# VFZ

Windgebied onbebouwd | Rev. 1.2
Omgeving : I | Date 16-08-23
**Construction Calculations** | Auteur ing. A. Azaroual

| Berekening opgesteld door |
|---|
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**Inhoud**


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**Gebruikte normen**

***Eurocode 1 - Belastingen op constructies***

EN 1991-1-1 Deel 1-1: Algemene belastingen - Volumieke gewichten, eigen gewicht, opgelegde belastingen voor gebouwen
EN 1991-1-4 Deel 1-4: Algemene belastingen – Windbelasting

***Eurocode 3 - Ontwerp en berekening van staalconstructies***

EN 1993-1-1 Deel 1-1: Algemene regels en regels voor gebouwen
EN 1993-1-2 Deel 1-2: Algemene regels - Ontwerp en berekening van constructies bij brand
EN 1993-1-3 Deel 1-3: Algemene regels - Aanvullende regels voor koudgevormde dunwandige profielen en platen
EN 1993-1-4 Deel 1-4: Algemene regels - Aanvullende regels voor roestvast staal
EN 1993-1-5 Deel 1-5: Algemene regels - Constructieve plaatvelden
EN 1993-1-6 Deel 1-6: Algemene regels - Sterkte en stabiliteit van schaalconstructies
EN 1993-1-7 Deel 1-7: Algemene regels - Sterkte en stabiliteit van haaks op het vlak belaste platen
EN 1993-1-8 Deel 1-8: Algemene regels - Ontwerp en berekening van verbindingen
EN 1993-1-9 Deel 1-9: Algemene regels – Vermoeiing
EN 1993-1-10 Deel 1-10: Algemene regels - Materiaaltaaiheid en eigenschappen in de dikterichting
EN 1993-1-11 Deel 1-11: Algemene regels - Ontwerp en berekening van op trek belaste componenten
EN 1993-1-12 Deel 1-12: Algemene regels - Aanvullende regels voor de uitbreiding van EN 1993 voor staalsoorten tot en met S 700
EN 1993-2 Deel 2: Bruggen
EN 1993-3-1 Deel 3-1: Torens, masten en schoorstenen - Torens en masten
EN 1993-3-2 Deel 3-2: Torens, masten en schoorstenen – Schoorstenen
EN 1993-4-1 Deel 4-1: Silo's
EN 1993-4-2 Deel 4-2: Opslagtanks
EN 1993-4-3 Deel 4-3: Buisleidingen
EN 1993-5 Deel 5: Palen en damwanden
EN 1993-6 Deel 6: Kraanbanen

## Conclusies

*Controle hoekverdraaing en sterkte*

Bij een ----> $\psi_t$ = 0,56 (referentieperiode van 1 jaar) (conform de Eurocode)

***toetsing hoekverdraaiing:***

**dit zijn de eisen van de telecomproviders.**

| | | | |
|---|---|---|---|
| hoekverdraaiing (t.p.v. 3x VF dish Ø600 H=+40m)= | 0,00662 | radiaal = | 0,38 graden < 0,7 graden (ok) |
| hoekverdraaiing (t.p.v. 3x VF antenna ASI4518R10v06 + 15*RRU H=37,0 m)= | 0,00674 | radiaal = | 0,39 graden < 1,0 graden (ok) |
| hoekverdraaiing (t.p.v. 3x VF antenna AIR6488 H=35,0 m)= | 0,00667 | radiaal = | 0,38 graden < 1,0 graden (ok) |
| hoekverdraaiing (t.p.v. 3x KPN dish Ø300 H=+34m)= | 0,00650 | radiaal = | 0,37 graden < 0,7 graden (ok) |
| hoekverdraaiing (t.p.v. 3x KPN antenna 80020892 +6*RRU H=31 m)= | 0,00643 | radiaal = | 0,37 graden < 1,0 graden (ok) |
| hoekverdraaiing (t.p.v. 3x KPN antenna 80020892 +6*RRU H=28 m)= | 0,00613 | radiaal = | 0,35 graden < 1,0 graden (ok) |
| hoekverdraaiing (t.p.v. 3x TM dish Ø600 H=+27m)= | 0,00568 | radiaal = | 0,33 graden < 0,7 graden (ok) |
| hoekverdraaiing (t.p.v. 3x TM antenna AAU5972 H=25 m)= | 0,00547 | radiaal = | 0,31 graden < 1,0 graden (ok) |
| hoekverdraaiing (t.p.v. 3x TM antenna AHP4518R5V06 +6xRRU H=22 m)= | 0,00473 | radiaal = | 0,27 graden < 1,0 graden (ok) |
| hoekverdraaiing (t.p.v. 3x OLO dish Ø600 H=+21m)= | 0,00425 | radiaal = | 0,24 graden < 0,7 graden (ok) |
| hoekverdraaiing (t.p.v. 3x OLO antenna ASI4518R10v06 + 6*RRU H=18 m)= | 0,00401 | radiaal = | 0,23 graden < 1,0 graden (ok) |

Bij een ----> $\psi_t$ = 0,87 (referentieperiode van 15 jaar) (conform de Eurocode)

***toetsing vervorming Conform NEN-EN 50341-3:***

| | | | |
|---|---|---|---|
| maximale horizontale uitbuiging: | 0,246m | H= 40,000m | ***= 0,61%*** *< 8% (ok)* |
| max relatieve verplaatsing | 0,123m | H= 40,000m | ***= 0,31%*** *< 1% (ok)* |

Bij een ----> $\psi_t$ = 1,00 (max. stuwdruk, referentieperiode van 50 jaar)

***toetsing vervorming Conform NEN-EN 50341-3:***

| | | | |
|---|---|---|---|
| maximale horizontale uitbuiging: | 0,284m | H= 40,000m | ***= 0,71%*** *< 8% (ok)* |
| max relatieve verplaatsing | 0,142m | H= 40,000m | ***= 0,36%*** *< 1% (ok)* |

***sterkte toetsing = De volledige constructie voldoet op sterkte bij een referentie periode van 50 jaar***

Max UC = ***0,69*** < 1,0 (ok)

## Controle staanders en diagonalen

| | Randstaven | Diagonalen |
|---|---|---|
| Sectie 1 | uc=0,67<1.0 | uc=0,55<1.0 |
| Sectie 2 | uc=0,69<1.0 | uc=0,52<1.0 |
| Sectie 3 | uc=0,58<1.0 | uc=0,57<1.0 |
| Sectie 4 | uc=0,09<1.0 | uc=0,27<1.0 |

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**Construction Calculations**

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## Controle verbindingen

| | | | Controle lasverbindingen | |
|---|---|---|---|---|
| | Controle ankers | Controle flensplaat | Randstaven | Diagonalen |
| Sectie 1 | uc=0,55<1.0 | uc=0,75<1.0 | uc=0,43<1.0 | uc=0,86<1.0 |
| Sectie 2 | uc=0,76<1.0 | uc=0,61<1.0 | uc=0,42<1.0 | uc=0,78<1.0 |
| Sectie 3 | uc=0,34<1.0 | uc=0,51<1.0 | uc=0,23<1.0 | uc=0,57<1.0 |
| Sectie 4 | uc=0,08<1.0 | uc=0,22<1.0 | uc=0,04<1.0 | uc=0,30<1.0 |

## Reactiekrachten mast:

De mast is van het type VDL vkm VeHa 40m 1200-3000.

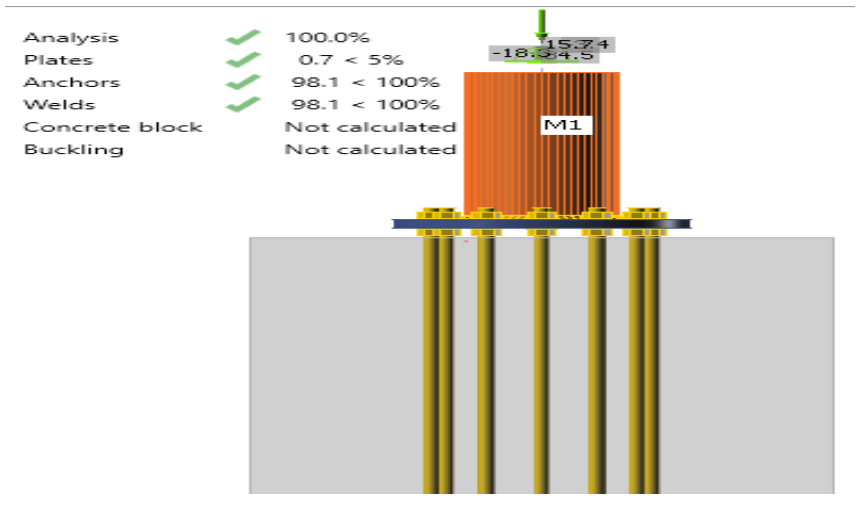
**X-Richting**

| | Ka C 1 | | Fu.C.2 | | Fu.C.4 | |
|---|---|---|---|---|---|---|
| | γg=1,0 | γq=1,0 | γg=1,2 | γq=1,6 | γg=0,9 | γq=1,6 |
| Voetmoment | 1694 | kNm | 2710 | kNm | **2710** | kNm |
| Dwarskracht | 82 | kN | 132 | kN | **132** | kN |
| Gewicht mast | 72 | kN | 87 | kN | 65 | kN |
| Max. gedrukte voet | 676 | kN | **1072** | kN | 1065 | kN |
| Max. getrokken voet | 628 | kN | 1014 | kN | **1021** | kN |

**Y-Richting**

| | Ka C 2 | | Fu.C.3 | | Fu.C.5 | |
|---|---|---|---|---|---|---|
| | γg=1,0 | γq=1,0 | γg=1,2 | γq=1,6 | γg=0,9 | γq=1,6 |
| Voetmoment | 2420 | kNm | **3887** | kNm | 3898 | kNm |
| Dwarskracht | 92 | kN | **147** | kN | 147 | kN |
| Gewicht mast | 72 | kN | 87 | kN | 65 | kN |
| Max. gedrukte voet | 771 | kN | **1252** | kN | 1267 | kN |
| Max. getrokken voet | 843 | kN | **1339** | kN | 1332 | kN |

## Controle ankers t.p.v. steunpunten




*12x M24 Bolts 8,8*
*Plates 25mm* S355
*Welds 9mm* S355

**UC Max** **0,98** **< 1,0 (ok)**

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**Construction Calculations**

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## Beschrijving site

In dit rapport wordt een berekening opgesteld voor een nieuwe vakwerkmast met een nieuwe antennecondiguratie.
De windbelastingen ten gevolge van de aanwezige feeders is meegenomen in de berekening.
De mast is van het type VDL 40 m 3000-1200 en berekend op basis van maximale configuratie en ongunstige situatie
in Windgebied I onbebouwd.

## Uitgangspunten berekening

De aangehouden veiligheidsfactoren is volgens de NEN-EN 1993-3-1 ontwerp en berekeningen van staal constructie deel 3-1 torens, masten en schoorstenen, annex A.
De aangehouden realiabitiy class is RC3 (=CC3). Dit wijkt af van de veiligheidsfactoren uit de basis Eurocode voor hooggebouwen,
De constructie is niet hoger dan 70m, in dit geval is er geen toezicht benodigd tijdens de bouw.

| | | |
|---|---|---|
| Gevolgklasse (= veiligheidsklasse) | CC 3 | -- |
| Betrouwbaarheidsklasse | RC 3 | -- |
| Referentieperiode | 50 | jaar |
| Maximaal toelaatbare hoekverdraaiing gebruikstoestand antennes | 1,0 | graden |
| Maximaal toelaatbare hoekverdraaiing gebruikstoestand mini links | 0,7 | graden |

| | | |
|---|---|---|
| $\gamma_{SLS,g}$ = | 1,0 | -- |
| $\gamma_{SLS,q}$ = | 1,0 | -- |
| $\gamma_{ULS,g}$ = | 0,9 | -- (ongunstig) |
| $\gamma_{ULS,g}$ = | 1,2 | -- EN 1993-3-1 |
| $\gamma_{ULS,q}$ = | 1,6 | -- EN 1993-3-1 |
| $c_s c_d$ = | 1,03 | -- (vormfactor dimensie) |
| $\psi_t$ = | 0,87 | -- ( t = 15 jaar conform de Eurocode) |
| $\psi_t$ = | 0,74 | -- ( t = 5 jaar conform de Eurocode) |
| $\psi_t$ = | 0,56 | -- ( t = 1 jaar conform de Eurocode) |

Kniklengte randstaven= Lcr = 1,5 * Lsys  Kniklengte diagonalen= Lcr = 1,0 * Lsys  *(zie invoer Matrix bijlage 2)*

**Materialen**

| | | |
|---|---|---|
| **Staalsoort :** | S355 | |
| $f_{y;rep}$ = | 355 | N/mm$^2$ |
| $E_{rep}$ = | 210000 | N/mm$^2$ |
| $\rho_{staal}$ = | 78,5 | kN/m$^3$ |
| **Bouten:** | 8.8 | |
| $f_{t;b;d}$ = | 800 | N/mm$^2$ |

**Belastingen**

| | | |
|---|---|---|
| Windgebied : | onbebouwd | |
| Omgeving : | I | |
| $h_{max.}$ = | 40 | m |
| $p_w$ = | 1,55 | kN/m$^2$ |
| $z_0$ = | *0,2* | m |
| $z_{min}$ = | *4,0* | m |
| $k_r$ = | 0,21 | -- |
| $c_r$ = | 1,11 | -- |
| $c_0$ = | 1 | -- |
| $V_b$ = | 29,5 | m/s |
| $V_m$ = | 32,7 | m/s |
| $I_v$ = | 0,19 | -- |

**Reductiefactor afhankelijk van referentieperiode:**

| | | | |
|---|---|---|---|
| t = | 15 | | *jaar (referentieperiode)* |
| p = | 0,064 | -- | *(art.4.2 Basiswaarden NEN-EN 1991-1-4)* |
| n = | 0,5 | -- | *(Tabel NB.2 NEN-EN 1991-1-4:2005/NB:2007)* |
| K = | 0,2 | -- | *(Tabel NB.2 NEN-EN 1991-1-4:2005/NB:2007)* |
| $c_{prob}$ = | 0,931 | -- | *(art.4.2 Basiswaarden NEN-EN 1991-1-4)* |
| $V_{b;t}$ | 27 | m/s | *(afh. van referentieperiode van t jaren)* |
| $V_{m;t}$ | 30 | m/s | *(afh. van referentieperiode van t jaren)* |
| $p_{w;t}$ = | 1,35 | *kN/m$^2$* | |
| $\psi_t = p_{w;t}/p_w$ = | ***0,87*** | -- | $F_t = F_{t_0}\{1+\frac{1-\psi_1}{9}\ln(\frac{t}{t_0})\}$ *(A1.1 NEN-EN 1990)* |

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**Belastingen antennes**

**Eigengewicht: 3 x VF dish Ø600**

$F_{rep,EG}$ = 0,240 kN/minilink
$F_{d,EG,minilink}$ = 0,288 kN/minilink
3x $F_{rep,EG}$ = 0,720 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,240kN**
*3xRG214 kabel* 0,003 kN/m h=40,00m=> 0,12kN over de hele lengte mast been 1 en 2======> $q_{rep,SW,feeders}$= 0,002 kN/m

**Eigengewicht: 3x VF antennes ASI4518R10v06 (afm. 2769 x 429 x 196 mm; 66,1 kg)**

$F_{rep,EG,antenne}$ = 0,661 kN/antenne
$F_{d,EG,antenne}$ = 0,7932 kN/antenne
3x $F_{rep,EG,antenne}$ = 1,983 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,661kN**
*Glas+DC cables* 0,017 kN/m h=37,0m=> 0,63kN over de hele lengte mast been 1 en 2======> $q_{rep,EG\ feeders}$= 0,009 kN/m

**Eigengewicht: 15 xKPN RRU (afm.351x298x130mm; 14 kg)**

$F_{rep,EG,RRU}$ = 0,14 kN/antenne
$F_{d,EG,RRU}$ = 0,168 kN/antenne
15x $F_{rep,EG,RRU}$ = 2,100 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,700kN**

**Eigengewicht: 3x VF antennes AIR6488 (afm. 893 x 520 x 238 mm; 67,1 kg)**

$F_{rep,EG,antenne}$ = 0,671 kN/antenne
$F_{d,EG,antenne}$ = 0,8052 kN/antenne
3x $F_{rep,EG,antenne}$ = 2,013 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,671kN**
*Glas+DC cables* 0,017 kN/m h=35,0m=> 0,60kN over de hele lengte mast been 1 en 2======> $q_{rep,EG\ feeders}$= 0,009 kN/m

**Eigengewicht: 3 x KPN dish Ø300**

$F_{rep,EG}$ = 0,180 kN/minilink
$F_{d,EG,minilink}$ = 0,216 kN/minilink
3x $F_{rep,EG}$ = 0,540 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,180kN**
*3xRG214 kabel* 0,003 kN/m h=34,00m=> 0,10kN over de hele lengte mast been 1 en 2======> $q_{rep,SW,feeders}$= 0,002 kN/m

**Eigengewicht: 3x KPN antennes 80020892 (afm. 2693 x 377 x 169 mm; 49 kg)**

$F_{rep,EG,antenne}$ = 0,49 kN/antenne
$F_{d,EG,antenne}$ = 0,588 kN/antenne
3x $F_{rep,EG,antenne}$ = 1,470 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,490kN**
*Glas+DC cables* 0,011 kN/m h=31,0m=> 0,35kN over de hele lengte mast been 1 en 2======> $q_{rep,EG\ feeders}$= 0,006 kN/m

**Eigengewicht: 6 x KPN RRU (afm.485x380x170mm; 25 kg)**

$F_{rep,EG,RRU}$ = 0,25 kN/antenne
$F_{d,EG,RRU}$ = 0,3 kN/antenne
6x $F_{rep,EG,RRU}$ = 1,500 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,500kN**

**Eigengewicht: 3x KPN antennes 80020892 (afm. 2693 x 377 x 169 mm; 49 kg)**

$F_{rep,EG,antenne}$ = 0,49 kN/antenne
$F_{d,EG,antenne}$ = 0,588 kN/antenne
3x $F_{rep,EG,antenne}$ = 1,470 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,490kN**
*Glas+DC cables* 0,011 kN/m h=28,0m=> 0,32kN over de hele lengte mast been 1 en 2======> $q_{rep,EG\ feeders}$= 0,006 kN/m

**Eigengewicht: 6 x KPN RRU (afm.485x380x170mm; 25 kg)**

$F_{rep,EG,RRU}$ = 0,25 kN/antenne
$F_{d,EG,RRU}$ = 0,3 kN/antenne
6x $F_{rep,EG,RRU}$ = 1,500 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,500kN**

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**Eigengewicht: 3 x TM dish Ø600**

$F_{rep,EG}$ = 0,240 kN/minilink
$F_{d,EG,minilink}$ = 0,288 kN/minilink
3x $F_{rep,EG}$ = 0,720 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,240kN**
*3xRG214 kabel* 0,003 kN/m h=27,00m=> 0,08kN over de hele lengte mast been 1 en 2======> $q_{rep,SW,feeders}$= 0,002 kN/m

**Eigengewicht: 3x TM antennes AAU5972 (afm,: 1500 mm x 370 mm x 258 mm; Weigt 51 kg)**

$F_{rep,EG,antenne}$ = 0,51 kN/antenna
$F_{d,EG,antenne}$ = 0,612 kN/antenna
3x $F_{rep,EG,antenne}$ = 1,530 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,510kN**
*Glas+DC cables* 0,038 kN/m h=25,00m=> 14,45kN full-length tower leg 1 en 2======> $q_{rep,SW,feeders}$= 0,289 kN/m

**Eigengewicht: 3x TM antennes AHP4518R5V06 (afm,: 2769 x 469 x 206 mm, Weigt 51,2 kg)**

$F_{rep,EG,antenne}$ = 0,512 kN/antenna
$F_{d,EG,antenne}$ = 0,6144 kN/antenna
3x $F_{rep,EG,antenne}$ = 1,536 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,512kN**
*Glas+DC cables* 0,038 kN/m h=22,0m=> 18,55kN full-length tower leg 1 en 2======> $q_{rep,SW,feeders}$= 0,422 kN/m

**Eigengewicht: 6 x TM RRU (afm.485x380x170mm; 25 kg)**

$F_{rep,EG,RRU}$ = 0,25 kN/antenne
$F_{d,EG,RRU}$ = 0,3 kN/antenne
6x $F_{rep,EG,RRU}$ = 1,500 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,500kN**

**Eigengewicht: 3 x OLO dish Ø600**

$F_{rep,EG}$ = 0,240 kN/minilink
$F_{d,EG,minilink}$ = 0,288 kN/minilink
3x $F_{rep,EG}$ = 0,720 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,240kN**
*3xRG214 kabel* 0,003 kN/m h=21,00m=> 0,06kN over de hele lengte mast been 1 en 2======> $q_{rep,SW,feeders}$= 0,002 kN/m

**Eigengewicht: 3x OLO antennes ASI4518R10v06 (afm. 2769 x 429 x 196 mm; 66,1 kg)**

$F_{rep,EG,antenne}$ = 0,661 kN/antenne
$F_{d,EG,antenne}$ = 0,7932 kN/antenne
3x $F_{rep,EG,antenne}$ = 1,983 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,661kN**
*Glas+DC cables* 0,017 kN/m h=18,0m=> 0,31kN over de hele lengte mast been 1 en 2======> $q_{rep,EG\ feeders}$= 0,009 kN/m

**Eigengewicht: 6 x OLO RRU (afm.485x380x170mm; 25 kg)**

$F_{rep,EG,RRU}$ = 0,25 kN/antenne
$F_{d,EG,RRU}$ = 0,3 kN/antenne
6x $F_{rep,EG,RRU}$ = 1,500 kN 1x invoer per mastbeen=====> $F_{rep,EG,antenne}$ = **0,500kN**

**Belastingcombinaties**

Bruikbaarheidsgrenstoestand (SLS; Doorbuiging) = $\gamma_{SLS,g}G + \gamma_{SLS,q}Q_W$
Uiterste grenstoestand (ULS; Sterkte) = $\gamma_{ULS,g}G + \gamma_{ULS,q}Q_W$

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## Windbelasting algemeen:

Windgebied : onbebouwd Omgeving : I

P = $P_w . c_f . c_s . c_d$ *kN/m² (Windbelasting, NEN-EN 1991-4-1)*
$c_s . c_d$ = 1,03 *-- (Bouwwerkfactor, Procedure 2 bijlage C NEN-EN 1991-4-1)*
$\Sigma c_f$ = $c_{f,S} + c_{f,A}$ *-- (Druk- en krachtcoëfficiënten totaal; B2.1.3 NEN-EN 1993-3-1 )*
$c_{f,s}$ = $K_\theta * c_{f,s,0} * As/\Sigma A$ *-- (Druk- en krachtcoëfficiënten Mast; B2.2 NEN-EN 1993-3-1 en correctieblad C1-2009)*
$c_{f,A}$ = $K_A * c_{f,A,0} * \sin^2\psi * As/\Sigma A$ *-- (Druk- en krachtcoëfficiënten Kabels; B2.3 NEN-EN 1993-3-1 en correctieblad C1-2009)*
$\varphi$ = $A_s + A_A / A$ -- (Volheidsgrad )

$A_s$ De som van de geprojecteerde oppervlakte van de staven
$A_A$ De som van de geprojecteerde oppervlakte van de kabels
A Het totale ingesloten oppervlakte van de vaktwerkmast element

Re = b * v(ze) / v *(Reynoldsgetal, art. 7.9.1 NEN-EN 1991-4-1)*
*voorwaarde Reynoldgetal: voor Re < $4*10^5$ is sub critical en voor Re > $4*10^5$ is supercritical*
v = 0,000015 $m/s^2$ *(De kinematische viscositeit van de lucht)*
v(ze) de piekwindsnelheid op hoogte ze vastgesteld *conform NEN-EN 1991-4-1*
$b_{gem}$ = 1,9875 m *(Gemiddelde breedte van de mast)*
$h_{max}$ = 40,0 m *(Totale hoogte van de mast incl. topbuis)*
$C_{tot} = c_f . c_s . c_d$ *(totale factor)*

| ***h*** [m] | $z_0$ [m] | $z_{min}$ [m] | $k_r$ [-] | $c_r$ [-] | $c_0$ [-] | $V_b$ [m/s] | $V_m$ [m/s] | $I_v$ [-] |
|---|---|---|---|---|---|---|---|---|
| 5,00 | *0,2* | *4,0* | 0,21 | 0,67 | 1 | 29,5 | 19,9 | 0,31 |
| 6,00 | *0,2* | *4,0* | 0,21 | 0,71 | 1 | 29,5 | 21,0 | 0,29 |
| 12,00 | *0,2* | *4,0* | 0,21 | 0,86 | 1 | 29,5 | 25,3 | 0,24 |
| 18,00 | *0,2* | *4,0* | 0,21 | 0,94 | 1 | 29,5 | 27,8 | 0,22 |
| 24,00 | *0,2* | *4,0* | 0,21 | 1,00 | 1 | 29,5 | 29,6 | 0,21 |
| 30,00 | *0,2* | *4,0* | 0,21 | 1,05 | 1 | 29,5 | 30,9 | 0,20 |
| 36,00 | *0,2* | *4,0* | 0,21 | 1,09 | 1 | 29,5 | 32,1 | 0,19 |
| 40,00 | *0,2* | *4,0* | 0,21 | 1,11 | 1 | 29,5 | 32,7 | 0,19 |

| **Element** | **Sectielengte (mm)** | **Voetbreedte (mm)** | **Hoogte (m)** | **Stuwdruk $P_w$ ($kN/m^2$)** | **$P_{w;gem}$ ($kN/m^2$)** | **$P_{w;gem}$ ($kN/m^2$)** |
|---|---|---|---|---|---|---|
| | | | 5,0 | 0,784 | | |
| **1** | 6000 | 3000 | 6,0 | 0,843 | (0,78 + 0,84 ) / 2 | 0,81 |
| **2** | 6000 | 2700 | 12,0 | 1,083 | (0,84 + 1,08 ) / 2 | 0,96 |
| **3** | 6000 | 2400 | 18,0 | 1,234 | (1,08 + 1,23 ) / 2 | 1,16 |
| **4** | 6000 | 2100 | 24,0 | 1,345 | (1,23 + 1,35 ) / 2 | 1,29 |
| **5** | 6000 | 1800 | 30,0 | 1,435 | (1,35 + 1,43 ) / 2 | 1,39 |
| **6** | 6000 | 1500 | 36,0 | 1,510 | (1,43 + 1,51 ) / 2 | 1,47 |
| **7** | 4000 | 1200 | 40,0 | 1,594 | (1,51 + 1,59 ) / 2 | 1,55 |
| | | 1200 | | | | |

## Bepaling sub of supercritical

| | | ***Randstaven*** | | | ***Diagonalen*** | | |
|---|---|---|---|---|---|---|---|
| **element** | **V(ze)** | **$b_{rand}$ [mm]** | **Re** | | **$b_{dia}$ [mm]** | **Re** | |
| 1 | 36,7 m/s | 219,1 | 536573 | < $4*10^5$ sub crit. | 88,9 | 217715 | < $4*10^5$ sub crit. |
| 2 | 41,6 m/s | 219,1 | 608015 | < $4*10^5$ sub crit. | 88,9 | 246702 | < $4*10^5$ sub crit. |
| 3 | 44,4 m/s | 168,3 | 498488 | < $4*10^5$ sub crit. | 82,5 | 244357 | < $4*10^5$ sub crit. |
| 4 | 46,4 m/s | 168,3 | 520568 | < $4*10^5$ sub crit. | 82,5 | 255180 | < $4*10^5$ sub crit. |
| 5 | 47,9 m/s | 139,7 | 446225 | < $4*10^5$ sub crit. | 60,3 | 192608 | < $4*10^5$ sub crit. |
| 6 | 49,1 m/s | 139,7 | 457706 | < $4*10^5$ sub crit. | 60,3 | 197564 | < $4*10^5$ sub crit. |
| 7 | 50,5 m/s | 139,7 | 470289 | < $4*10^5$ sub crit. | 60,3 | 202995 | < $4*10^5$ sub crit. |

**Profielgegevens**

| staander | Ø (mm) | t (mm) | A ($mm^2$) | I ($mm^4$) | W ($mm^3$) | m (kg/m) | i (mm) |
|---|---|---|---|---|---|---|---|
| 1 | 219,1 | 10,0 | 6569 | 35984390 | 328475 | 51,57 | 74,01 |
| 2 | 219,1 | 10,0 | 6569 | 35984390 | 328475 | 51,57 | 74,01 |
| 3 | 168,3 | 8,0 | 4029 | 12972712 | 154162 | 31,63 | 56,75 |
| 4 | 168,3 | 8,0 | 4029 | 12972712 | 154162 | 31,63 | 56,75 |
| 5 | 139,7 | 5,0 | 2116 | 4805412 | 68796 | 16,61 | 47,66 |
| 6 | 139,7 | 5,0 | 2116 | 4805412 | 68796 | 16,61 | 47,66 |
| 7 | 114,3 | 5,0 | 1717 | 2569202 | 44955 | 13,48 | 38,68 |

| Diagonalen | Ø (mm) | t (mm) | A ($mm^2$) | I ($mm^4$) | W ($mm^3$) | m (kg/m) | i (mm) |
|---|---|---|---|---|---|---|---|
| 1 | 88,9 | 3,2 | 862 | 792059 | 17819 | 6,76 | 30,32 |
| 2 | 88,9 | 3,2 | 862 | 792059 | 17819 | 6,76 | 30,32 |
| 3 | 82,5 | 3,2 | 797 | 627677 | 15216 | 6,26 | 28,06 |
| 4 | 82,5 | 3,2 | 797 | 627677 | 15216 | 6,26 | 28,06 |
| 5 | 60,3 | 2,9 | 523 | 215924 | 7162 | 4,11 | 20,32 |
| 6 | 60,3 | 2,9 | 523 | 215924 | 7162 | 4,11 | 20,32 |
| 7 | 48,3 | 2,6 | 373 | 97765 | 4048 | 2,93 | 16,18 |

# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

Rev. 1.2
Date 16-08-23
Auteur ing. A. Azaroual

**Berekening van de windoppervlak mast**

| | | Y- richting | | | | |
|---|---|---|---|---|---|---|
| | A | As (y-as) $_{tot}$ | As (y-as) | L $_{dia,tot}$ | As (y-as) | L $_{rand,tot}$ |
| element | [m$^2$] | [mm$^2$] | [mm$^2$] | [mm] | [mm$^2$] | [mm] |
| 1 | 17100000 | 3774569 | 1145369 | 12884 | 2629200 | 12000 |
| 2 | 15300000 | 3681366 | 1052166 | 11835 | 2629200 | 12000 |
| 3 | 13500000 | 2912135 | 892535 | 10819 | 2019600 | 12000 |
| 4 | 11700000 | 2831667 | 812067 | 9843 | 2019600 | 12000 |
| 5 | 9900000 | 2291733 | 615333 | 10205 | 1676400 | 12000 |
| 6 | 8100000 | 2221272 | 544872 | 9036 | 1676400 | 12000 |
| 7 | 2400000 | 1216275 | 301875 | 6250 | 914400 | 8000 |
| totaal | **78000000** | | | | | |

| | | X- richting | | | | |
|---|---|---|---|---|---|---|
| | A . cos(30$^o$) | As (x-as) $_{tot}$ | As (x-as) . cos(30$^o$) | L $_{dia,tot}$ | As (x-as) | L $_{rand,tot}$ |
| element | [m$^2$] | [mm$^2$] | [mm$^2$] | [mm] | [mm$^2$] | [mm] |
| 1 | 14809034 | 3621119 | 991919 | 12884 | 2629200 | 12000 |
| 2 | 13250189 | 3540403 | 911203 | 11835 | 2629200 | 12000 |
| 3 | 11691343 | 2792558 | 772958 | 10819 | 2019600 | 12000 |
| 4 | 10132497 | 2722871 | 703271 | 9843 | 2019600 | 12000 |
| 5 | 8573651 | 2209294 | 532894 | 10205 | 1676400 | 12000 |
| 6 | 7014806 | 2148273 | 471873 | 9036 | 1676400 | 12000 |
| 7 | 2078461 | 1175831 | 261431 | 6250 | 914400 | 8000 |
| totaal | **67549981** | | | | | |

**Berekening van de windoppervlak kabels**

*Kabels&Ladder (feeders):*

| *Y-richting* | | | | | | |
|---|---|---|---|---|---|---|
| element | Hoogte (m) | Hoogte t.o.v. mv. (m) | feeders (inch) | Kabels totaal Breedte(m) | A$_{ladder\ (m2/m')}$ | A$_{kabels\ (m2/m')}$ incl ladder |
| 1 | 6,00 | 6,00 | 12*RG214+63*GLS | 0,240 | 0,100 | 0,340 |
| 2 | 6,00 | 12,00 | 12*RG214+63*GLS | 0,240 | 0,100 | 0,340 |
| 3 | 6,00 | 18,00 | 12*RG214+63*GLS | 0,240 | 0,100 | 0,340 |
| 4 | 6,00 | 24,00 | 12*RG214+63*GLS | 0,240 | 0,100 | 0,340 |
| 5 | 6,00 | 30,00 | 9*RG214+36*GLS | 0,180 | 0,100 | 0,280 |
| 6 | 6,00 | 36,00 | 6*RG214+36*GLS | 0,169 | 0,100 | 0,269 |
| 7 | 4,00 | 40,00 | 3*RG214+18*GLS | 0,096 | 0,100 | 0,196 |

| *X-richting* | | | | | | |
|---|---|---|---|---|---|---|
| element | Hoogte (m) | Hoogte t.o.v. mv. (m) | feeders (inch) | Kabels totaal Breedte(m) | A$_{ladder\ (m2/m')}$ | A$_{kabels\ (m2/m')}$ |
| 1 | 6,00 | 6,00 | 12*RG214+63*GLS | 0,107 | 0,050 | 0,157 |
| 2 | 6,00 | 12,00 | 12*RG214+63*GLS | 0,107 | 0,050 | 0,157 |
| 3 | 6,00 | 18,00 | 12*RG214+63*GLS | 0,107 | 0,050 | 0,157 |
| 4 | 6,00 | 24,00 | 12*RG214+63*GLS | 0,107 | 0,050 | 0,157 |
| 5 | 6,00 | 30,00 | 9*RG214+36*GLS | 0,107 | 0,050 | 0,157 |
| 6 | 6,00 | 36,00 | 6*RG214+36*GLS | 0,107 | 0,050 | 0,157 |
| 7 | 4,00 | 40,00 | 3*RG214+18*GLS | 0,096 | 0,050 | 0,146 |

**Berekening Druk- en krachtcoëfficiënten**

$K_\theta$ = 1 -- *(Voor de driekhoek mast formule B.3b art. B.2.2.1 NEN-EN 1993-3-1)*
C1 = 1,9 -- *(Voor de driekhoek mast B.2.2.2 NEN-EN 1993-3-1)*
C2 = 1,4 -- *(Voor de driekhoek mast B.2.2.2 NEN-EN 1993-3-1)*
$\sin(\psi)^2$= 1 -- *( $\psi = 90^o$ )*
$K_A$ = 0,8 --*(Reductie factor Tabel B.2.2 NEN-EN 1993-3-1)*
$C_{f.A.0}$ = 1,2 --*(coefficient afhankelijk van mast type en Reynoldsgetal, Tabel B.2.1 NEN-EN 1993-3-1)*

***Y-richting***

| element | $c_{f,0,f}$ [-] | $c_{f,0,c}$ [-] | $c_{f,0,c;,sup}$ [-] | $A_f$ [mm2] | $A_c$ [mm2] | $A_{c,sup}$ [mm2] | $A_s$ [mm2] |
|---|---|---|---|---|---|---|---|
| 1 | 2,14 | 1,32 | 1,10 | 0,00 | 3774569 | 0,00 | 3774569 |
| 2 | 2,06 | 1,29 | 1,11 | 0,00 | 3681366 | 0,00 | 3681366 |
| 3 | 2,08 | 1,30 | 1,10 | 0,00 | 2912135 | 0,00 | 2912135 |
| 4 | 1,97 | 1,27 | 1,12 | 0,00 | 2831667 | 0,00 | 2831667 |
| 5 | 2,00 | 1,28 | 1,11 | 0,00 | 2291733 | 0,00 | 2291733 |
| 6 | 1,88 | 1,26 | 1,14 | 0,00 | 2221272 | 0,00 | 2221272 |
| 7 | 1,76 | 1,61 | 1,40 | 0,00 | 1216275 | 0,00 | 1216275 |

| element | $c_{f,s,0,c}$ [-] | $A_A$ [mm2] | $c_{f,s}$ [-] | $\varphi = (A_S + A_A) / A$ [-] | $c_{f,A}$ [-] | $c_f = c_{f,s} + c_{f,A}$ [-] | $C_{tot} = c_f \cdot c_s \cdot c_d$ *[-]* |
|---|---|---|---|---|---|---|---|
| 1 | 1,32 | 2040000 | 0,85 | 0,34 | 0,34 | 1,19 | ***1,22*** |
| 2 | 1,29 | 2040000 | 0,83 | 0,37 | 0,34 | 1,17 | ***1,21*** |
| 3 | 1,30 | 2040000 | 0,76 | 0,37 | 0,40 | 1,16 | ***1,19*** |
| 4 | 1,27 | 2040000 | 0,74 | 0,42 | 0,40 | 1,14 | ***1,17*** |
| 5 | 1,28 | 1680000 | 0,74 | 0,40 | 0,41 | 1,14 | ***1,18*** |
| 6 | 1,26 | 1614000 | 0,73 | 0,47 | 0,40 | 1,14 | ***1,17*** |
| 7 | 1,61 | 782000 | 0,98 | 0,83 | 0,38 | 1,36 | ***1,39*** |

***X-richting***

| element | $c_{f,0,f}$ [-] | $c_{f,0,c}$ [-] | $c_{f,0,c;,sup}$ [-] | $A_f$ [mm2] | $A_c$ [mm2] | $A_{c,sup}$ [mm2] | $A_s$ [mm2] |
|---|---|---|---|---|---|---|---|
| 1 | 2,22 | 1,34 | 1,09 | 0,00 | 3621119 | 0,00 | 3621119 |
| 2 | 2,14 | 1,32 | 1,10 | 0,00 | 3540403 | 0,00 | 3540403 |
| 3 | 2,19 | 1,33 | 1,09 | 0,00 | 2792558 | 0,00 | 2792558 |
| 4 | 2,09 | 1,30 | 1,10 | 0,00 | 2722871 | 0,00 | 2722871 |
| 5 | 2,08 | 1,30 | 1,10 | 0,00 | 2209294 | 0,00 | 2209294 |
| 6 | 1,93 | 1,27 | 1,12 | 0,00 | 2148273 | 0,00 | 2148273 |
| 7 | 1,78 | 1,64 | 1,42 | 0,00 | 1175831 | 0,00 | 1175831 |

| element | $c_{f,s,0,c}$ [-] | $A_A$ [mm2] | $c_{f,s}$ [-] | $\varphi = (A_S + A_A) / A$ [-] | $c_{f,A}$ [-] | $c_f = c_{f,s} + c_{f,A}$ [-] | $C_{tot} = c_f \cdot c_s \cdot c_d$ *[-]* |
|---|---|---|---|---|---|---|---|
| 1 | 1,34 | 939000 | 1,07 | 0,31 | 0,20 | 1,26 | ***1,30*** |
| 2 | 1,32 | 939000 | 1,04 | 0,34 | 0,20 | 1,24 | ***1,28*** |
| 3 | 1,33 | 939000 | 1,00 | 0,32 | 0,24 | 1,24 | ***1,27*** |
| 4 | 1,30 | 939000 | 0,97 | 0,36 | 0,25 | 1,21 | ***1,25*** |
| 5 | 1,30 | 939000 | 0,91 | 0,37 | 0,29 | 1,20 | ***1,23*** |
| 6 | 1,27 | 939000 | 0,88 | 0,44 | 0,29 | 1,17 | ***1,21*** |
| 7 | 1,64 | 582000 | 1,09 | 0,85 | 0,32 | 1,41 | ***1,45*** |

# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

| | |
|---|---|
| Rev. | 1.2 |
| Date | 16-08-23 |
| Auteur | ing. A. Azaroual |

**Berekening Bouwwerkfactor**

| | | |
|---|---|---|
| h= | 40,0 | m |
| Windgebied : | o | |
| Omgeving : | 1 | |
| $z_0$ | *0,2* | |
| $z_{min}$ | *4,0* | |
| $k_r$ | 0,21 | |
| $c_r$ | 1,11 | |
| $c_0$ | 1 | |
| $V_b$ | 29,5 | |
| $V_m$ | 32,72 | |
| $I_v$ | 0,19 | |
| $P_w$ = | 1,55 | |

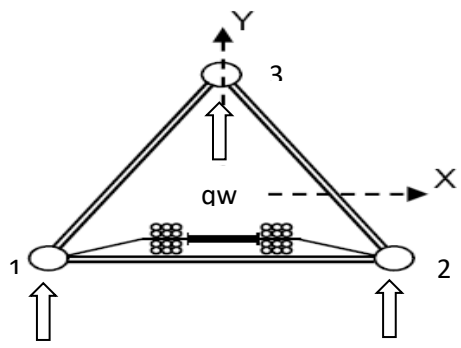
**Bepaling van eigenfrequentie, meewerkende massa en Stijfheid van de mast**

*(zie Over spannend staal construeren B hfd. 6 Dynamica)*

| | | | |
|---|---|---|---|
| Eigengewicht mast incl. antennes Σ Fz= | 73,3 | kN | *(zie Matrix uitvoer bijlage 1)* |
| Eigengewicht feeders = | 35,6 | kN | |
| l= | 40,0 | m | |
| $q_{eg.mast}$= | 2,721 | KN/m | |
| $q_{eg.mast}$= | 2721 | N/m | |
| $f_{max}$ = | 0,082 | m | *(verplaatsing t.g.v. EG vakwerk zie Matrix uitvoer bijlage 1)* |
| $EI = q_{eg,mast}*l^4/8*f_{max}$ = | 1,0644E+10 | $N/m^2$ | |
| $k=8EI/l^3$ = | 1330477 | N/m | |
| fe = | 2,388 | hz | *(zie Matrix uitvoer bijlage 1)* |
| $me = k/(2\pi*f_e)^2$ = | 5910 | kg | |

| | | | |
|---|---|---|---|
| $m_e$ = | 147,7 | kg/m | |
| h of z = | 40,0 | m | |
| b = | 0,4070 | *m (gemiddelde diameter randstaven en diagonalen)* | |
| $c_r(z)$= | 1,11 | -- | |
| $c_r(z_s)$= | 1,00 | -- | |
| $V_m(z)$ = | 32,72 | m/s | |
| $V_m(z_s)$ = | 29,57 | m/s | |
| $I_v(z)$ = | 0,189 | -- | |
| $I_v(z_s)$ = | 0,21 | -- | |
| $z_s$ = h0 + 0,6 h = | 24,00 | m | *(Referentiehoogte of gemiddelde hoogte figuur 6.1)* |
| $\alpha = 0,67+0,05*\ln(z_0)$ = | 0,59 | -- | |
| $L_t$ = | 300 | m | *(Referentielengteschaal)* |
| zt = | 200 | m | *(Referentiehoogte)* |
| $L(z) = L_t * (z/z_t)^{\alpha} > z(min)$ = | 116,16 | m | |
| $L(z_s) = L_t * (z_s/z_t)^{\alpha} > z(min)$ = | 85,96 | m | |
| $B^2$ = | 0,59 | -- | *(Achtergrondresponsfactor C.1 bijlage C NEN-EN1991-4-1)* |
| n = | 2,388 | Hz | |
| $f_L(z_s,n) = n*L(zs)/V_m(zs)$ = | 6,94 | -- | |
| $c_{f,gem}$ = | 1,46 | -- | *(gemiddelde cf, zie blad 5)* |
| $\delta_s$ = | 0,02 | -- | *(NEN-EN 1991-1-4+A1+C2:2011 tabel F.2)* |
| $\delta_d$ = | 0 | -- | |
| $\delta_a = c_f*\rho*b*V_m(z_s)/(2*n*m_e)$ | 0,031 | | |
| $\delta = \delta_s + \delta_a + \delta_d$ = | 0,051 | | |
| $S_L(z,n) = 6,8*f_L(z,n)/(1+10,2*f_L(z,n))^{5/3}$ = | 0,04 | -- | |
| $G_y$ | 0,50 | -- | *(Opgegeven in bijlage C.2 NEN-EN 1991-4-1)* |
| $G_z$ | 0,28 | -- | *(Opgegeven in bijlage C.2 NEN-EN 1991-4-1)* |
| $C_y$ | 11,50 | -- | *(Opgegeven in bijlage C.2 NEN-EN 1991-4-1)* |
| Cz | 11,50 | -- | *(Opgegeven in bijlage C.2 NEN-EN 1991-4-1)* |
| $Ø_y$ | 0,38 | -- | |
| $Ø_z$ | 37,15 | -- | |
| $K_s$ | 0,09 | -- | *(Achtergrondresponsfactor C.3 bijlage C NEN-EN1991-4-1)* |
| $R^2$ = | 0,32 | -- | *(Achtergrondresponsfactor C.2 bijlage C NEN-EN1991-4-1)* |
| $v = n*(R^2/(B^2 + R^2))^{0,5}$ = | 1,42 | Hz | |
| T = | 600 | sec | |
| $k_p = (2*\ln(v.T))^{0,5} + 0,6/(2*\ln(v.T))^{0,5}$ = | 3,84 | -- | |
| **$c_s c_d$ =** | **1,03** | -- | *(Conform Procedure 1 Bijlage C NEN-EN 1991-4-1)* |

## Berekening windbelasting vakwerkmast y-richting




| | H (m) | | Ø (mm) | t (mm) | Totale lengte (m) | Windbelasting $q_w = \Sigma A * C_{tot} * p_{w;gem} / h_{element}$ A ($m^2$) | | | |
|---|---|---|---|---|---|---|---|---|---|
| **element 1:** | 6,00 | staander | 219,1 | 10 | 6,0 | | | | |
| h = | 6,00 | diagonaal | 88,9 | 3,2 | 12,9 | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,57 | *Ø/1000 x Totale lengte dia /2* | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,33 | *$A_{s\ dia\ loodrecht}$ *TAN(30)* | | |
| | | | | | $A_{s\ staander}$ | 1,31 | *Ø/1000 x Totale lengte staander* | | |
| | | | (kabels) | | $A_A / 2$ = | 1,02 | *zie feeders $A_A$ Y- richting* | | |
| | | | | Staander 1, 2 | ΣA = | ***3,24*** | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,98*** | **-0,538 kN/m** | **-0,538 kN/m** | **-0,328 kN/m** |
| **element 2:** | 6,00 - 12,00 | staander | 219,1 | 10 | 6,0 | | | | |
| h = | 6,00 | diagonaal | 88,9 | 3,2 | 11,8 | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,53 | *Ø/1000 x Totale lengte dia /2* | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,30 | *$A_{s\ dia\ loodrecht}$ *TAN(30)* | | |
| | | | | | $A_{s\ staander}$ | 1,31 | *Ø/1000 x Totale lengte staander* | | |
| | | | (kabels) | | $A_A / 2$ = | 1,02 | *zie feeders $A_A$ Y- richting* | | |
| | | | | Staander 1, 2 | ΣA = | ***3,16*** | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,92*** | **-0,613 kN/m** | **-0,613 kN/m** | **-0,372 kN/m** |
| **element 3:** | 12,00 - 18,00 | staander | 168,3 | 8 | 6,0 | | | | |
| h = | 6,00 | diagonaal | 82,5 | 3,2 | 10,8 | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,45 | *Ø/1000 x Totale lengte dia /2* | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,26 | *$A_{s\ dia\ loodrecht}$ *TAN(30)* | | |
| | | | | | $A_{s\ staander}$ | 1,01 | *Ø/1000 x Totale lengte staander* | | |
| | | | (kabels) | | $A_A / 2$ = | 1,02 | *zie feeders $A_A$ Y- richting* | | |
| | | | | Staander 1, 2 | ΣA = | ***2,73*** | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,53*** | **-0,628 kN/m** | **-0,628 kN/m** | **-0,351 kN/m** |
| **element 4:** | 18,00 - 24,00 | staander | 168,3 | 8 | 6,0 | | | | |
| h = | 6,00 | diagonaal | 82,5 | 3,2 | 9,8 | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,41 | *Ø/1000 x Totale lengte dia /2* | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,23 | *$A_{s\ dia\ loodrecht}$ *TAN(30)* | | |
| | | | | | $A_{s\ staander}$ | 1,01 | *Ø/1000 x Totale lengte staander* | | |
| | | | (kabels) | | $A_A / 2$ = | 1,02 | *zie feeders $A_A$ Y- richting* | | |
| | | | | Staander 1, 2 | ΣA = | ***2,67*** | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,48*** | **-0,674 kN/m** | **-0,674 kN/m** | **-0,373 kN/m** |
| **element 5:** | 24,00 - 30,00 | staander | 139,7 | 5 | 6,0 | | | | |
| h = | 6,00 | diagonaal | 60,3 | 2,9 | 10,2 | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,31 | *Ø/1000 x Totale lengte dia /2* | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,18 | *$A_{s\ dia\ loodrecht}$ *TAN(30)* | | |
| | | | | | $A_{s\ staander}$ | 0,84 | *Ø/1000 x Totale lengte staander* | | |
| | | | (kabels) | | $A_A / 2$ = | 0,84 | *zie feeders $A_A$ Y- richting* | | |
| | | | | Staander 1, 2 | ΣA = | ***2,16*** | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,19*** | **-0,590 kN/m** | **-0,590 kN/m** | **-0,325 kN/m** |
| **element 6:** | 30,00 - 36,00 | staander | 139,7 | 5 | 6,0 | | | | |
| h = | 6,00 | diagonaal | 60,3 | 2,9 | 9,0 | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,27 | *Ø/1000 x Totale lengte dia /2* | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,16 | *$A_{s\ dia\ loodrecht}$ *TAN(30)* | | |
| | | | | | $A_{s\ staander}$ | 0,84 | *Ø/1000 x Totale lengte staander* | | |
| | | | (kabels) | | $A_A / 2$ = | 0,81 | *zie feeders $A_A$ Y- richting* | | |
| | | | | Staander 1, 2 | ΣA = | ***2,07*** | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,15*** | **-0,594 kN/m** | **-0,594 kN/m** | **-0,330 kN/m** |

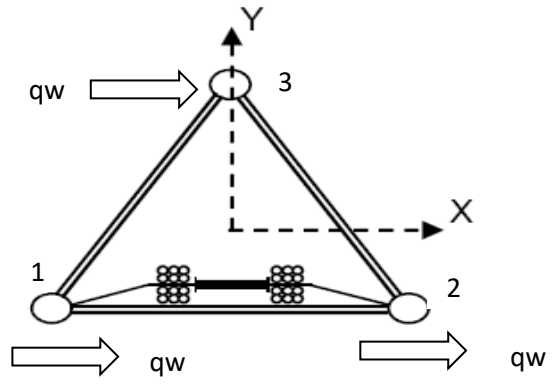
# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

| | |
|---|---|
| Rev. | 1.2 |
| Date | 16-08-23 |
| Auteur | ing. A. Azaroual |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **element 7:** | 36,00 - 40,00 | staander | 114,3 | 5 | 4,0 | | | | | |
| h = | 4,00 | diagonaal | 48,3 | 2,6 | 6,3 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,15 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,09 | *$A_{s\ dia\ loodrecht}$ *TAN(30)* | | | |
| | | | | | $A_{s\ staander}$ | 0,46 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A$ / 2 = | 0,39 | *zie feeders $A_A$ Y- richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***1,09*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***0,63*** | | **-0,587 kN/m** | **-0,587 kN/m** | **-0,341 kN/m** |

## Berekening windbelasting vakwerkmast x-richting




| | H (m) | | Ø (mm) | t (mm) | Totale lengte (m) | Windbelasting $q_w = \Sigma A * C_{tot} * p_{w;gem} / h_{element}$ A ($m^2$) | | stander 1 | stander 2 | stander 3 |
|---|---|---|---|---|---|---|---|---|---|---|
| **element 1:** | 6,00 | staander | 219,1 | 10 | 7,5 | | | | | |
| h = | 7,50 | diagonaal | 88,9 | 3,2 | 12,9 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,57 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,50 | *$A_{s\ dia\ loodrecht}$ *COS(30)* | | | |
| | | | | | $A_{s\ staander}$ | 1,64 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A / 2 =$ | 0,47 | *zie feeders $A_A$ X-richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***2,61*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***2,64*** | | **0,368 kN/m** | **0,368 kN/m** | **0,372 kN/m** |
| **element 2:** | 6,00 - 12,00 | staander | 219,1 | 10 | 6,0 | | | | | |
| h = | 6,00 | diagonaal | 88,9 | 3,2 | 11,8 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,53 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,46 | *$A_{s\ dia\ loodrecht}$ *COS(30)* | | | |
| | | | | | $A_{s\ staander}$ | 1,31 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A / 2 =$ | 0,47 | *zie feeders $A_A$ X-richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***2,24*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***2,23*** | | **0,459 kN/m** | **0,459 kN/m** | **0,456 kN/m** |
| **element 3:** | 12,00 - 18,00 | staander | 168,3 | 8 | 6,0 | | | | | |
| h = | 6,00 | diagonaal | 82,5 | 3,2 | 10,8 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,45 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,39 | *$A_{s\ dia\ loodrecht}$ *COS(30)* | | | |
| | | | | | $A_{s\ staander}$ | 1,01 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A / 2 =$ | 0,47 | *zie feeders $A_A$ X-richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***1,87*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,78*** | | **0,459 kN/m** | **0,459 kN/m** | **0,438 kN/m** |
| **element 4:** | 18,00 - 24,00 | staander | 168,3 | 8 | 6,0 | | | | | |
| h = | 6,00 | diagonaal | 82,5 | 3,2 | 9,8 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,41 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,35 | *$A_{s\ dia\ loodrecht}$ *COS(30)* | | | |
| | | | | | $A_{s\ staander}$ | 1,01 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A / 2 =$ | 0,47 | *zie feeders $A_A$ X-richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***1,83*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,71*** | | **0,491 kN/m** | **0,491 kN/m** | **0,459 kN/m** |
| **element 5:** | 24,00 - 30,00 | staander | 139,7 | 5 | 6,0 | | | | | |
| h = | 6,00 | diagonaal | 60,3 | 2,9 | 10,2 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,31 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,27 | *$A_{s\ dia\ loodrecht}$ *COS(30)* | | | |
| | | | | | $A_{s\ staander}$ | 0,84 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A / 2 =$ | 0,47 | *zie feeders $A_A$ X-richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***1,57*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,37*** | | **0,449 kN/m** | **0,449 kN/m** | **0,391 kN/m** |
| **element 6:** | 30,00 - 36,00 | staander | 139,7 | 5 | 6,0 | | | | | |
| h = | 6,00 | diagonaal | 60,3 | 2,9 | 9,0 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,27 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,24 | *$A_{s\ dia\ loodrecht}$ *COS(30)* | | | |
| | | | | | $A_{s\ staander}$ | 0,84 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A / 2 =$ | 0,47 | *zie feeders $A_A$ X-richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***1,54*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***1,31*** | | **0,457 kN/m** | **0,457 kN/m** | **0,388 kN/m** |

# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

| | |
|---|---|
| Rev. | 1.2 |
| Date | 16-08-23 |
| Auteur | ing. A. Azaroual |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **element 7:** | 36,00 - 40,00 | staander | 114,3 | 5 | 4,0 | | | | | |
| h = | 4,00 | diagonaal | 48,3 | 2,6 | 6,3 | | | | | |
| | | | (mast) | | $A_{s\ dia\ loodrecht}$ | 0,15 | *Ø/1000 x Totale lengte dia /2* | | | |
| | | | | | $A_{s\ dia\ schuin}$ | 0,13 | *$A_{s\ dia\ loodrecht}$ *COS(30)* | | | |
| | | | | | $A_{s\ staander}$ | 0,46 | *Ø/1000 x Totale lengte staander* | | | |
| | | | (kabels) | | $A_A$ / 2 = | 0,29 | *zie feeders $A_A$ X-richting* | | | |
| | | | | Staander 1, 2 | ΣA = | ***0,88*** | | stander 1 | stander 2 | stander 3 |
| | | | | Staander 3 | ΣA = | ***0,72*** | | **0,495 kN/m** | **0,495 kN/m** | **0,404 kN/m** |

# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

Rev. 1.2
Date 16-08-23
Auteur ing. A. Azaroual

## Berekening windbelasting antennes e.d.:

*A is incl oppervlakte uithouders ca. 10%*

| Omschrijving: | A ($m^2$) | A incl. staander ($m^2$) | A excl. staander ($m^2$) | h (m) | Iv | Vm | $P_{w;rep}$ ($kN/m^2$) |
|---|---|---|---|---|---|---|---|
| 3x VF dish Ø600 | 0,150 | 0,165 | 0,165 | 40,0 | 0,19 | 32,7 | 1,55 |
| 3x VF antenna ASI4518R10v06 + 15*RRU | 1,073 | 1,180 | 0,863 | 37,0 | 0,19 | 32,5 | 1,54 |
| 3x VF antenna AIR6488 | 0,388 | 0,427 | 0,303 | 35,0 | 0,21 | 29,4 | 1,34 |
| 3x KPN dish Ø300 | 0,100 | 0,110 | 0,110 | 34,0 | 0,19 | 31,7 | 1,49 |
| 3x KPN antenna 80020892 +6*RRU | 0,877 | 0,964 | 0,588 | 31,0 | 0,20 | 31,4 | 1,47 |
| 3x KPN antenna 80020892 +6*RRU | 0,877 | 0,964 | 0,588 | 28,0 | 0,20 | 30,8 | 1,43 |
| 3x TM dish Ø600 | 0,150 | 0,165 | 0,165 | 27,0 | 0,20 | 30,3 | 1,39 |
| 3x TM antenna AAU5972 | 0,536 | 0,590 | 0,418 | 25,0 | 0,21 | 30,0 | 1,37 |
| 3x TM antenna AHP4518R5V06 +6xRRU | 1,124 | 1,236 | 0,920 | 22,0 | 0,21 | 29,4 | 1,34 |
| 3x OLO dish Ø600 | 0,150 | 0,165 | 0,165 | 21,0 | 0,21 | 28,7 | 1,29 |
| 3x OLO antenna ASI4518R10v06 + 6*RRU | 1,110 | 1,221 | 0,755 | 18,0 | 0,22 | 28,2 | 1,26 |

| staander | Ø (mm) | h [m] | Knooppunt | | | H hart antenne (m) | *Per mast deel excl staander* $F_{w;rep}$ (kN) | *Per mast deel incl staander* $F_{w;rep}$ (kN) |
|---|---|---|---|---|---|---|---|---|
| | | | 91 | 92 | 93 | 40,0 | 0,51 | 0,51 |
| 1 | 219,1 | 6,00 | 88 | 89 | 90 | 38,4 | 1,33 | 1,81 |
| 2 | 219,1 | 6,00 - 12,00 | 79 | 80 | 81 | 35,4 | 0,40 | 0,57 |
| 3 | 168,3 | 12,00 - 18,00 | 73 | 74 | 75 | 34,0 | 0,33 | 0,33 |
| 4 | 168,3 | 18,00 - 24,00 | 70 | 71 | 72 | 32,3 | 0,86 | 1,41 |
| 5 | 139,7 | 24,00 - 30,00 | 64 | 65 | 66 | 29,3 | 0,84 | 1,37 |
| 6 | 139,7 | 30,00 - 36,00 | 58 | 59 | 60 | 27,0 | 0,46 | 0,46 |
| 7 | 114,3 | 36,00 - 40,00 | 55 | 56 | 57 | 25,8 | 0,57 | 0,81 |
| | | | 49 | 50 | 51 | 23,4 | 1,23 | 1,65 |
| | | | 43 | 44 | 45 | 21,0 | 0,43 | 0,43 |
| | | | 40 | 41 | 42 | 19,4 | 0,95 | 1,54 |

Antennetype: ***VF*** **ASI4518R10v06**
Windlasten antennes: Rearside: *1320* N
Lateral: *380* N
Frontal: *1320* N
Windsnelheid ($v_w$) *150* km/h
Stuwdruk ($p_w$)= 1/2 * 1,25 * ($v_w$/3,6)$^2$ = *1085* $N/m^2$ h= 2,769 m

Uit de gegeven windlast en de windsnelheid kan de effectieve antenne-oppervlakte bepaald worden.
1 antenens: $A_{w,UMTS}$ = Gem. windload / $p_w$ = *0,928* $m^2$

***incl. 5 x RRU 2217 (afm.351x298x115mm; 14 kg)***

*De RRU's worden achter de antennes geplaatst.*

Rearside en Frontal: *extra windvang, 0,351x0,298=* 0,10460 $m^2$
Lateral: *extra windvang, 0,115*0,351 =* 0,04037 $m^2$

Antennetype: ***VF*** **AIR6488**
Windlasten antennes: Rearside: *692* N
Frontal: *151* N
Windsnelheid ($v_w$) *150* km/h
Stuwdruk ($p_w$)= 1/2 * 1,25 * ($v_w$/3,6)$^2$ = *1085* $N/m^2$ h= 0,893 m

Uit de gegeven windlast en de windsnelheid kan de effectieve antenne-oppervlakte bepaald worden.
1 antenens: $A_{w,UMTS}$ = Gem. windload / $p_w$ = *0,388* $m^2$

# VFZ

Windgebied onbebouwd | Rev. 1.2
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**Construction Calculations** | Auteur ing. A. Azaroual

| | | | | | | |
|---|---|---|---|---|---|---|
| Antennetype: ***KPN*** | **80020892** | | | | | |
| Windlasten antennes: | Rearside: | *930* | N | | | |
| | Lateral: | *400* | N | | | |
| | Frontal: | *930* | N | | | |
| Windsnelheid ($v_w$) | | *150* | km/h | | | |
| Stuwdruk ($p_w$)= 1/2 * 1,25 * ($v_w$/3,6)$^2$ = | | *1085* | N/m$^2$ | h= | 2,693 | m |

Uit de gegeven windlast en de windsnelheid kan de effectieve antenne-oppervlakte bepaald worden.

1 antenens: $A_{w,UMTS}$ = Gem. windload / $p_w$ = *0,694* m$^2$

***incl. 2 x RRU (afm.485x380x170mm; 25 kg)***

*De RRU's worden achter de antennes geplaatst.*

| | | | |
|---|---|---|---|
| Rearside en Frontal: | *extra windvang, 0,48x0,38=* | 0,18240 | m$^2$ |
| Lateral: | *extra windvang, 0,17*0,485 =* | 0,08245 | m$^2$ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Antennetype: ***TM*** | **AAU5972** | | | | | |
| Windlasten antennes: | Rearside: | *820* | N | | | |
| | Lateral: | *335* | N | | | |
| | Frontal: | *590* | N | | | |
| Windsnelheid ($v_w$) | | *150* | km/h | | | |
| Stuwdruk ($p_w$)= 1/2 * 1,25 * ($v_w$/3,6)$^2$ = | | *1085* | N/m$^2$ | h= | 1,500 | m |

Uit de gegeven windlast en de windsnelheid kan de effectieve antenne-oppervlakte bepaald worden.

1 antenens: $A_{w,UMTS}$ = Gem. windload / $p_w$ = *0,536* m$^2$

| | | | | | | |
|---|---|---|---|---|---|---|
| Antennetype: ***TM*** | **AHP4518R5v06** | | | | | |
| Windlasten antennes: | Rearside: | *1305* | N | | | |
| | Lateral: | *390* | N | | | |
| | Frontal: | *1370* | N | | | |
| Windsnelheid ($v_w$) | | *150* | km/h | | | |
| Stuwdruk ($p_w$)= 1/2 * 1,25 * ($v_w$/3,6)$^2$ = | | *1085* | N/m$^2$ | h= | 2,769 | m |

Uit de gegeven windlast en de windsnelheid kan de effectieve antenne-oppervlakte bepaald worden.

1 antenens: $A_{w,UMTS}$ = Gem. windload / $p_w$ = *0,942* m$^2$

***incl. 2 x RRU (afm.485x380x170mm; 25 kg)***

*De RRU's worden achter de antennes geplaatst.*

| | | | |
|---|---|---|---|
| Rearside en Frontal: | *extra windvang, 0,48x0,38=* | 0,18240 | m$^2$ |
| Lateral: | *extra windvang, 0,17*0,485 =* | 0,08245 | m$^2$ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Antennetype: ***OLO*** | **ASI4518R10v06** | | | | | |
| Windlasten antennes: | Rearside: | *1320* | N | | | |
| | Lateral: | *380* | N | | | |
| | Frontal: | *1320* | N | | | |
| Windsnelheid ($v_w$) | | *150* | km/h | | | |
| Stuwdruk ($p_w$)= 1/2 * 1,25 * ($v_w$/3,6)$^2$ = | | *1085* | N/m$^2$ | h= | 2,769 | m |

Uit de gegeven windlast en de windsnelheid kan de effectieve antenne-oppervlakte bepaald worden.

1 antenens: $A_{w,UMTS}$ = Gem. windload / $p_w$ = *0,928* m$^2$

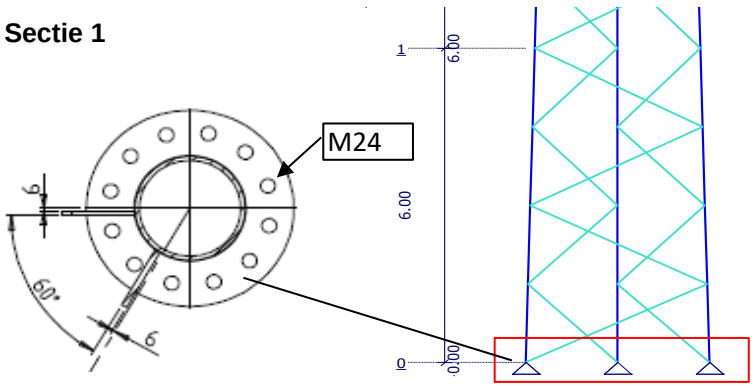
***incl. 2 x RRU (afm.485x380x170mm; 25 kg)***

*De RRU's worden achter de antennes geplaatst.*

| | | | |
|---|---|---|---|
| Rearside en Frontal: | *extra windvang, 0,48x0,38=* | 0,18240 | m$^2$ |
| Lateral: | *extra windvang, 0,17*0,485 =* | 0,08245 | m$^2$ |

**Controle verbindingen staanders en diagonalen t.p.v.**

**Sectie 1**

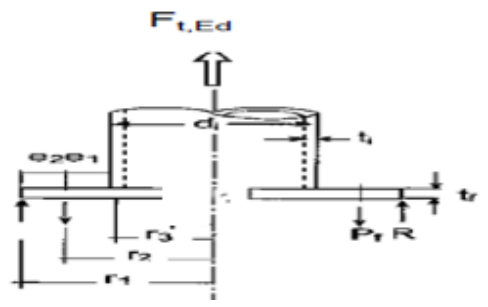



***Controle ankers***

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | A | As | $\alpha_v$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [mm$^2$] | [mm$^2$] | [--] |
| ***1339,11*** | | M24 | 8.8 | 800 | 12 | draad | 452 | 353 | 0,6 |

| $k_2$ | $\Sigma F_{v,Rd}$ | $\Sigma F_{t,Rd}$ | | | |
|---|---|---|---|---|---|
| [--] | [kN] | [kN] | Controle trek bout | u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = | 0,55 < 1,0 (ok) |
| 0,9 | 1627 | 2440 | | | |

***Controle flensplaat***




**Onder**

| $F_{t,Ed}$ | | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] |
| ***1339,11*** | | 219,1 | 10 | 30 | 159,55 | 104,6 | 0,42 | 2,42 | 5,28 |

| $t_{ben}$ | Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | |
|---|---|---|---|---|---|---|---|---|
| [mm] | [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | |
| 22,4 | S355 | 355 | 1,1 | 50 | 50 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,75 < 1,0 (ok) |

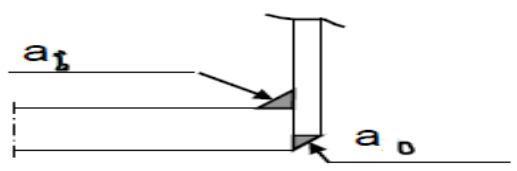
**Boven**

| $F_{t,Ed}$ | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ | $t_{ben}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] | [mm] |
| ***1137,0*** | 219,1 | 10 | 30 | 159,55 | 104,6 | 0,42 | 2,42 | 5,28 | 20,6 |

| Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | |
|---|---|---|---|---|---|---|---|
| [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | |
| S355 | 355 | 1,1 | 50 | 50 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,69 < 1,0 (ok) |

***Controle lasverbindingen***

$\tau_1 = \sigma_1 =$ $F_{Ed}$ /((a$_1$+a$_2$)*$L_{las}$*√2)
$L_{las} = \pi$* d
$\sigma_{Ed}$= ($\sigma_1^2$ + 3*($\tau_1^2$ + $\tau_2^2$))$^{0,5}$




| Randstaven | Onder | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***1339*** | | 8 | 6 | 219,1 | 98 | 0 | 688 | 197 | 1,25 |

| $\beta_w$ | Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | |
|---|---|---|---|---|---|---|---|
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | |
| 0,9 | S355 | 510 | 453 | 367 | Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,43 < 1,0 (ok) |
| | | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,27 < 1,0 (ok) |

| Randstaven | Boven | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***1137*** | | 8 | 6 | 219,1 | 83 | 0 | 688 | 167 | 1,25 |

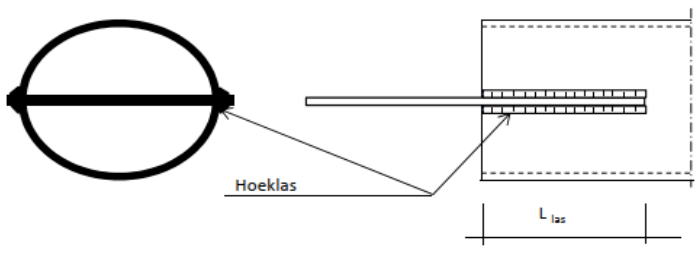
| $\beta_w$ | Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | |
|---|---|---|---|---|---|---|---|
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | |
| 0,9 | S355 | 510 | 453 | 367 | Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,37 < 1,0 (ok) |
| | | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,23 < 1,0 (ok) |

# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

| | |
|---|---|
| Rev. | 1.2 |
| Date | 16-08-23 |
| Auteur | ing. A. Azaroual |

Las schetsplaten diagonalen sectie 1 t/m7, $L_{las}$ maatgevend is 60 mm de maximale optredende belasting is 42,3 kN




**Diagonalen**

| $F_{Ed,max}$ | $a_b$ | $a_o$ | $d_{dia}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ | $\beta_w$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] | [--] |
| ***66,5*** | 4 | 0 | 88,9 | 196 | 0 | 60 | 392 | 1,25 | 0,9 |

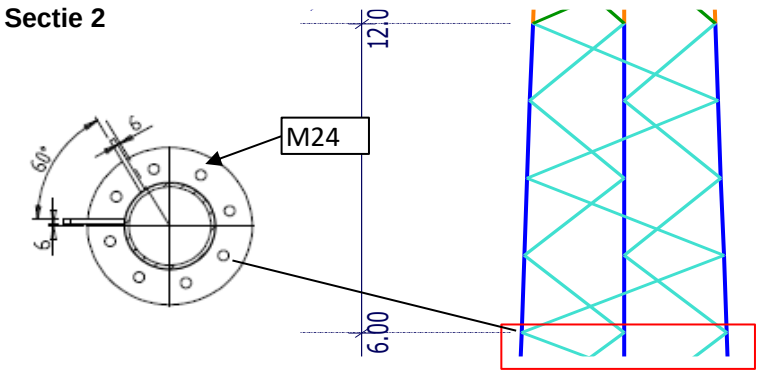
| Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ |
|---|---|---|---|
| [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] |
| S355 | 510 | 453 | 367 |

Controle trek- of drukspanning las  u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = 0,86 < 1,0 (ok)
Controle afschuiving las  u.c. = $\tau_1$ / $f_{u;t}$ = 0,53 < 1,0 (ok)

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | $k_2$ | $\Sigma F_{v,Rd}$ |
|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [--] | [kN] |
| ***66,53*** | | M24 | 8.8 | 800 | 1 | draad | 0,9 | 135,6 |

Controle trek bout  u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,55 < 1,0 (ok)

**Controle flensverbinding staanders en diagonalen t.p.v.** **Sectie 2**

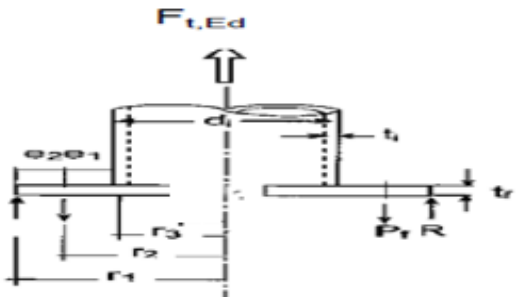



***Controle ankers***

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | A | As | $\alpha_v$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [mm$^2$] | [mm$^2$] | [--] |
| ***724,5*** | | M24 | 8.8 | 800 | 8 | draad | 452 | 353 | 0,6 |

| $k_2$ | $\Sigma F_{v,Rd}$ | $\Sigma F_{t,Rd}$ |
|---|---|---|
| [--] | [kN] | [kN] |
| 0,9 | 1084 | 1627 |

Controle trek bout  u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,45 < 1,0 (ok)




***Controle flensplaat***

**Onder**

| $F_{t,Ed}$ | | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] |
| ***1087,6*** | | 219,1 | 10 | 30 | 159,55 | 104,6 | 0,42 | 2,42 | 5,28 |

| $t_{ben}$ | Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | |
|---|---|---|---|---|---|---|---|---|
| [mm] | [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | |
| 20,2 | S355 | 355 | 1,1 | 50 | 50 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,67 < 1,0 (ok) |

**Boven**

| $F_{t,Ed}$ | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ | $t_{ben}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] | [mm] |
| ***914,7*** | 219,1 | 10 | 30 | 159,55 | 104,6 | 0,42 | 2,42 | 5,28 | 18,5 |

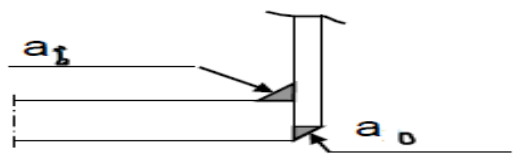
| Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | |
|---|---|---|---|---|---|---|---|
| [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | |
| S355 | 355 | 1,1 | 50 | 50 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,62 < 1,0 (ok) |

***Controle lasverbindingen***

$\tau_1 = \sigma_1 =$ $F_{Ed}/((a_1+a_2)*L_{las}*\sqrt{2})$

$L_{las} = \pi * d$

$\sigma_{Ed} = (\sigma_1^2 + 3*(\tau_1^2 + \tau_2^2))^{0,5}$




| Randstaven | Onder | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm²] | [N/mm²] | [mm] | [N/mm²] | [--] |
| ***1087,6*** | | 8 | 6 | 219,1 | 80 | 0 | 688 | 160 | 1,25 |
| $\beta_w$ | **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm²] | [N/mm²] | [N/mm²] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | | | | | |

| | | | |
|---|---|---|---|
| Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,35 | < 1,0 (ok) |
| Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,22 | < 1,0 (ok) |

| Randstaven | Boven | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm²] | [N/mm²] | [mm] | [N/mm²] | [--] |
| ***914,7*** | | 8 | 6 | 219,1 | 67 | 0 | 688 | 134 | 1,25 |
| $\beta_w$ | **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm²] | [N/mm²] | [N/mm²] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | | | | | |

| | | | |
|---|---|---|---|
| Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,30 | < 1,0 (ok) |
| Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,18 | < 1,0 (ok) |

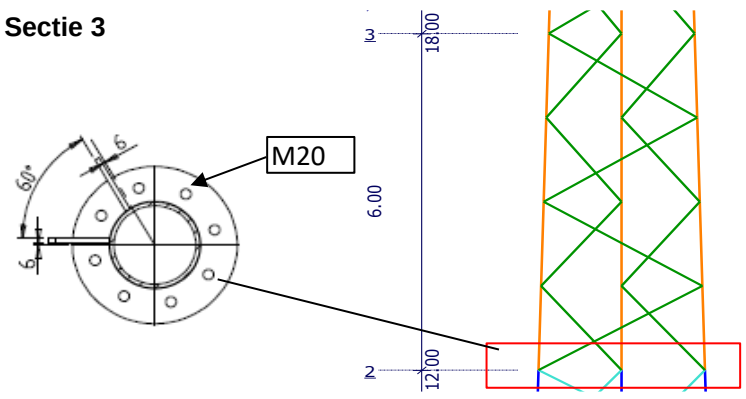
| Diagonalen | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | $a_b$ | $a_o$ | $d_{dia}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ | $\beta_w$ |
| [kN] | [mm] | [mm] | [mm] | [N/mm²] | [N/mm²] | [mm] | [N/mm²] | [--] | [--] |
| ***62,0*** | 4 | 0 | 88,9 | 183 | 0 | 60 | 365 | 1,25 | 0,9 |
| **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | | |
| [--] | [N/mm²] | [N/mm²] | [N/mm²] | | | | | | |
| S355 | 510 | 453 | 367 | | | | | | |

| | | | |
|---|---|---|---|
| Controle trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,81 | < 1,0 (ok) |
| Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,50 | < 1,0 (ok) |

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | $k_2$ | $\Sigma F_{v,Rd}$ |
|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm²] | [--] | [--] | [--] | [kN] |
| ***61,97*** | | M24 | 8.8 | 800 | 1 | draad | 0,9 | 135,6 |

Controle trek bout u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,51 < 1,0 (ok)

**Controle flensverbinding staanders en diagonalen t.p.v.** **Sectie 3**

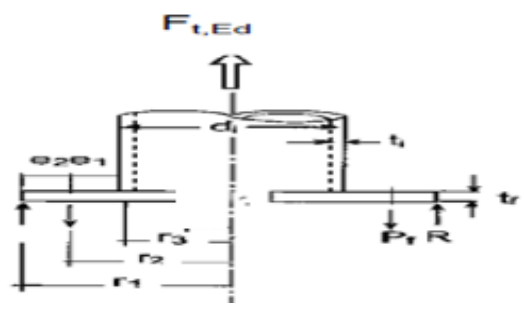



***Controle ankers***

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | A | As | $\alpha_v$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm²] | [--] | [--] | [mm²] | [mm²] | [--] |
| ***856,3*** | | M20 | 8.8 | 800 | 8 | draad | 314 | 245 | 0,6 |
| $k_2$ | $\Sigma F_{v,Rd}$ | $\Sigma F_{t,Rd}$ | | | | | | | |
| [--] | [kN] | [kN] | | | | | | | |
| 0,9 | 753 | 1129 | | | | | | | |

Controle trek bout u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,76 < 1,0 (ok)

***Controle flensplaat***



# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

| | |
|---|---|
| Rev. | 1.2 |
| Date | 16-08-23 |
| Auteur | ing. A. Azaroual |

**Onder**

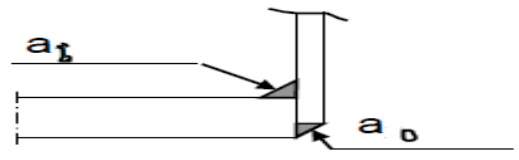
| $F_{t,Ed}$ | | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] |
| ***856,3*** | | 168,3 | 8 | 30 | 124,15 | 80,2 | 0,44 | 2,44 | 5,12 |
| $t_{ben}$ | Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | | |
| [mm] | [--] | [N/mm²] | [--] | [mm] | [mm] | | | | |
| 18,2 | S355 | 355 | 1,1 | 40 | 40 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,61 | < 1,0 (ok) |

**Boven**

| $F_{t,Ed}$ | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ | $t_{ben}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] | [mm] |
| ***673,8*** | 168,3 | 8 | 30 | 124,15 | 80,2 | 0,44 | 2,44 | 5,12 | 16,1 |
| Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | | | |
| [--] | [N/mm²] | [--] | [mm] | [mm] | | | | | |
| S355 | 355 | 1,1 | 40 | 40 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,54 | < 1,0 (ok) | |

***Controle lasverbindingen***

$\tau_1 = \sigma_1 =$ $F_{Ed}/((a_1+a_2)*L_{las}*\sqrt{2})$
$L_{las} = \pi * d$
$\sigma_{Ed} = (\sigma_1^2 + 3*(\tau_1^2 + \tau_2^2))^{0,5}$




**Randstaven** **Onder**

| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm²] | [N/mm²] | [mm] | [N/mm²] | [--] |
| ***856,3*** | | 6 | 6 | 168,3 | 95 | 0 | 529 | 191 | 1,25 |
| $\beta_w$ | **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm²] | [N/mm²] | [N/mm²] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,42 | < 1,0 (ok) | |
| | | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,26 | < 1,0 (ok) | |

**Randstaven** **Boven**

| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm²] | [N/mm²] | [mm] | [N/mm²] | [--] |
| ***673,8*** | | 6 | 6 | 168,3 | 75 | 0 | 529 | 150 | 1,25 |
| $\beta_w$ | **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm²] | [N/mm²] | [N/mm²] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,33 | < 1,0 (ok) | |
| | | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,20 | < 1,0 (ok) | |

**Diagonalen**

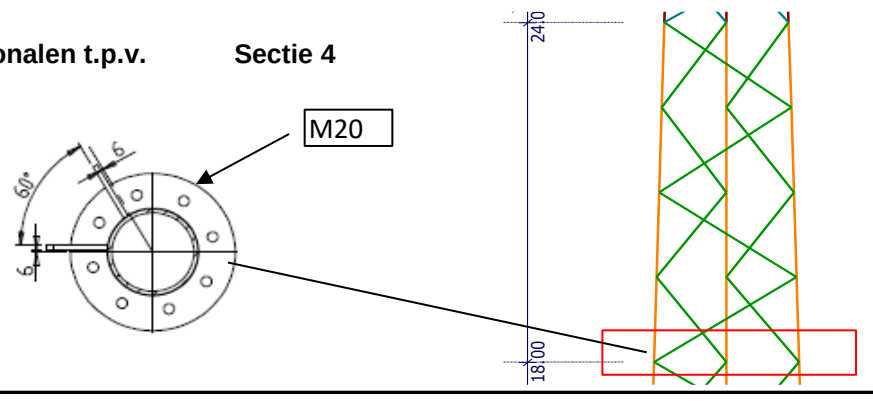
| $F_{Ed,max}$ | $a_b$ | $a_o$ | $d_{dia}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ | $\beta_w$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [N/mm²] | [N/mm²] | [mm] | [N/mm²] | [--] | [--] |
| ***60,0*** | 4 | 0 | 82,5 | 177 | 0 | 60 | 353 | 1,25 | 0,9 |
| **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | | |
| [--] | [N/mm²] | [N/mm²] | [N/mm²] | | | | | | |
| S355 | 510 | 453 | 367 | Controle trek- of drukspanning las | | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,78 | < 1,0 (ok) | |
| | | | | Controle afschuiving las | | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,48 | < 1,0 (ok) | |

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | $k_2$ | $\Sigma F_{v,Rd}$ |
|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm²] | [--] | [--] | [--] | [kN] |
| ***59,99*** | | M20 | 8.8 | 800 | 1 | draad | 0,9 | 94,1 |

Controle trek bout u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,71 < 1,0 (ok)

**Controle flensverbinding staanders en diagonalen t.p.v. Sectie 4**

***Controle ankers***



# VFZ

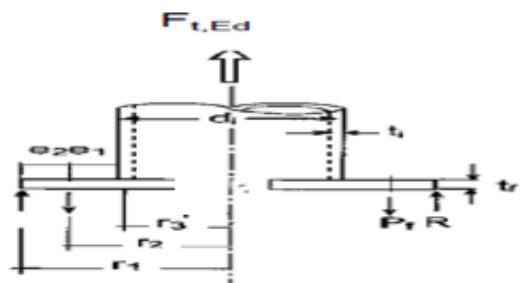
Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

Rev. 1.2
Date 16-08-23
Auteur ing. A. Azaroual

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | A | As | $\alpha_v$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [mm$^2$] | [mm$^2$] | [--] |
| ***611,4*** | | M20 | 8.8 | 800 | 8 | draad | 314 | 245 | 0,6 |

| $k_2$ | $\Sigma F_{v,Rd}$ | $\Sigma F_{t,Rd}$ | | | |
|---|---|---|---|---|---|
| [--] | [kN] | [kN] | Controle trek bout | u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = | 0,54 < 1,0 (ok) |
| 0,9 | 753 | 1129 | | | |

***Controle flensplaat***




**Onder**

| $F_{t,Ed}$ | | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] |
| ***611,4*** | | 168,3 | 8 | 25 | 124,15 | 80,2 | 0,44 | 2,44 | 5,12 |

| $t_{ben}$ | Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | |
|---|---|---|---|---|---|---|---|---|
| [mm] | [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | |
| 15,3 | S355 | 355 | 1,1 | 40 | 40 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,61 < 1,0 (ok) |

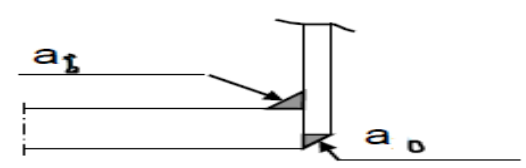
**Boven**

| $F_{t,Ed}$ | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ | $t_{ben}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] | [mm] |
| ***431,5*** | 168,3 | 8 | 25 | 124,15 | 80,2 | 0,44 | 2,44 | 5,12 | 12,9 |

| Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | |
|---|---|---|---|---|---|---|---|
| [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | |
| S355 | 355 | 1,1 | 40 | 40 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,52 < 1,0 (ok) |

***Controle lasverbindingen***

$\tau_1 = \sigma_1 =$ $F_{Ed}$ /((a$_1$+a$_2$)*L$_{las}$*$\sqrt{2}$)
$L_{las} = \pi * d$
$\sigma_{Ed} = (\sigma_1^2 + 3*(\tau_1^2 + \tau_2^2))^{0,5}$




**Randstaven Onder**

| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***611,4*** | | 6 | 6 | 168,3 | 68 | 0 | 529 | 136 | 1,25 |

| $\beta_w$ | Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | |
|---|---|---|---|---|---|---|---|
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | |
| 0,9 | S355 | 510 | 453 | 367 | Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,30 < 1,0 (ok) |
| | | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,19 < 1,0 (ok) |

**Randstaven Boven**

| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***431,5*** | | 6 | 6 | 168,3 | 48 | 0 | 529 | 96 | 1,25 |

| $\beta_w$ | Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | |
|---|---|---|---|---|---|---|---|
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | |
| 0,9 | S355 | 510 | 453 | 367 | Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,21 < 1,0 (ok) |
| | | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,13 < 1,0 (ok) |

**Diagonalen**

| $F_{Ed,max}$ | $a_b$ | $a_o$ | $d_{dia}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ | $\beta_w$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] | [--] |
| ***59,2*** | 4 | 0 | 82,5 | 175 | 0 | 60 | 349 | 1,25 | 0,9 |

| Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | |
|---|---|---|---|---|---|---|
| [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | |
| S355 | 510 | 453 | 367 | Controle trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | 0,77 < 1,0 (ok) |
| | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | 0,48 < 1,0 (ok) |

# VFZ

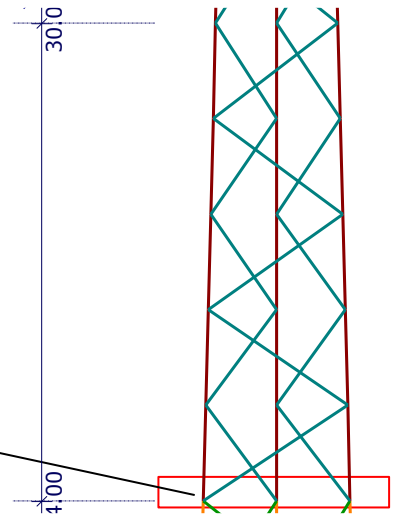
Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

| | |
|---|---|
| Rev. | 1.2 |
| Date | 16-08-23 |
| Auteur | ing. A. Azaroual |

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | $k_2$ | $\Sigma F_{v,Rd}$ |
|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [--] | [kN] |
| ***59,23*** | | M20 | 8.8 | 800 | 1 | draad | 0,9 | 94,1 |

Controle trek bout  u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,70 < 1,0 (ok)

**Controle flensverbinding staanders en diagonalen t.p.v.** **Sectie 5**

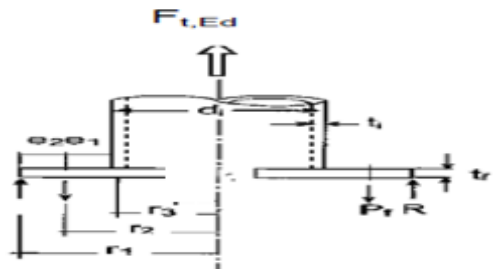



***Controle ankers***

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | A | As | $\alpha_v$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [mm$^2$] | [mm$^2$] | [--] |
| ***380,7*** | | M20 | 8.8 | 800 | 8 | draad | 314 | 245 | 0,6 |

| $k_2$ | $\Sigma F_{v,Rd}$ | $\Sigma F_{t,Rd}$ |
|---|---|---|
| [--] | [kN] | [kN] |
| 0,9 | 753 | 1129 |

Controle trek bout  u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,34 < 1,0 (ok)




***Controle flensplaat***

**Onder**

| $F_{t,Ed}$ | | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] |
| ***380,7*** | | 139,7 | 5 | 25 | 109,85 | 67,4 | 0,49 | 2,49 | 4,65 |

| $t_{ben}$ | Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ |
|---|---|---|---|---|---|
| [mm] | [--] | [N/mm$^2$] | [--] | [mm] | [mm] |
| 12,7 | S355 | 355 | 1,1 | 40 | 40 |

Controle plaat  u.c.= $t_{ben}$ / $t_{plaat}$= 0,51 < 1,0 (ok)

**Boven**

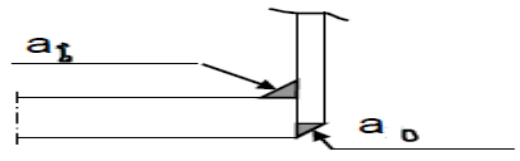
| $F_{t,Ed}$ | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ | $t_{ben}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] | [mm] |
| ***219,5*** | 139,7 | 5 | 25 | 109,85 | 67,4 | 0,49 | 2,49 | 4,65 | 9,7 |

| Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ |
|---|---|---|---|---|
| [--] | [N/mm$^2$] | [--] | [mm] | [mm] |
| S355 | 355 | 1,1 | 40 | 40 |

Controle plaat  u.c.= $t_{ben}$ / $t_{plaat}$= 0,39 < 1,0 (ok)

***Controle lasverbindingen***

$\tau_1 = \sigma_1 =$ $F_{Ed}/((a_1+a_2)*L_{las}*\sqrt{2})$
$L_{las} = \pi * d$
$\sigma_{Ed} = (\sigma_1^2 + 3*(\tau_1^2 + \tau_2^2))^{0,5}$




| Randstaven | Onder | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
| [kN] | [kN] | [mm] | 4 | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***380,7*** | | 6 | 6 | 139,7 | 51 | 0 | 439 | 102 | 1,25 |

| $\beta_w$ | Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ |
|---|---|---|---|---|
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] |
| 0,9 | S355 | 510 | 453 | 367 |

Trek- of drukspanning las  u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = 0,23 < 1,0 (ok)
Controle afschuiving las  u.c. = $\tau_1$ / $f_{u;t}$ = 0,14 < 1,0 (ok)

# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

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Auteur ing. A. Azaroual

| Randstaven | Boven | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***219,5*** | | 6 | 6 | 139,7 | 29 | 0 | 439 | 59 | 1,25 |
| $\beta_w$ | **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | | | | | |

Trek- of drukspanning las u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = 0,13 < 1,0 (ok)
Controle afschuiving las u.c. = $\tau_1$ / $f_{u;t}$ = 0,08 < 1,0 (ok)

| Diagonalen | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | $a_b$ | $a_o$ | $d_{dia}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ | $\beta_w$ |
| [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] | [--] |
| ***43,6*** | 4 | 0 | 60,3 | 128 | 0 | 60 | 257 | 1,25 | 0,9 |
| **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | | |
| [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | | | | |
| S355 | 510 | 453 | 367 | | | | | | |

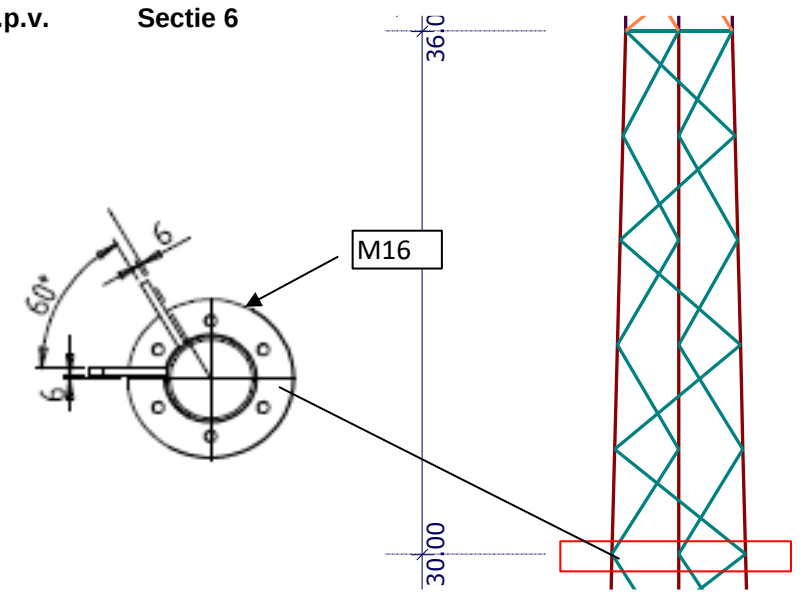
Controle trek- of drukspanning las u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = 0,57 < 1,0 (ok)
Controle afschuiving las u.c. = $\tau_1$ / $f_{u;t}$ = 0,35 < 1,0 (ok)

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | $k_2$ | $\Sigma F_{v,Rd}$ |
|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [--] | [kN] |
| ***43,59*** | | M20 | 8.8 | 800 | 1 | draad | 0,9 | 94,1 |

Controle trek bout u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,51 < 1,0 (ok)

**Controle flensverbinding staanders en diagonalen t.p.v.** **Sectie 6**

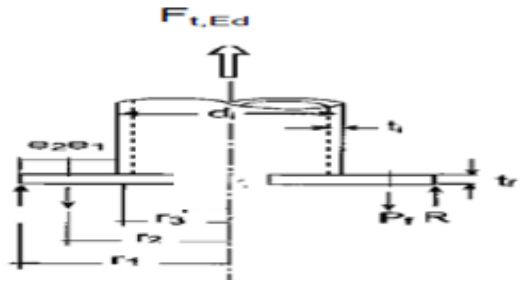
***Controle ankers***




| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | A | As | $\alpha_v$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [mm$^2$] | [mm$^2$] | [--] |
| ***181,6*** | | M16 | 8.8 | 800 | 6 | draad | 201 | 157 | 0,6 |
| $k_2$ | $\Sigma F_{v,Rd}$ | $\Sigma F_{t,Rd}$ | | | | | | | |
| [--] | [kN] | [kN] | | | | | | | |
| 0,9 | 362 | 543 | | | | | | | |

Controle trek bout u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,33 < 1,0 (ok)

***Controle flensplaat***




| Onder | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{t,Ed}$ | | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] |
| ***181,6*** | | 139,7 | 5 | 20 | 109,85 | 67,4 | 0,49 | 2,49 | 4,65 |
| $t_{ben}$ | Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | | |
| [mm] | [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | | |
| 8,8 | S355 | 355 | 1,1 | 40 | 40 | | | | |

Controle plaat u.c.= $t_{ben}$ / $t_{plaat}$= 0,44 < 1,0 (ok)

# VFZ

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Omgeving : I
**Construction Calculations**

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Auteur ing. A. Azaroual

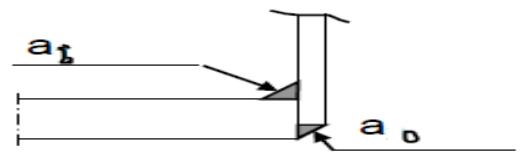
**Boven**

| $F_{t,Ed}$ | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ | $t_{ben}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] | [mm] |
| ***65,5*** | 139,7 | 5 | 20 | 109,85 | 67,4 | 0,49 | 2,49 | 4,65 | 5,3 |
| Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | | | |
| [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | | | |
| S355 | 355 | 1,1 | 40 | 40 | | | | | |

Controle plaat  u.c.= $t_{ben}$ / $t_{plaat}$= 0,26 < 1,0 (ok)

***Controle lasverbindingen***

$\tau_1 = \sigma_1 =$ $F_{Ed}/((a_1+a_2)*L_{las}*\sqrt{2})$
$L_{las} = \pi * d$
$\sigma_{Ed} = (\sigma_1^2 + 3*(\tau_1^2 + \tau_2^2))^{0,5}$




**Randstaven Onder**

| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***181,6*** | | 5 | 4 | 139,7 | 33 | 0 | 439 | 65 | 1,25 |
| $\beta_w$ | **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | | | | | |

Trek- of drukspanning las  u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = 0,14 < 1,0 (ok)
Controle afschuiving las  u.c. = $\tau_1$ / $f_{u;t}$ = 0,09 < 1,0 (ok)

**Randstaven Boven**

| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***65,5*** | | 5 | 4 | 139,7 | 12 | 0 | 439 | 23 | 1,25 |
| $\beta_w$ | **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | | | | | |

Trek- of drukspanning las  u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = 0,05 < 1,0 (ok)
Controle afschuiving las  u.c. = $\tau_1$ / $f_{u;t}$ = 0,03 < 1,0 (ok)

**Diagonalen**

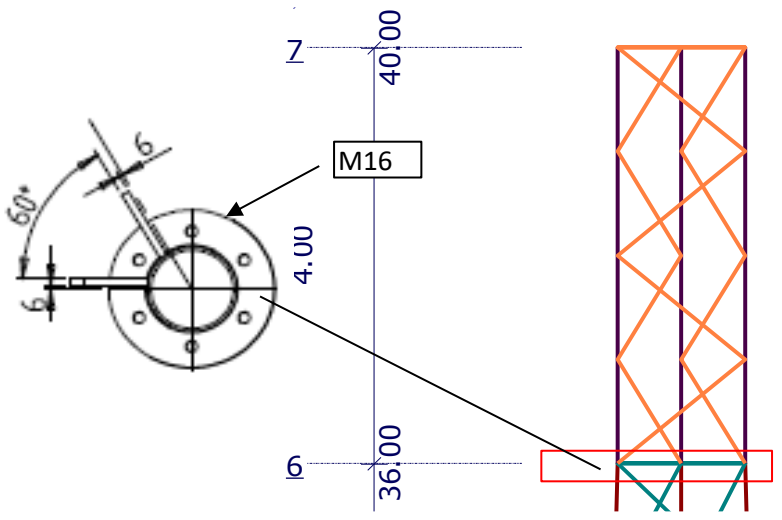
| $F_{Ed,max}$ | $a_b$ | $a_o$ | $d_{dia}$ | $\tau_1 = \sigma_1$ | $\tau_2 =$ | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ | $\beta_w$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] | [--] |
| ***31,9*** | 4 | 0 | 60,3 | 94 | 0 | 60 | 188 | 1,25 | 0,9 |
| **Staal** | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | | |
| [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | | | | |
| S355 | 510 | 453 | 367 | | | | | | |

Controle trek- of drukspanning las  u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = 0,42 < 1,0 (ok)
Controle afschuiving las  u.c. = $\tau_1$ / $f_{u;t}$ = 0,26 < 1,0 (ok)

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | $k_2$ | $\Sigma F_{v,Rd}$ |
|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [--] | [kN] |
| ***31,94*** | | M20 | 8.8 | 800 | 1 | draad | 0,9 | 94,1 |

Controle trek bout  u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,38 < 1,0 (ok)

**Controle flensverbinding staanders en diagonalen t.p.v. Sectie 7**




***Controle ankers***

# VFZ

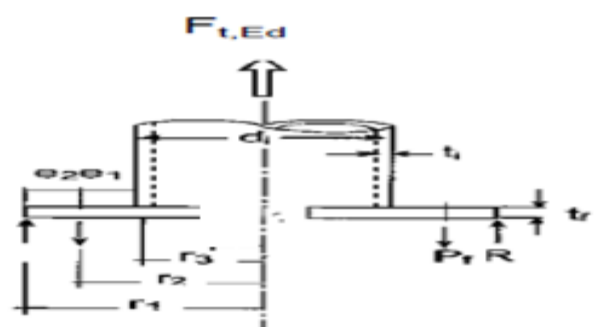
Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

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Auteur ing. A. Azaroual

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | A | As | $\alpha_v$ |
|---|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [mm$^2$] | [mm$^2$] | [--] |
| ***43,7*** | | M16 | 8.8 | 800 | 6 | draad | 201 | 157 | 0,6 |

| $k_2$ | $\Sigma F_{v,Rd}$ | $\Sigma F_{t,Rd}$ | | | |
|---|---|---|---|---|---|
| [--] | [kN] | [kN] | Controle trek bout | u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = | 0,08 < 1,0 (ok) |
| 0,9 | 362 | 543 | | | |

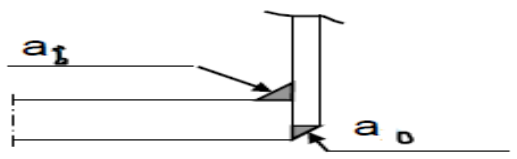
***Controle flensplaat***




| Onder | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{t,Ed}$ | | $d_{rand}$ | t | $t_{plaat}$ | $r_2$ | $r_3$ | $k_1$ | $k_3$ | $f_3$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [--] | [--] | [--] |
| ***43,7*** | | 114,3 | 5 | 20 | 92,15 | 54,7 | 0,52 | 2,52 | 4,39 |
| $t_{ben}$ | Staal | $f_y$ | $\gamma_m$ | $e_1$ | $e_2$ | | | | |
| [mm] | [--] | [N/mm$^2$] | [--] | [mm] | [mm] | | | | |
| 4,4 | S355 | 355 | 1,1 | 35 | 35 | Controle plaat | u.c.= $t_{ben}$ / $t_{plaat}$= | 0,22 | < 1,0 (ok) |

***Controle lasverbindingen***

$\tau_1 = \sigma_1 =$ $F_{Ed}/((a_1+a_2)*L_{las}*\sqrt{2})$
$L_{las} = \pi * d$
$\sigma_{Ed} = (\sigma_1^2 + 3*(\tau_1^2 + \tau_2^2))^{0,5}$




| Randstaven | Onder | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | | $a_b$ | $a_o$ | $d_{rand}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ |
| [kN] | [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] |
| ***43,7*** | | 5 | 4 | 114,3 | 10 | 0 | 359 | 19 | 1,25 |
| $\beta_w$ | Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | |
| [--] | [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | | | |
| 0,9 | S355 | 510 | 453 | 367 | Trek- of drukspanning las | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | | 0,04 | < 1,0 (ok) |
| | | | | | Controle afschuiving las | u.c. = $\tau_1$ / $f_{u;t}$ = | | 0,03 | < 1,0 (ok) |

| Diagonalen | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $F_{Ed,max}$ | $a_b$ | $a_o$ | $d_{dia}$ | $\tau_1 = \sigma_1$ | $\tau_2$ = | $L_{las}$ | $\sigma_{Ed}$ | $\gamma_{M2}$ | $\beta_w$ |
| [kN] | [mm] | [mm] | [mm] | [N/mm$^2$] | [N/mm$^2$] | [mm] | [N/mm$^2$] | [--] | [--] |
| ***16,5*** | 4 | 0 | 48,3 | 49 | 0 | 60 | 97 | 1,25 | 0,9 |
| Staal | $f_u$ | $f_{u;\sigma}$ | $f_{u;\tau}$ | | | | | | |
| [--] | [N/mm$^2$] | [N/mm$^2$] | [N/mm$^2$] | | | | | | |
| S355 | 510 | 453 | 367 | Controle trek- of drukspanning las | | u.c. = $\sigma_{Ed}$ / $f_{u;s}$ = | | 0,21 | < 1,0 (ok) |
| | | | | Controle afschuiving las | | u.c. = $\tau_1$ / $f_{u;t}$ = | | 0,13 | < 1,0 (ok) |

| $F_{t,Ed}$ | | Bout | Kwal. | $f_{ub}$ | n | afschuif | $k_2$ | $\Sigma F_{v,Rd}$ |
|---|---|---|---|---|---|---|---|---|
| [kN] | [kN] | | [--] | [N/mm$^2$] | [--] | [--] | [--] | [kN] |
| ***16,51*** | | M16 | 8.8 | 800 | 1 | draad | 0,9 | 60,3 |

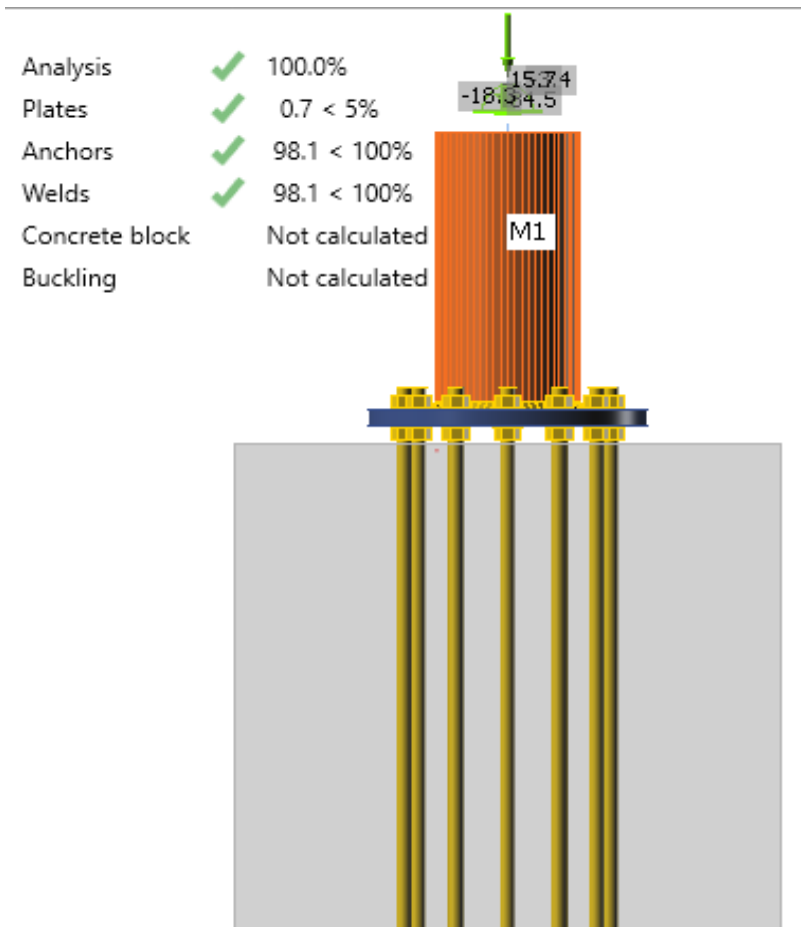
Controle trek bout u.c.= $F_{t,Ed}$ /$\Sigma F_{t,Rd}$ = 0,30 < 1,0 (ok)

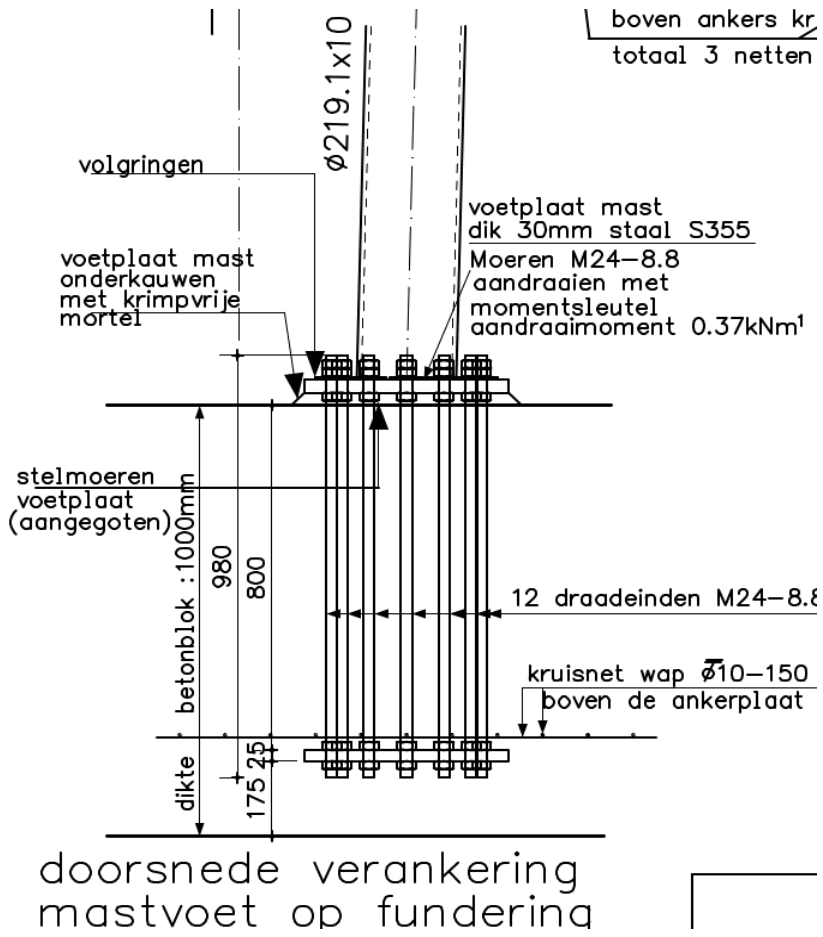
# VFZ

Windgebied onbebouwd
Omgeving : I
**Construction Calculations**

| | |
|---|---|
| Rev. | 1.2 |
| Date | 16-08-23 |
| Auteur | ing. A. Azaroual |

***Controle ankers t.p.v. steunpunten***



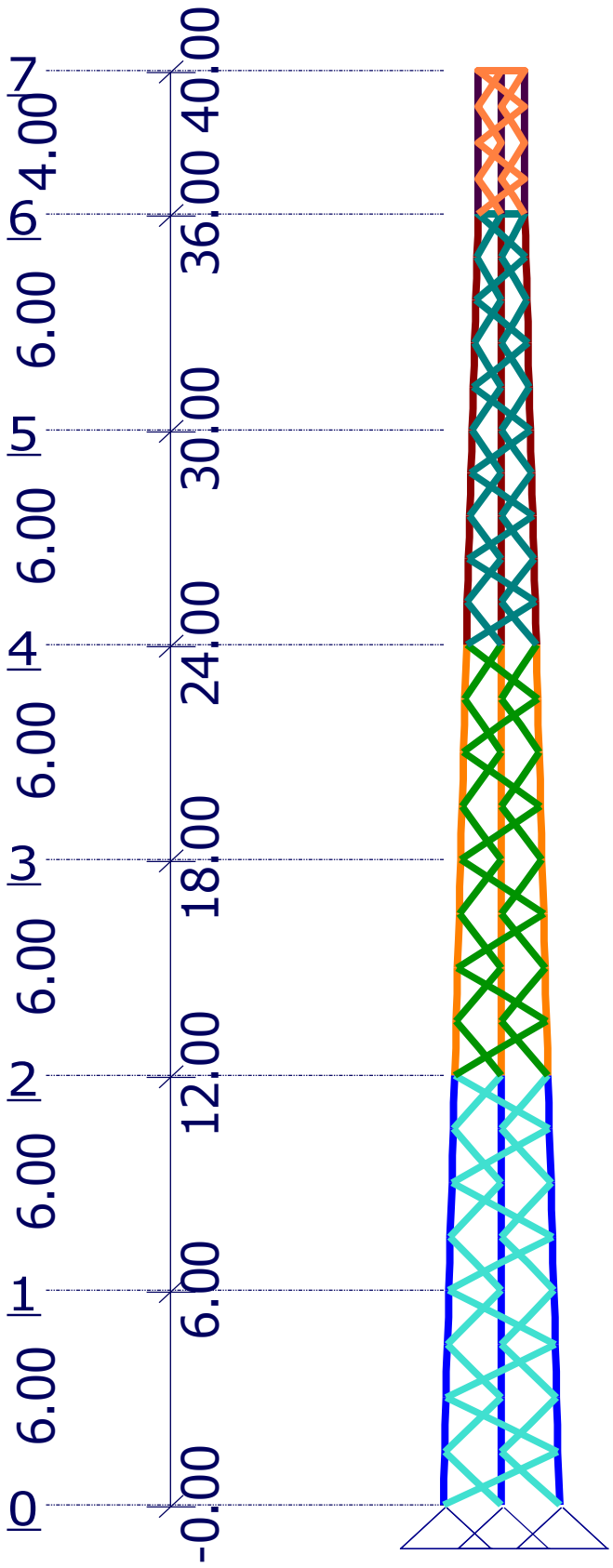

*12x M24 Bolts 8,8*

| | | | |
|---|---|---|---|
| *Plates 25mm* | S355 | | |
| *Welds 9mm* | S355 | **UC Max** | **0,98** **< 1,0 (ok)** |

Zie ook bijlage blz 1 t/m 7 van IDEA StatiCa® Calculate yesterday's estimates

# Bijlage 1:

## Eigen Frequentie



| | | | |
|---|---|---|---|
| Projectnaam | VFZ 40m 3000- 1200 | Projectnummer | |
| Omschrijving | | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | Eenheden | m, kN, kNm |

## PROFIELEN

| Profiel | Profielnaam | Oppervlakte | It | Iy | Iz | Materiaal | Hoek |
|---|---|---|---|---|---|---|---|
| P1 | B219x10 | 6.5659e-03 | 7.1866e-05 | 3.5933e-05 | 3.5933e-05 | S355 | 0.0 |
| P2 | B88.9x3.2 | 8.6155e-04 | 1.5841e-06 | 7.9206e-07 | 7.9206e-07 | S235 | 0.0 |
| P5 | B168.3x8 | 4.0288e-03 | 2.5945e-05 | 1.2973e-05 | 1.2973e-05 | S355 | 0.0 |
| P6 | B82.5x3.2 | 7.9721e-04 | 1.2554e-06 | 6.2768e-07 | 6.2768e-07 | S235 | 0.0 |
| P9 | B139.7x5 | 2.1159e-03 | 9.6108e-06 | 4.8054e-06 | 4.8054e-06 | S355 | 0.0 |
| P10 | B60.3x2.9 | 5.2295e-04 | 4.3185e-07 | 2.1592e-07 | 2.1592e-07 | S235 | 0.0 |
| P15 | B114.3x5 | 1.7169e-03 | 5.1384e-06 | 2.5692e-06 | 2.5692e-06 | S355 | 0.0 |
| P16 | B48.3x2.6 | 3.7328e-04 | 1.9553e-07 | 9.7765e-08 | 9.7765e-08 | S235 | 0.0 |
| - | - | m2 | m4 | m4 | m4 | - | ° |

## PROFIELVORMEN

| Profiel | Verl. h. | hB | hE | tf | tw | tf2 | B | bL | bR | Raatl. | Hoogte |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | Nee | 0,219 | 0,219 | 0,0100 | 0,0100 | 0,0000 | 0,219 | 0,000 | 0,000 | Nee | 0,000 |
| P2 | Nee | 0,089 | 0,089 | 0,0032 | 0,0032 | 0,0000 | 0,089 | 0,000 | 0,000 | Nee | 0,000 |
| P5 | Nee | 0,168 | 0,168 | 0,0080 | 0,0080 | 0,0000 | 0,168 | 0,000 | 0,000 | Nee | 0,000 |
| P6 | Nee | 0,083 | 0,083 | 0,0032 | 0,0032 | 0,0000 | 0,083 | 0,000 | 0,000 | Nee | 0,000 |
| P9 | Nee | 0,140 | 0,140 | 0,0050 | 0,0050 | 0,0000 | 0,140 | 0,000 | 0,000 | Nee | 0,000 |
| P10 | Nee | 0,060 | 0,060 | 0,0029 | 0,0029 | 0,0000 | 0,060 | 0,000 | 0,000 | Nee | 0,000 |
| P15 | Nee | 0,114 | 0,114 | 0,0050 | 0,0050 | 0,0000 | 0,114 | 0,000 | 0,000 | Nee | 0,000 |
| P16 | Nee | 0,048 | 0,048 | 0,0026 | 0,0026 | 0,0000 | 0,048 | 0,000 | 0,000 | Nee | 0,000 |
| - | - | m | m | m | m | m | m | m | m | - | m |

## MATERIALEN

| Materiaalnaam | Poison | Dichtheid | E-Modulus | Uitzettingcoeff |
|---|---|---|---|---|
| S235 | 0.30 | 78.50 | 2.1000e+08 | 12.0000e-06 |
| S355 | 0.30 | 78.50 | 2.1000e+08 | 12.0000e-06 |
| - | - | kN/m3 | kN/m2 | C°m |

## OPLEGGINGEN

| Oplegging | Object | Positie | | | Z | Xr | Yr | Zr | HoekXr | HoekYr | HoekZr |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O1 | K1 | 0.000 | vast | vast | vast | vrij | vrij | vast | 0 | 0 | 0 |
| O2 | K2 | 0.000 | vast | vast | vast | vrij | vrij | vast | 0 | 0 | 0 |
| O3 | K3 | 0.000 | vast | vast | vast | vrij | vrij | vast | 0 | 0 | 0 |
| - | - | m | kN/m | kN/m | kN/m | kNm/rad | kNm/rad | kNm/rad | ° | ° | ° |

## BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven | B.G.Type | Gunstig/Ong. | Element | Niveau | Veld | Psi0 | Psi1 | Psi2 | Cprob UGT/GGT |
|---|---|---|---|---|---|---|---|---|---|---|
| B.G.1 | Permanent | Permanent | - | | N.v.t. | N.v.t. | | | | |
| B.G.2 | Wind X | Windbelasting | - | | N.v.t. | N.v.t. | | 0.20 | | 1.00/1.00 |
| B.G.3 | Wind Y | Niet gedefinieerd | | | N.v.t. | N.v.t. | | | | |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

## B.G. KNOOPVERPLAATSINGEN

| Knoop | B.G. | X | Y | Z | Xr | Yr | Zr |
|---|---|---|---|---|---|---|---|
| K1 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | -0.007e-03 | 0.000e-03 | 0.000e-03 |
| | B.G.2 | 0.0000 | 0.0000 | 0.0000 | 0.012e-03 | -0.560e-03 | 0.000e-03 |
| | B.G.3 | 0.0000 | 0.0000 | 0.0000 | 0.491e-03 | 0.075e-03 | -0.000e-03 |
| K2 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | 0.003e-03 | -0.006e-03 | 0.000e-03 |
| | B.G.2 | 0.0000 | 0.0000 | 0.0000 | 0.029e-03 | -0.458e-03 | 0.000e-03 |
| | B.G.3 | 0.0000 | 0.0000 | 0.0000 | 0.606e-03 | 0.110e-03 | 0.000e-03 |

| Knoop | B.G. | X | Y | Z | Xr | Yr | Zr |
|---|---|---|---|---|---|---|---|
| K3 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | 0.003e-03 | 0.006e-03 | 0.000e-03 |
| | B.G.2 | 0.0000 | 0.0000 | 0.0000 | 0.106e-03 | -0.430e-03 | -0.000e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Projectnaam | | VFZ 40m 3000- 1200 | | | Projectnummer | | |
| Omschrijving | | | | | Constructeur | Ing. A. Azaroual | |
| Opdrachtgever | | | | | Eenheden | m, kN, kNm | |
| | B.G.3 | 0.0000 | 0.0000 | 0.0000 | 0.573e-03 | -0.010e-03 | -0.000e-03 |
| K4 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | -0.004e-03 | -0.000e-03 | 0.000e-03 |
| | B.G.2 | 0.0009 | 0.0000 | -0.0004 | 0.005e-03 | -0.611e-03 | 0.020e-03 |
| | B.G.3 | -0.0001 | -0.0008 | -0.0003 | 0.677e-03 | -0.002e-03 | -0.022e-03 |
| K5 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | 0.002e-03 | -0.003e-03 | 0.000e-03 |
| | B.G.2 | 0.0008 | 0.0000 | 0.0004 | 0.029e-03 | -0.621e-03 | 0.018e-03 |
| | B.G.3 | -0.0001 | -0.0009 | -0.0003 | 0.658e-03 | 0.027e-03 | 0.020e-03 |
| K6 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | 0.002e-03 | 0.003e-03 | 0.000e-03 |
| | B.G.2 | 0.0007 | -0.0001 | 0.0000 | 0.009e-03 | -0.545e-03 | -0.014e-03 |
| | B.G.3 | 0.0000 | -0.0009 | 0.0006 | 0.693e-03 | 0.019e-03 | -0.003e-03 |
| K7 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | -0.001e-03 | 0.000e-03 |
| | B.G.2 | 0.0020 | 0.0000 | -0.0008 | -0.010e-03 | -0.862e-03 | 0.035e-03 |
| | B.G.3 | 0.0000 | -0.0021 | -0.0005 | 1.010e-03 | -0.027e-03 | -0.039e-03 |
| K8 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | 0.001e-03 | 0.001e-03 | 0.000e-03 |
| | B.G.2 | 0.0019 | -0.0001 | 0.0008 | 0.030e-03 | -0.913e-03 | 0.033e-03 |
| | B.G.3 | -0.0001 | -0.0021 | -0.0005 | 0.947e-03 | -0.014e-03 | 0.032e-03 |
| K9 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | -0.001e-03 | 0.000e-03 | 0.000e-03 |
| | B.G.2 | 0.0017 | -0.0001 | 0.0000 | -0.034e-03 | -0.834e-03 | -0.021e-03 |
| | B.G.3 | 0.0000 | -0.0022 | 0.0011 | 0.991e-03 | 0.024e-03 | -0.005e-03 |
| K10 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | 0.001e-03 | -0.000e-03 | 0.000e-03 |
| | B.G.2 | 0.0035 | 0.0000 | -0.0012 | -0.027e-03 | -1.188e-03 | 0.048e-03 |
| | B.G.3 | 0.0000 | -0.0039 | -0.0008 | 1.327e-03 | 0.008e-03 | -0.053e-03 |
| K11 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | -0.000e-03 | 0.001e-03 | 0.000e-03 |
| | B.G.2 | 0.0035 | -0.0001 | 0.0012 | 0.031e-03 | -1.189e-03 | 0.047e-03 |
| | B.G.3 | -0.0001 | -0.0038 | -0.0008 | 1.323e-03 | 0.001e-03 | 0.042e-03 |
| K12 | B.G.1 | 0.0000 | 0.0000 | 0.0000 | -0.001e-03 | -0.001e-03 | 0.000e-03 |
| | B.G.2 | 0.0032 | 0.0000 | 0.0000 | 0.002e-03 | -1.151e-03 | -0.026e-03 |
| | B.G.3 | -0.0001 | -0.0040 | 0.0016 | 1.319e-03 | -0.001e-03 | -0.007e-03 |
| K13 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | B.G.2 | 0.0055 | 0.0000 | -0.0015 | -0.039e-03 | -1.465e-03 | 0.061e-03 |
| | B.G.3 | 0.0000 | -0.0061 | -0.0010 | 1.630e-03 | 0.013e-03 | -0.067e-03 |
| K14 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | 0.000e-03 | 0.000e-03 |
| | B.G.2 | 0.0055 | -0.0002 | 0.0015 | 0.028e-03 | -1.452e-03 | 0.062e-03 |
| | B.G.3 | -0.0001 | -0.0060 | -0.0010 | 1.638e-03 | -0.007e-03 | 0.050e-03 |
| K15 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | -0.000e-03 | 0.000e-03 |
| | B.G.2 | 0.0052 | 0.0000 | 0.0000 | 0.005e-03 | -1.432e-03 | -0.030e-03 |
| | B.G.3 | 0.0000 | -0.0062 | 0.0020 | 1.616e-03 | -0.012e-03 | -0.007e-03 |
| K16 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0079 | 0.0001 | -0.0019 | -0.041e-03 | -1.714e-03 | 0.075e-03 |
| | B.G.3 | 0.0000 | -0.0087 | -0.0012 | 1.923e-03 | 0.003e-03 | -0.079e-03 |
| K17 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | 0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0079 | -0.0002 | 0.0019 | 0.025e-03 | -1.714e-03 | 0.075e-03 |
| | B.G.3 | -0.0001 | -0.0087 | -0.0012 | 1.917e-03 | -0.018e-03 | 0.059e-03 |
| K18 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0075 | -0.0001 | 0.0000 | -0.008e-03 | -1.690e-03 | -0.033e-03 |
| | B.G.3 | 0.0000 | -0.0088 | 0.0024 | 1.901e-03 | -0.012e-03 | -0.010e-03 |
| K19 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | -0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0107 | 0.0001 | -0.0021 | -0.033e-03 | -1.975e-03 | 0.087e-03 |
| | B.G.3 | 0.0000 | -0.0119 | -0.0014 | 2.206e-03 | 0.007e-03 | -0.090e-03 |
| K20 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | 0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0107 | -0.0002 | 0.0021 | 0.025e-03 | -1.971e-03 | 0.088e-03 |
| | B.G.3 | -0.0001 | -0.0118 | -0.0014 | 2.205e-03 | -0.008e-03 | 0.065e-03 |
| K21 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.001e-03 | 0.000e-03 | 0.001e-03 |

| | | | | |
|---|---|---|---|---|
| Projectnaam | VFZ 40m 3000- 1200 | Projectnummer | | |
| Omschrijving | | Constructeur | Ing. A. Azaroual | |
| Opdrachtgever | | Eenheden | m, kN, kNm | |

| Knoop | B.G. | X | Y | Z | Xr | Yr | Zr |
|---|---|---|---|---|---|---|---|
| K21 | B.G.2 | 0.0102 | 0.0000 | 0.0000 | -0.001e-03 | -1.946e-03 | -0.034e-03 |
| | B.G.3 | 0.0000 | -0.0119 | 0.0028 | 2.193e-03 | -0.010e-03 | -0.011e-03 |
| K22 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0138 | 0.0002 | -0.0024 | -0.017e-03 | -2.226e-03 | 0.099e-03 |
| | B.G.3 | 0.0000 | -0.0154 | -0.0016 | 2.483e-03 | 0.005e-03 | -0.099e-03 |
| K23 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0138 | -0.0002 | 0.0024 | 0.026e-03 | -2.227e-03 | 0.099e-03 |
| | B.G.3 | -0.0001 | -0.0153 | -0.0015 | 2.475e-03 | 0.006e-03 | 0.072e-03 |
| K24 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | 0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0133 | -0.0001 | 0.0000 | 0.004e-03 | -2.186e-03 | -0.035e-03 |
| | B.G.3 | 0.0000 | -0.0154 | 0.0031 | 2.479e-03 | 0.002e-03 | -0.014e-03 |
| K25 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.001e-03 | 0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0173 | 0.0002 | -0.0026 | -0.004e-03 | -2.433e-03 | 0.111e-03 |
| | B.G.3 | 0.0000 | -0.0193 | -0.0017 | 2.727e-03 | -0.004e-03 | -0.109e-03 |
| K26 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | -0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0174 | -0.0003 | 0.0026 | 0.027e-03 | -2.451e-03 | 0.111e-03 |
| | B.G.3 | -0.0001 | -0.0192 | -0.0017 | 2.700e-03 | 0.008e-03 | 0.077e-03 |
| K27 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.001e-03 | 0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0168 | 0.0000 | 0.0000 | -0.004e-03 | -2.392e-03 | -0.035e-03 |
| | B.G.3 | 0.0000 | -0.0193 | 0.0034 | 2.722e-03 | 0.015e-03 | -0.016e-03 |
| K28 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.001e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0214 | 0.0002 | -0.0030 | -0.017e-03 | -2.889e-03 | 0.145e-03 |
| | B.G.3 | 0.0000 | -0.0237 | -0.0020 | 3.232e-03 | 0.004e-03 | -0.133e-03 |
| K29 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.001e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0214 | -0.0003 | 0.0030 | 0.029e-03 | -2.898e-03 | 0.141e-03 |
| | B.G.3 | -0.0002 | -0.0237 | -0.0019 | 3.215e-03 | -0.000e-03 | 0.092e-03 |
| K30 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | 0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0207 | -0.0001 | 0.0000 | -0.001e-03 | -2.857e-03 | -0.034e-03 |
| | B.G.3 | 0.0000 | -0.0238 | 0.0039 | 3.219e-03 | 0.005e-03 | -0.023e-03 |
| K31 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | -0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0260 | 0.0002 | -0.0034 | -0.040e-03 | -3.273e-03 | 0.173e-03 |
| | B.G.3 | 0.0000 | -0.0289 | -0.0022 | 3.649e-03 | 0.014e-03 | -0.155e-03 |
| K32 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | 0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0260 | -0.0003 | 0.0034 | 0.026e-03 | -3.263e-03 | 0.173e-03 |
| | B.G.3 | -0.0001 | -0.0288 | -0.0022 | 3.654e-03 | -0.014e-03 | 0.101e-03 |
| K33 | B.G.1 | 0.0000 | 0.0000 | 0.0001 | -0.001e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0253 | 0.0000 | 0.0000 | 0.001e-03 | -3.254e-03 | -0.029e-03 |
| | B.G.3 | 0.0000 | -0.0290 | 0.0043 | 3.628e-03 | -0.016e-03 | -0.026e-03 |
| K34 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.001e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0312 | 0.0003 | -0.0037 | -0.039e-03 | -3.636e-03 | 0.201e-03 |
| | B.G.3 | 0.0000 | -0.0347 | -0.0024 | 4.059e-03 | 0.004e-03 | -0.172e-03 |
| K35 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.001e-03 | 0.001e-03 |
| | B.G.2 | 0.0312 | -0.0004 | 0.0037 | 0.021e-03 | -3.636e-03 | 0.200e-03 |
| | B.G.3 | -0.0002 | -0.0346 | -0.0024 | 4.053e-03 | -0.019e-03 | 0.108e-03 |
| K36 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.001e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0304 | -0.0001 | 0.0000 | -0.008e-03 | -3.620e-03 | -0.020e-03 |
| | B.G.3 | 0.0000 | -0.0348 | 0.0047 | 4.036e-03 | -0.014e-03 | -0.033e-03 |
| K37 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0369 | 0.0003 | -0.0039 | -0.030e-03 | -4.000e-03 | 0.226e-03 |
| | B.G.3 | 0.0000 | -0.0411 | -0.0025 | 4.453e-03 | 0.003e-03 | -0.187e-03 |
| K38 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0369 | -0.0004 | 0.0039 | 0.018e-03 | -3.997e-03 | 0.228e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Projectnaam | | VFZ 40m 3000- 1200 | | | Projectnummer | | |
| Omschrijving | | | | | Constructeur | | Ing. A. Azaroual |
| Opdrachtgever | | | | | Eenheden | | m, kN, kNm |
| | B.G.3 | -0.0001 | -0.0410 | -0.0025 | 4.449e-03 | -0.010e-03 | 0.110e-03 |
| K39 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | -0.000e-03 | 0.001e-03 |
| | B.G.2 | 0.0361 | 0.0000 | 0.0000 | -0.005e-03 | -3.976e-03 | -0.007e-03 |

| **Knoop** | **B.G.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K39 | B.G.3 | 0.0000 | -0.0411 | 0.0051 | 4.439e-03 | -0.011e-03 | -0.037e-03 |
| K40 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0432 | 0.0003 | -0.0041 | -0.032e-03 | -4.337e-03 | 0.251e-03 |
| | B.G.3 | 0.0000 | -0.0480 | -0.0027 | 4.832e-03 | 0.004e-03 | -0.197e-03 |
| K41 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0432 | -0.0004 | 0.0042 | 0.018e-03 | -4.337e-03 | 0.251e-03 |
| | B.G.3 | -0.0001 | -0.0480 | -0.0027 | 4.824e-03 | -0.016e-03 | 0.110e-03 |
| K42 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0424 | -0.0001 | 0.0000 | -0.007e-03 | -4.322e-03 | 0.009e-03 |
| | B.G.3 | 0.0000 | -0.0481 | 0.0053 | 4.812e-03 | -0.012e-03 | -0.043e-03 |
| K43 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0499 | 0.0004 | -0.0043 | -0.032e-03 | -4.666e-03 | 0.274e-03 |
| | B.G.3 | 0.0000 | -0.0556 | -0.0028 | 5.193e-03 | 0.015e-03 | -0.206e-03 |
| K44 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0500 | -0.0004 | 0.0043 | 0.023e-03 | -4.661e-03 | 0.275e-03 |
| | B.G.3 | -0.0001 | -0.0554 | -0.0028 | 5.192e-03 | -0.013e-03 | 0.107e-03 |
| K45 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.001e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0491 | 0.0000 | 0.0000 | 0.000e-03 | -4.658e-03 | 0.028e-03 |
| | B.G.3 | 0.0000 | -0.0556 | 0.0055 | 5.168e-03 | -0.010e-03 | -0.048e-03 |
| K46 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0572 | 0.0004 | -0.0045 | -0.017e-03 | -4.977e-03 | 0.296e-03 |
| | B.G.3 | 0.0000 | -0.0636 | -0.0029 | 5.543e-03 | 0.010e-03 | -0.212e-03 |
| K47 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0572 | -0.0004 | 0.0045 | 0.027e-03 | -4.988e-03 | 0.297e-03 |
| | B.G.3 | -0.0001 | -0.0635 | -0.0028 | 5.525e-03 | -0.004e-03 | 0.103e-03 |
| K48 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0563 | 0.0000 | 0.0000 | -0.002e-03 | -4.967e-03 | 0.048e-03 |
| | B.G.3 | 0.0000 | -0.0636 | 0.0057 | 5.520e-03 | 0.004e-03 | -0.054e-03 |
| K49 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0648 | 0.0004 | -0.0045 | -0.005e-03 | -5.241e-03 | 0.318e-03 |
| | B.G.3 | 0.0000 | -0.0722 | -0.0029 | 5.870e-03 | -0.028e-03 | -0.218e-03 |
| K50 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0649 | -0.0004 | 0.0045 | 0.023e-03 | -5.295e-03 | 0.318e-03 |
| | B.G.3 | -0.0001 | -0.0720 | -0.0029 | 5.795e-03 | -0.022e-03 | 0.097e-03 |
| K51 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0640 | 0.0000 | 0.0000 | -0.034e-03 | -5.234e-03 | 0.069e-03 |
| | B.G.3 | 0.0000 | -0.0721 | 0.0058 | 5.841e-03 | 0.016e-03 | -0.060e-03 |
| K52 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | -0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0715 | 0.0004 | -0.0048 | -0.027e-03 | -5.811e-03 | 0.363e-03 |
| | B.G.3 | 0.0000 | -0.0795 | -0.0031 | 6.399e-03 | 0.014e-03 | -0.225e-03 |
| K53 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0715 | -0.0004 | 0.0048 | 0.011e-03 | -5.778e-03 | 0.362e-03 |
| | B.G.3 | -0.0001 | -0.0794 | -0.0030 | 6.421e-03 | 0.014e-03 | 0.082e-03 |
| K54 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.000e-03 | 0.002e-03 |
| | B.G.2 | 0.0706 | 0.0000 | 0.0000 | 0.016e-03 | -5.760e-03 | 0.119e-03 |
| | B.G.3 | 0.0000 | -0.0795 | 0.0061 | 6.411e-03 | -0.026e-03 | -0.072e-03 |
| K55 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0787 | 0.0004 | -0.0050 | -0.051e-03 | -6.213e-03 | 0.405e-03 |

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|---|---|---|---|---|
| Projectnaam | VFZ 40m 3000- 1200 | | Projectnummer | |
| Omschrijving | | | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | | Eenheden | m, kN, kNm |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | B.G.3 | 0.0000 | -0.0875 | -0.0032 | 6.864e-03 | 0.015e-03 | -0.233e-03 |
| K56 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0788 | -0.0004 | 0.0050 | 0.015e-03 | -6.188e-03 | 0.407e-03 |
| | B.G.3 | -0.0001 | -0.0873 | -0.0032 | 6.878e-03 | -0.017e-03 | 0.064e-03 |
| K57 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.001e-03 | -0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0778 | 0.0000 | 0.0000 | 0.002e-03 | -6.192e-03 | 0.171e-03 |
| | B.G.3 | 0.0001 | -0.0875 | 0.0063 | 6.842e-03 | -0.035e-03 | -0.082e-03 |

| **Knoop** | **B.G.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K58 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0864 | 0.0005 | -0.0051 | -0.044e-03 | -6.553e-03 | 0.449e-03 |
| | B.G.3 | 0.0000 | -0.0959 | -0.0033 | 7.266e-03 | 0.006e-03 | -0.237e-03 |
| K59 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0864 | -0.0005 | 0.0051 | 0.021e-03 | -6.558e-03 | 0.448e-03 |
| | B.G.3 | -0.0001 | -0.0958 | -0.0032 | 7.247e-03 | -0.029e-03 | 0.045e-03 |
| K60 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | -0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0854 | 0.0000 | 0.0000 | -0.014e-03 | -6.554e-03 | 0.224e-03 |
| | B.G.3 | 0.0001 | -0.0960 | 0.0065 | 7.226e-03 | -0.019e-03 | -0.096e-03 |
| K61 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0944 | 0.0005 | -0.0052 | -0.026e-03 | -6.896e-03 | 0.489e-03 |
| | B.G.3 | 0.0000 | -0.1049 | -0.0033 | 7.626e-03 | 0.008e-03 | -0.240e-03 |
| K62 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0945 | -0.0005 | 0.0052 | 0.019e-03 | -6.899e-03 | 0.490e-03 |
| | B.G.3 | 0.0000 | -0.1047 | -0.0033 | 7.608e-03 | -0.011e-03 | 0.023e-03 |
| K63 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | -0.000e-03 | 0.003e-03 |
| | B.G.2 | 0.0935 | 0.0000 | 0.0000 | -0.006e-03 | -6.888e-03 | 0.281e-03 |
| | B.G.3 | 0.0001 | -0.1049 | 0.0066 | 7.601e-03 | -0.012e-03 | -0.107e-03 |
| K64 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.004e-03 |
| | B.G.2 | 0.1030 | 0.0005 | -0.0052 | -0.023e-03 | -7.211e-03 | 0.530e-03 |
| | B.G.3 | 0.0000 | -0.1142 | -0.0033 | 7.964e-03 | 0.006e-03 | -0.239e-03 |
| K65 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.004e-03 |
| | B.G.2 | 0.1029 | -0.0005 | 0.0052 | 0.015e-03 | -7.213e-03 | 0.528e-03 |
| | B.G.3 | -0.0001 | -0.1141 | -0.0033 | 7.945e-03 | -0.010e-03 | -0.001e-03 |
| K66 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | -0.000e-03 | 0.004e-03 |
| | B.G.2 | 0.1020 | 0.0000 | 0.0000 | -0.006e-03 | -7.203e-03 | 0.340e-03 |
| | B.G.3 | 0.0001 | -0.1142 | 0.0066 | 7.940e-03 | -0.013e-03 | -0.120e-03 |
| K67 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.004e-03 |
| | B.G.2 | 0.1117 | 0.0005 | -0.0052 | -0.025e-03 | -7.484e-03 | 0.567e-03 |
| | B.G.3 | 0.0000 | -0.1240 | -0.0033 | 8.260e-03 | 0.015e-03 | -0.237e-03 |
| K68 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.004e-03 |
| | B.G.2 | 0.1118 | -0.0005 | 0.0052 | 0.018e-03 | -7.485e-03 | 0.567e-03 |
| | B.G.3 | 0.0000 | -0.1238 | -0.0033 | 8.245e-03 | -0.012e-03 | -0.027e-03 |
| K69 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.000e-03 | 0.004e-03 |
| | B.G.2 | 0.1108 | 0.0000 | 0.0000 | -0.005e-03 | -7.488e-03 | 0.401e-03 |
| | B.G.3 | 0.0001 | -0.1239 | 0.0066 | 8.229e-03 | -0.013e-03 | -0.131e-03 |
| K70 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.000e-03 | 0.005e-03 |
| | B.G.2 | 0.1209 | 0.0005 | -0.0052 | -0.023e-03 | -7.724e-03 | 0.606e-03 |
| | B.G.3 | 0.0000 | -0.1340 | -0.0033 | 8.518e-03 | 0.011e-03 | -0.234e-03 |
| K71 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.005e-03 |
| | B.G.2 | 0.1209 | -0.0005 | 0.0052 | 0.013e-03 | -7.726e-03 | 0.605e-03 |
| | B.G.3 | -0.0001 | -0.1339 | -0.0033 | 8.499e-03 | -0.016e-03 | -0.054e-03 |
| K72 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.000e-03 | 0.000e-03 | 0.005e-03 |
| | B.G.2 | 0.1200 | 0.0000 | 0.0000 | -0.005e-03 | -7.729e-03 | 0.463e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | B.G.3 | 0.0002 | -0.1340 | 0.0066 | 8.484e-03 | -0.017e-03 | -0.143e-03 |
| K73 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.000e-03 | 0.005e-03 |
| | B.G.2 | 0.1302 | 0.0005 | -0.0051 | -0.022e-03 | -7.934e-03 | 0.643e-03 |
| | B.G.3 | 0.0000 | -0.1444 | -0.0032 | 8.721e-03 | -0.013e-03 | -0.232e-03 |
| K74 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | -0.001e-03 | 0.000e-03 | 0.005e-03 |
| | B.G.2 | 0.1303 | -0.0004 | 0.0051 | -0.013e-03 | -7.931e-03 | 0.643e-03 |
| | B.G.3 | 0.0000 | -0.1442 | -0.0032 | 8.703e-03 | -0.013e-03 | -0.081e-03 |
| K75 | B.G.1 | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | -0.001e-03 | 0.005e-03 |
| | B.G.2 | 0.1294 | 0.0001 | 0.0000 | -0.013e-03 | -7.924e-03 | 0.526e-03 |
| | B.G.3 | 0.0002 | -0.1443 | 0.0064 | 8.713e-03 | -0.032e-03 | -0.154e-03 |
| K76 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | -0.000e-03 | 0.005e-03 |

| **Knoop** | **B.G.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K76 | B.G.2 | 0.1399 | 0.0005 | -0.0049 | -0.025e-03 | -8.088e-03 | 0.680e-03 |
| | B.G.3 | 0.0000 | -0.1549 | -0.0032 | 8.852e-03 | 0.003e-03 | -0.230e-03 |
| K77 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | 0.001e-03 | 0.005e-03 |
| | B.G.2 | 0.1398 | -0.0004 | 0.0050 | -0.016e-03 | -8.061e-03 | 0.680e-03 |
| | B.G.3 | 0.0000 | -0.1548 | -0.0031 | 8.865e-03 | 0.007e-03 | -0.108e-03 |
| K78 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | -0.001e-03 | 0.005e-03 |
| | B.G.2 | 0.1390 | 0.0000 | 0.0000 | -0.008e-03 | -8.085e-03 | 0.589e-03 |
| | B.G.3 | 0.0002 | -0.1548 | 0.0063 | 8.867e-03 | -0.036e-03 | -0.166e-03 |
| K79 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | -0.002e-03 | 0.006e-03 |
| | B.G.2 | 0.1496 | 0.0005 | -0.0048 | -0.002e-03 | -8.175e-03 | 0.717e-03 |
| | B.G.3 | 0.0000 | -0.1657 | -0.0030 | 9.009e-03 | 0.053e-03 | -0.225e-03 |
| K80 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | 0.002e-03 | 0.006e-03 |
| | B.G.2 | 0.1496 | -0.0004 | 0.0048 | 0.050e-03 | -8.174e-03 | 0.715e-03 |
| | B.G.3 | 0.0000 | -0.1654 | -0.0030 | 8.992e-03 | -0.002e-03 | -0.136e-03 |
| K81 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.003e-03 | -0.000e-03 | 0.006e-03 |
| | B.G.2 | 0.1488 | 0.0001 | 0.0000 | 0.038e-03 | -8.230e-03 | 0.652e-03 |
| | B.G.3 | 0.0002 | -0.1655 | 0.0061 | 8.944e-03 | 0.022e-03 | -0.179e-03 |
| K82 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.002e-03 | 0.000e-03 | 0.006e-03 |
| | B.G.2 | 0.1579 | 0.0005 | -0.0048 | -0.021e-03 | -8.316e-03 | 0.718e-03 |
| | B.G.3 | -0.0001 | -0.1748 | -0.0031 | 9.473e-03 | -0.032e-03 | -0.218e-03 |
| K83 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | -0.002e-03 | 0.006e-03 |
| | B.G.2 | 0.1579 | -0.0005 | 0.0048 | 0.106e-03 | -8.569e-03 | 0.714e-03 |
| | B.G.3 | 0.0000 | -0.1746 | -0.0031 | 9.212e-03 | -0.192e-03 | -0.148e-03 |
| K84 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | 0.001e-03 | 0.006e-03 |
| | B.G.2 | 0.1572 | 0.0000 | 0.0000 | -0.203e-03 | -8.618e-03 | 0.667e-03 |
| | B.G.3 | 0.0001 | -0.1746 | 0.0061 | 9.219e-03 | 0.136e-03 | -0.182e-03 |
| K85 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | 0.000e-03 | 0.006e-03 |
| | B.G.2 | 0.1662 | 0.0006 | -0.0049 | -0.085e-03 | -8.389e-03 | 0.717e-03 |
| | B.G.3 | 0.0000 | -0.1843 | -0.0031 | 9.130e-03 | 0.095e-03 | -0.211e-03 |
| K86 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | 0.001e-03 | 0.006e-03 |
| | B.G.2 | 0.1665 | -0.0005 | 0.0049 | 0.011e-03 | -8.264e-03 | 0.715e-03 |
| | B.G.3 | 0.0003 | -0.1838 | -0.0031 | 9.269e-03 | -0.019e-03 | -0.160e-03 |
| K87 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.000e-03 | -0.001e-03 | 0.006e-03 |
| | B.G.2 | 0.1659 | 0.0003 | 0.0000 | 0.088e-03 | -8.456e-03 | 0.681e-03 |
| | B.G.3 | 0.0000 | -0.1838 | 0.0062 | 9.103e-03 | -0.083e-03 | -0.185e-03 |
| K88 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.000e-03 | 0.001e-03 | 0.006e-03 |
| | B.G.2 | 0.1746 | 0.0006 | -0.0049 | 0.032e-03 | -8.207e-03 | 0.714e-03 |
| | B.G.3 | -0.0002 | -0.1930 | -0.0031 | 8.617e-03 | 0.056e-03 | -0.209e-03 |
| K89 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | -0.000e-03 | 0.006e-03 |
| | B.G.2 | 0.1744 | -0.0005 | 0.0049 | -0.111e-03 | -7.925e-03 | 0.721e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | B.G.3 | 0.0000 | -0.1930 | -0.0031 | 8.918e-03 | 0.210e-03 | -0.173e-03 |
| K90 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | -0.000e-03 | 0.006e-03 |
| | B.G.2 | 0.1740 | -0.0001 | 0.0000 | 0.228e-03 | -7.904e-03 | 0.693e-03 |
| | B.G.3 | 0.0003 | -0.1928 | 0.0062 | 8.879e-03 | -0.140e-03 | -0.183e-03 |
| K91 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | -0.004e-03 | 0.007e-03 |
| | B.G.2 | 0.1826 | 0.0005 | -0.0049 | 0.144e-03 | -7.832e-03 | 0.716e-03 |
| | B.G.3 | 0.0000 | -0.2018 | -0.0031 | 8.822e-03 | -0.387e-03 | -0.207e-03 |
| K92 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | 0.003e-03 | 0.003e-03 | 0.007e-03 |
| | B.G.2 | 0.1826 | -0.0004 | 0.0049 | -0.137e-03 | -8.210e-03 | 0.724e-03 |
| | B.G.3 | 0.0000 | -0.2016 | -0.0031 | 8.402e-03 | -0.082e-03 | -0.181e-03 |
| K93 | B.G.1 | 0.0000 | 0.0000 | 0.0003 | -0.004e-03 | 0.001e-03 | 0.007e-03 |
| | B.G.2 | 0.1818 | 0.0001 | 0.0000 | -0.357e-03 | -7.752e-03 | 0.704e-03 |
| | B.G.3 | 0.0002 | -0.2017 | 0.0062 | 8.917e-03 | 0.108e-03 | -0.185e-03 |
| **-** | **-** | **m** | **m** | **m** | **rad** | **rad** | **rad** |

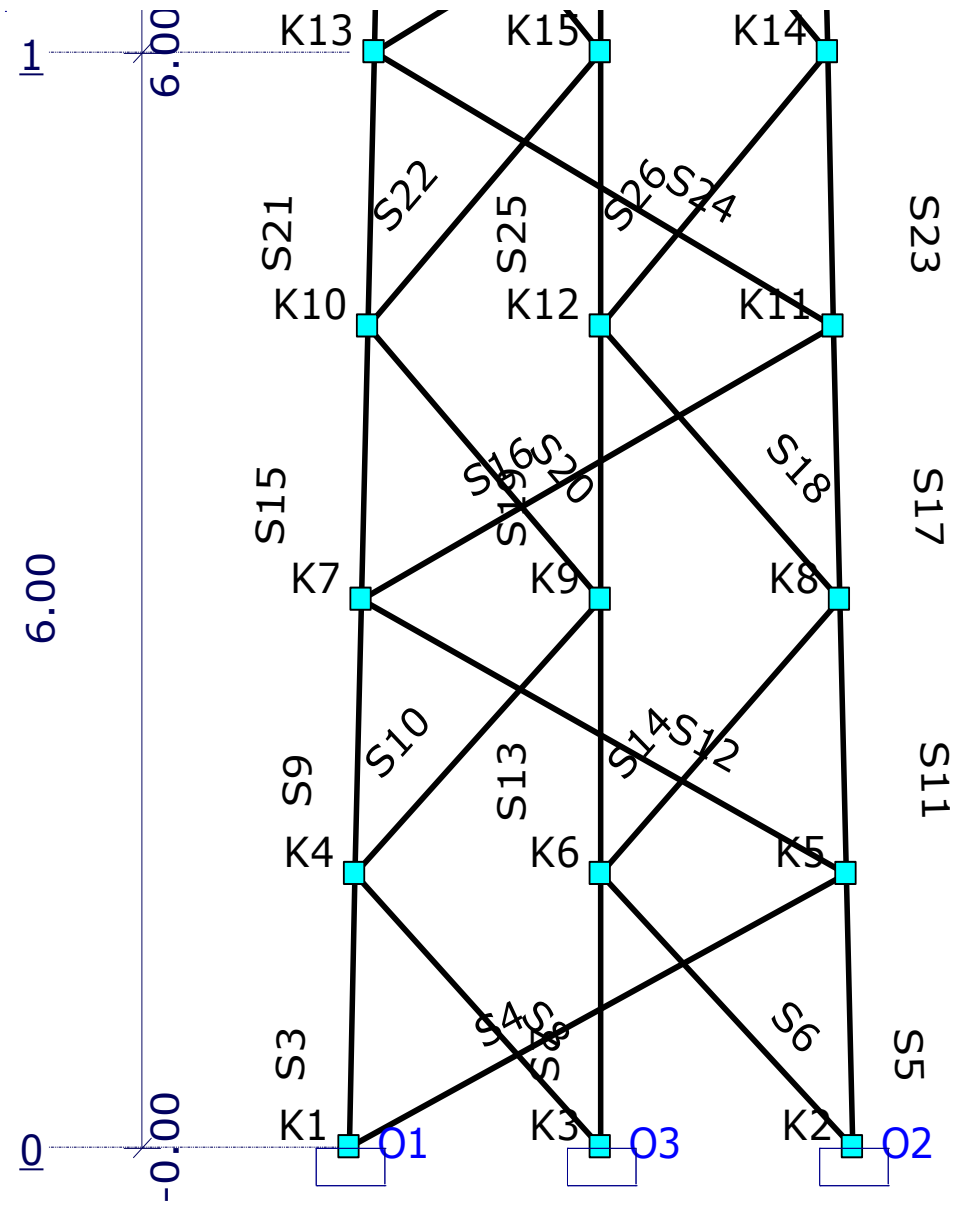
## B.G. OPLEGREACTIES

| B.G. | Oplegging | Knoop | X | Y | Z | Mx | My | Mz |
|---|---|---|---|---|---|---|---|---|
| B.G.1 | O1 | K1 | 0.44 | -0.25 | -16.54 | 0.00 | 0.00 | 0.00 |
| B.G.1 | O2 | K2 | -0.44 | -0.26 | -16.54 | 0.00 | 0.00 | 0.00 |
| B.G.1 | O3 | K3 | 0.00 | 0.51 | -16.54 | 0.00 | 0.00 | 0.00 |
| | **Som Reacties** | | **0.00** | **0.00** | **-49.62** | | | |
| | **Som Lasten** | | **0.00** | **0.00** | **49.62** | | | |
| B.G.2 | O1 | K1 | -34.21 | 6.11 | 420.27 | 0.00 | 0.00 | 0.08 |
| B.G.2 | O2 | K2 | -15.01 | -15.48 | -420.27 | 0.00 | 0.00 | 0.08 |
| B.G.2 | O3 | K3 | -4.40 | 9.37 | 0.00 | 0.00 | 0.00 | -0.07 |
| | **Som Reacties** | | **-53.62** | **0.00** | **0.00** | | | |
| | **Som Lasten** | | **53.62** | **0.00** | **0.00** | | | |
| B.G.3 | O1 | K1 | -6.76 | 2.89 | 272.32 | 0.00 | 0.00 | -0.10 |
| B.G.3 | O2 | K2 | 18.59 | 23.23 | 272.32 | 0.00 | 0.00 | 0.09 |
| B.G.3 | O3 | K3 | -11.83 | 35.20 | -544.63 | 0.00 | 0.00 | -0.01 |
| | **Som Reacties** | | **0.00** | **61.33** | **0.00** | | | |
| | **Som Lasten** | | **0.00** | **-61.33** | **0.00** | | | |
| **-** | **-** | **-** | **kN** | **kN** | **kN** | **kNm** | **kNm** | **kNm** |

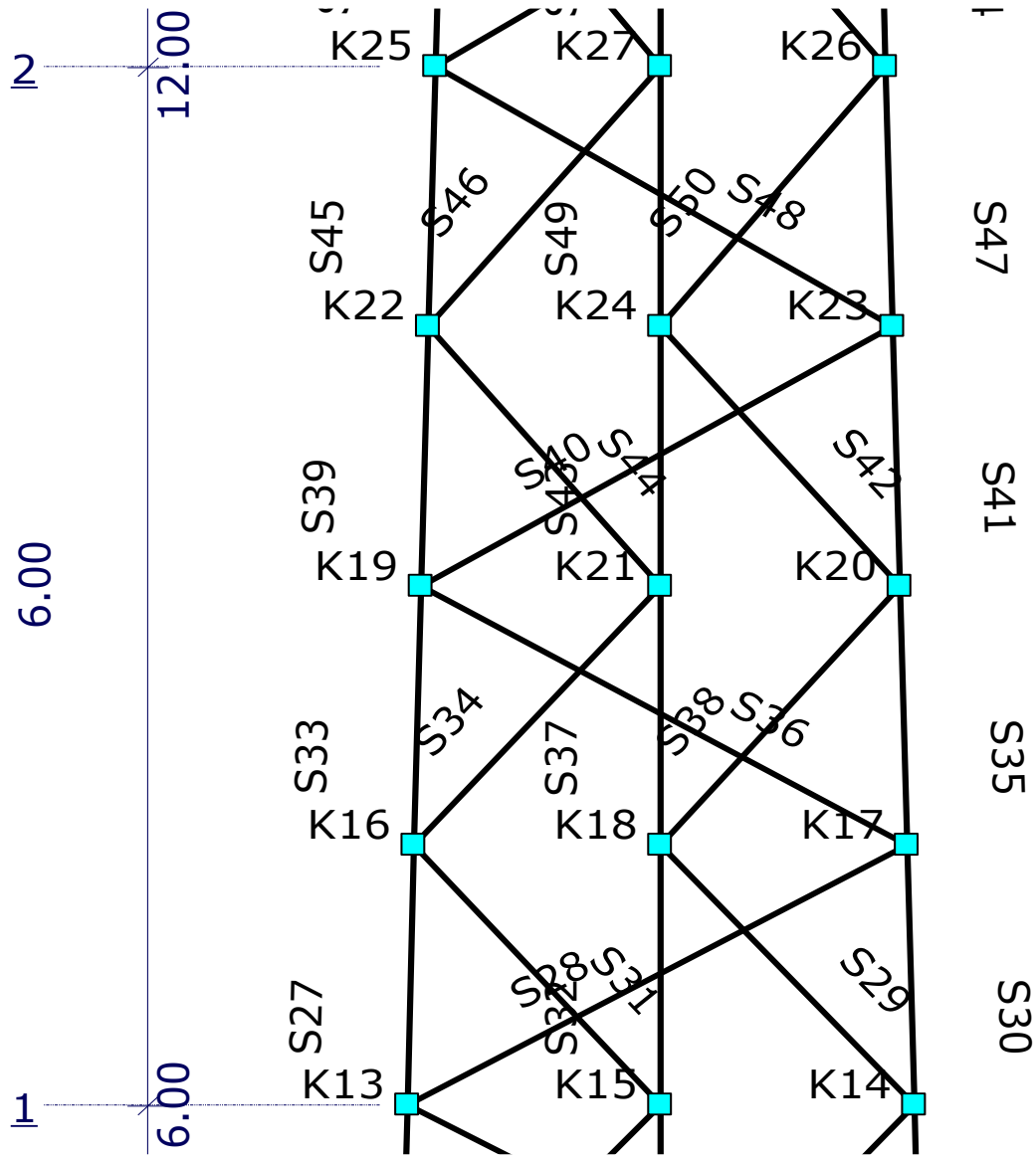
# Bijlage 2:

# Controle sterkte

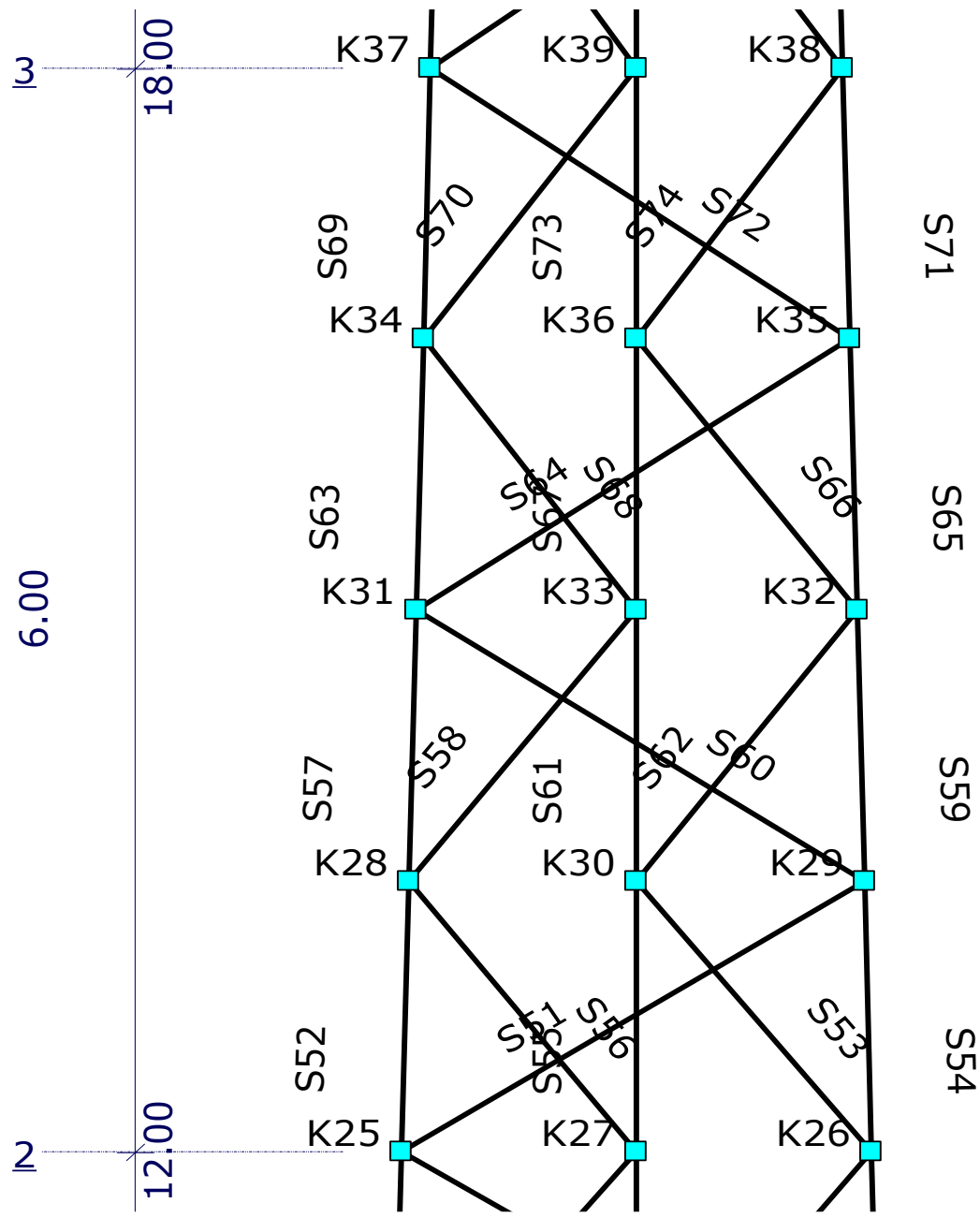
Sectie 1:



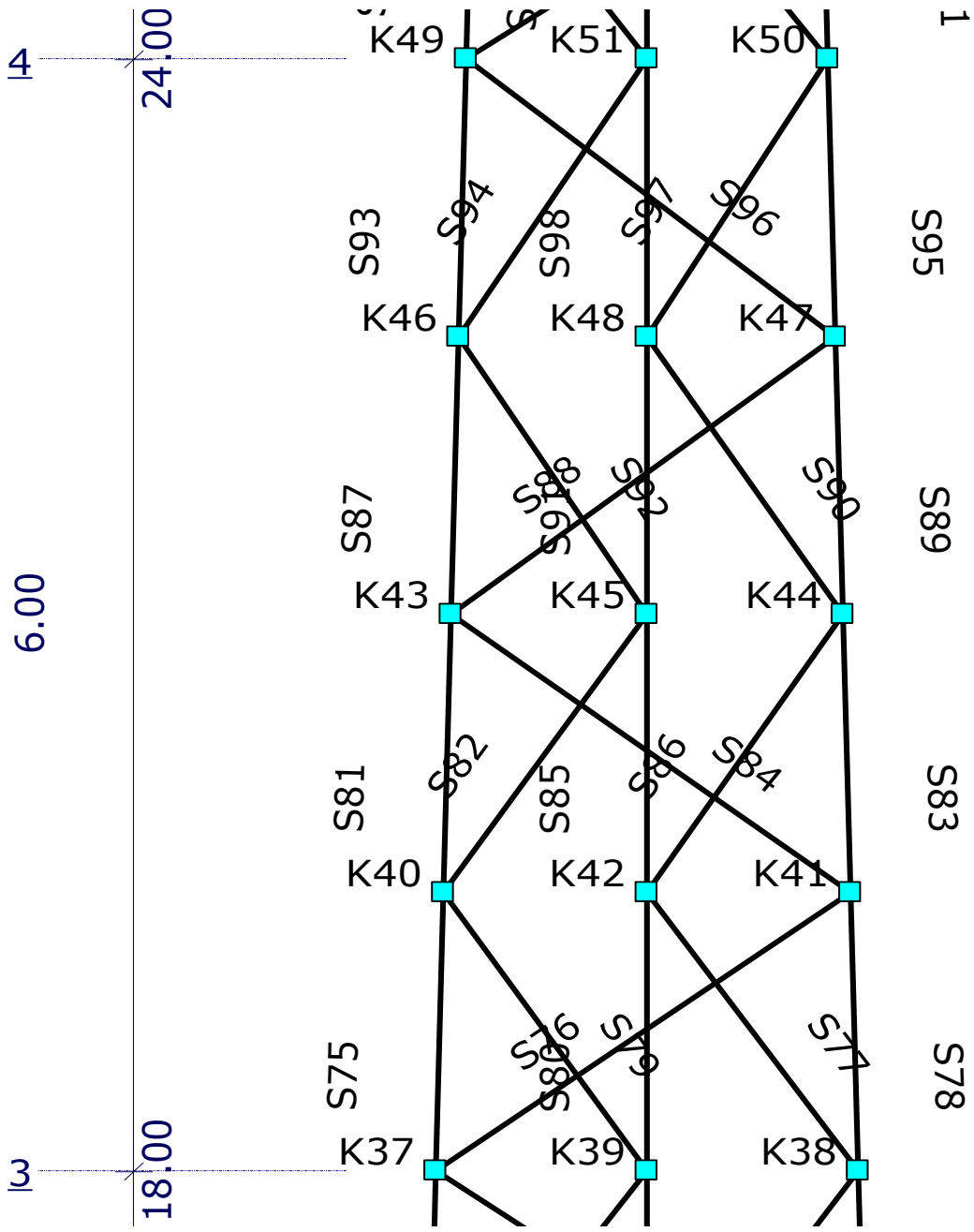
Sectie 2:


2
1
12.00
6.00
6.00
K25
K27
K26
K22
K24
K23
K19
K21
K20
K16
K18
K17
K13
K15
K14
S45
S46
S49
S50
S48
S47
S39
S40
S43
S44
S42
S41
S33
S34
S37
S38
S36
S35
S27
S28
S31
S29
S30

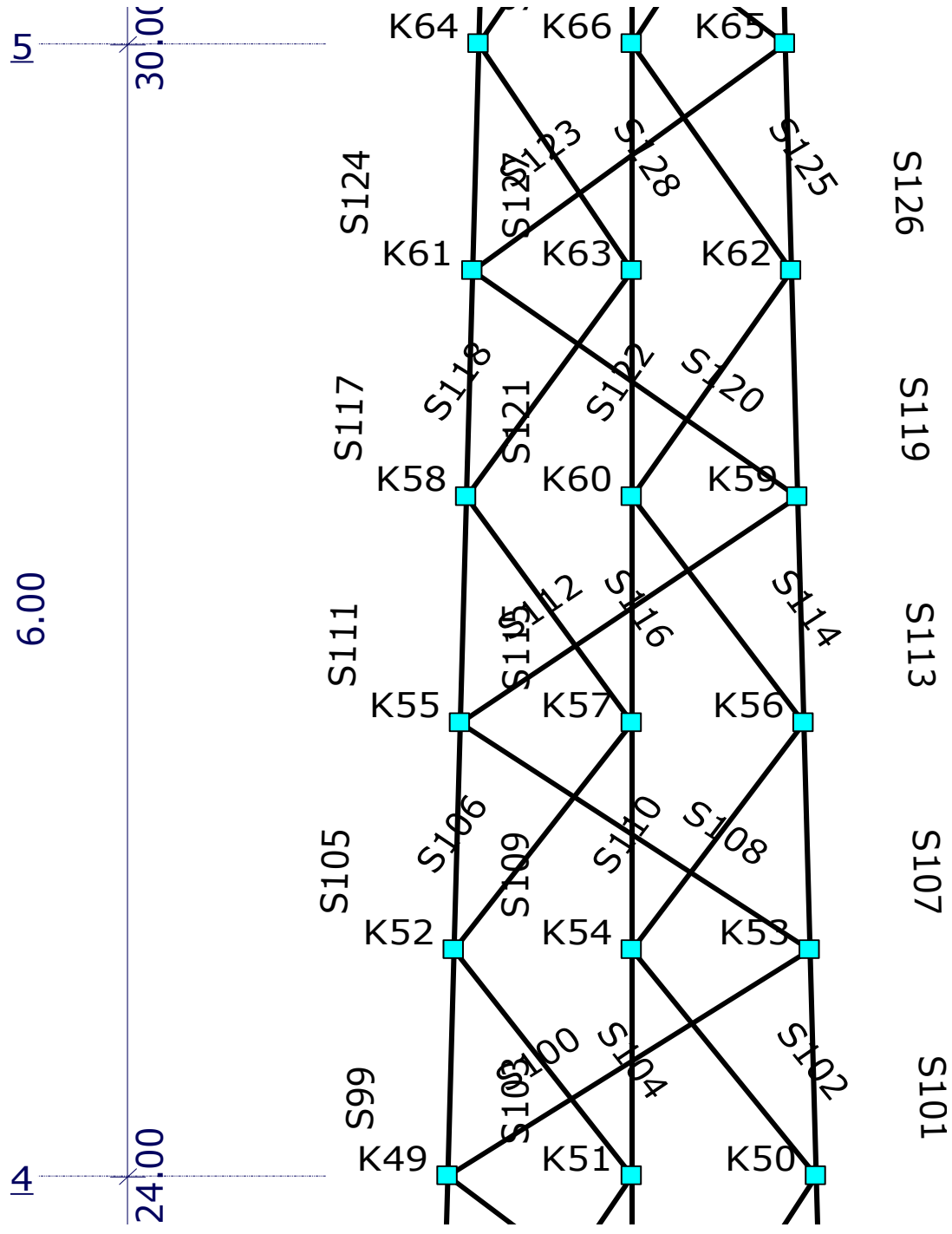
Sectie 3:


3
18.00
6.00
12.00
2
K37
K39
K38
K34
K36
K35
K31
K33
K32
K28
K30
K29
K25
K27
K26
S69
S70
S73
S74
S72
S71
S63
S67
S64
S68
S66
S65
S57
S58
S61
S62
S60
S59
S52
S55
S56
S53
S54

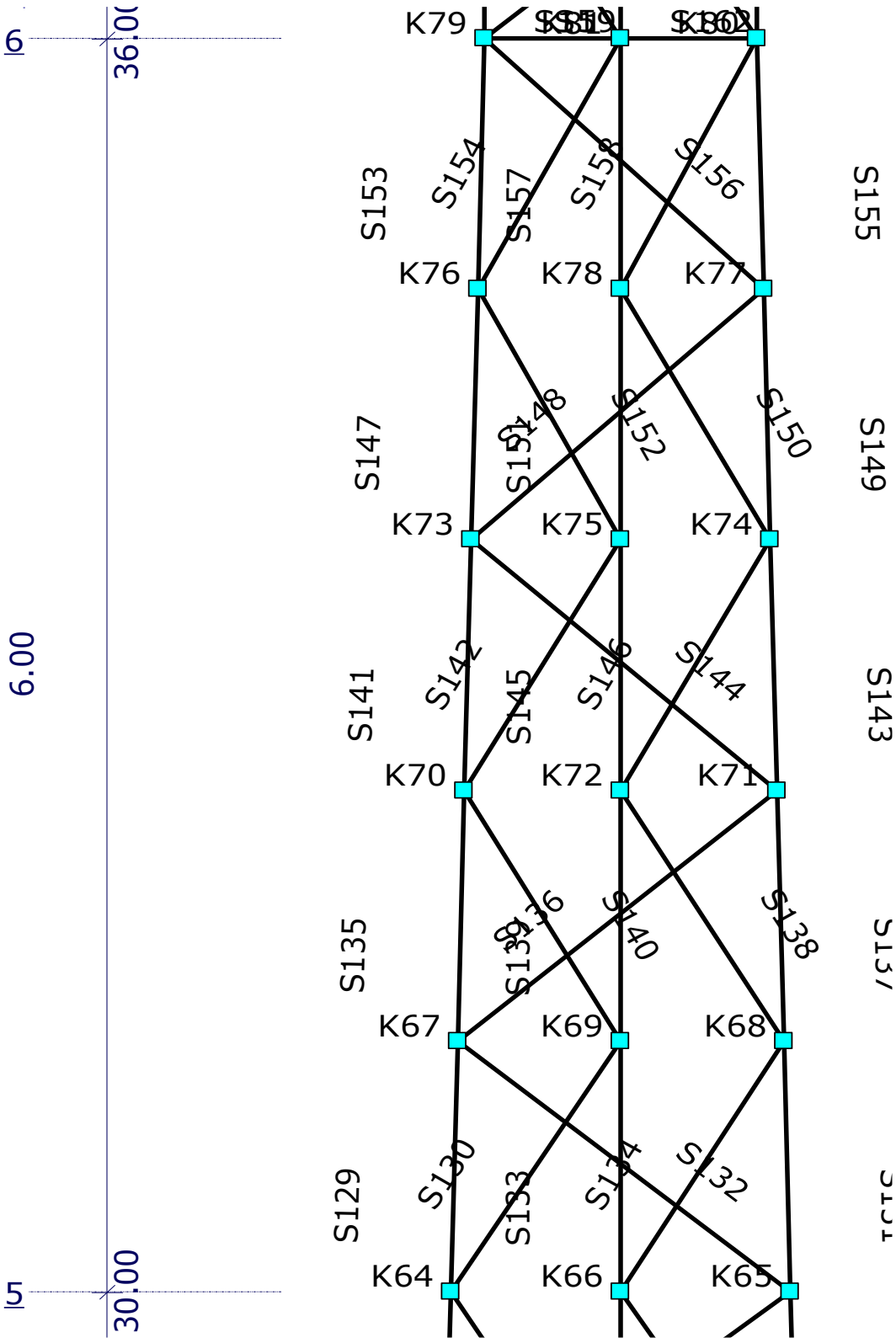
Sectie 4:


4
24.00
6.00
3
18.00
K49
K51
K50
K46
K48
K47
K43
K45
K44
K40
K42
K41
K37
K39
K38
S93
S94
S98
S97
S96
S95
S87
S88
S92
S90
S89
S81
S82
S85
S84
S83
S75
S76
S79
S74
S78

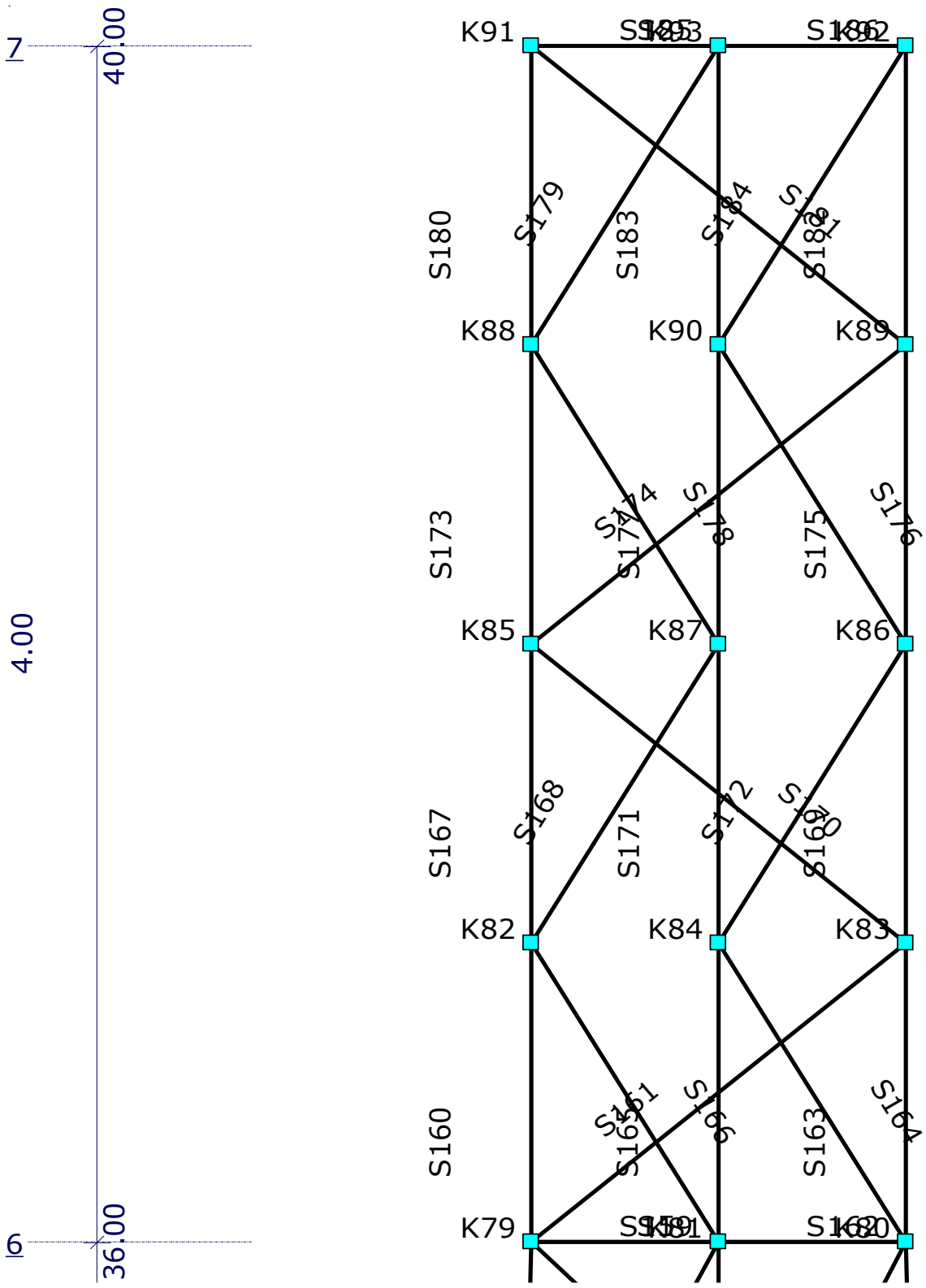
Sectie 5:


5
30.00
6.00
4
24.00
K64
K66
K65
K61
K63
K62
K58
K60
K59
K55
K57
K56
K52
K54
K53
K49
K51
K50
S124
S123
S127
S128
S125
S126
S117
S118
S121
S122
S120
S119
S111
S112
S115
S116
S114
S113
S105
S106
S109
S110
S108
S107
S99
S100
S103
S104
S102
S101

Sectie 6:


6
36.00
6.00
5
30.00
K79
K76
K78
K77
K73
K75
K74
K70
K72
K71
K67
K69
K68
K64
K66
K65
S153
S154
S157
S158
S156
S155
S147
S148
S151
S152
S150
S149
S141
S142
S145
S146
S144
S143
S135
S136
S139
S140
S138
S137
S129
S130
S133
S134
S132
S131

Sectie 7:


7
40.00
4.00
6
36.00
K91
K88
K90
K89
K85
K87
K86
K82
K84
K83
K79
S180
S179
S183
S184
S185
S186
S173
S174
S177
S178
S175
S176
S167
S168
S171
S172
S169
S170
S160
S161
S162
S163
S164

| | | | |
|---|---|---|---|
| Projectnaam | VFZ | Projectnummer | |
| Omschrijving | Controle sterkte | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | Eenheden | m, kN, kNm |

## CONSTRUCTIEGEGEVENS

| Projecttype | Knopen | Staven | Opleggingen | Profielen | Bel.gev. | Bel.comb. |
|---|---|---|---|---|---|---|
| 3D-Raamwerk | 93 | 186 | 3 | 16 | 3 | 8 |

## PROFIELEN

| Profiel | Profielnaam | Oppervlakte | It | Iy | Iz | Materiaal | Hoek |
|---|---|---|---|---|---|---|---|
| P1 | B219x10 | 6.5659e-03 | 7.1866e-05 | 3.5933e-05 | 3.5933e-05 | S355 | 0.0 |
| P2 | B88.9x3.2 | 8.6155e-04 | 1.5841e-06 | 7.9206e-07 | 7.9206e-07 | S235 | 0.0 |
| P5 | B168.3x8 | 4.0288e-03 | 2.5945e-05 | 1.2973e-05 | 1.2973e-05 | S355 | 0.0 |
| P6 | B82.5x3.2 | 7.9721e-04 | 1.2554e-06 | 6.2768e-07 | 6.2768e-07 | S235 | 0.0 |
| P9 | B139.7x5 | 2.1159e-03 | 9.6108e-06 | 4.8054e-06 | 4.8054e-06 | S355 | 0.0 |
| P10 | B60.3x2.9 | 5.2295e-04 | 4.3185e-07 | 2.1592e-07 | 2.1592e-07 | S235 | 0.0 |
| P15 | B114.3x5 | 1.7169e-03 | 5.1384e-06 | 2.5692e-06 | 2.5692e-06 | S355 | 0.0 |
| P16 | B48.3x2.6 | 3.7328e-04 | 1.9553e-07 | 9.7765e-08 | 9.7765e-08 | S235 | 0.0 |
| - | - | m2 | m4 | m4 | m4 | - | ° |

## PROFIELVORMEN

| Profiel | Verl. h. | hB | hE | tf | tw | tf2 | B | bL | bR | Raatl. | Hoogte |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | Nee | 0,219 | 0,219 | 0,0100 | 0,0100 | 0,0000 | 0,219 | 0,000 | 0,000 | Nee | 0,000 |
| P2 | Nee | 0,089 | 0,089 | 0,0032 | 0,0032 | 0,0000 | 0,089 | 0,000 | 0,000 | Nee | 0,000 |
| P5 | Nee | 0,168 | 0,168 | 0,0080 | 0,0080 | 0,0000 | 0,168 | 0,000 | 0,000 | Nee | 0,000 |
| P6 | Nee | 0,083 | 0,083 | 0,0032 | 0,0032 | 0,0000 | 0,083 | 0,000 | 0,000 | Nee | 0,000 |
| P9 | Nee | 0,140 | 0,140 | 0,0050 | 0,0050 | 0,0000 | 0,140 | 0,000 | 0,000 | Nee | 0,000 |
| P10 | Nee | 0,060 | 0,060 | 0,0029 | 0,0029 | 0,0000 | 0,060 | 0,000 | 0,000 | Nee | 0,000 |
| P15 | Nee | 0,114 | 0,114 | 0,0050 | 0,0050 | 0,0000 | 0,114 | 0,000 | 0,000 | Nee | 0,000 |
| P16 | Nee | 0,048 | 0,048 | 0,0026 | 0,0026 | 0,0000 | 0,048 | 0,000 | 0,000 | Nee | 0,000 |
| - | - | m | m | m | m | m | m | m | m | - | m |

## MATERIALEN

| Materiaalnaam | Poison | Dichtheid | E-Modulus | Uitzettingcoeff |
|---|---|---|---|---|
| S235 | 0.30 | 78.50 | 2.1000e+08 | 12.0000e-06 |
| S355 | 0.30 | 78.50 | 2.1000e+08 | 12.0000e-06 |
| - | - | kN/m3 | kN/m2 | C°m |

## OPLEGGINGEN

| Oplegging | Object | Positie | | | Z | Xr | Yr | Zr | HoekXr | HoekYr | HoekZr |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O1 | K1 | 0.000 | Vast | Vast | Vast | Vast | Vast | Vast | 0 | 0 | 0 |
| O2 | K2 | 0.000 | Vast | Vast | Vast | Vast | Vast | Vast | 0 | 0 | 0 |
| O3 | K3 | 0.000 | Vast | Vast | Vast | Vast | Vast | Vast | 0 | 0 | 0 |
| - | - | m | kN/m | kN/m | kN/m | kNm/rad | kNm/rad | kNm/rad | ° | ° | ° |

## STAVEN

| Staaf | Knoop B | Knoop E | X-B | Y-B | Z-B | X-E | Y-E | Z-E | Lengte | Profiel | Positie |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | K79 | K80 | 0.900 | -0.520 | -36.000 | 2.100 | -0.520 | -36.000 | 1.200 | P10 | 0.000 - L(1.200) |
| S2 | K91 | K92 | 0.900 | -0.520 | -40.000 | 2.100 | -0.520 | -40.000 | 1.200 | P16 | 0.000 - L(1.200) |
| S3 | K1 | K4 | 0.000 | 0.000 | 0.000 | 0.038 | -0.022 | -1.500 | 1.501 | P1 | 0.000 - L(1.501) |
| S4 | K1 | K5 | 0.000 | 0.000 | 0.000 | 2.963 | -0.022 | -1.500 | 3.321 | P2 | 0.000 - L(3.321) |
| S5 | K2 | K5 | 3.000 | 0.000 | 0.000 | 2.963 | -0.022 | -1.500 | 1.501 | P1 | 0.000 - L(1.501) |
| S6 | K2 | K6 | 3.000 | 0.000 | 0.000 | 1.500 | -2.555 | -1.500 | 3.321 | P2 | 0.000 - L(3.321) |
| S7 | K3 | K6 | 1.500 | -2.598 | 0.000 | 1.500 | -2.555 | -1.500 | 1.501 | P1 | 0.000 - L(1.501) |
| S8 | K3 | K4 | 1.500 | -2.598 | 0.000 | 0.038 | -0.022 | -1.500 | 3.321 | P2 | 0.000 - L(3.321) |
| S9 | K4 | K7 | 0.038 | -0.022 | -1.500 | 0.075 | -0.043 | -3.000 | 1.501 | P1 | 0.000 - L(1.501) |
| S10 | K4 | K9 | 0.038 | -0.022 | -1.500 | 1.500 | -2.511 | -3.000 | 3.254 | P2 | 0.000 - L(3.254) |
| S11 | K5 | K8 | 2.963 | -0.022 | -1.500 | 2.925 | -0.043 | -3.000 | 1.501 | P1 | 0.000 - L(1.501) |
| S12 | K5 | K7 | 2.963 | -0.022 | -1.500 | 0.075 | -0.043 | -3.000 | 3.254 | P2 | 0.000 - L(3.254) |
| S13 | K6 | K9 | 1.500 | -2.555 | -1.500 | 1.500 | -2.511 | -3.000 | 1.501 | P1 | 0.000 - L(1.501) |
| S14 | K6 | K8 | 1.500 | -2.555 | -1.500 | 2.925 | -0.043 | -3.000 | 3.254 | P2 | 0.000 - L(3.254) |
| S15 | K7 | K10 | 0.075 | -0.043 | -3.000 | 0.113 | -0.065 | -4.500 | 1.501 | P1 | 0.000 - L(1.501) |
| S16 | K7 | K11 | 0.075 | -0.043 | -3.000 | 2.888 | -0.065 | -4.500 | 3.188 | P2 | 0.000 - L(3.188) |
| S17 | K8 | K11 | 2.925 | -0.043 | -3.000 | 2.888 | -0.065 | -4.500 | 1.501 | P1 | 0.000 - L(1.501) |
| S18 | K8 | K12 | 2.925 | -0.043 | -3.000 | 1.500 | -2.468 | -4.500 | 3.188 | P2 | 0.000 - L(3.188) |
| S19 | K9 | K12 | 1.500 | -2.511 | -3.000 | 1.500 | -2.468 | -4.500 | 1.501 | P1 | 0.000 - L(1.501) |
| S20 | K9 | K10 | 1.500 | -2.511 | -3.000 | 0.113 | -0.065 | -4.500 | 3.188 | P2 | 0.000 - L(3.188) |
| S21 | K10 | K13 | 0.113 | -0.065 | -4.500 | 0.150 | -0.087 | -6.000 | 1.501 | P1 | 0.000 - L(1.501) |

| Staaf | Knoop B | Knoop E | X-B | Y-B | Z-B | X-E | Y-E | Z-E | Lengte | Profiel | Positie |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S22 | K10 | K15 | 0.113 | -0.065 | -4.500 | 1.500 | -2.425 | -6.000 | 3.122 | P2 | 0.000 - L(3.122) |
| S23 | K11 | K14 | 2.888 | -0.065 | -4.500 | 2.850 | -0.087 | -6.000 | 1.501 | P1 | 0.000 - L(1.501) |
| S24 | K11 | K13 | 2.888 | -0.065 | -4.500 | 0.150 | -0.087 | -6.000 | 3.122 | P2 | 0.000 - L(3.122) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S25 | K12 | K15 | 1.500 | -2.468 | -4.500 | 1.500 | -2.425 | -6.000 | 1.501 P1 | 0.000 - L(1.501) |
| S26 | K12 | K14 | 1.500 | -2.468 | -4.500 | 2.850 | -0.087 | -6.000 | 3.122 P2 | 0.000 - L(3.122) |
| S27 | K13 | K16 | 0.150 | -0.087 | -6.000 | 0.188 | -0.108 | -7.500 | 1.501 P1 | 0.000 - L(1.501) |
| S28 | K13 | K17 | 0.150 | -0.087 | -6.000 | 2.813 | -0.108 | -7.500 | 3.056 P2 | 0.000 - L(3.056) |
| S29 | K14 | K18 | 2.850 | -0.087 | -6.000 | 1.500 | -2.382 | -7.500 | 3.056 P2 | 0.000 - L(3.056) |
| S30 | K14 | K17 | 2.850 | -0.087 | -6.000 | 2.813 | -0.108 | -7.500 | 1.501 P1 | 0.000 - L(1.501) |
| S31 | K15 | K16 | 1.500 | -2.425 | -6.000 | 0.188 | -0.108 | -7.500 | 3.056 P2 | 0.000 - L(3.056) |
| S32 | K15 | K18 | 1.500 | -2.425 | -6.000 | 1.500 | -2.382 | -7.500 | 1.501 P1 | 0.000 - L(1.501) |
| S33 | K16 | K19 | 0.188 | -0.108 | -7.500 | 0.225 | -0.130 | -9.000 | 1.501 P1 | 0.000 - L(1.501) |
| S34 | K16 | K21 | 0.188 | -0.108 | -7.500 | 1.500 | -2.338 | -9.000 | 2.991 P2 | 0.000 - L(2.991) |
| S35 | K17 | K20 | 2.813 | -0.108 | -7.500 | 2.775 | -0.130 | -9.000 | 1.501 P1 | 0.000 - L(1.501) |
| S36 | K17 | K19 | 2.813 | -0.108 | -7.500 | 0.225 | -0.130 | -9.000 | 2.991 P2 | 0.000 - L(2.991) |
| S37 | K18 | K21 | 1.500 | -2.382 | -7.500 | 1.500 | -2.338 | -9.000 | 1.501 P1 | 0.000 - L(1.501) |
| S38 | K18 | K20 | 1.500 | -2.382 | -7.500 | 2.775 | -0.130 | -9.000 | 2.991 P2 | 0.000 - L(2.991) |
| S39 | K19 | K22 | 0.225 | -0.130 | -9.000 | 0.263 | -0.152 | -10.500 | 1.501 P1 | 0.000 - L(1.501) |
| S40 | K19 | K23 | 0.225 | -0.130 | -9.000 | 2.738 | -0.152 | -10.500 | 2.926 P2 | 0.000 - L(2.926) |
| S41 | K20 | K23 | 2.775 | -0.130 | -9.000 | 2.738 | -0.152 | -10.500 | 1.501 P1 | 0.000 - L(1.501) |
| S42 | K20 | K24 | 2.775 | -0.130 | -9.000 | 1.500 | -2.295 | -10.500 | 2.926 P2 | 0.000 - L(2.926) |
| S43 | K21 | K24 | 1.500 | -2.338 | -9.000 | 1.500 | -2.295 | -10.500 | 1.501 P1 | 0.000 - L(1.501) |
| S44 | K21 | K22 | 1.500 | -2.338 | -9.000 | 0.263 | -0.152 | -10.500 | 2.926 P2 | 0.000 - L(2.926) |
| S45 | K22 | K25 | 0.263 | -0.152 | -10.500 | 0.300 | -0.173 | -12.000 | 1.501 P1 | 0.000 - L(1.501) |
| S46 | K22 | K27 | 0.263 | -0.152 | -10.500 | 1.500 | -2.252 | -12.000 | 2.862 P2 | 0.000 - L(2.862) |
| S47 | K23 | K26 | 2.738 | -0.152 | -10.500 | 2.700 | -0.173 | -12.000 | 1.501 P1 | 0.000 - L(1.501) |
| S48 | K23 | K25 | 2.738 | -0.152 | -10.500 | 0.300 | -0.173 | -12.000 | 2.862 P2 | 0.000 - L(2.862) |
| S49 | K24 | K27 | 1.500 | -2.295 | -10.500 | 1.500 | -2.252 | -12.000 | 1.501 P1 | 0.000 - L(1.501) |
| S50 | K24 | K26 | 1.500 | -2.295 | -10.500 | 2.700 | -0.173 | -12.000 | 2.862 P2 | 0.000 - L(2.862) |
| S51 | K25 | K29 | 0.300 | -0.173 | -12.000 | 2.663 | -0.195 | -13.500 | 2.799 P6 | 0.000 - L(2.799) |
| S52 | K25 | K28 | 0.300 | -0.173 | -12.000 | 0.338 | -0.195 | -13.500 | 1.501 P5 | 0.000 - L(1.501) |
| S53 | K26 | K30 | 2.700 | -0.173 | -12.000 | 1.500 | -2.208 | -13.500 | 2.799 P6 | 0.000 - L(2.799) |
| S54 | K26 | K29 | 2.700 | -0.173 | -12.000 | 2.663 | -0.195 | -13.500 | 1.501 P5 | 0.000 - L(1.501) |
| S55 | K27 | K30 | 1.500 | -2.252 | -12.000 | 1.500 | -2.208 | -13.500 | 1.501 P5 | 0.000 - L(1.501) |
| S56 | K27 | K28 | 1.500 | -2.252 | -12.000 | 0.338 | -0.195 | -13.500 | 2.799 P6 | 0.000 - L(2.799) |
| S57 | K28 | K31 | 0.338 | -0.195 | -13.500 | 0.375 | -0.217 | -15.000 | 1.501 P5 | 0.000 - L(1.501) |
| S58 | K28 | K33 | 0.338 | -0.195 | -13.500 | 1.500 | -2.165 | -15.000 | 2.736 P6 | 0.000 - L(2.736) |
| S59 | K29 | K32 | 2.663 | -0.195 | -13.500 | 2.625 | -0.217 | -15.000 | 1.501 P5 | 0.000 - L(1.501) |
| S60 | K29 | K31 | 2.663 | -0.195 | -13.500 | 0.375 | -0.217 | -15.000 | 2.736 P6 | 0.000 - L(2.736) |
| S61 | K30 | K33 | 1.500 | -2.208 | -13.500 | 1.500 | -2.165 | -15.000 | 1.501 P5 | 0.000 - L(1.501) |
| S62 | K30 | K32 | 1.500 | -2.208 | -13.500 | 2.625 | -0.217 | -15.000 | 2.736 P6 | 0.000 - L(2.736) |
| S63 | K31 | K34 | 0.375 | -0.217 | -15.000 | 0.413 | -0.238 | -16.500 | 1.501 P5 | 0.000 - L(1.501) |
| S64 | K31 | K35 | 0.375 | -0.217 | -15.000 | 2.588 | -0.238 | -16.500 | 2.673 P6 | 0.000 - L(2.673) |
| S65 | K32 | K35 | 2.625 | -0.217 | -15.000 | 2.588 | -0.238 | -16.500 | 1.501 P5 | 0.000 - L(1.501) |
| S66 | K32 | K36 | 2.625 | -0.217 | -15.000 | 1.500 | -2.122 | -16.500 | 2.673 P6 | 0.000 - L(2.673) |
| S67 | K33 | K36 | 1.500 | -2.165 | -15.000 | 1.500 | -2.122 | -16.500 | 1.501 P5 | 0.000 - L(1.501) |
| S68 | K33 | K34 | 1.500 | -2.165 | -15.000 | 0.413 | -0.238 | -16.500 | 2.673 P6 | 0.000 - L(2.673) |
| S69 | K34 | K37 | 0.413 | -0.238 | -16.500 | 0.450 | -0.260 | -18.000 | 1.501 P5 | 0.000 - L(1.501) |
| S70 | K34 | K39 | 0.413 | -0.238 | -16.500 | 1.500 | -2.078 | -18.000 | 2.611 P6 | 0.000 - L(2.611) |
| S71 | K35 | K38 | 2.588 | -0.238 | -16.500 | 2.550 | -0.260 | -18.000 | 1.501 P5 | 0.000 - L(1.501) |
| S72 | K35 | K37 | 2.588 | -0.238 | -16.500 | 0.450 | -0.260 | -18.000 | 2.611 P6 | 0.000 - L(2.611) |
| S73 | K36 | K39 | 1.500 | -2.122 | -16.500 | 1.500 | -2.078 | -18.000 | 1.501 P5 | 0.000 - L(1.501) |
| S74 | K36 | K38 | 1.500 | -2.122 | -16.500 | 2.550 | -0.260 | -18.000 | 2.611 P6 | 0.000 - L(2.611) |
| S75 | K37 | K40 | 0.450 | -0.260 | -18.000 | 0.488 | -0.281 | -19.500 | 1.501 P5 | 0.000 - L(1.501) |
| S76 | K37 | K41 | 0.450 | -0.260 | -18.000 | 2.513 | -0.281 | -19.500 | 2.550 P6 | 0.000 - L(2.550) |
| S77 | K38 | K42 | 2.550 | -0.260 | -18.000 | 1.500 | -2.035 | -19.500 | 2.550 P6 | 0.000 - L(2.550) |
| S78 | K38 | K41 | 2.550 | -0.260 | -18.000 | 2.513 | -0.281 | -19.500 | 1.501 P5 | 0.000 - L(1.501) |
| S79 | K39 | K40 | 1.500 | -2.078 | -18.000 | 0.488 | -0.281 | -19.500 | 2.550 P6 | 0.000 - L(2.550) |
| S80 | K39 | K42 | 1.500 | -2.078 | -18.000 | 1.500 | -2.035 | -19.500 | 1.501 P5 | 0.000 - L(1.501) |
| S81 | K40 | K43 | 0.488 | -0.281 | -19.500 | 0.525 | -0.303 | -21.000 | 1.501 P5 | 0.000 - L(1.501) |
| S82 | K40 | K45 | 0.488 | -0.281 | -19.500 | 1.500 | -1.992 | -21.000 | 2.490 P6 | 0.000 - L(2.490) |
| S83 | K41 | K44 | 2.513 | -0.281 | -19.500 | 2.475 | -0.303 | -21.000 | 1.501 P5 | 0.000 - L(1.501) |
| S84 | K41 | K43 | 2.513 | -0.281 | -19.500 | 0.525 | -0.303 | -21.000 | 2.490 P6 | 0.000 - L(2.490) |
| S85 | K42 | K45 | 1.500 | -2.035 | -19.500 | 1.500 | -1.992 | -21.000 | 1.501 P5 | 0.000 - L(1.501) |
| S86 | K42 | K44 | 1.500 | -2.035 | -19.500 | 2.475 | -0.303 | -21.000 | 2.490 P6 | 0.000 - L(2.490) |
| S87 | K43 | K46 | 0.525 | -0.303 | -21.000 | 0.563 | -0.325 | -22.500 | 1.501 P5 | 0.000 - L(1.501) |
| S88 | K43 | K47 | 0.525 | -0.303 | -21.000 | 2.438 | -0.325 | -22.500 | 2.431 P6 | 0.000 - L(2.431) |
| S89 | K44 | K47 | 2.475 | -0.303 | -21.000 | 2.438 | -0.325 | -22.500 | 1.501 P5 | 0.000 - L(1.501) |
| S90 | K44 | K48 | 2.475 | -0.303 | -21.000 | 1.500 | -1.949 | -22.500 | 2.431 P6 | 0.000 - L(2.431) |
| S91 | K45 | K48 | 1.500 | -1.992 | -21.000 | 1.500 | -1.949 | -22.500 | 1.501 P5 | 0.000 - L(1.501) |
| S92 | K45 | K46 | 1.500 | -1.992 | -21.000 | 0.563 | -0.325 | -22.500 | 2.431 P6 | 0.000 - L(2.431) |
| S93 | K46 | K49 | 0.563 | -0.325 | -22.500 | 0.600 | -0.346 | -24.000 | 1.501 P5 | 0.000 - L(1.501) |
| S94 | K46 | K51 | 0.563 | -0.325 | -22.500 | 1.500 | -1.905 | -24.000 | 2.372 P6 | 0.000 - L(2.372) |
| S95 | K47 | K50 | 2.438 | -0.325 | -22.500 | 2.400 | -0.346 | -24.000 | 1.501 P5 | 0.000 - L(1.501) |
| S96 | K47 | K49 | 2.438 | -0.325 | -22.500 | 0.600 | -0.346 | -24.000 | 2.372 P6 | 0.000 - L(2.372) |

| | | | |
|---|---|---|---|
| Projectnaam | VFZ | Projectnummer | |
| Omschrijving | Controle sterkte | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | Eenheden | m, kN, kNm |

| Staaf | Knoop B | Knoop E | X-B | Y-B | Z-B | X-E | Y-E | Z-E | Lengte | Profiel | Positie |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S97 | K48 | K50 | 1.500 | -1.949 | -22.500 | 2.400 | -0.346 | -24.000 | 2.372 | P6 | 0.000 - L(2.372) |
| S98 | K48 | K51 | 1.500 | -1.949 | -22.500 | 1.500 | -1.905 | -24.000 | 1.501 | P5 | 0.000 - L(1.501) |
| S99 | K49 | K52 | 0.600 | -0.346 | -24.000 | 0.630 | -0.364 | -25.200 | 1.200 | P9 | 0.000 - L(1.200) |
| S100 | K49 | K53 | 0.600 | -0.346 | -24.000 | 2.370 | -0.364 | -25.200 | 2.139 | P10 | 0.000 - L(2.139) |
| S101 | K50 | K53 | 2.400 | -0.346 | -24.000 | 2.370 | -0.364 | -25.200 | 1.200 | P9 | 0.000 - L(1.200) |
| S102 | K50 | K54 | 2.400 | -0.346 | -24.000 | 1.500 | -1.871 | -25.200 | 2.139 | P10 | 0.000 - L(2.139) |
| S103 | K51 | K54 | 1.500 | -1.905 | -24.000 | 1.500 | -1.871 | -25.200 | 1.200 | P9 | 0.000 - L(1.200) |
| S104 | K51 | K52 | 1.500 | -1.905 | -24.000 | 0.630 | -0.364 | -25.200 | 2.139 | P10 | 0.000 - L(2.139) |
| S105 | K52 | K55 | 0.630 | -0.364 | -25.200 | 0.660 | -0.381 | -26.400 | 1.200 | P9 | 0.000 - L(1.200) |
| S106 | K52 | K57 | 0.630 | -0.364 | -25.200 | 1.500 | -1.836 | -26.400 | 2.089 | P10 | 0.000 - L(2.089) |
| S107 | K53 | K56 | 2.370 | -0.364 | -25.200 | 2.340 | -0.381 | -26.400 | 1.200 | P9 | 0.000 - L(1.200) |
| S108 | K53 | K55 | 2.370 | -0.364 | -25.200 | 0.660 | -0.381 | -26.400 | 2.089 | P10 | 0.000 - L(2.089) |
| S109 | K54 | K57 | 1.500 | -1.871 | -25.200 | 1.500 | -1.836 | -26.400 | 1.200 | P9 | 0.000 - L(1.200) |
| S110 | K54 | K56 | 1.500 | -1.871 | -25.200 | 2.340 | -0.381 | -26.400 | 2.089 | P10 | 0.000 - L(2.089) |
| S111 | K55 | K58 | 0.660 | -0.381 | -26.400 | 0.690 | -0.398 | -27.600 | 1.200 | P9 | 0.000 - L(1.200) |
| S112 | K55 | K59 | 0.660 | -0.381 | -26.400 | 2.310 | -0.398 | -27.600 | 2.040 | P10 | 0.000 - L(2.040) |
| S113 | K56 | K59 | 2.340 | -0.381 | -26.400 | 2.310 | -0.398 | -27.600 | 1.200 | P9 | 0.000 - L(1.200) |
| S114 | K56 | K60 | 2.340 | -0.381 | -26.400 | 1.500 | -1.801 | -27.600 | 2.040 | P10 | 0.000 - L(2.040) |
| S115 | K57 | K60 | 1.500 | -1.836 | -26.400 | 1.500 | -1.801 | -27.600 | 1.200 | P9 | 0.000 - L(1.200) |
| S116 | K57 | K58 | 1.500 | -1.836 | -26.400 | 0.690 | -0.398 | -27.600 | 2.040 | P10 | 0.000 - L(2.040) |
| S117 | K58 | K61 | 0.690 | -0.398 | -27.600 | 0.720 | -0.416 | -28.800 | 1.200 | P9 | 0.000 - L(1.200) |
| S118 | K58 | K63 | 0.690 | -0.398 | -27.600 | 1.500 | -1.767 | -28.800 | 1.992 | P10 | 0.000 - L(1.992) |
| S119 | K59 | K62 | 2.310 | -0.398 | -27.600 | 2.280 | -0.416 | -28.800 | 1.200 | P9 | 0.000 - L(1.200) |
| S120 | K59 | K61 | 2.310 | -0.398 | -27.600 | 0.720 | -0.416 | -28.800 | 1.992 | P10 | 0.000 - L(1.992) |
| S121 | K60 | K63 | 1.500 | -1.801 | -27.600 | 1.500 | -1.767 | -28.800 | 1.200 | P9 | 0.000 - L(1.200) |
| S122 | K60 | K62 | 1.500 | -1.801 | -27.600 | 2.280 | -0.416 | -28.800 | 1.992 | P10 | 0.000 - L(1.992) |
| S123 | K61 | K65 | 0.720 | -0.416 | -28.800 | 2.250 | -0.433 | -30.000 | 1.945 | P10 | 0.000 - L(1.945) |
| S124 | K61 | K64 | 0.720 | -0.416 | -28.800 | 0.750 | -0.433 | -30.000 | 1.200 | P9 | 0.000 - L(1.200) |
| S125 | K62 | K66 | 2.280 | -0.416 | -28.800 | 1.500 | -1.732 | -30.000 | 1.945 | P10 | 0.000 - L(1.945) |
| S126 | K62 | K65 | 2.280 | -0.416 | -28.800 | 2.250 | -0.433 | -30.000 | 1.200 | P9 | 0.000 - L(1.200) |
| S127 | K63 | K66 | 1.500 | -1.767 | -28.800 | 1.500 | -1.732 | -30.000 | 1.200 | P9 | 0.000 - L(1.200) |
| S128 | K63 | K64 | 1.500 | -1.767 | -28.800 | 0.750 | -0.433 | -30.000 | 1.945 | P10 | 0.000 - L(1.945) |
| S129 | K64 | K67 | 0.750 | -0.433 | -30.000 | 0.780 | -0.450 | -31.200 | 1.200 | P9 | 0.000 - L(1.200) |
| S130 | K64 | K69 | 0.750 | -0.433 | -30.000 | 1.500 | -1.697 | -31.200 | 1.898 | P10 | 0.000 - L(1.898) |
| S131 | K65 | K68 | 2.250 | -0.433 | -30.000 | 2.220 | -0.450 | -31.200 | 1.200 | P9 | 0.000 - L(1.200) |
| S132 | K65 | K67 | 2.250 | -0.433 | -30.000 | 0.780 | -0.450 | -31.200 | 1.898 | P10 | 0.000 - L(1.898) |
| S133 | K66 | K69 | 1.500 | -1.732 | -30.000 | 1.500 | -1.697 | -31.200 | 1.200 | P9 | 0.000 - L(1.200) |
| S134 | K66 | K68 | 1.500 | -1.732 | -30.000 | 2.220 | -0.450 | -31.200 | 1.898 | P10 | 0.000 - L(1.898) |
| S135 | K67 | K70 | 0.780 | -0.450 | -31.200 | 0.810 | -0.468 | -32.400 | 1.200 | P9 | 0.000 - L(1.200) |
| S136 | K67 | K71 | 0.780 | -0.450 | -31.200 | 2.190 | -0.468 | -32.400 | 1.852 | P10 | 0.000 - L(1.852) |
| S137 | K68 | K71 | 2.220 | -0.450 | -31.200 | 2.190 | -0.468 | -32.400 | 1.200 | P9 | 0.000 - L(1.200) |
| S138 | K68 | K72 | 2.220 | -0.450 | -31.200 | 1.500 | -1.663 | -32.400 | 1.852 | P10 | 0.000 - L(1.852) |
| S139 | K69 | K72 | 1.500 | -1.697 | -31.200 | 1.500 | -1.663 | -32.400 | 1.200 | P9 | 0.000 - L(1.200) |
| S140 | K69 | K70 | 1.500 | -1.697 | -31.200 | 0.810 | -0.468 | -32.400 | 1.852 | P10 | 0.000 - L(1.852) |
| S141 | K70 | K73 | 0.810 | -0.468 | -32.400 | 0.840 | -0.485 | -33.600 | 1.200 | P9 | 0.000 - L(1.200) |
| S142 | K70 | K75 | 0.810 | -0.468 | -32.400 | 1.500 | -1.628 | -33.600 | 1.806 | P10 | 0.000 - L(1.806) |
| S143 | K71 | K74 | 2.190 | -0.468 | -32.400 | 2.160 | -0.485 | -33.600 | 1.200 | P9 | 0.000 - L(1.200) |
| S144 | K71 | K73 | 2.190 | -0.468 | -32.400 | 0.840 | -0.485 | -33.600 | 1.806 | P10 | 0.000 - L(1.806) |
| S145 | K72 | K75 | 1.500 | -1.663 | -32.400 | 1.500 | -1.628 | -33.600 | 1.200 | P9 | 0.000 - L(1.200) |
| S146 | K72 | K74 | 1.500 | -1.663 | -32.400 | 2.160 | -0.485 | -33.600 | 1.806 | P10 | 0.000 - L(1.806) |
| S147 | K73 | K76 | 0.840 | -0.485 | -33.600 | 0.870 | -0.502 | -34.800 | 1.200 | P9 | 0.000 - L(1.200) |
| S148 | K73 | K77 | 0.840 | -0.485 | -33.600 | 2.130 | -0.502 | -34.800 | 1.762 | P10 | 0.000 - L(1.762) |
| S149 | K74 | K77 | 2.160 | -0.485 | -33.600 | 2.130 | -0.502 | -34.800 | 1.200 | P9 | 0.000 - L(1.200) |
| S150 | K74 | K78 | 2.160 | -0.485 | -33.600 | 1.500 | -1.593 | -34.800 | 1.762 | P10 | 0.000 - L(1.762) |
| S151 | K75 | K78 | 1.500 | -1.628 | -33.600 | 1.500 | -1.593 | -34.800 | 1.200 | P9 | 0.000 - L(1.200) |
| S152 | K75 | K76 | 1.500 | -1.628 | -33.600 | 0.870 | -0.502 | -34.800 | 1.762 | P10 | 0.000 - L(1.762) |
| S153 | K76 | K79 | 0.870 | -0.502 | -34.800 | 0.900 | -0.520 | -36.000 | 1.200 | P9 | 0.000 - L(1.200) |
| S154 | K76 | K81 | 0.870 | -0.502 | -34.800 | 1.500 | -1.559 | -36.000 | 1.718 | P10 | 0.000 - L(1.718) |
| S155 | K77 | K80 | 2.130 | -0.502 | -34.800 | 2.100 | -0.520 | -36.000 | 1.200 | P9 | 0.000 - L(1.200) |
| S156 | K77 | K79 | 2.130 | -0.502 | -34.800 | 0.900 | -0.520 | -36.000 | 1.718 | P10 | 0.000 - L(1.718) |
| S157 | K78 | K81 | 1.500 | -1.593 | -34.800 | 1.500 | -1.559 | -36.000 | 1.200 | P9 | 0.000 - L(1.200) |
| S158 | K78 | K80 | 1.500 | -1.593 | -34.800 | 2.100 | -0.520 | -36.000 | 1.718 | P10 | 0.000 - L(1.718) |
| S159 | K81 | K79 | 1.500 | -1.559 | -36.000 | 0.900 | -0.520 | -36.000 | 1.200 | P10 | 0.000 - L(1.200) |
| S160 | K79 | K82 | 0.900 | -0.520 | -36.000 | 0.900 | -0.520 | -37.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S161 | K79 | K83 | 0.900 | -0.520 | -36.000 | 2.100 | -0.520 | -37.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S162 | K80 | K81 | 2.100 | -0.520 | -36.000 | 1.500 | -1.559 | -36.000 | 1.200 | P10 | 0.000 - L(1.200) |
| S163 | K80 | K83 | 2.100 | -0.520 | -36.000 | 2.100 | -0.520 | -37.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S164 | K80 | K84 | 2.100 | -0.520 | -36.000 | 1.500 | -1.559 | -37.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S165 | K81 | K84 | 1.500 | -1.559 | -36.000 | 1.500 | -1.559 | -37.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S166 | K81 | K82 | 1.500 | -1.559 | -36.000 | 0.900 | -0.520 | -37.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S167 | K82 | K85 | 0.900 | -0.520 | -37.000 | 0.900 | -0.520 | -38.000 | 1.000 | P15 | 0.000 - L(1.000) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S168 | K82 | K87 | 0.900 | -0.520 | -37.000 | 1.500 | -1.559 | -38.000 | 1.562 P16 | 0.000 - L(1.562) |
| S169 | K83 | K86 | 2.100 | -0.520 | -37.000 | 2.100 | -0.520 | -38.000 | 1.000 P15 | 0.000 - L(1.000) |
| S170 | K83 | K85 | 2.100 | -0.520 | -37.000 | 0.900 | -0.520 | -38.000 | 1.562 P16 | 0.000 - L(1.562) |
| S171 | K84 | K87 | 1.500 | -1.559 | -37.000 | 1.500 | -1.559 | -38.000 | 1.000 P15 | 0.000 - L(1.000) |

| **Staaf** | **Knoop B** | **Knoop E** | **X-B** | **Y-B** | **Z-B** | **X-E** | **Y-E** | **Z-E** | **Lengte** | **Profiel** | **Positie** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S172 | K84 | K86 | 1.500 | -1.559 | -37.000 | 2.100 | -0.520 | -38.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S173 | K85 | K88 | 0.900 | -0.520 | -38.000 | 0.900 | -0.520 | -39.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S174 | K85 | K89 | 0.900 | -0.520 | -38.000 | 2.100 | -0.520 | -39.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S175 | K86 | K89 | 2.100 | -0.520 | -38.000 | 2.100 | -0.520 | -39.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S176 | K86 | K90 | 2.100 | -0.520 | -38.000 | 1.500 | -1.559 | -39.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S177 | K87 | K90 | 1.500 | -1.559 | -38.000 | 1.500 | -1.559 | -39.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S178 | K87 | K88 | 1.500 | -1.559 | -38.000 | 0.900 | -0.520 | -39.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S179 | K88 | K93 | 0.900 | -0.520 | -39.000 | 1.500 | -1.559 | -40.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S180 | K88 | K91 | 0.900 | -0.520 | -39.000 | 0.900 | -0.520 | -40.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S181 | K89 | K91 | 2.100 | -0.520 | -39.000 | 0.900 | -0.520 | -40.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S182 | K89 | K92 | 2.100 | -0.520 | -39.000 | 2.100 | -0.520 | -40.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S183 | K90 | K93 | 1.500 | -1.559 | -39.000 | 1.500 | -1.559 | -40.000 | 1.000 | P15 | 0.000 - L(1.000) |
| S184 | K90 | K92 | 1.500 | -1.559 | -39.000 | 2.100 | -0.520 | -40.000 | 1.562 | P16 | 0.000 - L(1.562) |
| S185 | K93 | K91 | 1.500 | -1.559 | -40.000 | 0.900 | -0.520 | -40.000 | 1.200 | P16 | 0.000 - L(1.200) |
| S186 | K92 | K93 | 2.100 | -0.520 | -40.000 | 1.500 | -1.559 | -40.000 | 1.200 | P16 | 0.000 - L(1.200) |
| - | - | - | m | m | m | m | m | m | m | - | - |

## SCHARNIEREN

| **Staaf** | **Positie** | **Oplegg.** | **Scharnier** | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | **Xr** | **Yr** | **Zr** |
| S1 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast |
| S10 | 0.000 | A6 | Vast | Vast | Vast | Vrij | Vrij |
| | L(3.254) | A2 | Vast | Vast | Vast | Vrij | Vrij |
| S100 | 0.000 | A50 | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.139) | A2 | Vast | Vast | Vast | Vrij | Vrij |
| S101 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast |
| S102 | 0.000 | A51 | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.139) | A2 | Vast | Vast | Vast | Vrij | Vrij |
| S103 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast |
| S104 | 0.000 | A52 | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.139) | A2 | Vast | Vast | Vast | Vrij | Vrij |
| S105 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast |
| S106 | 0.000 | A54 | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.089) | A2 | Vast | Vast | Vast | Vrij | Vrij |
| S107 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast |
| S108 | 0.000 | A53 | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.089) | A2 | Vast | Vast | Vast | Vrij | Vrij |
| S109 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | Projectnummer | | | | | |
| Omschrijving | Controle sterkte | | | Constructeur | | | Ing. A. Azaroual | | |
| Opdrachtgever | | | | Eenheden | | | m, kN, kNm | | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S11 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S110 | 0.000 | A55 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(2.089) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S111 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S112 | 0.000 | A56 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(2.040) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S113 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S114 | 0.000 | A57 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(2.040) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S115 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S116 | 0.000 | A58 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(2.040) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S117 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S118 | 0.000 | A60 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(1.992) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| **Staaf** | **Positie** | | | **Scharnier** | | | | | |
| | | **Oplegg.** | | | | | **Xr** | **Yr** | **Zr** |
| | | | | Vast | | | | | |
| S119 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S12 | 0.000 | A5 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(3.254) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S120 | 0.000 | A59 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(1.992) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S121 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| S122 | 0.000 | A61 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(1.992) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S123 | 0.000 | A62 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| | L(1.945) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | Vast | | | | | |
| S124 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | Vast | | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | Projectnummer | | | | |
| Omschrijving | Controle sterkte | | | Constructeur | | | Ing. A. Azaroual | |
| Opdrachtgever | | | | Eenheden | | | m, kN, kNm | |
| S125 | 0.000 | A63 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.945) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S126 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S127 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S128 | 0.000 | A64 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.945) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S129 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S13 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S130 | 0.000 | A66 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.898) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S131 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S132 | 0.000 | A65 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.898) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S133 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S134 | 0.000 | A67 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.898) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S135 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S136 | 0.000 | A68 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.852) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S137 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S138 | 0.000 | A69 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.852) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S139 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S14 | 0.000 | A7 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(3.254) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S140 | 0.000 | A70 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.852) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S141 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S142 | 0.000 | A72 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.806) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S143 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S144 | 0.000 | A71 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.806) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S145 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |

| **Staaf** | **Positie** | | **Oplegg.** | **Scharnier** | | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|---|
| S146 | 0.000 | A73 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.806) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S147 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S148 | 0.000 | A74 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.762) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S149 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S15 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S150 | 0.000 | A75 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.762) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S151 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S152 | 0.000 | A76 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.762) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S153 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S154 | 0.000 | A78 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.718) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S155 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S156 | 0.000 | A77 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(1.718) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S157 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S158 | 0.000 | A79 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(1.718) | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| S159 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S16 | 0.000 | A8 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(3.188) | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| S160 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.000) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S161 | 0.000 | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(1.562) | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| S162 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.200) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S163 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.000) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S164 | 0.000 | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(1.562) | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| S165 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.000) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S166 | 0.000 | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(1.562) | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| S167 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.000) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S168 | 0.000 | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(1.562) | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| S169 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.000) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S17 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S170 | 0.000 | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(1.562) | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| S171 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| | L(1.000) | A1 | Vast | | Vast | Vast | Vast | Vast |
| | | | | Vast | | | | |
| S172 | 0.000 | A2 | Vast | | Vast | Vast | Vrij | Vrij |
| | | | | Vast | | | | |
| | L(1.562) | A2 | Vast | | Vast | Vast | Vrij | Vrij |

| **Staaf** | **Positie** | | **Scharnier** | | | |
|---|---|---|---|---|---|---|
| | **Oplegg.** | | | **Xr** | **Yr** | **Zr** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | Projectnummer | | | | | |
| Omschrijving | Controle sterkte | | | Constructeur | | | Ing. A. Azaroual | | |
| Opdrachtgever | | | | Eenheden | | | m, kN, kNm | | |
| S173 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.000) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S174 | 0.000 | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(1.562) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S175 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.000) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S176 | 0.000 | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(1.562) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S177 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.000) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S178 | 0.000 | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(1.562) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S179 | 0.000 | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(1.562) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S18 | 0.000 | A9 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(3.188) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S180 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.000) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S181 | 0.000 | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(1.562) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S182 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.000) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S183 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.000) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S184 | 0.000 | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(1.562) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S185 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S186 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S19 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S2 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |
| S20 | 0.000 | A10 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| | L(3.188) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij | Vast |
| S21 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast | Vast |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | | Projectnummer | | | | |
| Omschrijving | Controle sterkte | | | | Constructeur | | Ing. A. Azaroual | | |
| Opdrachtgever | | | | | Eenheden | | m, kN, kNm | | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S22 | 0.000 | A12 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(3.122) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| S23 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S24 | 0.000 | A11 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(3.122) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| S25 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S26 | 0.000 | A13 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(3.122) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| S27 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S28 | 0.000 | A14 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(3.056) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| S29 | 0.000 | A15 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(3.056) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| S3 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S30 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S31 | 0.000 | A16 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(3.056) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| **Staaf** | **Positie** | | | | **Scharnier** | | | | |
| | | **Oplegg.** | | | | | **Xr** | **Yr** | **Zr** |
| | | | | | Vast | | | | |
| S32 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S33 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S34 | 0.000 | A18 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(2.991) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| S35 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |
| S36 | 0.000 | A17 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| | L(2.991) | A2 | Vast | | Vast | Vast | Vrij | Vrij | |
| | | | | | Vast | | | | |
| S37 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | |
| | | | | | Vast | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | Projectnummer | | | | | |
| Omschrijving | Controle sterkte | | | Constructeur | | | Ing. A. Azaroual | | |
| Opdrachtgever | | | | Eenheden | | | m, kN, kNm | | |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S38 | 0.000 | A19 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.991) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S39 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S4 | 0.000 | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(3.321) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S40 | 0.000 | A20 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.926) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S41 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S42 | 0.000 | A21 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.926) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S43 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S44 | 0.000 | A22 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.926) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S45 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S46 | 0.000 | A24 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.862) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S47 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S48 | 0.000 | A23 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.862) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S49 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S5 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S50 | 0.000 | A25 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.862) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S51 | 0.000 | A26 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.799) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| S52 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | | Vast | Vast | Vast | Vast | Vast |
| S53 | 0.000 | A27 | Vast | | Vast | Vast | Vrij | Vrij | Vast |
| | L(2.799) | A2 | Vast | | Vast | Vast | Vrij | Vrij | Vast |

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|---|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | Projectnummer | | | | |
| Omschrijving | Controle sterkte | | | Constructeur | | | Ing. A. Azaroual | |
| Opdrachtgever | | | | Eenheden | | | m, kN, kNm | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S54 | 0.000 | A1 | Vast | | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S55 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S56 | 0.000 | A28 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.799) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S57 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S58 | 0.000 | A30 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.736) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S59 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |

| **Staaf** | **Positie** | | | **Scharnier** | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Oplegg.** | | | | **Xr** | **Yr** | **Zr** |
| S6 | 0.000 | A3 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(3.321) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S60 | 0.000 | A29 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.736) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S61 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S62 | 0.000 | A31 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.736) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S63 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S64 | 0.000 | A32 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.673) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S65 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S66 | 0.000 | A33 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.673) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S67 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S68 | 0.000 | A34 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.673) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S69 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S7 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |

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|---|---|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | Projectnummer | | | | | |
| Omschrijving | Controle sterkte | | | Constructeur | | | Ing. A. Azaroual | | |
| Opdrachtgever | | | | Eenheden | | | m, kN, kNm | | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S70 | 0.000 A36 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.611) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S71 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S72 | 0.000 A35 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.611) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S73 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S74 | 0.000 A37 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.611) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S75 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S76 | 0.000 A38 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.550) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S77 | 0.000 A39 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.550) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S78 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S79 | 0.000 A40 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.550) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S8 | 0.000 A4 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(3.321) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S80 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S81 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S82 | 0.000 A42 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.490) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S83 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S84 | 0.000 A41 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.490) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| S85 | 0.000 A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| | L(1.501) A1 | Vast | | Vast | Vast | Vast | Vast | Vast | |
| S86 | 0.000 A43 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |
| | L(2.490) A2 | Vast | | Vast | Vast | Vast | Vrij | Vrij | |

| | | | |
|---|---|---|---|
| Projectnaam | VFZ | Projectnummer | |
| Omschrijving | Controle sterkte | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | Eenheden | m, kN, kNm |

| Staaf | Positie | Oplegg. | | Scharnier | | Xr | Yr | Zr |
|---|---|---|---|---|---|---|---|---|
| S87 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S88 | 0.000 | A44 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.431) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S89 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S9 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S90 | 0.000 | A45 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.431) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S91 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S92 | 0.000 | A46 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.431) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S93 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S94 | 0.000 | A48 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.372) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S95 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S96 | 0.000 | A47 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.372) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S97 | 0.000 | A49 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| | L(2.372) | A2 | Vast | Vast | Vast | Vast | Vrij | Vrij |
| S98 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.501) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| S99 | 0.000 | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| | L(1.200) | A1 | Vast | Vast | Vast | Vast | Vast | Vast |
| - | m | - | kN/m | kN/m | kN/m | kNm/rad | kNm/rad | kNm/rad |

## BELASTINGSGEVALLEN TYPEN

| Oplegg. | Staven | B.G.Type | Gunstig/Ong. | Element | Niveau | Veld | Psi0 | Psi1 | Psi2 | Cprob UGT/GGT |
|---|---|---|---|---|---|---|---|---|---|---|
| B.G.1 | Permanent | Permanent | - | | N.v.t. | N.v.t. | | | | |
| B.G.2 | Wind X | Windbelasting | - | | N.v.t. | N.v.t. | | 0.20 | | 1.00/1.00 |
| B.G.3 | Wind Y | Niet gedefinieerd | | | N.v.t. | N.v.t. | | | | |

## BELASTINGSGEVALLEN

| Type | Beginwaarde | Eindwaarde | Beginafstand | Eindafstand | Richting | Staaf of knoop |
|---|---|---|---|---|---|---|
| **B.G.1: Permanent** | | | | | | |

| | | | |
|---|---|---|---|
| Projectnaam | VFZ | Projectnummer | |
| Omschrijving | Controle sterkte | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | Eenheden | m, kN, kNm |

| | | | | | | |
|---|---|---|---|---|---|---|
| qG | 0.52 (1.00x) | 0.52 (1.00x) | 0.000 | 1.501(L) | Z" | S3,S5,S7,S9,S11, S13,S15,S17,S19, S21,S23,S25,S27, S30,S32-S33,S35, S37,S39,S41,S43,S45,S47,S49 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 3.321(L) | Z" | S4,S6,S8 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 3.254(L) | Z" | S10,S12,S14 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 3.188(L) | Z" | S16,S18,S20 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 3.122(L) | Z" | S22,S24,S26 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 3.056(L) | Z" | S28-S29,S31 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 2.991(L) | Z" | S34,S36,S38 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 2.926(L) | Z" | S40,S42,S44 |
| qG | 0.07 (1.00x) | 0.07 (1.00x) | 0.000 | 2.862(L) | Z" | S46,S48,S50 |
| qG | 0.32 (1.00x) | 0.32 (1.00x) | 0.000 | 1.501(L) | Z" | S52,S54-S55,S57, S59,S61,S63,S65, S67,S69,S71,S73, S75,S78,S80-S81, S83,S85,S87,S89,S91,S93,S95,S98 |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.799(L) | Z" | S51,S53,S56 |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.736(L) | Z" | S58,S60,S62 |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.673(L) | Z" | S64,S66,S68 |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.611(L) | Z" | S70,S72,S74 |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.550(L) | Z" | S76-S77,S79 |

| **Type** | **Beginwaarde** | **Eindwaarde** | **Beginafstand** | **Eindafstand** | **Richting** | **Staaf of knoop** |
|---|---|---|---|---|---|---|
| **B.G.1: Permanent** | | | | | | |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.490(L) | Z" | S82,S84,S86 |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.431(L) | Z" | S88,S90,S92 |
| qG | 0.06 (1.00x) | 0.06 (1.00x) | 0.000 | 2.372(L) | Z" | S94,S96-S97 |
| qG | 0.17 (1.00x) | 0.17 (1.00x) | 0.000 | 1.200(L) | Z" | S99,S101,S103, S105,S107,S109, S111,S113,S115, S117,S119,S121, S124,S126-S127, S129,S131,S133, S135,S137,S139, S141,S143,S145, S147,S149,S151,S153,S155,S157 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 2.139(L) | Z" | S100,S102,S104 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 2.089(L) | Z" | S106,S108,S110 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 2.040(L) | Z" | S112,S114,S116 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.992(L) | Z" | S118,S120,S122 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.945(L) | Z" | S123,S125,S128 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.898(L) | Z" | S130,S132,S134 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.852(L) | Z" | S136,S138,S140 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.806(L) | Z" | S142,S144,S146 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.762(L) | Z" | S148,S150,S152 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.718(L) | Z" | S154,S156,S158 |
| qG | 0.04 (1.00x) | 0.04 (1.00x) | 0.000 | 1.200(L) | Z" | S1,S159,S162 |
| qG | 0.13 (1.00x) | 0.13 (1.00x) | 0.000 | 1.000(L) | Z" | S160,S163,S165, S167,S169,S171, S173,S175,S177,S180,S182-S183 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.200(L) | Z" | S185-S186 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.200(L) | Z" | S2 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S161,S170,S174,S181 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S166 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S168 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S178 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S179 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S164 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S172 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S176 |
| qG | 0.03 (1.00x) | 0.03 (1.00x) | 0.000 | 1.562(L) | Z" | S184 |
| N | 0.24 | | | | Z | K43-K45,K58-K60,K91-K93 |
| N | 1.36 | | | | Z | K88-K90 |

| | | | | | | |
|---|---|---|---|---|---|---|
| N | 0.67 | | | | Z | K79-K81 |
| N | 0.18 | | | | Z | K73-K75 |
| N | 0.99 | | | | Z | K64-K66,K70-K72 |
| N | 0.51 | | | | Z | K55-K57 |
| N | 1.01 | | | | Z | K49-K51 |
| N | 1.16 | | | | Z | K40-K42 |
| **Som lasten** | **X:** | **0,00 kN** | **Y: 0.00 kN** | **Z:** | **72,39 kN** | |
| **B.G.2: Wind X** | | | | | | |
| q | 0.37 | 0.37 | 0.000 | 1.500(L) | X | S3,S5,S9,S11,S15,S17,S21,S23 |
| q | 0.37 | 0.37 | 0.000 | 1.501(L) | X | S7,S13,S19,S25 |
| q | 0.46 | 0.46 | 0.000 | 1.500(L) | X | S27,S30,S33,S35, S39,S41,S45,S47, S52,S54,S57,S59, S63,S65,S69,S71,S80,S85,S91,S98 |
| q | 0.46 | 0.46 | 0.000 | 1.501(L) | X | S32,S37,S43,S49 |
| q | 0.44 | 0.44 | 0.000 | 1.501(L) | X | S55,S61,S67,S73 |
| q | 0.49 | 0.49 | 0.000 | 1.500(L) | X | S75,S78,S81,S83,S87,S89,S93,S95 |
| q | 0.45 | 0.45 | 0.000 | 1.200(L) | X | S99,S101,S105, S107,S111,S113, S117,S119,S124,S126 |
| q | 0.39 | 0.39 | 0.000 | 1.200(L) | X | S103,S109,S115,S121,S127 |
| q | 0.46 | 0.46 | 0.000 | 1.200(L) | X | S129,S131,S135, S137,S141,S143, S147,S149,S153,S155 |
| q | 0.39 | 0.39 | 0.000 | 1.200(L) | X | S133,S139,S145,S151,S157,S160 |
| q | 0.50 | 0.50 | 0.000 | 1.000(L) | X | S163,S165,S167, S169,S173,S175,S180,S182 |
| q | 0.40 | 0.40 | 0.000 | 1.000(L) | X | S171,S177,S183 |

| **Type** | **Beginwaarde** | **Eindwaarde** | **Beginafstand** | **Eindafstand** | **Richting** | **Staaf of knoop** |
|---|---|---|---|---|---|---|
| **B.G.2: Wind X** | | | | | | |
| N | 0.51 | | | | X | K91-K93 |
| N | 1.81 | | | | X | K88-K89 |
| N | 1.33 | | | | X | K90 |
| N | 0.57 | | | | X | K57,K79-K80 |
| N | 0.40 | | | | X | K81 |
| N | 0.33 | | | | X | K73-K75 |
| N | 1.41 | | | | X | K70-K71 |
| N | 0.86 | | | | X | K72 |
| N | 1.37 | | | | X | K64-K65 |
| N | 0.84 | | | | X | K66 |
| N | 0.46 | | | | X | K58-K60 |
| N | 0.81 | | | | X | K55-K56 |
| N | 1.65 | | | | X | K49-K50 |
| N | 1.23 | | | | X | K51 |
| N | 0.43 | | | | X | K43-K45 |
| N | 1.54 | | | | X | K40-K41 |
| N | 0.95 | | | | X | K42 |
| **Som lasten** | **X:** | **82,48 kN** | **Y: 0.00 kN** | **Z:** | **0,00 kN** | |
| **B.G.3: Wind Y** | | | | | | |
| q | -0.54 | -0.54 | 0.000 | 1.500(L) | Y | S3,S5,S9,S11,S15,S17,S21,S23 |
| q | -0.33 | -0.33 | 0.000 | 1.500(L) | Y | S7,S13,S19,S25 |
| q | -0.61 | -0.61 | 0.000 | 1.500(L) | Y | S27,S30,S33,S35,S39,S41,S45,S47 |
| q | -0.37 | -0.37 | 0.000 | 1.500(L) | Y | S32,S37,S43,S49 |
| q | -0.63 | -0.63 | 0.000 | 1.500(L) | Y | S52,S54,S57,S59,S63,S65,S69,S71 |
| q | -0.35 | -0.35 | 0.000 | 1.500(L) | Y | S55,S61,S67,S73 |
| q | -0.67 | -0.67 | 0.000 | 1.500(L) | Y | S75,S78,S81,S83,S87,S89,S93,S95 |
| q | -0.37 | -0.37 | 0.000 | 1.500(L) | Y | S80,S85,S91,S98 |
| q | -0.59 | -0.59 | 0.000 | 1.200(L) | Y | S99,S101,S105, S107,S111,S113, S117,S119,S124,S126 |
| q | -0.33 | -0.33 | 0.000 | 1.200(L) | Y | S103,S109,S115,S121,S127 |
| q | -0.59 | -0.59 | 0.000 | 1.200(L) | Y | S129,S131,S135, S137,S141,S143, |

| | | | | | | |
|---|---|---|---|---|---|---|
| q | -0.33 | -0.33 | 0.000 | 1.200(L) | Y | S147,S149,S153,S155<br>S133,S139,S145,S151,S157,S160 |
| q | -0.59 | -0.59 | 0.000 | 1.000(L) | Y | S163,S165,S167,<br>S169,S173,S175,S180,S182 |
| q | -0.34 | -0.34 | 0.000 | 1.000(L) | Y | S171,S177,S183 |
| N | -0.51 | | | | Y | K91-K93 |
| N | -1.81 | | | | Y | K88-K89 |
| N | -1.33 | | | | Y | K90 |
| N | -0.57 | | | | Y | K57,K79-K80 |
| N | -0.40 | | | | Y | K81 |
| N | -0.33 | | | | Y | K73-K75 |
| N | -1.41 | | | | Y | K70-K71 |
| N | -0.86 | | | | Y | K72 |
| N | -1.37 | | | | Y | K64-K65 |
| N | -0.84 | | | | Y | K66 |
| N | -0.46 | | | | Y | K58-K60 |
| N | -0.81 | | | | Y | K55-K56 |
| N | -1.65 | | | | Y | K49-K50 |
| N | -1.23 | | | | Y | K51 |
| N | -0.43 | | | | Y | K43-K45 |
| N | -1.54 | | | | Y | K40-K41 |
| N | -0.95 | | | | Y | K42 |
| **Som lasten** | **X:** | **0,00 kN** | **Y: -91.87 kN** | **Z: 0,00 kN** | | |
| - | - | - | m | m | - - | |

## CHARACTERISTIC BELASTINGSCOMBINATIES (TABEL)

| B.G. | Omschrijving | Ch.C.(w1) | Ch.C.1 | Ch.C.2 |
|---|---|---|---|---|
| B.G.1 | Permanent | 1.00 | 1.00 | 1.00 |
| B.G.2 | Wind X | - | 1.00 | - |
| B.G.3 | Wind Y | - | - | 1.00 |

## PERSISTENT BELASTINGSCOMBINATIES (TABEL)

| B.G. | Omschrijving | Pe.C.1 | Pe.C.2 | Pe.C.3 | Pe.C.4 | Pe.C.5 |
|---|---|---|---|---|---|---|
| B.G.1 | Permanent | 1.35 | 1.20 | 1.20 | 0.90 | 0.90 |
| B.G.2 | Wind X | - | 1.60 | - | 1.60 | - |
| B.G.3 | Wind Y | - | - | 1.60 | - | 1.60 |

## PE.C. OPLEGREACTIES

| B.C. | Oplegging | Knoop | X | Y | Z | Mx | My | Mz |
|---|---|---|---|---|---|---|---|---|
| Pe.C.1 | O1 | K1 | 1.06 | -0.61 | -32.57 | -0.15 | -0.05 | 0.00 |
| Pe.C.1 | O2 | K2 | -1.06 | -0.61 | -32.57 | 0.03 | 0.16 | 0.00 |
| Pe.C.1 | O3 | K3 | 0.00 | 1.22 | -32.58 | 0.12 | -0.11 | 0.00 |
| | **Som Reacties** | | **0.00** | **0.00** | **-97.73** | | | |
| | **Som Lasten** | | **0.00** | **0.00** | **97.73** | | | |
| Pe.C.2 | O1 | K1 | -74.63 | 18.35 | 1001.57 | 3.63 | 11.78 | 0.16 |
| Pe.C.2 | O2 | K2 | -46.14 | -34.47 | -1061.25 | 0.55 | 14.63 | 0.01 |
| Pe.C.2 | O3 | K3 | -11.20 | 16.13 | -27.18 | 0.43 | 8.53 | 0.07 |
| | **Som Reacties** | | **-131.97** | **0.00** | **-86.87** | | | |
| | **Som Lasten** | | **131.97** | **0.00** | **86.87** | | | |
| Pe.C.3 | O1 | K1 | -20.11 | 15.16 | 620.30 | 12.92 | 1.33 | 0.05 |
| Pe.C.3 | O2 | K2 | 38.44 | 47.07 | 616.87 | 10.51 | -3.08 | 0.05 |
| Pe.C.3 | O3 | K3 | -18.33 | 84.76 | -1324.04 | 15.73 | -3.38 | -0.09 |
| | **Som Reacties** | | **0.00** | **146.99** | **-86.87** | | | |
| | **Som Lasten** | | **0.00** | **-146.99** | **86.87** | | | |
| Pe.C.4 | O1 | K1 | -74.86 | 18.48 | 1008.80 | 3.66 | 11.79 | 0.16 |
| Pe.C.4 | O2 | K2 | -45.90 | -34.34 | -1054.01 | 0.54 | 14.59 | 0.02 |
| Pe.C.4 | O3 | K3 | -11.20 | 15.86 | -19.94 | 0.41 | 8.55 | 0.07 |
| | **Som Reacties** | | **-131.97** | **0.00** | **-65.15** | | | |
| | **Som Lasten** | | **131.97** | **0.00** | **65.15** | | | |
| Pe.C.5 | O1 | K1 | -20.34 | 15.30 | 627.54 | 12.96 | 1.34 | 0.05 |
| Pe.C.5 | O2 | K2 | 38.67 | 47.20 | 624.11 | 10.50 | -3.12 | 0.05 |
| Pe.C.5 | O3 | K3 | -18.33 | 84.49 | -1316.80 | 15.71 | -3.35 | -0.09 |
| | **Som Reacties** | | **0.00** | **146.99** | **-65.15** | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Som Lasten** | | **0.00** | **-146.99** | **65.15** | | | |
| **-** | **-** | **-** | **kN** | **kN** | **kN** | **kNm** | **kNm** | **kNm** |

## CH.C. OPLEGREACTIES

| **B.C.** | **Oplegging** | **Knoop** | **X** | **Y** | **Z** | **Mx** | **My** | **Mz** |
|---|---|---|---|---|---|---|---|---|
| Ch.C.(w1) | O1 | K1 | 0.78 | -0.45 | -24.13 | -0.11 | -0.04 | 0.00 |
| Ch.C.(w1) | O2 | K2 | -0.78 | -0.45 | -24.13 | 0.02 | 0.12 | 0.00 |
| Ch.C.(w1) | O3 | K3 | 0.00 | 0.90 | -24.13 | 0.09 | -0.08 | 0.00 |
| | **Som Reacties** | | **0.00** | **0.00** | **-72.39** | | | |
| | **Som Lasten** | | **0.00** | **0.00** | **72.39** | | | |
| Ch.C.1 | O1 | K1 | -46.45 | 11.35 | 619.95 | 2.24 | 7.35 | 0.10 |
| Ch.C.1 | O2 | K2 | -29.03 | -21.66 | -669.31 | 0.35 | 9.17 | 0.01 |
| Ch.C.1 | O3 | K3 | -7.00 | 10.31 | -23.02 | 0.29 | 5.31 | 0.04 |
| | **Som Reacties** | | **-82.48** | **0.00** | **-72.39** | | | |
| | **Som Lasten** | | **82.48** | **0.00** | **72.39** | | | |
| Ch.C.2 | O1 | K1 | -12.37 | 9.36 | 381.65 | 8.05 | 0.82 | 0.03 |
| Ch.C.2 | O2 | K2 | 23.83 | 29.30 | 379.51 | 6.57 | -1.90 | 0.03 |
| Ch.C.2 | O3 | K3 | -11.45 | 53.20 | -833.56 | 9.85 | -2.13 | -0.06 |
| | **Som Reacties** | | **0.00** | **91.87** | **-72.39** | | | |
| | **Som Lasten** | | **0.00** | **-91.87** | **72.39** | | | |
| **-** | **-** | **-** | **kN** | **kN** | **kN** | **kNm** | **kNm** | **kNm** |

## CH.C. KNOOPVERPLAATSINGEN

| **Knoop** | **B.C.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K1 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.2 | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| K2 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.2 | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| K3 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.2 | 0.0000 | 0.0000 | 0.0000 | 0.000e-03 | 0.000e-03 | 0.000e-03 |

| **Knoop** | **B.C.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K4 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0000 | -0.006e-03 | 0.001e-03 | -0.000e-03 |
| | Ch.C.1 | 0.0009 | -0.0002 | -0.0006 | 0.087e-03 | -1.003e-03 | 0.026e-03 |
| | Ch.C.2 | 0.0001 | -0.0009 | -0.0004 | 1.061e-03 | -0.024e-03 | -0.010e-03 |
| K5 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0000 | 0.002e-03 | -0.006e-03 | -0.000e-03 |
| | Ch.C.1 | 0.0010 | 0.0000 | 0.0007 | 0.044e-03 | -1.058e-03 | 0.019e-03 |
| | Ch.C.2 | -0.0002 | -0.0008 | -0.0004 | 1.015e-03 | 0.103e-03 | 0.017e-03 |
| K6 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0000 | 0.004e-03 | 0.005e-03 | -0.000e-03 |
| | Ch.C.1 | 0.0007 | 0.0000 | 0.0000 | 0.033e-03 | -0.850e-03 | -0.000e-03 |
| | Ch.C.2 | -0.0002 | -0.0011 | 0.0009 | 1.157e-03 | 0.096e-03 | -0.003e-03 |
| K7 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.001e-03 | -0.002e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0028 | -0.0001 | -0.0012 | -0.096e-03 | -1.460e-03 | 0.049e-03 |
| | Ch.C.2 | 0.0000 | -0.0029 | -0.0008 | 1.539e-03 | 0.041e-03 | -0.030e-03 |
| K8 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.001e-03 | 0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0028 | -0.0001 | 0.0013 | 0.047e-03 | -1.388e-03 | 0.050e-03 |
| | Ch.C.2 | -0.0002 | -0.0028 | -0.0008 | 1.615e-03 | -0.022e-03 | 0.034e-03 |
| K9 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | -0.002e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0024 | -0.0001 | 0.0000 | 0.020e-03 | -1.401e-03 | -0.004e-03 |
| | Ch.C.2 | -0.0002 | -0.0031 | 0.0017 | 1.517e-03 | -0.050e-03 | 0.004e-03 |
| K10 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.002e-03 | -0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0052 | 0.0000 | -0.0018 | -0.101e-03 | -1.836e-03 | 0.077e-03 |
| | Ch.C.2 | 0.0000 | -0.0055 | -0.0011 | 2.003e-03 | 0.003e-03 | -0.049e-03 |
| K11 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | 0.002e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0052 | -0.0001 | 0.0019 | 0.035e-03 | -1.822e-03 | 0.077e-03 |
| | Ch.C.2 | -0.0002 | -0.0056 | -0.0011 | 2.021e-03 | -0.059e-03 | 0.056e-03 |
| K12 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | -0.001e-03 | -0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0048 | -0.0001 | 0.0001 | -0.021e-03 | -1.814e-03 | -0.009e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Ch.C.2 | -0.0001 | -0.0057 | 0.0024 | 1.954e-03 | -0.041e-03 | 0.004e-03 |
| K13 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0083 | 0.0001 | -0.0023 | -0.044e-03 | -2.273e-03 | 0.103e-03 |
| | Ch.C.2 | 0.0000 | -0.0089 | -0.0014 | 2.454e-03 | -0.000e-03 | -0.065e-03 |
| K14 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0083 | -0.0002 | 0.0025 | 0.039e-03 | -2.272e-03 | 0.103e-03 |
| | Ch.C.2 | -0.0001 | -0.0089 | -0.0014 | 2.457e-03 | -0.006e-03 | 0.075e-03 |
| K15 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | -0.000e-03 | -0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0078 | 0.0000 | 0.0001 | -0.000e-03 | -2.213e-03 | -0.012e-03 |
| | Ch.C.2 | -0.0001 | -0.0091 | 0.0031 | 2.450e-03 | -0.001e-03 | 0.005e-03 |
| K16 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | -0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0121 | 0.0002 | -0.0028 | -0.044e-03 | -2.680e-03 | 0.128e-03 |
| | Ch.C.2 | 0.0000 | -0.0129 | -0.0017 | 2.901e-03 | 0.003e-03 | -0.078e-03 |
| K17 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | 0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0121 | -0.0002 | 0.0030 | 0.046e-03 | -2.684e-03 | 0.127e-03 |
| | Ch.C.2 | -0.0001 | -0.0130 | -0.0017 | 2.898e-03 | -0.008e-03 | 0.092e-03 |
| K18 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | -0.001e-03 | -0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0115 | -0.0001 | 0.0001 | -0.005e-03 | -2.626e-03 | -0.011e-03 |
| | Ch.C.2 | -0.0001 | -0.0131 | 0.0037 | 2.888e-03 | 0.004e-03 | 0.006e-03 |
| K19 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.000e-03 | -0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0164 | 0.0002 | -0.0032 | -0.056e-03 | -3.087e-03 | 0.150e-03 |
| | Ch.C.2 | 0.0000 | -0.0176 | -0.0019 | 3.334e-03 | 0.010e-03 | -0.090e-03 |
| K20 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | 0.001e-03 | 0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0164 | -0.0003 | 0.0035 | 0.047e-03 | -3.080e-03 | 0.152e-03 |
| | Ch.C.2 | -0.0001 | -0.0176 | -0.0019 | 3.343e-03 | -0.015e-03 | 0.105e-03 |
| K21 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0001 | -0.001e-03 | 0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0157 | 0.0000 | 0.0001 | -0.001e-03 | -3.036e-03 | -0.008e-03 |
| | Ch.C.2 | -0.0001 | -0.0178 | 0.0043 | 3.315e-03 | -0.005e-03 | 0.008e-03 |
| K22 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | -0.001e-03 | -0.000e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0213 | 0.0003 | -0.0036 | -0.039e-03 | -3.480e-03 | 0.174e-03 |
| | Ch.C.2 | 0.0000 | -0.0229 | -0.0022 | 3.750e-03 | 0.005e-03 | -0.099e-03 |
| K23 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.001e-03 | -0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0213 | -0.0003 | 0.0039 | 0.046e-03 | -3.481e-03 | 0.174e-03 |
| | Ch.C.2 | -0.0001 | -0.0230 | -0.0022 | 3.754e-03 | -0.001e-03 | 0.117e-03 |

| **Knoop** | **B.C.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K24 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.001e-03 | 0.000e-03 |
| | Ch.C.1 | 0.0206 | -0.0001 | 0.0001 | 0.006e-03 | -3.411e-03 | -0.003e-03 |
| | Ch.C.2 | -0.0001 | -0.0231 | 0.0048 | 3.748e-03 | 0.008e-03 | 0.009e-03 |
| K25 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | -0.002e-03 | 0.000e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0268 | 0.0003 | -0.0039 | -0.018e-03 | -3.806e-03 | 0.196e-03 |
| | Ch.C.2 | 0.0001 | -0.0288 | -0.0024 | 4.112e-03 | -0.007e-03 | -0.108e-03 |
| K26 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.001e-03 | -0.002e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0269 | -0.0004 | 0.0043 | 0.049e-03 | -3.832e-03 | 0.196e-03 |
| | Ch.C.2 | -0.0001 | -0.0289 | -0.0024 | 4.092e-03 | 0.007e-03 | 0.129e-03 |
| K27 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.001e-03 | 0.002e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0259 | 0.0000 | 0.0002 | -0.002e-03 | -3.728e-03 | 0.002e-03 |
| | Ch.C.2 | -0.0001 | -0.0290 | 0.0053 | 4.116e-03 | 0.029e-03 | 0.010e-03 |
| K28 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | -0.001e-03 | -0.000e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0331 | 0.0003 | -0.0045 | -0.023e-03 | -4.515e-03 | 0.260e-03 |
| | Ch.C.2 | 0.0000 | -0.0355 | -0.0027 | 4.858e-03 | 0.005e-03 | -0.130e-03 |
| K29 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.001e-03 | -0.001e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0331 | -0.0005 | 0.0049 | 0.057e-03 | -4.524e-03 | 0.254e-03 |
| | Ch.C.2 | -0.0002 | -0.0356 | -0.0027 | 4.852e-03 | 0.013e-03 | 0.161e-03 |
| K30 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.001e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0321 | -0.0001 | 0.0002 | 0.006e-03 | -4.435e-03 | 0.020e-03 |
| | Ch.C.2 | -0.0001 | -0.0358 | 0.0060 | 4.860e-03 | 0.022e-03 | 0.010e-03 |
| K31 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.001e-03 | -0.001e-03 | 0.001e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Ch.C.1 | 0.0403 | 0.0003 | -0.0050 | -0.061e-03 | -5.082e-03 | 0.314e-03 |
| | Ch.C.2 | 0.0001 | -0.0433 | -0.0030 | 5.476e-03 | 0.009e-03 | -0.149e-03 |
| K32 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | 0.000e-03 | 0.001e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0404 | -0.0005 | 0.0054 | 0.056e-03 | -5.082e-03 | 0.315e-03 |
| | Ch.C.2 | -0.0002 | -0.0433 | -0.0030 | 5.479e-03 | -0.019e-03 | 0.184e-03 |
| K33 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0002 | -0.001e-03 | -0.000e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0392 | -0.0001 | 0.0002 | -0.004e-03 | -5.034e-03 | 0.043e-03 |
| | Ch.C.2 | -0.0001 | -0.0436 | 0.0067 | 5.454e-03 | -0.007e-03 | 0.017e-03 |
| K34 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | -0.000e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0484 | 0.0004 | -0.0054 | -0.100e-03 | -5.629e-03 | 0.370e-03 |
| | Ch.C.2 | 0.0000 | -0.0520 | -0.0033 | 6.093e-03 | -0.005e-03 | -0.159e-03 |
| K35 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.000e-03 | 0.000e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0484 | -0.0006 | 0.0059 | 0.050e-03 | -5.644e-03 | 0.368e-03 |
| | Ch.C.2 | -0.0002 | -0.0521 | -0.0032 | 6.081e-03 | -0.066e-03 | 0.203e-03 |
| K36 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.000e-03 | -0.000e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0471 | -0.0001 | 0.0002 | -0.026e-03 | -5.602e-03 | 0.074e-03 |
| | Ch.C.2 | -0.0001 | -0.0522 | 0.0073 | 6.039e-03 | -0.019e-03 | 0.019e-03 |
| K37 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.000e-03 | -0.002e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0573 | 0.0006 | -0.0057 | -0.110e-03 | -6.281e-03 | 0.417e-03 |
| | Ch.C.2 | 0.0001 | -0.0616 | -0.0034 | 6.665e-03 | 0.052e-03 | -0.165e-03 |
| K38 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | 0.002e-03 | 0.001e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0573 | -0.0006 | 0.0063 | 0.043e-03 | -6.178e-03 | 0.422e-03 |
| | Ch.C.2 | 0.0000 | -0.0616 | -0.0035 | 6.772e-03 | -0.009e-03 | 0.211e-03 |
| K39 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | 0.001e-03 | 0.001e-03 |
| | Ch.C.1 | 0.0560 | 0.0000 | 0.0003 | 0.030e-03 | -6.170e-03 | 0.111e-03 |
| | Ch.C.2 | -0.0001 | -0.0617 | 0.0077 | 6.643e-03 | -0.040e-03 | 0.027e-03 |
| K40 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | 0.000e-03 | -0.001e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0671 | 0.0007 | -0.0060 | -0.062e-03 | -6.656e-03 | 0.470e-03 |
| | Ch.C.2 | 0.0000 | -0.0719 | -0.0036 | 7.158e-03 | -0.004e-03 | -0.167e-03 |
| K41 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | 0.001e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0669 | -0.0007 | 0.0066 | 0.044e-03 | -6.659e-03 | 0.471e-03 |
| | Ch.C.2 | -0.0001 | -0.0722 | -0.0036 | 7.156e-03 | -0.029e-03 | 0.223e-03 |
| K42 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | 0.000e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0656 | -0.0001 | 0.0003 | -0.019e-03 | -6.614e-03 | 0.151e-03 |
| | Ch.C.2 | 0.0000 | -0.0721 | 0.0081 | 7.134e-03 | -0.003e-03 | 0.029e-03 |
| K43 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | 0.001e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0772 | 0.0007 | -0.0062 | -0.012e-03 | -6.997e-03 | 0.519e-03 |
| | Ch.C.2 | 0.0001 | -0.0830 | -0.0037 | 7.590e-03 | -0.006e-03 | -0.168e-03 |

| **Knoop** | **B.C.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K44 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | 0.000e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0773 | -0.0007 | 0.0068 | 0.072e-03 | -7.070e-03 | 0.519e-03 |
| | Ch.C.2 | 0.0000 | -0.0831 | -0.0037 | 7.522e-03 | -0.020e-03 | 0.232e-03 |
| K45 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | 0.000e-03 | -0.001e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0758 | 0.0000 | 0.0003 | -0.017e-03 | -7.013e-03 | 0.193e-03 |
| | Ch.C.2 | -0.0001 | -0.0831 | 0.0084 | 7.562e-03 | 0.032e-03 | 0.032e-03 |
| K46 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | 0.001e-03 | -0.001e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0882 | 0.0007 | -0.0063 | -0.015e-03 | -7.531e-03 | 0.565e-03 |
| | Ch.C.2 | 0.0000 | -0.0948 | -0.0038 | 8.164e-03 | 0.012e-03 | -0.159e-03 |
| K47 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.000e-03 | 0.001e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0882 | -0.0008 | 0.0070 | 0.092e-03 | -7.608e-03 | 0.561e-03 |
| | Ch.C.2 | -0.0001 | -0.0949 | -0.0038 | 8.094e-03 | -0.020e-03 | 0.233e-03 |
| K48 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0003 | -0.001e-03 | -0.001e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0867 | -0.0001 | 0.0003 | -0.018e-03 | -7.514e-03 | 0.242e-03 |
| | Ch.C.2 | -0.0001 | -0.0949 | 0.0086 | 8.081e-03 | 0.049e-03 | 0.033e-03 |
| K49 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.000e-03 | 0.000e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0997 | 0.0007 | -0.0064 | -0.041e-03 | -7.893e-03 | 0.609e-03 |
| | Ch.C.2 | 0.0001 | -0.1074 | -0.0038 | 8.548e-03 | -0.030e-03 | -0.154e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Projectnaam | VFZ | | | | Projectnummer | | |
| Omschrijving | Controle sterkte | | | | Constructeur | Ing. A. Azaroual | |
| Opdrachtgever | | | | | Eenheden | m, kN, kNm | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| K50 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | -0.000e-03 | 0.000e-03 | 0.002e-03 |
| | Ch.C.1 | 0.1000 | -0.0009 | 0.0071 | 0.068e-03 | -7.972e-03 | 0.608e-03 |
| | Ch.C.2 | 0.0001 | -0.1072 | -0.0038 | 8.456e-03 | -0.054e-03 | 0.234e-03 |
| K51 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | -0.000e-03 | -0.000e-03 | 0.002e-03 |
| | Ch.C.1 | 0.0983 | 0.0001 | 0.0004 | -0.056e-03 | -7.862e-03 | 0.291e-03 |
| | Ch.C.2 | -0.0002 | -0.1074 | 0.0088 | 8.482e-03 | 0.038e-03 | 0.037e-03 |
| K52 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | -0.001e-03 | -0.000e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1097 | 0.0008 | -0.0066 | -0.079e-03 | -8.601e-03 | 0.704e-03 |
| | Ch.C.2 | 0.0000 | -0.1178 | -0.0040 | 9.060e-03 | 0.019e-03 | -0.141e-03 |
| K53 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.000e-03 | -0.001e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1097 | -0.0009 | 0.0074 | 0.003e-03 | -8.480e-03 | 0.705e-03 |
| | Ch.C.2 | -0.0001 | -0.1179 | -0.0040 | 9.193e-03 | 0.037e-03 | 0.234e-03 |
| K54 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.000e-03 | 0.001e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1081 | -0.0001 | 0.0004 | 0.048e-03 | -8.456e-03 | 0.398e-03 |
| | Ch.C.2 | -0.0001 | -0.1179 | 0.0091 | 9.150e-03 | -0.060e-03 | 0.046e-03 |
| K55 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.001e-03 | -0.001e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1203 | 0.0009 | -0.0068 | -0.096e-03 | -9.127e-03 | 0.794e-03 |
| | Ch.C.2 | 0.0001 | -0.1292 | -0.0041 | 9.724e-03 | -0.029e-03 | -0.121e-03 |
| K56 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.001e-03 | 0.002e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1204 | -0.0009 | 0.0076 | 0.008e-03 | -9.095e-03 | 0.800e-03 |
| | Ch.C.2 | 0.0000 | -0.1292 | -0.0041 | 9.764e-03 | -0.035e-03 | 0.227e-03 |
| K57 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | -0.002e-03 | -0.000e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1186 | 0.0000 | 0.0004 | -0.007e-03 | -9.049e-03 | 0.511e-03 |
| | Ch.C.2 | -0.0001 | -0.1293 | 0.0093 | 9.728e-03 | -0.055e-03 | 0.057e-03 |
| K58 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | -0.000e-03 | -0.000e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1315 | 0.0009 | -0.0069 | -0.096e-03 | -9.471e-03 | 0.888e-03 |
| | Ch.C.2 | 0.0000 | -0.1411 | -0.0041 | 10.118e-03 | 0.003e-03 | -0.102e-03 |
| K59 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.000e-03 | -0.000e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1314 | -0.0009 | 0.0078 | 0.038e-03 | -9.448e-03 | 0.893e-03 |
| | Ch.C.2 | 0.0000 | -0.1413 | -0.0041 | 10.150e-03 | -0.041e-03 | 0.224e-03 |
| K60 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.000e-03 | 0.000e-03 | 0.003e-03 |
| | Ch.C.1 | 0.1297 | -0.0001 | 0.0004 | -0.009e-03 | -9.429e-03 | 0.623e-03 |
| | Ch.C.2 | 0.0000 | -0.1412 | 0.0095 | 10.109e-03 | -0.023e-03 | 0.063e-03 |
| K61 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | -0.000e-03 | -0.002e-03 | 0.004e-03 |
| | Ch.C.1 | 0.1431 | 0.0010 | -0.0069 | -0.085e-03 | -9.963e-03 | 0.977e-03 |
| | Ch.C.2 | 0.0001 | -0.1536 | -0.0041 | 10.602e-03 | 0.029e-03 | -0.078e-03 |
| K62 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | 0.002e-03 | 0.001e-03 | 0.004e-03 |
| | Ch.C.1 | 0.1431 | -0.0009 | 0.0078 | 0.048e-03 | -9.907e-03 | 0.984e-03 |
| | Ch.C.2 | 0.0001 | -0.1536 | -0.0041 | 10.664e-03 | -0.015e-03 | 0.213e-03 |
| K63 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0004 | -0.001e-03 | 0.001e-03 | 0.004e-03 |
| | Ch.C.1 | 0.1413 | 0.0000 | 0.0004 | -0.003e-03 | -9.856e-03 | 0.740e-03 |
| | Ch.C.2 | 0.0000 | -0.1536 | 0.0096 | 10.569e-03 | -0.006e-03 | 0.073e-03 |

| **Knoop** | **B.C.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K64 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.000e-03 | -0.001e-03 | 0.004e-03 |
| | Ch.C.1 | 0.1553 | 0.0011 | -0.0069 | -0.078e-03 | -10.216e-03 | 1.068e-03 |
| | Ch.C.2 | 0.0000 | -0.1665 | -0.0041 | 10.952e-03 | -0.011e-03 | -0.053e-03 |
| K65 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.001e-03 | 0.000e-03 | 0.004e-03 |
| | Ch.C.1 | 0.1552 | -0.0009 | 0.0079 | 0.046e-03 | -10.240e-03 | 1.075e-03 |
| | Ch.C.2 | 0.0000 | -0.1667 | -0.0041 | 10.937e-03 | -0.058e-03 | 0.205e-03 |
| K66 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.001e-03 | 0.001e-03 | 0.004e-03 |
| | Ch.C.1 | 0.1534 | 0.0000 | 0.0005 | -0.020e-03 | -10.188e-03 | 0.857e-03 |
| | Ch.C.2 | 0.0000 | -0.1666 | 0.0096 | 10.910e-03 | -0.003e-03 | 0.080e-03 |
| K67 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.000e-03 | -0.002e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1676 | 0.0011 | -0.0068 | -0.059e-03 | -10.519e-03 | 1.157e-03 |
| | Ch.C.2 | 0.0001 | -0.1798 | -0.0040 | 11.227e-03 | 0.025e-03 | -0.028e-03 |
| K68 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.002e-03 | 0.001e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1676 | -0.0010 | 0.0078 | 0.052e-03 | -10.499e-03 | 1.166e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Ch.C.2 | 0.0002 | -0.1799 | -0.0040 | 11.258e-03 | -0.021e-03 | 0.194e-03 |
| K69 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.001e-03 | 0.001e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1658 | 0.0001 | 0.0005 | 0.006e-03 | -10.490e-03 | 0.976e-03 |
| | Ch.C.2 | 0.0000 | -0.1798 | 0.0095 | 11.200e-03 | -0.004e-03 | 0.090e-03 |
| K70 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.000e-03 | -0.002e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1805 | 0.0011 | -0.0067 | -0.015e-03 | -10.756e-03 | 1.246e-03 |
| | Ch.C.2 | 0.0000 | -0.1934 | -0.0040 | 11.490e-03 | 0.006e-03 | -0.002e-03 |
| K71 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.002e-03 | 0.001e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1803 | -0.0010 | 0.0077 | 0.044e-03 | -10.766e-03 | 1.255e-03 |
| | Ch.C.2 | 0.0001 | -0.1937 | -0.0039 | 11.488e-03 | -0.004e-03 | 0.184e-03 |
| K72 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.001e-03 | 0.001e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1786 | 0.0000 | 0.0005 | -0.014e-03 | -10.734e-03 | 1.095e-03 |
| | Ch.C.2 | 0.0000 | -0.1935 | 0.0094 | 11.468e-03 | 0.021e-03 | 0.097e-03 |
| K73 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.001e-03 | 0.003e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1933 | 0.0011 | -0.0065 | 0.010e-03 | -10.805e-03 | 1.337e-03 |
| | Ch.C.2 | 0.0001 | -0.2073 | -0.0038 | 11.617e-03 | -0.072e-03 | 0.021e-03 |
| K74 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.003e-03 | -0.001e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1934 | -0.0010 | 0.0075 | 0.005e-03 | -10.913e-03 | 1.345e-03 |
| | Ch.C.2 | 0.0002 | -0.2074 | -0.0038 | 11.518e-03 | -0.040e-03 | 0.178e-03 |
| K75 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.002e-03 | -0.002e-03 | 0.005e-03 |
| | Ch.C.1 | 0.1916 | 0.0001 | 0.0005 | -0.050e-03 | -10.840e-03 | 1.211e-03 |
| | Ch.C.2 | 0.0000 | -0.2073 | 0.0092 | 11.615e-03 | 0.025e-03 | 0.105e-03 |
| K76 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.006e-03 | -0.001e-03 | 0.006e-03 |
| | Ch.C.1 | 0.2065 | 0.0011 | -0.0063 | -0.028e-03 | -11.097e-03 | 1.422e-03 |
| | Ch.C.2 | 0.0001 | -0.2213 | -0.0037 | 11.717e-03 | 0.022e-03 | 0.047e-03 |
| K77 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.002e-03 | 0.005e-03 | 0.006e-03 |
| | Ch.C.1 | 0.2065 | -0.0009 | 0.0073 | -0.016e-03 | -10.999e-03 | 1.435e-03 |
| | Ch.C.2 | 0.0001 | -0.2215 | -0.0037 | 11.823e-03 | 0.045e-03 | 0.165e-03 |
| K78 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.003e-03 | -0.005e-03 | 0.006e-03 |
| | Ch.C.1 | 0.2047 | 0.0000 | 0.0005 | 0.035e-03 | -11.023e-03 | 1.330e-03 |
| | Ch.C.2 | 0.0000 | -0.2214 | 0.0089 | 11.775e-03 | -0.043e-03 | 0.115e-03 |
| K79 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.003e-03 | -0.003e-03 | 0.006e-03 |
| | Ch.C.1 | 0.2198 | 0.0010 | -0.0061 | -0.008e-03 | -11.140e-03 | 1.510e-03 |
| | Ch.C.2 | 0.0001 | -0.2355 | -0.0035 | 11.910e-03 | -0.050e-03 | 0.072e-03 |
| K80 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.001e-03 | 0.004e-03 | 0.006e-03 |
| | Ch.C.1 | 0.2198 | -0.0009 | 0.0071 | 0.022e-03 | -11.194e-03 | 1.523e-03 |
| | Ch.C.2 | 0.0001 | -0.2356 | -0.0035 | 11.865e-03 | -0.026e-03 | 0.155e-03 |
| K81 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.004e-03 | -0.002e-03 | 0.006e-03 |
| | Ch.C.1 | 0.2181 | 0.0001 | 0.0005 | -0.042e-03 | -11.146e-03 | 1.448e-03 |
| | Ch.C.2 | 0.0000 | -0.2356 | 0.0086 | 11.914e-03 | 0.010e-03 | 0.122e-03 |
| K82 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.006e-03 | 0.001e-03 | 0.007e-03 |
| | Ch.C.1 | 0.2310 | 0.0011 | -0.0061 | -0.084e-03 | -11.280e-03 | 1.545e-03 |
| | Ch.C.2 | 0.0002 | -0.2475 | -0.0036 | 12.169e-03 | -0.035e-03 | 0.083e-03 |
| K83 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.002e-03 | -0.006e-03 | 0.007e-03 |
| | Ch.C.1 | 0.2311 | -0.0009 | 0.0072 | 0.054e-03 | -11.388e-03 | 1.560e-03 |
| | Ch.C.2 | 0.0001 | -0.2476 | -0.0036 | 12.062e-03 | -0.128e-03 | 0.150e-03 |

| **Knoop** | **B.C.** | **X** | **Y** | **Z** | **Xr** | **Yr** | **Zr** |
|---|---|---|---|---|---|---|---|
| K84 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.004e-03 | 0.004e-03 | 0.007e-03 |
| | Ch.C.1 | 0.2293 | 0.0001 | 0.0005 | -0.070e-03 | -11.325e-03 | 1.496e-03 |
| | Ch.C.2 | 0.0000 | -0.2476 | 0.0087 | 12.041e-03 | 0.016e-03 | 0.127e-03 |
| K85 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.001e-03 | -0.001e-03 | 0.009e-03 |
| | Ch.C.1 | 0.2424 | 0.0012 | -0.0061 | -0.218e-03 | -11.654e-03 | 1.577e-03 |
| | Ch.C.2 | 0.0001 | -0.2598 | -0.0036 | 12.193e-03 | 0.196e-03 | 0.092e-03 |
| K86 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.001e-03 | 0.001e-03 | 0.009e-03 |
| | Ch.C.1 | 0.2425 | -0.0010 | 0.0072 | 0.026e-03 | -11.335e-03 | 1.600e-03 |
| | Ch.C.2 | 0.0003 | -0.2599 | -0.0036 | 12.505e-03 | -0.018e-03 | 0.143e-03 |
| K87 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.002e-03 | -0.000e-03 | 0.009e-03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Ch.C.1 | 0.2408 | 0.0002 | 0.0005 | 0.120e-03 | -11.539e-03 | 1.544e-03 |
| | Ch.C.2 | 0.0000 | -0.2596 | 0.0088 | 12.126e-03 | -0.131e-03 | 0.136e-03 |
| K88 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.000e-03 | -0.001e-03 | 0.010e-03 |
| | Ch.C.1 | 0.2541 | 0.0014 | -0.0061 | 0.048e-03 | -11.342e-03 | 1.609e-03 |
| | Ch.C.2 | -0.0001 | -0.2718 | -0.0036 | 11.903e-03 | 0.038e-03 | 0.100e-03 |
| K89 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.001e-03 | 0.001e-03 | 0.010e-03 |
| | Ch.C.1 | 0.2537 | -0.0010 | 0.0072 | -0.015e-03 | -11.230e-03 | 1.641e-03 |
| | Ch.C.2 | 0.0002 | -0.2723 | -0.0036 | 12.027e-03 | 0.136e-03 | 0.136e-03 |
| K90 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.001e-03 | 0.000e-03 | 0.010e-03 |
| | Ch.C.1 | 0.2522 | -0.0001 | 0.0005 | 0.084e-03 | -11.211e-03 | 1.592e-03 |
| | Ch.C.2 | 0.0002 | -0.2718 | 0.0088 | 12.038e-03 | -0.011e-03 | 0.146e-03 |
| K91 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.001e-03 | -0.005e-03 | 0.011e-03 |
| | Ch.C.1 | 0.2650 | 0.0011 | -0.0062 | 0.288e-03 | -10.623e-03 | 1.646e-03 |
| | Ch.C.2 | 0.0002 | -0.2836 | -0.0036 | 11.769e-03 | -0.416e-03 | 0.109e-03 |
| K92 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | 0.004e-03 | 0.004e-03 | 0.011e-03 |
| | Ch.C.1 | 0.2650 | -0.0009 | 0.0072 | -0.018e-03 | -11.233e-03 | 1.676e-03 |
| | Ch.C.2 | 0.0002 | -0.2838 | -0.0036 | 11.132e-03 | -0.061e-03 | 0.135e-03 |
| K93 | Ch.C.(w1) | 0.0000 | 0.0000 | 0.0005 | -0.005e-03 | 0.002e-03 | 0.011e-03 |
| | Ch.C.1 | 0.2632 | 0.0001 | 0.0005 | -0.309e-03 | -10.786e-03 | 1.637e-03 |
| | Ch.C.2 | 0.0000 | -0.2837 | 0.0088 | 11.821e-03 | 0.227e-03 | 0.148e-03 |
| **-** | **-** | **m** | **m** | **m** | **rad** | **rad** | **rad** |

## UITGANGSPUNTEN VAN DE ANALYSE

Lineaire Elastische Analyse uitgevoerd

## KNIKLENGTEGEGEVENS

| Staaf | Profiel | Lokale Y-as | | | | Lokale Z-as | | |
|---|---|---|---|---|---|---|---|---|
| | | Lsys | methode | Lbuc | Lbuc/Lsys | methode | Lbuc | Lbuc/Lsys |
| C1 - V1 (0.000-1.200) | P10 | 1.200 | Handmatige Invoer | 1.200 | 1.00 | Handmatige Invoer | 1.200 | 1.00 |
| C2 - V1 (0.000-1.200) | P16 | 1.200 | Handmatige Invoer | 1.200 | 1.00 | Handmatige Invoer | 1.200 | 1.00 |
| C3 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C4 - V1 (0.000-3.321) | P2 | 3.320 | Handmatige Invoer | 3.321 | 1.00 | Handmatige Invoer | 3.321 | 1.00 |
| C5 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C6 - V1 (0.000-3.321) | P2 | 3.320 | Handmatige Invoer | 3.321 | 1.00 | Handmatige Invoer | 3.321 | 1.00 |
| C7 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C8 - V1 (0.000-3.321) | P2 | 3.320 | Handmatige Invoer | 3.321 | 1.00 | Handmatige Invoer | 3.321 | 1.00 |
| C9 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C10 - V1 (0.000-3.254) | P2 | 3.250 | Handmatige Invoer | 3.254 | 1.00 | Handmatige Invoer | 3.254 | 1.00 |
| C11 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C12 - V1 (0.000-3.254) | P2 | 3.250 | Handmatige Invoer | 3.254 | 1.00 | Handmatige Invoer | 3.254 | 1.00 |
| C13 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C14 - V1 (0.000-3.254) | P2 | 3.250 | Handmatige Invoer | 3.254 | 1.00 | Handmatige Invoer | 3.254 | 1.00 |

| Staaf | Profiel | Lokale Y-as | | | | Lokale Z-as | | |
|---|---|---|---|---|---|---|---|---|
| | | Lsys | methode | Lbuc | Lbuc/Lsys | methode | Lbuc | Lbuc/Lsys |
| C15 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C16 - V1 (0.000-3.188) | P2 | 3.190 | Handmatige Invoer | 3.188 | 1.00 | Handmatige Invoer | 3.188 | 1.00 |
| C17 - V1 (0.000-1.501) | P1 | 1.500 | Handmatige | 2.251 | 1.50 | Handmatige | 2.251 | 1.50 |

| Projectnaam | VFZ | | | | | Projectnummer | | | |
|---|---|---|---|---|---|---|---|---|---|
| Omschrijving | Controle sterkte | | | | | Constructeur | Ing. A. Azaroual | | |
| Opdrachtgever | | | | | | Eenheden | m, kN, kNm | | |
| C18 - V1 (0.000-3.188) | P2 | 3.190 | Invoer Handmatige | 3.188 | 1.00 | Invoer Handmatige | 3.188 | 1.00 | |
| C19 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C20 - V1 (0.000-3.188) | P2 | 3.190 | Invoer Handmatige | 3.188 | 1.00 | Invoer Handmatige | 3.188 | 1.00 | |
| C21 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C22 - V1 (0.000-3.122) | P2 | 3.120 | Invoer Handmatige | 3.122 | 1.00 | Invoer Handmatige | 3.122 | 1.00 | |
| C23 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C24 - V1 (0.000-3.122) | P2 | 3.120 | Invoer Handmatige | 3.122 | 1.00 | Invoer Handmatige | 3.122 | 1.00 | |
| C25 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C26 - V1 (0.000-3.122) | P2 | 3.120 | Invoer Handmatige | 3.122 | 1.00 | Invoer Handmatige | 3.122 | 1.00 | |
| C27 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C28 - V1 (0.000-3.056) | P2 | 3.060 | Invoer Handmatige | 3.056 | 1.00 | Invoer Handmatige | 3.056 | 1.00 | |
| C29 - V1 (0.000-3.056) | P2 | 3.060 | Invoer Handmatige | 3.056 | 1.00 | Invoer Handmatige | 3.056 | 1.00 | |
| C30 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C31 - V1 (0.000-3.056) | P2 | 3.060 | Invoer Handmatige | 3.056 | 1.00 | Invoer Handmatige | 3.056 | 1.00 | |
| C32 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C33 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C34 - V1 (0.000-2.991) | P2 | 2.990 | Invoer Handmatige | 2.991 | 1.00 | Invoer Handmatige | 2.991 | 1.00 | |
| C35 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C36 - V1 (0.000-2.991) | P2 | 2.990 | Invoer Handmatige | 2.991 | 1.00 | Invoer Handmatige | 2.991 | 1.00 | |
| C37 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C38 - V1 (0.000-2.991) | P2 | 2.990 | Invoer Handmatige | 2.991 | 1.00 | Invoer Handmatige | 2.991 | 1.00 | |
| C39 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C40 - V1 (0.000-2.926) | P2 | 2.930 | Invoer Handmatige | 2.926 | 1.00 | Invoer Handmatige | 2.926 | 1.00 | |
| C41 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C42 - V1 (0.000-2.926) | P2 | 2.930 | Invoer Handmatige | 2.926 | 1.00 | Invoer Handmatige | 2.926 | 1.00 | |
| C43 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C44 - V1 (0.000-2.926) | P2 | 2.930 | Invoer Handmatige | 2.926 | 1.00 | Invoer Handmatige | 2.926 | 1.00 | |
| C45 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C46 - V1 (0.000-2.862) | P2 | 2.860 | Invoer Handmatige | 2.862 | 1.00 | Invoer Handmatige | 2.862 | 1.00 | |
| C47 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C48 - V1 (0.000-2.862) | P2 | 2.860 | Invoer Handmatige | 2.862 | 1.00 | Invoer Handmatige | 2.862 | 1.00 | |
| C49 - V1 (0.000-1.501) | P1 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C50 - V1 (0.000-2.862) | P2 | 2.860 | Invoer Handmatige | 2.862 | 1.00 | Invoer Handmatige | 2.862 | 1.00 | |
| C51 - V1 (0.000-2.799) | P6 | 2.800 | Invoer Handmatige | 2.799 | 1.00 | Invoer Handmatige | 2.799 | 1.00 | |
| C52 - V1 (0.000-1.501) | P5 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |
| C53 - V1 (0.000-2.799) | P6 | 2.800 | Invoer Handmatige | 2.799 | 1.00 | Invoer Handmatige | 2.799 | 1.00 | |
| C54 - V1 (0.000-1.501) | P5 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 | |

| | | | |
|---|---|---|---|
| Projectnaam | VFZ | Projectnummer | |
| Omschrijving | Controle sterkte | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | Eenheden | m, kN, kNm |

| | | | Invoer | | | Invoer | | |
|---|---|---|---|---|---|---|---|---|
| **Staaf** | **Profiel** | | **Lokale Y-as** | | | | **Lokale Z-as** | |
| | | **Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** |
| C55 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C56 - V1 (0.000-2.799) | P6 | 2.800 | Handmatige Invoer | 2.799 | 1.00 | Handmatige Invoer | 2.799 | 1.00 |
| C57 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C58 - V1 (0.000-2.736) | P6 | 2.740 | Handmatige Invoer | 2.736 | 1.00 | Handmatige Invoer | 2.736 | 1.00 |
| C59 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C60 - V1 (0.000-2.736) | P6 | 2.740 | Handmatige Invoer | 2.736 | 1.00 | Handmatige Invoer | 2.736 | 1.00 |
| C61 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C62 - V1 (0.000-2.736) | P6 | 2.740 | Handmatige Invoer | 2.736 | 1.00 | Handmatige Invoer | 2.736 | 1.00 |
| C63 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C64 - V1 (0.000-2.673) | P6 | 2.670 | Handmatige Invoer | 2.673 | 1.00 | Handmatige Invoer | 2.673 | 1.00 |
| C65 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C66 - V1 (0.000-2.673) | P6 | 2.670 | Handmatige Invoer | 2.673 | 1.00 | Handmatige Invoer | 2.673 | 1.00 |
| C67 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C68 - V1 (0.000-2.673) | P6 | 2.670 | Handmatige Invoer | 2.673 | 1.00 | Handmatige Invoer | 2.673 | 1.00 |
| C69 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C70 - V1 (0.000-2.611) | P6 | 2.610 | Handmatige Invoer | 2.611 | 1.00 | Handmatige Invoer | 2.611 | 1.00 |
| C71 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C72 - V1 (0.000-2.611) | P6 | 2.610 | Handmatige Invoer | 2.611 | 1.00 | Handmatige Invoer | 2.611 | 1.00 |
| C73 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C74 - V1 (0.000-2.611) | P6 | 2.610 | Handmatige Invoer | 2.611 | 1.00 | Handmatige Invoer | 2.611 | 1.00 |
| C75 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C76 - V1 (0.000-2.550) | P6 | 2.550 | Handmatige Invoer | 2.550 | 1.00 | Handmatige Invoer | 2.550 | 1.00 |
| C77 - V1 (0.000-2.550) | P6 | 2.550 | Handmatige Invoer | 2.550 | 1.00 | Handmatige Invoer | 2.550 | 1.00 |
| C78 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C79 - V1 (0.000-2.550) | P6 | 2.550 | Handmatige Invoer | 2.550 | 1.00 | Handmatige Invoer | 2.550 | 1.00 |
| C80 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C81 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C82 - V1 (0.000-2.490) | P6 | 2.490 | Handmatige Invoer | 2.490 | 1.00 | Handmatige Invoer | 2.490 | 1.00 |
| C83 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C84 - V1 (0.000-2.490) | P6 | 2.490 | Handmatige Invoer | 2.490 | 1.00 | Handmatige Invoer | 2.490 | 1.00 |
| C85 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C86 - V1 (0.000-2.490) | P6 | 2.490 | Handmatige Invoer | 2.490 | 1.00 | Handmatige Invoer | 2.490 | 1.00 |
| C87 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige Invoer | 2.251 | 1.50 | Handmatige Invoer | 2.251 | 1.50 |
| C88 - V1 (0.000-2.431) | P6 | 2.430 | Handmatige Invoer | 2.431 | 1.00 | Handmatige Invoer | 2.431 | 1.00 |
| C89 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige | 2.251 | 1.50 | Handmatige | 2.251 | 1.50 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C90 - V1 (0.000-2.431) | P6 | 2.430 | Invoer Handmatige | 2.431 | 1.00 | Invoer Handmatige | 2.431 | 1.00 |
| C91 - V1 (0.000-1.501) | P5 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 |
| C92 - V1 (0.000-2.431) | P6 | 2.430 | Invoer Handmatige | 2.431 | 1.00 | Invoer Handmatige | 2.431 | 1.00 |
| C93 - V1 (0.000-1.501) | P5 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 |
| C94 - V1 (0.000-2.372) | P6 | 2.370 | Invoer Handmatige | 2.372 | 1.00 | Invoer Handmatige | 2.372 | 1.00 |

| **Staaf** | **Profiel** | | **Lokale Y-as** | | | **Lokale Z-as** | | |
|---|---|---|---|---|---|---|---|---|
| | | **Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** |
| C95 - V1 (0.000-1.501) | P5 | 1.500 | Handmatige | 2.251 | 1.50 | Handmatige | 2.251 | 1.50 |
| C96 - V1 (0.000-2.372) | P6 | 2.370 | Invoer Handmatige | 2.372 | 1.00 | Invoer Handmatige | 2.372 | 1.00 |
| C97 - V1 (0.000-2.372) | P6 | 2.370 | Invoer Handmatige | 2.372 | 1.00 | Invoer Handmatige | 2.372 | 1.00 |
| C98 - V1 (0.000-1.501) | P5 | 1.500 | Invoer Handmatige | 2.251 | 1.50 | Invoer Handmatige | 2.251 | 1.50 |
| C99 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C100 - V1 (0.000-2.139) | P10 | 2.140 | Invoer Handmatige | 2.139 | 1.00 | Invoer Handmatige | 2.139 | 1.00 |
| C101 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C102 - V1 (0.000-2.139) | P10 | 2.140 | Invoer Handmatige | 2.139 | 1.00 | Invoer Handmatige | 2.139 | 1.00 |
| C103 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C104 - V1 (0.000-2.139) | P10 | 2.140 | Invoer Handmatige | 2.139 | 1.00 | Invoer Handmatige | 2.139 | 1.00 |
| C105 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C106 - V1 (0.000-2.089) | P10 | 2.090 | Invoer Handmatige | 2.089 | 1.00 | Invoer Handmatige | 2.089 | 1.00 |
| C107 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C108 - V1 (0.000-2.089) | P10 | 2.090 | Invoer Handmatige | 2.089 | 1.00 | Invoer Handmatige | 2.089 | 1.00 |
| C109 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C110 - V1 (0.000-2.089) | P10 | 2.090 | Invoer Handmatige | 2.089 | 1.00 | Invoer Handmatige | 2.089 | 1.00 |
| C111 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C112 - V1 (0.000-2.040) | P10 | 2.040 | Invoer Handmatige | 2.040 | 1.00 | Invoer Handmatige | 2.040 | 1.00 |
| C113 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C114 - V1 (0.000-2.040) | P10 | 2.040 | Invoer Handmatige | 2.040 | 1.00 | Invoer Handmatige | 2.040 | 1.00 |
| C115 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C116 - V1 (0.000-2.040) | P10 | 2.040 | Invoer Handmatige | 2.040 | 1.00 | Invoer Handmatige | 2.040 | 1.00 |
| C117 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C118 - V1 (0.000-1.992) | P10 | 1.990 | Invoer Handmatige | 1.992 | 1.00 | Invoer Handmatige | 1.992 | 1.00 |
| C119 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C120 - V1 (0.000-1.992) | P10 | 1.990 | Invoer Handmatige | 1.992 | 1.00 | Invoer Handmatige | 1.992 | 1.00 |
| C121 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C122 - V1 (0.000-1.992) | P10 | 1.990 | Invoer Handmatige | 1.992 | 1.00 | Invoer Handmatige | 1.992 | 1.00 |
| C123 - V1 (0.000-1.945) | P10 | 1.940 | Invoer Handmatige | 1.945 | 1.00 | Invoer Handmatige | 1.945 | 1.00 |
| C124 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C125 - V1 (0.000-1.945) | P10 | 1.940 | Invoer Handmatige | 1.945 | 1.00 | Invoer Handmatige | 1.945 | 1.00 |
| C126 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C127 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C128 - V1 (0.000-1.945) | P10 | 1.940 | Invoer Handmatige | 1.945 | 1.00 | Invoer Handmatige | 1.945 | 1.00 |
| C129 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C130 - V1 (0.000-1.898) | P10 | 1.900 | Invoer Handmatige | 1.898 | 1.00 | Invoer Handmatige | 1.898 | 1.00 |
| C131 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C132 - V1 (0.000-1.898) | P10 | 1.900 | Invoer Handmatige | 1.898 | 1.00 | Invoer Handmatige | 1.898 | 1.00 |
| C133 - V1 (0.000-1.200) | P9 | 1.200 | Invoer Handmatige | 1.801 | 1.50 | Invoer Handmatige | 1.801 | 1.50 |
| C134 - V1 (0.000-1.898) | P10 | 1.900 | Invoer Handmatige | 1.898 | 1.00 | Invoer Handmatige | 1.898 | 1.00 |

| **Staaf** | **Profiel** | | **Lokale Y-as** | | | **Lokale Z-as** | | |
|---|---|---|---|---|---|---|---|---|
| | | **Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** |
| C135 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C136 - V1 (0.000-1.852) | P10 | 1.850 | Handmatige Invoer | 1.852 | 1.00 | Handmatige Invoer | 1.852 | 1.00 |
| C137 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C138 - V1 (0.000-1.852) | P10 | 1.850 | Handmatige Invoer | 1.852 | 1.00 | Handmatige Invoer | 1.852 | 1.00 |
| C139 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C140 - V1 (0.000-1.852) | P10 | 1.850 | Handmatige Invoer | 1.852 | 1.00 | Handmatige Invoer | 1.852 | 1.00 |
| C141 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C142 - V1 (0.000-1.806) | P10 | 1.810 | Handmatige Invoer | 1.806 | 1.00 | Handmatige Invoer | 1.806 | 1.00 |
| C143 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C144 - V1 (0.000-1.806) | P10 | 1.810 | Handmatige Invoer | 1.806 | 1.00 | Handmatige Invoer | 1.806 | 1.00 |
| C145 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C146 - V1 (0.000-1.806) | P10 | 1.810 | Handmatige Invoer | 1.806 | 1.00 | Handmatige Invoer | 1.806 | 1.00 |
| C147 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C148 - V1 (0.000-1.762) | P10 | 1.760 | Handmatige Invoer | 1.762 | 1.00 | Handmatige Invoer | 1.762 | 1.00 |
| C149 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C150 - V1 (0.000-1.762) | P10 | 1.760 | Handmatige Invoer | 1.762 | 1.00 | Handmatige Invoer | 1.762 | 1.00 |
| C151 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C152 - V1 (0.000-1.762) | P10 | 1.760 | Handmatige Invoer | 1.762 | 1.00 | Handmatige Invoer | 1.762 | 1.00 |
| C153 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C154 - V1 (0.000-1.718) | P10 | 1.720 | Handmatige Invoer | 1.718 | 1.00 | Handmatige Invoer | 1.718 | 1.00 |
| C155 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C156 - V1 (0.000-1.718) | P10 | 1.720 | Handmatige Invoer | 1.718 | 1.00 | Handmatige Invoer | 1.718 | 1.00 |
| C157 - V1 (0.000-1.200) | P9 | 1.200 | Handmatige Invoer | 1.801 | 1.50 | Handmatige Invoer | 1.801 | 1.50 |
| C158 - V1 (0.000-1.718) | P10 | 1.720 | Handmatige Invoer | 1.718 | 1.00 | Handmatige Invoer | 1.718 | 1.00 |
| C159 - V1 (0.000-1.200) | P10 | 1.200 | Handmatige Invoer | 1.200 | 1.00 | Handmatige Invoer | 1.200 | 1.00 |

| | | | Invoer | | | Invoer | | |
|---|---|---|---|---|---|---|---|---|
| C160 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C161 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C162 - V1 (0.000-1.200) | P10 | 1.200 | Handmatige | 1.200 | 1.00 | Handmatige | 1.200 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C163 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C164 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C165 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C166 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C167 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C168 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C169 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C170 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C171 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C172 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C173 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C174 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |

| **Staaf** | **Profiel** | | **Lokale Y-as** | | | **Lokale Z-as** | | |
|---|---|---|---|---|---|---|---|---|
| | | **Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** | **methode** | **Lbuc** | **Lbuc/Lsys** |
| C175 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C176 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C177 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C178 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C179 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C180 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C181 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C182 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C183 - V1 (0.000-1.000) | P15 | 1.000 | Handmatige | 1.500 | 1.50 | Handmatige | 1.500 | 1.50 |
| | | | Invoer | | | Invoer | | |
| C184 - V1 (0.000-1.562) | P16 | 1.560 | Handmatige | 1.562 | 1.00 | Handmatige | 1.562 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C185 - V1 (0.000-1.200) | P16 | 1.200 | Handmatige | 1.200 | 1.00 | Handmatige | 1.200 | 1.00 |
| | | | Invoer | | | Invoer | | |
| C186 - V1 (0.000-1.200) | P16 | 1.200 | Handmatige | 1.200 | 1.00 | Handmatige | 1.200 | 1.00 |
| | | | Invoer | | | Invoer | | |
| **-** | **-** | **m** | **-** | **m** | **-** | **-** | **m** | **-** |

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

| **Veld** | **Toetsing** | **Combinatie** | **Artikel** | **UC max** |
|---|---|---|---|---|
| C1-V1 (0.000-1.200) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(NB.33) | 0.04 |
| C2-V1 (0.000-1.200) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(NB.33) | 0.05 |
| C3-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.53 |
| C4-V1 (0.000-3.321) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.25 |
| C5-V1 (0.000-1.501) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.1) | 0.57 |
| C6-V1 (0.000-3.321) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.25 |
| C7-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.67 |
| C8-V1 (0.000-3.321) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.47 |

| | | | | |
|---|---|---|---|---|
| C9-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.46 |
| C10-V1 (0.000-3.254) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.28 |
| C11-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.47 |
| C12-V1 (0.000-3.254) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.55 |
| C13-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.59 |
| C14-V1 (0.000-3.254) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.52 |
| C15-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.42 |
| C16-V1 (0.000-3.188) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.31 |
| C17-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.47 |

| **Veld** | **Toetsing** | **Combinatie** | **Artikel** | **UC max** |
|---|---|---|---|---|
| C18-V1 (0.000-3.188) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.29 |
| C19-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.57 |
| C20-V1 (0.000-3.188) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.51 |
| C21-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.41 |
| C22-V1 (0.000-3.122) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.28 |
| C23-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.44 |
| C24-V1 (0.000-3.122) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.53 |
| C25-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.54 |
| C26-V1 (0.000-3.122) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.50 |
| C27-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.39 |
| C28-V1 (0.000-3.056) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.31 |
| C29-V1 (0.000-3.056) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.28 |
| C30-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.43 |
| C31-V1 (0.000-3.056) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.48 |
| C32-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.51 |
| C33-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.38 |
| C34-V1 (0.000-2.991) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.27 |
| C35-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.40 |
| C36-V1 (0.000-2.991) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.50 |
| C37-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.49 |
| C38-V1 (0.000-2.991) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.47 |
| C39-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.35 |
| C40-V1 (0.000-2.926) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.30 |
| C41-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.38 |
| C42-V1 (0.000-2.926) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.27 |
| C43-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.46 |
| C44-V1 (0.000-2.926) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.44 |
| C45-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.33 |
| C46-V1 (0.000-2.862) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.26 |
| C47-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.35 |
| C48-V1 (0.000-2.862) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.46 |
| C49-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.43 |
| C50-V1 (0.000-2.862) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.43 |
| C51-V1 (0.000-2.799) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.32 |
| C52-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.50 |
| C53-V1 (0.000-2.799) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.28 |
| C54-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.57 |
| C55-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.69 |
| C56-V1 (0.000-2.799) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.49 |
| C57-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.47 |
| C58-V1 (0.000-2.736) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.28 |
| C59-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.52 |
| C60-V1 (0.000-2.736) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.52 |
| C61-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.64 |
| C62-V1 (0.000-2.736) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.48 |
| C63-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.43 |
| C64-V1 (0.000-2.673) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.33 |

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|---|---|---|---|---|
| C65-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.49 |
| C66-V1 (0.000-2.673) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.29 |
| C67-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.59 |
| C68-V1 (0.000-2.673) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.46 |
| C69-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.42 |
| C70-V1 (0.000-2.611) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.28 |
| C71-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.44 |
| C72-V1 (0.000-2.611) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.50 |
| C73-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.54 |
| C74-V1 (0.000-2.611) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.45 |
| C75-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.37 |
| C76-V1 (0.000-2.550) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.32 |
| C77-V1 (0.000-2.550) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.27 |

| **Veld** | **Toetsing** | **Combinatie** | **Artikel** | **UC max** |
|---|---|---|---|---|
| C78-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.41 |
| C79-V1 (0.000-2.550) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.43 |
| C80-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.49 |
| C81-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.35 |
| C82-V1 (0.000-2.490) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.26 |
| C83-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.36 |
| C84-V1 (0.000-2.490) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.44 |
| C85-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.44 |
| C86-V1 (0.000-2.490) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.40 |
| C87-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.30 |
| C88-V1 (0.000-2.431) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.28 |
| C89-V1 (0.000-1.501) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.34 |
| C90-V1 (0.000-2.431) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.24 |
| C91-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.40 |
| C92-V1 (0.000-2.431) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.37 |
| C93-V1 (0.000-1.501) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.26 |
| C94-V1 (0.000-2.372) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.23 |
| C95-V1 (0.000-1.501) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.1) | 0.29 |
| C96-V1 (0.000-2.372) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.38 |
| C97-V1 (0.000-2.372) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.34 |
| C98-V1 (0.000-1.501) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.35 |
| C99-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.44 |
| C100-V1 (0.000-2.139) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.35 |
| C101-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.50 |
| C102-V1 (0.000-2.139) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.30 |
| C103-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.58 |
| C104-V1 (0.000-2.139) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.56 |
| C105-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.39 |
| C106-V1 (0.000-2.089) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.28 |
| C107-V1 (0.000-1.200) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.1) | 0.43 |
| C108-V1 (0.000-2.089) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.57 |
| C109-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.52 |
| C110-V1 (0.000-2.089) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.51 |
| C111-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.1) | 0.33 |
| C112-V1 (0.000-2.040) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.32 |
| C113-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.38 |
| C114-V1 (0.000-2.040) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.27 |
| C115-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.45 |
| C116-V1 (0.000-2.040) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.47 |
| C117-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.27 |
| C118-V1 (0.000-1.992) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.25 |
| C119-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.32 |
| C120-V1 (0.000-1.992) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.49 |

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|---|---|---|---|---|
| C121-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.39 |
| C122-V1 (0.000-1.992) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.44 |
| C123-V1 (0.000-1.945) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.28 |
| C124-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.21 |
| C125-V1 (0.000-1.945) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.24 |
| C126-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.29 |
| C127-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.33 |
| C128-V1 (0.000-1.945) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.40 |
| C129-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.19 |
| C130-V1 (0.000-1.898) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.21 |
| C131-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.22 |
| C132-V1 (0.000-1.898) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.40 |
| C133-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.28 |
| C134-V1 (0.000-1.898) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.36 |
| C135-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.14 |
| C136-V1 (0.000-1.852) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.23 |
| C137-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.20 |

| **Veld** | **Toetsing** | **Combinatie** | **Artikel** | **UC max** |
|---|---|---|---|---|
| C138-V1 (0.000-1.852) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.19 |
| C139-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.23 |
| C140-V1 (0.000-1.852) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.31 |
| C141-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.13 |
| C142-V1 (0.000-1.806) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.16 |
| C143-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.15 |
| C144-V1 (0.000-1.806) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.29 |
| C145-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.18 |
| C146-V1 (0.000-1.806) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.27 |
| C147-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.09 |
| C148-V1 (0.000-1.762) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.17 |
| C149-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.12 |
| C150-V1 (0.000-1.762) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.14 |
| C151-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.14 |
| C152-V1 (0.000-1.762) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.22 |
| C153-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.07 |
| C154-V1 (0.000-1.718) | Doorsnede | Pe.C.5 | NEN-EN1993-1-1(6.5) | 0.13 |
| C155-V1 (0.000-1.200) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.09 |
| C156-V1 (0.000-1.718) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.22 |
| C157-V1 (0.000-1.200) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.10 |
| C158-V1 (0.000-1.718) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.20 |
| C159-V1 (0.000-1.200) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(NB.33) | 0.03 |
| C160-V1 (0.000-1.000) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.05 |
| C161-V1 (0.000-1.562) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(6.5) | 0.19 |
| C162-V1 (0.000-1.200) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(NB.33) | 0.03 |
| C163-V1 (0.000-1.000) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.08 |
| C164-V1 (0.000-1.562) | Doorsnede | Pe.C.5 | NEN-EN1993-1-1(6.5) | 0.15 |
| C165-V1 (0.000-1.000) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.09 |
| C166-V1 (0.000-1.562) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.26 |
| C167-V1 (0.000-1.000) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(NB.33) | 0.04 |
| C168-V1 (0.000-1.562) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.13 |
| C169-V1 (0.000-1.000) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(NB.33) | 0.05 |
| C170-V1 (0.000-1.562) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.27 |
| C171-V1 (0.000-1.000) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.06 |
| C172-V1 (0.000-1.562) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.24 |
| C173-V1 (0.000-1.000) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(NB.33) | 0.06 |
| C174-V1 (0.000-1.562) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(6.5) | 0.12 |
| C175-V1 (0.000-1.000) | Doorsnede | Pe.C.5 | NEN-EN1993-1-1(NB.33) | 0.07 |
| C176-V1 (0.000-1.562) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.10 |

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|---|---|---|---|---|
| Projectnaam | VFZ | | Projectnummer | |
| Omschrijving | Controle sterkte | | Constructeur | Ing. A. Azaroual |
| Opdrachtgever | | | Eenheden | m, kN, kNm |

| | | | | |
|---|---|---|---|---|
| C177-V1 (0.000-1.000) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(NB.33) | 0.05 |
| C178-V1 (0.000-1.562) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.18 |
| C179-V1 (0.000-1.562) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(6.5) | 0.04 |
| C180-V1 (0.000-1.000) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(NB.33) | 0.06 |
| C181-V1 (0.000-1.562) | Stabiliteit | Pe.C.2 | NEN-EN1993-1-1(6.61&6.62) | 0.09 |
| C182-V1 (0.000-1.000) | Doorsnede | Pe.C.5 | NEN-EN1993-1-1(NB.33) | 0.07 |
| C183-V1 (0.000-1.000) | Doorsnede | Pe.C.2 | NEN-EN1993-1-1(NB.33) | 0.05 |
| C184-V1 (0.000-1.562) | Stabiliteit | Pe.C.3 | NEN-EN1993-1-1(6.61&6.62) | 0.09 |
| C185-V1 (0.000-1.200) | Doorsnede | Pe.C.4 | NEN-EN1993-1-1(NB.33) | 0.04 |
| C186-V1 (0.000-1.200) | Doorsnede | Pe.C.3 | NEN-EN1993-1-1(NB.33) | 0.06 |

# Bijlage 3:

# fundatie berekening Leegte Bouwadvies

**Project:**
**Project no:**
**Author:**

IDEA StatiCa
Calculate yesterday's estimates

## Project data

| | |
|---|---|
| Project name | |
| Project number | |
| Author | |
| Description | |
| Date | 5/7/2020 |
| Design code | EN |

## Material

| | |
|---|---|
| Steel | S 355 |
| Concrete | C25/30 |

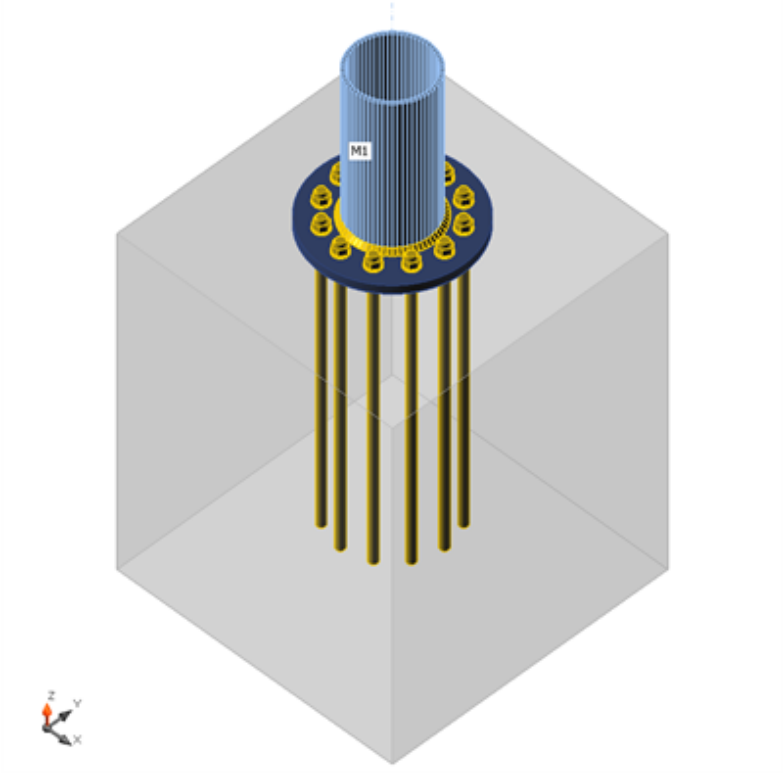
# Project item CON1

## Design

| | |
|---|---|
| Name | CON1 |
| Description | |
| Analysis | Stress, strain/ simplified loading |

### Beams and columns

| Name | Cross-section | β – Direction [°] | γ - Pitch [°] | α - Rotation [°] | Offset ex [mm] | Offset ey [mm] | Offset ez [mm] | Forces in |
|---|---|---|---|---|---|---|---|---|
| M1 | 1 - B219.1/10 | 0.0 | -90.0 | 0.0 | 0 | 0 | 0 | Node |




### Cross-sections

| Name | Material |
|---|---|
| 1 - B219.1/10 | S 355 |

### Anchors

| Name | Bolt assembly | Diameter [mm] | fu [MPa] | Gross area [$mm^2$] |
|---|---|---|---|---|
| M24 8.8 | M24 8.8 | 24 | 800.0 | 452 |

### Load effects (equilibrium not required)

| Name | Member | N [kN] | Vy [kN] | Vz [kN] | Mx [kNm] | My [kNm] | Mz [kNm] |
|---|---|---|---|---|---|---|---|
| LE1 | M1 | -1324.0 | 84.5 | -18.3 | 0.0 | -3.4 | 15.7 |

## Foundation block

| Item | Value | Unit |
|---|---|---|
| **CB 1** | | |
| Dimensions | 820 x 820 | mm |
| Depth | 1000 | mm |
| Anchor | M24 8.8 | |
| Anchoring length | 825 | mm |
| Shear force transfer | Anchors | |
| Gap | 30 | mm |

# Check

## Summary

| Name | Value | Status |
|---|---|---|
| Analysis | 100.0% | OK |
| Plates | 0.7 < 5% | OK |
| Anchors | 98.1 < 100% | OK |
| Welds | 98.1 < 100% | OK |
| Concrete block | Not calculated | |
| Buckling | Not calculated | |

## Plates

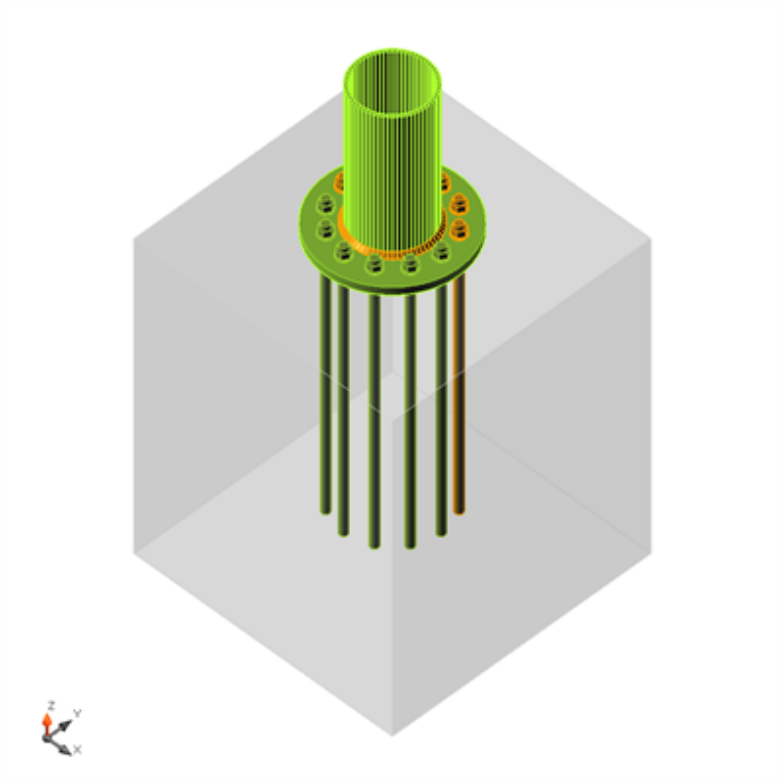
| Name | Thickness [mm] | Loads | $\sigma_{Ed}$ [MPa] | $\varepsilon_{Pl}$ [%] | Status |
|---|---|---|---|---|---|
| M1 | 10.0 | LE1 | 356.2 | 0.6 | OK |
| BP1 | 25.0 | LE1 | 356.4 | 0.7 | OK |

### Design data

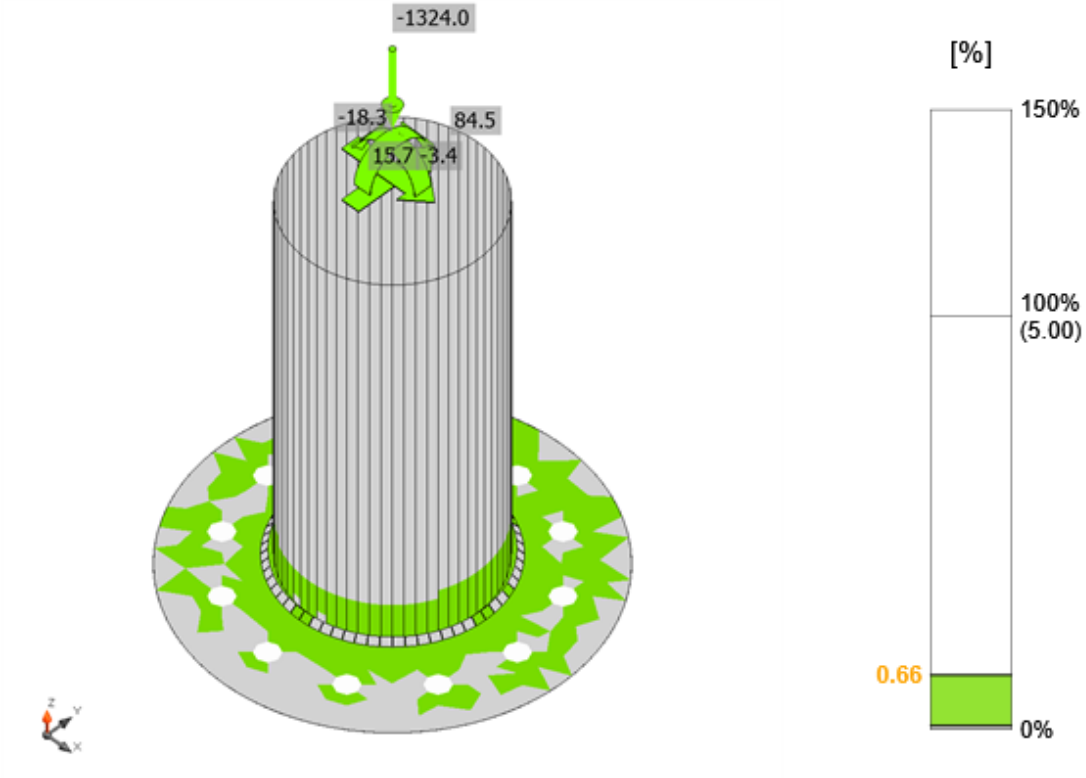
| Material | $f_y$ [MPa] | $\varepsilon_{lim}$ [%] |
|---|---|---|
| S 355 | 355.0 | 5.0 |

### Symbol explanation

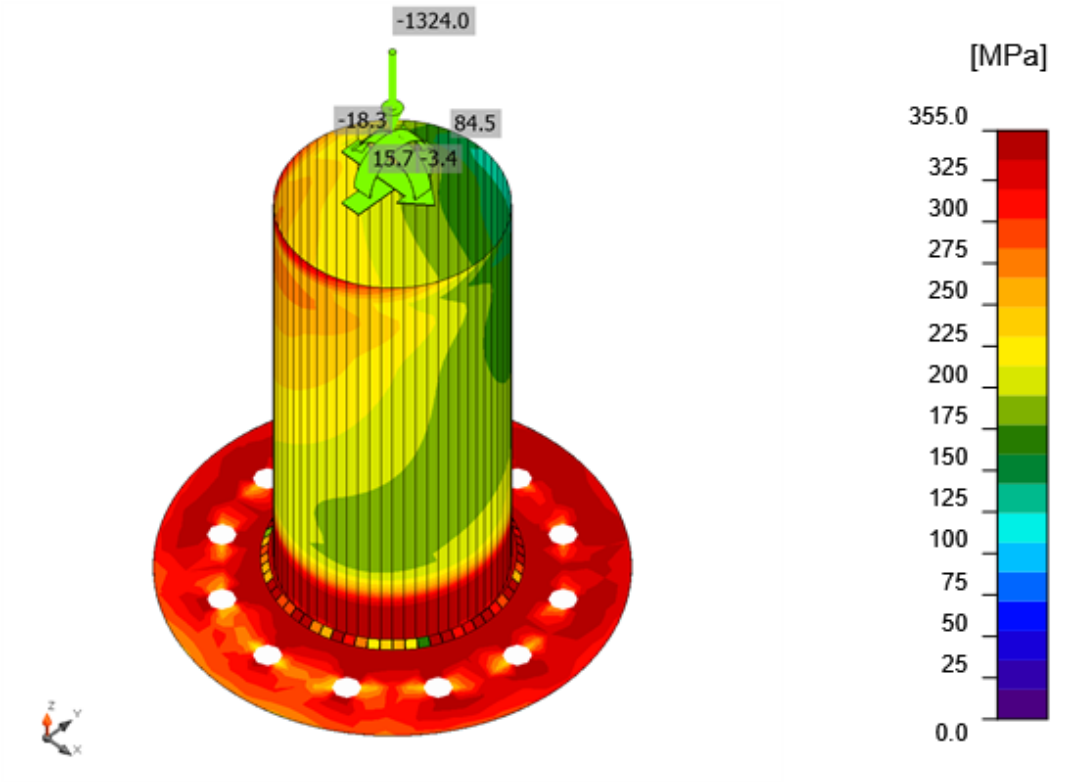
| | |
|---|---|
| $\varepsilon_{Pl}$ | Strain |
| $\sigma_{Ed}$ | Eq. stress |
| $f_y$ | Yield strength |
| $\varepsilon_{lim}$ | Limit of plastic strain |



*Overall check, LE1*

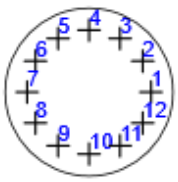



*Strain check, LE1*




*Equivalent stress, LE1*

## Anchors in compression

| | Name | Bolt assembly | Loads | $F_c$ [kN] | V [kN] | M [kNm] | $N_{b,Rd}$ [kN] | $V_{pl,Rd}$ [kN] | $M_{pl,Rd}$ [kNm] | $Ut_c$ [%] | $Ut_s$ [%] | $Ut_b$ [%] | $Ut_{cb}$ [%] | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | A1 | M24 8.8 - 1 | LE1 | -127.1 | 7.2 | 0.2 | 165.8 | 88.1 | 0.8 | 76.6 | 1.2 | 21.5 | 98.1 | OK |
| | A2 | M24 8.8 - 1 | LE1 | -126.9 | 7.1 | 0.2 | 165.8 | 88.1 | 0.8 | 76.5 | 1.2 | 21.6 | 98.1 | OK |
| | A3 | M24 8.8 - 1 | LE1 | -123.3 | 7.3 | 0.2 | 165.8 | 88.1 | 0.8 | 74.4 | 1.2 | 23.1 | 97.4 | OK |
| | A4 | M24 8.8 - 1 | LE1 | -114.9 | 7.9 | 0.2 | 165.8 | 88.1 | 0.8 | 69.3 | 1.7 | 26.6 | 95.9 | OK |
| | A5 | M24 8.8 - 1 | LE1 | -103.7 | 8.7 | 0.3 | 165.8 | 88.1 | 0.8 | 62.5 | 1.5 | 31.2 | 93.7 | OK |
| | A6 | M24 8.8 - 1 | LE1 | -98.2 | 8.2 | 0.3 | 165.8 | 88.1 | 0.8 | 59.2 | 1.4 | 32.8 | 92.0 | OK |
| | A7 | M24 8.8 - 1 | LE1 | -88.2 | 7.6 | 0.3 | 165.8 | 88.1 | 0.8 | 53.2 | 1.8 | 36.2 | 89.4 | OK |
| | A8 | M24 8.8 - 1 | LE1 | -90.5 | 9.9 | 0.3 | 165.8 | 88.1 | 0.8 | 54.5 | 1.7 | 36.3 | 90.8 | OK |
| | A9 | M24 8.8 - 1 | LE1 | -98.1 | 9.8 | 0.3 | 165.8 | 88.1 | 0.8 | 59.1 | 2.1 | 33.2 | 92.4 | OK |
| | A10 | M24 8.8 - 1 | LE1 | -109.2 | 8.9 | 0.2 | 165.8 | 88.1 | 0.8 | 65.9 | 1.5 | 28.6 | 94.5 | OK |
| | A11 | M24 8.8 - 1 | LE1 | -119.2 | 8.0 | 0.2 | 165.8 | 88.1 | 0.8 | 71.9 | 1.4 | 24.5 | 96.4 | OK |
| | A12 | M24 8.8 - 1 | LE1 | -124.7 | 7.5 | 0.2 | 165.8 | 88.1 | 0.8 | 75.2 | 1.3 | 22.4 | 97.6 | OK |

**Symbol explanation**

| | |
|---|---|
| $F_c$ | Compressive force |
| V | Resultant of shear forces Vy, Vz in bolt |
| M | Bending moment |
| $N_{b,Rd}$ | Compressive resistance – EN 1993-1-1 Cl. 6.3 |
| $V_{pl,Rd}$ | Shear resistance – EN 1993-1-1 Cl. 6.2.6 |
| $M_{pl,Rd}$ | Bending resistance – EN 1993-1-1 Cl. 6.2.5 |
| $Ut_c$ | Utilization in compression |
| $Ut_s$ | Utilization in shear |
| $Ut_b$ | Utilization in bending |
| $Ut_{cb}$ | Utilization in compression and bending - linear interaction |

## Welds (Plastic redistribution)

| Item | Edge | Throat th. [mm] | Length [mm] | Loads | $\sigma_{w,Ed}$ [MPa] | $\varepsilon_{Pl}$ [%] | $\sigma_{\perp}$ [MPa] | $\tau_{\parallel}$ [MPa] | $\tau_{\perp}$ [MPa] | Ut [%] | $Ut_c$ [%] | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP1 | M1 | ◢9.0 | 656 | LE1 | 427.2 | 0.2 | -212.2 | -188.5 | 101.5 | 98.1 | 78.7 | OK |

**Design data**

| | $\beta_w$ [-] | $\sigma_{w,Rd}$ [MPa] | 0.9 σ [MPa] |
|---|---|---|---|
| S 355 | 0.90 | 435.6 | 352.8 |

**Symbol explanation**

| | |
|---|---|
| $\varepsilon_{Pl}$ | Strain |
| $\sigma_{w,Ed}$ | Equivalent stress |
| $\sigma_{w,Rd}$ | Equivalent stress resistance |
| $\sigma_{\perp}$ | Perpendicular stress |
| $\tau_{\parallel}$ | Shear stress parallel to weld axis |
| $\tau_{\perp}$ | Shear stress perpendicular to weld axis |
| 0.9 σ | Perpendicular stress resistance - 0.9*fu/γM2 |
| $\beta_w$ | Corelation factor EN 1993-1-8 tab. 4.1 |
| Ut | Utilization |
| Utc | Weld capacity utilization |

## Buckling

**Buckling analysis was not calculated.**

# Code settings

| Item | Value | Unit | Reference |
|---|---|---|---|
| $\gamma_{M0}$ | 1.00 | - | EN 1993-1-1: 6.1 |
| $\gamma_{M1}$ | 1.00 | - | EN 1993-1-1: 6.1 |
| $\gamma_{M2}$ | 1.25 | - | EN 1993-1-1: 6.1 |
| $\gamma_{M3}$ | 1.25 | - | EN 1993-1-8: 2.2 |
| $\gamma_C$ | 1.50 | - | EN 1992-1-1: 2.4.2.4 |
| $\gamma_{Inst}$ | 1.20 | - | ETAG 001-C: 3.2.1 |
| Joint coefficient βj | 0.67 | - | EN 1993-1-8: 6.2.5 |

| Item | Value | Unit | Reference |
|---|---|---|---|
| Effective area - influence of mesh size | 0.10 | - | |
| Friction coefficient - concrete | 0.25 | - | EN 1993-1-8 |
| Friction coefficient in slip-resistance | 0.30 | - | EN 1993-1-8 tab 3.7 |
| Limit plastic strain | 0.05 | - | EN 1993-1-5 |
| Weld stress evaluation | Plastic redistribution | | |
| Detailing | No | | |
| Distance between bolts [d] | 2.20 | - | EN 1993-1-8: tab 3.3 |
| Distance between bolts and edge [d] | 1.20 | - | EN 1993-1-8: tab 3.3 |
| Concrete breakout resistance | Yes | | ETAG 001-C |
| Use calculated αb in bearing check. | Yes | | EN 1993-1-8: tab 3.4 |
| Cracked concrete | Yes | | |
| Local deformation check | No | | |
| Local deformation limit | 0.03 | - | CIDECT DG 1, 3 - 1.1 |
| Geometrical nonlinearity (GMNA) | Yes | | Allow large deformations of hollow sections |
| Braced system | No | | |