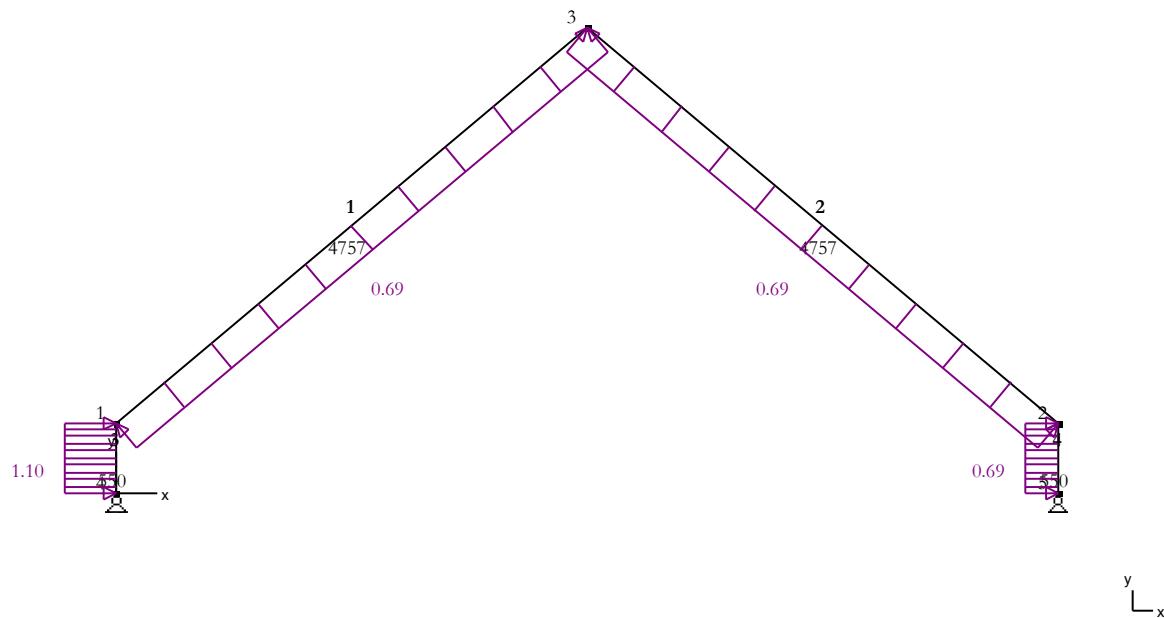
staal: Lasten - wind 2 (kN, kNm, kN/m)



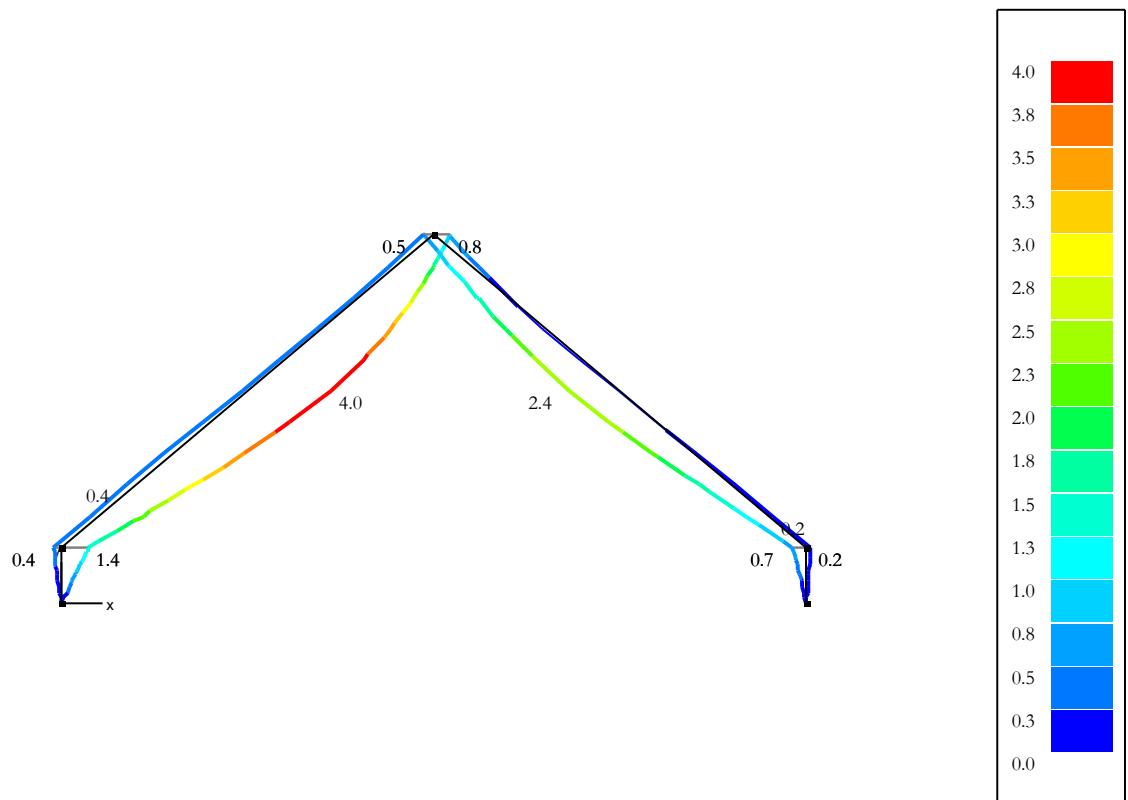
staal: Lasten - wind 3 (kN, kNm, kN/m)



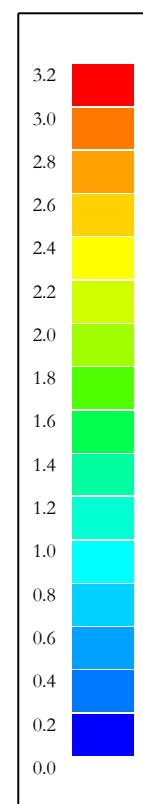
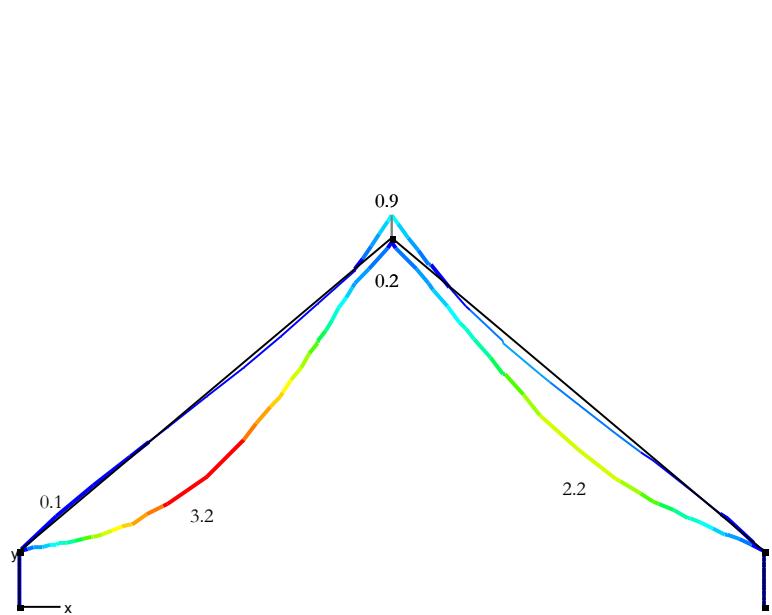
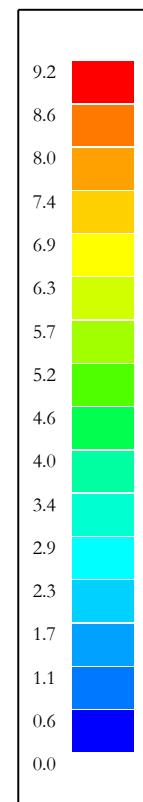
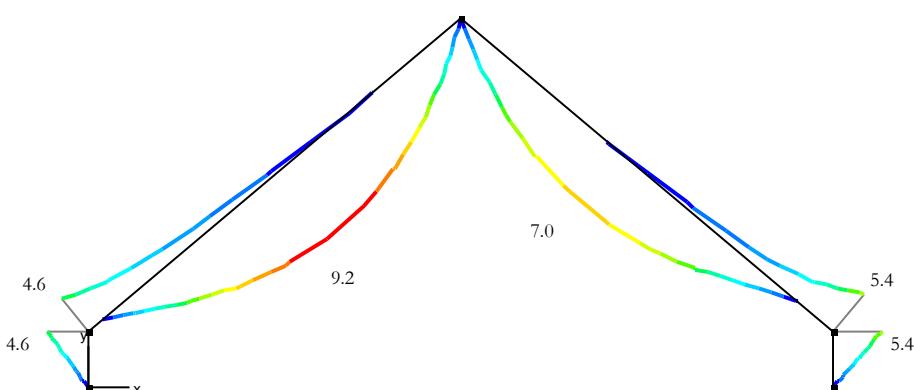
staal: Lasten - wind 4 (kN, kNm, kN/m)

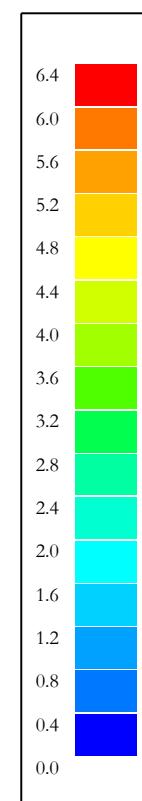
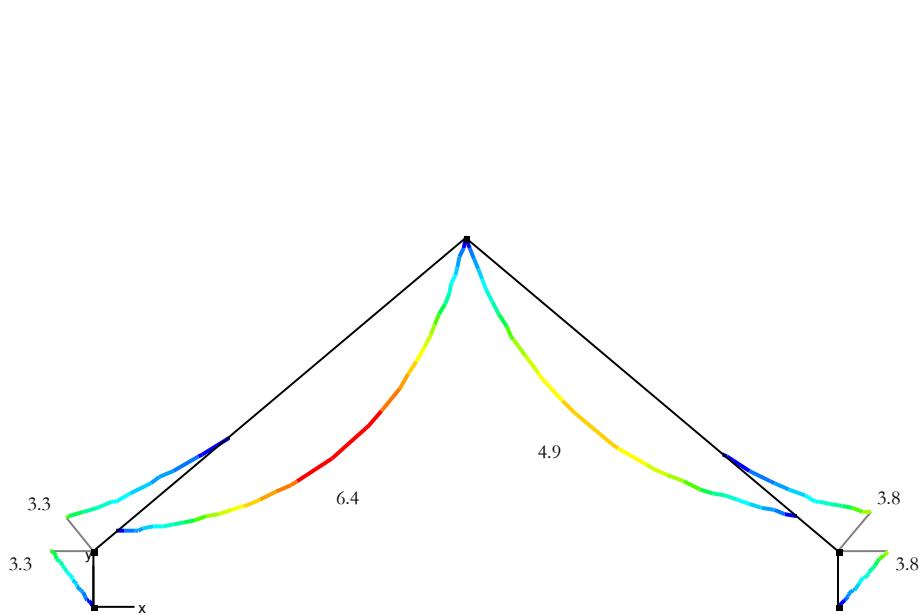


staal: GGT ZC-Vervorming dX (mm)

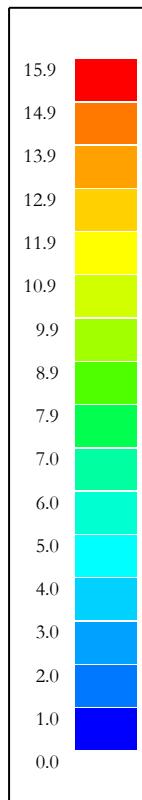
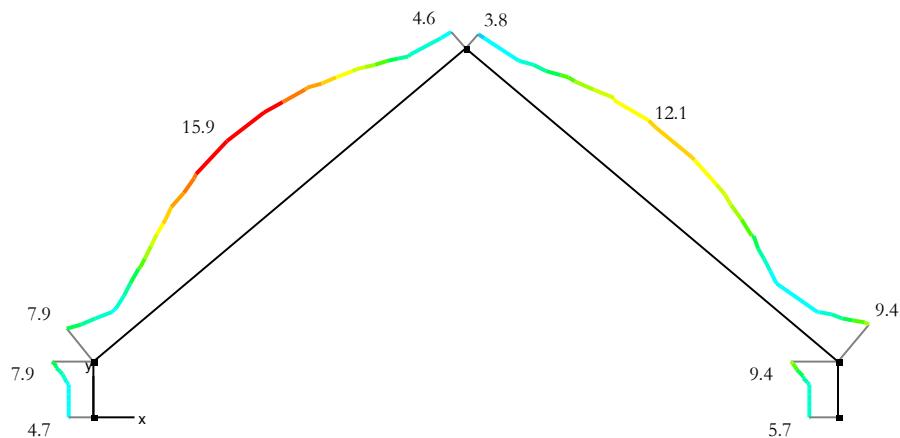


staal: GGT ZC-Vervorming dY (mm)

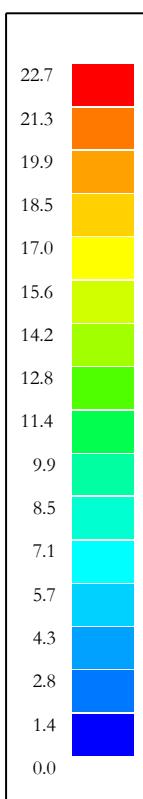
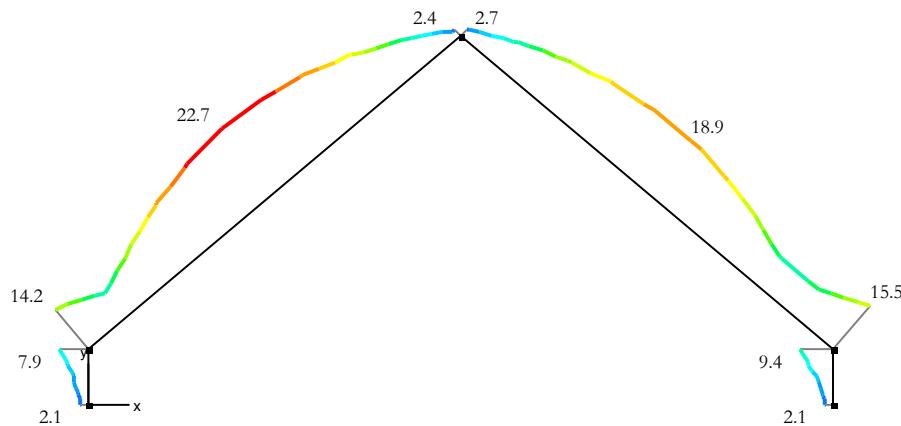
staal: UGT FC-Buigende momenten M_y' (kNm)

staal: GGT ZC-Buigende momenten M_y' (kNm)

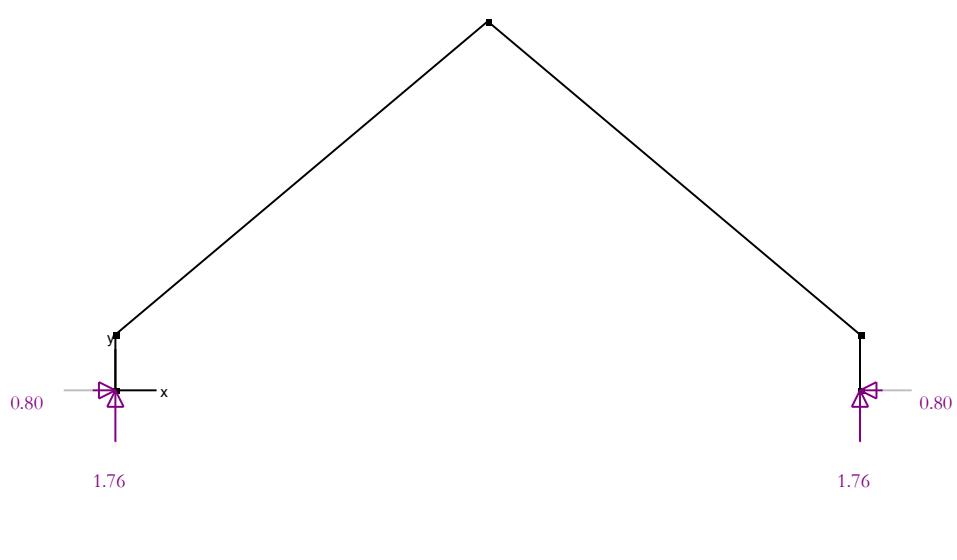
staal: Weerstandscontrole (%) - NEN EN 1993-1-1



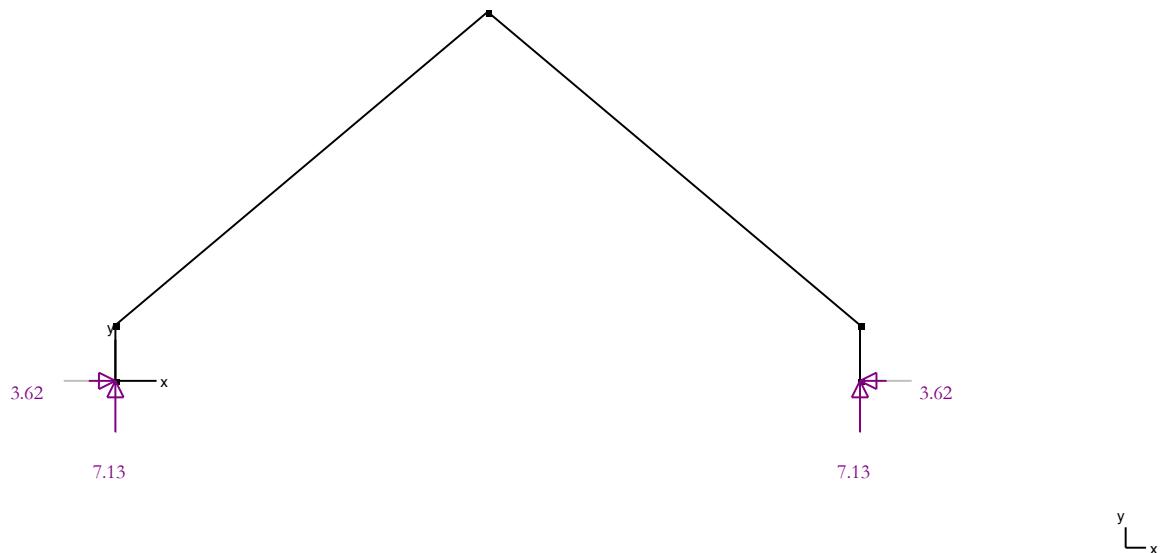
staal: Stabiliteitscontrole (%) - NEN EN 1993-1-1



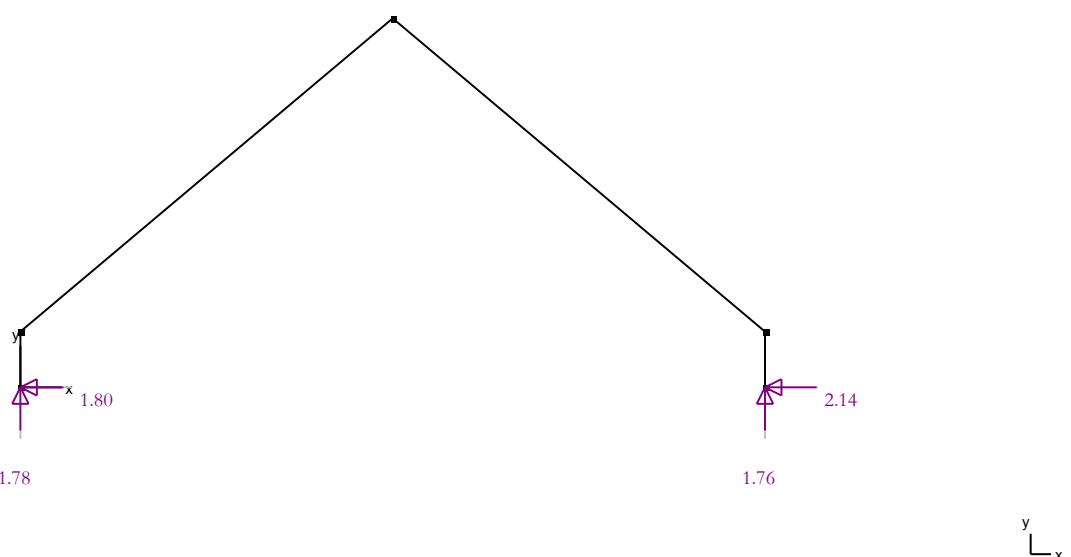
staal: eigengewicht-Reacties (kN)



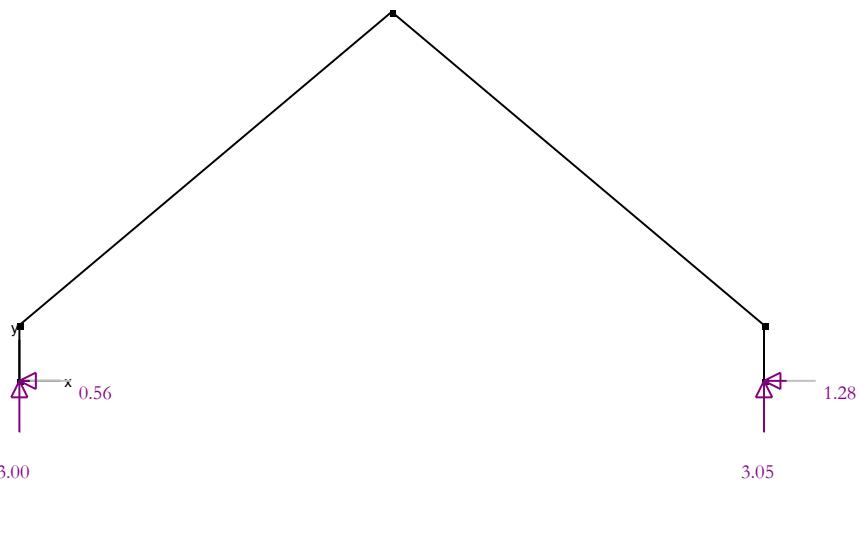
staal: permanent-Reacties (kN)



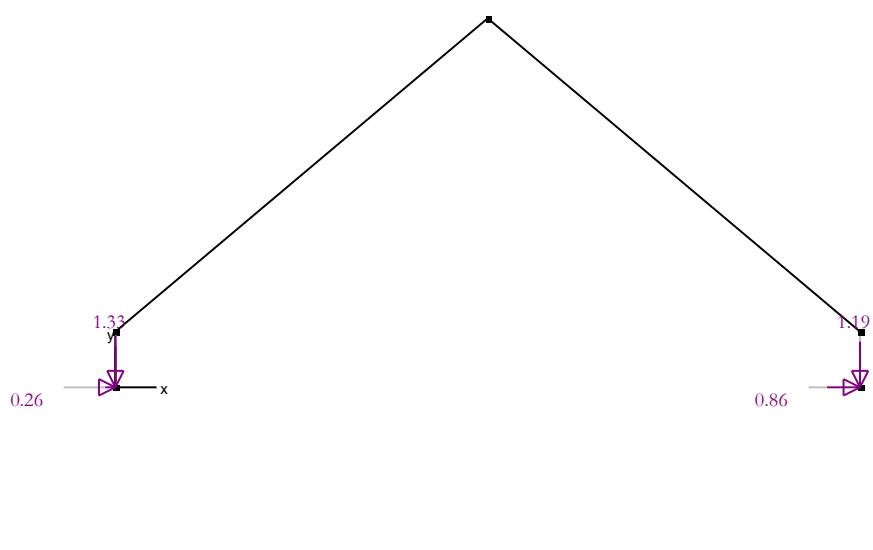
staal: wind 1-Reacties (kN)



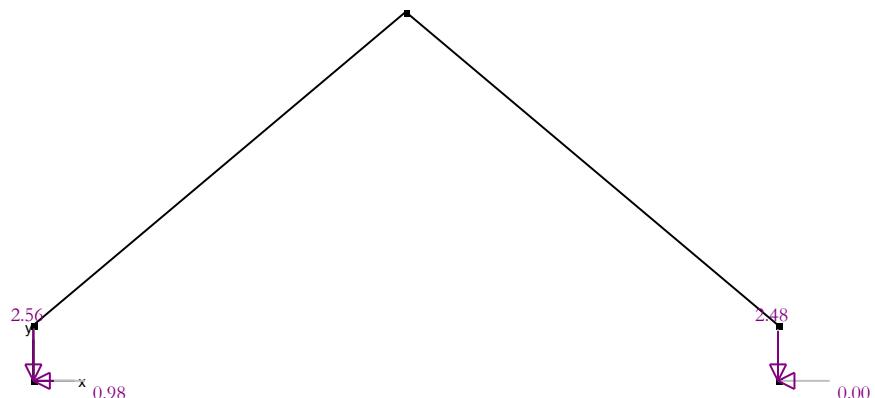
staal: wind 2-Reacties (kN)



staal: wind 3-Reacties (kN)

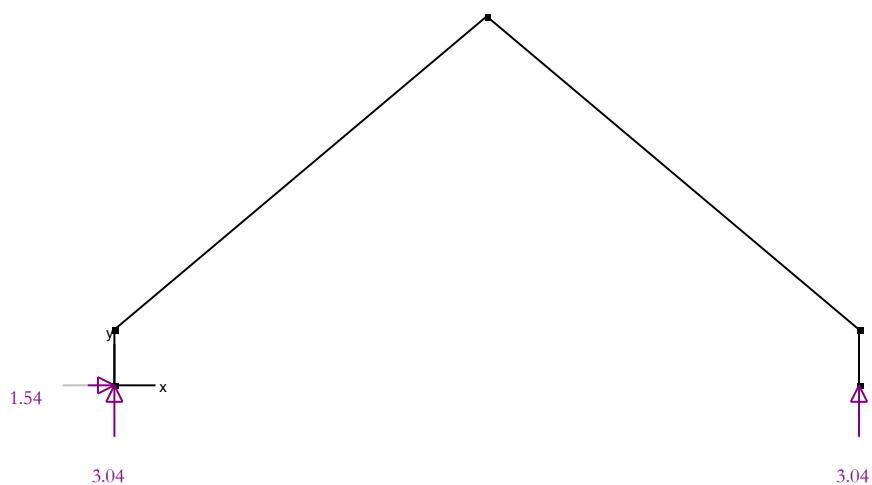


staal: wind 4-Reacties (kN)



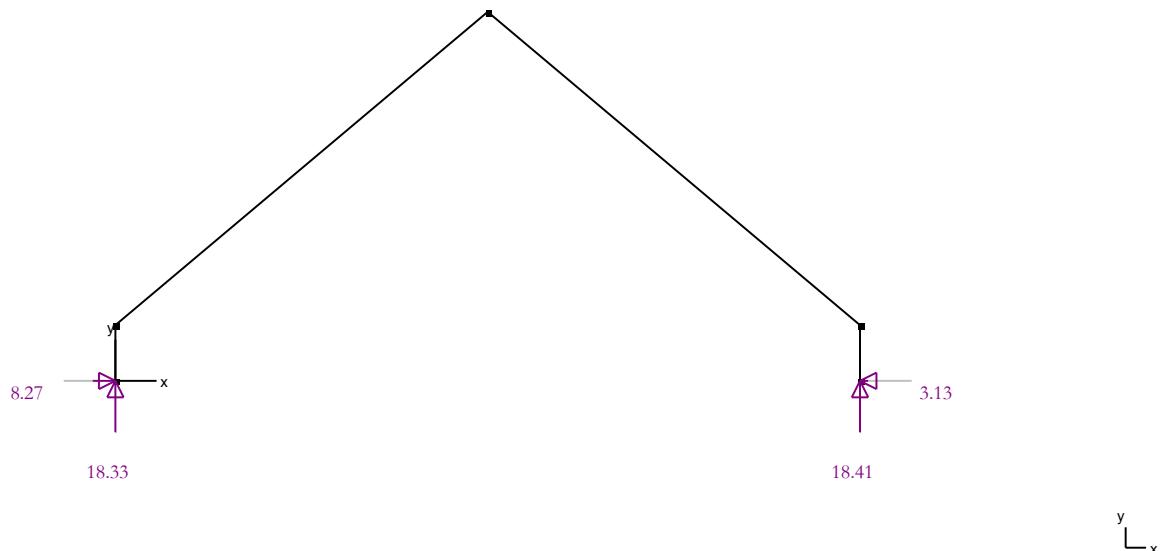
y
└ x

staal: gebruikslast-Grootste reacties (kN)

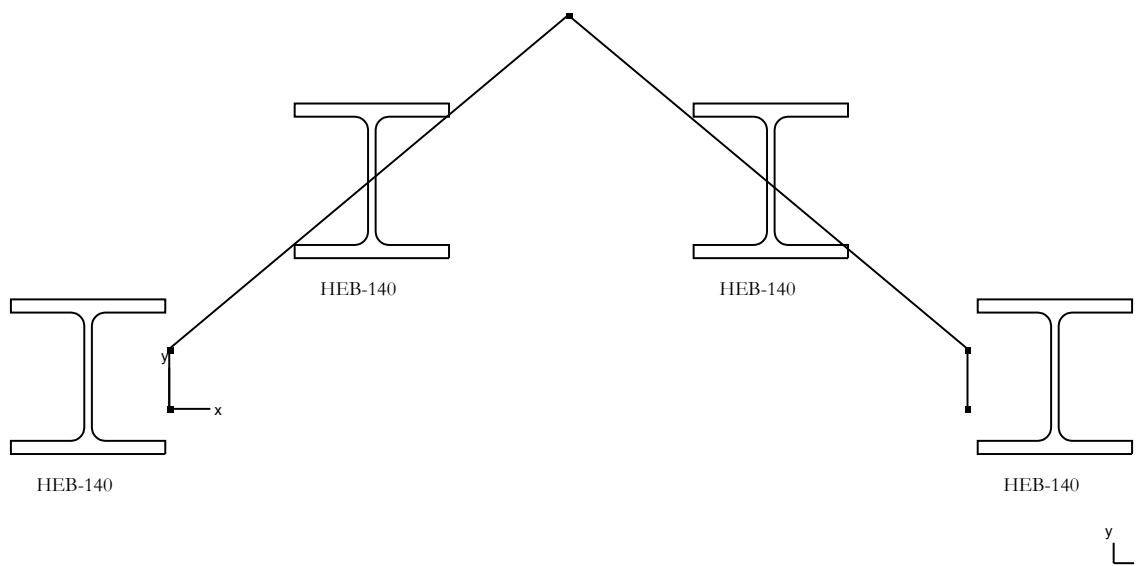


y
└ x

staal: UGT FC-Grootste reacties (kN)



staal: Dimensionering



| staal: Data - Samenstelling Lastencombinaties | | | | | | | |
|---|--------------|-----------------|----------------------|-------------|-------------|-------------|-------------|
| Naam combinatie | Eigengewicht | Permanente last | Nuttige last | Wind1 | Wind2 | Wind3 | Wind4 |
| eigengewicht | 1.00 x 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| permanent | 0.00 | 1.00 x 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| gebruikslast | 0.00 | 0.00 | 1.00 x (1.00 ~ 0.00) | 0.00 | 0.00 | 0.00 | 0.00 |
| wind 1 | 0.00 | 0.00 | 0.00 | 1.00 x 1.00 | 0.00 | 0.00 | 0.00 |
| wind 2 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 x 1.00 | 0.00 | 0.00 |
| wind 3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 x 1.00 | 0.00 |
| wind 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 x 1.00 |
| UGT FC 1 | 1.00 x 1.35 | 1.00 x 1.35 | 1.00 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 0.00 |
| UGT FC 2 | 1.00 x 1.35 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 1.00 x 1.50 | 0.00 | 0.00 | 0.00 |
| UGT FC 3 | 1.00 x 1.35 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 0.00 | 1.00 x 1.50 | 0.00 | 0.00 |
| UGT FC 4 | 1.00 x 1.35 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 1.00 x 1.50 | 0.00 |
| UGT FC 5 | 1.00 x 1.35 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 1.00 x 1.50 |
| UGT FC 6 | 1.00 x 1.00 | 1.00 x 1.35 | 1.00 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 0.00 |
| UGT FC 7 | 1.00 x 1.00 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 1.00 x 1.50 | 0.00 | 0.00 | 0.00 |
| UGT FC 8 | 1.00 x 1.00 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 0.00 | 1.00 x 1.50 | 0.00 | 0.00 |
| UGT FC 9 | 1.00 x 1.00 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 1.00 x 1.50 | 0.00 |
| UGT FC 10 | 1.00 x 1.00 | 1.00 x 1.35 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 1.00 x 1.50 |
| UGT FC 11 | 1.00 x 1.35 | 1.00 x 1.00 | 1.00 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 0.00 |
| UGT FC 12 | 1.00 x 1.35 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 1.00 x 1.50 | 0.00 | 0.00 | 0.00 |
| UGT FC 13 | 1.00 x 1.35 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 0.00 | 1.00 x 1.50 | 0.00 | 0.00 |
| UGT FC 14 | 1.00 x 1.35 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 1.00 x 1.50 | 0.00 |
| UGT FC 15 | 1.00 x 1.35 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 1.00 x 1.50 |
| UGT FC 16 | 1.00 x 1.00 | 1.00 x 1.00 | 1.00 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 0.00 |
| UGT FC 17 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 1.00 x 1.50 | 0.00 | 0.00 | 0.00 |
| UGT FC 18 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 0.00 | 1.00 x 1.50 | 0.00 | 0.00 |
| UGT FC 19 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 1.00 x 1.50 | 0.00 |
| UGT FC 20 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.50 ~ 0.00) | 0.00 | 0.00 | 0.00 | 1.00 x 1.50 |
| GGT ZC 1 | 1.00 x 1.00 | 1.00 x 1.00 | 1.00 x (1.00 ~ 0.00) | 0.00 | 0.00 | 0.00 | 0.00 |
| GGT ZC 2 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.00 ~ 0.00) | 1.00 x 1.00 | 0.00 | 0.00 | 0.00 |
| GGT ZC 3 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.00 ~ 0.00) | 0.00 | 1.00 x 1.00 | 0.00 | 0.00 |
| GGT ZC 4 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.00 ~ 0.00) | 0.00 | 0.00 | 1.00 x 1.00 | 0.00 |
| GGT ZC 5 | 1.00 x 1.00 | 1.00 x 1.00 | 0.40 x (1.00 ~ 0.00) | 0.00 | 0.00 | 0.00 | 1.00 x 1.00 |
| GGT QP 1 | 1.00 x 1.00 | 1.00 x 1.00 | 0.30 x (1.00 ~ 0.00) | 0.00 | 0.00 | 0.00 | 0.00 |

| |
|-------------------------|
| Data - Parameters staal |
|-------------------------|

Toegepaste staalnorm : NEN EN 1993-1-1

karakteristieken :

elasticiteitsmodulus = 210000 N/mm²

coëfficiënt v. Poisson = 0.3

soortelijke massa = 77.0 kN/m³

therm. uitzettingscoëff. = 0.000012 /°C

Staalkwaliteiten (N/mm²) :

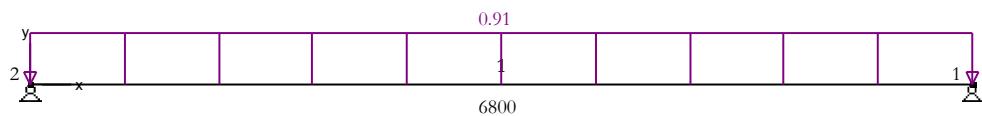
| staalsoort | t <= 40 | | 40 < t <= 100 | |
|------------|----------------|----------------|----------------|----------------|
| | f _y | f _u | f _y | f _u |
| S235 | 235.0 | 360.0 | 215.0 | 360.0 |

Veiligheidscoëfficiënten :

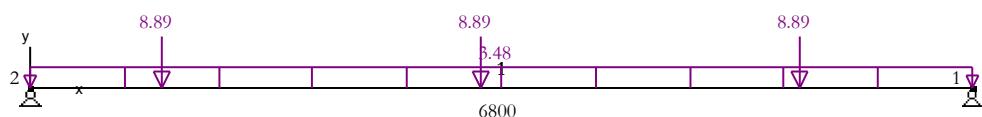
Doorsnede klasse 1, 2 en 3 : $\gamma_{M0} = 1.0$

Doorsnede klasse 4 en knikweerstand : $\gamma_{M1} = 1.0$

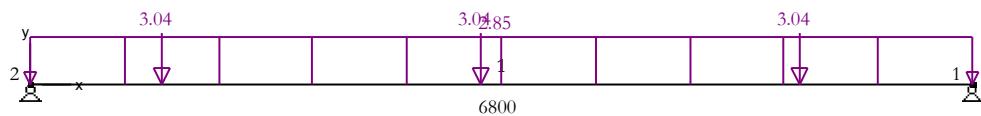
staal: Lasten - eigengewicht (kN, kNm, kN/m)



staal: Lasten - permanent (kN, kNm, kN/m)

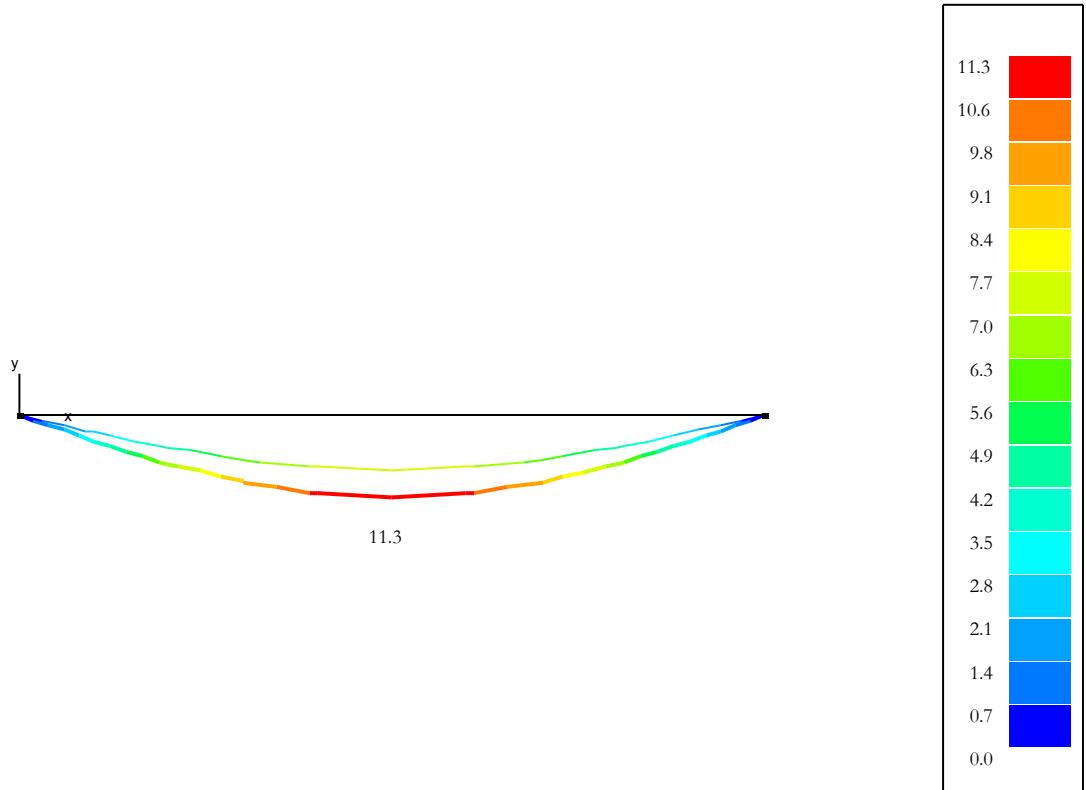


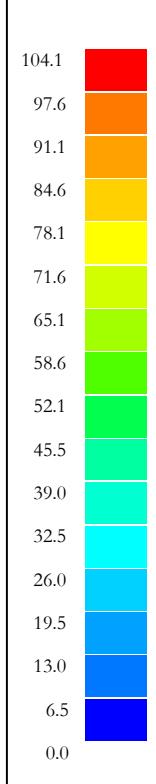
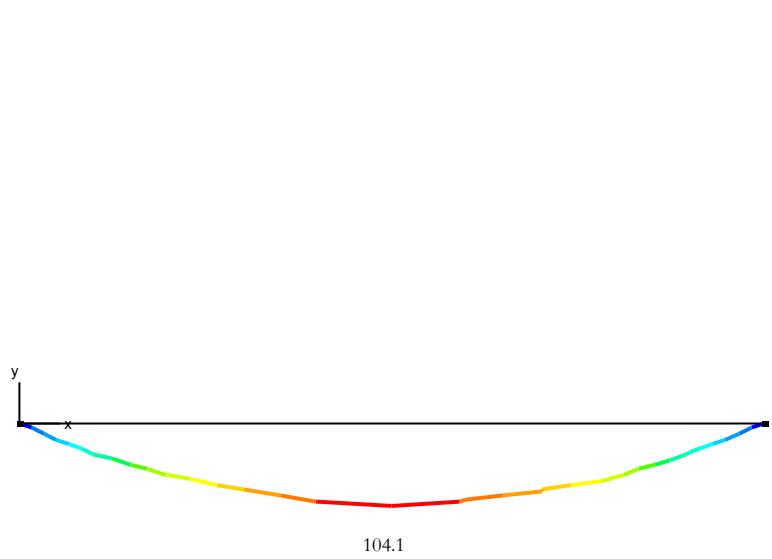
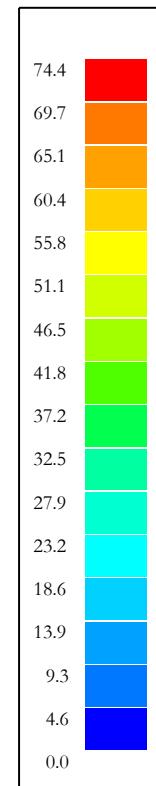
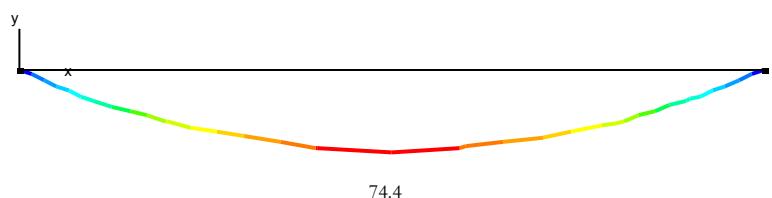
staal: Lasten - gebruikslast (kN, kNm, kN/m)



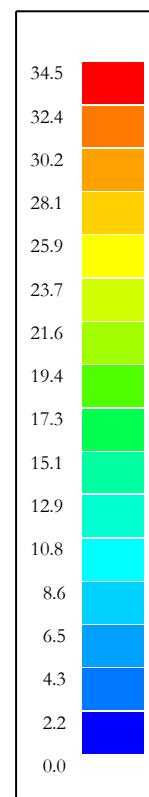
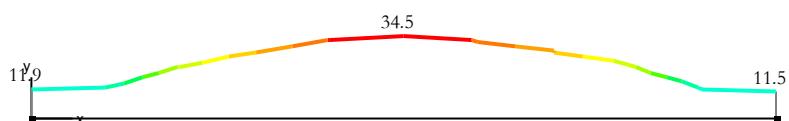
y
└ x

staal: GGT ZC-Vervorming dY (mm)

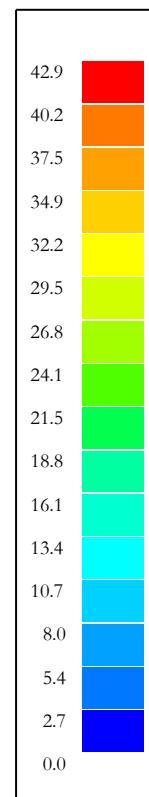


staal: UGT FC-Buigende momenten M_y' (kNm)staal: GGT ZC-Buigende momenten M_y' (kNm)

staal: Weerstandscontrole (%) - NEN EN 1993-1-1



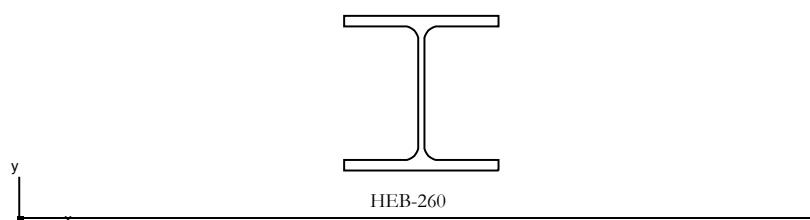
staal: Stabiliteitscontrole (%) - NEN EN 1993-1-1



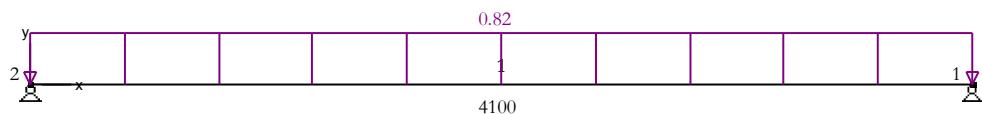
staal: UGT FC-Grootste reacties (kN)



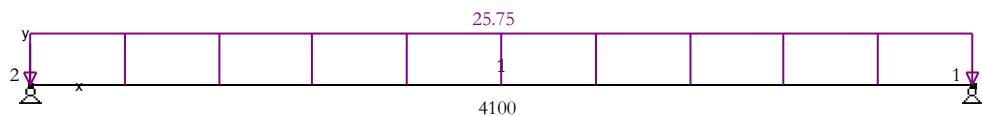
staal: Dimensionering



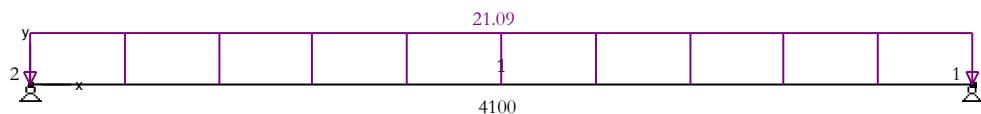
staal: Lasten - eigengewicht (kN, kNm, kN/m)



staal: Lasten - permanent (kN, kNm, kN/m)

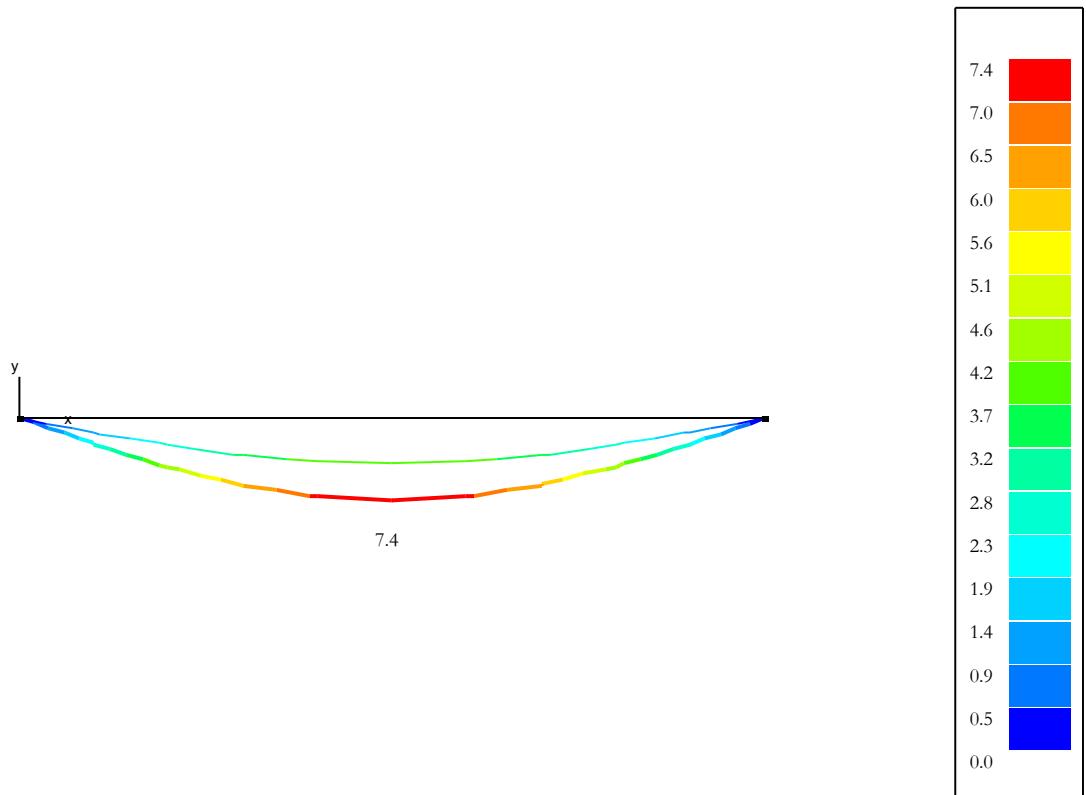


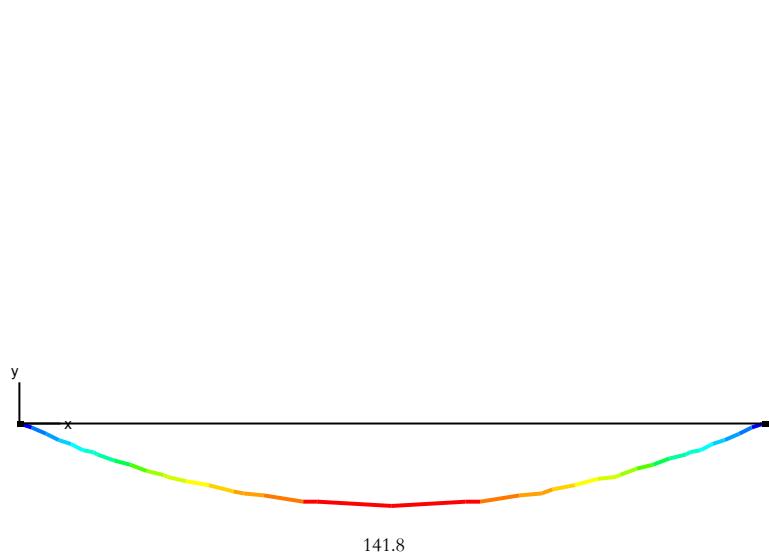
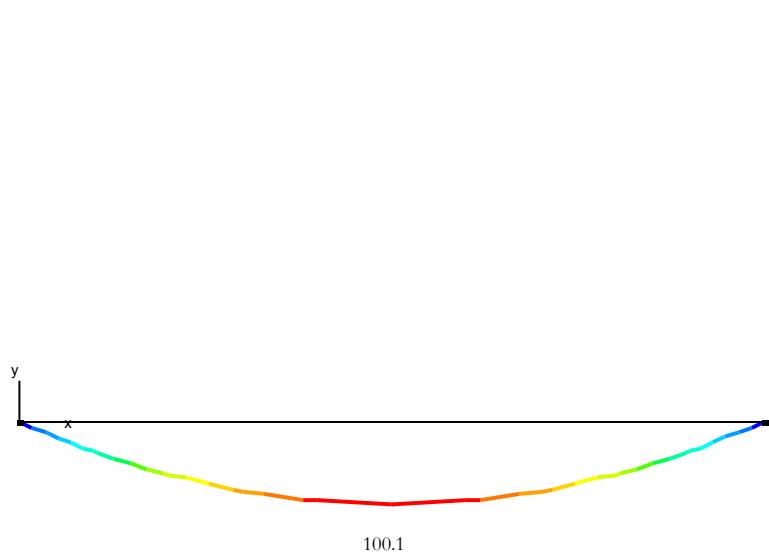
staal: Lasten - gebruikslast (kN, kNm, kN/m)



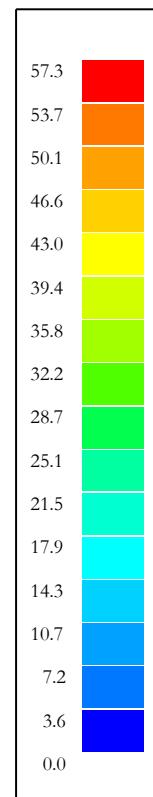
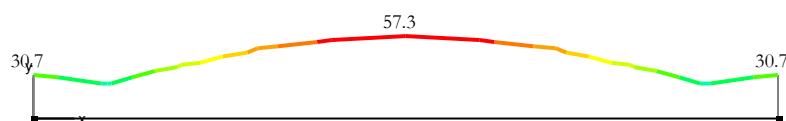
y
x

staal: GGT ZC-Vervorming dY (mm)

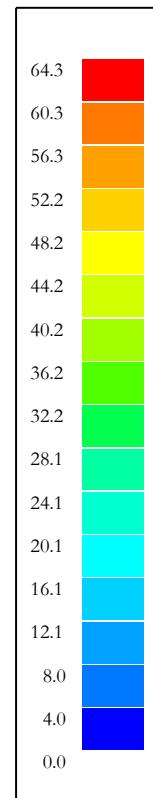
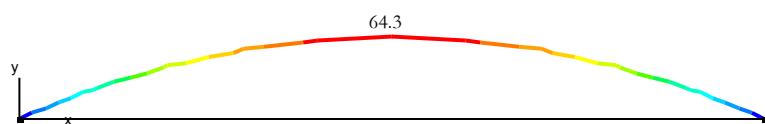


staal: UGT FC-Buigende momenten M_y' (kNm)staal: GGT ZC-Buigende momenten M_y' (kNm)

staal: Weerstandscontrole (%) - NEN EN 1993-1-1



staal: Stabiliteitscontrole (%) - NEN EN 1993-1-1

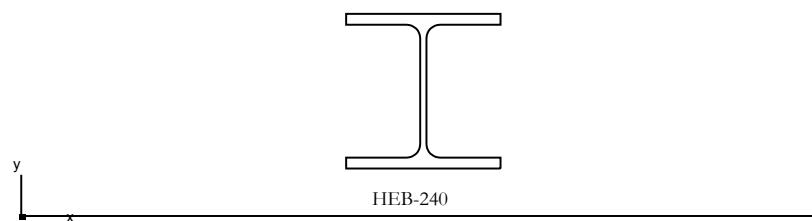


staal: UGT FC-Grootste reacties (kN)



y
└ x

staal: Dimensionering



y
└ x

6.2. Bijlage B: berekeningen Technosoft reactiekrachten kelderwand

Project...: 411: woning met schuur

Onderdeel: woning: wand 1

Dimensies: kN; m; rad (tenzij anders aangegeven)

Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|--|--------------------|----------------------------|
| Belastingen | NEN-EN 1990:2002 NEN-EN 1991-1-1:2002 | C2:2010 C1:2009 | NB:2011(nl) NB:2011(nl) |
|-------------|--|--------------------|----------------------------|

GEOMETRIE



MATERIALEN

| Mt | Omschrijving | E-modulus [N/mm ²] | S.M. | Pois. | Uitz. coëff |
|----|--------------|--------------------------------|------|-------|-------------|
| 1 | C30/37 | 9465 | 25.0 | 0.20 | 1.0000e-05 |

MATERIALEN vervolg

| Mt Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|-----------------|--------|-----------|---------|--------------------------|
| 1 C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 350*2600 | 1:C30/37 | 9.1000e+05 | 5.1263e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staaftype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|-----------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 350 | 2600 | 1300.0 | 0:RH | | | | |

KNOPEN

| Knoop | X | Z |
|-------|-------|-------|
| 1 | 0.000 | 0.000 |
| 2 | 2.550 | 0.000 |
| 3 | 5.100 | 0.000 |
| 4 | 7.650 | 0.000 |

Project...: 411: woning met schuur

Onderdeel: woning: wand 1

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 350*2600 | NDM | NDM | 2.550 | |
| 2 | 2 | 3 | 1:B*H 350*2600 | NDM | NDM | 2.550 | |
| 3 | 3 | 4 | 1:B*H 350*2600 | NDM | NDM | 2.550 | |

VASTE STEUNPUNTEN

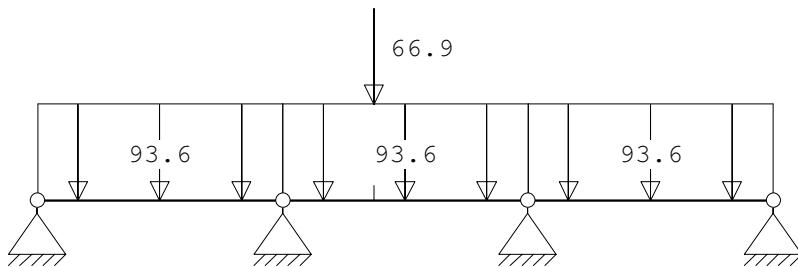
| Nr. | knoop | Kode | XZR | 1=vast 0=vrij | Hoek |
|-----|-------|------|-----|---------------|------|
| 1 | 1 | 110 | | | 0.00 |
| 2 | 2 | 110 | | | 0.00 |
| 3 | 3 | 110 | | | 0.00 |
| 4 | 4 | 110 | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---------------------------------|
| 1 | perm. bel. | EGZ=0.00 1 Permanente belasting |
| 2 | ver. bel. Q | 2 Ver. bel. pers. ed. (p_prep) |

BELASTINGEN

B.G:1 perm. bel.

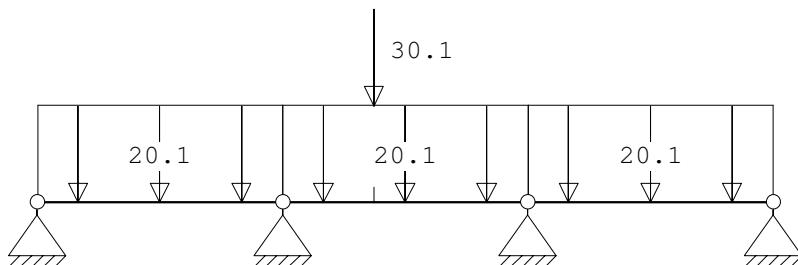
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|--------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -93.60 | -93.60 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -93.60 | -93.60 | 0.000 | 0.000 | | | |
| 3 | 1:QZLokaal | -93.60 | -93.60 | 0.000 | 0.000 | | | |
| 2 | 10:PZGeproj. | -66.90 | | 0.950 | | | | |

BELASTINGEN

B.G:2 ver. bel. Q



Project..: 411: woning met schuur

Onderdeel: woning: wand 1

STAAFBELASTINGEN

B.G:2 ver. bel. Q

| Staaf Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|----------------|--------|--------|-------|-------|----------|----------|----------|
| 2 10:PZGeproj. | -30.10 | | 0.950 | | 0.4 | 0.5 | 0.3 |
| 1 1:QZLokaal | -20.10 | -20.10 | 0.000 | 0.000 | 0.4 | 0.5 | 0.3 |
| 2 1:QZLokaal | -20.10 | -20.10 | 0.000 | 0.000 | 0.4 | 0.5 | 0.3 |
| 3 1:QZLokaal | -20.10 | -20.10 | 0.000 | 0.000 | 0.4 | 0.5 | 0.3 |

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

- 1 2 Nauwkeurigheid bereikt
- 2 2 Nauwkeurigheid bereikt
- 3 2 Nauwkeurigheid bereikt
- 4 2 Nauwkeurigheid bereikt
- 5 2 Nauwkeurigheid bereikt

BELASTINGCOMBINATIES

BC Type

- 1 Fund. 1.22 $G_{k,1}$ + 1.35 Ψ_0 $Q_{k,2}$
- 2 Fund. 1.08 $G_{k,1}$ + 1.35 $Q_{k,2}$
- 3 Kar. 1.00 $G_{k,1}$
- 4 Kar. 1.00 $Q_{k,2}$
- 5 Kar. 1.00 $G_{k,1}$ + 1.00 $Q_{k,2}$

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE

B.C:3 kar. perm.

REACTIES

2e orde

B.C:3 kar. perm.

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 90.12 | |
| 2 | -0.00 | 311.21 | |
| 3 | 0.00 | 290.17 | |
| 4 | -0.00 | 91.44 | |
| | 0.00 | 782.94 | : Som van de reacties |
| | 0.00 | -782.94 | : Som van de belastingen |

BELASTINGCOMBINATIE

B.C:4 kar. Q

REACTIES

2e orde

B.C:4 kar. Q

| Kn. | X | Z | M |
|-----|-------|-------|---|
| 1 | 0.00 | 18.09 | |
| 2 | 0.00 | 78.27 | |
| 3 | -0.00 | 68.81 | |
| 4 | -0.00 | 18.69 | |

Project...: 411: woning met schuur

Onderdeel: woning: wand 1

| | | |
|------|---------|--------------------------|
| 0.00 | 183.87 | : Som van de reacties |
| 0.00 | -183.87 | : Som van de belastingen |

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q****REACTIES**

2e orde

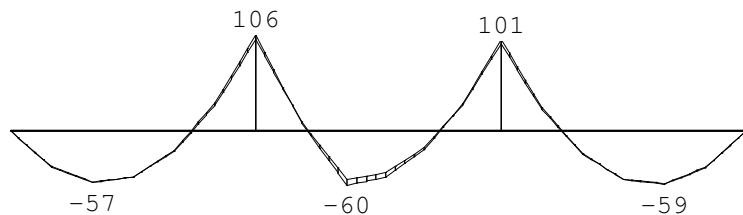
B.C:5 kar. perm.+Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 108.21 | |
| 2 | -0.00 | 389.48 | |
| 3 | 0.00 | 358.98 | |
| 4 | -0.00 | 110.13 | |
| | 0.00 | 966.80 | : Som van de reacties |
| | 0.00 | -966.80 | : Som van de belastingen |

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 119.71 | 121.75 | | |
| 2 | -0.00 | -0.00 | 421.94 | 441.78 | | |
| 3 | 0.00 | 0.00 | 391.16 | 406.27 | | |
| 4 | -0.00 | -0.00 | 121.66 | 123.99 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 18.09 | 108.21 | | |
| 2 | -0.00 | 0.00 | 78.27 | 389.48 | | |
| 3 | -0.00 | 0.00 | 68.81 | 358.98 | | |
| 4 | -0.00 | -0.00 | 18.69 | 110.13 | | |

Project...: 411: woning met schuur
 Onderdeel: woning: wand 2
 Dimensies: kN;m;rad (tenzij anders aangegeven)
 Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

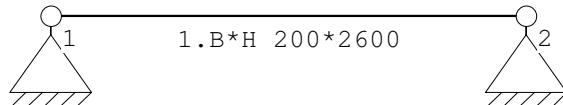
Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|----------------------|---------|-------------|
| Belastingen | NEN-EN 1990:2002 | C2:2010 | NB:2011(nl) |
| | NEN-EN 1991-1-1:2002 | C1:2009 | NB:2011(nl) |

GEOMETRIE



MATERIALEN

| Mt Omschrijving | E-modulus [N/mm ²] | S.M. Pois. | Uitz. coëff |
|-----------------|--------------------------------|------------|-------------|
| 1 C30/37 | 9465 | 25.0 | 0.20 |

MATERIALEN vervolg

| Mt Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|-----------------|--------|-----------|---------|--------------------------|
| 1 C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 200*2600 | 1:C30/37 | 5.2000e+05 | 2.9293e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staatstype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|------------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 200 | 2600 | 1300.0 | 0:RH | | | | |

Project...: 411: woning met schuur
 Onderdeel: woning: wand 2

KNOPEN

| Knoep | X | Z |
|-------|-------|-------|
| 1 | 0.000 | 0.000 |
| 2 | 3.500 | 0.000 |

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 200*2600 | NDM | NDM | 3.500 | |

VASTE STEUNPUNTEN

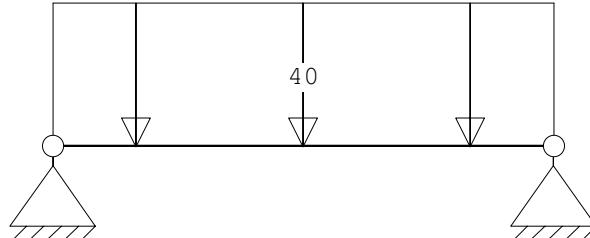
| Nr. | knoep | Kode | XZR | 1=vast | 0=vrij | Hoek |
|-----|-------|------|-----|--------|--------|------|
| 1 | 1 | 110 | | | | 0.00 |
| 2 | 2 | 110 | | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---|
| 1 | perm. bel. | EGZ=0.00 |
| 2 | ver. bel. Q | 1 Permanente belasting 2 Ver. bel. pers. ed. (p_rep) |

BELASTINGEN

B.G:1 perm. bel.

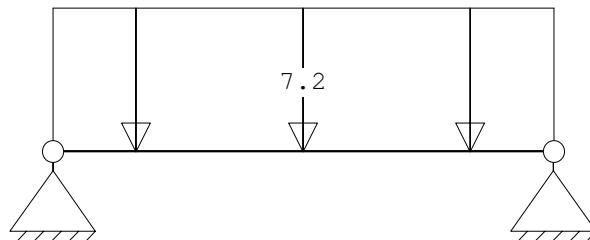
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -40.00 | -40.00 | 0.000 | 0.000 | | | |

BELASTINGEN

B.G:2 ver. bel. Q



Project..: 411: woning met schuur

Onderdeel: woning: wand 2

STAAFBELASTINGEN

B.G:2 ver. bel. Q

| Staaf Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|--------------|--------|-------|-------|-------|----------|----------|----------|
| 1 1:QZLokaal | -7.20 | -7.20 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

- 1 2 Nauwkeurigheid bereikt
- 2 2 Nauwkeurigheid bereikt
- 3 2 Nauwkeurigheid bereikt
- 4 2 Nauwkeurigheid bereikt
- 5 2 Nauwkeurigheid bereikt

BELASTINGCOMBINATIES

BC Type

- 1 Fund. 1.22 $G_{k,1}$ + 1.35 $\Psi_0 Q_{k,2}$
- 2 Fund. 1.08 $G_{k,1}$ + 1.35 $Q_{k,2}$
- 3 Kar. 1.00 $G_{k,1}$
- 4 Kar. 1.00 $Q_{k,2}$
- 5 Kar. 1.00 $G_{k,1}$ + 1.00 $Q_{k,2}$

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE

B.C:3 kar. perm.

REACTIES

2e orde

B.C:3 kar. perm.

| Kn. | X | Z | M |
|-----|-------|-------|---|
| 1 | 0.00 | 70.00 | |
| 2 | -0.00 | 70.00 | |

0.00 140.00 : Som van de reacties
 0.00 -140.00 : Som van de belastingen

BELASTINGCOMBINATIE

B.C:4 kar. Q

REACTIES

2e orde

B.C:4 kar. Q

| Kn. | X | Z | M |
|-----|-------|-------|---|
| 1 | 0.00 | 12.60 | |
| 2 | -0.00 | 12.60 | |

0.00 25.20 : Som van de reacties
 0.00 -25.20 : Som van de belastingen

Project..: 411: woning met schuur

Onderdeel: woning: wand 2

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q****REACTIES**

2e orde

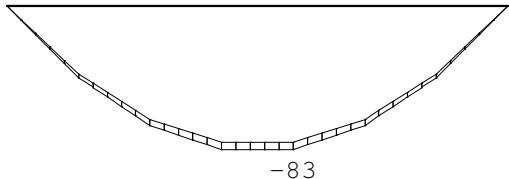
B.C:5 kar. perm.+Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 82.60 | |
| 2 | -0.00 | 82.60 | |
| | 0.00 | 165.20 | : Som van de reacties |
| | 0.00 | -165.20 | : Som van de belastingen |

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|-------|-------|-------|
| 1 | 0.00 | 0.00 | 92.61 | 97.31 | | |
| 2 | -0.00 | -0.00 | 92.61 | 97.31 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|-------|-------|-------|
| 1 | 0.00 | 0.00 | 12.60 | 82.60 | | |
| 2 | -0.00 | -0.00 | 12.60 | 82.60 | | |

Project...: 411: woning met schuur

Onderdeel: woning: wand 3

Dimensies: kN; m; rad (tenzij anders aangegeven)

Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

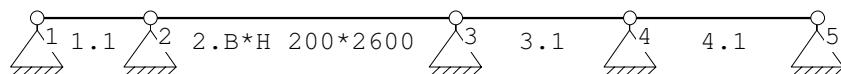
Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|--|--------------------|----------------------------|
| Belastingen | NEN-EN 1990:2002 NEN-EN 1991-1-1:2002 | C2:2010 C1:2009 | NB:2011(nl) NB:2011(nl) |
|-------------|--|--------------------|----------------------------|

GEOMETRIE



MATERIALEN

| Mt Omschrijving | E-modulus [N/mm ²] | S.M. Pois. | Uitz. coëff |
|-----------------|--------------------------------|------------|-------------|
| 1 C30/37 | 9465 | 25.0 | 0.20 |

MATERIALEN vervolg

| Mt Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|-----------------|--------|-----------|---------|--------------------------|
| 1 C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 200*2600 | 1:C30/37 | 5.2000e+05 | 2.9293e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staaftype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|-----------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 200 | 2600 | 1300.0 | 0:RH | | | | |

KNOPEN

| Knoop | X | Z |
|-------|-------|-------|
| 1 | 0.000 | 0.000 |
| 2 | 1.300 | 0.000 |
| 3 | 4.800 | 0.000 |
| 4 | 6.800 | 0.000 |
| 5 | 8.950 | 0.000 |

Project...: 411: woning met schuur

Onderdeel: woning: wand 3

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 200*2600 | NDM | NDM | 1.300 | |
| 2 | 2 | 3 | 1:B*H 200*2600 | NDM | NDM | 3.500 | |
| 3 | 3 | 4 | 1:B*H 200*2600 | NDM | NDM | 2.000 | |
| 4 | 4 | 5 | 1:B*H 200*2600 | NDM | NDM | 2.150 | |

VASTE STEUNPUNTEN

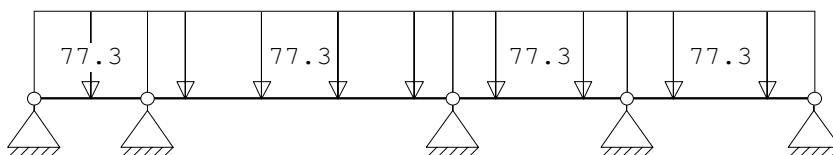
| Nr. | knoop | Kode | XZR | 1=vast 0=vrij | Hoek |
|-----|-------|------|-----|---------------|------|
| 1 | 1 | 110 | | | 0.00 |
| 2 | 2 | 110 | | | 0.00 |
| 3 | 3 | 110 | | | 0.00 |
| 4 | 4 | 110 | | | 0.00 |
| 5 | 5 | 110 | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---------------------------------|
| 1 | perm. bel. | EGZ=0.00 1 Permanente belasting |
| 2 | ver. bel. Q | 2 Ver. bel. pers. ed. (p_rep) |

BELASTINGEN

B.G:1 perm. bel.

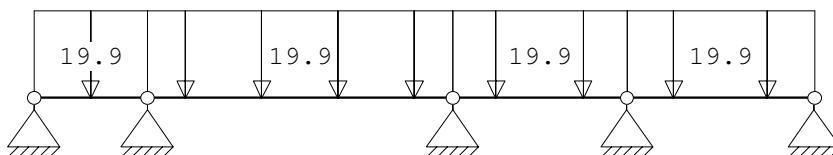
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -77.30 | -77.30 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -77.30 | -77.30 | 0.000 | 0.000 | | | |
| 3 | 1:QZLokaal | -77.30 | -77.30 | 0.000 | 0.000 | | | |
| 4 | 1:QZLokaal | -77.30 | -77.30 | 0.000 | 0.000 | | | |

BELASTINGEN

B.G:2 ver. bel. Q

**STAAFBELASTINGEN**

B.G:2 ver. bel. Q

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -19.90 | -19.90 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 2 | 1:QZLokaal | -19.90 | -19.90 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 3 | 1:QZLokaal | -19.90 | -19.90 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 4 | 1:QZLokaal | -19.90 | -19.90 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |

Project...: 411: woning met schuur

Onderdeel: woning: wand 3

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

| | |
|---|--------------------------|
| 1 | 2 Nauwkeurigheid bereikt |
| 2 | 2 Nauwkeurigheid bereikt |
| 3 | 2 Nauwkeurigheid bereikt |
| 4 | 2 Nauwkeurigheid bereikt |
| 5 | 2 Nauwkeurigheid bereikt |

BELASTINGCOMBINATIES**BC Type**

| | | | | | | |
|---------|------|-----------|---|------|----------|-----------|
| 1 Fund. | 1.22 | $G_{k,1}$ | + | 1.35 | Ψ_0 | $Q_{k,2}$ |
| 2 Fund. | 1.08 | $G_{k,1}$ | + | 1.35 | | $Q_{k,2}$ |
| 3 Kar. | 1.00 | $G_{k,1}$ | | | | |
| 4 Kar. | 1.00 | $Q_{k,2}$ | | | | |
| 5 Kar. | 1.00 | $G_{k,1}$ | + | 1.00 | | $Q_{k,2}$ |

GUNSTIGE WERKING PERMANENTE BELASTINGEN**BC Staven met gunstige werking**

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE**B.C:3 kar. perm.****REACTIES** 2e orde

B.C:3 kar. perm.

| Kn. | X | Z | M |
|-----|-------|--------|---|
| 1 | -0.00 | -1.89 | |
| 2 | 0.00 | 239.02 | |
| 3 | -0.00 | 229.40 | |
| 4 | 0.00 | 154.57 | |
| 5 | -0.00 | 70.73 | |

0.00 691.84 : Som van de reacties
 0.00 -691.84 : Som van de belastingen

BELASTINGCOMBINATIE**B.C:4 kar. Q****REACTIES** 2e orde

B.C:4 kar. Q

| Kn. | X | Z | M |
|-----|-------|-------|---|
| 1 | -0.00 | -0.49 | |
| 2 | 0.00 | 61.53 | |
| 3 | -0.00 | 59.06 | |
| 4 | 0.00 | 39.79 | |
| 5 | -0.00 | 18.21 | |

0.00 178.10 : Som van de reacties
 0.00 -178.10 : Som van de belastingen

Project...: 411: woning met schuur

Onderdeel: woning: wand 3

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q****REACTIES**

2e orde

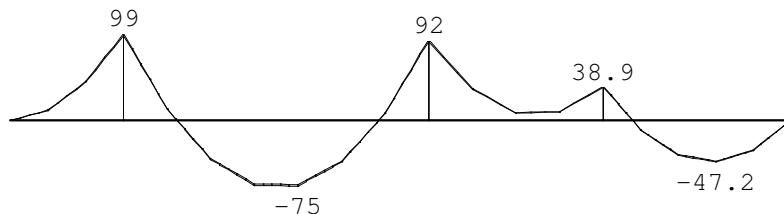
B.C:5 kar. perm.+Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | -0.00 | -2.37 | |
| 2 | 0.00 | 300.55 | |
| 3 | -0.00 | 288.46 | |
| 4 | 0.00 | 194.36 | |
| 5 | -0.00 | 88.94 | |
| | 0.00 | 869.94 | : Som van de reacties |
| | 0.00 | -869.94 | : Som van de belastingen |

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | -0.00 | -0.00 | -2.76 | -2.69 | | |
| 2 | 0.00 | 0.00 | 341.21 | 349.75 | | |
| 3 | -0.00 | -0.00 | 327.48 | 335.68 | | |
| 4 | 0.00 | 0.00 | 220.65 | 226.18 | | |
| 5 | -0.00 | -0.00 | 100.97 | 103.50 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|--------|-------|-------|
| 1 | -0.00 | -0.00 | -2.37 | -0.49 | | |
| 2 | 0.00 | 0.00 | 61.53 | 300.55 | | |
| 3 | -0.00 | -0.00 | 59.06 | 288.46 | | |
| 4 | 0.00 | 0.00 | 39.79 | 194.36 | | |
| 5 | -0.00 | -0.00 | 18.21 | 88.94 | | |

Project...: 411: woning met schuur

Onderdeel: woning: wand 4

Dimensies: kN; m; rad (tenzij anders aangegeven)

Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

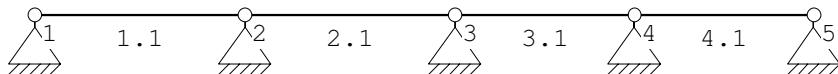
Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|--|--------------------|----------------------------|
| Belastingen | NEN-EN 1990:2002 NEN-EN 1991-1-1:2002 | C2:2010 C1:2009 | NB:2011(nl) NB:2011(nl) |
|-------------|--|--------------------|----------------------------|

GEOMETRIE



MATERIALEN

| Mt Omschrijving | E-modulus [N/mm ²] | S.M. Pois. | Uitz. coëff |
|-----------------|--------------------------------|------------|-------------|
| 1 C30/37 | 9465 | 25.0 | 0.20 |

MATERIALEN vervolg

| Mt Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|-----------------|--------|-----------|---------|--------------------------|
| 1 C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 350*2600 | 1:C30/37 | 9.1000e+05 | 5.1263e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staatstype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|------------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 350 | 2600 | 1300.0 | 0:RH | | | | |

KNOPEN

| Knoop | X | Z |
|-------|-------|-------|
| 1 | 0.000 | 0.000 |
| 2 | 2.400 | 0.000 |
| 3 | 4.800 | 0.000 |
| 4 | 6.850 | 0.000 |
| 5 | 8.900 | 0.000 |

Project...: 411: woning met schuur

Onderdeel: woning: wand 4

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 350*2600 | NDM | NDM | 2.400 | |
| 2 | 2 | 3 | 1:B*H 350*2600 | NDM | NDM | 2.400 | |
| 3 | 3 | 4 | 1:B*H 350*2600 | NDM | NDM | 2.050 | |
| 4 | 4 | 5 | 1:B*H 350*2600 | NDM | NDM | 2.050 | |

VASTE STEUNPUNTEN

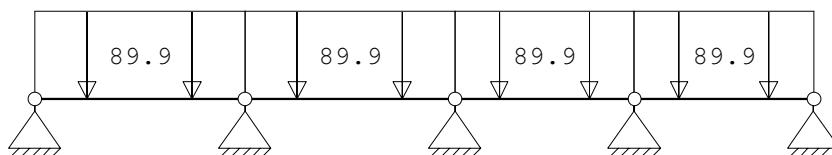
| Nr. | knoop | Kode | XZR | 1=vast 0=vrij | Hoek |
|-----|-------|------|-----|---------------|------|
| 1 | 1 | 110 | | | 0.00 |
| 2 | 2 | 110 | | | 0.00 |
| 3 | 3 | 110 | | | 0.00 |
| 4 | 4 | 110 | | | 0.00 |
| 5 | 5 | 110 | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---------------------------------|
| 1 | perm. bel. | EGZ=0.00 1 Permanente belasting |
| 2 | ver. bel. Q | 2 Ver. bel. pers. ed. (p_rep) |

BELASTINGEN

B.G:1 perm. bel.

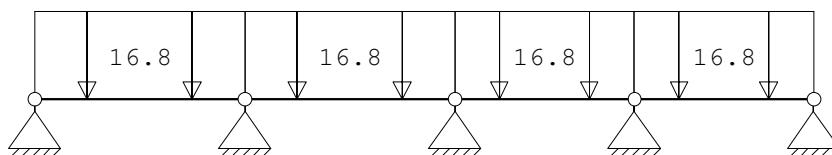
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -89.90 | -89.90 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -89.90 | -89.90 | 0.000 | 0.000 | | | |
| 3 | 1:QZLokaal | -89.90 | -89.90 | 0.000 | 0.000 | | | |
| 4 | 1:QZLokaal | -89.90 | -89.90 | 0.000 | 0.000 | | | |

BELASTINGEN

B.G:2 ver. bel. Q

**STAAFBELASTINGEN**

B.G:2 ver. bel. Q

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -16.80 | -16.80 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 2 | 1:QZLokaal | -16.80 | -16.80 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 3 | 1:QZLokaal | -16.80 | -16.80 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 4 | 1:QZLokaal | -16.80 | -16.80 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |

Project...: 411: woning met schuur

Onderdeel: woning: wand 4

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

| | |
|---|--------------------------|
| 1 | 2 Nauwkeurigheid bereikt |
| 2 | 2 Nauwkeurigheid bereikt |
| 3 | 2 Nauwkeurigheid bereikt |
| 4 | 2 Nauwkeurigheid bereikt |
| 5 | 2 Nauwkeurigheid bereikt |

BELASTINGCOMBINATIES**BC Type**

| | | | | | | |
|---------|------|-----------|---|------|----------|-----------|
| 1 Fund. | 1.22 | $G_{k,1}$ | + | 1.35 | Ψ_0 | $Q_{k,2}$ |
| 2 Fund. | 1.08 | $G_{k,1}$ | + | 1.35 | | $Q_{k,2}$ |
| 3 Kar. | 1.00 | $G_{k,1}$ | | | | |
| 4 Kar. | 1.00 | $Q_{k,2}$ | | | | |
| 5 Kar. | 1.00 | $G_{k,1}$ | + | 1.00 | | $Q_{k,2}$ |

GUNSTIGE WERKING PERMANENTE BELASTINGEN**BC Staven met gunstige werking**

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE**B.C:3 kar. perm.**

| REACTIES | | 2e orde | | B.C:3 kar. perm. |
|-----------------|-------|---------|--------|-------------------------|
| Kn. | | X | Z | M |
| 1 | 0.00 | | 84.28 | |
| 2 | -0.00 | | 249.46 | |
| 3 | -0.00 | | 186.63 | |
| 4 | 0.00 | | 206.68 | |
| 5 | -0.00 | | 73.06 | |
| | 0.00 | 800.11 | : | Som van de reacties |
| | 0.00 | -800.11 | : | Som van de belastingen |

BELASTINGCOMBINATIE**B.C:4 kar. Q**

| REACTIES | | 2e orde | | B.C:4 kar. Q |
|-----------------|-------|---------|-------|------------------------|
| Kn. | | X | Z | M |
| 1 | 0.00 | | 15.75 | |
| 2 | -0.00 | | 46.62 | |
| 3 | -0.00 | | 34.88 | |
| 4 | 0.00 | | 38.62 | |
| 5 | -0.00 | | 13.65 | |
| | 0.00 | 149.52 | : | Som van de reacties |
| | 0.00 | -149.52 | : | Som van de belastingen |

Project...: 411: woning met schuur
 Onderdeel: woning: wand 4

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q****REACTIES**

2e orde

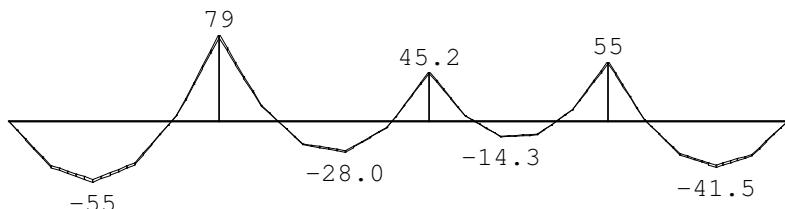
B.C:5 kar. perm.+Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 100.03 | |
| 2 | -0.00 | 296.08 | |
| 3 | -0.00 | 221.51 | |
| 4 | 0.00 | 245.30 | |
| 5 | -0.00 | 86.71 | |
| | 0.00 | 949.63 | : Som van de reacties |
| | 0.00 | -949.63 | : Som van de belastingen |

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 112.29 | 117.71 | | |
| 2 | -0.00 | -0.00 | 332.35 | 348.40 | | |
| 3 | -0.00 | -0.00 | 248.64 | 260.65 | | |
| 4 | 0.00 | 0.00 | 275.35 | 288.64 | | |
| 5 | -0.00 | -0.00 | 97.34 | 102.03 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 15.75 | 100.03 | | |
| 2 | -0.00 | -0.00 | 46.62 | 296.08 | | |
| 3 | -0.00 | -0.00 | 34.88 | 221.51 | | |
| 4 | 0.00 | 0.00 | 38.62 | 245.30 | | |
| 5 | -0.00 | -0.00 | 13.65 | 86.71 | | |

Project...: 411: woning met schuur
 Onderdeel: woning: wand 5
 Dimensies: kN;m;rad (tenzij anders aangegeven)
 Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

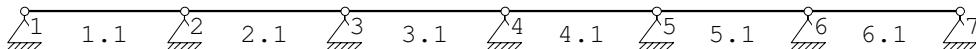
Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|----------------------|---------|-------------|
| Belastingen | NEN-EN 1990:2002 | C2:2010 | NB:2011(nl) |
| | NEN-EN 1991-1-1:2002 | C1:2009 | NB:2011(nl) |

GEOMETRIE



MATERIALEN

| Mt | Omschrijving | E-modulus [N/mm ²] | S.M. | Pois. | Uitz. coëff |
|----|--------------|--------------------------------|------|-------|-------------|
| 1 | C30/37 | 9465 | 25.0 | 0.20 | 1.0000e-05 |

MATERIALEN vervolg

| Mt | Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|----|--------------|--------|-----------|---------|--------------------------|
| 1 | C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 350*2600 | 1:C30/37 | 9.1000e+05 | 5.1263e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staatstype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|------------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 350 | 2600 | 1300.0 | 0:RH | | | | |

KNOPEN

| Knoop | X | Z | Knoop | X | Z |
|-------|--------|-------|-------|--------|-------|
| 1 | 0.000 | 0.000 | 6 | 13.950 | 0.000 |
| 2 | 2.850 | 0.000 | 7 | 16.650 | 0.000 |
| 3 | 5.700 | 0.000 | | | |
| 4 | 8.550 | 0.000 | | | |
| 5 | 11.250 | 0.000 | | | |

Project...: 411: woning met schuur

Onderdeel: woning: wand 5

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 350*2600 | NDM | NDM | 2.850 | |
| 2 | 2 | 3 | 1:B*H 350*2600 | NDM | NDM | 2.850 | |
| 3 | 3 | 4 | 1:B*H 350*2600 | NDM | NDM | 2.850 | |
| 4 | 4 | 5 | 1:B*H 350*2600 | NDM | NDM | 2.700 | |
| 5 | 5 | 6 | 1:B*H 350*2600 | NDM | NDM | 2.700 | |
| 6 | 6 | 7 | 1:B*H 350*2600 | NDM | NDM | 2.700 | |

VASTE STEUNPUNTEN

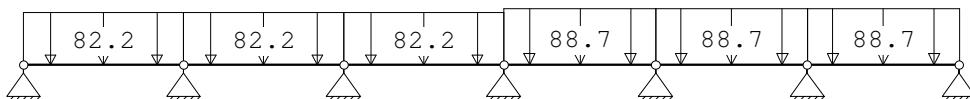
| Nr. | knoop | Kode | XZR | 1=vast 0=vrij | Hoek |
|-----|-------|------|-----|---------------|------|
| 1 | 1 | 110 | | | 0.00 |
| 2 | 2 | 110 | | | 0.00 |
| 3 | 3 | 110 | | | 0.00 |
| 4 | 4 | 110 | | | 0.00 |
| 5 | 5 | 110 | | | 0.00 |
| 6 | 6 | 110 | | | 0.00 |
| 7 | 7 | 110 | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---------------------------------|
| 1 | perm. bel. | EGZ=0.00 1 Permanente belasting |
| 2 | ver. bel. Q | 2 Ver. bel. pers. ed. (p_rep) |

BELASTINGEN

B.G:1 perm. bel.

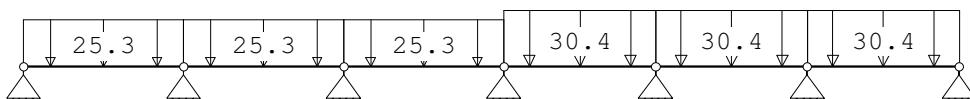
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -82.20 | -82.20 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -82.20 | -82.20 | 0.000 | 0.000 | | | |
| 3 | 1:QZLokaal | -82.20 | -82.20 | 0.000 | 0.000 | | | |
| 4 | 1:QZLokaal | -88.70 | -88.70 | 0.000 | 0.000 | | | |
| 5 | 1:QZLokaal | -88.70 | -88.70 | 0.000 | 0.000 | | | |
| 6 | 1:QZLokaal | -88.70 | -88.70 | 0.000 | 0.000 | | | |

BELASTINGEN

B.G:2 ver. bel. Q



Project...: 411: woning met schuur

Onderdeel: woning: wand 5

STAAFBELASTINGEN

B.G:2 ver. bel. Q

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -25.30 | -25.30 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 2 | 1:QZLokaal | -25.30 | -25.30 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 3 | 1:QZLokaal | -25.30 | -25.30 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 4 | 1:QZLokaal | -30.40 | -30.40 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 5 | 1:QZLokaal | -30.40 | -30.40 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 6 | 1:QZLokaal | -30.40 | -30.40 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

- 1 2 Nauwkeurigheid bereikt
- 2 2 Nauwkeurigheid bereikt
- 3 2 Nauwkeurigheid bereikt
- 4 2 Nauwkeurigheid bereikt
- 5 2 Nauwkeurigheid bereikt

BELASTINGCOMBINATIES

BC Type

- 1 Fund. 1.22 $G_{k,1}$ + 1.35 $\Psi_0 Q_{k,2}$
- 2 Fund. 1.08 $G_{k,1}$ + 1.35 $Q_{k,2}$
- 3 Kar. 1.00 $G_{k,1}$
- 4 Kar. 1.00 $Q_{k,2}$
- 5 Kar. 1.00 $G_{k,1}$ + 1.00 $Q_{k,2}$

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE

B.C:3 kar. perm.

REACTIES

2e orde

B.C:3 kar. perm.

| Kn. | X | Z | M |
|-----|-------|----------|--------------------------|
| 1 | 0.00 | 92.38 | |
| 2 | -0.00 | 265.68 | |
| 3 | 0.00 | 225.76 | |
| 4 | -0.00 | 241.48 | |
| 5 | -0.00 | 229.72 | |
| 6 | 0.00 | 271.87 | |
| 7 | -0.00 | 94.39 | |
| | 0.00 | 1421.28 | : Som van de reacties |
| | 0.00 | -1421.28 | : Som van de belastingen |

Project..: 411: woning met schuur

Onderdeel: woning: wand 5

BELASTINGCOMBINATIE**B.C:4 kar. Q**

| REACTIES | | 2e orde | | B.C:4 kar. Q |
|-----------------|-------|---------|-------|------------------------|
| Kn. | | X | Z | M |
| 1 | 0.00 | | 28.41 | |
| 2 | -0.00 | | 81.91 | |
| 3 | 0.00 | | 68.95 | |
| 4 | 0.00 | | 78.54 | |
| 5 | -0.00 | | 79.35 | |
| 6 | 0.00 | | 93.02 | |
| 7 | -0.00 | | 32.38 | |
| | 0.00 | 462.55 | : | Som van de reacties |
| | 0.00 | -462.55 | : | Som van de belastingen |

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q**

| REACTIES | | 2e orde | | B.C:5 kar. perm.+Q |
|-----------------|-------|----------|--------|---------------------------|
| Kn. | | X | Z | M |
| 1 | 0.00 | | 120.79 | |
| 2 | -0.00 | | 347.59 | |
| 3 | 0.00 | | 294.71 | |
| 4 | -0.00 | | 320.02 | |
| 5 | -0.00 | | 309.07 | |
| 6 | 0.00 | | 364.89 | |
| 7 | -0.00 | | 126.77 | |
| | 0.00 | 1883.83 | : | Som van de reacties |
| | 0.00 | -1883.83 | : | Som van de belastingen |

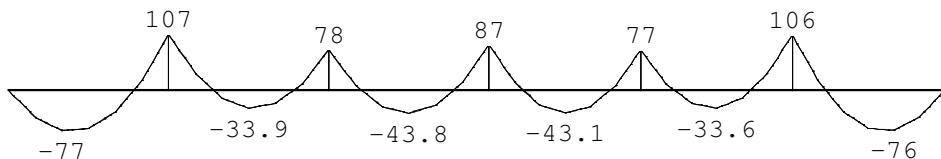
Project...: 411: woning met schuur

Onderdeel: woning: wand 5

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 138.12 | 139.55 | | |
| 2 | -0.00 | -0.00 | 397.51 | 401.53 | | |
| 3 | 0.00 | 0.00 | 336.90 | 340.58 | | |
| 4 | -0.00 | 0.00 | 366.83 | 368.83 | | |
| 5 | -0.00 | -0.00 | 355.22 | 355.25 | | |
| 6 | 0.00 | 0.00 | 419.20 | 419.59 | | |
| 7 | -0.00 | -0.00 | 145.65 | 145.75 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 28.41 | 120.79 | | |
| 2 | -0.00 | -0.00 | 81.91 | 347.59 | | |
| 3 | 0.00 | 0.00 | 68.95 | 294.71 | | |
| 4 | -0.00 | 0.00 | 78.54 | 320.02 | | |
| 5 | -0.00 | -0.00 | 79.35 | 309.07 | | |
| 6 | 0.00 | 0.00 | 93.02 | 364.89 | | |
| 7 | -0.00 | -0.00 | 32.38 | 126.77 | | |

Project...: 411: woning met schuur
 Onderdeel: woning: wand 6
 Dimensies: kN;m;rad (tenzij anders aangegeven)
 Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

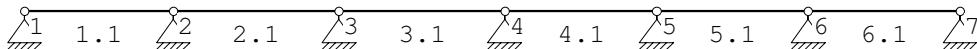
Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|----------------------|---------|-------------|
| Belastingen | NEN-EN 1990:2002 | C2:2010 | NB:2011(nl) |
| | NEN-EN 1991-1-1:2002 | C1:2009 | NB:2011(nl) |

GEOMETRIE



MATERIALEN

| Mt | Omschrijving | E-modulus [N/mm ²] | S.M. | Pois. | Uitz. coëff |
|----|--------------|--------------------------------|------|-------|-------------|
| 1 | C30/37 | 9465 | 25.0 | 0.20 | 1.0000e-05 |

MATERIALEN vervolg

| Mt | Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|----|--------------|--------|-----------|---------|--------------------------|
| 1 | C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 200*2600 | 1:C30/37 | 5.2000e+05 | 2.9293e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staatstype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|------------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 200 | 2600 | 1300.0 | 0:RH | | | | |

KNOPEN

| Knoop | X | Z | Knoop | X | Z |
|-------|--------|-------|-------|--------|-------|
| 1 | 0.000 | 0.000 | 6 | 13.950 | 0.000 |
| 2 | 2.650 | 0.000 | 7 | 16.650 | 0.000 |
| 3 | 5.600 | 0.000 | | | |
| 4 | 8.550 | 0.000 | | | |
| 5 | 11.250 | 0.000 | | | |

Project...: 411: woning met schuur

Onderdeel: woning: wand 6

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 200*2600 | NDM | NDM | 2.650 | |
| 2 | 2 | 3 | 1:B*H 200*2600 | NDM | NDM | 2.950 | |
| 3 | 3 | 4 | 1:B*H 200*2600 | NDM | NDM | 2.950 | |
| 4 | 4 | 5 | 1:B*H 200*2600 | NDM | NDM | 2.700 | |
| 5 | 5 | 6 | 1:B*H 200*2600 | NDM | NDM | 2.700 | |
| 6 | 6 | 7 | 1:B*H 200*2600 | NDM | NDM | 2.700 | |

VASTE STEUNPUNTEN

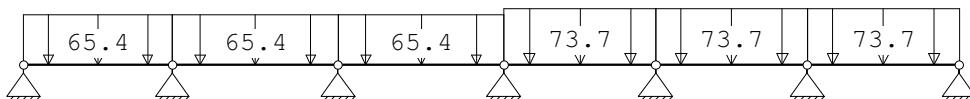
| Nr. | knoop | Kode | XZR | 1=vast 0=vrij | Hoek |
|-----|-------|------|-----|---------------|------|
| 1 | 1 | 110 | | | 0.00 |
| 2 | 2 | 110 | | | 0.00 |
| 3 | 3 | 110 | | | 0.00 |
| 4 | 4 | 110 | | | 0.00 |
| 5 | 5 | 110 | | | 0.00 |
| 6 | 6 | 110 | | | 0.00 |
| 7 | 7 | 110 | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---------------------------------|
| 1 | perm. bel. | EGZ=0.00 1 Permanente belasting |
| 2 | ver. bel. Q | 2 Ver. bel. pers. ed. (p_rep) |

BELASTINGEN

B.G:1 perm. bel.

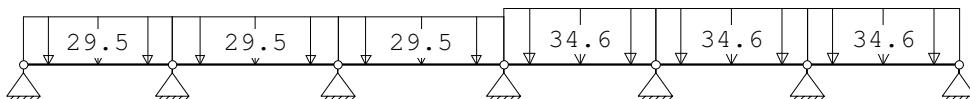
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -65.40 | -65.40 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -65.40 | -65.40 | 0.000 | 0.000 | | | |
| 3 | 1:QZLokaal | -65.40 | -65.40 | 0.000 | 0.000 | | | |
| 4 | 1:QZLokaal | -73.70 | -73.70 | 0.000 | 0.000 | | | |
| 5 | 1:QZLokaal | -73.70 | -73.70 | 0.000 | 0.000 | | | |
| 6 | 1:QZLokaal | -73.70 | -73.70 | 0.000 | 0.000 | | | |

BELASTINGEN

B.G:2 ver. bel. Q



Project...: 411: woning met schuur

Onderdeel: woning: wand 6

STAAFBELASTINGEN

B.G:2 ver. bel. Q

| Staaf Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|--------------|--------|--------|-------|-------|----------|----------|----------|
| 1 1:QZLokaal | -29.50 | -29.50 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 2 1:QZLokaal | -29.50 | -29.50 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 3 1:QZLokaal | -29.50 | -29.50 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 4 1:QZLokaal | -34.60 | -34.60 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 5 1:QZLokaal | -34.60 | -34.60 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 6 1:QZLokaal | -34.60 | -34.60 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

- 1 2 Nauwkeurigheid bereikt
- 2 2 Nauwkeurigheid bereikt
- 3 2 Nauwkeurigheid bereikt
- 4 2 Nauwkeurigheid bereikt
- 5 2 Nauwkeurigheid bereikt

BELASTINGCOMBINATIES

BC Type

- 1 Fund. 1.22 $G_{k,1}$ + 1.35 $\Psi_0 Q_{k,2}$
- 2 Fund. 1.08 $G_{k,1}$ + 1.35 $Q_{k,2}$
- 3 Kar. 1.00 $G_{k,1}$
- 4 Kar. 1.00 $Q_{k,2}$
- 5 Kar. 1.00 $G_{k,1}$ + 1.00 $Q_{k,2}$

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE

B.C:3 kar. perm.

REACTIES

2e orde

B.C:3 kar. perm.

| Kn. | X | Z | M |
|-----|-------|--------|---|
| 1 | 0.00 | 66.85 | |
| 2 | -0.00 | 205.06 | |
| 3 | 0.00 | 190.39 | |
| 4 | -0.00 | 198.68 | |
| 5 | -0.00 | 190.82 | |
| 6 | 0.00 | 225.91 | |
| 7 | -0.00 | 78.43 | |

0.00 1156.14 : Som van de reacties
 0.00 -1156.14 : Som van de belastingen

Project...: 411: woning met schuur

Onderdeel: woning: wand 6

BELASTINGCOMBINATIE**B.C:4 kar. Q**

| REACTIES | | 2e orde | | B.C:4 kar. Q |
|-----------------|-------|---------|--------|------------------------|
| Kn. | | X | Z | M |
| 1 | 0.00 | | 30.14 | |
| 2 | -0.00 | | 92.55 | |
| 3 | 0.00 | | 85.66 | |
| 4 | 0.00 | | 91.45 | |
| 5 | -0.00 | | 89.86 | |
| 6 | 0.00 | | 105.99 | |
| 7 | -0.00 | | 36.83 | |
| | 0.00 | 532.48 | : | Som van de reacties |
| | 0.00 | -532.48 | : | Som van de belastingen |

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q**

| REACTIES | | 2e orde | | B.C:5 kar. perm.+Q |
|-----------------|-------|----------|--------|---------------------------|
| Kn. | | X | Z | M |
| 1 | 0.00 | | 97.00 | |
| 2 | -0.00 | | 297.61 | |
| 3 | 0.00 | | 276.05 | |
| 4 | -0.00 | | 290.13 | |
| 5 | -0.00 | | 280.68 | |
| 6 | 0.00 | | 331.89 | |
| 7 | -0.00 | | 115.26 | |
| | 0.00 | 1688.62 | : | Som van de reacties |
| | 0.00 | -1688.62 | : | Som van de belastingen |

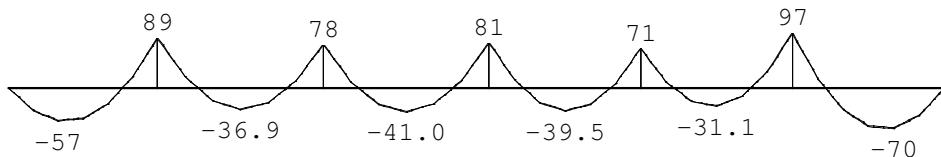
Project...: 411: woning met schuur

Onderdeel: woning: wand 6

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 110.04 | 112.89 | | |
| 2 | -0.00 | -0.00 | 337.63 | 346.41 | | |
| 3 | 0.00 | 0.00 | 313.23 | 321.27 | | |
| 4 | -0.00 | -0.00 | 328.81 | 338.03 | | |
| 5 | -0.00 | -0.00 | 317.72 | 327.40 | | |
| 6 | 0.00 | 0.00 | 375.76 | 387.06 | | |
| 7 | -0.00 | -0.00 | 130.49 | 134.42 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 30.14 | 97.00 | | |
| 2 | -0.00 | -0.00 | 92.55 | 297.61 | | |
| 3 | 0.00 | 0.00 | 85.66 | 276.05 | | |
| 4 | -0.00 | 0.00 | 91.45 | 290.13 | | |
| 5 | -0.00 | -0.00 | 89.86 | 280.68 | | |
| 6 | 0.00 | 0.00 | 105.99 | 331.89 | | |
| 7 | -0.00 | -0.00 | 36.83 | 115.26 | | |

Project...: 411: woning met schuur

Onderdeel: woning: wand 7

Dimensies: kN; m; rad (tenzij anders aangegeven)

Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

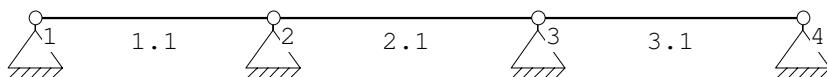
Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|--|--------------------|----------------------------|
| Belastingen | NEN-EN 1990:2002 NEN-EN 1991-1-1:2002 | C2:2010 C1:2009 | NB:2011(nl) NB:2011(nl) |
|-------------|--|--------------------|----------------------------|

GEOMETRIE



MATERIALEN

| Mt Omschrijving | E-modulus [N/mm ²] | S.M. Pois. | Uitz. coëff |
|-----------------|--------------------------------|------------|-------------|
| 1 C30/37 | 9465 | 25.0 | 0.20 |

MATERIALEN vervolg

| Mt Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|-----------------|--------|-----------|---------|--------------------------|
| 1 C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 350*2600 | 1:C30/37 | 9.1000e+05 | 5.1263e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staaftype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|-----------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 350 | 2600 | 1300.0 | 0:RH | | | | |

KNOPEN

| Knoop | X | Z |
|-------|-------|-------|
| 1 | 0.000 | 0.000 |
| 2 | 2.650 | 0.000 |
| 3 | 5.600 | 0.000 |
| 4 | 8.550 | 0.000 |

Project...: 411: woning met schuur

Onderdeel: woning: wand 7

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 350*2600 | NDM | NDM | 2.650 | |
| 2 | 2 | 3 | 1:B*H 350*2600 | NDM | NDM | 2.950 | |
| 3 | 3 | 4 | 1:B*H 350*2600 | NDM | NDM | 2.950 | |

VASTE STEUNPUNTEN

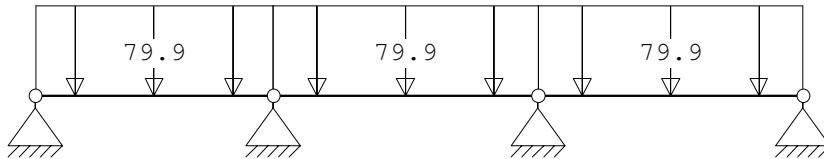
| Nr. | knoop | Kode | XZR | 1=vast 0=vrij | Hoek |
|-----|-------|------|-----|---------------|------|
| 1 | 1 | 110 | | | 0.00 |
| 2 | 2 | 110 | | | 0.00 |
| 3 | 3 | 110 | | | 0.00 |
| 4 | 4 | 110 | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---|
| 1 | perm. bel. | EGZ=0.00 |
| 2 | ver. bel. Q | 1 Permanente belasting 2 Ver. bel. pers. ed. (p_rep) |

BELASTINGEN

B.G:1 perm. bel.

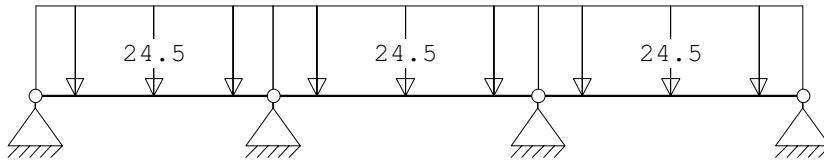
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -79.90 | -79.90 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -79.90 | -79.90 | 0.000 | 0.000 | | | |
| 3 | 1:QZLokaal | -79.90 | -79.90 | 0.000 | 0.000 | | | |

BELASTINGEN

B.G:2 ver. bel. Q

**STAAFBELASTINGEN**

B.G:2 ver. bel. Q

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -24.50 | -24.50 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 2 | 1:QZLokaal | -24.50 | -24.50 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 3 | 1:QZLokaal | -24.50 | -24.50 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

1 2 Nauwkeurigheid bereikt

Project...: 411: woning met schuur

Onderdeel: woning: wand 7

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

| | |
|---|--------------------------|
| 2 | 2 Nauwkeurigheid bereikt |
| 3 | 2 Nauwkeurigheid bereikt |
| 4 | 2 Nauwkeurigheid bereikt |
| 5 | 2 Nauwkeurigheid bereikt |

BELASTINGCOMBINATIES

BC Type

| | | | | | | |
|---------|------|-----------|---|------|----------|-----------|
| 1 Fund. | 1.22 | $G_{k,1}$ | + | 1.35 | Ψ_0 | $Q_{k,2}$ |
| 2 Fund. | 1.08 | $G_{k,1}$ | + | 1.35 | | $Q_{k,2}$ |
| 3 Kar. | 1.00 | $G_{k,1}$ | | | | |
| 4 Kar. | 1.00 | $Q_{k,2}$ | | | | |
| 5 Kar. | 1.00 | $G_{k,1}$ | + | 1.00 | | $Q_{k,2}$ |

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE**B.C:3 kar. perm.****REACTIES**

2e orde

B.C:3 kar. perm.

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 83.21 | |
| 2 | -0.00 | 242.35 | |
| 3 | 0.00 | 264.10 | |
| 4 | -0.00 | 93.48 | |
| | 0.00 | 683.15 | : Som van de reacties |
| | 0.00 | -683.15 | : Som van de belastingen |

BELASTINGCOMBINATIE**B.C:4 kar. Q****REACTIES**

2e orde

B.C:4 kar. Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 25.52 | |
| 2 | -0.00 | 74.31 | |
| 3 | 0.00 | 80.98 | |
| 4 | -0.00 | 28.66 | |
| | 0.00 | 209.47 | : Som van de reacties |
| | 0.00 | -209.47 | : Som van de belastingen |

Project..: 411: woning met schuur

Onderdeel: woning: wand 7

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q****REACTIES**

2e orde

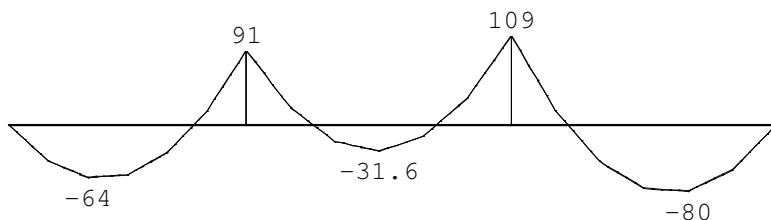
B.C:5 kar. perm.+Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 108.73 | |
| 2 | -0.00 | 316.66 | |
| 3 | 0.00 | 345.09 | |
| 4 | -0.00 | 122.14 | |
| | 0.00 | 892.62 | : Som van de reacties |
| | 0.00 | -892.62 | : Som van de belastingen |

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 124.32 | 125.63 | | |
| 2 | -0.00 | -0.00 | 362.06 | 365.89 | | |
| 3 | 0.00 | 0.00 | 394.56 | 398.74 | | |
| 4 | -0.00 | -0.00 | 139.65 | 141.13 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 25.52 | 108.73 | | |
| 2 | -0.00 | -0.00 | 74.31 | 316.66 | | |
| 3 | 0.00 | 0.00 | 80.98 | 345.09 | | |
| 4 | -0.00 | -0.00 | 28.66 | 122.14 | | |

Project...: 411: woning met schuur
 Onderdeel: woning: wand 8
 Dimensies: kN;m;rad (tenzij anders aangegeven)
 Datum....: 10-04-17

Rekenmodel.....: 2e-orde-elastisch.

Theorieën voor de bepaling van de krachtsverdeling:

1) Uiterste grenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

2) Gebruiksgrenstoestand:

Geometrisch niet lineair alle staven.

Fysisch niet lineair alle staven.

Maximum aantal iteraties.....: 50

Max.deellengte kolommen/wanden: 0.500 Max.deellengte balken/vloeren: 0.500

Max. X-verplaatsing in UGT....: 0.500 Max. Z-verplaatsing in UGT...: 0.250

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|----------------------|---------|-------------|
| Belastingen | NEN-EN 1990:2002 | C2:2010 | NB:2011(nl) |
| | NEN-EN 1991-1-1:2002 | C1:2009 | NB:2011(nl) |

GEOMETRIE



MATERIALEN

| Mt Omschrijving | E-modulus [N/mm ²] | S.M. Pois. | Uitz. coëff |
|-----------------|--------------------------------|------------|-------------|
| 1 C30/37 | 9465 | 25.0 | 0.20 |

MATERIALEN vervolg

| Mt Omschrijving | Cement | Kruipfac. | Toeslag | Rho [kg/m ³] |
|-----------------|--------|-----------|---------|--------------------------|
| 1 C30/37 | N | 2.47 | Normaal | 2400 |

PROFIELEN [mm]

| Prof. Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|--------------------|-----------|------------|------------|--------|
| 1 B*H 350*2600 | 1:C30/37 | 9.1000e+05 | 5.1263e+11 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. Staatstype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|------------------|---------|--------|--------|------|----|----|----|----|
| 1 0:Normaal | 350 | 2600 | 1300.0 | 0:RH | | | | |

KNOPEN

| Knoop | X | Z |
|-------|-------|-------|
| 1 | 0.000 | 0.000 |
| 2 | 2.700 | 0.000 |
| 3 | 5.400 | 0.000 |
| 4 | 8.100 | 0.000 |

Project...: 411: woning met schuur

Onderdeel: woning: wand 8

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte | Opm. |
|-----|----|----|----------------|---------|---------|--------|------|
| 1 | 1 | 2 | 1:B*H 350*2600 | NDM | NDM | 2.700 | |
| 2 | 2 | 3 | 1:B*H 350*2600 | NDM | NDM | 2.700 | |
| 3 | 3 | 4 | 1:B*H 350*2600 | NDM | NDM | 2.700 | |

VASTE STEUNPUNTEN

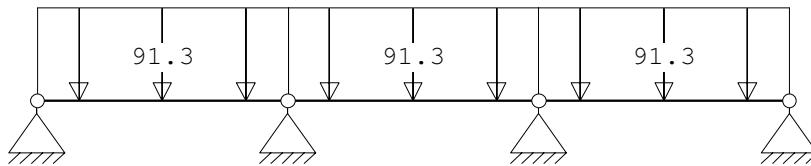
| Nr. | knoop | Kode | XZR | 1=vast 0=vrij | Hoek |
|-----|-------|------|-----|---------------|------|
| 1 | 1 | 110 | | | 0.00 |
| 2 | 2 | 110 | | | 0.00 |
| 3 | 3 | 110 | | | 0.00 |
| 4 | 4 | 110 | | | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---|
| 1 | perm. bel. | EGZ=0.00 |
| 2 | ver. bel. Q | 1 Permanente belasting 2 Ver. bel. pers. ed. (p_rep) |

BELASTINGEN

B.G:1 perm. bel.

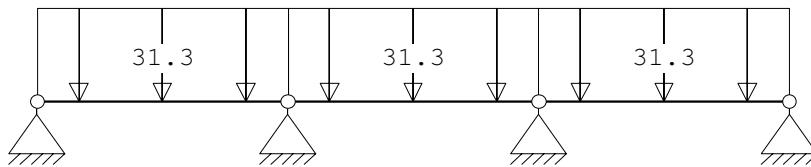
**STAAFBELASTINGEN**

B.G:1 perm. bel.

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -91.30 | -91.30 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -91.30 | -91.30 | 0.000 | 0.000 | | | |
| 3 | 1:QZLokaal | -91.30 | -91.30 | 0.000 | 0.000 | | | |

BELASTINGEN

B.G:2 ver. bel. Q

**STAAFBELASTINGEN**

B.G:2 ver. bel. Q

| Staaf | Type | q1/p/m | q2 | A | B | Ψ_0 | Ψ_1 | Ψ_2 |
|-------|------------|--------|--------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -31.30 | -31.30 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 2 | 1:QZLokaal | -31.30 | -31.30 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |
| 3 | 1:QZLokaal | -31.30 | -31.30 | 0.000 | 0.000 | 0.7 | 0.5 | 0.3 |

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

1 Nauwkeurigheid bereikt

Project..: 411: woning met schuur

Onderdeel: woning: wand 8

BEREKENINGSTATUS

Controlerende berekening

B.C. Iteratie Status

| | |
|---|--------------------------|
| 2 | 2 Nauwkeurigheid bereikt |
| 3 | 2 Nauwkeurigheid bereikt |
| 4 | 2 Nauwkeurigheid bereikt |
| 5 | 2 Nauwkeurigheid bereikt |

BELASTINGCOMBINATIES

BC Type

| | | | | | | |
|---------|------|-----------|---|------|----------|-----------|
| 1 Fund. | 1.22 | $G_{k,1}$ | + | 1.35 | Ψ_0 | $Q_{k,2}$ |
| 2 Fund. | 1.08 | $G_{k,1}$ | + | 1.35 | | $Q_{k,2}$ |
| 3 Kar. | 1.00 | $G_{k,1}$ | | | | |
| 4 Kar. | 1.00 | $Q_{k,2}$ | | | | |
| 5 Kar. | 1.00 | $G_{k,1}$ | + | 1.00 | | $Q_{k,2}$ |

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

- 1 Geen
- 2 Geen

BELASTINGCOMBINATIE**B.C:3 kar. perm.****REACTIES** 2e orde

B.C:3 kar. perm.

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 98.60 | |
| 2 | -0.00 | 271.16 | |
| 3 | 0.00 | 271.16 | |
| 4 | -0.00 | 98.60 | |
| | 0.00 | 739.53 | : Som van de reacties |
| | 0.00 | -739.53 | : Som van de belastingen |

BELASTINGCOMBINATIE**B.C:4 kar. Q****REACTIES** 2e orde

B.C:4 kar. Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 33.80 | |
| 2 | -0.00 | 92.96 | |
| 3 | 0.00 | 92.96 | |
| 4 | -0.00 | 33.80 | |
| | 0.00 | 253.53 | : Som van de reacties |
| | 0.00 | -253.53 | : Som van de belastingen |

Project..: 411: woning met schuur

Onderdeel: woning: wand 8

BELASTINGCOMBINATIE**B.C:5 kar. perm.+Q****REACTIES**

2e orde

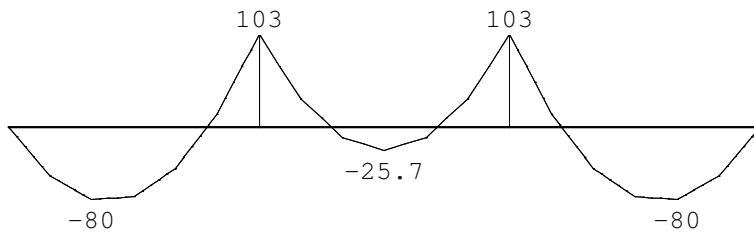
B.C:5 kar. perm.+Q

| Kn. | X | Z | M |
|-----|-------|---------|--------------------------|
| 1 | 0.00 | 132.41 | |
| 2 | -0.00 | 364.12 | |
| 3 | 0.00 | 364.12 | |
| 4 | -0.00 | 132.41 | |
| | 0.00 | 993.06 | : Som van de reacties |
| | 0.00 | -993.06 | : Som van de belastingen |

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**MOMENTEN**

2e orde

Fundamentele combinatie

**REACTIES**

2e orde

Fundamentele combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|--------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 152.13 | 152.24 | | |
| 2 | -0.00 | -0.00 | 418.35 | 418.66 | | |
| 3 | 0.00 | 0.00 | 418.35 | 418.66 | | |
| 4 | -0.00 | -0.00 | 152.13 | 152.24 | | |

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**REACTIES**

2e orde

Karakteristieke combinatie

| Kn. | X-min | X-max | Z-min | Z-max | M-min | M-max |
|-----|-------|-------|-------|--------|-------|-------|
| 1 | 0.00 | 0.00 | 33.80 | 132.41 | | |
| 2 | -0.00 | -0.00 | 92.96 | 364.12 | | |
| 3 | 0.00 | 0.00 | 92.96 | 364.12 | | |
| 4 | -0.00 | -0.00 | 33.80 | 132.41 | | |

6.3. Bijlage C: berekeningen Technosoft palen

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 ontwerp

ALGEMENE GEGEVENS

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 ontwerp
 Datum : 10-04-2017

Berekeningstype : Verticaal belaste paal
 Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

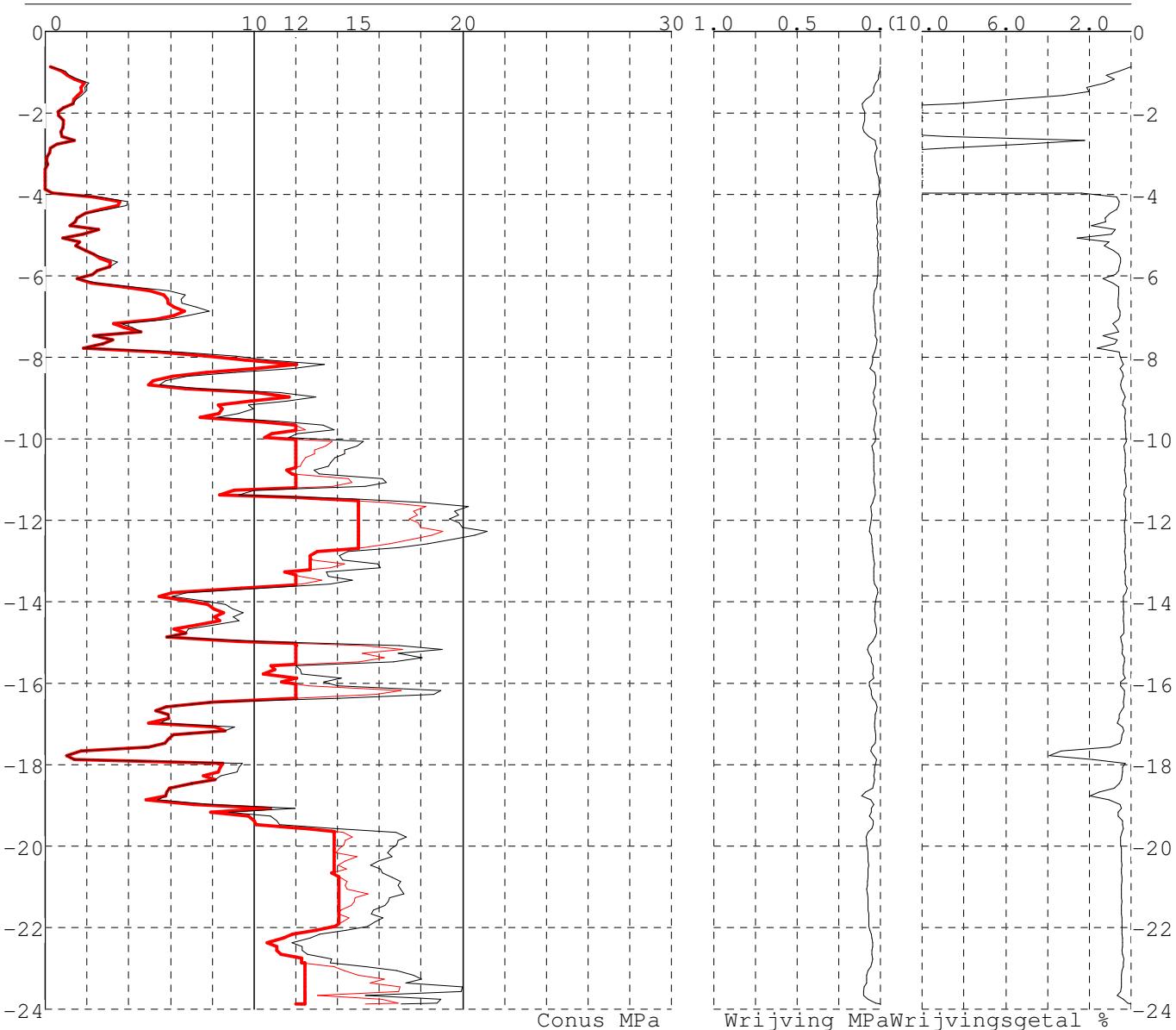
Toegepaste normen volgens Eurocode met Nederlandse NB

| | |
|----------------------------|---------|
| Geotechniek EN 1997-1:2004 | AC:2009 |
| NEN-EN 1997-1:2005 | C1:2015 |
| NEN 9997-1:2011 | C2:2015 |

SONDERINGSGEGEVENS ALGEMEEN: 01

Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.
 Hoogte maaiveld [m] : -0.87 Bodemprofiel: 01
 Traject negatieve kleef : -0.87 tot -4.00 [m]
 Traject positieve kleef : -8.00 tot -23.87 [m]

SONDERINGSGEGEVENS GRAFIEK: 01



Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 ontwerp

SONDERINGSGEGEVENS ALGEMEEN: 02

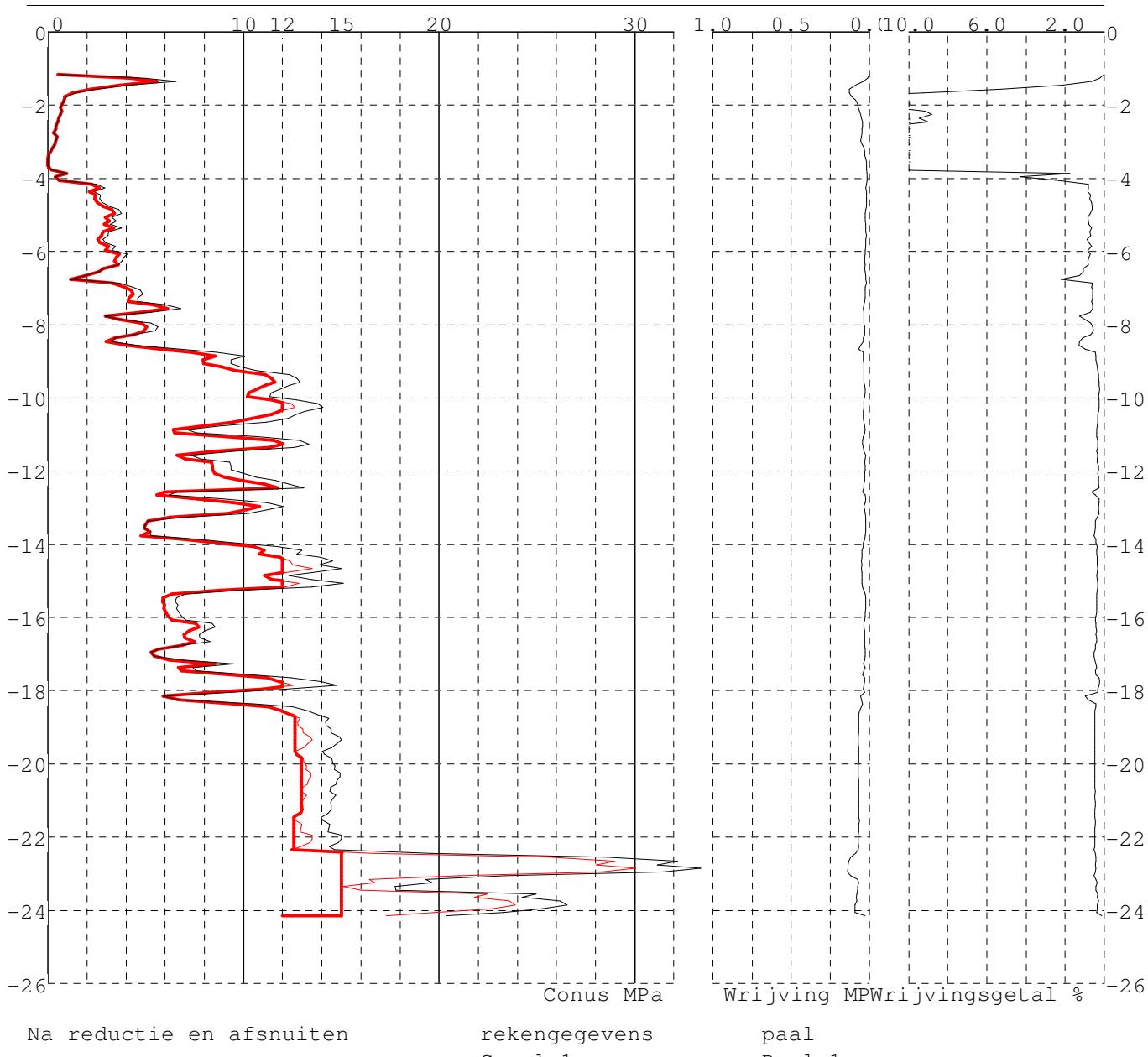
Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Hoogte maaiveld [m] : -1.16 Bodemprofiel: 02

Traject negatieve kleef : -1.16 tot -4.20 [m]

Traject positieve kleef : -6.80 tot -24.15 [m]

SONDERINGSGEGEVENS GRAFIEK: 02



Na reductie en afsnuiten

rekengegevens
Geval 1

paal
Paal 1

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 ontwerp

PAALGEGEVENS Paal 1

Type : Geheide paal (beton)
 Wijze van installeren : Heien
 Afmeting a [m] : 0.350
 Afmeting b [m] : 0.350
 Elasticiteitsmodulus [N/mm²] : 20000
 Factor α_s (tabel 7.c EC 7.1) : 0.010 (zandlagen; voor kleilagen zie tabel 7.d)
 Factor α_t (tabel 7.c EC 7.1) : 0.0070 (zandlagen; voor kleilagen zie tabel 7.d)
 Paalklassefactor α_p : 0.70 (gered. n.a.v. NEN 9997-1:2017 tabel 7.c)
 Paalvoetvormfactor β : 1.00
 Type lastzakkingsdiagram : Grondverdringende paal
 Verm.factor * $\Phi'_{j,k}$: 0.75

REKENGEGEVENS Geval 1

Berekening : Ontwerpend
 Rekenmethode : Drukpalen volgens NEN-EN 1997-1, art. 7.6.2
 Sondering(en) : 01, 02

Stijf bouwwerk : NEE
 Paalgroep : NEE
 Aantal palen : 1 Aantal sonderingen : 2
 Factor ξ_3 (gem) : 1.32
 Factor ξ_4 (min) : 1.32
 Weerstandsfactor γ_R : 1.20
 $\gamma_{f,nk}$: 1.0
 $q_{b,max}$ begrenzen op 12 MN/m² : NEE
 $R_{s,cal,max;i}$ begrenzen op 0.5 * $R_{b,cal,max;i}$: NEE

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

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 ontwerp

OVERZICHT NETTO DRAAGVERMOGEN DRUKPALEN

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

| sondering | niveau | maaveld niveau | R _{c; netto; d} [kN] |
|-----------|--------|----------------|-------------------------------|
| | | | Geval 1 |
| 01 | -0.87 | -5.00 | 15 |
| | | -5.25 | 35 |
| | | -5.50 | 41 |
| | | -5.75 | 41 |
| | | -6.00 | 56 |
| | | -6.25 | 86 |
| | | -6.50 | 89 |
| | | -6.75 | 87 |
| | | -7.00 | 80 |
| | | -7.25 | 76 |
| | | -7.50 | 71 |
| | | -7.75 | 179 |
| | | -8.00 | 209 |
| | | -8.25 | 218 |
| | | -8.50 | 214 |
| | | -8.75 | 317 |
| | | -9.00 | 349 |
| | | -9.25 | 360 |
| | | -9.50 | 460 |
| | | -9.75 | 494 |
| | | -10.00 | 530 |
| | | -10.25 | 568 |
| | | <u>-10.50</u> | <u>607</u> |
| | | -10.75 | 647 |
| | | -11.00 | 683 |
| | | -11.25 | 725 |
| | | -11.50 | 874 |
| | | -11.75 | 904 |
| | | -12.00 | 936 |
| | | -12.25 | 766 |
| | | -12.50 | 762 |
| | | -12.75 | 782 |
| | | -13.00 | 800 |
| | | -13.25 | 791 |
| | | -13.50 | 783 |
| | | -13.75 | 796 |
| | | -14.00 | 812 |
| | | -14.25 | 826 |
| | | <u>-14.50</u> | <u>833</u> |
| | | -14.75 | 887 |
| | | -15.00 | 943 |
| 02 | -1.16 | -5.00 | 70 |
| | | -5.25 | 43 |
| | | -5.50 | 45 |
| | | -5.75 | 48 |
| | | -6.00 | 50 |
| | | -6.25 | 47 |
| | | -6.50 | 41 |
| | | -6.75 | 91 |
| | | -7.00 | 115 |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 ontwerp

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

| sondering | maaiveld niveau | paalpunt niveau | $R_c; \text{netto}; d$ | [kN] |
|-----------|-----------------|-----------------|------------------------|------|
| | | | Geval 1 | |
| | -7.25 | | 127 | |
| | -7.50 | | 140 | |
| | -7.75 | | 152 | |
| | -8.00 | | 160 | |
| | -8.25 | | 165 | |
| | -8.50 | | 240 | |
| | -8.75 | | 336 | |
| | -9.00 | | 365 | |
| | -9.25 | | 383 | |
| | -9.50 | | 403 | |
| | -9.75 | | 437 | |
| | -10.00 | | 470 | |
| | -10.25 | | 494 | |
| | <u>-10.50</u> | | <u>516</u> | |
| | -10.75 | | 510 | |
| | -11.00 | | 537 | |
| | -11.25 | | 535 | |
| | -11.50 | | 559 | |
| | -11.75 | | 562 | |
| | -12.00 | | 543 | |
| | -12.25 | | 538 | |
| | -12.50 | | 548 | |
| | -12.75 | | 558 | |
| | -13.00 | | 551 | |
| | -13.25 | | 548 | |
| | -13.50 | | 552 | |
| | -13.75 | | 630 | |
| | -14.00 | | 678 | |
| | -14.25 | | 684 | |
| | <u>-14.50</u> | | <u>673</u> | |
| | -14.75 | | 686 | |
| | -15.00 | | 701 | |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 355 kN

ALGEMENE GEGEVENS

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 355 kN
 Datum : 10-04-2017

Berekeningstype : Verticaal belaste paal
 Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | |
|----------------------------|---------|
| Geotechniek EN 1997-1:2004 | AC:2009 |
| NEN-EN 1997-1:2005 | C1:2015 |
| NEN 9997-1:2011 | NB:2015 |
| | C2:2015 |

REKENGEGEVENS Geval 1

Berekening : Controleerend
 Rekenmethode : Drukpalen volgens NEN-EN 1997-1, art. 7.6.2
 Sondering(en) : 01, 02

Stijf bouwwerk : NEE
 Paalgroep : NEE
 Aantal palen : 1 Aantal sonderingen : 2
 Factor ξ_3 (gem) : 1.32
 Factor ξ_4 (min) : 1.32
 Weerstandsfactor γ_R : 1.20
 $\gamma_{f,nk}$: 1.0
 $q_{b,max}$ begrenzen op 12 MN/m² : NEE
 $R_{s;cal;max;i}$ begrenzen op 0.5 * $R_{b;cal;max;i}$: NEE

Paal : Paal 1
 Niveau paalkop [m] : N.A.P. 0.00
 $E_{d;1}$ [kN] : -355.00 $E_{d;2}$ [kN] : -296.00
 $s_{req;1}$ [m] : 0.15 $s_{req;2}$ [m] : 0.05
 Bovenbel. [kN/m²] : 0.00

RESULTATEN Geval 1**Sondering : 01**

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

| Niveau [m] | R_b [kN] | R_s [kN] | $R_{c,cal}$ [kN] | $R_{c,k}$ [kN] | $R_{c,d}$ [kN] | $F_{nk,d}$ [kN] | R_{cnd} [kN] | $F_{c,tot,1}$ [kN] | U.C. | $s_{1,1}$ [mm] | $s_{1,2}$ [mm] |
|------------|------------|------------|------------------|----------------|----------------|-----------------|----------------|--------------------|--------------------|----------------|----------------|
| -5.00 | 66.6 | 0.0 | 66.6 | 47.9 | 40.0 | -25.3 | 14.6 | -380.3 | 9.52 dg.vpl dg.vpl | | |
| -5.25 | 101.2 | 0.0 | 101.2 | 72.8 | 60.7 | -25.3 | 35.4 | -380.3 | 6.27 dg.vpl dg.vpl | | |
| -5.50 | 110.5 | 0.0 | 110.5 | 79.5 | 66.3 | -25.3 | 41.0 | -380.3 | 5.74 dg.vpl dg.vpl | | |
| -5.75 | 110.0 | 0.0 | 110.0 | 79.1 | 66.0 | -25.3 | 40.6 | -380.3 | 5.77 dg.vpl dg.vpl | | |
| -6.00 | 135.4 | 0.0 | 135.4 | 97.4 | 81.2 | -25.3 | 55.9 | -380.3 | 4.69 dg.vpl dg.vpl | | |
| -6.25 | 185.6 | 0.0 | 185.6 | 133.5 | 111.2 | -25.3 | 85.9 | -380.3 | 3.42 dg.vpl dg.vpl | | |
| -6.50 | 190.0 | 0.0 | 190.0 | 136.7 | 113.9 | -25.3 | 88.6 | -380.3 | 3.34 dg.vpl dg.vpl | | |
| -6.75 | 187.7 | 0.0 | 187.7 | 135.0 | 112.5 | -25.3 | 87.2 | -380.3 | 3.38 dg.vpl dg.vpl | | |
| -7.00 | 175.0 | 0.0 | 175.0 | 125.9 | 104.9 | -25.3 | 79.6 | -380.3 | 3.62 dg.vpl dg.vpl | | |
| -7.25 | 168.3 | 0.0 | 168.3 | 121.1 | 100.9 | -25.3 | 75.6 | -380.3 | 3.77 dg.vpl dg.vpl | | |
| -7.50 | 160.5 | 0.0 | 160.5 | 115.5 | 96.2 | -25.3 | 70.9 | -380.3 | 3.95 dg.vpl dg.vpl | | |
| -7.75 | 340.2 | 0.0 | 340.2 | 244.7 | 203.9 | -25.3 | 178.6 | -380.3 | 1.86 dg.vpl dg.vpl | | |
| -8.00 | 390.7 | 0.0 | 390.7 | 281.1 | 234.2 | -25.3 | 208.9 | -380.3 | 1.62 dg.vpl dg.vpl | | |
| -8.25 | 378.6 | 27.7 | 406.3 | 292.3 | 243.6 | -25.3 | 218.3 | -380.3 | 1.56 dg.vpl dg.vpl | | |
| -8.50 | 366.1 | 33.1 | 399.2 | 287.2 | 239.3 | -25.3 | 214.0 | -380.3 | 1.59 dg.vpl dg.vpl | | |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 355 kN

Sondering : 01

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|--------------------|------------------------|------------------------|
| -8.75 | 519.5 | 51.9 | 571.4 | 411.1 | 342.6 | -25.3 | 317.3 | -380.3 | <u>1.11 dg.vpl</u> | -14.2 | |
| -9.00 | 538.1 | 85.5 | 623.6 | 448.6 | 373.9 | -25.3 | 348.6 | -380.3 | <u>1.02</u> | -35.8 | -10.5 |
| -9.25 | 546.3 | 95.8 | 642.0 | 461.9 | 384.9 | -25.3 | 359.6 | -380.3 | 0.99 | -31.1 | -9.7 |
| -9.50 | 698.8 | 110.1 | 808.9 | 582.0 | 485.0 | -25.3 | 459.7 | -380.3 | 0.78 | -14.0 | -6.1 |
| -9.75 | 718.6 | 147.9 | 866.5 | 623.4 | 519.5 | -25.3 | 494.2 | -380.3 | 0.73 | -11.0 | -5.2 |
| -10.00 | 738.8 | 187.0 | 925.8 | 666.1 | 555.0 | -25.3 | 529.7 | -380.3 | 0.69 | -9.1 | -4.5 |
| -10.25 | 760.5 | 229.0 | 989.5 | 711.9 | 593.2 | -25.3 | 567.9 | -380.3 | 0.64 | -7.7 | -4.0 |
| -10.50 | 783.1 | 271.0 | 1054 | 758.3 | 631.9 | -25.3 | 606.6 | -380.3 | 0.60 | -6.6 | -3.6 |
| -10.75 | 809.1 | 312.9 | 1122 | 807.1 | 672.6 | -25.3 | 647.3 | -380.3 | 0.57 | -5.7 | -3.3 |
| -11.00 | 827.4 | 354.3 | 1182 | 850.2 | 708.5 | -25.3 | 683.2 | -380.3 | 0.54 | -5.1 | -3.1 |
| -11.25 | 855.1 | 395.7 | 1251 | 899.9 | 749.9 | -25.3 | 724.6 | -380.3 | 0.51 | -4.7 | -2.9 |
| -11.50 | 1068 | 431.4 | 1500 | 1079 | 899.1 | -25.3 | 873.8 | -380.3 | 0.42 | -3.9 | -2.6 |
| -11.75 | 1067 | 483.8 | 1550 | 1115 | 929.5 | -25.3 | 904.2 | -380.3 | 0.41 | -3.7 | -2.5 |
| -12.00 | 1067 | 536.3 | 1603 | 1154 | 961.3 | -25.3 | 936.0 | -380.3 | 0.40 | -3.5 | -2.4 |
| -12.25 | 731.5 | 588.8 | 1320 | 949.8 | 791.5 | -25.3 | 766.2 | -380.3 | 0.48 | -4.0 | -2.6 |
| -12.50 | 672.3 | 641.3 | 1314 | 945.0 | 787.5 | -25.3 | 762.2 | -380.3 | 0.48 | -3.9 | -2.6 |
| -12.75 | 654.2 | 693.0 | 1347 | 969.2 | 807.7 | -25.3 | 782.4 | -380.3 | 0.47 | -3.7 | -2.5 |
| -13.00 | 637.9 | 737.9 | 1376 | 989.8 | 824.8 | -25.3 | 799.5 | -380.3 | 0.46 | -3.6 | -2.5 |
| -13.25 | 594.4 | 768.1 | 1362 | 980.2 | 816.8 | -25.3 | 791.5 | -380.3 | 0.47 | -3.6 | -2.5 |
| -13.50 | 558.0 | 789.9 | 1348 | 969.7 | 808.1 | -25.3 | 782.8 | -380.3 | 0.47 | -3.6 | -2.5 |
| -13.75 | 543.4 | 825.8 | 1369 | 985.1 | 820.9 | -25.3 | 795.6 | -380.3 | 0.46 | -3.5 | -2.4 |
| -14.00 | 550.3 | 847.1 | 1397 | 1005 | 837.8 | -25.3 | 812.5 | -380.3 | 0.45 | -3.5 | -2.4 |
| -14.25 | 545.4 | 874.7 | 1420 | 1022 | 851.4 | -25.3 | 826.1 | -380.3 | 0.45 | -3.4 | -2.4 |
| -14.50 | 527.7 | 903.7 | 1431 | 1030 | 858.2 | -25.3 | 832.9 | -380.3 | 0.44 | -3.4 | -2.4 |
| -14.75 | 594.0 | 927.7 | 1522 | 1095 | 912.3 | -25.3 | 887.0 | -380.3 | 0.42 | -3.3 | -2.3 |
| -15.00 | 682.0 | 933.8 | 1616 | 1162 | 968.7 | -25.3 | 943.4 | -380.3 | 0.39 | -3.2 | -2.3 |

Sondering : 02

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|---------------------------|------------------------|------------------------|
| -5.00 | 156.1 | 0.0 | 156.1 | 112.3 | 93.6 | -23.8 | 69.8 | -378.8 | <u>4.05 dg.vpl dg.vpl</u> | | |
| -5.25 | 112.0 | 0.0 | 112.0 | 80.6 | 67.2 | -23.8 | 43.4 | -378.8 | <u>5.64 dg.vpl dg.vpl</u> | | |
| -5.50 | 115.1 | 0.0 | 115.1 | 82.8 | 69.0 | -23.8 | 45.3 | -378.8 | <u>5.49 dg.vpl dg.vpl</u> | | |
| -5.75 | 119.8 | 0.0 | 119.8 | 86.2 | 71.8 | -23.8 | 48.1 | -378.8 | <u>5.27 dg.vpl dg.vpl</u> | | |
| -6.00 | 122.7 | 0.0 | 122.7 | 88.3 | 73.6 | -23.8 | 49.8 | -378.8 | <u>5.15 dg.vpl dg.vpl</u> | | |
| -6.25 | 118.3 | 0.0 | 118.3 | 85.1 | 70.9 | -23.8 | 47.2 | -378.8 | <u>5.34 dg.vpl dg.vpl</u> | | |
| -6.50 | 108.2 | 0.0 | 108.2 | 77.9 | 64.9 | -23.8 | 41.1 | -378.8 | <u>5.84 dg.vpl dg.vpl</u> | | |
| -6.75 | 190.7 | 0.0 | 190.7 | 137.2 | 114.3 | -23.8 | 90.5 | -378.8 | <u>3.31 dg.vpl dg.vpl</u> | | |
| -7.00 | 224.0 | 7.3 | 231.2 | 166.3 | 138.6 | -23.8 | 114.8 | -378.8 | <u>2.73 dg.vpl dg.vpl</u> | | |
| -7.25 | 229.7 | 22.1 | 251.9 | 181.2 | 151.0 | -23.8 | 127.2 | -378.8 | <u>2.51 dg.vpl dg.vpl</u> | | |
| -7.50 | 235.0 | 38.3 | 273.3 | 196.6 | 163.8 | -23.8 | 140.1 | -378.8 | <u>2.31 dg.vpl dg.vpl</u> | | |
| -7.75 | 237.0 | 55.8 | 292.7 | 210.6 | 175.5 | -23.8 | 151.7 | -378.8 | <u>2.16 dg.vpl dg.vpl</u> | | |
| -8.00 | 248.1 | 58.9 | 307.0 | 220.9 | 184.1 | -23.8 | 160.3 | -378.8 | <u>2.06 dg.vpl dg.vpl</u> | | |
| -8.25 | 238.6 | 75.9 | 314.6 | 226.3 | 188.6 | -23.8 | 164.8 | -378.8 | <u>2.01 dg.vpl dg.vpl</u> | | |
| -8.50 | 361.9 | 78.3 | 440.2 | 316.7 | 263.9 | -23.8 | 240.1 | -378.8 | <u>1.44 dg.vpl</u> | -33.6 | |
| -8.75 | 511.5 | 88.3 | 599.8 | 431.5 | 359.6 | -23.8 | 335.8 | -378.8 | <u>1.05 dg.vpl</u> | -11.2 | |
| -9.00 | 560.7 | 88.3 | 649.0 | 466.9 | 389.1 | -23.8 | 365.3 | -378.8 | 0.97 | -29.2 | -9.5 |
| -9.25 | 577.8 | 99.9 | 677.7 | 487.5 | 406.3 | -23.8 | 382.5 | -378.8 | 0.93 | -24.4 | -8.5 |
| -9.50 | 574.6 | 138.0 | 712.6 | 512.6 | 427.2 | -23.8 | 403.4 | -378.8 | 0.89 | -19.6 | -7.3 |
| -9.75 | 590.7 | 177.3 | 768.0 | 552.6 | 460.5 | -23.8 | 436.7 | -378.8 | 0.82 | -14.5 | -5.9 |
| -10.00 | 609.8 | 213.7 | 823.5 | 592.4 | 493.7 | -23.8 | 469.9 | -378.8 | 0.77 | -11.1 | -5.0 |
| -10.25 | 609.8 | 254.7 | 864.4 | 621.9 | 518.2 | -23.8 | 494.5 | -378.8 | 0.73 | -9.5 | -4.5 |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 355 kN

Sondering : 02

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|------|------------------------|------------------------|
| -10.50 | 605.5 | 295.7 | 901.2 | 648.3 | 540.3 | -23.8 | 516.5 | -378.8 | 0.70 | -8.3 | -4.1 |
| -10.75 | 585.6 | 304.7 | 890.3 | 640.5 | 533.7 | -23.8 | 510.0 | -378.8 | 0.71 | -8.4 | -4.1 |
| -11.00 | 611.6 | 323.8 | 935.3 | 672.9 | 560.7 | -23.8 | 537.0 | -378.8 | 0.68 | -7.5 | -3.9 |
| -11.25 | 593.8 | 338.6 | 932.4 | 670.8 | 559.0 | -23.8 | 535.2 | -378.8 | 0.68 | -7.4 | -3.8 |
| -11.50 | 596.1 | 375.2 | 971.3 | 698.8 | 582.3 | -23.8 | 558.5 | -378.8 | 0.65 | -6.6 | -3.6 |
| -11.75 | 575.9 | 400.4 | 976.2 | 702.3 | 585.3 | -23.8 | 561.5 | -378.8 | 0.65 | -6.4 | -3.5 |
| -12.00 | 514.8 | 429.8 | 944.6 | 679.5 | 566.3 | -23.8 | 542.5 | -378.8 | 0.67 | -6.5 | -3.5 |
| -12.25 | 499.5 | 436.9 | 936.5 | 673.7 | 561.4 | -23.8 | 537.6 | -378.8 | 0.67 | -6.6 | -3.5 |
| -12.50 | 494.9 | 458.8 | 953.7 | 686.1 | 571.8 | -23.8 | 548.0 | -378.8 | 0.66 | -6.2 | -3.4 |
| -12.75 | 488.3 | 481.6 | 969.9 | 697.7 | 581.5 | -23.8 | 557.7 | -378.8 | 0.65 | -6.0 | -3.4 |
| -13.00 | 469.8 | 488.6 | 958.4 | 689.5 | 574.6 | -23.8 | 550.8 | -378.8 | 0.66 | -6.0 | -3.4 |
| -13.25 | 433.0 | 520.7 | 953.7 | 686.1 | 571.8 | -23.8 | 548.0 | -378.8 | 0.66 | -5.9 | -3.3 |
| -13.50 | 431.6 | 529.6 | 961.2 | 691.5 | 576.3 | -23.8 | 552.5 | -378.8 | 0.66 | -5.8 | -3.3 |
| -13.75 | 561.0 | 529.6 | 1091 | 784.6 | 653.8 | -23.8 | 630.0 | -378.8 | 0.58 | -5.0 | -3.1 |
| -14.00 | 616.2 | 553.7 | 1170 | 841.7 | 701.4 | -23.8 | 677.6 | -378.8 | 0.54 | -4.6 | -2.9 |
| -14.25 | 602.8 | 577.1 | 1180 | 848.9 | 707.4 | -23.8 | 683.6 | -378.8 | 0.54 | -4.5 | -2.9 |
| -14.50 | 585.6 | 577.1 | 1163 | 836.5 | 697.1 | -23.8 | 673.3 | -378.8 | 0.54 | -4.6 | -2.9 |
| -14.75 | 575.7 | 609.0 | 1185 | 852.3 | 710.3 | -23.8 | 686.5 | -378.8 | 0.53 | -4.5 | -2.9 |
| -15.00 | 566.2 | 642.8 | 1209 | 869.8 | 724.8 | -23.8 | 701.0 | -378.8 | 0.52 | -4.3 | -2.8 |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 491 kN

ALGEMENE GEGEVENS

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 491 kN
 Datum : 10-04-2017

Berekeningstype : Verticaal belaste paal
 Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | |
|----------------------------|---------|
| Geotechniek EN 1997-1:2004 | AC:2009 |
| NEN-EN 1997-1:2005 | C1:2015 |
| NEN 9997-1:2011 | NB:2015 |
| | C2:2015 |

REKENGEGEVENS Geval 1

Berekening : Controleerend
 Rekenmethode : Drukpalen volgens NEN-EN 1997-1, art. 7.6.2
 Sondering(en) : 01, 02

Stijf bouwwerk : NEE
 Paalgroep : NEE
 Aantal palen : 1 Aantal sonderingen : 2
 Factor ξ_3 (gem) : 1.32
 Factor ξ_4 (min) : 1.32
 Weerstandsfactor γ_R : 1.20
 $\gamma_{f,nk}$: 1.0
 $q_{b,max}$ begrenzen op 12 MN/m² : NEE
 $R_{s;cal;max;i}$ begrenzen op 0.5 * $R_{b;cal;max;i}$: NEE

Paal : Paal 1
 Niveau paalkop [m] : N.A.P. 0.00
 $E_{d;1}$ [kN] : -491.00 $E_{d;2}$ [kN] : -409.00
 $s_{req;1}$ [m] : 0.15 $s_{req;2}$ [m] : 0.05
 Bovenbel. [kN/m²] : 0.00

RESULTATEN Geval 1**Sondering : 01**

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

| Niveau [m] | R_b [kN] | R_s [kN] | $R_{c,cal}$ [kN] | $R_{c,k}$ [kN] | $R_{c,d}$ [kN] | $F_{nk,d}$ [kN] | R_{cnd} [kN] | $F_{c,tot,1}$ [kN] | U.C. | $s_{1,1}$ [mm] | $s_{1,2}$ [mm] |
|------------|------------|------------|------------------|----------------|----------------|-----------------|----------------|--------------------|---------------------|----------------|----------------|
| -5.00 | 66.6 | 0.0 | 66.6 | 47.9 | 40.0 | -25.3 | 14.6 | -516.3 | 12.92 dg.vpl dg.vpl | | |
| -5.25 | 101.2 | 0.0 | 101.2 | 72.8 | 60.7 | -25.3 | 35.4 | -516.3 | 8.51 dg.vpl dg.vpl | | |
| -5.50 | 110.5 | 0.0 | 110.5 | 79.5 | 66.3 | -25.3 | 41.0 | -516.3 | 7.79 dg.vpl dg.vpl | | |
| -5.75 | 110.0 | 0.0 | 110.0 | 79.1 | 66.0 | -25.3 | 40.6 | -516.3 | 7.83 dg.vpl dg.vpl | | |
| -6.00 | 135.4 | 0.0 | 135.4 | 97.4 | 81.2 | -25.3 | 55.9 | -516.3 | 6.36 dg.vpl dg.vpl | | |
| -6.25 | 185.6 | 0.0 | 185.6 | 133.5 | 111.2 | -25.3 | 85.9 | -516.3 | 4.64 dg.vpl dg.vpl | | |
| -6.50 | 190.0 | 0.0 | 190.0 | 136.7 | 113.9 | -25.3 | 88.6 | -516.3 | 4.53 dg.vpl dg.vpl | | |
| -6.75 | 187.7 | 0.0 | 187.7 | 135.0 | 112.5 | -25.3 | 87.2 | -516.3 | 4.59 dg.vpl dg.vpl | | |
| -7.00 | 175.0 | 0.0 | 175.0 | 125.9 | 104.9 | -25.3 | 79.6 | -516.3 | 4.92 dg.vpl dg.vpl | | |
| -7.25 | 168.3 | 0.0 | 168.3 | 121.1 | 100.9 | -25.3 | 75.6 | -516.3 | 5.12 dg.vpl dg.vpl | | |
| -7.50 | 160.5 | 0.0 | 160.5 | 115.5 | 96.2 | -25.3 | 70.9 | -516.3 | 5.36 dg.vpl dg.vpl | | |
| -7.75 | 340.2 | 0.0 | 340.2 | 244.7 | 203.9 | -25.3 | 178.6 | -516.3 | 2.53 dg.vpl dg.vpl | | |
| -8.00 | 390.7 | 0.0 | 390.7 | 281.1 | 234.2 | -25.3 | 208.9 | -516.3 | 2.20 dg.vpl dg.vpl | | |
| -8.25 | 378.6 | 27.7 | 406.3 | 292.3 | 243.6 | -25.3 | 218.3 | -516.3 | 2.12 dg.vpl dg.vpl | | |
| -8.50 | 366.1 | 33.1 | 399.2 | 287.2 | 239.3 | -25.3 | 214.0 | -516.3 | 2.16 dg.vpl dg.vpl | | |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 491 kN

Sondering : 01

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|--------------------|------------------------|------------------------|
| -8.75 | 519.5 | 51.9 | 571.4 | 411.1 | 342.6 | -25.3 | 317.3 | -516.3 | 1.51 dg.vpl dg.vpl | | |
| -9.00 | 538.1 | 85.5 | 623.6 | 448.6 | 373.9 | -25.3 | 348.6 | -516.3 | 1.38 dg.vpl | -28.7 | |
| -9.25 | 546.3 | 95.8 | 642.0 | 461.9 | 384.9 | -25.3 | 359.6 | -516.3 | 1.34 dg.vpl | -25.5 | |
| -9.50 | 698.8 | 110.1 | 808.9 | 582.0 | 485.0 | -25.3 | 459.7 | -516.3 | 1.06 dg.vpl | -12.2 | |
| -9.75 | 718.6 | 147.9 | 866.5 | 623.4 | 519.5 | -25.3 | 494.2 | -516.3 | 0.99 | -32.3 | -10.0 |
| -10.00 | 738.8 | 187.0 | 925.8 | 666.1 | 555.0 | -25.3 | 529.7 | -516.3 | 0.93 | -24.0 | -8.4 |
| -10.25 | 760.5 | 229.0 | 989.5 | 711.9 | 593.2 | -25.3 | 567.9 | -516.3 | 0.87 | -18.3 | -7.1 |
| -10.50 | 783.1 | 271.0 | 1054 | 758.3 | 631.9 | -25.3 | 606.6 | -516.3 | 0.82 | -14.3 | -6.2 |
| -10.75 | 809.1 | 312.9 | 1122 | 807.1 | 672.6 | -25.3 | 647.3 | -516.3 | 0.77 | -11.5 | -5.4 |
| -11.00 | 827.4 | 354.3 | 1182 | 850.2 | 708.5 | -25.3 | 683.2 | -516.3 | 0.73 | -10.0 | -5.0 |
| -11.25 | 855.1 | 395.7 | 1251 | 899.9 | 749.9 | -25.3 | 724.6 | -516.3 | 0.69 | -8.8 | -4.6 |
| -11.50 | 1068 | 431.4 | 1500 | 1079 | 899.1 | -25.3 | 873.8 | -516.3 | 0.57 | -6.5 | -3.9 |
| -11.75 | 1067 | 483.8 | 1550 | 1115 | 929.5 | -25.3 | 904.2 | -516.3 | 0.56 | -6.0 | -3.8 |
| -12.00 | 1067 | 536.3 | 1603 | 1154 | 961.3 | -25.3 | 936.0 | -516.3 | 0.54 | -5.7 | -3.6 |
| -12.25 | 731.5 | 588.8 | 1320 | 949.8 | 791.5 | -25.3 | 766.2 | -516.3 | 0.65 | -7.0 | -4.0 |
| -12.50 | 672.3 | 641.3 | 1314 | 945.0 | 787.5 | -25.3 | 762.2 | -516.3 | 0.66 | -6.7 | -3.9 |
| -12.75 | 654.2 | 693.0 | 1347 | 969.2 | 807.7 | -25.3 | 782.4 | -516.3 | 0.64 | -6.3 | -3.8 |
| -13.00 | 637.9 | 737.9 | 1376 | 989.8 | 824.8 | -25.3 | 799.5 | -516.3 | 0.63 | -6.0 | -3.7 |
| -13.25 | 594.4 | 768.1 | 1362 | 980.2 | 816.8 | -25.3 | 791.5 | -516.3 | 0.63 | -5.9 | -3.7 |
| -13.50 | 558.0 | 789.9 | 1348 | 969.7 | 808.1 | -25.3 | 782.8 | -516.3 | 0.64 | -6.0 | -3.7 |
| -13.75 | 543.4 | 825.8 | 1369 | 985.1 | 820.9 | -25.3 | 795.6 | -516.3 | 0.63 | -5.8 | -3.6 |
| -14.00 | 550.3 | 847.1 | 1397 | 1005 | 837.8 | -25.3 | 812.5 | -516.3 | 0.62 | -5.6 | -3.6 |
| -14.25 | 545.4 | 874.7 | 1420 | 1022 | 851.4 | -25.3 | 826.1 | -516.3 | 0.61 | -5.5 | -3.5 |
| -14.50 | 527.7 | 903.7 | 1431 | 1030 | 858.2 | -25.3 | 832.9 | -516.3 | 0.60 | -5.4 | -3.5 |
| -14.75 | 594.0 | 927.7 | 1522 | 1095 | 912.3 | -25.3 | 887.0 | -516.3 | 0.57 | -5.2 | -3.4 |
| -15.00 | 682.0 | 933.8 | 1616 | 1162 | 968.7 | -25.3 | 943.4 | -516.3 | 0.53 | -5.0 | -3.4 |

Sondering : 02

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|--------------------|------------------------|------------------------|
| -5.00 | 156.1 | 0.0 | 156.1 | 112.3 | 93.6 | -23.8 | 69.8 | -514.8 | 5.50 dg.vpl dg.vpl | | |
| -5.25 | 112.0 | 0.0 | 112.0 | 80.6 | 67.2 | -23.8 | 43.4 | -514.8 | 7.66 dg.vpl dg.vpl | | |
| -5.50 | 115.1 | 0.0 | 115.1 | 82.8 | 69.0 | -23.8 | 45.3 | -514.8 | 7.46 dg.vpl dg.vpl | | |
| -5.75 | 119.8 | 0.0 | 119.8 | 86.2 | 71.8 | -23.8 | 48.1 | -514.8 | 7.17 dg.vpl dg.vpl | | |
| -6.00 | 122.7 | 0.0 | 122.7 | 88.3 | 73.6 | -23.8 | 49.8 | -514.8 | 7.00 dg.vpl dg.vpl | | |
| -6.25 | 118.3 | 0.0 | 118.3 | 85.1 | 70.9 | -23.8 | 47.2 | -514.8 | 7.26 dg.vpl dg.vpl | | |
| -6.50 | 108.2 | 0.0 | 108.2 | 77.9 | 64.9 | -23.8 | 41.1 | -514.8 | 7.93 dg.vpl dg.vpl | | |
| -6.75 | 190.7 | 0.0 | 190.7 | 137.2 | 114.3 | -23.8 | 90.5 | -514.8 | 4.50 dg.vpl dg.vpl | | |
| -7.00 | 224.0 | 7.3 | 231.2 | 166.3 | 138.6 | -23.8 | 114.8 | -514.8 | 3.71 dg.vpl dg.vpl | | |
| -7.25 | 229.7 | 22.1 | 251.9 | 181.2 | 151.0 | -23.8 | 127.2 | -514.8 | 3.41 dg.vpl dg.vpl | | |
| -7.50 | 235.0 | 38.3 | 273.3 | 196.6 | 163.8 | -23.8 | 140.1 | -514.8 | 3.14 dg.vpl dg.vpl | | |
| -7.75 | 237.0 | 55.8 | 292.7 | 210.6 | 175.5 | -23.8 | 151.7 | -514.8 | 2.93 dg.vpl dg.vpl | | |
| -8.00 | 248.1 | 58.9 | 307.0 | 220.9 | 184.1 | -23.8 | 160.3 | -514.8 | 2.80 dg.vpl dg.vpl | | |
| -8.25 | 238.6 | 75.9 | 314.6 | 226.3 | 188.6 | -23.8 | 164.8 | -514.8 | 2.73 dg.vpl dg.vpl | | |
| -8.50 | 361.9 | 78.3 | 440.2 | 316.7 | 263.9 | -23.8 | 240.1 | -514.8 | 1.95 dg.vpl dg.vpl | | |
| -8.75 | 511.5 | 88.3 | 599.8 | 431.5 | 359.6 | -23.8 | 335.8 | -514.8 | 1.43 dg.vpl | -33.3 | |
| -9.00 | 560.7 | 88.3 | 649.0 | 466.9 | 389.1 | -23.8 | 365.3 | -514.8 | 1.32 dg.vpl | -24.2 | |
| -9.25 | 577.8 | 99.9 | 677.7 | 487.5 | 406.3 | -23.8 | 382.5 | -514.8 | 1.27 dg.vpl | -20.6 | |
| -9.50 | 574.6 | 138.0 | 712.6 | 512.6 | 427.2 | -23.8 | 403.4 | -514.8 | 1.20 dg.vpl | -16.6 | |
| -9.75 | 590.7 | 177.3 | 768.0 | 552.6 | 460.5 | -23.8 | 436.7 | -514.8 | 1.12 dg.vpl | -12.3 | |
| -10.00 | 609.8 | 213.7 | 823.5 | 592.4 | 493.7 | -23.8 | 469.9 | -514.8 | 1.04 | -41.2 | -10.0 |
| -10.25 | 609.8 | 254.7 | 864.4 | 621.9 | 518.2 | -23.8 | 494.5 | -514.8 | 0.99 | -30.8 | -8.6 |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 491 kN

Sondering : 02

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|------|------------------------|------------------------|
| -10.50 | 605.5 | 295.7 | 901.2 | 648.3 | 540.3 | -23.8 | 516.5 | -514.8 | 0.95 | -24.4 | -7.6 |
| -10.75 | 585.6 | 304.7 | 890.3 | 640.5 | 533.7 | -23.8 | 510.0 | -514.8 | 0.96 | -25.7 | -7.7 |
| -11.00 | 611.6 | 323.8 | 935.3 | 672.9 | 560.7 | -23.8 | 537.0 | -514.8 | 0.92 | -20.3 | -7.0 |
| -11.25 | 593.8 | 338.6 | 932.4 | 670.8 | 559.0 | -23.8 | 535.2 | -514.8 | 0.92 | -20.2 | -6.9 |
| -11.50 | 596.1 | 375.2 | 971.3 | 698.8 | 582.3 | -23.8 | 558.5 | -514.8 | 0.88 | -16.3 | -6.2 |
| -11.75 | 575.9 | 400.4 | 976.2 | 702.3 | 585.3 | -23.8 | 561.5 | -514.8 | 0.88 | -15.5 | -6.0 |
| -12.00 | 514.8 | 429.8 | 944.6 | 679.5 | 566.3 | -23.8 | 542.5 | -514.8 | 0.91 | -16.9 | -6.1 |
| -12.25 | 499.5 | 436.9 | 936.5 | 673.7 | 561.4 | -23.8 | 537.6 | -514.8 | 0.92 | -17.4 | -6.2 |
| -12.50 | 494.9 | 458.8 | 953.7 | 686.1 | 571.8 | -23.8 | 548.0 | -514.8 | 0.90 | -15.6 | -5.9 |
| -12.75 | 488.3 | 481.6 | 969.9 | 697.7 | 581.5 | -23.8 | 557.7 | -514.8 | 0.89 | -13.8 | -5.6 |
| -13.00 | 469.8 | 488.6 | 958.4 | 689.5 | 574.6 | -23.8 | 550.8 | -514.8 | 0.90 | -14.4 | -5.7 |
| -13.25 | 433.0 | 520.7 | 953.7 | 686.1 | 571.8 | -23.8 | 548.0 | -514.8 | 0.90 | -13.7 | -5.6 |
| -13.50 | 431.6 | 529.6 | 961.2 | 691.5 | 576.3 | -23.8 | 552.5 | -514.8 | 0.89 | -12.9 | -5.5 |
| -13.75 | 561.0 | 529.6 | 1091 | 784.6 | 653.8 | -23.8 | 630.0 | -514.8 | 0.79 | -10.0 | -4.9 |
| -14.00 | 616.2 | 553.7 | 1170 | 841.7 | 701.4 | -23.8 | 677.6 | -514.8 | 0.73 | -8.7 | -4.6 |
| -14.25 | 602.8 | 577.1 | 1180 | 848.9 | 707.4 | -23.8 | 683.6 | -514.8 | 0.73 | -8.4 | -4.5 |
| -14.50 | 585.6 | 577.1 | 1163 | 836.5 | 697.1 | -23.8 | 673.3 | -514.8 | 0.74 | -8.7 | -4.6 |
| -14.75 | 575.7 | 609.0 | 1185 | 852.3 | 710.3 | -23.8 | 686.5 | -514.8 | 0.72 | -8.2 | -4.5 |
| -15.00 | 566.2 | 642.8 | 1209 | 869.8 | 724.8 | -23.8 | 701.0 | -514.8 | 0.71 | -7.7 | -4.3 |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 674 kN

ALGEMENE GEGEVENS

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 674 kN
 Datum : 10-04-2017

Berekeningstype : Verticaal belaste paal
 Alle niveaus/hoogtes/peilmaten zijn t.o.v.: N.A.P.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | |
|----------------------------|---------|
| Geotechniek EN 1997-1:2004 | AC:2009 |
| NEN-EN 1997-1:2005 | C1:2015 |
| NEN 9997-1:2011 | NB:2015 |
| | C2:2015 |

REKENGEEVENS Geval 1

Berekening : Controleerend
 Rekenmethode : Drukpalen volgens NEN-EN 1997-1, art. 7.6.2
 Sondering(en) : 01, 02

Stijf bouwwerk : NEE
 Paalgroep : NEE
 Aantal palen : 1 Aantal sonderingen : 2
 Factor ξ_3 (gem) : 1.32
 Factor ξ_4 (min) : 1.32
 Weerstandsfactor γ_R : 1.20
 $\gamma_{f,nk}$: 1.0
 $q_{b,max}$ begrenzen op 12 MN/m² : NEE
 $R_{s;cal;max;i}$ begrenzen op 0.5 * $R_{b;cal;max;i}$: NEE

Paal : Paal 1
 Niveau paalkop [m] : N.A.P. 0.00
 $E_{d;1}$ [kN] : -674.00 $E_{d;2}$ [kN] : -562.00
 $s_{req;1}$ [m] : 0.15 $s_{req;2}$ [m] : 0.05
 Bovenbel. [kN/m²] : 0.00

RESULTATEN Geval 1**Sondering : 01**

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

| Niveau [m] | R_b [kN] | R_s [kN] | $R_{c,cal}$ [kN] | $R_{c,k}$ [kN] | $R_{c,d}$ [kN] | $F_{nk,d}$ [kN] | R_{cnd} [kN] | $F_{c,tot,1}$ [kN] | U.C. | $s_{1,1}$ [mm] | $s_{1,2}$ [mm] |
|------------|------------|------------|------------------|----------------|----------------|-----------------|----------------|--------------------|---------------------|----------------|----------------|
| -5.00 | 66.6 | 0.0 | 66.6 | 47.9 | 40.0 | -25.3 | 14.6 | -699.3 | 17.50 dg.vpl dg.vpl | | |
| -5.25 | 101.2 | 0.0 | 101.2 | 72.8 | 60.7 | -25.3 | 35.4 | -699.3 | 11.52 dg.vpl dg.vpl | | |
| -5.50 | 110.5 | 0.0 | 110.5 | 79.5 | 66.3 | -25.3 | 41.0 | -699.3 | 10.55 dg.vpl dg.vpl | | |
| -5.75 | 110.0 | 0.0 | 110.0 | 79.1 | 66.0 | -25.3 | 40.6 | -699.3 | 10.60 dg.vpl dg.vpl | | |
| -6.00 | 135.4 | 0.0 | 135.4 | 97.4 | 81.2 | -25.3 | 55.9 | -699.3 | 8.61 dg.vpl dg.vpl | | |
| -6.25 | 185.6 | 0.0 | 185.6 | 133.5 | 111.2 | -25.3 | 85.9 | -699.3 | 6.29 dg.vpl dg.vpl | | |
| -6.50 | 190.0 | 0.0 | 190.0 | 136.7 | 113.9 | -25.3 | 88.6 | -699.3 | 6.14 dg.vpl dg.vpl | | |
| -6.75 | 187.7 | 0.0 | 187.7 | 135.0 | 112.5 | -25.3 | 87.2 | -699.3 | 6.21 dg.vpl dg.vpl | | |
| -7.00 | 175.0 | 0.0 | 175.0 | 125.9 | 104.9 | -25.3 | 79.6 | -699.3 | 6.66 dg.vpl dg.vpl | | |
| -7.25 | 168.3 | 0.0 | 168.3 | 121.1 | 100.9 | -25.3 | 75.6 | -699.3 | 6.93 dg.vpl dg.vpl | | |
| -7.50 | 160.5 | 0.0 | 160.5 | 115.5 | 96.2 | -25.3 | 70.9 | -699.3 | 7.27 dg.vpl dg.vpl | | |
| -7.75 | 340.2 | 0.0 | 340.2 | 244.7 | 203.9 | -25.3 | 178.6 | -699.3 | 3.43 dg.vpl dg.vpl | | |
| -8.00 | 390.7 | 0.0 | 390.7 | 281.1 | 234.2 | -25.3 | 208.9 | -699.3 | 2.99 dg.vpl dg.vpl | | |
| -8.25 | 378.6 | 27.7 | 406.3 | 292.3 | 243.6 | -25.3 | 218.3 | -699.3 | 2.87 dg.vpl dg.vpl | | |
| -8.50 | 366.1 | 33.1 | 399.2 | 287.2 | 239.3 | -25.3 | 214.0 | -699.3 | 2.92 dg.vpl dg.vpl | | |

Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 674 kN

Sondering : 01

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|---------------------------|------------------------|------------------------|
| -8.75 | 519.5 | 51.9 | 571.4 | 411.1 | 342.6 | -25.3 | 317.3 | -699.3 | <u>2.04 dg.vpl dg.vpl</u> | | |
| -9.00 | 538.1 | 85.5 | 623.6 | 448.6 | 373.9 | -25.3 | 348.6 | -699.3 | <u>1.87 dg.vpl dg.vpl</u> | | |
| -9.25 | 546.3 | 95.8 | 642.0 | 461.9 | 384.9 | -25.3 | 359.6 | -699.3 | <u>1.82 dg.vpl dg.vpl</u> | | |
| -9.50 | 698.8 | 110.1 | 808.9 | 582.0 | 485.0 | -25.3 | 459.7 | -699.3 | <u>1.44 dg.vpl</u> | -35.1 | |
| -9.75 | 718.6 | 147.9 | 866.5 | 623.4 | 519.5 | -25.3 | 494.2 | -699.3 | <u>1.35 dg.vpl</u> | -26.0 | |
| -10.00 | 738.8 | 187.0 | 925.8 | 666.1 | 555.0 | -25.3 | 529.7 | -699.3 | <u>1.26 dg.vpl</u> | -20.0 | |
| -10.25 | 760.5 | 229.0 | 989.5 | 711.9 | 593.2 | -25.3 | 567.9 | -699.3 | <u>1.18 dg.vpl</u> | -15.5 | |
| -10.50 | 783.1 | 271.0 | 1054 | 758.3 | 631.9 | -25.3 | 606.6 | -699.3 | <u>1.11 dg.vpl</u> | -12.3 | |
| -10.75 | 809.1 | 312.9 | 1122 | 807.1 | 672.6 | -25.3 | 647.3 | -699.3 | <u>1.04</u> | -41.4 | -10.5 |
| -11.00 | 827.4 | 354.3 | 1182 | 850.2 | 708.5 | -25.3 | 683.2 | -699.3 | 0.99 | -30.6 | -9.2 |
| -11.25 | 855.1 | 395.7 | 1251 | 899.9 | 749.9 | -25.3 | 724.6 | -699.3 | 0.93 | -23.3 | -8.2 |
| -11.50 | 1068 | 431.4 | 1500 | 1079 | 899.1 | -25.3 | 873.8 | -699.3 | 0.78 | -12.7 | -6.3 |
| -11.75 | 1067 | 483.8 | 1550 | 1115 | 929.5 | -25.3 | 904.2 | -699.3 | 0.75 | -11.6 | -5.9 |
| -12.00 | 1067 | 536.3 | 1603 | 1154 | 961.3 | -25.3 | 936.0 | -699.3 | 0.73 | -10.6 | -5.6 |
| -12.25 | 731.5 | 588.8 | 1320 | 949.8 | 791.5 | -25.3 | 766.2 | -699.3 | 0.88 | -15.9 | -6.6 |
| -12.50 | 672.3 | 641.3 | 1314 | 945.0 | 787.5 | -25.3 | 762.2 | -699.3 | 0.89 | -15.2 | -6.5 |
| -12.75 | 654.2 | 693.0 | 1347 | 969.2 | 807.7 | -25.3 | 782.4 | -699.3 | 0.87 | -13.1 | -6.1 |
| -13.00 | 637.9 | 737.9 | 1376 | 989.8 | 824.8 | -25.3 | 799.5 | -699.3 | 0.85 | -12.2 | -5.9 |
| -13.25 | 594.4 | 768.1 | 1362 | 980.2 | 816.8 | -25.3 | 791.5 | -699.3 | 0.86 | -12.2 | -5.9 |
| -13.50 | 558.0 | 789.9 | 1348 | 969.7 | 808.1 | -25.3 | 782.8 | -699.3 | 0.87 | -12.2 | -5.9 |
| -13.75 | 543.4 | 825.8 | 1369 | 985.1 | 820.9 | -25.3 | 795.6 | -699.3 | 0.85 | -11.6 | -5.7 |
| -14.00 | 550.3 | 847.1 | 1397 | 1005 | 837.8 | -25.3 | 812.5 | -699.3 | 0.83 | -11.1 | -5.6 |
| -14.25 | 545.4 | 874.7 | 1420 | 1022 | 851.4 | -25.3 | 826.1 | -699.3 | 0.82 | -10.6 | -5.5 |
| -14.50 | 527.7 | 903.7 | 1431 | 1030 | 858.2 | -25.3 | 832.9 | -699.3 | 0.81 | -10.2 | -5.4 |
| -14.75 | 594.0 | 927.7 | 1522 | 1095 | 912.3 | -25.3 | 887.0 | -699.3 | 0.77 | -9.3 | -5.2 |
| -15.00 | 682.0 | 933.8 | 1616 | 1162 | 968.7 | -25.3 | 943.4 | -699.3 | 0.72 | -8.6 | -5.1 |

Sondering : 02

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|----------------------------|------------------------|------------------------|
| -5.00 | 156.1 | 0.0 | 156.1 | 112.3 | 93.6 | -23.8 | 69.8 | -697.8 | <u>7.46 dg.vpl dg.vpl</u> | | |
| -5.25 | 112.0 | 0.0 | 112.0 | 80.6 | 67.2 | -23.8 | 43.4 | -697.8 | <u>10.39 dg.vpl dg.vpl</u> | | |
| -5.50 | 115.1 | 0.0 | 115.1 | 82.8 | 69.0 | -23.8 | 45.3 | -697.8 | <u>10.11 dg.vpl dg.vpl</u> | | |
| -5.75 | 119.8 | 0.0 | 119.8 | 86.2 | 71.8 | -23.8 | 48.1 | -697.8 | <u>9.71 dg.vpl dg.vpl</u> | | |
| -6.00 | 122.7 | 0.0 | 122.7 | 88.3 | 73.6 | -23.8 | 49.8 | -697.8 | <u>9.48 dg.vpl dg.vpl</u> | | |
| -6.25 | 118.3 | 0.0 | 118.3 | 85.1 | 70.9 | -23.8 | 47.2 | -697.8 | <u>9.84 dg.vpl dg.vpl</u> | | |
| -6.50 | 108.2 | 0.0 | 108.2 | 77.9 | 64.9 | -23.8 | 41.1 | -697.8 | <u>10.75 dg.vpl dg.vpl</u> | | |
| -6.75 | 190.7 | 0.0 | 190.7 | 137.2 | 114.3 | -23.8 | 90.5 | -697.8 | <u>6.10 dg.vpl dg.vpl</u> | | |
| -7.00 | 224.0 | 7.3 | 231.2 | 166.3 | 138.6 | -23.8 | 114.8 | -697.8 | <u>5.03 dg.vpl dg.vpl</u> | | |
| -7.25 | 229.7 | 22.1 | 251.9 | 181.2 | 151.0 | -23.8 | 127.2 | -697.8 | <u>4.62 dg.vpl dg.vpl</u> | | |
| -7.50 | 235.0 | 38.3 | 273.3 | 196.6 | 163.8 | -23.8 | 140.1 | -697.8 | <u>4.26 dg.vpl dg.vpl</u> | | |
| -7.75 | 237.0 | 55.8 | 292.7 | 210.6 | 175.5 | -23.8 | 151.7 | -697.8 | <u>3.98 dg.vpl dg.vpl</u> | | |
| -8.00 | 248.1 | 58.9 | 307.0 | 220.9 | 184.1 | -23.8 | 160.3 | -697.8 | <u>3.79 dg.vpl dg.vpl</u> | | |
| -8.25 | 238.6 | 75.9 | 314.6 | 226.3 | 188.6 | -23.8 | 164.8 | -697.8 | <u>3.70 dg.vpl dg.vpl</u> | | |
| -8.50 | 361.9 | 78.3 | 440.2 | 316.7 | 263.9 | -23.8 | 240.1 | -697.8 | <u>2.64 dg.vpl dg.vpl</u> | | |
| -8.75 | 511.5 | 88.3 | 599.8 | 431.5 | 359.6 | -23.8 | 335.8 | -697.8 | <u>1.94 dg.vpl dg.vpl</u> | | |
| -9.00 | 560.7 | 88.3 | 649.0 | 466.9 | 389.1 | -23.8 | 365.3 | -697.8 | <u>1.79 dg.vpl dg.vpl</u> | | |
| -9.25 | 577.8 | 99.9 | 677.7 | 487.5 | 406.3 | -23.8 | 382.5 | -697.8 | <u>1.72 dg.vpl dg.vpl</u> | | |
| -9.50 | 574.6 | 138.0 | 712.6 | 512.6 | 427.2 | -23.8 | 403.4 | -697.8 | <u>1.63 dg.vpl dg.vpl</u> | | |
| -9.75 | 590.7 | 177.3 | 768.0 | 552.6 | 460.5 | -23.8 | 436.7 | -697.8 | <u>1.52 dg.vpl dg.vpl</u> | | |
| -10.00 | 609.8 | 213.7 | 823.5 | 592.4 | 493.7 | -23.8 | 469.9 | -697.8 | <u>1.41 dg.vpl</u> | -30.8 | |
| -10.25 | 609.8 | 254.7 | 864.4 | 621.9 | 518.2 | -23.8 | 494.5 | -697.8 | <u>1.35 dg.vpl</u> | -23.9 | |

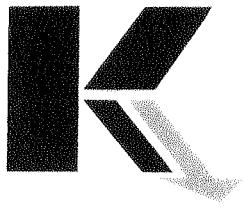
Project : 411: woning met schuur
 Onderdeel : woning: heipaal 350 controle 674 kN

Sondering : 02

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

| Niveau [m] | R _b [kN] | R _s [kN] | R _{c; cal} [kN] | R _{c; k} [kN] | R _{c; d} [kN] | F _{nk; d} [kN] | R _{cnd} [kN] | F _{c; tot; 1} [kN] | U.C. | s _{1; 1} [mm] | s _{1; 2} [mm] |
|------------|---------------------|---------------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------------|--------------------|------------------------|------------------------|
| -10.50 | 605.5 | 295.7 | 901.2 | 648.3 | 540.3 | -23.8 | 516.5 | -697.8 | <u>1.29 dg.vpl</u> | -19.5 | |
| -10.75 | 585.6 | 304.7 | 890.3 | 640.5 | 533.7 | -23.8 | 510.0 | -697.8 | <u>1.31 dg.vpl</u> | -20.2 | |
| -11.00 | 611.6 | 323.8 | 935.3 | 672.9 | 560.7 | -23.8 | 537.0 | -697.8 | <u>1.24 dg.vpl</u> | -16.4 | |
| -11.25 | 593.8 | 338.6 | 932.4 | 670.8 | 559.0 | -23.8 | 535.2 | -697.8 | <u>1.25 dg.vpl</u> | -16.3 | |
| -11.50 | 596.1 | 375.2 | 971.3 | 698.8 | 582.3 | -23.8 | 558.5 | -697.8 | <u>1.20 dg.vpl</u> | -13.2 | |
| -11.75 | 575.9 | 400.4 | 976.2 | 702.3 | 585.3 | -23.8 | 561.5 | -697.8 | <u>1.19 dg.vpl</u> | -12.6 | |
| -12.00 | 514.8 | 429.8 | 944.6 | 679.5 | 566.3 | -23.8 | 542.5 | -697.8 | <u>1.23 dg.vpl</u> | -13.3 | |
| -12.25 | 499.5 | 436.9 | 936.5 | 673.7 | 561.4 | -23.8 | 537.6 | -697.8 | <u>1.24 dg.vpl</u> | -13.6 | |
| -12.50 | 494.9 | 458.8 | 953.7 | 686.1 | 571.8 | -23.8 | 548.0 | -697.8 | <u>1.22 dg.vpl</u> | -12.5 | |
| -12.75 | 488.3 | 481.6 | 969.9 | 697.7 | 581.5 | -23.8 | 557.7 | -697.8 | <u>1.20 dg.vpl</u> | -11.8 | |
| -13.00 | 469.8 | 488.6 | 958.4 | 689.5 | 574.6 | -23.8 | 550.8 | -697.8 | <u>1.21 dg.vpl</u> | -12.0 | |
| -13.25 | 433.0 | 520.7 | 953.7 | 686.1 | 571.8 | -23.8 | 548.0 | -697.8 | <u>1.22 dg.vpl</u> | -11.7 | |
| -13.50 | 431.6 | 529.6 | 961.2 | 691.5 | 576.3 | -23.8 | 552.5 | -697.8 | <u>1.21 dg.vpl</u> | -11.4 | |
| -13.75 | 561.0 | 529.6 | 1091 | 784.6 | 653.8 | -23.8 | 630.0 | -697.8 | <u>1.07 dg.vpl</u> | -9.2 | |
| -14.00 | 616.2 | 553.7 | 1170 | 841.7 | 701.4 | -23.8 | 677.6 | -697.8 | 0.99 | -29.3 | -8.1 |
| -14.25 | 602.8 | 577.1 | 1180 | 848.9 | 707.4 | -23.8 | 683.6 | -697.8 | 0.99 | -27.5 | -7.9 |
| -14.50 | 585.6 | 577.1 | 1163 | 836.5 | 697.1 | -23.8 | 673.3 | -697.8 | 1.00 | -30.1 | -8.1 |
| -14.75 | 575.7 | 609.0 | 1185 | 852.3 | 710.3 | -23.8 | 686.5 | -697.8 | 0.98 | -26.2 | -7.8 |
| -15.00 | 566.2 | 642.8 | 1209 | 869.8 | 724.8 | -23.8 | 701.0 | -697.8 | 0.96 | -22.7 | -7.4 |

6.4. Bijlage D: sonderingen



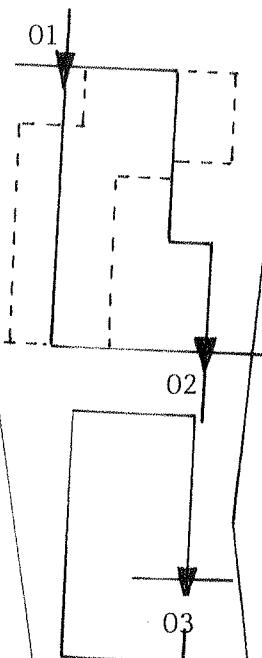
JOHN KONINGS SONDERINGEN Tel: 0165-534969

Sonderingen tbv nieuw te bouwen woning en schuur
gelegen aan de Eindsestraat 27 te Drongelen

DATUM: 19-06-2015

OPDR. No: 2015.069

grondwaterstand 2.00 mtr.-mv



meetpunt vloer=0.00

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