

# BOERKOEL

BOUWTECHNISCH ADVIES- EN  
KONSTRUKTIEBUREAU

Boerkoel Utrecht  
Wielewaal 34  
3435 AR Nieuwegein  
Telefoon 0641474257

[iboerkoel@hotmail.com](mailto:iboerkoel@hotmail.com)

Bank:  
NL96 RABO 0364193751

OB-nummer :  
NL 0794-26.694B.01

## STATISCHE BEREKENING

**Project:** GILDENBORGLAAN 13  
NIEUWEGEIN

**Projectnr:** 19.078

**Ontwerp:** BLONK + HEUVELINK ARCHITEKTEN  
NIEUWEGEIN

Dec 2019  
Ing J.C.Grimmelikhuijzen

NEN-EN 1991 Belastingen op constructies

NEN-EN 1992 Ontwerp en berekening van betonconstructies

NEN-EN 1993 Ontwerp en berekening van staalconstructies

## Materialen

Indien niet anders vermeld

|       |        |
|-------|--------|
| Beton | C20/25 |
| Staal | S235   |
| Hout  | C18    |

|                   |         |
|-------------------|---------|
| Bestaande bouw    |         |
| Referentieperiode | 25 jaar |
| Gevolgklasse      | CC1     |

|                     |           |
|---------------------|-----------|
| Veiligheidsfactoren |           |
| Eigen gewicht       | 1,08 1,35 |
| Nuttige belasting   | 1,35      |

# BOERKOEL UTRECHT

werk: 19078

onderdeel: GILDENBORG LAAN 13

blad: 1

STATISCHE BEREKENING TEN  
BEHOEF VAN DE UITBREIDING  
VAN DE WONING GILDENBORG  
TE NIEUWEGEIN

WONING

KL CCI

2 HZ GW 1.00

2 NUTTG 1.35

BESTAANDE BEBOUWINGEN

OP STAAL GEFUNDEERD

KOPGEVEL VAN DE UITBOUW

STROOFT MET EEN BESTAANDE

KEERWAND WELKE NIET BRAST

NAG WORDEN



# BOERKOEL UTRECHT

werk: 19078

onderdeel: GILDENBORGVAAN 13

blad 2

## BELASTINGEN

DANNENKAP 0.65 KN/m<sup>2</sup>

VERID VLOER

HOUTEN VLOER 0.5 KN/m<sup>2</sup>

SEP 0.5 "

NUTTIG 1.75 "

## BELANGE GROND VLOER

SYST VLOER 3 KN/m<sup>2</sup>

SEP 0.5 "

NUTTIG 1.75 "

KONSTRUKTIEF IS MET

OPRIJNGEN VAN DE BUITENGEEL

BOUW DE KEERWAND MAATGEVEND



# BOERKOEL UTRECHT

werk: 19078

onderdeel: GILDENBURGLAAN 13

blad: 3

OPP LENS

$$2.1 \times 5.6 + 3 \times \frac{1.1}{2} + 4.25 \times 2$$

$$= 22.7 \text{ m}^2$$

$$P_{LI} 2 \times 3.8 = 7.6 \text{ m}^2$$

$$G_{EW} \text{ mW } (22.7 - 7.6) \times 2 = 30.2 \text{ kN}$$

$$\text{PER ZIJDE } \frac{30.2}{2} = 15.1 \text{ kN}$$

$$L 100.200.10 \quad L = 1.8 \text{ m}$$

$$\alpha = 1.35$$

$$Q = \frac{1.35 \times 15.1}{1.8} = 11.3 \text{ kN/m}$$

$$m_{OH} = 1.8 \times 11.3 \times 1.8^2$$

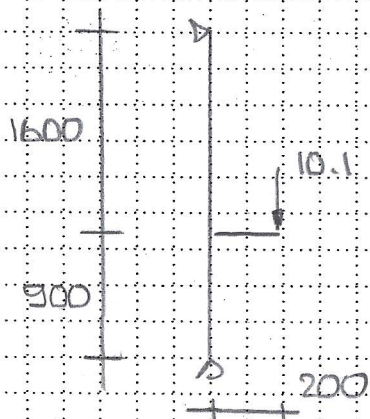
$$= 4.6 \text{ kN m}$$

$$L 100.200.10 \quad u_c = \frac{4.6}{2.1.8} = 0.21$$

PRAKTISCHE KEUZE

$$R = \frac{1.35 \times 15.1}{2} = 10.1 \text{ kN}$$

## KOLON MEIODA



$$N = 0.2 \times 10.1 = 2 \text{ KN NR}$$

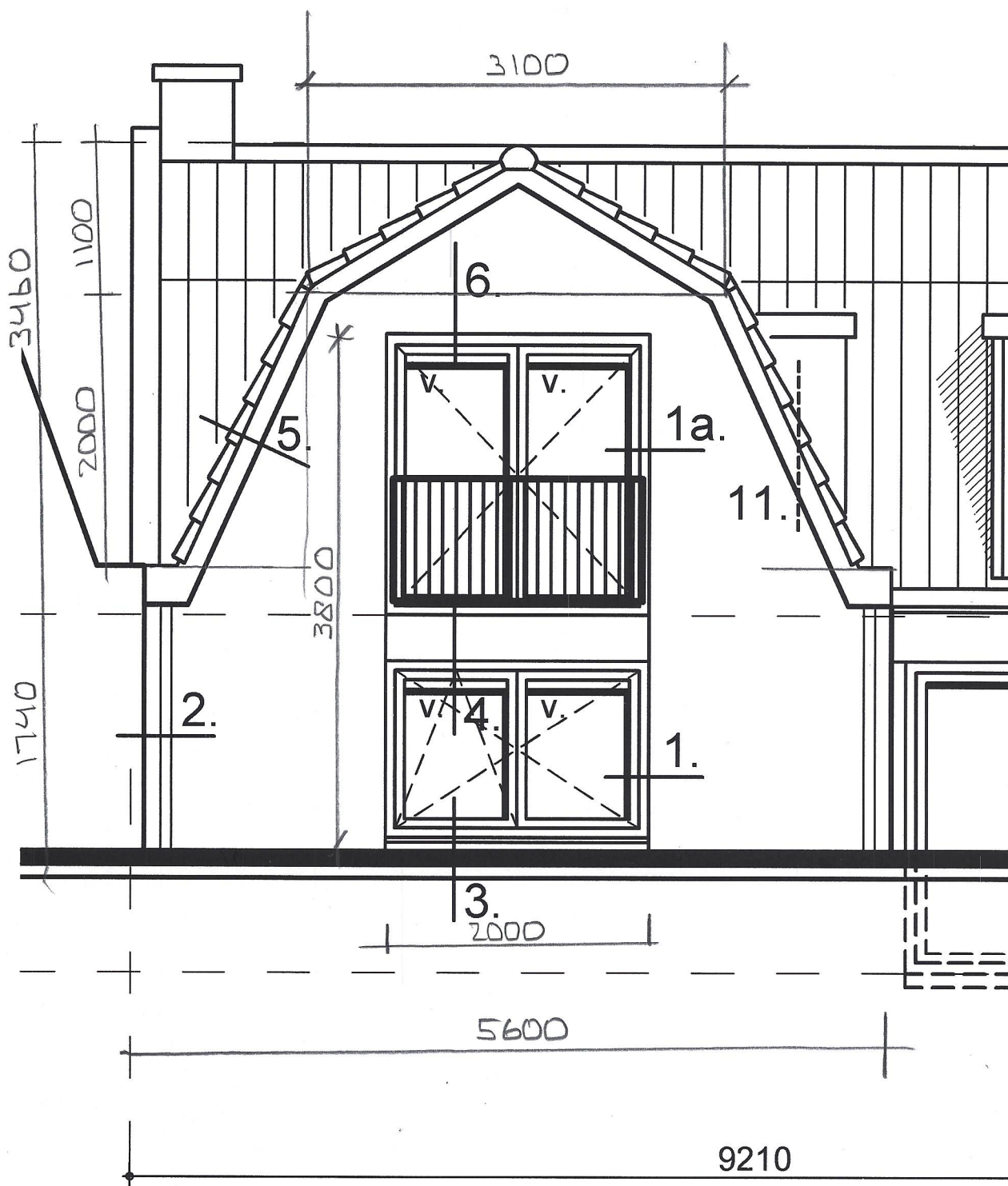
$$H = \frac{2}{2.5} = 0.8 \text{ KN}$$

KOLON VAN BOVENZIDE

AF STEUNEN MET  $\pm 60 \times 6$ 

C PRAKTIJSCH





zuidgevel  
gewijzigd.



# BOERKOEL UTRECHT

werk: 19078

onderdeel: GILDENBORGLAAN 13

blad: 6

BALKUAAL DAK

BESTAANDE KAP DIENT NOG

INGEMETEN WORDEN

NOKGORDIJN

L = 3800

1,4 NTR KAP DRAGEND

94 x 196

ZIE BYLAGE

BALKUAAL OERD ODER

L = 3300

71 x 171 - 500

ZIE BYLAGE

RAUWELIJN TPO PUI

L = 2200

1,7 NTR ODER DRAGEND

2 x 71 x 171

ZIE BYLAGE

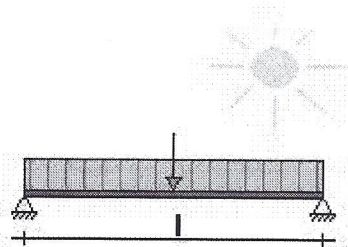
Project: GILDENBORGLAAN 13  
Onderdeel:  
Opdrachtgever:  
Bestand:

Project Nr.:19078  
Constructeur:  
Eenheden: m, kN, kNm

## 1. Platdak (NEN-EN1995-1-1:2011/NB:2013)

### PROFIELGEGEVENS: R94X196

|                      |                     |                          |                  |                    |                          |
|----------------------|---------------------|--------------------------|------------------|--------------------|--------------------------|
| Breedte              | b                   | 94 mm                    | Oppervlak        | A                  | 18424 mm <sup>2</sup>    |
| Hoogte               | h                   | 196 mm                   |                  |                    |                          |
| Weerstandsmoment     | Wy                  | 6019e+02 mm <sup>4</sup> | Traagheidsmoment | I <sub>tor</sub>   | 3787e+04 mm <sup>4</sup> |
| Weerstandsmoment     | Wz                  | 2886e+02 mm <sup>4</sup> | Traagheidsmoment | I <sub>y</sub>     | 5898e+04 mm <sup>4</sup> |
|                      |                     |                          | Traagheidsmoment | I <sub>z</sub>     | 1357e+04 mm <sup>4</sup> |
| Sterkte klasse       |                     | C18                      |                  |                    |                          |
|                      | f <sub>m,0,k</sub>  | 18.0 N/mm <sup>2</sup>   |                  | f <sub>c,0,k</sub> | 18.0 N/mm <sup>2</sup>   |
|                      | f <sub>t,0,k</sub>  | 11.0 N/mm <sup>2</sup>   |                  | f <sub>v,0,k</sub> | 3.4 N/mm <sup>2</sup>    |
| Elasticiteitsmodulus | E <sub>0,mean</sub> | 9000.0 N/mm <sup>2</sup> |                  | G <sub>mean</sub>  | 560.0 N/mm <sup>2</sup>  |



|                          |        |         |                           |         |       |
|--------------------------|--------|---------|---------------------------|---------|-------|
| Klimaatklasse            |        | I       |                           | Gamma;M | 1.30  |
|                          | k;h    | 1.00    | I (Permanent)             | k;mod   | 0.60  |
|                          | Beta;c | 0.2     | II (Lange termijn)        | k;mod   | 0.70  |
| Ontwerplevensduur        |        | 25 Jaar | III (Middellange termijn) | k;mod   | 0.80  |
| Betrouwbaarheidsklasse   |        | 1       | IV (Korte termijn)        | k;mod   | 0.90  |
| l <sub>sys</sub>         |        | 3.800 m | V (Onmiddellijk)          | k;mod   | 1.10  |
| hoh afstand              | Lt     | 1.400 m | Beschot kwaliteit         |         | C18   |
| Zeeg                     |        | 0 mm    | Beschot dikte             |         | 20 mm |
| Doorbuigingen beschouwen |        | Ja      |                           |         |       |
| Stootbelasting           |        | Nee     |                           |         |       |
| Reductiefactor spreading |        | 1.00    |                           |         |       |

### BELASTINGEN

### CPROB

|            |                                 |                              |      |
|------------|---------------------------------|------------------------------|------|
| Permanent  | Eigen gewicht                   | 0.05 kN/m <sup>2</sup>       |      |
|            | overig                          | 0.65 kN/m <sup>2</sup>       |      |
|            | <b>Totaal</b>                   | <b>0.70 kN/m<sup>2</sup></b> |      |
| Opgelegd   | q;k                             | 1.00 kN/m <sup>2</sup>       | 0.92 |
|            | psi (-)_0; psi (-)_1; psi (-)_2 | 0.00; 0.00; 0.00             |      |
|            | Q;k                             | 1.50 kN                      |      |
| Wind       | Winddruk                        | 0.18 kN/m <sup>2</sup>       | 0.95 |
|            | Windzuiging                     | -0.67 kN/m <sup>2</sup>      |      |
| Sneeuw     | p <sub>sneeuw</sub>             | 0.56 kN/m <sup>2</sup>       | 0.86 |
| Regenwater | Niveau dhw                      | 0.000 m                      |      |
| Bijzonder  | Bijzonder; Fbijz                | 0.00 kN                      |      |
|            | Bijzonder; pbijz                | 0.00 kN/m <sup>2</sup>       |      |

### BELASTINGSCOMBINATIES VOOR UITERSTE GRENSTOESTAND (610A + 6.10B)

|        |  |                                    |                         |
|--------|--|------------------------------------|-------------------------|
| Fu.C.1 | p = + yG * G <sub>rep</sub>                                  | = + 1.22 * 0.70 =                  | 0.85 kN/m <sup>2</sup>  |
| Fu.C.2 | p = + yG * G <sub>rep</sub>                                  | = + 0.90 * 0.70 =                  | 0.63 kN/m <sup>2</sup>  |
| Fu.C.3 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>rep</sub>          | = + 1.08 * 0.70 + 1.25 * 1.00 =    | 2.00 kN/m <sup>2</sup>  |
| Fu.C.4 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>wind_druk</sub>    | = + 1.08 * 0.70 + 1.22 * 0.18 =    | 0.98 kN/m <sup>2</sup>  |
| Fu.C.5 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>wind_zuiging</sub> | = + 0.90 * 0.70 + 1.22 * (-0.67) = | -0.19 kN/m <sup>2</sup> |
| Fu.C.6 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>sneeuw</sub>       | = + 1.08 * 0.70 + 1.16 * 0.56 =    | 1.41 kN/m <sup>2</sup>  |
| Fu.C.7 | p = + yG * G <sub>rep</sub>                                  | = + 1.08 * 0.70 =                  | 0.76 kN/m <sup>2</sup>  |
|        | F = + yQ * F <sub>rep</sub>                                  | = + 1.35 * 1.50 =                  | 2.03 kN                 |
| Bi.C.1 | p = + yG * G <sub>rep</sub>                                  | = + 1.00 * 0.70 =                  | 0.70 kN/m <sup>2</sup>  |
| Bi.C.2 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>wind_druk</sub>    | = + 1.00 * 0.70 + 0.18 * 0.18 =    | 0.73 kN/m <sup>2</sup>  |
| Bi.C.3 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>wind_zuiging</sub> | = + 1.00 * 0.70 + 0.18 * (-0.67) = | 0.58 kN/m <sup>2</sup>  |

Project: GILDENBORGLAAN 13  
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### MAATGEVENDE SNEDEKRACHTEN

| Comb.  | Nc;Ed, Nt;Ed | Vy;Ed | Vz;Ed | My;Ed | Mz;Ed |
|--------|--------------|-------|-------|-------|-------|
| Fu.C.1 | 0.00         | 0.00  | 2.26  | 2.15  | 0.00  |
| Fu.C.2 | 0.00         | 0.00  | 1.68  | 1.59  | 0.00  |
| Fu.C.3 | 0.00         | 0.00  | 5.33  | 5.06  | 0.00  |
| Fu.C.4 | 0.00         | 0.00  | 2.60  | 2.47  | 0.00  |
| Fu.C.5 | 0.00         | 0.00  | -0.50 | -0.48 | 0.00  |
| Fu.C.6 | 0.00         | 0.00  | 3.74  | 3.55  | 0.00  |
| Fu.C.7 | 0.00         | 0.00  | 4.04  | 3.84  | 0.00  |
| Bi.C.1 | 0.00         | 0.00  | 1.86  | 1.77  | 0.00  |
| Bi.C.2 | 0.00         | 0.00  | 1.95  | 1.85  | 0.00  |
| Bi.C.3 | 0.00         | 0.00  | 1.54  | 1.46  | 0.00  |
|        | kN           | kN    | kN    | kNm   | kNm   |

### MAX UC SNEDEKRACHT

| Comb.  | Nc;Ed, Nt;Ed | Vy;Ed | Vz;Ed | My;Ed | Mz;Ed |
|--------|--------------|-------|-------|-------|-------|
| Fu.C.1 | 0.00         | 0.00  | 0.00  | 2.15  | 0.00  |
| Fu.C.2 | 0.00         | 0.00  | 0.00  | 1.59  | 0.00  |
| Fu.C.3 | 0.00         | 0.00  | 0.00  | 5.06  | 0.00  |
| Fu.C.4 | 0.00         | 0.00  | 0.00  | 2.47  | 0.00  |
| Fu.C.5 | 0.00         | 0.00  | 0.00  | -0.48 | 0.00  |
| Fu.C.6 | 0.00         | 0.00  | 0.00  | 3.55  | 0.00  |
| Fu.C.7 | 0.00         | 0.00  | 1.01  | 3.84  | 0.00  |
| Bi.C.1 | 0.00         | 0.00  | 0.00  | 1.77  | 0.00  |
| Bi.C.2 | 0.00         | 0.00  | 0.00  | 1.85  | 0.00  |
| Bi.C.3 | 0.00         | 0.00  | 0.00  | 1.46  | 0.00  |
|        | kN           | kN    | kN    | kNm   | kNm   |

### REKENSTERKTE

| Comb.  | Belasting duurklasse      | f;m,y,d           | f;m,z,d           | f;t,0,d           | f;c,0,d           | f;v,0,d           |
|--------|---------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Fu.C.1 | I (Permanent)             | 8.31              | 9.12              | 5.08              | 8.31              | 1.57              |
| Fu.C.2 | I (Permanent)             | 8.31              | 9.12              | 5.08              | 8.31              | 1.57              |
| Fu.C.3 | III (Middellange termijn) | 11.08             | 12.16             | 6.77              | 11.08             | 2.09              |
| Fu.C.4 | IV (Korte termijn)        | 12.46             | 13.68             | 7.62              | 12.46             | 2.35              |
| Fu.C.5 | IV (Korte termijn)        | 12.46             | 13.68             | 7.62              | 12.46             | 2.35              |
| Fu.C.6 | IV (Korte termijn)        | 12.46             | 13.68             | 7.62              | 12.46             | 2.35              |
| Fu.C.7 | III (Middellange termijn) | 11.08             | 12.16             | 6.77              | 11.08             | 2.09              |
| Bi.C.1 | I (Permanent)             | 8.31              | 9.12              | 5.08              | 8.31              | 1.57              |
| Bi.C.2 | IV (Korte termijn)        | 12.46             | 13.68             | 7.62              | 12.46             | 2.35              |
| Bi.C.3 | IV (Korte termijn)        | 12.46             | 13.68             | 7.62              | 12.46             | 2.35              |
|        |                           | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

### REKENSPANNING

| Comb.  | sigma;m,y,d       | sigma;m,z,d       | tau;v,y,d         | tau;v,z,d         | sigma;c(t),0,d    |
|--------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Fu.C.1 | 3.57              | 0.00              | 0.00              | 0.00              | 0.00              |
| Fu.C.2 | 2.65              | 0.00              | 0.00              | 0.00              | 0.00              |
| Fu.C.3 | 8.41              | 0.00              | 0.00              | 0.00              | 0.00              |
| Fu.C.4 | 4.10              | 0.00              | 0.00              | 0.00              | 0.00              |
| Fu.C.5 | 0.79              | 0.00              | 0.00              | 0.00              | 0.00              |
| Fu.C.6 | 5.90              | 0.00              | 0.00              | 0.00              | 0.00              |
| Fu.C.7 | 6.37              | 0.00              | 0.00              | 0.08              | 0.00              |
| Bi.C.1 | 2.94              | 0.00              | 0.00              | 0.00              | 0.00              |
| Bi.C.2 | 3.08              | 0.00              | 0.00              | 0.00              | 0.00              |
| Bi.C.3 | 2.43              | 0.00              | 0.00              | 0.00              | 0.00              |
|        | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> | N/mm <sup>2</sup> |

### UC DOORSNEDE PER BELASTINGSCOMBINATIE

|        |                             |                                   |         |
|--------|-----------------------------|-----------------------------------|---------|
| Fu.C.1 | NEN-EN1995-1-1#6.1.6 (6.11) | 3.571 / 8.308 + 0.7 x 0 / 9.122   | 0.43 Ok |
| Fu.C.2 | NEN-EN1995-1-1#6.1.6 (6.11) | 2.645 / 8.308 + 0.7 x 0 / 9.122   | 0.32 Ok |
| Fu.C.3 | NEN-EN1995-1-1#6.1.6 (6.11) | 8.41 / 11.077 + 0.7 x 0 / 12.162  | 0.76 Ok |
| Fu.C.4 | NEN-EN1995-1-1#6.1.6 (6.11) | 4.102 / 12.462 + 0.7 x 0 / 13.682 | 0.33 Ok |
| Fu.C.5 | NEN-EN1995-1-1#6.1.6 (6.11) | 0.794 / 12.462 + 0.7 x 0 / 13.682 | 0.06 Ok |



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|        |                             |                                   |         |
|--------|-----------------------------|-----------------------------------|---------|
| Fu.C.6 | NEN-EN1995-1-1#6.1.6 (6.11) | 5.899 / 12.462 + 0.7 x 0 / 13.682 | 0.47 Ok |
| Fu.C.7 | NEN-EN1995-1-1#6.1.6 (6.11) | 6.375 / 11.077 + 0.7 x 0 / 12.162 | 0.58 Ok |
| Fu.C.7 | NEN-EN1995-1-1#6.1.7 (6.13) | Vz 0.082 / 2.092                  | 0.04 Ok |
| Bi.C.1 | NEN-EN1995-1-1#6.1.6 (6.11) | 2.939 / 8.308 + 0.7 x 0 / 9.122   | 0.35 Ok |
| Bi.C.2 | NEN-EN1995-1-1#6.1.6 (6.11) | 3.076 / 12.462 + 0.7 x 0 / 13.682 | 0.25 Ok |
| Bi.C.3 | NEN-EN1995-1-1#6.1.6 (6.11) | 2.43 / 12.462 + 0.7 x 0 / 13.682  | 0.19 Ok |

### BELASTINGSCOMBINATIES VOOR BRUIKBAARHEIDSGRENSTOESTAND

|           |  |                                    |                        |
|-----------|--|------------------------------------|------------------------|
| Ka.C.1    | p = + yG * G_rep                       | = + 1.00 * 0.70 =                  | 0.70 kN/m <sup>2</sup> |
| Ka.C.2    | p = + yG * G_rep + yQ * Q_rep          | = + 1.00 * 0.70 + 0.92 * 1.00 =    | 1.62 kN/m <sup>2</sup> |
| Ka.C.3    | p = + yG * G_rep + yQ * Q_wind_druk    | = + 1.00 * 0.70 + 0.91 * 0.18 =    | 0.86 kN/m <sup>2</sup> |
| Ka.C.4    | p = + yG * G_rep + yQ * Q_wind_zuiging | = + 1.00 * 0.70 + 0.91 * (-0.67) = | 0.09 kN/m <sup>2</sup> |
| Ka.C.5    | p = + yG * G_rep + yQ * Q_sneeuw       | = + 1.00 * 0.70 + 0.86 * 0.56 =    | 1.18 kN/m <sup>2</sup> |
| Qu.C.1    | p = + yG * G_rep                       | = + 1.00 * 0.70 =                  | 0.70 kN/m <sup>2</sup> |
| Ka.C.(w1) | p = + yG * G_rep                       | = + 1.00 * 0.70 =                  | 0.70 kN/m <sup>2</sup> |

### UC DOORBUIGINGEN PER BELASTINGSCOMBINATIE

|           |                |                          |                    |                |                           |
|-----------|----------------|--------------------------|--------------------|----------------|---------------------------|
| L/250     | Limiet w;max   | 15.2 mm                  | L/250              | Limiet w;2+w;3 | 15.2 mm                   |
| E;mean    | E;0;ser;d;inst | 9000.0 N/mm <sup>2</sup> | E;mean / Kdef      | E;0;ser;d;cr   | 15000.0 N/mm <sup>2</sup> |
|           |                |                          | E-Mod/E;0;ser;d;cr |                | 0.60                      |
| Ka.C.(w1) | w;1            | 5.0 mm                   |                    | w;c            | 0.0 mm                    |
| Qu.C.1    | w;2            | 3.0 mm                   |                    |                |                           |

| Comb.  | w;3  | w;tot | w;max | w;2+w;3 | UC(w;max) | UC(w;2+w;3) |
|--------|------|-------|-------|---------|-----------|-------------|
| Ka.C.1 | 0.0  | 8.0   | 8.0   | 3.0     | 0.53      | 0.20        |
| Ka.C.2 | 6.6  | 14.6  | 14.6  | 9.6     | 0.96      | 0.63        |
| Ka.C.3 | 1.2  | 9.2   | 9.2   | 4.2     | 0.60      | 0.27        |
| Ka.C.4 | -4.3 | 3.7   | 3.7   | -1.3    | 0.24      | 0.09        |
| Ka.C.5 | 3.4  | 11.5  | 11.5  | 6.4     | 0.75      | 0.42        |
|        | mm   | mm    | mm    | mm      |           |             |

### MAATGEVENDE KRACHTEN (FU.C.3)

|               |       |          |
|---------------|-------|----------|
| Normaalkracht | Nt;Ed | 0.00 kN  |
| Dwarskracht   | Vy;Ed | 0.00 kN  |
| Dwarskracht   | Vz;Ed | 0.00 kN  |
| Torsie        | Mx;Ed | 0.00 kNm |
| Moment        | My;Ed | 5.06 kNm |
| Moment        | Mz;Ed | 0.00 kNm |

### MAATGEVENDE DOORBUIGINGEN (KA.C.2)

|           |                |         |
|-----------|----------------|---------|
| Ka.C.(w1) | w;1            | 5.0 mm  |
| Qu.C.1    | w;2            | 3.0 mm  |
| Ka.C.2    | w;3            | 6.6 mm  |
|           | w;tot          | 14.6 mm |
|           | w;max          | 14.6 mm |
|           | w;2+w;3        | 9.6 mm  |
|           | Limiet w;max   | 15.2 mm |
|           | Limiet w;2+w;3 | 15.2 mm |
|           | UC(w;max)      | 0.96    |
|           | UC(w;2+w;3)    | 0.63    |

### UITGEVOERDE CONTROLES

|               |                                      |                                  |         |
|---------------|--------------------------------------|----------------------------------|---------|
| Doorsnede     | NEN-EN1995-1-1#6.1.7 (6.13)          | Vz 0.434 / 2.092                 | 0.21 Ok |
| Doorsnede     | NEN-EN1995-1-1#6.1.6 (6.11)          | 8.41 / 11.077 + 0.7 x 0 / 12.162 | 0.76 Ok |
| Doorbuigingen | NEN-EN1995#7.2 NEN-EN1990#A1.4.3 (4) | 14.6 / 15.2                      | 0.96 Ok |

**Ligger gecontroleerd op sterkte en doorbuiging**  
**Ligger Ok**

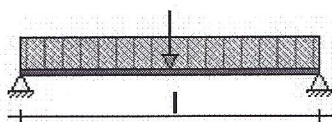
Project: GILDENBORGLAAN 13  
 Onderdeel:  
 Opdrachtgever:  
 Bestand:

Project Nr.:19078  
 Constructeur:  
 Eenheden: m, kN, kNm

## 1. Vloer (NEN-EN1995-1-1:2011/NB:2013)

### PROFIELGEGEVENS: HT-GS 71 X 171

|                      |                     |                          |                  |                    |                          |
|----------------------|---------------------|--------------------------|------------------|--------------------|--------------------------|
| Breedte              | b                   | 71 mm                    | Oppervlak        | A                  | 12141 mm <sup>2</sup>    |
| Hoogte               | h                   | 171 mm                   |                  |                    |                          |
| Weerstandsmoment     | Wy                  | 3460e+02 mm <sup>3</sup> | Traagheidsmoment | I <sub>tor</sub>   | 1504e+04 mm <sup>4</sup> |
| Weerstandsmoment     | Wz                  | 1437e+02 mm <sup>3</sup> | Traagheidsmoment | I <sub>y</sub>     | 2958e+04 mm <sup>4</sup> |
|                      |                     |                          | Traagheidsmoment | I <sub>z</sub>     | 5100e+03 mm <sup>4</sup> |
| Sterkte klasse       |                     | C18                      |                  |                    |                          |
|                      | f <sub>m,0,k</sub>  | 18.0 N/mm <sup>2</sup>   |                  | f <sub>c,0,k</sub> | 18.0 N/mm <sup>2</sup>   |
|                      | f <sub>t,0,k</sub>  | 11.0 N/mm <sup>2</sup>   |                  | f <sub>v,0,k</sub> | 3.4 N/mm <sup>2</sup>    |
| Elasticiteitsmodulus | E <sub>0,mean</sub> | 9000.0 N/mm <sup>2</sup> |                  | G <sub>mean</sub>  | 560.0 N/mm <sup>2</sup>  |



|                          |        |         |                           |         |       |
|--------------------------|--------|---------|---------------------------|---------|-------|
| Klimaatklasse            |        | I       |                           | Gamma;M | 1.30  |
|                          | k;h    | 1.00    | I (Permanent)             | k;mod   | 0.60  |
|                          | Beta;c | 0.2     | II (Lange termijn)        | k;mod   | 0.70  |
| Ontwerplevensduur        |        | 50 Jaar | III (Middellange termijn) | k;mod   | 0.80  |
| Betrouwbaarheidsklasse   |        | 1       | IV (Korte termijn)        | k;mod   | 0.90  |
| lsys                     |        | 3.300 m | V (Onmiddellijk)          | k;mod   | 1.10  |
| hoh afstand              | Lt     | 0.500 m | Beschot kwaliteit         |         | C18   |
| Zeeg                     |        | 0 mm    | Beschot dikte             |         | 20 mm |
| Doorbuigingen beschouwen |        | Ja      |                           |         |       |
| Stootbelasting           |        | Nee     |                           |         |       |
| Reductiefactor spreiding |        | 0.65    |                           |         |       |

### GEWICHTS BEREKENING

#### Veranderlijk

|     |                            |                                     |                        |
|-----|----------------------------|-------------------------------------|------------------------|
| qk1 | Opgelegde belastingen (qk) | NEN-EN1991-1-1#6.3(Cat=A, SubCat=1) | 1.75 kN/m <sup>2</sup> |
| qk2 | Separaties (qk)            | 0.5                                 | 0.50 kN/m <sup>2</sup> |
| qk3 | Opgelegde belastingen (qk) | qk1 + qk2                           | 2.25 kN/m <sup>2</sup> |
| fk1 | Opgelegde belastingen (fk) | NEN-EN1991-1-1#6.3(Cat=A, SubCat=1) | 3.00 kN                |

### BELASTINGEN

|           |                                 |                              |      |
|-----------|---------------------------------|------------------------------|------|
| Permanent | Eigen gewicht                   | 0.09 kN/m <sup>2</sup>       |      |
|           | overig                          | 0.50 kN/m <sup>2</sup>       |      |
|           | <b>Totaal</b>                   | <b>0.59 kN/m<sup>2</sup></b> |      |
| Opgelegd  | q;k                             | 2.25 kN/m <sup>2</sup>       | 1.00 |
|           | psi (-)_0; psi (-)_1; psi (-)_2 | 0.40; 0.50; 0.30             |      |
|           | Q;k                             | 3.00 kN                      |      |
| Bijzonder | Bijzonder; Fbijz                | 0.00 kN                      |      |
|           | Bijzonder; pbijz                | 0.00 kN/m <sup>2</sup>       |      |

### CPROB

### BELASTINGSCOMBINATIES VOOR UITERSTE GRENSTOESTAND (610A + 6.10B)

|        |   |                                 |                        |
|--------|---|---------------------------------|------------------------|
| Fu.C.1 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>rep</sub> | = + 1.22 * 0.59 + 0.54 * 2.25 = | 1.93 kN/m <sup>2</sup> |
| Fu.C.2 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>rep</sub> | = + 1.08 * 0.59 + 1.35 * 2.25 = | 3.68 kN/m <sup>2</sup> |
| Fu.C.3 | p = + yG * G <sub>rep</sub>                         | = + 1.22 * 0.59 =               | 0.72 kN/m <sup>2</sup> |
|        | F = + yQ * F <sub>rep</sub>                         | = + 0.54 * 3.00 =               | 1.62 kN                |
| Fu.C.4 | p = + yG * G <sub>rep</sub>                         | = + 1.08 * 0.59 =               | 0.64 kN/m <sup>2</sup> |
|        | F = + yQ * F <sub>rep</sub>                         | = + 1.35 * 3.00 =               | 4.05 kN                |
| Bi.C.1 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>rep</sub> | = + 1.00 * 0.59 + 0.30 * 2.25 = | 1.27 kN/m <sup>2</sup> |

### MAATGEVENDE SNEDEKRACHTEN

| Comb.  | Nc;Ed, Nt;Ed | Vy;Ed | Vz;Ed | My;Ed | Mz;Ed |
|--------|--------------|-------|-------|-------|-------|
| Fu.C.1 | 0.00         | 0.00  | 1.60  | 1.32  | 0.00  |
| Fu.C.2 | 0.00         | 0.00  | 3.03  | 2.50  | 0.00  |

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|        |      |      |      |      |      |
|--------|------|------|------|------|------|
| Fu.C.3 | 0.00 | 0.00 | 2.21 | 1.36 | 0.00 |
| Fu.C.4 | 0.00 | 0.00 | 4.58 | 2.61 | 0.00 |
| Bi.C.1 | 0.00 | 0.00 | 1.05 | 0.86 | 0.00 |
|        | kN   | kN   | kN   | kNm  | kNm  |

#### MAX UC SNEDEKRACHT

| Comb.  | Nc;Ed, Nt;Ed | Vy;Ed | Vz;Ed | My;Ed | Mz;Ed |
|--------|--------------|-------|-------|-------|-------|
| Fu.C.1 | 0.00         | 0.00  | 0.00  | 1.32  | 0.00  |
| Fu.C.2 | 0.00         | 0.00  | 0.00  | 2.50  | 0.00  |
| Fu.C.3 | 0.00         | 0.00  | 0.53  | 1.36  | 0.00  |
| Fu.C.4 | 0.00         | 0.00  | 1.32  | 2.61  | 0.00  |
| Bi.C.1 | 0.00         | 0.00  | 0.00  | 0.86  | 0.00  |
|        | kN           | kN    | kN    | kNm   | kNm   |

#### REKENSTERKTE

| Comb.  | Belasting duurklasse      | f;m,y,d | f;m,z,d | f;t,0,d | f;c,0,d | f;v,0,d |
|--------|---------------------------|---------|---------|---------|---------|---------|
| Fu.C.1 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Fu.C.2 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Fu.C.3 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Fu.C.4 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Bi.C.1 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
|        |                           | N/mm^2  | N/mm^2  | N/mm^2  | N/mm^2  | N/mm^2  |

#### REKENSPANNING

| Comb.  | sigma;m,y,d | sigma;m,z,d | tau;v,y,d | tau;v,z,d | sigma;c(t),0,d |
|--------|-------------|-------------|-----------|-----------|----------------|
| Fu.C.1 | 3.81        | 0.00        | 0.00      | 0.00      | 0.00           |
| Fu.C.2 | 7.23        | 0.00        | 0.00      | 0.00      | 0.00           |
| Fu.C.3 | 3.93        | 0.00        | 0.00      | 0.07      | 0.00           |
| Fu.C.4 | 7.54        | 0.00        | 0.00      | 0.16      | 0.00           |
| Bi.C.1 | 2.49        | 0.00        | 0.00      | 0.00      | 0.00           |
|        | N/mm^2      | N/mm^2      | N/mm^2    | N/mm^2    | N/mm^2         |

#### UC DOORSNEDE PER BELASTINGSCOMBINATIE

|        |                             |                                   |         |
|--------|-----------------------------|-----------------------------------|---------|
| Fu.C.1 | NEN-EN1995-1-1#6.1.6 (6.11) | 3.805 / 11.077 + 0.7 x 0 / 12.864 | 0.34 Ok |
| Fu.C.2 | NEN-EN1995-1-1#6.1.6 (6.11) | 7.235 / 11.077 + 0.7 x 0 / 12.864 | 0.65 Ok |
| Fu.C.3 | NEN-EN1995-1-1#6.1.6 (6.11) | 3.926 / 11.077 + 0.7 x 0 / 12.864 | 0.35 Ok |
| Fu.C.3 | NEN-EN1995-1-1#6.1.7 (6.13) | Vz 0.065 / 2.092                  | 0.03 Ok |
| Fu.C.4 | NEN-EN1995-1-1#6.1.6 (6.11) | 7.536 / 11.077 + 0.7 x 0 / 12.864 | 0.68 Ok |
| Fu.C.4 | NEN-EN1995-1-1#6.1.7 (6.13) | Vz 0.163 / 2.092                  | 0.08 Ok |
| Bi.C.1 | NEN-EN1995-1-1#6.1.6 (6.11) | 2.493 / 11.077 + 0.7 x 0 / 12.864 | 0.23 Ok |

#### BELASTINGSCOMBINATIES VOOR BRUIKBAARHEIDSGRENSTOESTAND

|           |                               |                                 |             |
|-----------|-------------------------------|---------------------------------|-------------|
| Ka.C.1    | p = + yG * G_rep + yQ * Q_rep | = + 1.00 * 0.59 + 0.40 * 2.25 = | 1.49 kN/m^2 |
| Ka.C.2    | p = + yG * G_rep + yQ * Q_rep | = + 1.00 * 0.59 + 1.00 * 2.25 = | 2.84 kN/m^2 |
| Qu.C.1    | p = + yG * G_rep + yQ * Q_rep | = + 1.00 * 0.59 + 0.30 * 2.25 = | 1.27 kN/m^2 |
| Ka.C.(w1) | p = + yG * G_rep              | = + 1.00 * 0.59 =               | 0.59 kN/m^2 |

#### UC DOORBUIGINGEN PER BELASTINGSCOMBINATIE

|           |                |               |                    |                |                |
|-----------|----------------|---------------|--------------------|----------------|----------------|
| L/250     | Limiet w;max   | 13.2 mm       | L/333              | Limiet w;2+w;3 | 9.9 mm         |
| E;mean    | E;0;ser;d;inst | 9000.0 N/mm^2 | E;mean / Kdef      | E;0;ser;d;cr   | 15000.0 N/mm^2 |
|           |                |               | E-Mod/E;0;ser;d;cr |                | 0.60           |
| Ka.C.(w1) | w;1            | 1.7 mm        |                    | w;c            | 0.0 mm         |
| Qu.C.1    | w;2            | 2.2 mm        |                    |                |                |

| Comb.  | w;3 | w;tot | w;max | w;2+w;3 | UC(w;max) | UC(w;2+w;3) |
|--------|-----|-------|-------|---------|-----------|-------------|
| Ka.C.1 | 2.6 | 6.5   | 6.5   | 4.8     | 0.49      | 0.49        |
| Ka.C.2 | 6.5 | 10.4  | 10.4  | 8.7     | 0.79      | 0.88        |
|        | mm  | mm    | mm    | mm      |           |             |

#### MAATGEVENDE KRACHTEN (FU.C.4)

|               |       |         |
|---------------|-------|---------|
| Normaalkracht | Nt;Ed | 0.00 kN |
| Dwarskracht   | Vy;Ed | 0.00 kN |
| Dwarskracht   | Vz;Ed | 1.32 kN |

#### MAATGEVENDE DOORBUIGINGEN (KA.C.2)

|           |     |        |
|-----------|-----|--------|
| Ka.C.(w1) | w;1 | 1.7 mm |
| Qu.C.1    | w;2 | 2.2 mm |
| Ka.C.2    | w;3 | 6.5 mm |



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m, kN, kNm

|        |       |          |                |         |
|--------|-------|----------|----------------|---------|
| Torsie | Mx;Ed | 0.00 kNm | w;tot          | 10.4 mm |
| Moment | My;Ed | 2.61 kNm | w;max          | 10.4 mm |
| Moment | Mz;Ed | 0.00 kNm | w;2+w;3        | 8.7 mm  |
|        |       |          | Limiet w;max   | 13.2 mm |
|        |       |          | Limiet w;2+w;3 | 9.9 mm  |
|        |       |          | UC(w;max)      | 0.79    |
|        |       |          | UC(w;2+w;3)    | 0.88    |

### UITGEVOERDE CONTROLES

|               |                                      |    |                                   |         |
|---------------|--------------------------------------|----|-----------------------------------|---------|
| Doorsnede     | NEN-EN1995-1-1#6.1.7 (6.13)          | Vz | 0.566 / 2.092                     | 0.27 Ok |
| Doorsnede     | NEN-EN1995-1-1#6.1.6 (6.11)          |    | 7.536 / 11.077 + 0.7 x 0 / 12.864 | 0.68 Ok |
| Doorbuigingen | NEN-EN1995#7.2 NEN-EN1990#A1.4.3 (4) |    | 8.7 / 9.9                         | 0.88 Ok |

**Ligger gecontroleerd op sterkte en doorbuiging**

**Ligger Ok**

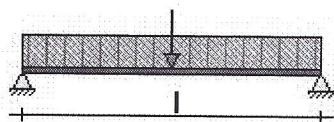
Project: GILDENBRGLAAN 13  
Onderdeel:  
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Project Nr.:19078  
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## 1. Vloer (NEN-EN1995-1-1:2011/NB:2013)

### PROFIELGEGEVENS: HT-GS 71 X 171

|                      |                     |                          |                  |                    |                          |
|----------------------|---------------------|--------------------------|------------------|--------------------|--------------------------|
| Breedte              | b                   | 71 mm                    | Oppervlak        | A                  | 12141 mm <sup>2</sup>    |
| Hoogte               | h                   | 171 mm                   |                  |                    |                          |
| Weerstandsmoment     | Wy                  | 3460e+02 mm <sup>4</sup> | Traagheidsmoment | I <sub>tor</sub>   | 1504e+04 mm <sup>4</sup> |
| Weerstandsmoment     | Wz                  | 1437e+02 mm <sup>4</sup> | Traagheidsmoment | I <sub>y</sub>     | 2958e+04 mm <sup>4</sup> |
|                      |                     |                          | Traagheidsmoment | I <sub>z</sub>     | 5100e+03 mm <sup>4</sup> |
| Sterkte klasse       |                     | C18                      |                  |                    |                          |
|                      | f <sub>m,0,k</sub>  | 18.0 N/mm <sup>2</sup>   |                  | f <sub>c,0,k</sub> | 18.0 N/mm <sup>2</sup>   |
|                      | f <sub>t,0,k</sub>  | 11.0 N/mm <sup>2</sup>   |                  | f <sub>v,0,k</sub> | 3.4 N/mm <sup>2</sup>    |
| Elasticiteitsmodulus | E <sub>0,mean</sub> | 9000.0 N/mm <sup>2</sup> |                  | G <sub>mean</sub>  | 560.0 N/mm <sup>2</sup>  |



|                          |        |         |                           |         |       |
|--------------------------|--------|---------|---------------------------|---------|-------|
| Klimaatklasse            |        | I       |                           | Gamma;M | 1.30  |
|                          | k;h    | 1.00    | I (Permanent)             | k;mod   | 0.60  |
|                          |        |         | II (Lange termijn)        | k;mod   | 0.70  |
|                          | Beta;c | 0.2     | III (Middellange termijn) | k;mod   | 0.80  |
| Ontwerplevensduur        |        | 50 Jaar | IV (Korte termijn)        | k;mod   | 0.90  |
| Betrouwbaarheidsklasse   |        | 1       | V (Onmiddellijk)          | k;mod   | 1.10  |
| Isys                     |        | 2.100 m | Beschot kwaliteit         |         | C18   |
| hoh afstand              | Lt     | 1.700 m | Beschot dikte             |         | 20 mm |
| Zeeg                     |        | 0 mm    |                           |         |       |
| Doorbuigingen beschouwen |        | Ja      |                           |         |       |
| Stootbelasting           |        | Nee     |                           |         |       |
| Reductiefactor spreiding |        | 1.00    |                           |         |       |

### GEWICHTS BEREKENING

#### Veranderlijk

|     |                            |                                     |                        |
|-----|----------------------------|-------------------------------------|------------------------|
| qk1 | Opgelegde belastingen (qk) | NEN-EN1991-1-1#6.3(Cat=A, SubCat=1) | 1.75 kN/m <sup>2</sup> |
| qk2 | Separaties (qk)            | 0.5                                 | 0.50 kN/m <sup>2</sup> |
| qk3 | Opgelegde belastingen (qk) | qk1 + qk2                           | 2.25 kN/m <sup>2</sup> |
| fk1 | Opgelegde belastingen (fk) | NEN-EN1991-1-1#6.3(Cat=A, SubCat=1) | 3.00 kN                |

### BELASTINGEN

|           |                                 |                              |
|-----------|---------------------------------|------------------------------|
| Permanent | Eigen gewicht                   | 0.03 kN/m <sup>2</sup>       |
|           | overig                          | 0.50 kN/m <sup>2</sup>       |
|           | <b>Totaal</b>                   | <b>0.53 kN/m<sup>2</sup></b> |
| Opgelegd  | q <sub>i</sub> k                | 2.25 kN/m <sup>2</sup> 1.00  |
|           | psi (-)_0; psi (-)_1; psi (-)_2 | 0.40; 0.50; 0.30             |
|           | Q <sub>i</sub> k                | 3.00 kN                      |
| Bijzonder | Bijzonder; F <sub>bijz</sub>    | 0.00 kN                      |
|           | Bijzonder; p <sub>bijz</sub>    | 0.00 kN/m <sup>2</sup>       |

### CPROB

### BELASTINGSCOMBINATIES VOOR UITERSTE GRENSTOESTAND (610A + 6.10B)

|        |   |                                 |                        |
|--------|---|---------------------------------|------------------------|
| Fu.C.1 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>rep</sub> | = + 1.22 * 0.53 + 0.54 * 2.25 = | 1.86 kN/m <sup>2</sup> |
| Fu.C.2 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>rep</sub> | = + 1.08 * 0.53 + 1.35 * 2.25 = | 3.61 kN/m <sup>2</sup> |
| Fu.C.3 | p = + yG * G <sub>rep</sub>                         | = + 1.22 * 0.53 =               | 0.64 kN/m <sup>2</sup> |
|        | F = + yQ * F <sub>rep</sub>                         | = + 0.54 * 3.00 =               | 1.62 kN                |
| Fu.C.4 | p = + yG * G <sub>rep</sub>                         | = + 1.08 * 0.53 =               | 0.57 kN/m <sup>2</sup> |
|        | F = + yQ * F <sub>rep</sub>                         | = + 1.35 * 3.00 =               | 4.05 kN                |
| Bi.C.1 | p = + yG * G <sub>rep</sub> + yQ * Q <sub>rep</sub> | = + 1.00 * 0.53 + 0.30 * 2.25 = | 1.20 kN/m <sup>2</sup> |

### MAATGEVENDE SNEDEKRACHTEN

| Comb.  | N <sub>c</sub> ;E <sub>d</sub> , N <sub>t</sub> ;E <sub>d</sub> | V <sub>y</sub> ;E <sub>d</sub> | V <sub>z</sub> ;E <sub>d</sub> | M <sub>y</sub> ;E <sub>d</sub> | M <sub>z</sub> ;E <sub>d</sub> |
|--------|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Fu.C.1 | 0.00  | 0.00                           | 3.31                           | 1.74                           | 0.00                           |
| Fu.C.2 | 0.00  | 0.00                           | 6.44                           | 3.38                           | 0.00                           |

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|        |      |      |      |      |      |
|--------|------|------|------|------|------|
| Fu.C.3 | 0.00 | 0.00 | 2.76 | 1.45 | 0.00 |
| Fu.C.4 | 0.00 | 0.00 | 5.07 | 2.66 | 0.00 |
| Bi.C.1 | 0.00 | 0.00 | 2.15 | 1.13 | 0.00 |
|        | kN   | kN   | kN   | kNm  | kNm  |

#### MAX UC SNEDEKRACHT

| Comb.  | Nc;Ed, Nt;Ed | Vy;Ed | Vz;Ed | My;Ed | Mz;Ed |
|--------|--------------|-------|-------|-------|-------|
| Fu.C.1 | 0.00         | 0.00  | 0.00  | 1.74  | 0.00  |
| Fu.C.2 | 0.00         | 0.00  | 0.00  | 3.38  | 0.00  |
| Fu.C.3 | 0.00         | 0.00  | 0.81  | 1.45  | 0.00  |
| Fu.C.4 | 0.00         | 0.00  | 2.02  | 2.66  | 0.00  |
| Bi.C.1 | 0.00         | 0.00  | 0.00  | 1.13  | 0.00  |
|        | kN           | kN    | kN    | kNm   | kNm   |

#### REKENSTERKTE

| Comb.  | Belasting duurklasse      | f;m,y,d | f;m,z,d | f;t,0,d | f;c,0,d | f;v,0,d |
|--------|---------------------------|---------|---------|---------|---------|---------|
| Fu.C.1 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Fu.C.2 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Fu.C.3 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Fu.C.4 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
| Bi.C.1 | III (Middellange termijn) | 11.08   | 12.86   | 6.77    | 11.08   | 2.09    |
|        |                           | N/mm^2  | N/mm^2  | N/mm^2  | N/mm^2  | N/mm^2  |

#### REKENSPANNING

| Comb.  | sigma;m,y,d | sigma;m,z,d | tau;v,y,d | tau;v,z,d | sigma;c(t),0,d |
|--------|-------------|-------------|-----------|-----------|----------------|
| Fu.C.1 | 5.03        | 0.00        | 0.00      | 0.00      | 0.00           |
| Fu.C.2 | 9.77        | 0.00        | 0.00      | 0.00      | 0.00           |
| Fu.C.3 | 4.19        | 0.00        | 0.00      | 0.10      | 0.00           |
| Fu.C.4 | 7.69        | 0.00        | 0.00      | 0.25      | 0.00           |
| Bi.C.1 | 3.26        | 0.00        | 0.00      | 0.00      | 0.00           |
|        | N/mm^2      | N/mm^2      | N/mm^2    | N/mm^2    | N/mm^2         |

#### UC DOORSNEDE PER BELASTINGSCOMBINATIE

|        |                             |                                   |         |
|--------|-----------------------------|-----------------------------------|---------|
| Fu.C.1 | NEN-EN1995-1-1#6.1.6 (6.11) | 5.025 / 11.077 + 0.7 x 0 / 12.864 | 0.45 Ok |
| Fu.C.2 | NEN-EN1995-1-1#6.1.6 (6.11) | 9.77 / 11.077 + 0.7 x 0 / 12.864  | 0.88 Ok |
| Fu.C.3 | NEN-EN1995-1-1#6.1.6 (6.11) | 4.193 / 11.077 + 0.7 x 0 / 12.864 | 0.38 Ok |
| Fu.C.3 | NEN-EN1995-1-1#6.1.7 (6.13) | Vz 0.1 / 2.092                    | 0.05 Ok |
| Fu.C.4 | NEN-EN1995-1-1#6.1.6 (6.11) | 7.689 / 11.077 + 0.7 x 0 / 12.864 | 0.69 Ok |
| Fu.C.4 | NEN-EN1995-1-1#6.1.7 (6.13) | Vz 0.25 / 2.092                   | 0.12 Ok |
| Bi.C.1 | NEN-EN1995-1-1#6.1.6 (6.11) | 3.256 / 11.077 + 0.7 x 0 / 12.864 | 0.29 Ok |

#### BELASTINGSCOMBINATIES VOOR BRUIKBAARHEIDSGRENSTOESTAND

|           |                               |                                 |             |
|-----------|-------------------------------|---------------------------------|-------------|
| Ka.C.1    | p = + yG * G_rep + yQ * Q_rep | = + 1.00 * 0.53 + 0.40 * 2.25 = | 1.43 kN/m^2 |
| Ka.C.2    | p = + yG * G_rep + yQ * Q_rep | = + 1.00 * 0.53 + 1.00 * 2.25 = | 2.78 kN/m^2 |
| Qu.C.1    | p = + yG * G_rep + yQ * Q_rep | = + 1.00 * 0.53 + 0.30 * 2.25 = | 1.20 kN/m^2 |
| Ka.C.(w1) | p = + yG * G_rep              | = + 1.00 * 0.53 =               | 0.53 kN/m^2 |

#### UC DOORBUIGINGEN PER BELASTINGSCOMBINATIE

|           |                |               |                    |                |                       |
|-----------|----------------|---------------|--------------------|----------------|-----------------------|
| L/250     | Limiet w;max   | 8.4 mm        | L/333              | Limiet w;2+w;3 | 6.3 mm                |
| E;mean    | E;0;ser;d;inst | 9000.0 N/mm^2 | E;mean / Kdef      | E;0;ser;d;cr   | 15000.0 N/mm^2        |
|           |                |               | E-Mod/E;0;ser;d;cr |                | 0.60                  |
| Ka.C.(w1) | w;1            | 0.9 mm        | w;c                |                | 0.0 mm                |
| Qu.C.1    | w;2            | 1.2 mm        |                    |                |                       |
| Comb.     | w;3            | w;tot         | w;max              | w;2+w;3        | UC(w;max) UC(w;2+w;3) |
| Ka.C.1    | 1.5            | 3.5           | 3.5                | 2.6            | 0.41 0.42             |
| Ka.C.2    | 3.6            | 5.7           | 5.7                | 4.8            | 0.67 0.76             |
|           | mm             | mm            | mm                 | mm             |                       |

#### MAATGEVENDE KRACHTEN (FU.C.2)

|               |       |         |
|---------------|-------|---------|
| Normaalkracht | Nt;Ed | 0.00 kN |
| Dwarskracht   | Vy;Ed | 0.00 kN |
| Dwarskracht   | Vz;Ed | 0.00 kN |

#### MAATGEVENDE DOORBUIGINGEN (KA.C.2)

|           |     |        |
|-----------|-----|--------|
| Ka.C.(w1) | w;1 | 0.9 mm |
| Qu.C.1    | w;2 | 1.2 mm |
| Ka.C.2    | w;3 | 3.6 mm |



Project: GILDENBRGLAAN 13  
 Onderdeel:  
 Opdrachtgever:  
 Bestand:

Project Nr.:19078  
 Constructeur:  
 Eenheden:

m, kN, kNm

|        |       |          |
|--------|-------|----------|
| Torsie | Mx;Ed | 0.00 kNm |
| Moment | My;Ed | 3.38 kNm |
| Moment | Mz;Ed | 0.00 kNm |

|                |        |
|----------------|--------|
| w;tot          | 5.7 mm |
| w;max          | 5.7 mm |
| w;2+w;3        | 4.8 mm |
| Limiet w;max   | 8.4 mm |
| Limiet w;2+w;3 | 6.3 mm |
| UC(w;max)      | 0.67   |
| UC(w;2+w;3)    | 0.76   |

# **UITGEVOERDE CONTROLES**

|               |                                      |
|---------------|--------------------------------------|
| Doorsnede     | NEN-EN1995-1-1#6.1.7 (6.13)          |
| Doorsnede     | NEN-EN1995-1-1#6.1.6 (6.11)          |
| Doorbuigingen | NEN-EN1995#7.2 NEN-EN1990#A1.4.3 (4) |

|    |                                  |
|----|----------------------------------|
| Vz | 0.796 / 2.092                    |
|    | 9.77 / 11.077 + 0.7 x 0 / 12.864 |
|    | 4.8 / 6.3                        |

|      |    |
|------|----|
| 0.38 | Ok |
| 0.88 | Ok |
| 0.76 | Ok |

**Ligger gecontroleerd op sterkte en doorbuiging**  
**Ligger Ok**

# BOERKOEL UTRECHT

werk: 19078

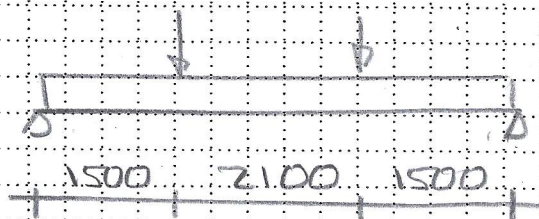
onderdeel: GILDENBORGLAAN 13

blad: 15

FUNDERING

BALK TPO KOPGEVUL

SCHEMA



$$F = 10 \text{ KN}$$

Q LAST

$$\text{BALK } 0.3 \times 0.4 \times 25 = 3 \text{ KN/M}$$

$$\text{DAK } \frac{3.8 \times 0.65}{2} = 1.25$$

$$\text{VLOER } \frac{3.3 \times 0.5}{2} = 1.65$$

$$\text{H.S.W. LBN } 4 \times 0.5 = 2$$

$$7.9 \text{ KN/M}$$

$$\text{NUTTIG } \frac{3.3 \times 2.25}{2} = 3.7 \text{ u}$$

$$QR = 1.08 \times 7.9 + 1.35 \times 3.7 = 13.5 \text{ KN/M}$$

ZIE BIJLAGE



**Liggerberekening gildenborglaan 13**

Resultaten

**algemene gegevens 300 x 400**

|                  |            |                            |
|------------------|------------|----------------------------|
| liggerlengte     | $I_{tot}$  | 5,10 m                     |
| E-modulus        | $E_{mod}$  | 14,3E+03 N/mm <sup>2</sup> |
| traagheidsmoment | $I_{buig}$ | 16,0E+08 mm <sup>4</sup>   |

**knoopgegevens**

| knoop | x-coord | y-coord |
|-------|---------|---------|
| 1     | 0,00    | 0,00    |
| 2     | 1,50    | 0,00    |
| 3     | 3,60    | 0,00    |
| 4     | 5,10    | 0,00    |
|       | m       | m       |

**staafgegevens**

| staaf | kn 1 | kn 2 |
|-------|------|------|
| 1     | 1    | 2    |
| 2     | 2    | 3    |
| 3     | 3    | 4    |

**opleggingen**

| steunpunt | op afstand x | verticaal | rotatie |
|-----------|--------------|-----------|---------|
| 1         | 0,00         | vast      | -       |
| 2         | 5,10         | vast      | -       |
|           | m            |           |         |

**q-lasten**

| staaf | q      | x1   | x2   |
|-------|--------|------|------|
| 1     | -13,50 | 0,00 | 1,50 |
| 2     | -13,50 | 0,00 | 2,10 |
| 3     | -13,50 | 0,00 | 1,50 |
|       | kN/m'  | m    | m    |

**p-lasten**

| knoop | $F_y$  | x    |
|-------|--------|------|
| 2     | -10,00 | 1,50 |
| 3     | -10,00 | 3,60 |
|       | kN     | m    |

**knoopverplaatsingen**

| knoop | u        | v         | rotatie   |
|-------|----------|-----------|-----------|
| 1     | 0,000000 | 0,000000  | -0,004441 |
| 2     | 0,000000 | -0,005694 | -0,002589 |
| 3     | 0,000000 | -0,005694 | 0,002589  |
| 4     | 0,000000 | 0,000000  | 0,004441  |
|       | m        | m         | rad       |

**staafelementeindkrachten en -momenten**

| element | $F_x;1$ | $F_y;1$ | $M_z;1$ | $F_x;2$ | $F_y;2$ | $M_z;2$ |
|---------|---------|---------|---------|---------|---------|---------|
| 1       | 0,00    | 44,42   | 0,00    | 0,00    | -24,17  | 51,45   |
| 2       | 0,00    | 14,17   | -51,45  | 0,00    | 14,18   | 51,45   |
| 3       | 0,00    | -24,18  | -51,45  | 0,00    | 44,43   | 0,00    |
|         | kN      | kN      | kNm     | kN      | kN      | kNm     |

**staafkrachten en -momenten**

| element | N1   | N2   | V1     | V2     | M1   | M2     |
|---------|------|------|--------|--------|------|--------|
| 1       | 0,00 | 0,00 | -44,42 | -24,17 | 0,00 | -51,45 |

|   |      |      |        |       |        |        |
|---|------|------|--------|-------|--------|--------|
| 2 | 0,00 | 0,00 | -14,17 | 14,18 | -51,45 | -51,45 |
| 3 | 0,00 | 0,00 | 24,18  | 44,43 | -51,45 | 0,00   |
|   | kN   | kN   | kN     | kN    | kNm    | kNm    |

**resultaten**

| staaf op afstand x | M    | V      | u rel     |
|--------------------|------|--------|-----------|
| 1                  | 0,00 | 44,42  | 0,000000  |
|                    | 0,75 | 34,30  | -0,003202 |
|                    | 1,50 | 24,17  | -0,005694 |
| 2                  | 0,00 | 14,17  | -0,005694 |
|                    | 1,05 | 0,00   | -0,007083 |
|                    | 2,10 | -14,18 | -0,005694 |
| 3                  | 0,00 | -24,18 | -0,005694 |
|                    | 0,75 | -34,30 | -0,003202 |
|                    | 1,50 | -44,43 | 0,000000  |
|                    | m    | kN     | m         |

**oplegreacties**

| knoop | $R_y$ | $M_{z-z}$ |
|-------|-------|-----------|
| 1     | 44,42 | 0,00      |
| 4     | 44,43 | 0,00      |
|       | kN    | kNm       |

AA BEN  $410 \text{ mm}^2$

$$3 \Phi 10 + 2 \Phi 12 = 463 \text{ mm}^2$$

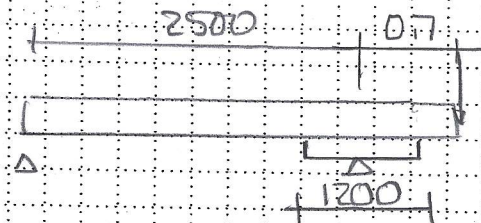
# BOERKOEL UTRECHT

werk: 19078

onderdeel: GILDEN BORGVAAH 13

blad: 68

24 GEBELS



$$F = 44 + 10 = \underline{\underline{55 \text{ KN}}}$$

Q LAST

$$\text{OUDER } \frac{5.4}{2} \times 3 = 8.1 \text{ KN/M}$$

BAUK

3 u

$$\text{GEBEL } 2.6 \times 4 = \underline{\underline{10.4}}$$

21.5 KN/M

$$\text{NUTTIL } \frac{5.4}{2} \times 2.25 = 6.1$$

$$\begin{aligned} Q_R &= 1.08 \times 21.5 + 1.35 \times 6.1 \\ &= 31.95 \text{ KN/M} \end{aligned}$$

TGU PUNT LAST

$$R = \frac{3.2 \times 55}{2.5} = 70 \text{ KN}$$

$$\text{TGU } Q = 31.0 \quad \text{TOTAAL } 100 \text{ KN}$$

DOR MAX 1 KW/CM²

STROOK 1200 x 800



# BOERKOEL UTRECHT

werk: 19078

onderdeel: GILDENBURGWAN 13

blad: 19

$$G_{GR} = \frac{100 \times 1000}{1200 \times 800} = 0.1 \text{ N/mm}^2$$

$$= 1 \text{ kg/cm}^2$$

WAP PRAKTISCH 60-150 #

|                |  |               |            |
|----------------|--|---------------|------------|
| Project:       |  | Project Nr.:  |            |
| Onderdeel:     |  | Constructeur: |            |
| Opdrachtgever: |  | Eenheden:     | m, kN, kNm |
| Bestand:       |  |               |            |

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

### MOMENTCAPACITEIT

#### PROFIELGEGEVENS: 300 X 400

|                |   |          |               |            |                        |
|----------------|---|----------|---------------|------------|------------------------|
| Hoogte         | h | 400 mm   | Breedte       | b          | 300 mm                 |
| Betonkwaliteit |   | C20/25 - |               | $f_{cd}$   | 13.3 N/mm <sup>2</sup> |
| Staalkwaliteit |   | B500A -  |               | $f_{ctm}$  | 2.21 N/mm <sup>2</sup> |
| Beugels        | - | 12 mm    | Normaalkracht | $f_{yd}$   | 435 N/mm <sup>2</sup>  |
|                |   |          |               | $N_{c;Ed}$ | 0.00 kN                |

#### DEKKING

|                    |            | Boven   | Onder   | Flank     |
|--------------------|------------|---------|---------|-----------|
| Constructieklasse  |            | S3      | S3      | S3 -      |
| Milieuklasse       |            | XC3     | XC3     | XC3 -     |
| Nabewerkt          |            | Nee     | Nee     | Nee -     |
| Meetnauwkeurigheid |            | Normaal | Normaal | Normaal - |
| Minimale dekking   | Cmin       | 25      | 25      | 25 mm     |
| Dekkingsafwijking  | Delta Cafw | 5       | 5       | 5 mm      |
| Nominale dekking   | Cnom       | 30      | 30      | 30 mm     |
| Toegepaste dekking | Ctoe       | 30      | 30      | 30 mm     |

#### COMBINATIES

| Wapening  | Asv;toe | Diam. | d   | w0   | MRd    | MRep  | Sigma;s | kx    | Controle |
|-----------|---------|-------|-----|------|--------|-------|---------|-------|----------|
| 3R8       | 150.8   | 8.0   | 354 | 0.14 | 22.65  | 18.76 | 360     | 0.062 | Ok       |
| 2R10      | 157.1   | 10.0  | 353 | 0.15 | 23.50  | 17.30 | 320     | 0.064 | Ok       |
| 4R8       | 201.1   | 8.0   | 354 | 0.19 | 29.96  | 24.80 | 360     | 0.082 | Ok       |
| 2R12      | 226.2   | 12.0  | 352 | 0.21 | 33.36  | 21.49 | 280     | 0.093 | Ok       |
| 3R10      | 235.6   | 10.0  | 353 | 0.22 | 34.80  | 25.61 | 320     | 0.097 | Ok       |
| 5R8       | 251.3   | 8.0   | 354 | 0.24 | 37.13  | 30.75 | 360     | 0.103 | Ok       |
| 2R10+2R8  | 257.6   | 9.0   | 353 | 0.24 | 37.96  | 30.12 | 345     | 0.106 | Ok       |
| 2R10+3R8  | 307.9   | 8.8   | 353 | 0.29 | 45.00  | 37.13 | 359     | 0.126 | Ok       |
| 4R10      | 314.2   | 10.0  | 353 | 0.30 | 45.80  | 36.35 | 345     | 0.129 | Ok       |
| 2R12+2R8  | 326.7   | 10.0  | 353 | 0.31 | 47.47  | 37.74 | 346     | 0.134 | Ok       |
| 3R10+2R8  | 336.2   | 9.2   | 353 | 0.32 | 48.87  | 40.33 | 359     | 0.138 | Ok       |
| 3R12      | 339.3   | 12.0  | 352 | 0.32 | 49.11  | 35.96 | 318     | 0.140 | Ok       |
| 2R12+3R8  | 377.0   | 9.6   | 353 | 0.36 | 54.34  | 44.90 | 359     | 0.155 | Ok       |
| 2R12+2R10 | 383.3   | 11.0  | 352 | 0.36 | 55.13  | 43.82 | 346     | 0.158 | Ok       |
| 5R10      | 392.7   | 10.0  | 353 | 0.37 | 56.49  | 46.62 | 359     | 0.161 | Ok       |
| 2R16      | 402.1   | 16.0  | 350 | 0.38 | 57.23  | 31.59 | 240     | 0.167 | Ok       |
| 3R12+2R8  | 439.8   | 10.4  | 352 | 0.42 | 62.66  | 51.77 | 359     | 0.181 | Ok       |
| 4R12      | 452.4   | 12.0  | 352 | 0.43 | 64.22  | 51.05 | 346     | 0.186 | Ok       |
| 2R12+3R10 | 461.8   | 10.8  | 353 | 0.44 | 65.55  | 54.16 | 359     | 0.190 | Ok       |
| 3R12+2R10 | 496.4   | 11.2  | 352 | 0.47 | 70.00  | 57.83 | 359     | 0.204 | Ok       |
| 2R16+2R10 | 559.2   | 13.0  | 351 | 0.53 | 77.64  | 61.90 | 347     | 0.231 | Ok       |
| 5R12      | 565.5   | 12.0  | 352 | 0.54 | 78.71  | 65.03 | 359     | 0.233 | Ok       |
| 3R16      | 603.2   | 16.0  | 350 | 0.57 | 82.87  | 60.99 | 320     | 0.250 | Ok       |
| 2R20      | 628.3   | 20.0  | 348 | 0.60 | 85.39  | 47.77 | 243     | 0.262 | Ok       |
| 2R16+2R12 | 628.3   | 14.0  | 351 | 0.60 | 86.14  | 68.68 | 347     | 0.260 | Ok       |
| 2R16+3R10 | 637.7   | 12.4  | 351 | 0.61 | 87.39  | 72.36 | 360     | 0.263 | Ok       |
| 2R16+3R12 | 741.4   | 13.6  | 351 | 0.70 | 99.65  | 82.51 | 360     | 0.306 | Ok       |
| 3R16+2R10 | 760.3   | 13.6  | 351 | 0.72 | 101.73 | 84.24 | 360     | 0.314 | Ok       |
| 4R16      | 804.2   | 16.0  | 350 | 0.77 | 106.54 | 84.94 | 347     | 0.333 | Ok       |
| 2R20+2R12 | 854.5   | 16.0  | 349 | 0.82 | 111.79 | 89.41 | 348     | 0.355 | Ok       |
| 3R20      | 942.5   | 20.0  | 348 | 0.90 | 120.83 | 89.38 | 322     | 0.393 | Ok       |