

|                     |                                                                                                |               |                |
|---------------------|------------------------------------------------------------------------------------------------|---------------|----------------|
|                     |                                                                                                |               |                |
| Projectomschrijving |                                                                                                | Projectnummer |                |
| Onderdeel           |                                                                                                | Constructeur  |                |
| Opdrachtgever       |                                                                                                | Eenheden      | m, mm, kN, kNm |
| Bestand             | C:\Users\awnis\OneDrive\Documenten\Portaal achtergevel Amsterdamsestraatweg 667 te Utrecht.mxf |               |                |

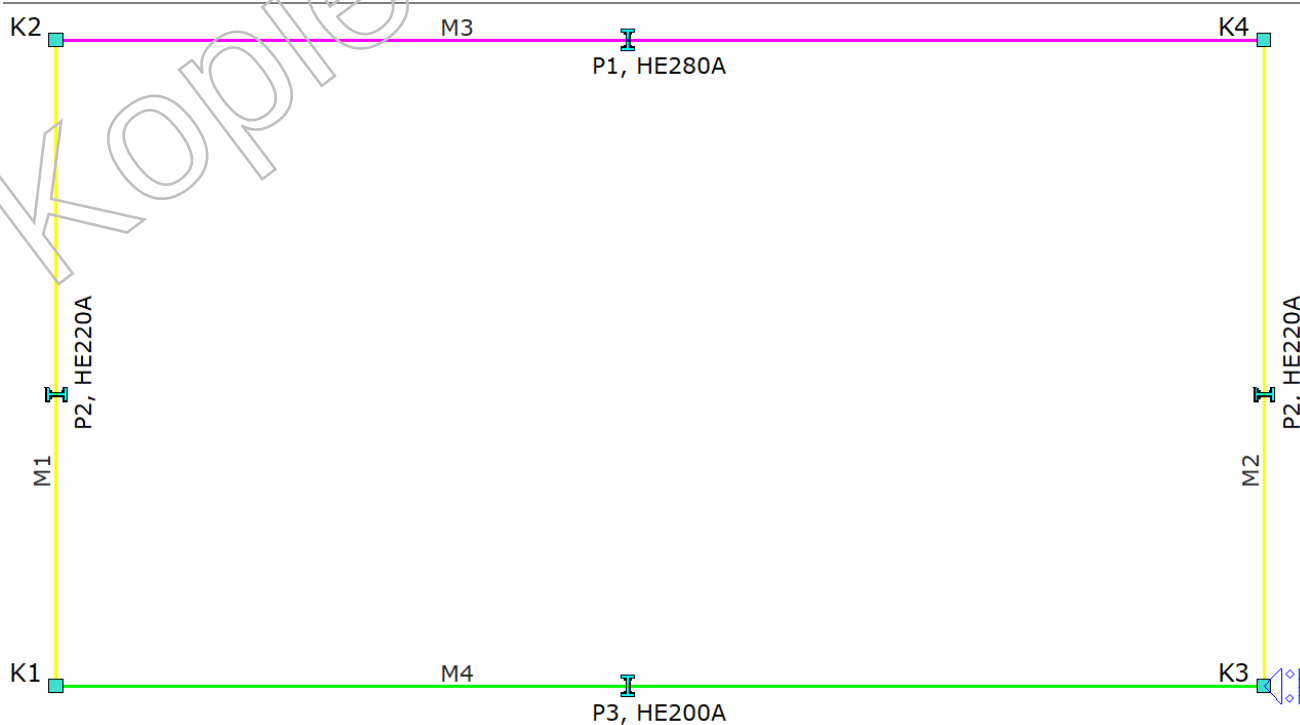
## Constructie



## STAVEN

| Staaf | Knoop-B | Knoop-E | X-B   | X-E   | Z-B    | Z-E    | Lengte | Profiel | Positie           |
|-------|---------|---------|-------|-------|--------|--------|--------|---------|-------------------|
| M1    | K1      | K2      | 0.000 | 0.000 | 0.000  | -3.000 | 3.000  | P2      | 0.000 - 3.000 (L) |
| M2    | K3      | K4      | 5.600 | 5.600 | 0.000  | -3.000 | 3.000  | P2      | 0.000 - 3.000 (L) |
| M3    | K2      | K4      | 0.000 | 5.600 | -3.000 | -3.000 | 5.600  | P1      | 0.000 - 5.600 (L) |
| M4    | K1      | K3      | 0.000 | 5.600 | 0.000  | 0.000  | 5.600  | P3      | 0.000 - 5.600 (L) |
|       |         |         | m     | m     | m      | m      | m      |         | m                 |

## Profielen



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## PROFIELEN

| Profiel | Profielnaam | Oppervlakte     | Iy              | Materiaal | Hoek |
|---------|-------------|-----------------|-----------------|-----------|------|
| P1      | HE280A      | 9726            | 1.3673e+08      | S235      | 0    |
| P2      | HE220A      | 6434            | 5.4097e+07      | S235      | 0    |
| P3      | HE200A      | 5383            | 3.6922e+07      | S235      | 0    |
|         |             | mm <sup>2</sup> | mm <sup>4</sup> |           | °    |

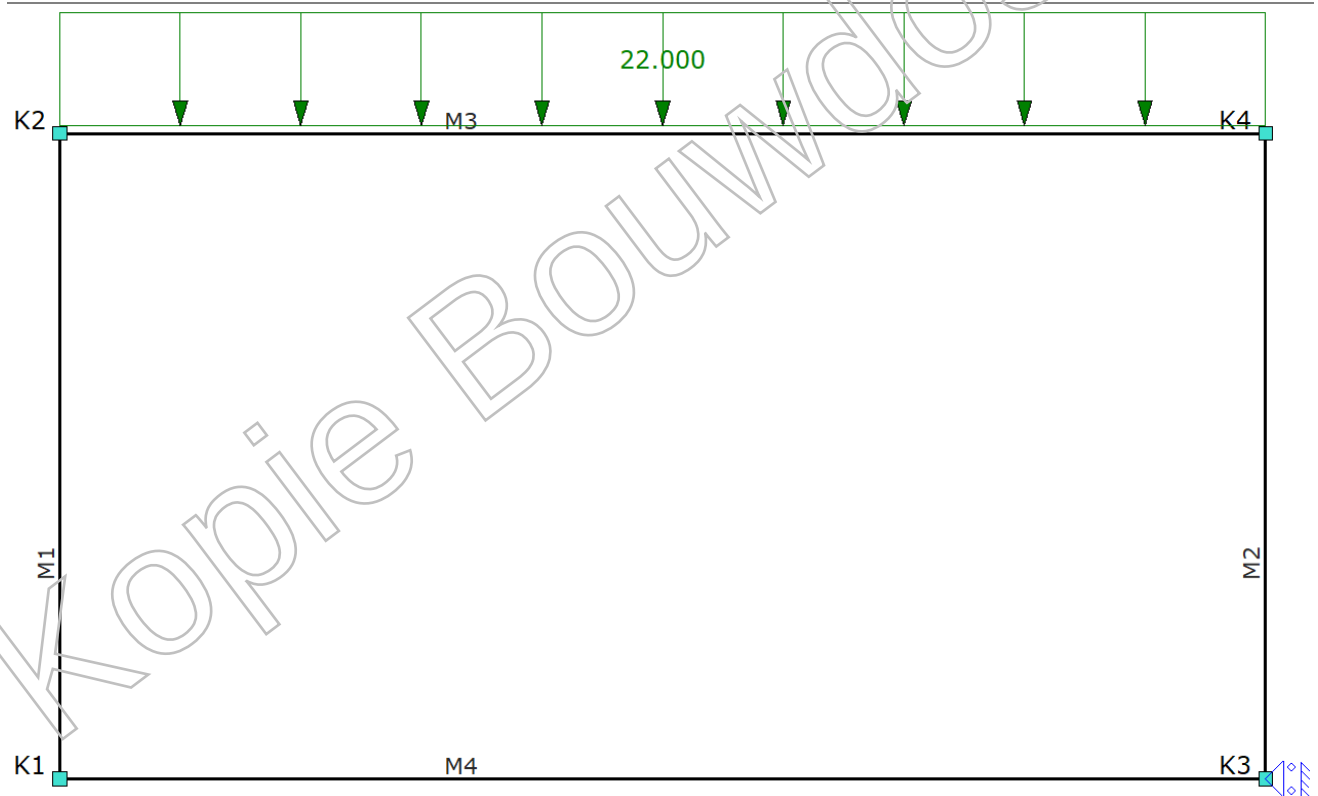
## MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus         | Uitzettingcoëff |
|---------------|--------|-------------------|-------------------|-----------------|
| S235          | 0.30   | 78.50             | 2.1000e+05        | 12.0000e-06     |
|               |        | kN/m <sup>3</sup> | N/mm <sup>2</sup> | C°m             |

## OPLEGGINGEN

| Oplegging | Object | Positie | X    | Z    | Yr   | Hoek    | Yr |
|-----------|--------|---------|------|------|------|---------|----|
| O1        | K3     | K3      | Vast | Vrij | Vrij | 0       | 0  |
|           |        |         | m    | kN/m | kN/m | kNm/rad | °  |

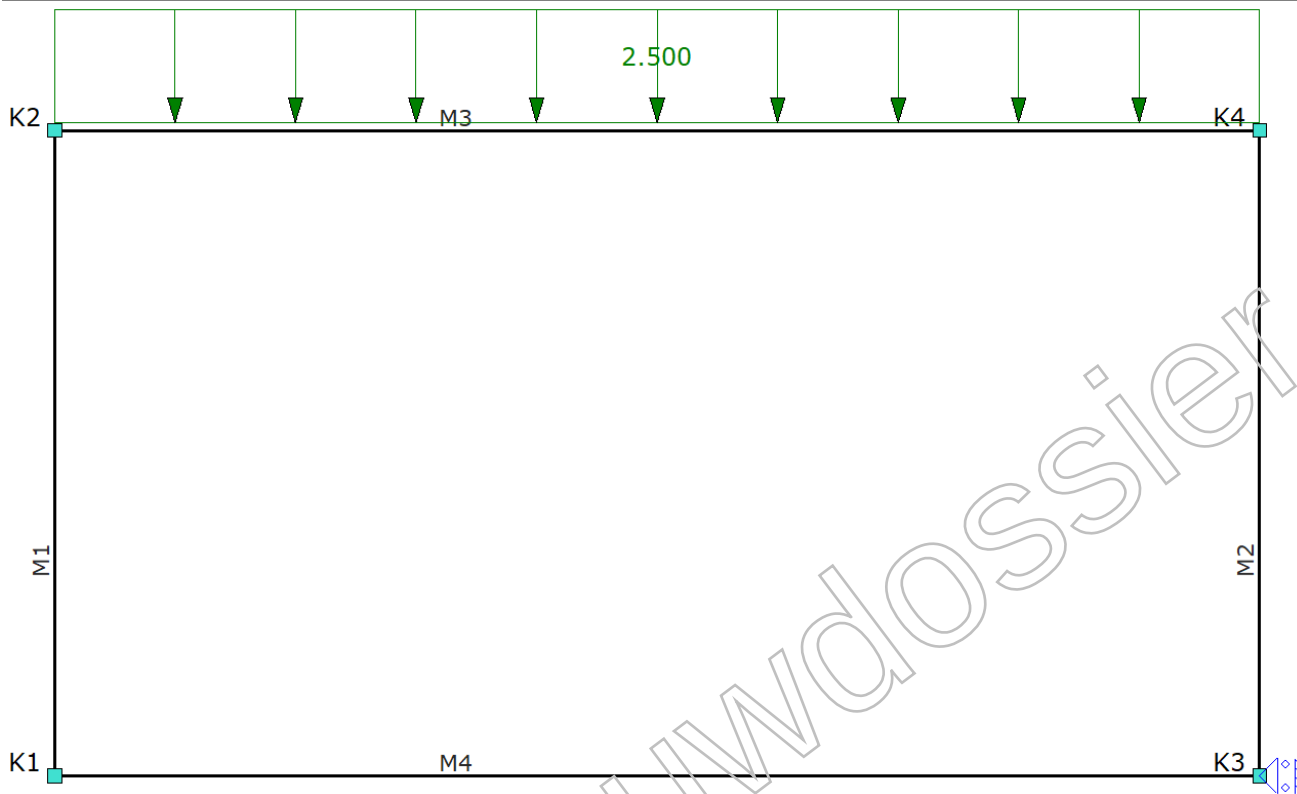
### B.G.1: Permanent



### B.G.1: PERMANENT

| Type       | Beginwaarde | Eindwaarde | Beginafstand | Eindafstand | Richting | Staat of knoop | Omschrijving |
|------------|-------------|------------|--------------|-------------|----------|----------------|--------------|
| q          | 22.000      | 22.000     | 0.000        | 5.600 (L)   | Z'       | M3             |              |
| Som lasten |             | Z: 123.200 |              |             |          |                |              |
|            |             |            | m            | m           |          |                |              |

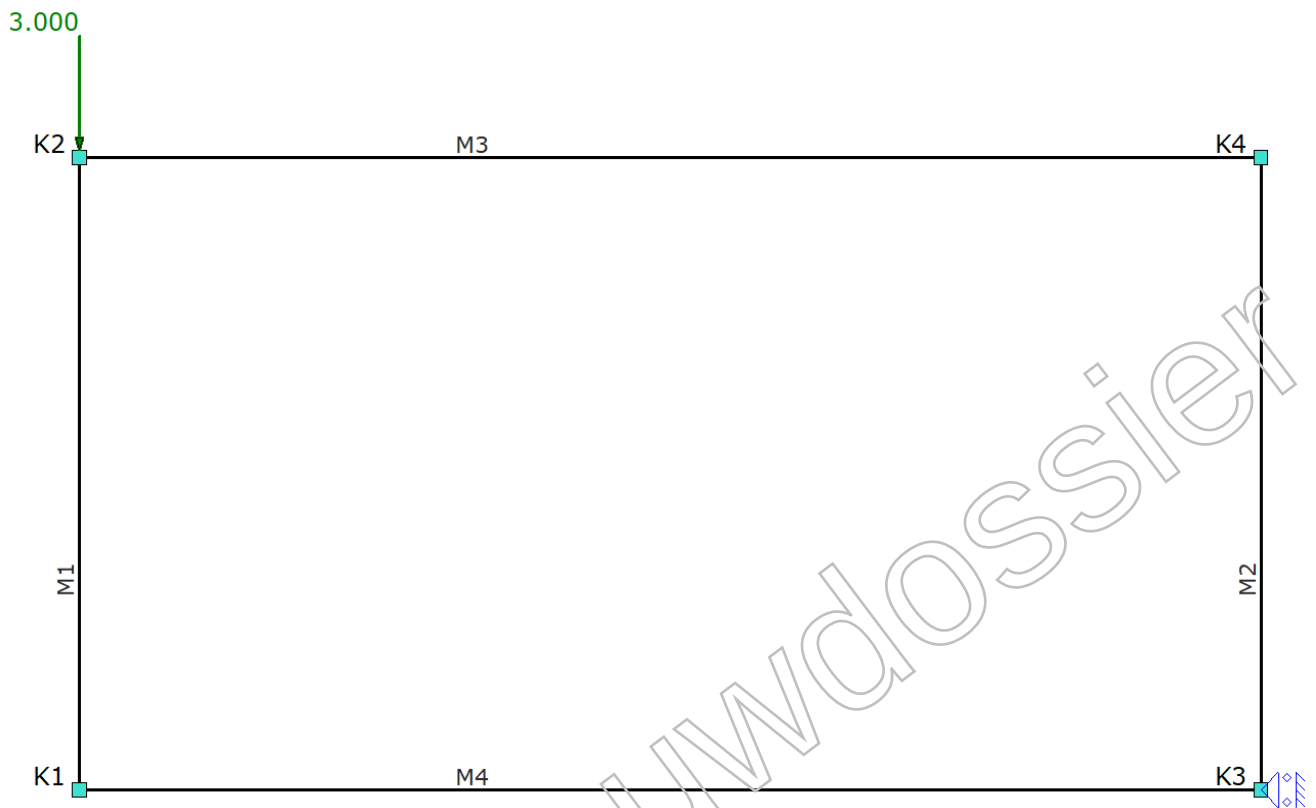
B.G.2: Verdeelde veranderlijke belasting



**B.G.2: VERDEELDE VERANDERLIJKE BELASTING**

| Type              | Beginwaarde      | Eindwaarde | Beginafstand | Eindafstand | Richting | Staaf of knoop | Omschrijving |
|-------------------|------------------|------------|--------------|-------------|----------|----------------|--------------|
| q                 | 2.500            | 2.500      | 0.000        | 5.600 (L)   | Z'       | M3             |              |
| <b>Som lasten</b> | <b>Z: 14.000</b> |            |              |             |          |                |              |
|                   |                  |            | m            | m           |          |                |              |

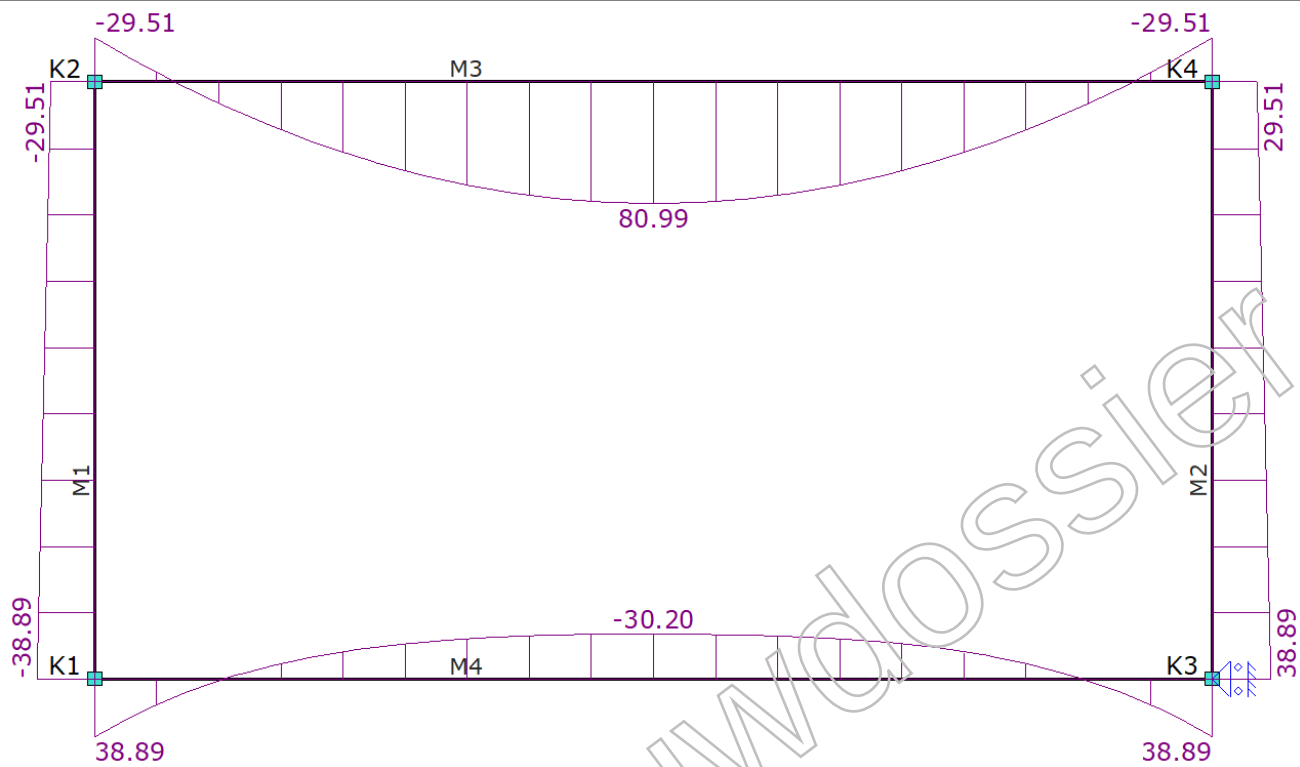
### B.G.3: Windbelasting



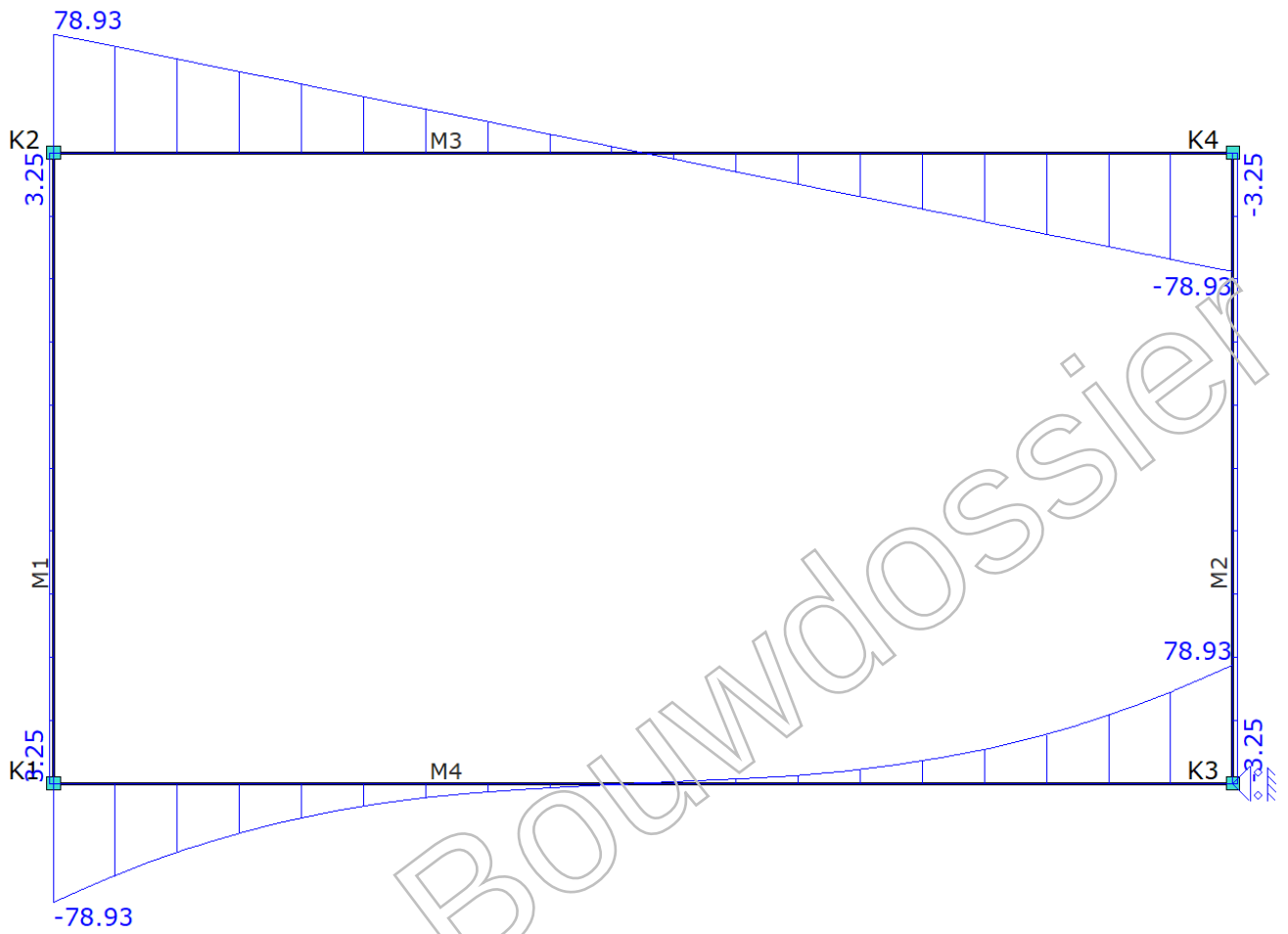
### B.G.3: WINDBELASTING

| Type              | Beginwaarde | Eindwaarde      | Beginafstand | Eindafstand | Richting | Staaf of knoop | Omschrijving |
|-------------------|-------------|-----------------|--------------|-------------|----------|----------------|--------------|
| N                 | 3.000       |                 |              |             |          | Z K2           |              |
| <b>Som lasten</b> |             | <b>Z: 3.000</b> |              |             |          |                |              |
|                   |             |                 | m            | m           |          |                |              |

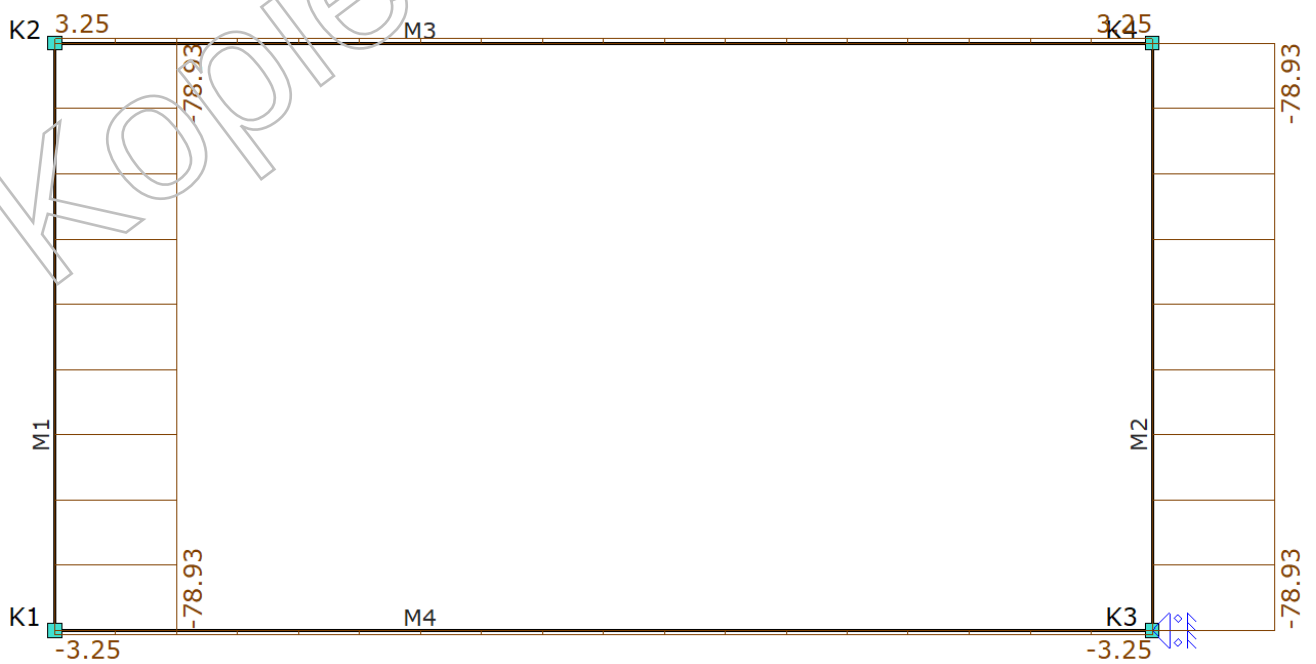
Fu.C. Omhullende Momenten (My)



Fu.C. Omhullende Dwarskracht (Vz)



Fu.C. Omhullende Normalkracht (Nx)



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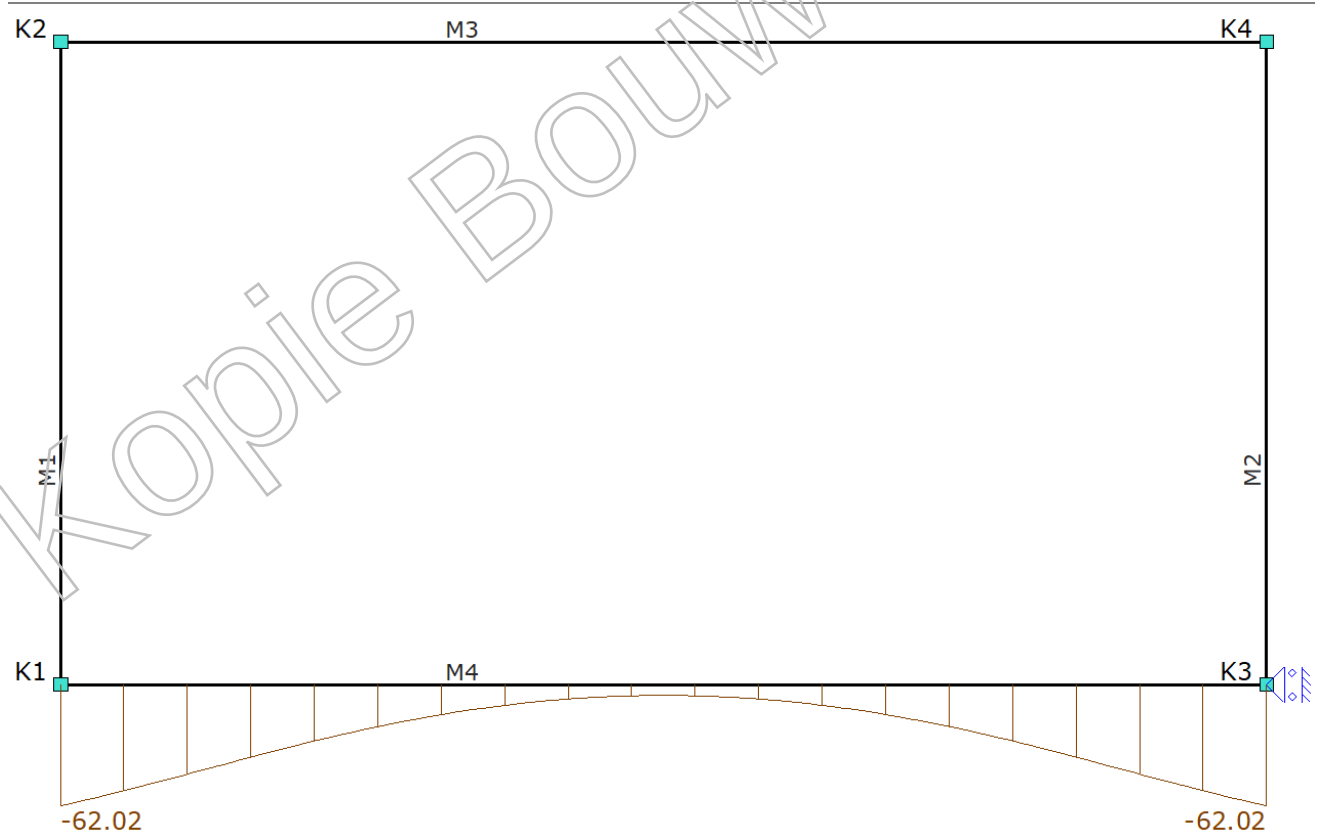
### EXTREME STAAFKRACHTEN

| Staaf               | Veld                   | B.C.   | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM <sub>0</sub> | xM <sub>0</sub> | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|---------------------|------------------------|--------|----------------|------------------|-------------------|----------------|-----------------|-----------------|-----|------------------|----------------|------------------|----------------|
| <b>Fundamenteel</b> |                        |        |                |                  |                   |                |                 |                 |     |                  |                |                  |                |
| M1                  | Veld 1 (0.000 - 3.000) | Fu.C.2 | -36.08         |                  |                   | -26.32         |                 |                 | D   | -74.46           | <b>3.25</b>    | <b>3.25</b>      | <b>3.25</b>    |
|                     | Veld 1 (0.000 - 3.000) | Fu.C.3 | <b>-38.89</b>  |                  |                   | <b>-29.51</b>  |                 |                 | D   | <b>-78.93</b>    | 3.12           | 3.12             | 3.12           |
| M2                  | Veld 1 (0.000 - 3.000) | Fu.C.2 | 35.49          |                  |                   | 25.73          |                 |                 | D   | -70.20           | <b>-3.25</b>   | <b>-3.25</b>     | <b>-3.25</b>   |
|                     | Veld 1 (0.000 - 3.000) | Fu.C.3 | <b>38.89</b>   |                  |                   | <b>29.51</b>   |                 |                 | D   | <b>-78.93</b>    | -3.12          | -3.12            | -3.12          |
| M3                  | Veld 1 (0.000 - 5.600) | Fu.C.2 | -26.32         | 72.41            | 2.804             | -25.73         | 0.403           | 5.206           | T   | <b>3.25</b>      | 70.41          | <b>70.41</b>     | -70.20         |
|                     | Veld 1 (0.000 - 5.600) | Fu.C.3 | <b>-29.51</b>  | <b>80.99</b>     | 2.800             | <b>-29.51</b>  | 0.403           | 5.197           | T   | 3.12             | <b>78.93</b>   | <b>-78.93</b>    | <b>-78.93</b>  |
| M4                  | Veld 1 (0.000 - 5.600) | Fu.C.2 | 36.08          | -27.69           | 2.644             | 35.49          | 0.638           | 4.931           | D   | <b>-3.25</b>     | -74.46         | -74.46           | 70.20          |
|                     | Veld 1 (0.000 - 5.600) | Fu.C.3 | <b>38.89</b>   | <b>-30.20</b>    | 2.800             | <b>38.89</b>   | 0.650           | 4.950           | D   | -3.12            | <b>-78.93</b>  | <b>-78.93</b>    | <b>78.93</b>   |
| <b>m</b>            |                        |        | <b>kNm</b>     | <b>kNm</b>       | <b>m</b>          | <b>kNm</b>     | <b>m</b>        | <b>m</b>        |     | <b>kN</b>        | <b>kN</b>      | <b>kN</b>        | <b>kN</b>      |

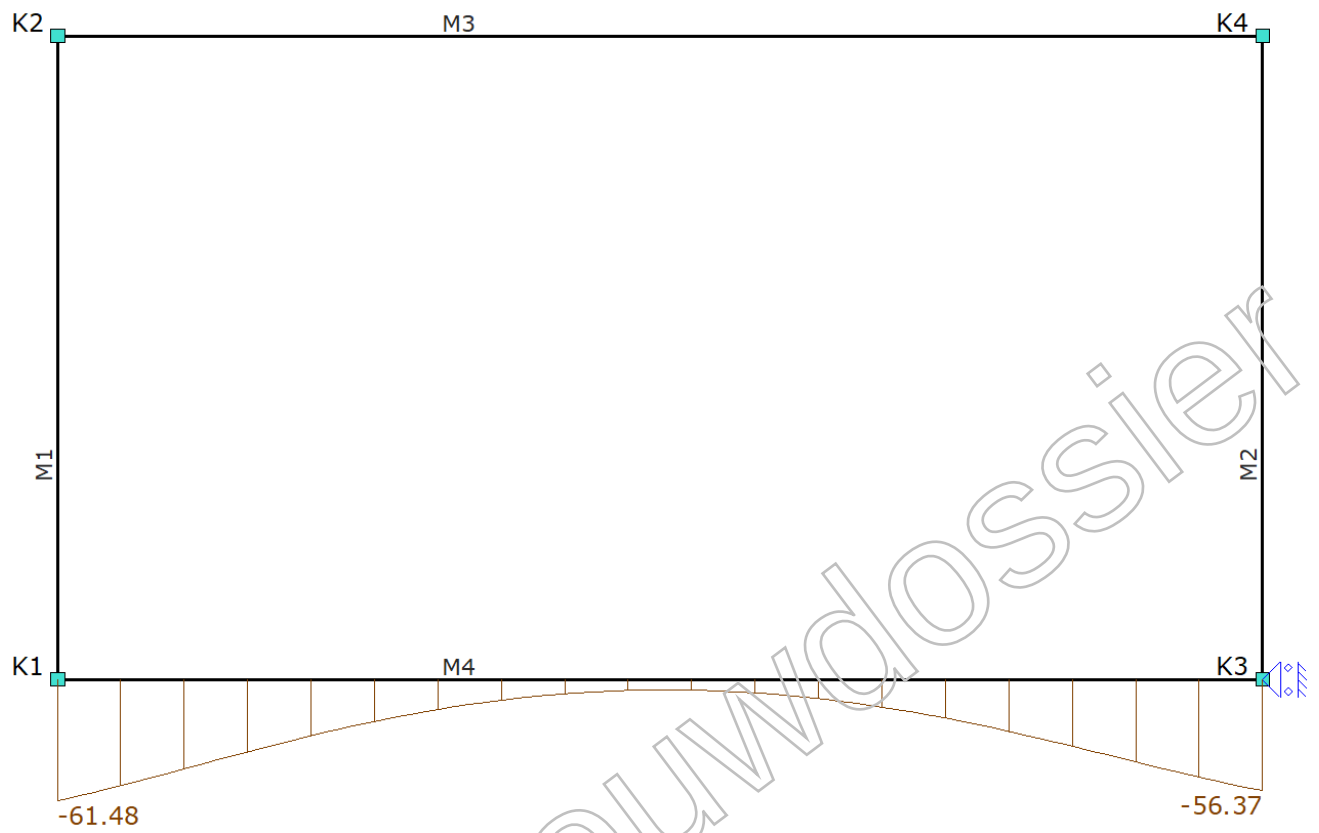
### EXTREME DOORBUIGINGEN

| Staaf          | Veld                   | B.C.   | Knoop Begin |      |       | Staaf |             |        | Knoop Eind |      |
|----------------|------------------------|--------|-------------|------|-------|-------|-------------|--------|------------|------|
|                |                        |        | X           | Z    | Zafst | Z'    | Z' glb dist | Z' glb | X          | Z    |
| Karakteristiek |                        |        |             |      |       |       |             |        |            |      |
| M1             | Veld 1 (0.000 - 3.000) | Ka.C.2 | -11.2       | 0.0  | 1.466 | -2.9  | 1.467       | -2.9   | -11.4      | 0.0  |
| M2             | Veld 1 (0.000 - 3.000) |        | -11.2       | 0.0  | 1.466 | 2.9   | 1.467       | 3.0    | -11.4      | 0.0  |
| M3             | Veld 1 (0.000 - 5.600) |        | 0.0         | 11.4 | 2.800 | 7.4   | 2.800       | 18.8   | 0.0        | 11.4 |
| M4             | Veld 1 (0.000 - 5.600) |        | 0.0         | 11.2 | 2.800 | -10.2 | 0.000       | 11.2   | 0.0        | 11.2 |
|                | m                      |        | mm          | mm   | m     | mm    | m           | mm     | mm         | mm   |

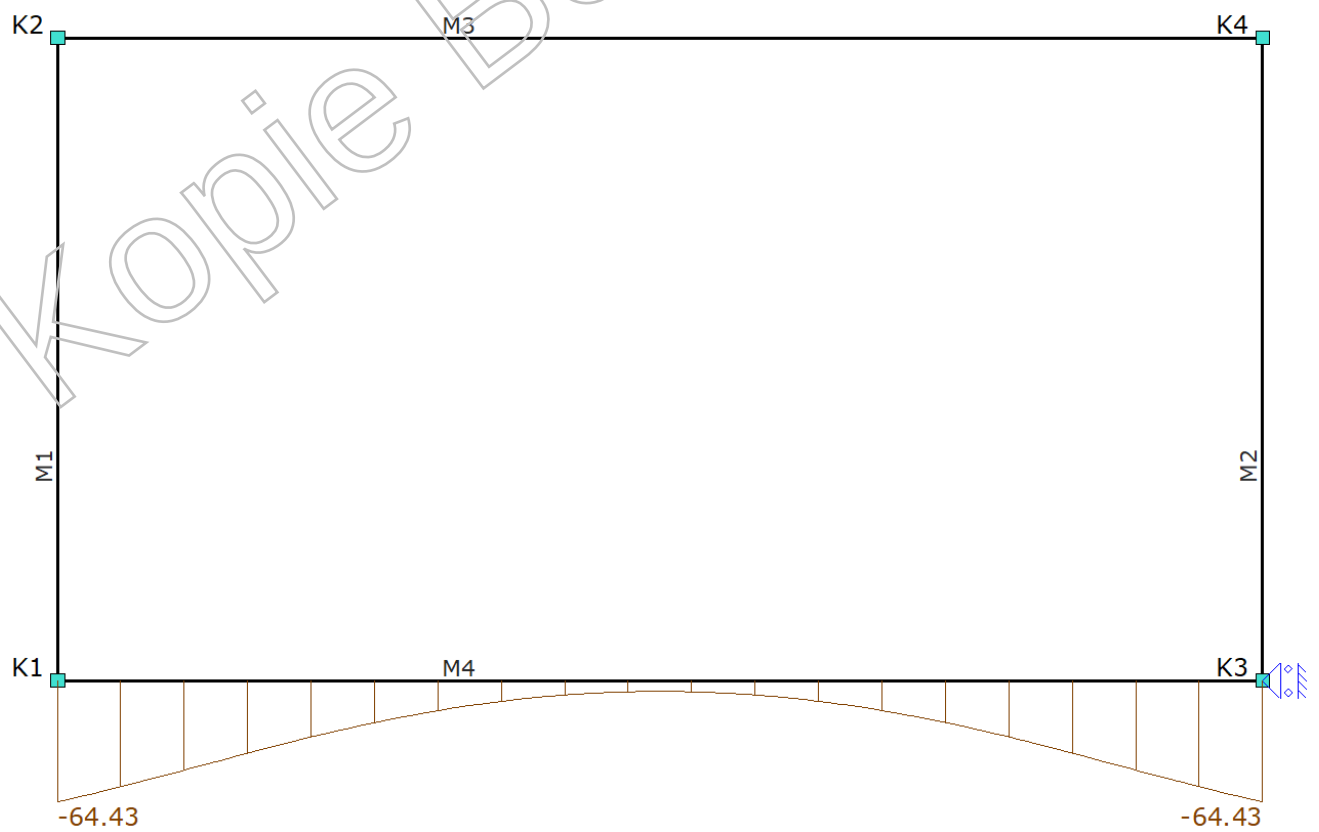
Fu.C.1 Gronddruk



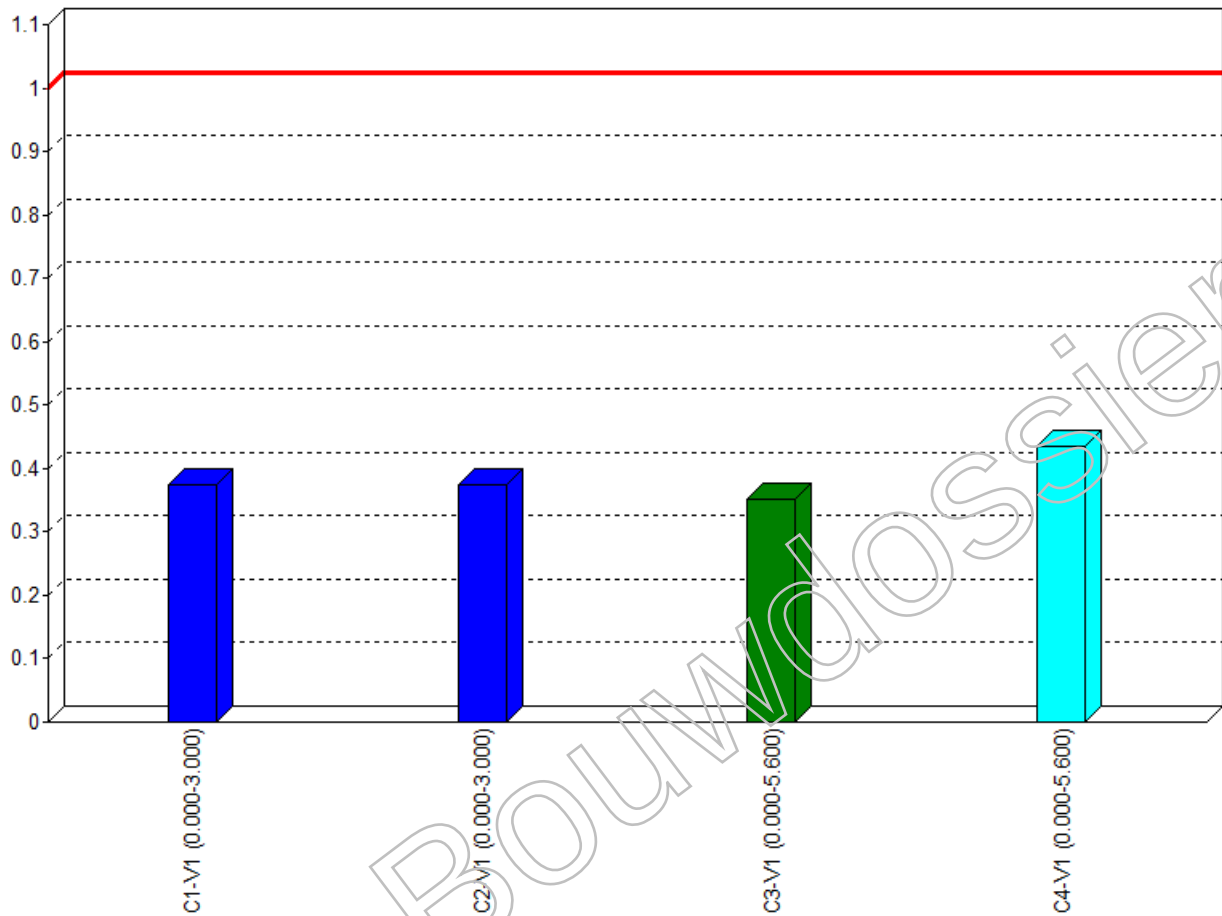
Fu.C.2 Gronddruk



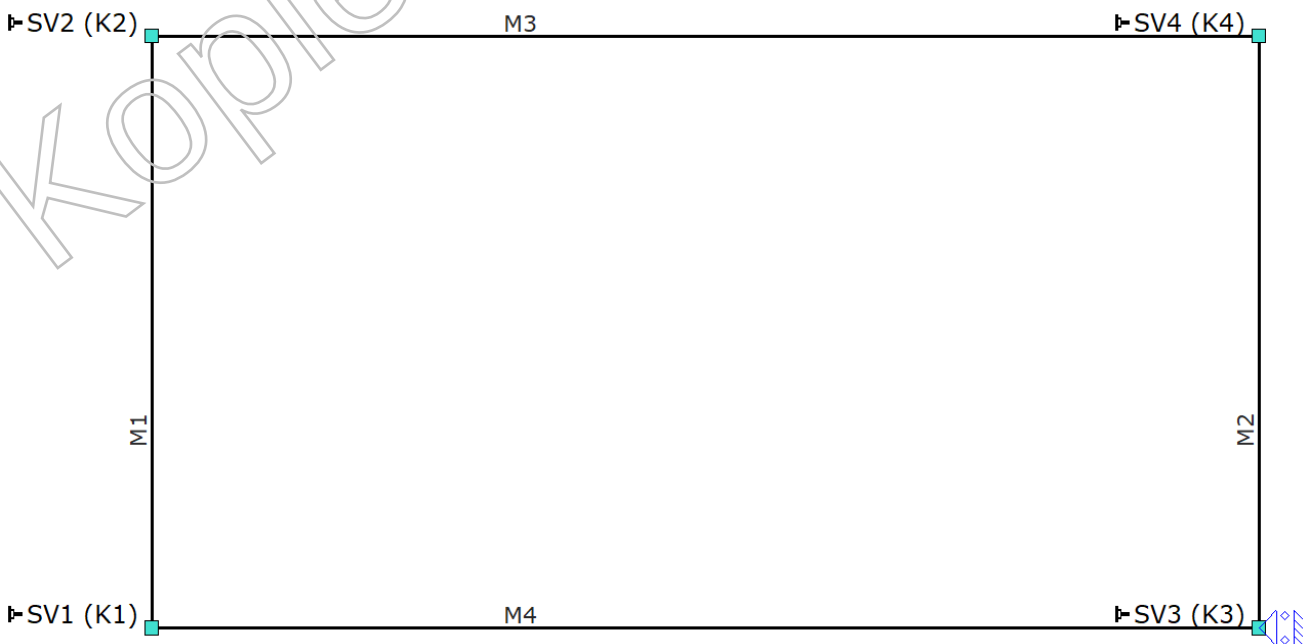
Fu.C.3 Gronddruk



Afb. Staal UC Diagram



Afb. S.V. definitie



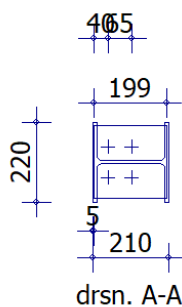
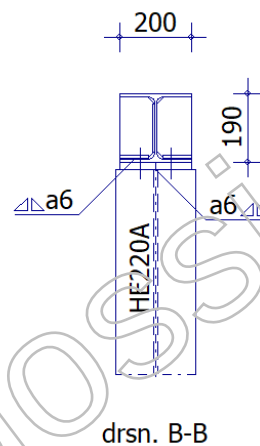
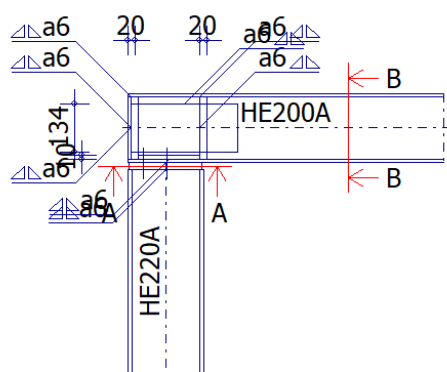
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#### S.V. DEFINITIE

| Knoop | Staaft | Azimuth | Elevatie | Topologie     | Profiel | Verbinding | Label | UC Max. |
|-------|--------|---------|----------|---------------|---------|------------|-------|---------|
| K1    | M1     | 0°      | 90°      | Kolom boven   | HE220A  | Kopplaat   | SV1   | 0.88    |
|       | M4     | 0°      | 0°       | Ligger rechts | HE200A  | Continue   |       | 0.88    |
| K2    | M1     | 0°      | 270°     | Kolom onder   | HE220A  | Kopplaat   | SV2   | 0.85    |
|       | M3     | 0°      | 0°       | Ligger rechts | HE280A  | Continue   |       | 0.85    |
| K3    | M2     | 0°      | 90°      | Kolom boven   | HE220A  | Continue   | SV3   | 1.59    |
|       | M4     | 0°      | 180°     | Ligger links  | HE200A  | Kopplaat   |       | 1.59    |
|       | M2     | 0°      | 90°      | Kolom boven   | HE220A  | Geen       | SV5   | N/B     |
|       | M4     | 0°      | 180°     | Ligger links  | HE200A  | Geen       |       | N/B     |
| K4    | M2     | 0°      | 270°     | Kolom onder   | HE220A  | Continue   | SV4   | 0.83    |
|       | M3     | 0°      | 180°     | Ligger links  | HE280A  | Kopplaat   |       | 0.83    |

#### SV1 (NEN-EN 1993-1-8:2011/NB:2011)





## Verbindingsgegevens

Ligger: HE200A

Kolom: HE220A

Kopplaat: 199x200x20 mm

Bouten: M20, Kwaliteit 8.8, Afstand 86

Maatvoering bout 1 t.o.v bovenzijde kopplaat

Randafstand: 40

Steek: 65

## VERB. VERKORT MAATGEVEND

## ALGEMEEN

|                  |                                    |      |                                                 |
|------------------|------------------------------------|------|-------------------------------------------------|
| Verbindings type | Enkele L-verbinding (Ligger-Kolom) |      |                                                 |
| Ligger           | HE200A                             | S235 | (b = 200, h = 190, $f_t = 10.0$ , $w_t = 6.5$ ) |
| Kolom            | HE220A                             | S235 | (b = 220, h = 210, $f_t = 11.0$ , $w_t = 7.0$ ) |
| Hoek             | 90.0 °                             |      |                                                 |
| Lengte           | Ligger<br>5.600 m                  |      |                                                 |

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|                       |                    |
|-----------------------|--------------------|
| Raamwerk              | Statisch bepaald   |
| Horizontale stijfheid | Geschoord raamwerk |
| Milieu                | Niet corrosief     |
| Rekentype             | Elastisch          |

## VERBINDINGSONDERDELEN

|                | Hoogte | Breedte | Dikte | Afstand | Las (h) | Las (v) | Materiaal |
|----------------|--------|---------|-------|---------|---------|---------|-----------|
| Kopplaat       | 199    | 200     | 20.0  | 5.0     | 6       | 6       | S235      |
| Trekschot hor. | 170    | 97      | 20.0  | 8.0     | 6       | 6       | S235      |
| Drukschot hor. | 170    | 97      | 20.0  | 198.0   | 6       | 6       | S235      |
| Lijfplaat      | 294    | 134     | 6.5   | 8.0     | 6       | 6       | S235      |
| Achterlegplaat | 170    | 79      | 10.0  | 28.0    | 6       | 6       | S235      |
|                | mm     | mm      | mm    | mm      | mm      | mm      |           |

## BOUTEN: M20

|                                              |              |
|----------------------------------------------|--------------|
| Sterkte                                      | 8.8 (Gerold) |
| Afstand                                      | 86 mm        |
| $d_{g,nom}$                                  | 22 mm        |
| Afschuifvlak van de bout gaat door het draad | Ja           |

|                       | Afstand | Totale afstand |                       | Afstand | Totale afstand |
|-----------------------|---------|----------------|-----------------------|---------|----------------|
| Randafstand boutrij 1 | 40      | 40             | Steek boutrijen 1 - 2 | 65      | 105            |
|                       | mm      | mm             |                       | mm      | mm             |

## BELASTINGEN

### Fu.C.3; Knoop K1

|            |        |            |        |            |        |
|------------|--------|------------|--------|------------|--------|
| $N_{1,Ed}$ | -78.93 | $M_{1,Ed}$ | -38.89 | $V_{1,Ed}$ | 3.12   |
| $N_{4,Ed}$ | -3.12  | $M_{4,Ed}$ | 38.89  | $V_{4,Ed}$ | -78.93 |

## OVERZICHT CONTROLES PER BELASTINGSGEVAL

| BC     | $M_{j,Rd}$ | UC max | Conclusie |
|--------|------------|--------|-----------|
| Fu.C.3 | 44.23      | 0.88   | Ok        |
|        | kNm        |        |           |

## CLASSIFICATIE DOOR STERKTE (NEN-EN 1993-1-8 #5.2.3)

| BC     | $M_{j,Rd}$ | $M_{kolom,u,d}$ | $M_{ligger,u,d}$ | Conclusie             |
|--------|------------|-----------------|------------------|-----------------------|
| Fu.C.3 | 44.23      | 133.59          | 100.93           | Gedeeltelijke sterkte |
|        | kNm        | kNm             | kNm              |                       |

## CLASSIFICATIE DOOR STIJFHEID (NEN-EN 1993-1-8 #5.2.2)

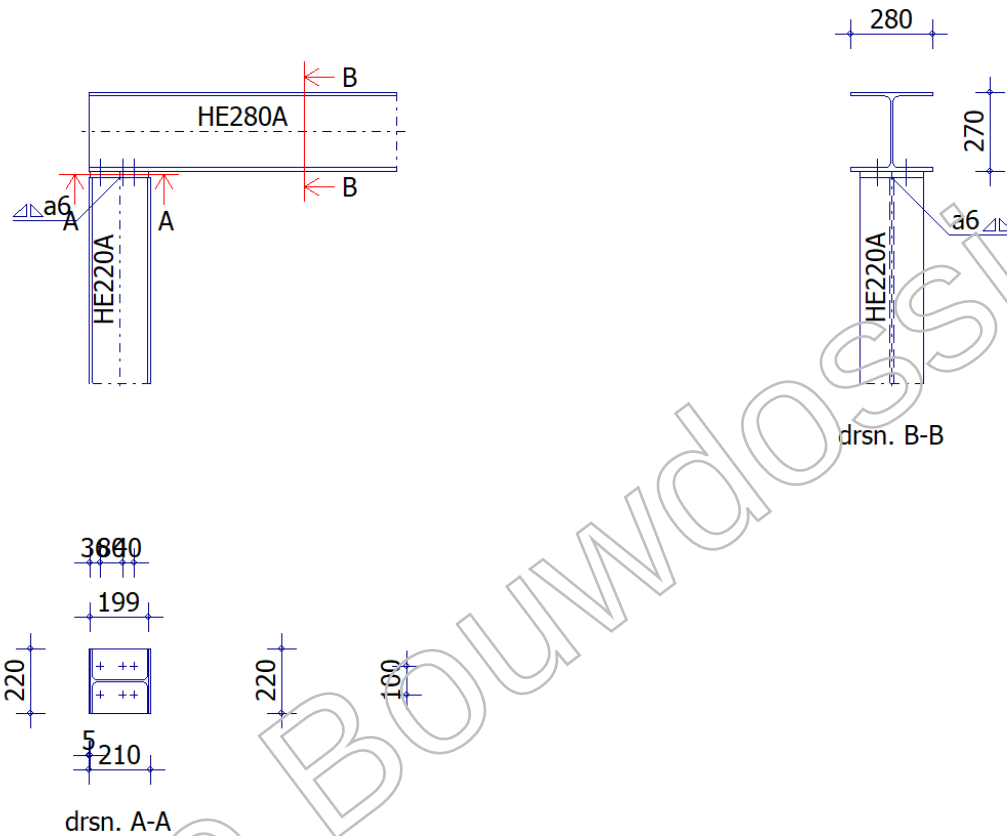
| BC     | Nominaal scharnierend | Stijf    | Berekend | Conclusie  |
|--------|-----------------------|----------|----------|------------|
| Fu.C.1 | 1893.40               | 30294.33 | 10030.96 | Semi-stijf |
| Fu.C.2 | 1893.40               | 30294.33 | 10030.96 | Semi-stijf |
| Fu.C.3 | 1893.40               | 30294.33 | 10030.96 | Semi-stijf |
|        | kNm/rad               | kNm/rad  | kNm/rad  |            |

## SV2 (NEN-EN 1993-1-8:2011/NB:2011)

M3

M1





Verbindingsgegevens  
 Ligger: HE280A  
 Kolom: HE220A  
 Kopplaat: 199x219x20 mm  
 Bouten: M16, Kwaliteit 8.8, Afstand 100  
 Maatvoering bout 1 t.o.v bovenzijde kopplaat  
 Randafstand: 36  
 Steek: 80, 39

## VERB. VERKORT MAATGEVEND

### ALGEMEEN

|                  |                                    |      |                                                 |
|------------------|------------------------------------|------|-------------------------------------------------|
| Verbindings type | Enkele L-verbinding (Ligger-Kolom) |      |                                                 |
| Ligger           | HE280A                             | S235 | (b = 280, h = 270, $f_t = 13.0$ , $w_t = 8.0$ ) |
| Kolom            | HE220A                             | S235 | (b = 220, h = 210, $f_t = 11.0$ , $w_t = 7.0$ ) |
| Hoek             | 90.0 °                             |      |                                                 |
| Lengte           | Ligger<br>5.600 m                  |      |                                                 |

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|                       |                    |
|-----------------------|--------------------|
| Raamwerk              | Statisch bepaald   |
| Horizontale stijfheid | Geschoord raamwerk |
| Milieu                | Niet corrosief     |
| Rekentype             | Elastisch          |

## VERBINDINGSONDERDELEN

|          | Hoogte | Breedte | Dikte | Afstand | Las (h) | Las (v) | Materiaal |
|----------|--------|---------|-------|---------|---------|---------|-----------|
| Kopplaat | 199    | 220     | 20.0  | 5.0     | 6       | 6       | S235      |
|          | mm     | mm      | mm    | mm      | mm      | mm      |           |

## BOUTEN: M16

|                                              |              |
|----------------------------------------------|--------------|
| Sterkte                                      | 8.8 (Gerold) |
| Afstand                                      | 100 mm       |
| $d_{g,nom}$                                  | 18 mm        |
| Afschuifvlak van de bout gaat door het draad | Ja           |

|                       | Afstand | Totale afstand |                       | Afstand | Totale afstand |
|-----------------------|---------|----------------|-----------------------|---------|----------------|
| Randafstand boutrij 1 | 36      | 36             | Steek boutrijen 1 - 2 | 80      | 116            |
| Steek boutrijen 2 - 3 | 40      | 156            |                       |         |                |
|                       | mm      | mm             |                       | mm      | mm             |

## BELASTINGEN

### Fu.C.3; Knoop K2

|            |        |            |        |            |       |
|------------|--------|------------|--------|------------|-------|
| $N_{1,Ed}$ | -78.93 | $M_{1,Ed}$ | 29.51  | $V_{1,Ed}$ | 3.12  |
| $N_{3,Ed}$ | 3.12   | $M_{3,Ed}$ | -29.51 | $V_{3,Ed}$ | 78.93 |

## OVERZICHT CONTROLES PER BELASTINGSGEVAL

| BC     | $M_{j,Rd}$ | UC max | Conclusie |
|--------|------------|--------|-----------|
| Fu.C.3 | 34.72      | 0.85   | Ok        |
|        | kNm        |        |           |

## CLASSIFICATIE DOOR STERKTE (NEN-EN 1993-1-8 #5.2.3)

| BC     | $M_{j,Rd}$ | $M_{kolom,u,d}$ | $M_{ligger,u,d}$ | Conclusie             |
|--------|------------|-----------------|------------------|-----------------------|
| Fu.C.3 | 34.72      | 133.59          | 261.37           | Gedeeltelijke sterkte |
|        | kNm        | kNm             | kNm              |                       |

## CLASSIFICATIE DOOR STIJFHEID (NEN-EN 1993-1-8 #5.2.2)

| BC     | Nominaal scharnierend | Stijf    | Berekend | Conclusie  |
|--------|-----------------------|----------|----------|------------|
| Fu.C.1 | 1893.40               | 30294.33 | 6616.05  | Semi-stijf |
| Fu.C.2 | 1893.40               | 30294.33 | 6616.05  | Semi-stijf |
| Fu.C.3 | 1893.40               | 30294.33 | 6616.05  | Semi-stijf |
|        | kNm/rad               | kNm/rad  | kNm/rad  |            |