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# Statische Berechnung

## Aluminiumverbundabdeckung

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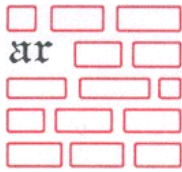
BAUHERR      AVA-Innovation  
Allmendstraße 7  
77948 Friesenheim

PROJEKT      Aluminiumverbundabdeckung

AZ              19259\_1a

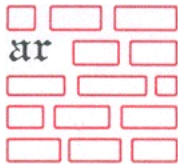
### **Aluminium Allwetterbelag.**

Die Berechnung betrachtet die Aludielen in 1m Breite verlegt.  
Berechnet wird das Element als Dachbelag und als Terrassenbelag.



## Inhaltsverzeichnis

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| AL2-4-MI         | Alu Bpr Kragarm (ML, 1.0 kN)                         | 14    |
| AL1-5-           | Alu Bpr (Verkehrslastansatz, 5.0 kN/m <sup>2</sup> ) | 20    |
| AL1-5-200        | Alu Bpr (Verkehrslastansatz, 5.0 kN/m <sup>2</sup> ) | 25    |
| AL2-5-           | Alu Bpr Kragarm (VL, 5.0 kN/m <sup>2</sup> )         | 30    |
| AL2-5-200        | Alu Bpr Kragarm (VL, 5.0 kN/m <sup>2</sup> )         | 35    |
| AL1-5-2-Feld     | Alu Bpr (Verkehrslastansatz, 5.0 kN/m <sup>2</sup> ) | 40    |
| AL1-5-2-Feld-200 | Alu Bpr (Verkehrslastansatz, 5.0 kN/m <sup>2</sup> ) | 46    |
| AL1-5-3-Feld     | Alu Bpr (Verkehrslastansatz, 5.0 kN/m <sup>2</sup> ) | 52    |
| AL1-5-3-Feld-200 | Alu Bpr (Verkehrslastansatz, 5.0 kN/m <sup>2</sup> ) | 59    |
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| ALSchT_01        | Schlusstext                                          | 82    |



PROJEKT **19259-1a AVA Diele 40**  
POSITION **ALLa01 Wind- und Schneelastzonen**

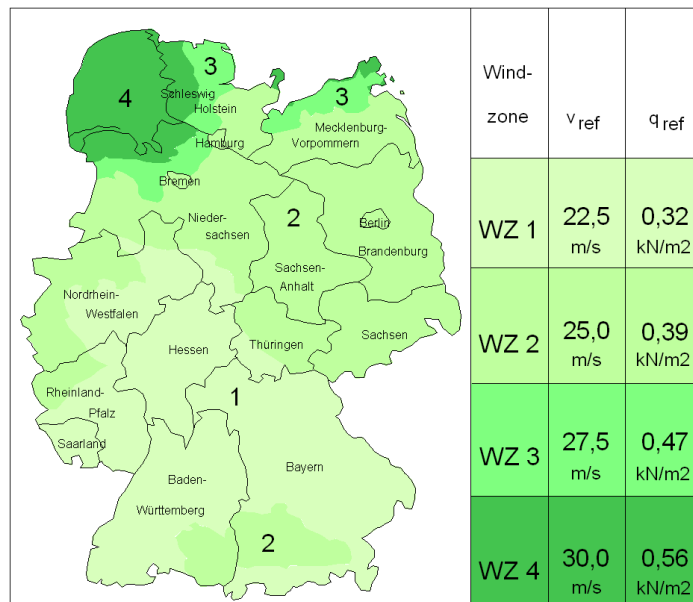
SEITE **3**  
PROJ.-NR. **19259\_1a**  
DATUM **10.07.2019**

## Pos. ALLa01

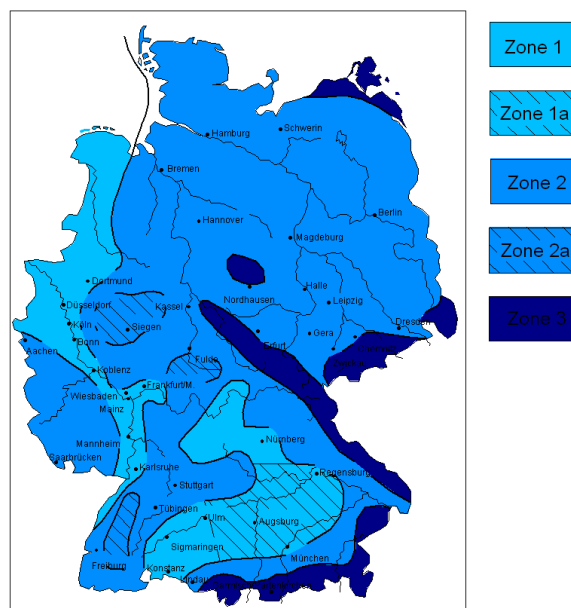
## Wind- und Schneelastzonen

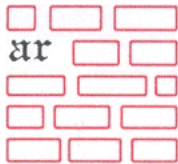
|                   |                   |                   |   |                        |
|-------------------|-------------------|-------------------|---|------------------------|
| Gebäude           | Postleitzahl      | PLZ               | = | 77948                  |
| Gebäudestandort   | Ortsname          | Ort               | = | Friesenheim            |
| Gemeinde          | Gemeindeschlüssel | AGS               | = | 08317031               |
|                   | Kreis             | Ortenaukreis      |   |                        |
|                   | Bundesland        | Baden-Württemberg |   |                        |
| Geodätische Daten | Geogr. Breite     | $\varphi$         | = | 48.37388 °             |
|                   | Geogr. Länge      | $\lambda$         | = | 7.88410 °              |
| Geograf. Daten    | Geländehöhe ü. NN | $H_s$             | = | 159.00 m               |
|                   | Windzone          | WZ                | = | 1                      |
|                   | Schneelastzone    | SLZ               | = | 1                      |
|                   | char. Schneelast  | $S_k$             | = | 0.65 kN/m <sup>2</sup> |

### Übersicht Wind



### Übersicht Schnee



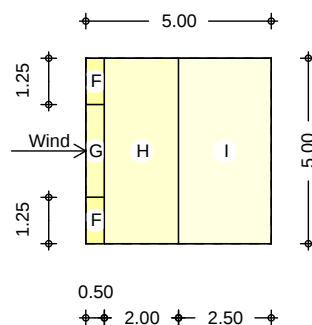


## Pos. ALLa02

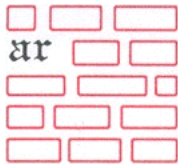
## Flachdach mit Schnee u. Wind für Regelfall

|                            |                                                                    |              |            |                   |
|----------------------------|--------------------------------------------------------------------|--------------|------------|-------------------|
| System                     | Gebäudedaten                                                       |              |            |                   |
| Abmessungen                | Gebäudebreite                                                      | B =          | 5.00       | m                 |
|                            | Gebäudelänge                                                       | L =          | 5.00       | m                 |
|                            | Gebäudehöhe (Höhe Flachdach)                                       | H =          | 10.00      | m                 |
| Geograf. Angaben           | Geländehöhe über NN                                                | A =          | 159.00     | m                 |
|                            | Windzone                                                           | WZ =         | 1          |                   |
|                            | Schneelastzone                                                     | SLZ =        | 1          |                   |
|                            | Standort                                                           |              | Binnenland |                   |
| Geometrie                  | Flachdach<br>scharfkantiger Traufbereich                           |              |            |                   |
| Wandöffnungen              | geschlossene Außenwände                                            |              |            |                   |
| Einwirkungen               | Einwirkungen nach DIN EN 1990:2010-12                              |              |            |                   |
| Qk.S                       | Schneeeinwirkung<br>Schnee- und Eislasten für Orte bis NN + 1000 m |              |            |                   |
|                            | Qk.S min/max Werte                                                 |              |            |                   |
| Qk.W                       | Wind<br>Windlasten                                                 |              |            |                   |
|                            | Qk.W min/max Werte                                                 |              |            |                   |
| Windlasten                 | Windlastermittlung nach DIN EN 1991-1-4:2010-12                    |              |            |                   |
|                            | Ermittlung im Regelfall nach NA.B.3.3                              |              |            |                   |
|                            | Anströmrichtung 0° auf Traufe links                                |              |            |                   |
|                            | Basiswindgeschwindigkeit                                           | $v_{b,0}$ =  | 22.50      | m/s               |
|                            | Basisgeschwindigkeitsdruck                                         | $q_{b,0}$ =  | 0.32       | kN/m <sup>2</sup> |
|                            | Bezugshöhe                                                         | $z_e$ =      | 10.00      | m                 |
|                            | Geschwindigkeitsdruck                                              | $q_p$ =      | 0.54       | kN/m <sup>2</sup> |
|                            | Lasteinflussfläche                                                 | $A_{\Omega}$ | 10.00      | m <sup>2</sup>    |
| Qk.W.000                   | Bereichsgröße                                                      | e =          | 5.00       | m                 |
| Richtung $\lambda=0^\circ$ |                                                                    |              |            |                   |

M 1:200



| Bereich | d<br>[m] | b<br>[m] | $C_{pe,1}$<br>[-] | $C_{pe,10}$<br>[-] | $W_{e,10}$<br>[kN/m <sup>2</sup> ] |
|---------|----------|----------|-------------------|--------------------|------------------------------------|
| F       | 0.50     | 1.25     | -2.50             | -1.80              | -0.98                              |
| G       | 0.50     | 2.50     | -2.00             | -1.20              | -0.65                              |
| H       | 2.00     | 5.00     | -1.20             | -0.70              | -0.38                              |
| I -     | 2.50     | 5.00     | -0.60             | -0.60              | -0.33                              |
| I +     | 2.50     | 5.00     | 0.20              | 0.20               | 0.11                               |

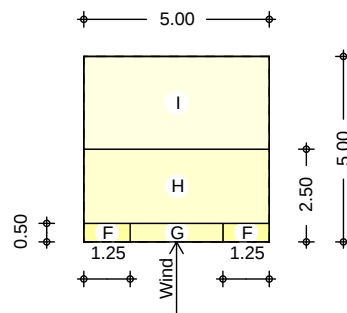


Qk.W.090  
Richtung  $\lambda=90^\circ$

Bereichsgröße

e = 5.00 m

M 1:200



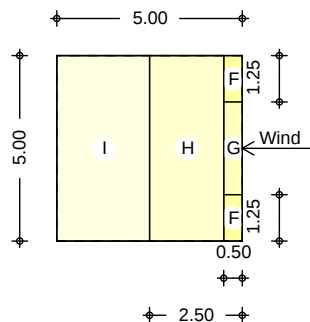
| Bereich | d<br>[m] | b<br>[m] | $C_{pe,1}$<br>[-] | $C_{pe,10}$<br>[-] | $W_{e,10}$<br>[kN/m <sup>2</sup> ] |
|---------|----------|----------|-------------------|--------------------|------------------------------------|
| F       | 0.50     | 1.25     | -2.50             | -1.80              | -0.98                              |
| G       | 0.50     | 2.50     | -2.00             | -1.20              | -0.65                              |
| H       | 2.00     | 5.00     | -1.20             | -0.70              | -0.38                              |
| I -     | 2.50     | 5.00     | -0.60             | -0.60              | -0.33                              |
| I +     | 2.50     | 5.00     | 0.20              | 0.20               | 0.11                               |

Qk.W.180  
Richtung  $\lambda=180^\circ$

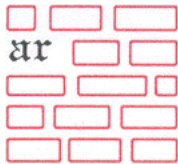
Bereichsgröße

e = 5.00 m

M 1:200



| Bereich | d<br>[m] | b<br>[m] | $C_{pe,1}$<br>[-] | $C_{pe,10}$<br>[-] | $W_{e,10}$<br>[kN/m <sup>2</sup> ] |
|---------|----------|----------|-------------------|--------------------|------------------------------------|
| F       | 0.50     | 1.25     | -2.50             | -1.80              | -0.98                              |
| G       | 0.50     | 2.50     | -2.00             | -1.20              | -0.65                              |
| H       | 2.00     | 5.00     | -1.20             | -0.70              | -0.38                              |
| I -     | 2.50     | 5.00     | -0.60             | -0.60              | -0.33                              |
| I +     | 2.50     | 5.00     | 0.20              | 0.20               | 0.11                               |

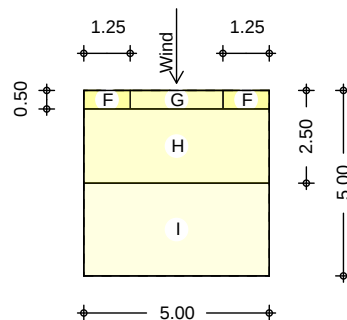


Qk.W.270  
Richtung  $\lambda=270^\circ$

Bereichsgröße

 $e = 5.00 \text{ m}$ 

M 1:200



| Bereich | d<br>[m] | b<br>[m] | $C_{pe,1}$<br>[-] | $C_{pe,10}$<br>[-] | $W_{e,10}$<br>[kN/m <sup>2</sup> ] |
|---------|----------|----------|-------------------|--------------------|------------------------------------|
| F       | 0.50     | 1.25     | -2.50             | -1.80              | -0.98                              |
| G       | 0.50     | 2.50     | -2.00             | -1.20              | -0.65                              |
| H       | 2.00     | 5.00     | -1.20             | -0.70              | -0.38                              |
| I -     | 2.50     | 5.00     | -0.60             | -0.60              | -0.33                              |
| I +     | 2.50     | 5.00     | 0.20              | 0.20               | 0.11                               |

Schneelasten

Schneelastermittlung nach DIN EN 1991-1-3:2010-12

char. Schneelast auf Boden

 $s_k = 0.65 \text{ kN/m}^2$ 

Formbeiwert für Schneelast

 $\psi_1 = 0.80$ 

Schneelast auf dem Dach

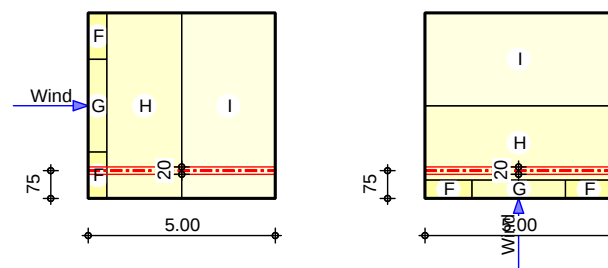
 $s = 0.52 \text{ kN/m}^2$ 

Dachlage

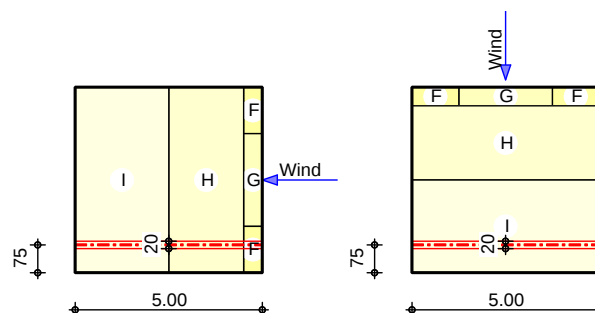
Wind- und Schneelasten für Bauteile in Dachlage

Grafik

M 1:200



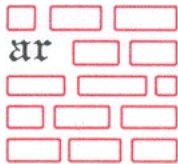
M 1:200



Sparren  
Bauteil DD

Bauteile quer zur Traufe

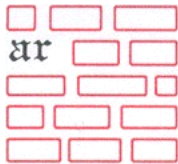
 $x_A=0.00\text{m}, y_A=0.75\text{m}, l=5.00\text{m}, LB_{li}=0.10\text{m}, LB_{re}=0.10\text{m}$

PROJEKT **19259-1a AVA Diele 40**

PROJ.-NR.

**19259\_1a**POSITION **ALLa02 Flachdach mit Schnee u. Wind für Regenfall****10.07.2019**

|          | Richtung | Bereich | X <sub>A</sub><br>[m] | X <sub>E</sub><br>[m] | q <sup>+</sup><br>[kN/m] | q <sup>-</sup><br>[kN/m] |
|----------|----------|---------|-----------------------|-----------------------|--------------------------|--------------------------|
| Qk.W.000 | lokal    | F       | 0.00                  | 0.50                  | -                        | -0.20                    |
|          | lokal    | H       | 0.50                  | 2.50                  | -                        | -0.08                    |
|          | lokal    | I       | 2.50                  | 5.00                  | 0.02                     | -0.07                    |
| Qk.W.090 | lokal    | H       | 0.00                  | 5.00                  | -                        | -0.08                    |
| Qk.W.180 | lokal    | F       | 4.50                  | 5.00                  | -                        | -0.20                    |
|          | lokal    | H       | 2.50                  | 4.50                  | -                        | -0.08                    |
|          | lokal    | I       | 0.00                  | 2.50                  | 0.02                     | -0.07                    |
| Qk.W.270 | lokal    | I       | 0.00                  | 5.00                  | 0.02                     | -0.07                    |
| Qk.S.A   | vert. GF | DF      | 0.00                  | 5.00                  | 0.10                     | -                        |



**Pos. ALLa05**      **Lastannahmen 5**

**1) Beschreibung des geplanten Projektes**

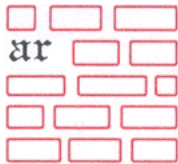
Es handelt sich um ein Aluminium-Dielenprofil.  
Es wird als Dachprofil und als Terrassen und Balkonbelag betrachtet.

**2) Lastannahmen**

**2.1) Lasten Podest**

|                         |   |             |                         |
|-------------------------|---|-------------|-------------------------|
| - aus Belag (Allgemein) | = | 0,15        | kN/m <sup>2</sup>       |
| - aus Konstruktion      | = | 0,10        | kN/m <sup>2</sup>       |
|                         |   | <u>0,25</u> | <u>kN/m<sup>2</sup></u> |

|                      |          |   |      |                                      |
|----------------------|----------|---|------|--------------------------------------|
| - aus Nutzlasten     | $q_{k1}$ | = | 5,00 | kN/m <sup>2</sup>                    |
| - Mannlast           | $q_m$    | = | 1.0  | kN/m                                 |
| Schneelast, Windlast |          |   |      | entsprechend der Ortslast nach La01a |



**Pos. AL1-MI - Alu Bpr. (Mannlastansatz 1.0 kN)**

Die Mannlast 1,0 kN wird auf 3 Dielen verteilt.

System Einfeldträger

M 1:145



| Abmessungen<br>Mat./Querschnitt | Feld | l<br>[m] | Lage<br>[°] | Achsen |
|---------------------------------|------|----------|-------------|--------|
|                                 | 1    | 2.35     | 0.0         | frei   |

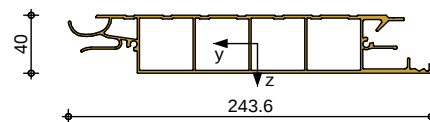
| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1    | EN-AW 6063, T66, EP | AVADIELE40 40 |

| Auflager | Lager | x<br>[m] | $K_{T,z}$<br>[kN/m] | $K_{R,y}$<br>bzw. | $K_{T,y}$<br>[kNm/rad] | $K_{R,z}$ | Gabel l. Wölbb. |
|----------|-------|----------|---------------------|-------------------|------------------------|-----------|-----------------|
|          | A     | 0.00     | fest                | frei              | fest                   | frei      | fest            |
|          | B     | 2.35     | fest                | frei              | fest                   | frei      | fest            |

| Lager | b<br>[cm] |
|-------|-----------|
| A,B   | 10.0      |

Grafik Querschnittsgrafik

M 1:5



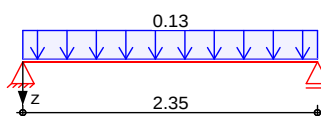
Belastungen Belastungen auf das System

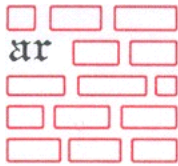
Grafik Belastungsgrafiken (einwirkungsbezogen)

Einwirkungen Gk Qk.N



Qk.S





Streckenlasten  
 in z-Richtung

Einw.  $G_k$   
 Einw.  $Q_{k,S}$

Gleichlasten  
 Feld Komm.

|   |          | a<br>[m] | s<br>[m] | $q_{li}$<br>[kN/m] | $q_{re}$<br>[kN/m] | e<br>[cm] |
|---|----------|----------|----------|--------------------|--------------------|-----------|
| 1 | Eigengew | 0.00     | 2.35     |                    | 0.04               | -0.4      |
| 1 | s        | 0.00     | 2.35     |                    | 0.13               | 0.0       |

Punktlasten  
 in z-Richtung

Einw.  $Q_{k,N}$

Einzellasten  
 Feld Komm.

|   |    | a<br>[m] | $F_z$<br>[kN] | e<br>[cm] |
|---|----|----------|---------------|-----------|
| 1 | MI | 1.18     | 0.33          | 0.0       |

Char. Schnittgrößen

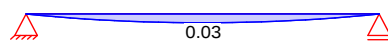
charakteristische Schnittgrößen und Verformungen

Grafik

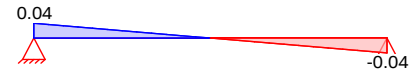
Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

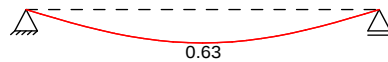
Moment  $M_{y,k}$  [kNm]



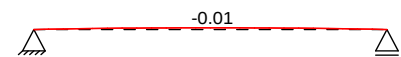
Querkraft  $V_{z,k}$  [kN]



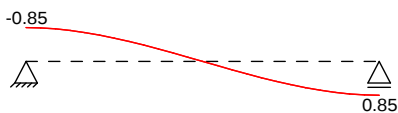
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_{x,k}$  [mrad]

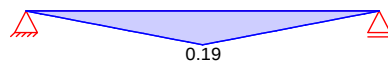


Verdrehung  $\varphi_{y,k}$  [mrad]

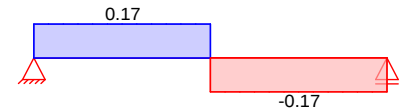


Einw.  $Q_{k,N}$

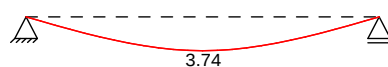
Moment  $M_{y,k}$  [kNm]



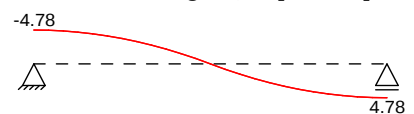
Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]

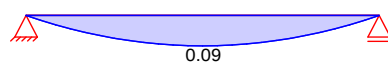


Verdrehung  $\varphi_{y,k}$  [mrad]

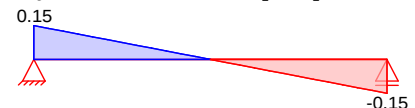


Einw.  $Q_{k,S}$

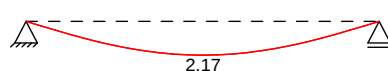
Moment  $M_{y,k}$  [kNm]



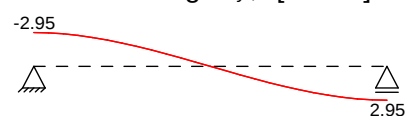
Querkraft  $V_{z,k}$  [kN]

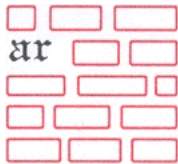


Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_{y,k}$  [mrad]





Tabelle

Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.04                  | 0.04*                 |
|                 |      | 1.18     | 0.03                   | 0.03*                  | 0.00                  | 0.00                  |
|                 |      | 2.35     | 0.00                   | 0.00                   | -0.04*                | -0.04                 |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.17                  | 0.17*                 |
|                 |      | 1.18     | 0.19                   | 0.19*                  | 0.17                  | 0.17                  |
|                 |      | 1.18     | 0.19                   | 0.19                   | -0.17*                | -0.17                 |
|                 |      | 2.35     | 0.00                   | 0.00                   | -0.17                 | -0.17                 |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.15                  | 0.15*                 |
|                 |      | 1.18     | 0.09                   | 0.09*                  | 0.00                  | 0.00                  |
|                 |      | 2.35     | 0.00                   | 0.00                   | -0.15*                | -0.15                 |

Verformungen (je Einwirkung)

|                 | Feld | x<br>[m] | $W_{z,k,min}$<br>[mm] | $y_{k,min}$<br>[mrad] | $x_{k,min}$<br>[mrad] |
|-----------------|------|----------|-----------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                  | -0.85*                | 0.00                  |
|                 |      |          | 0.00                  | -0.85                 | 0.00                  |
|                 |      | 1.18     | 0.63                  | 0.00                  | -0.01*                |
|                 |      |          | 0.63*                 | 0.00                  | -0.01                 |
|                 |      | 2.35     | 0.00                  | 0.85                  | 0.00                  |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                  | -4.78*                | 0.00                  |
|                 |      |          | 0.00                  | -4.78                 | 0.00                  |
|                 |      | 1.18     | 3.74                  | 0.00                  | 0.00                  |
|                 |      |          | 3.74*                 | 0.00                  | 0.00                  |
|                 |      | 2.35     | 0.00                  | 4.78                  | 0.00                  |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                  | -2.95*                | 0.00                  |
|                 |      |          | 0.00                  | -2.95                 | 0.00                  |
|                 |      | 1.18     | 2.17                  | 0.00                  | 0.00                  |
|                 |      |          | 2.17*                 | 0.00                  | 0.00                  |
|                 |      | 2.35     | 0.00                  | 2.95                  | 0.00                  |

Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | $E_k$ | Imp. | $u$ (I*K*EW)                                  |
|-------------------|-------|------|-----------------------------------------------|
| ständig/vorüberg. | 31    | 1    | 1.35* $G_k$ +1.50* $Q_{k,N}$ +1.50* $Q_{k,S}$ |
| quasi-ständig     | 12    |      | 1.00* $G_k$ +0.80* $Q_{k,N}$ (1)              |

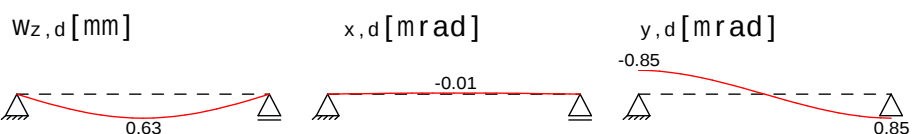
Bem.-verformungen

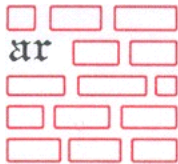
Bemessungsverformungen

Grafik

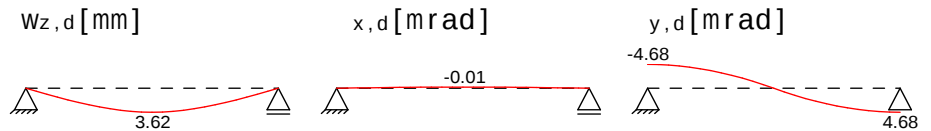
Verformungen (je Kombination)

Komb. 11

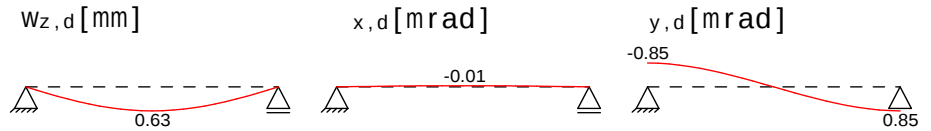




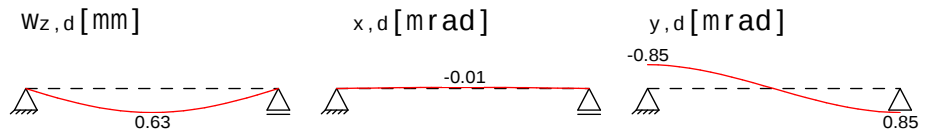
Komb. 12



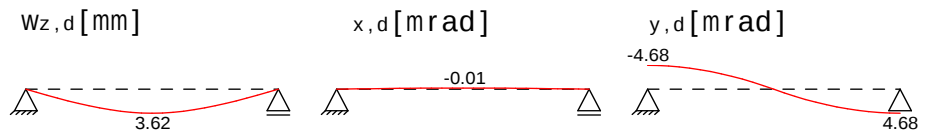
Komb. 43



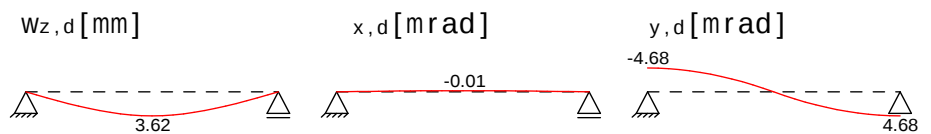
Komb. 44



Komb. 45



Komb. 46



Tabelle

Verformungen (je Kombination)

| Feld     | x<br>[m] | Wz,d<br>[mm] | y,d<br>[mrad] | x,d<br>[mrad] |
|----------|----------|--------------|---------------|---------------|
| Komb. 11 | 0.00     | 0.00         | -0.85*        | 0.00          |
|          | 1.18     | 0.63*        | 0.00          | -0.01*        |
|          | 2.35     | 0.00         | 0.85*         | 0.00          |
| Komb. 12 | 0.00     | 0.00         | -4.68*        | 0.00          |
|          | 1.18     | 3.62*        | 0.00          | -0.01*        |
|          | 2.35     | 0.00         | 4.68*         | 0.00          |
| Komb. 43 | 0.00     | 0.00         | -0.85*        | 0.00          |
|          | 1.18     | 0.63*        | 0.00          | -0.01*        |
|          | 2.35     | 0.00         | 0.85*         | 0.00          |
| Komb. 44 | 0.00     | 0.00         | -0.85*        | 0.00          |
|          | 1.18     | 0.63*        | 0.00          | -0.01*        |
|          | 2.35     | 0.00         | 0.85*         | 0.00          |
| Komb. 45 | 0.00     | 0.00         | -4.68*        | 0.00          |
|          | 1.18     | 3.62*        | 0.00          | -0.01*        |
|          | 2.35     | 0.00         | 4.68*         | 0.00          |
| Komb. 46 | 0.00     | 0.00         | -4.68*        | 0.00          |
|          | 1.18     | 3.62*        | 0.00          | -0.01*        |
|          | 2.35     | 0.00         | 4.68*         | 0.00          |

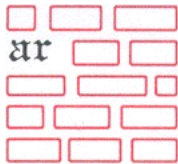
Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

| Material            | t <sub>Max</sub><br>[mm] | f <sub>0</sub><br>[N/mm <sup>2</sup> ] | E<br>[N/mm <sup>2</sup> ] | BC |
|---------------------|--------------------------|----------------------------------------|---------------------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                                    | 70000                     | A  |
|                     | 25 <sup>b</sup>          | 180                                    | 70000                     | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)



## Querschnitt

| QS | Profil        | A                  | $S_y$<br>$S_z$     | $I_y$<br>$I_z$     | $W_y$<br>$W_z$     |
|----|---------------|--------------------|--------------------|--------------------|--------------------|
|    |               | [cm <sup>2</sup> ] | [cm <sup>3</sup> ] | [cm <sup>4</sup> ] | [cm <sup>3</sup> ] |
| 1  | AVADIELE40 40 | 13.9               | 10.2<br>41.6       | 35.2<br>647.4      | 17.2<br>51.0       |

## Hauptachsen

| QS | Profil        | $\epsilon$ | $I_{yz}$           | $I_{Ib}$           | $I_{Ib}$           |
|----|---------------|------------|--------------------|--------------------|--------------------|
|    |               | [°]        | [cm <sup>4</sup> ] | [cm <sup>4</sup> ] | [cm <sup>4</sup> ] |
| 1  | AVADIELE40 40 | 87.42      | -27.6              | 648.7              | 34.0               |

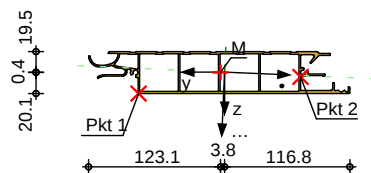
## Torsion

| QS | Profil        | $I_t$              | $I_n$              |
|----|---------------|--------------------|--------------------|
|    |               | [cm <sup>4</sup> ] | [cm <sup>6</sup> ] |
| 1  | AVADIELE40 40 | 73.1               | 0.0                |

## Grafik

Querschnittsgrafik [mm]

M 1:7



## Auflagerkräfte

Charakteristische Auflagerkräfte (global)

## Char. Auflagerkr.

|                 | Aufl. | $M_{x,k,min}$<br>$M_{x,k,max}$<br>[kNm] | $F_{z,k,min}$<br>$F_{z,k,max}$<br>[kN] | $F_{y,k,min}$<br>$F_{y,k,max}$<br>[kN] |
|-----------------|-------|-----------------------------------------|----------------------------------------|----------------------------------------|
| Einw. $G_k$     | A     | 0.00                                    | 0.04                                   | 0.00                                   |
|                 |       | 0.00                                    | 0.04                                   | 0.00                                   |
|                 | B     | 0.00                                    | 0.04                                   | 0.00                                   |
| Einw. $Q_{k,N}$ | A     | 0.00                                    | 0.17                                   | 0.00                                   |
|                 |       | 0.00                                    | 0.17                                   | 0.00                                   |
|                 | B     | 0.00                                    | 0.17                                   | 0.00                                   |
| Einw. $Q_{k,S}$ | A     | 0.00                                    | 0.15                                   | 0.00                                   |
|                 |       | 0.00                                    | 0.15                                   | 0.00                                   |
|                 | B     | 0.00                                    | 0.15                                   | 0.00                                   |

## Zusammenfassung

Zusammenfassung der Nachweise

## Nachweise (GZT)

Nachweise im Grenzzustand der Tragfähigkeit

Nachweis

|              |    |      |
|--------------|----|------|
| Nachweis E-E | OK | 0.20 |
|--------------|----|------|

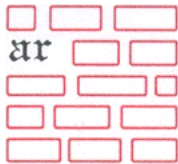
## Nachweise (GZG)

Nachweise im Grenzzust. der Gebrauchstauglichkeit

Nachweis

|            |    |      |
|------------|----|------|
| Verformung | OK | 0.46 |
|------------|----|------|

Die Auflagerspannweite ist als Grenzs-spannweite festgelegt.  
Kürzere Spannweiten sind möglich!

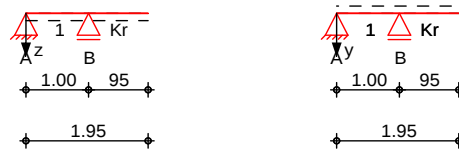


**Pos. AL2-4-MI Alu Bpr Kragarm (ML, 1.0 kN)**

Die Verkehrslast 4,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:120



| Abmessungen<br>Mat./Querschnitt | Feld | l<br>[m] | Lage<br>[°] | Achsen |
|---------------------------------|------|----------|-------------|--------|
|                                 | 1    | 1.00     | 0.0         | frei   |
|                                 | Kr   | 0.95     | 0.0         | frei   |

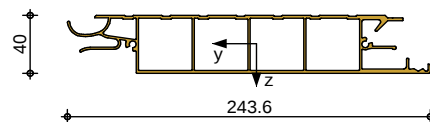
| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-Kr | EN-AW 6063, T66, EP | AVADIELE40 40 |

| Auflager | Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub> | Gabel l. Wölbb. |
|----------|-------|----------|----------------------------|--------------------------|-------------------------------|------------------|-----------------|
|          | A     | 0.00     | fest                       | frei                     | fest                          | frei             | fest            |
|          | B     | 1.00     | fest                       | frei                     | fest                          | frei             | fest            |

| Lager | b<br>[cm] |
|-------|-----------|
| A,B   | 10.0      |

Grafik Querschnittsgrafik

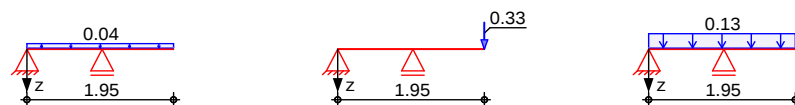
M 1:5



Belastungen Belastungen auf das System

Grafik Belastungsgrafiken (einwirkungsbezogen)

Einwirkungen Gk Qk.N-1 Qk.S

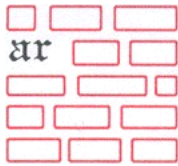


Streckenlasten  
in z-Richtung

| Gleichlasten |          | a    | s    | q <sub>li</sub> | q <sub>re</sub> | e    |
|--------------|----------|------|------|-----------------|-----------------|------|
| Feld         | Komm.    | [m]  | [m]  | [kN/m]          | [kN/m]          | [cm] |
| 1            | Eigengew | 0.00 | 1.00 |                 | 0.04            | -0.4 |
| Kr           | Eigengew | 0.00 | 0.95 |                 | 0.04            | -0.4 |
| 1            | p+s      | 0.00 | 1.95 |                 | 0.13            | 0.0  |

Punktlasten  
in z-Richtung

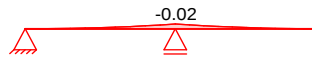
| Einzellasten |       | a    | F <sub>z</sub> | e    |
|--------------|-------|------|----------------|------|
| Feld         | Komm. | [m]  | [kN]           | [cm] |
| Kr           | MI    | 0.95 | 0.33           | 0.0  |



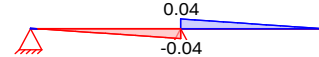
Char. Schnittgrößen charakteristische Schnittgrößen und Verformungen  
 Grafik Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

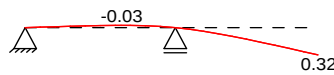
Moment  $M_{y,k}$  [kNm]



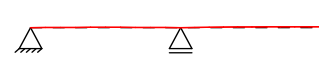
Querkraft  $V_{z,k}$  [kN]



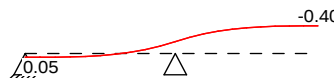
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_{x,k}$  [mrad]



Verdrehung  $\varphi_{y,k}$  [mrad]

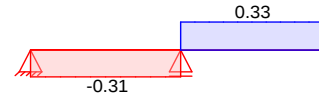


Einw.  $Q_{k,N-1}$

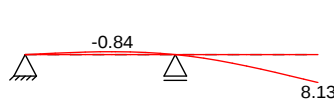
Moment  $M_{y,k}$  [kNm]



Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_{y,k}$  [mrad]

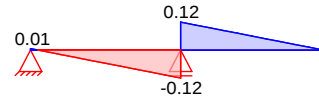


Einw.  $Q_{k,S}$

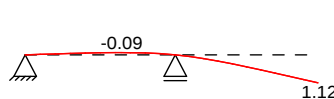
Moment  $M_{y,k}$  [kNm]



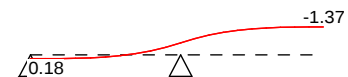
Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]



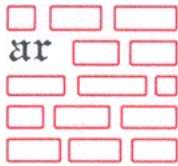
Verdrehung  $\varphi_{y,k}$  [mrad]



Tabelle

Schnittgrößen (je Einwirkung)

| Feld              | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-------------------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$       | 1        | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
|                   | 1.00     | -0.02 *                | -0.02                  | -0.04 *               | -0.04                 |
|                   | Kr       | 0.00                   | -0.02                  | 0.04                  | 0.04 *                |
|                   | 0.95     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
| Einw. $Q_{k,N-1}$ | 1        | 0.00                   | 0.00                   | -0.31 *               | 0.00                  |
|                   | 1.00     | -0.31 *                | 0.00                   | -0.31                 | 0.00                  |
|                   | Kr       | 0.00                   | 0.00                   | 0.00                  | 0.33 *                |
|                   | 0.95     | 0.00                   | 0.00                   | 0.00                  | 0.33                  |
| Einw. $Q_{k,S}$   | 1        | 0.00                   | 0.00                   | 0.01                  | 0.01                  |
|                   | 1.00     | -0.06 *                | -0.06                  | -0.12 *               | -0.12                 |
|                   | Kr       | 0.00                   | -0.06                  | 0.12                  | 0.12 *                |
|                   | 0.95     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |



### Verformungen (je Einwirkung)

|                     | Feld | X<br>[m] | Wz,k,min         | y,k,min           | x,k,min           |
|---------------------|------|----------|------------------|-------------------|-------------------|
|                     |      |          | Wz,k,max<br>[mm] | y,k,max<br>[mrad] | x,k,max<br>[mrad] |
| Einw. <i>Gk</i>     | 1    | 0.00     | 0.00             | 0.05              | 0.00              |
|                     |      |          | 0.00             | 0.05              | 0.00              |
|                     |      | 0.10     | -0.01            | 0.05              | 0.00              |
|                     |      |          | -0.01            | 0.05*             | 0.00              |
|                     |      | 0.64     | -0.03*           | 0.00              | 0.00              |
|                     | Kr   |          | -0.03            | 0.00              | 0.00              |
|                     |      | 1.00     | 0.00             | -0.17             | 0.00              |
|                     |      |          | 0.00             | -0.17             | 0.00              |
|                     |      | 0.00     | 0.00             | -0.17             | 0.00              |
|                     |      |          | 0.00             | -0.17             | 0.00              |
| Einw. <i>Qk.N-1</i> | 1    | 0.00     | 0.00             | 0.00              | 0.00              |
|                     |      |          | 0.00             | 2.19*             | 0.00              |
|                     |      | 0.58     | -0.84*           | -0.01             | 0.00              |
|                     |      |          | 0.00             | 0.00              | 0.00              |
|                     |      | 1.00     | 0.00             | -4.39             | 0.00              |
|                     | Kr   |          | 0.00             | 0.00              | 0.00              |
|                     |      | 0.00     | 0.00             | -4.39             | 0.00              |
|                     |      |          | 0.00             | 0.00              | 0.00              |
|                     |      | 0.95     | 0.00             | -10.64*           | 0.00              |
|                     |      |          | 8.13*            | 0.00              | 0.00              |
| Einw. <i>Qk.S</i>   | 1    | 0.00     | 0.00             | 0.18              | 0.00              |
|                     |      |          | 0.00             | 0.18              | 0.00              |
|                     |      | 0.10     | -0.02            | 0.18              | 0.00              |
|                     |      |          | -0.02            | 0.18*             | 0.00              |
|                     |      | 0.64     | -0.09*           | 0.00              | 0.00              |
|                     | Kr   |          | -0.09            | 0.00              | 0.00              |
|                     |      | 1.00     | 0.00             | -0.59             | 0.00              |
|                     |      |          | 0.00             | -0.59             | 0.00              |
|                     |      | 0.00     | 0.00             | -0.59             | 0.00              |
|                     |      |          | 0.00             | -0.59             | 0.00              |
|                     |      | 0.95     | 1.12             | -1.37*            | 0.00              |
|                     |      |          | 1.12*            | -1.37             | 0.00              |
|                     |      |          |                  |                   |                   |
|                     |      |          |                  |                   |                   |
|                     |      |          |                  |                   |                   |
|                     |      |          |                  |                   |                   |
|                     |      |          |                  |                   |                   |
|                     |      |          |                  |                   |                   |
|                     |      |          |                  |                   |                   |
|                     |      |          |                  |                   |                   |

### Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |                     |            |
|-------------------|----|------|------------|---------------------|------------|
| ständig/vorüberg. | 33 | 1    | 1.35*Gk    | +1.50*Qk.N-1        | +0.75*Qk.S |
|                   | 34 | 2    | 1.35*Gk    | (2)<br>+1.50*Qk.N-1 | +0.75*Qk.S |
| quasi-ständig     | 16 |      | 1.00*Gk    | (2)<br>+0.30*Qk.N-1 |            |

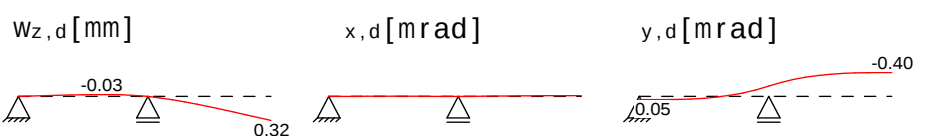
### Bem.-verformungen

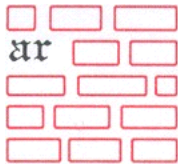
Bemessungsverformungen

### Grafik

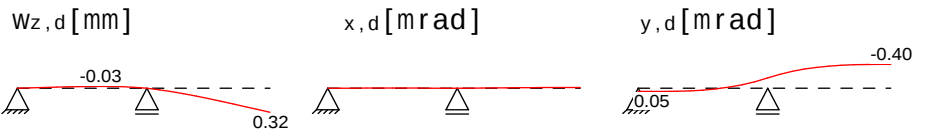
Verformungen (je Kombination)

Komb. 14

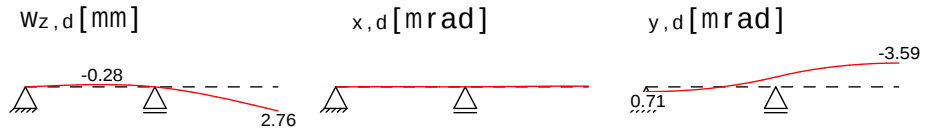




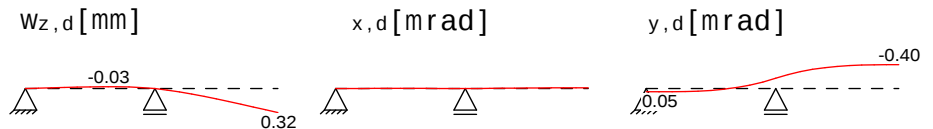
Komb. 15



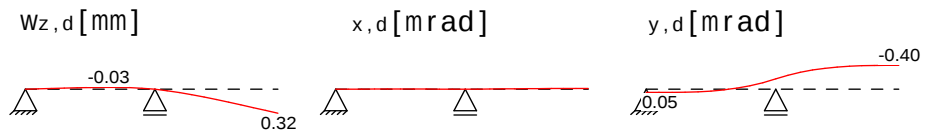
Komb. 16



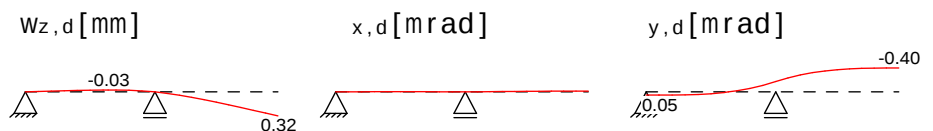
Komb. 55



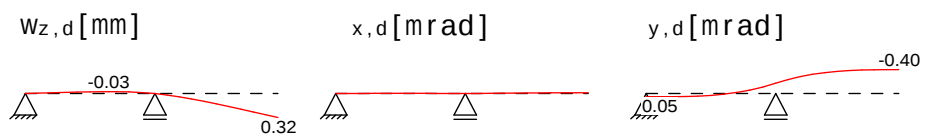
Komb. 56



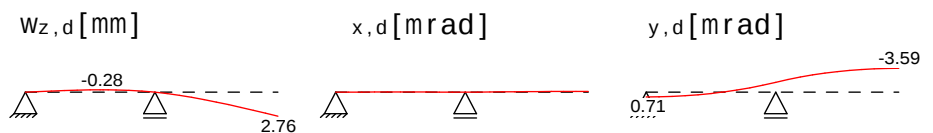
Komb. 57



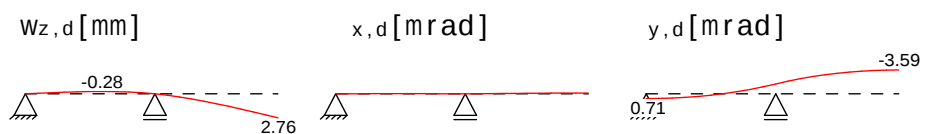
Komb. 58



Komb. 59



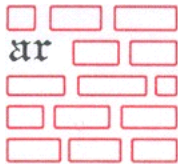
Komb. 60



Tabelle

Verformungen (je Kombination)

| Feld     | x<br>[m] | Wz, d<br>[mm] | y, d<br>[mrad] | x, d<br>[mrad] |
|----------|----------|---------------|----------------|----------------|
| Komb. 14 | 1        | 0.00          | 0.00           | 0.05           |
|          | 0.10     | -0.01         | 0.05*          | 0.00           |
|          | 0.64     | -0.03*        | 0.00           | 0.00           |
|          | 1.00     | 0.00          | -0.17          | 0.00           |
|          | Kr       | 0.00          | -0.17          | 0.00           |
| Komb. 15 | 1        | 0.00          | 0.05           | 0.00           |
|          | 0.10     | -0.01         | 0.05*          | 0.00           |
|          | 0.64     | -0.03*        | 0.00           | 0.00           |
|          | 1.00     | 0.00          | -0.17          | 0.00           |
|          | Kr       | 0.00          | -0.17          | 0.00           |
|          | 0.95     | 0.32*         | -0.40*         | 0.00           |



|          |    |      |        |        |      |
|----------|----|------|--------|--------|------|
| Komb. 16 | 1  | 0.00 | 0.00   | 0.71*  | 0.00 |
|          |    | 0.58 | -0.28* | 0.01   | 0.00 |
|          |    | 1.00 | 0.00   | -1.49  | 0.00 |
|          | Kr | 0.00 | 0.00   | -1.49  | 0.00 |
|          |    | 0.95 | 2.76*  | -3.59* | 0.00 |
| Komb. 55 | 1  | 0.00 | 0.00   | 0.05   | 0.00 |
|          |    | 0.10 | -0.01  | 0.05*  | 0.00 |
|          |    | 0.64 | -0.03* | 0.00   | 0.00 |
|          |    | 1.00 | 0.00   | -0.17  | 0.00 |
|          | Kr | 0.00 | 0.00   | -0.17  | 0.00 |
|          |    | 0.95 | 0.32*  | -0.40* | 0.00 |
| Komb. 56 | 1  | 0.00 | 0.00   | 0.05   | 0.00 |
|          |    | 0.10 | -0.01  | 0.05*  | 0.00 |
|          |    | 0.64 | -0.03* | 0.00   | 0.00 |
|          |    | 1.00 | 0.00   | -0.17  | 0.00 |
|          | Kr | 0.00 | 0.00   | -0.17  | 0.00 |
|          |    | 0.95 | 0.32*  | -0.40* | 0.00 |
| Komb. 57 | 1  | 0.00 | 0.00   | 0.05   | 0.00 |
|          |    | 0.10 | -0.01  | 0.05*  | 0.00 |
|          |    | 0.64 | -0.03* | 0.00   | 0.00 |
|          |    | 1.00 | 0.00   | -0.17  | 0.00 |
|          | Kr | 0.00 | 0.00   | -0.17  | 0.00 |
|          |    | 0.95 | 0.32*  | -0.40* | 0.00 |
| Komb. 58 | 1  | 0.00 | 0.00   | 0.05   | 0.00 |
|          |    | 0.10 | -0.01  | 0.05*  | 0.00 |
|          |    | 0.64 | -0.03* | 0.00   | 0.00 |
|          |    | 1.00 | 0.00   | -0.17  | 0.00 |
|          | Kr | 0.00 | 0.00   | -0.17  | 0.00 |
|          |    | 0.95 | 0.32*  | -0.40* | 0.00 |
| Komb. 59 | 1  | 0.00 | 0.00   | 0.71*  | 0.00 |
|          |    | 0.58 | -0.28* | 0.01   | 0.00 |
|          |    | 1.00 | 0.00   | -1.49  | 0.00 |
|          | Kr | 0.00 | 0.00   | -1.49  | 0.00 |
|          |    | 0.95 | 2.76*  | -3.59* | 0.00 |
| Komb. 60 | 1  | 0.00 | 0.00   | 0.71*  | 0.00 |
|          |    | 0.58 | -0.28* | 0.01   | 0.00 |
|          |    | 1.00 | 0.00   | -1.49  | 0.00 |
|          | Kr | 0.00 | 0.00   | -1.49  | 0.00 |
|          |    | 0.95 | 2.76*  | -3.59* | 0.00 |

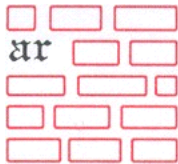
### Mat./Querschnitt Material- und Querschnittswerte

|           |                            |                          |                                        |                           |    |
|-----------|----------------------------|--------------------------|----------------------------------------|---------------------------|----|
| Aluminium | Material                   | t <sub>Max</sub><br>[mm] | f <sub>o</sub><br>[N/mm <sup>2</sup> ] | E<br>[N/mm <sup>2</sup> ] | BC |
|           | <i>EN-AW 6063, T66, EP</i> | 10 <sup>b</sup>          | 200                                    | 70000                     | A  |
|           |                            | 25 <sup>b</sup>          | 180                                    | 70000                     | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

|             |                        |                         |                                                        |                                                        |                                                        |
|-------------|------------------------|-------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| Querschnitt | QS Profil              | A<br>[cm <sup>2</sup> ] | S <sub>y</sub><br>S <sub>z</sub><br>[cm <sup>3</sup> ] | I <sub>y</sub><br>I <sub>z</sub><br>[cm <sup>4</sup> ] | W <sub>y</sub><br>W <sub>z</sub><br>[cm <sup>3</sup> ] |
|             | 1 <i>AVADIELE40 40</i> | 13.9                    | 10.2<br>41.6                                           | 35.2<br>647.4                                          | 17.2<br>51.0                                           |

|             |                        |          |                                       |                                      |                                      |
|-------------|------------------------|----------|---------------------------------------|--------------------------------------|--------------------------------------|
| Hauptachsen | QS Profil              | ε<br>[°] | I <sub>yz</sub><br>[cm <sup>4</sup> ] | I <sub>b</sub><br>[cm <sup>4</sup> ] | I <sub>b</sub><br>[cm <sup>4</sup> ] |
|             | 1 <i>AVADIELE40 40</i> | 87.42    | -27.6                                 | 648.7                                | 34.0                                 |



PROJEKT **19259-1a AVA Diele 40**  
 POSITION **AL2-4-MI Alu Bpr Kragarm (ML, 1.0 kN)**

SEITE **19**  
 PROJ.-NR. **19259\_1a**  
 DATUM **10.07.2019**

Torsion

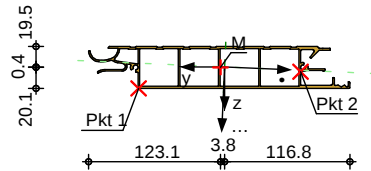
QS Profil

$I_t$   
 $[cm^4]$   
 73.1  
 $I_n$   
 $[cm^6]$   
 0.0

Grafik

Querschnittsgrafik [mm]

M 1:7



Auflagerkräfte

Charakteristische Auflagerkräfte (global)

Char. Auflagerkr.

|                   | Aufl. | $M_{x,k,min}$<br>$M_{x,k,max}$<br>[kNm] | $F_{z,k,min}$<br>$F_{z,k,max}$<br>[kN] | $F_{y,k,min}$<br>$F_{y,k,max}$<br>[kN] |
|-------------------|-------|-----------------------------------------|----------------------------------------|----------------------------------------|
| Einw. $G_k$       | A     | 0.00                                    | 0.00                                   | 0.00                                   |
|                   |       | 0.00                                    | 0.00                                   | 0.00                                   |
|                   | B     | 0.00                                    | 0.07                                   | 0.00                                   |
| Einw. $Q_{k,N-1}$ | A     | 0.00                                    | -0.31                                  | 0.00                                   |
|                   |       | 0.00                                    | 0.00                                   | 0.00                                   |
|                   | B     | 0.00                                    | 0.00                                   | 0.00                                   |
| Einw. $Q_{k,S}$   | A     | 0.00                                    | 0.01                                   | 0.00                                   |
|                   |       | 0.00                                    | 0.01                                   | 0.00                                   |
|                   | B     | 0.00                                    | 0.25                                   | 0.00                                   |
|                   |       | 0.00                                    | 0.25                                   | 0.00                                   |

Zusammenfassung

Zusammenfassung der Nachweise

Nachweise (GZT)

Nachweise im Grenzzustand der Tragfähigkeit

Nachweis

Nachweis E-E OK  $H_b$   
 $[-]$   
 0.23

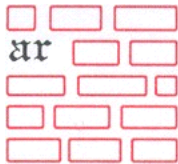
Nachweise (GZG)

Nachweise im Grenzzust. der Gebrauchstauglichkeit

Nachweis

Verformung OK  $H_b$   
 $[-]$   
 0.44

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
 Kürzere Spannweiten sind möglich!



## Pos. AL1-5- Alu Bpr (Verkehrslastansatz, 5.0 kN/m<sup>2</sup>)

Die Verkehrslast 5,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Einfeldträger

M 1:55



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1    | 1.94     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1    | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

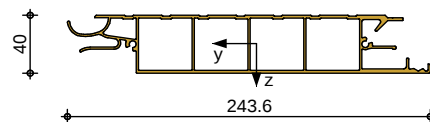
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub> | Gabel l. Wölbb. |
|-------|----------|----------------------------|--------------------------|-------------------------------|------------------|-----------------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei             | fest            |
| B     | 1.94     | fest                       | frei                     | fest                          | frei             | fest            |

| Lager | b<br>[cm] |
|-------|-----------|
| A,B   | 8.0       |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

Belastungen auf das System

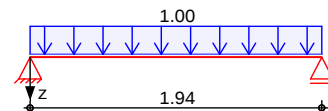
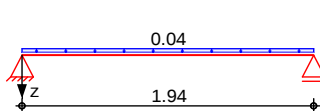
Grafik

Belastungsgrafiken (einwirkungsbezogen)

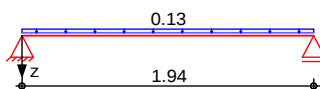
Einwirkungen

G<sub>k</sub>

Q<sub>k.N</sub>



Q<sub>k.S</sub>

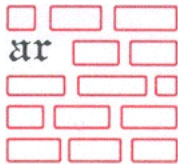


Streckenlasten  
in z-Richtung

Gleichlasten  
Feld Komm.

Einw. G<sub>k</sub>  
Einw. Q<sub>k.N</sub>  
Einw. Q<sub>k.S</sub>

|   |          | a<br>[m] | s<br>[m] | q <sub>li</sub><br>[kN/m] | q <sub>re</sub><br>[kN/m] | e<br>[cm] |
|---|----------|----------|----------|---------------------------|---------------------------|-----------|
| 1 | Eigengew | 0.00     | 1.94     |                           | 0.04                      | -0.4      |
| 1 | p+s      | 0.00     | 1.94     |                           | 1.00                      | 0.0       |
| 1 | p+s      | 0.00     | 1.94     |                           | 0.13                      | 0.0       |

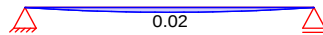


Char. Schnittgrößen charakteristische Schnittgrößen und Verformungen

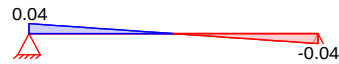
Grafik Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

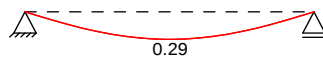
Moment  $M_{y,k}$  [kNm]



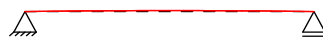
Querkraft  $V_{z,k}$  [kN]



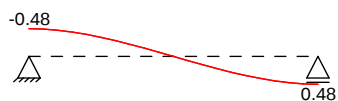
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_{x,k}$  [mrad]

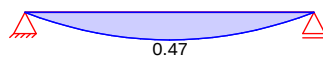


Verdrehung  $\varphi_{y,k}$  [mrad]

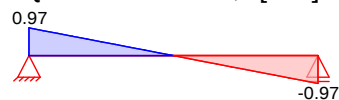


Einw.  $Q_{k,N}$

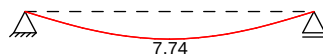
Moment  $M_{y,k}$  [kNm]



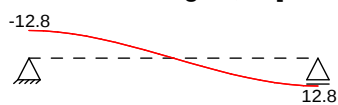
Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]

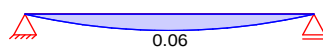


Verdrehung  $\varphi_{y,k}$  [mrad]

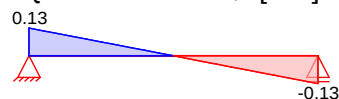


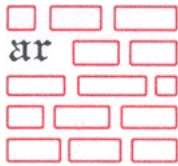
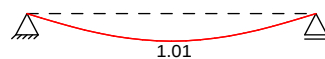
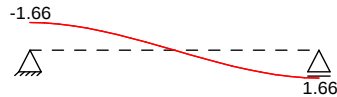
Einw.  $Q_{k,S}$

Moment  $M_{y,k}$  [kNm]



Querkraft  $V_{z,k}$  [kN]




Verschiebung  $w_{z,k}$  [mm]

Verdrehung  $y_k$  [mrad]


## Tabelle

## Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.04                  | 0.04*                 |
|                 |      | 0.97     | 0.02                   | 0.02*                  | 0.00                  | 0.00                  |
|                 |      | 1.94     | 0.00                   | 0.00                   | -0.04*                | -0.04                 |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.97                  | 0.97*                 |
|                 |      | 0.97     | 0.47                   | 0.47*                  | 0.00                  | 0.00                  |
|                 |      | 1.94     | 0.00                   | 0.00                   | -0.97*                | -0.97                 |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.13                  | 0.13*                 |
|                 |      | 0.97     | 0.06                   | 0.06*                  | 0.00                  | 0.00                  |
|                 |      | 1.94     | 0.00                   | 0.00                   | -0.13*                | -0.13                 |

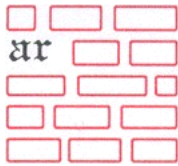
## Verformungen (je Einwirkung)

|                 | Feld | x<br>[m] | $w_{z,k,min}$<br>$w_{z,k,max}$<br>[mm] | $y_{k,min}$<br>$y_{k,max}$<br>[mrad] | $x_{k,min}$<br>$x_{k,max}$<br>[mrad] |
|-----------------|------|----------|----------------------------------------|--------------------------------------|--------------------------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                                   | -0.48*                               | 0.00                                 |
|                 |      |          | 0.00                                   | -0.48                                | 0.00                                 |
|                 |      | 0.97     | 0.29                                   | 0.00                                 | 0.00                                 |
|                 |      |          | 0.29*                                  | 0.00                                 | 0.00                                 |
|                 |      | 1.94     | 0.00                                   | 0.48                                 | 0.00                                 |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                                   | 0.48*                                | 0.00                                 |
|                 |      |          | 0.00                                   | 0.48*                                | 0.00                                 |
|                 |      | 0.97     | 0.00                                   | -12.77*                              | 0.00                                 |
|                 |      |          | 0.00                                   | -12.77                               | 0.00                                 |
|                 |      | 0.97     | 7.74                                   | 0.00                                 | 0.00                                 |
| Einw. $Q_{k,S}$ | 1    |          | 7.74*                                  | 0.00                                 | 0.00                                 |
|                 |      | 1.94     | 0.00                                   | 12.77                                | 0.00                                 |
|                 |      |          | 0.00                                   | 12.77*                               | 0.00                                 |
|                 |      | 0.00     | 0.00                                   | -1.66*                               | 0.00                                 |
|                 |      |          | 0.00                                   | -1.66                                | 0.00                                 |
|                 |      | 0.97     | 1.01                                   | 0.00                                 | 0.00                                 |
|                 |      |          | 1.01*                                  | 0.00                                 | 0.00                                 |
|                 |      | 1.94     | 0.00                                   | 1.66                                 | 0.00                                 |
|                 |      |          | 0.00                                   | 1.66*                                | 0.00                                 |

## Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | $E_k$ | Imp. | $u$ (I*K*EW) |                         |                  |
|-------------------|-------|------|--------------|-------------------------|------------------|
| ständig/vorüberg. | 31    | 1    | 1.35* $G_k$  | +1.50* $Q_{k,N}$        | +1.50* $Q_{k,S}$ |
| quasi-ständig     | 12    |      | 1.00* $G_k$  | (1)<br>+0.80* $Q_{k,N}$ | (1)              |



Bem.-verformungen

Bemessungsverformungen

Grafik

Verformungen (je Kombination)

Komb. 12

 $W_{z,d}$  [mm] $x,d$  [mrad] $y,d$  [mrad]

Tabelle

Verformungen (je Kombination)

Komb. 12

| Feld | x<br>[m] | $W_{z,d}$<br>[mm] | $y,d$<br>[mrad] | $x,d$<br>[mrad] |
|------|----------|-------------------|-----------------|-----------------|
| 1    | 0.00     | 0.00              | -10.70*         | 0.00            |
|      | 0.97     | 6.48*             | 0.00            | 0.00            |
|      | 1.94     | 0.00              | 10.70*          | 0.00            |

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

Material

|                     | $t_{\max}$<br>[mm] | $f_o$<br>[N/mm <sup>2</sup> ] | E<br>[N/mm <sup>2</sup> ] | BC |
|---------------------|--------------------|-------------------------------|---------------------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>    | 200                           | 70000                     | A  |
|                     | 25 <sup>b</sup>    | 180                           | 70000                     | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

QS Profil

|                 | A<br>[cm <sup>2</sup> ] | $S_y$<br>$S_z$<br>[cm <sup>3</sup> ] | $I_y$<br>$I_z$<br>[cm <sup>4</sup> ] | $W_y$<br>$W_z$<br>[cm <sup>3</sup> ] |
|-----------------|-------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1 AVADIELE40 40 | 13.9                    | 10.2<br>41.6                         | 35.2<br>647.4                        | 17.2<br>51.0                         |

Hauptachsen

QS Profil

|                 | $\epsilon$<br>[°] | $I_{yz}$<br>[cm <sup>4</sup> ] | $I_{Ib}$<br>[cm <sup>4</sup> ] | $I_{Ib}$<br>[cm <sup>4</sup> ] |
|-----------------|-------------------|--------------------------------|--------------------------------|--------------------------------|
| 1 AVADIELE40 40 | 87.42             | -27.6                          | 648.7                          | 34.0                           |

Torsion

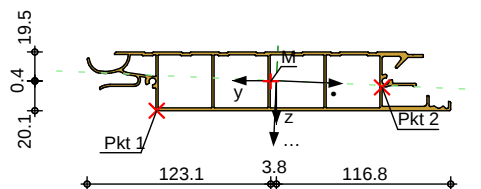
QS Profil

|                 | $I_t$<br>[cm <sup>4</sup> ] | $I_n$<br>[cm <sup>6</sup> ] |
|-----------------|-----------------------------|-----------------------------|
| 1 AVADIELE40 40 | 73.1                        | 0.0                         |

Grafik

Querschnittsgrafik [mm]

M 1:5



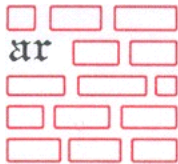
Auflagerkräfte

Charakteristische Auflagerkräfte (global)

Char. Auflagerkr.

Einw. Gk

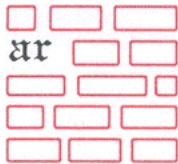
| Aufl.      | $M_{x,k,min}$<br>$M_{x,k,max}$<br>[kNm] | $F_{z,k,min}$<br>$F_{z,k,max}$<br>[kN] | $F_{y,k,min}$<br>$F_{y,k,max}$<br>[kN] |
|------------|-----------------------------------------|----------------------------------------|----------------------------------------|
| A          | 0.00                                    | 0.04                                   | 0.00                                   |
|            | 0.00                                    | 0.04                                   | 0.00                                   |
| B          | 0.00                                    | 0.04                                   | 0.00                                   |
|            | 0.00                                    | 0.04                                   | 0.00                                   |
| Einw. Qk.N | A                                       | 0.00                                   | 0.97                                   |



|            |   |      |      |      |
|------------|---|------|------|------|
|            |   | 0.00 | 0.97 | 0.00 |
|            | B | 0.00 | 0.97 | 0.00 |
|            |   | 0.00 | 0.97 | 0.00 |
| Einw. Qk.S | A | 0.00 | 0.13 | 0.00 |
|            |   | 0.00 | 0.13 | 0.00 |
|            | B | 0.00 | 0.13 | 0.00 |
|            |   | 0.00 | 0.13 | 0.00 |

|                 |                                                   |  |    |                |
|-----------------|---------------------------------------------------|--|----|----------------|
| Zusammenfassung | Zusammenfassung der Nachweise                     |  |    |                |
| Nachweise (GZT) | Nachweise im Grenzzustand der Tragfähigkeit       |  |    |                |
|                 | Nachweis                                          |  |    | h <sub>b</sub> |
|                 |                                                   |  |    | [ - ]          |
|                 | Nachweis E-E                                      |  | OK | 0.35           |
| Nachweise (GZG) | Nachweise im Grenzzust. der Gebrauchstauglichkeit |  |    |                |
|                 | Nachweis                                          |  |    | h <sub>b</sub> |
|                 |                                                   |  |    | [ - ]          |
|                 | Verformung                                        |  | OK | 1.00           |

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



## Pos. AL1-5-200 Alu Bpr (Verkehrslastansatz, 5.0 kN/m<sup>2</sup>)

Die Verkehrslast 5,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Einfeldträger

M 1:60



| Abmessungen      | Feld | l    | Lage | Achsen |
|------------------|------|------|------|--------|
| Mat./Querschnitt |      | [m]  | [°]  |        |
|                  | 1    | 2.22 | 0.0  | frei   |

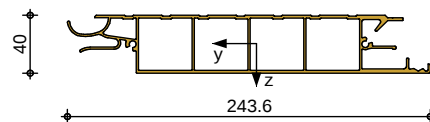
| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1    | EN-AW 6063, T66, EP | AVADIELE40 40 |

| Auflager | Lager | x    | K <sub>T,z</sub> | K <sub>R,y</sub> | K <sub>T,y</sub> | K <sub>R,z</sub> | Gabel. | Wölbb. |
|----------|-------|------|------------------|------------------|------------------|------------------|--------|--------|
|          |       | [m]  | [kN/m]           | bzw.             | [kNm/rad]        |                  |        |        |
|          | A     | 0.00 | fest             | frei             | fest             | frei             | fest   | frei   |
|          | B     | 2.22 | fest             | frei             | fest             | frei             | fest   | frei   |

| Lager | b    |
|-------|------|
|       | [cm] |
| A,B   | 8.0  |

Grafik Querschnittsgrafik

M 1:5



Belastungen Belastungen auf das System

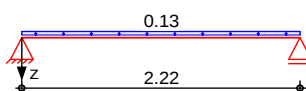
Grafik Belastungsgrafiken (einwirkungsbezogen)

Einwirkungen

Gk Qk.N

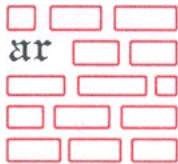


Qk.S



Streckenlasten  
in z-Richtung

| Gleichlasten | Feld | Komm.    | a    | s    | q <sub>li</sub> | q <sub>re</sub> | e    |
|--------------|------|----------|------|------|-----------------|-----------------|------|
|              |      |          | [m]  | [m]  | [kN/m]          | [kN/m]          | [cm] |
| Einw. Gk     | 1    | Eigengew | 0.00 | 2.22 |                 | 0.04            | -0.4 |
| Einw. Qk.N   | 1    | p+s      | 0.00 | 2.22 |                 | 1.00            | 0.0  |
| Einw. Qk.S   | 1    | p+s      | 0.00 | 2.22 |                 | 0.13            | 0.0  |

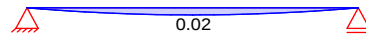


Char. Schnittgrößen charakteristische Schnittgrößen und Verformungen

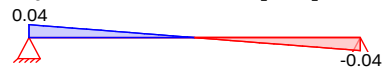
Grafik Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

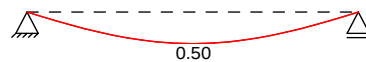
Moment  $M_{y,k}$  [kNm]



Querkraft  $V_{z,k}$  [kN]



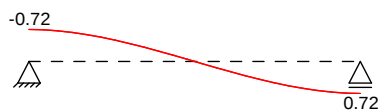
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_{x,k}$  [mrad]

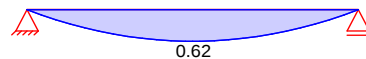


Verdrehung  $\varphi_{y,k}$  [mrad]

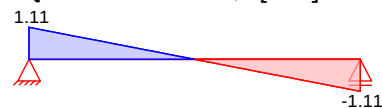


Einw.  $Q_{k,N}$

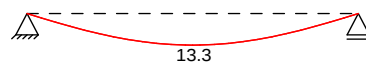
Moment  $M_{y,k}$  [kNm]



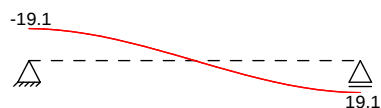
Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]

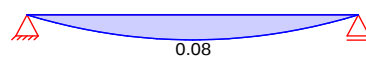


Verdrehung  $\varphi_{y,k}$  [mrad]

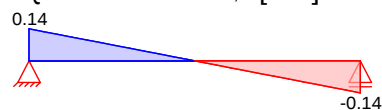


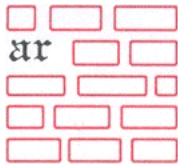
Einw.  $Q_{k,S}$

Moment  $M_{y,k}$  [kNm]

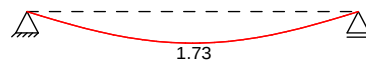


Querkraft  $V_{z,k}$  [kN]

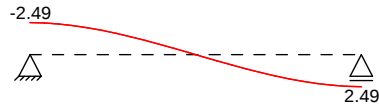




Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $y_k$  [mrad]



Tabelle

Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.04                  | 0.04*                 |
|                 |      | 1.11     | 0.02                   | 0.02*                  | 0.00                  | 0.00                  |
|                 |      | 2.22     | 0.00                   | 0.00                   | -0.04*                | -0.04                 |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                   | 0.00                   | 1.11                  | 1.11*                 |
|                 |      | 1.11     | 0.62                   | 0.62*                  | 0.00                  | 0.00                  |
|                 |      | 2.22     | 0.00                   | 0.00                   | -1.11*                | -1.11                 |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.14                  | 0.14*                 |
|                 |      | 1.11     | 0.08                   | 0.08*                  | 0.00                  | 0.00                  |
|                 |      | 2.22     | 0.00                   | 0.00                   | -0.14*                | -0.14                 |

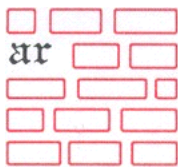
Verformungen (je Einwirkung)

|                 | Feld | x<br>[m] | $w_{z,k,min}$<br>[mm] | $w_{z,k,max}$<br>[mm] | $y_{k,min}$<br>[mrad] | $y_{k,max}$<br>[mrad] | $x_{k,min}$<br>[mrad] | $x_{k,max}$<br>[mrad] |
|-----------------|------|----------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                  | 0.00                  | -0.72*                | 0.00                  | 0.00                  | 0.00                  |
|                 |      | 1.11     | 0.50                  | 0.50*                 | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
|                 |      | 2.22     | 0.00                  | 0.00                  | 0.72                  | 0.00                  | 0.00                  | 0.00                  |
|                 |      |          | 0.00                  | 0.00                  | 0.72*                 | 0.00                  | 0.00                  | 0.00                  |
|                 |      |          |                       |                       |                       |                       |                       |                       |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                  | 0.00                  | -19.13*               | 0.00                  | 0.00                  | 0.00                  |
|                 |      | 1.11     | 13.27                 | 13.27*                | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
|                 |      | 2.22     | 0.00                  | 0.00                  | 19.13                 | 0.00                  | 0.00                  | 0.00                  |
|                 |      |          | 0.00                  | 0.00                  | 19.13*                | 0.00                  | 0.00                  | 0.00                  |
|                 |      |          |                       |                       |                       |                       |                       |                       |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                  | 0.00                  | -2.49*                | 0.00                  | 0.00                  | 0.00                  |
|                 |      | 1.11     | 1.73                  | 1.73*                 | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
|                 |      | 2.22     | 0.00                  | 0.00                  | 2.49                  | 0.00                  | 0.00                  | 0.00                  |
|                 |      |          | 0.00                  | 0.00                  | 2.49*                 | 0.00                  | 0.00                  | 0.00                  |
|                 |      |          |                       |                       |                       |                       |                       |                       |

Kombinationen

Kombinationsbildung nach DIN EN 1990  
 Darstellung der maßgebenden Kombinationen

|                   | $E_k$ | Imp. | $u$ (I*K*EW) |                  |                  |
|-------------------|-------|------|--------------|------------------|------------------|
| ständig/vorüberg. | 31    | 1    | 1.35* $G_k$  | +1.50* $Q_{k,N}$ | +1.50* $Q_{k,S}$ |
|                   |       |      |              | (1)              |                  |
| quasi-ständig     | 12    |      | 1.00* $G_k$  | +0.80* $Q_{k,N}$ |                  |
|                   |       |      |              | (1)              |                  |



Bem.-verformungen

Bemessungsverformungen

Grafik

Verformungen (je Kombination)

Komb. 12

 $W_{z,d}$  [mm] $x,d$  [mrad] $y,d$  [mrad]

Tabelle

Verformungen (je Kombination)

Komb. 12

| Feld | x<br>[m] | $W_{z,d}$<br>[mm] | $y,d$<br>[mrad] | $x,d$<br>[mrad] |
|------|----------|-------------------|-----------------|-----------------|
| 1    | 0.00     | 0.00              | -16.03*         | 0.00            |
|      | 1.11     | 11.12*            | 0.00            | 0.00            |
|      | 2.22     | 0.00              | 16.03*          | 0.00            |

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

Material

 $t_{\max}$ 

[mm]

 $f_o$ [N/mm<sup>2</sup>]

E

[N/mm<sup>2</sup>]

BC

EN-AW 6063, T66, EP

10<sup>b</sup>

200

70000

A

25<sup>b</sup>

180

70000

A

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

QS Profil

A

 $S_y$  $S_z$  $I_y$  $I_z$  $W_y$  $W_z$ 

|   |               | [cm <sup>2</sup> ] | [cm <sup>3</sup> ] | [cm <sup>4</sup> ] | [cm <sup>3</sup> ] |
|---|---------------|--------------------|--------------------|--------------------|--------------------|
| 1 | AVADIELE40 40 | 13.9               | 10.2               | 35.2               | 17.2               |
|   |               |                    | 41.6               | 647.4              | 51.0               |

Hauptachsen

QS Profil

 $\epsilon$  $I_{yz}$  $I_{yb}$  $I_{zb}$ 

|   |               | [°]   | [cm <sup>4</sup> ] | [cm <sup>4</sup> ] | [cm <sup>4</sup> ] |
|---|---------------|-------|--------------------|--------------------|--------------------|
| 1 | AVADIELE40 40 | 87.42 | -27.6              | 648.7              | 34.0               |

Torsion

QS Profil

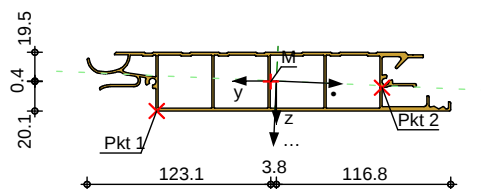
 $I_t$ [cm<sup>4</sup>] $I_n$ [cm<sup>6</sup>]

|   |               |      |     |
|---|---------------|------|-----|
| 1 | AVADIELE40 40 | 73.1 | 0.0 |
|---|---------------|------|-----|

Grafik

Querschnittsgrafik [mm]

M 1:5



Auflagerkräfte

Charakteristische Auflagerkräfte (global)

Char. Auflagerkr.

Aufl.

 $M_{x,k,min}$  $M_{x,k,max}$ 

[kNm]

 $F_{z,k,min}$  $F_{z,k,max}$ 

[kN]

 $F_{y,k,min}$  $F_{y,k,max}$ 

[kN]

Einw.  $G_k$ 

|   |      |      |      |
|---|------|------|------|
| A | 0.00 | 0.04 | 0.00 |
|---|------|------|------|

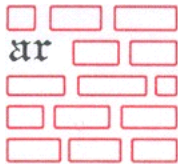
|  |      |      |      |
|--|------|------|------|
|  | 0.00 | 0.04 | 0.00 |
|--|------|------|------|

|   |      |      |      |
|---|------|------|------|
| B | 0.00 | 0.04 | 0.00 |
|---|------|------|------|

|  |      |      |      |
|--|------|------|------|
|  | 0.00 | 0.04 | 0.00 |
|--|------|------|------|

Einw.  $Q_{k,N}$ 

|   |      |      |      |
|---|------|------|------|
| A | 0.00 | 1.11 | 0.00 |
|---|------|------|------|



|                               |   |      |      |      |
|-------------------------------|---|------|------|------|
| Einw. <i>Q<sub>k</sub></i> .S |   | 0.00 | 1.11 | 0.00 |
|                               | B | 0.00 | 1.11 | 0.00 |
|                               |   | 0.00 | 1.11 | 0.00 |
|                               | A | 0.00 | 0.14 | 0.00 |
|                               |   | 0.00 | 0.14 | 0.00 |
|                               | B | 0.00 | 0.14 | 0.00 |
|                               |   | 0.00 | 0.14 | 0.00 |

#### Zusammenfassung

Zusammenfassung der Nachweise

#### Nachweise (GZT)

Nachweise im Grenzzustand der Tragfähigkeit

Nachweis

|              |    |                        |
|--------------|----|------------------------|
| Nachweis E-E | OK | $\frac{H_b}{[-]}$ 0.46 |
|--------------|----|------------------------|

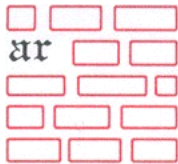
#### Nachweise (GZG)

Nachweise im Grenzzust. der Gebrauchstauglichkeit

Nachweis

|            |    |                        |
|------------|----|------------------------|
| Verformung | OK | $\frac{H_b}{[-]}$ 1.00 |
|------------|----|------------------------|

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



**Pos. AL2-5- Alu Bpr Kragarm (VL, 5.0 kN/m<sup>2</sup>)**

Die Verkehrslast 5,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:110



Abmessungen  
 Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1    | 1.00     | 0.0         | frei   |
| Kr   | 0.80     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-Kr | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

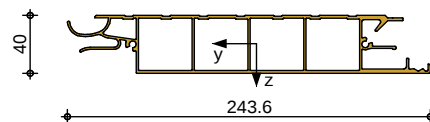
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub> | Gabel l. Wölbb. | beh. |
|-------|----------|----------------------------|--------------------------|-------------------------------|------------------|-----------------|------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei             | fest            | frei |
| B     | 1.00     | fest                       | frei                     | fest                          | frei             | fest            | frei |

| Lager | b<br>[cm] |
|-------|-----------|
| A, B  | 10.0      |

Grafik

Querschnittsgrafik

M 1:5



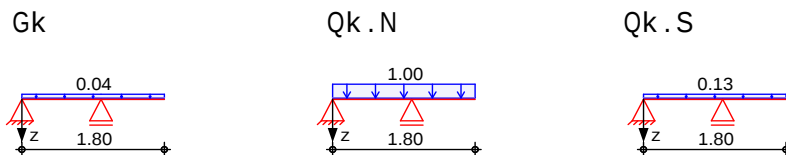
Belastungen

Belastungen auf das System

Grafik

Belastungsgrafiken (einwirkungsbezogen)

Einwirkungen



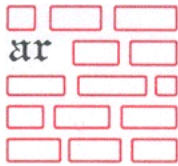
Streckenlasten  
 in z-Richtung

| Gleichlasten |          | a    | s    | q <sub>li</sub> | q <sub>re</sub> | e    |
|--------------|----------|------|------|-----------------|-----------------|------|
| Feld         | Komm.    | [m]  | [m]  | [kN/m]          | [kN/m]          | [cm] |
| 1            | Eigengew | 0.00 | 1.00 |                 | 0.04            | -0.4 |
| Kr           | Eigengew | 0.00 | 0.80 |                 | 0.04            | -0.4 |
| 1            | p+s      | 0.00 | 1.80 |                 | 1.00            | 0.0  |
| 1            | p+s      | 0.00 | 1.80 |                 | 0.13            | 0.0  |

Einw. Gk

Einw. Qk.N

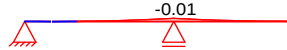
Einw. Qk.S



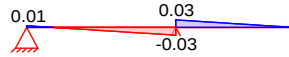
Char. Schnittgrößen charakteristische Schnittgrößen und Verformungen  
Grafik Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

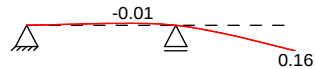
Moment  $M_{y,k}$  [kNm]



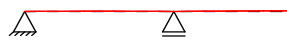
Querkraft  $V_{z,k}$  [kN]



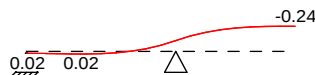
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_x$  [mrad]

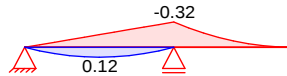


Verdrehung  $\varphi_y$  [mrad]

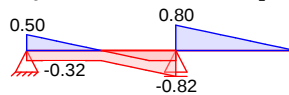


Einw.  $Q_k.N$

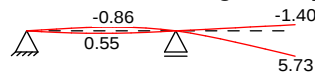
Moment  $M_{y,k}$  [kNm]



Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]

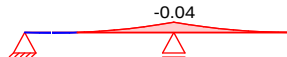


Verdrehung  $\varphi_y$  [mrad]

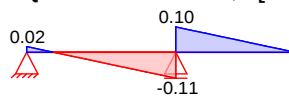


Einw.  $Q_k.S$

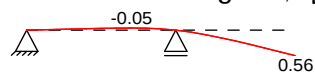
Moment  $M_{y,k}$  [kNm]

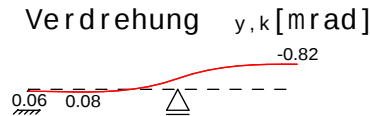
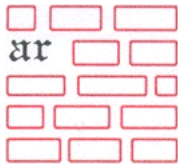


Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]





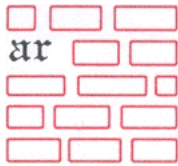
Tabelle

Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.01                  | 0.01                  |
|                 |      | 0.18     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
|                 |      | 1.00     | -0.01*                 | -0.01                  | -0.03*                | -0.03                 |
|                 | Kr   | 0.00     | -0.01                  | -0.01                  | 0.03                  | 0.03*                 |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                   | 0.00                   | -0.32                 | 0.50                  |
|                 |      | 0.50     | -0.16                  | 0.12*                  | -0.32                 | 0.00                  |
|                 |      | 1.00     | -0.32*                 | 0.00                   | -0.82*                | -0.32                 |
|                 | Kr   | 0.00     | -0.32                  | 0.00                   | 0.00                  | 0.80*                 |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.02                  | 0.02                  |
|                 |      | 0.18     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
|                 |      | 1.00     | -0.04*                 | -0.04                  | -0.11*                | -0.11                 |
|                 | Kr   | 0.00     | -0.04                  | -0.04                  | 0.10                  | 0.10*                 |
|                 |      | 0.80     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |

Verformungen (je Einwirkung)

|                 | Feld | x<br>[m] | $W_{z,k,min}$<br>[mm] | $y, k, min$<br>$y, k, max$<br>[mrad] | $x, k, min$<br>$x, k, max$<br>[mrad] |
|-----------------|------|----------|-----------------------|--------------------------------------|--------------------------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                  | 0.02                                 | 0.00                                 |
|                 |      |          | 0.00                  | 0.02                                 | 0.00                                 |
|                 |      | 0.36     | -0.01                 | 0.02                                 | 0.00                                 |
|                 |      |          | -0.01                 | 0.02*                                | 0.00                                 |
|                 |      | 0.69     | -0.01*                | 0.00                                 | 0.00                                 |
|                 | Kr   |          | -0.01                 | 0.00                                 | 0.00                                 |
|                 |      | 1.00     | 0.00                  | -0.10                                | 0.00                                 |
|                 |      |          | 0.00                  | -0.10                                | 0.00                                 |
|                 |      | 0.00     | 0.00                  | -0.10                                | 0.00                                 |
|                 |      | 0.80     | 0.16                  | -0.24*                               | 0.00                                 |
| Einw. $Q_{k,N}$ | 1    |          | 0.16*                 | -0.24                                | 0.00                                 |
|                 |      | 0.00     | 0.00                  | -1.75                                | 0.00                                 |
|                 |      |          | 0.00                  | 2.24*                                | 0.00                                 |
|                 |      | 1.00     | 0.00                  | -4.48                                | 0.00                                 |
|                 | Kr   |          | 0.00                  | 1.75                                 | 0.00                                 |
|                 |      | 0.00     | 0.00                  | -4.48                                | 0.00                                 |
|                 |      |          | 0.00                  | 1.75                                 | 0.00                                 |
|                 |      | 0.80     | -1.40                 | -8.06*                               | 0.00                                 |
| Einw. $Q_{k,S}$ | 1    |          | 5.73*                 | 1.75                                 | 0.00                                 |
|                 |      | 0.00     | 0.00                  | 0.06                                 | 0.00                                 |
|                 |      |          | 0.00                  | 0.06                                 | 0.00                                 |
|                 |      | 0.36     | -0.03                 | 0.08                                 | 0.00                                 |
|                 |      |          | -0.03                 | 0.08*                                | 0.00                                 |
|                 | Kr   | 0.69     | -0.05*                | 0.00                                 | 0.00                                 |
|                 |      |          | -0.05                 | 0.00                                 | 0.00                                 |
|                 |      | 1.00     | 0.00                  | -0.35                                | 0.00                                 |
|                 |      |          | 0.00                  | -0.35                                | 0.00                                 |
|                 |      | 0.00     | 0.00                  | -0.35                                | 0.00                                 |
|                 |      | 0.80     | 0.56                  | -0.82*                               | 0.00                                 |
|                 |      |          | 0.56*                 | -0.82                                | 0.00                                 |



## Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |                     |            |
|-------------------|----|------|------------|---------------------|------------|
| ständig/vorüberg. | 37 | 1    | 1.35*Gk    | +1.50*Qk.N<br>(1,2) | +1.50*Qk.S |
|                   | 38 | 2    | 1.35*Gk    | +1.50*Qk.N<br>(1,2) | +1.50*Qk.S |
| quasi-ständig     | 16 |      | 1.00*Gk    | +0.80*Qk.N<br>(2)   |            |

## Mat./Querschnitt

Material- und Querschnittswerte

## Aluminium

| Material            | t <sub>Max</sub><br>[mm] | f <sub>o</sub><br>[N/mm²] | E<br>[N/mm²] | BC |
|---------------------|--------------------------|---------------------------|--------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                       | 70000        | A  |
|                     | 25 <sup>b</sup>          | 180                       | 70000        | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

## Querschnitt

| QS | Profil        | A<br>[cm²] | S <sub>y</sub><br>S <sub>z</sub><br>[cm³] | I <sub>y</sub><br>I <sub>z</sub><br>[cm⁴] | W <sub>y</sub><br>W <sub>z</sub><br>[cm³] |
|----|---------------|------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| 1  | AVADIELE40 40 | 13.9       | 10.2<br>41.6                              | 35.2<br>647.4                             | 17.2<br>51.0                              |

## Hauptachsen

| QS | Profil        | ε<br>[°] | I <sub>yz</sub><br>[cm⁴] | I <sub>ib</sub><br>[cm⁴] | I <sub>ib</sub><br>[cm⁴] |
|----|---------------|----------|--------------------------|--------------------------|--------------------------|
| 1  | AVADIELE40 40 | 87.42    | -27.6                    | 648.7                    | 34.0                     |

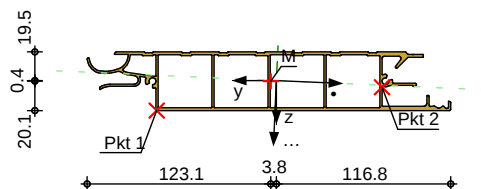
## Torsion

| QS | Profil        | I <sub>t</sub><br>[cm⁴] | I <sub>n</sub><br>[cm⁶] |
|----|---------------|-------------------------|-------------------------|
| 1  | AVADIELE40 40 | 73.1                    | 0.0                     |

## Grafik

Querschnittsgrafik [mm]

M 1:5



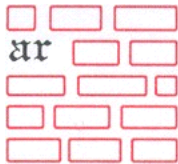
## Auflagerkräfte

Charakteristische Auflagerkräfte (global)

## Char. Auflagerkr.

|            | Aufl. | M <sub>x,k,min</sub><br>M <sub>x,k,max</sub><br>[kNm] | F <sub>z,k,min</sub><br>F <sub>z,k,max</sub><br>[kN] | F <sub>y,k,min</sub><br>F <sub>y,k,max</sub><br>[kN] |
|------------|-------|-------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| Einw. Gk   | A     | 0.00                                                  | 0.01                                                 | 0.00                                                 |
|            | B     | 0.00                                                  | 0.01                                                 | 0.00                                                 |
| Einw. Qk.N | A     | 0.00                                                  | 0.06                                                 | 0.00                                                 |
|            | B     | 0.00                                                  | 0.06                                                 | 0.00                                                 |
| Einw. Qk.S | A     | 0.00                                                  | -0.32                                                | 0.00                                                 |
|            | B     | 0.00                                                  | 0.50                                                 | 0.00                                                 |
|            | A     | 0.00                                                  | 0.50                                                 | 0.00                                                 |
|            | B     | 0.00                                                  | 1.62                                                 | 0.00                                                 |
|            | A     | 0.00                                                  | 0.02                                                 | 0.00                                                 |
|            | B     | 0.00                                                  | 0.02                                                 | 0.00                                                 |
|            | A     | 0.00                                                  | 0.21                                                 | 0.00                                                 |
|            | B     | 0.00                                                  | 0.21                                                 | 0.00                                                 |



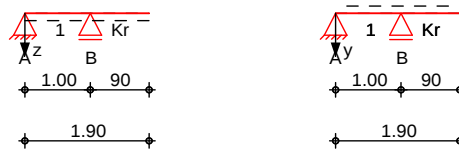


**Pos. AL2-5-200 Alu Bpr Kragarm (VL, 5.0 kN/m²)**

Die Verkehrslast 5,0 kN/m² wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:115



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1    | 1.00     | 0.0         | frei   |
| Kr   | 0.90     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-Kr | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

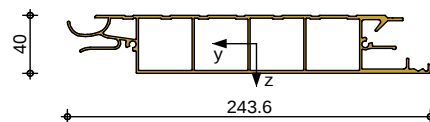
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub> | Gabel l. Wölbb. | beh. |
|-------|----------|----------------------------|--------------------------|-------------------------------|------------------|-----------------|------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei             | fest            | frei |
| B     | 1.00     | fest                       | frei                     | fest                          | frei             | fest            | frei |

| Lager | b<br>[cm] |
|-------|-----------|
| A, B  | 10.0      |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

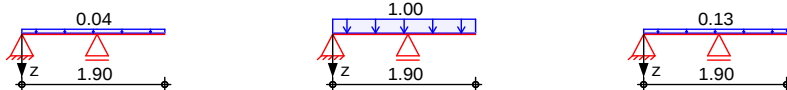
Belastungen auf das System

Grafik

Belastungsgrafiken (einwirkungsbezogen)

Einwirkungen

Gk Qk.N Qk.S



Streckenlasten  
in z-Richtung

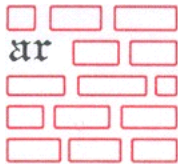
Gleichlasten  
Feld Komm.

Einw. Gk

Einw. Qk.N

Einw. Qk.S

|    |          | a<br>[m] | s<br>[m] | q <sub>li</sub><br>[kN/m] | q <sub>re</sub><br>[kN/m] | e<br>[cm] |
|----|----------|----------|----------|---------------------------|---------------------------|-----------|
| 1  | Eigengew | 0.00     | 1.00     |                           | 0.04                      | -0.4      |
| Kr | Eigengew | 0.00     | 0.90     |                           | 0.04                      | -0.4      |
| 1  | p+s      | 0.00     | 1.90     |                           | 1.00                      | 0.0       |
| 1  | p+s      | 0.00     | 1.90     |                           | 0.13                      | 0.0       |

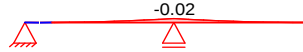


Char. Schnittgrößen charakteristische Schnittgrößen und Verformungen

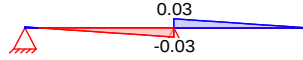
Grafik Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

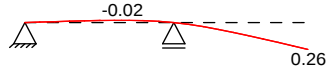
Moment  $M_{y,k}$  [kNm]



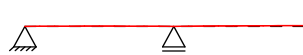
Querkraft  $V_{z,k}$  [kN]



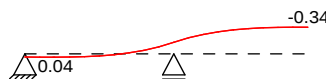
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_x$  [mrad]

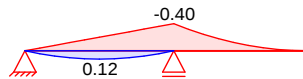


Verdrehung  $\varphi_y$  [mrad]

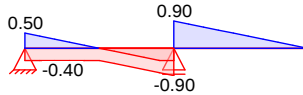


Einw.  $Q_k.N$

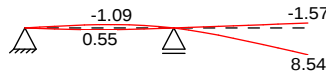
Moment  $M_{y,k}$  [kNm]



Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]

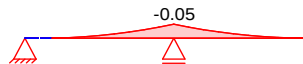


Verdrehung  $\varphi_y$  [mrad]

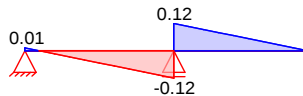


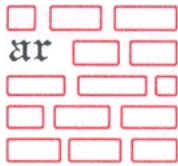
Einw.  $Q_k.S$

Moment  $M_{y,k}$  [kNm]

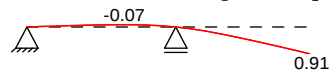


Querkraft  $V_{z,k}$  [kN]





Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_{y,k}$  [mrad]



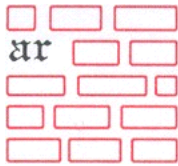
Tabelle

Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
|                 |      | 0.10     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
|                 |      | 1.00     | -0.02 *                | -0.02                  | -0.03 *               | -0.03                 |
|                 | Kr   | 0.00     | -0.02                  | -0.02                  | 0.03                  | 0.03 *                |
|                 |      | 0.90     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                   | 0.00                   | -0.40                 | 0.50                  |
|                 |      | 0.50     | -0.20                  | 0.12 *                 | -0.40                 | 0.00                  |
|                 |      | 1.00     | -0.40 *                | 0.00                   | -0.90 *               | -0.40                 |
|                 | Kr   | 0.00     | -0.40                  | 0.00                   | 0.00                  | 0.90 *                |
|                 |      | 0.90     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.01                  | 0.01                  |
|                 |      | 0.10     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |
|                 |      | 1.00     | -0.05 *                | -0.05                  | -0.12 *               | -0.12                 |
|                 | Kr   | 0.00     | -0.05                  | -0.05                  | 0.12                  | 0.12 *                |
|                 |      | 0.90     | 0.00                   | 0.00                   | 0.00                  | 0.00                  |

Verformungen (je Einwirkung)

|                 | Feld | x<br>[m] | $w_{z,k,min}$<br>[mm] | $w_{z,k,max}$<br>[mm] | $\varphi_{y,k,min}$<br>[mrad] | $\varphi_{y,k,max}$<br>[mrad] | $x_{k,min}$<br>[mrad] | $x_{k,max}$<br>[mrad] |
|-----------------|------|----------|-----------------------|-----------------------|-------------------------------|-------------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                  | 0.00                  | 0.04                          | 0.04                          | 0.00                  | 0.00                  |
|                 |      | 0.19     | -0.01                 | -0.01                 | 0.04                          | 0.04 *                        | 0.00                  | 0.00                  |
|                 |      | 0.65     | -0.02 *               | -0.02                 | 0.00                          | 0.00                          | 0.00                  | 0.00                  |
|                 |      | 1.00     | 0.00                  | 0.00                  | -0.15                         | -0.15                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.26                  | 0.26 *                | -0.34 *                       | -0.34                         | 0.00                  | 0.00                  |
|                 | Kr   | 0.00     | 0.00                  | 0.00                  | -0.15                         | -0.15                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.00                  | 0.00                  | -0.15                         | -0.15                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.26                  | 0.26 *                | -0.34 *                       | -0.34                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.26                  | 0.26 *                | -0.34 *                       | -0.34                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.26                  | 0.26 *                | -0.34 *                       | -0.34                         | 0.00                  | 0.00                  |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                  | 0.00                  | -1.75                         | -1.75                         | 0.00                  | 0.00                  |
|                 |      | 1.00     | 0.00                  | 0.00                  | -5.67                         | -5.67                         | 0.00                  | 0.00                  |
|                 |      | 1.00     | 0.00                  | 0.00                  | -5.67                         | -5.67                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | -1.57                 | -1.57                 | -10.77 *                      | -10.77 *                      | 0.00                  | 0.00                  |
|                 |      | 0.90     | 8.54 *                | 8.54 *                | 1.75                          | 1.75                          | 0.00                  | 0.00                  |
|                 | Kr   | 0.00     | 0.00                  | 0.00                  | -5.67                         | -5.67                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.00                  | 0.00                  | -5.67                         | -5.67                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | -1.57                 | -1.57                 | -10.77 *                      | -10.77 *                      | 0.00                  | 0.00                  |
|                 |      | 0.90     | 8.54 *                | 8.54 *                | 1.75                          | 1.75                          | 0.00                  | 0.00                  |
|                 |      | 0.90     | 8.54 *                | 8.54 *                | 1.75                          | 1.75                          | 0.00                  | 0.00                  |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                  | 0.00                  | 0.14                          | 0.14                          | 0.00                  | 0.00                  |
|                 |      | 0.19     | -0.03                 | -0.03                 | 0.14                          | 0.14 *                        | 0.00                  | 0.00                  |
|                 |      | 0.65     | -0.07 *               | -0.07                 | 0.00                          | 0.00                          | 0.00                  | 0.00                  |
|                 |      | 1.00     | 0.00                  | 0.00                  | -0.51                         | -0.51                         | 0.00                  | 0.00                  |
|                 |      | 1.00     | 0.00                  | 0.00                  | -0.51                         | -0.51                         | 0.00                  | 0.00                  |
|                 | Kr   | 0.00     | 0.00                  | 0.00                  | -0.51                         | -0.51                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.00                  | 0.00                  | -0.51                         | -0.51                         | 0.00                  | 0.00                  |
|                 |      | 0.90     | -0.03                 | -0.03                 | 0.14                          | 0.14 *                        | 0.00                  | 0.00                  |
|                 |      | 0.90     | -0.07 *               | -0.07                 | 0.00                          | 0.00                          | 0.00                  | 0.00                  |
|                 |      | 0.90     | 0.00                  | 0.00                  | -0.51                         | -0.51                         | 0.00                  | 0.00                  |



|    |      |       |        |      |
|----|------|-------|--------|------|
|    |      | 0.00  | -0.51  | 0.00 |
| Kr | 0.00 | 0.00  | -0.51  | 0.00 |
|    |      | 0.00  | -0.51  | 0.00 |
|    | 0.90 | 0.91  | -1.17* | 0.00 |
|    |      | 0.91* | -1.17  | 0.00 |

# Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |                     |            |
|-------------------|----|------|------------|---------------------|------------|
| ständig/vorüberg. | 37 | 1    | 1.35*Gk    | +1.50*Qk.N<br>(1,2) | +1.50*Qk.S |
|                   | 38 | 2    | 1.35*Gk    | +1.50*Qk.N<br>(1,2) | +1.50*Qk.S |
| quasi-ständig     | 16 |      | 1.00*Gk    | +0.80*Qk.N<br>(2)   |            |

# Mat./Querschnitt

Material- und Querschnittswerte

## Aluminium

| Material            | t <sub>Max</sub><br>[mm] | f <sub>o</sub><br>[N/mm²] | E<br>[N/mm²] | BC |
|---------------------|--------------------------|---------------------------|--------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                       | 70000        | A  |
|                     | 25 <sup>b</sup>          | 180                       | 70000        | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

## Querschnitt

| QS | Profil        | A<br>[cm²] | S <sub>y</sub><br>S <sub>z</sub><br>[cm³] | I <sub>y</sub><br>I <sub>z</sub><br>[cm⁴] | W <sub>y</sub><br>W <sub>z</sub><br>[cm³] |
|----|---------------|------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| 1  | AVADIELE40 40 | 13.9       | 10.2<br>41.6                              | 35.2<br>647.4                             | 17.2<br>51.0                              |

## Hauptachsen

| QS | Profil        | ε<br>[°] | I <sub>yz</sub><br>[cm⁴] | I <sub>tb</sub><br>[cm⁴] | I <sub>fb</sub><br>[cm⁴] |
|----|---------------|----------|--------------------------|--------------------------|--------------------------|
| 1  | AVADIELE40 40 | 87.42    | -27.6                    | 648.7                    | 34.0                     |

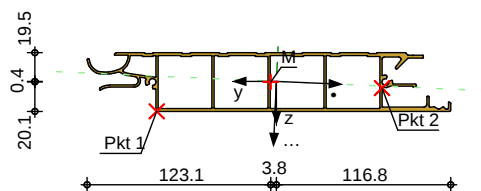
## Torsion

| QS | Profil        | I <sub>t</sub><br>[cm⁴] | I <sub>n</sub><br>[cm⁶] |
|----|---------------|-------------------------|-------------------------|
| 1  | AVADIELE40 40 | 73.1                    | 0.0                     |

## Grafik

Querschnittsgrafik [mm]

M 1:5

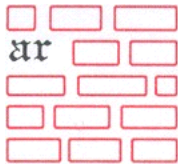


## Auflagerkräfte

Charakteristische Auflagerkräfte (global)

## Char. Auflagerkr.

|            | Aufl. | M <sub>x,k,min</sub><br>M <sub>x,k,max</sub><br>[kNm] | F <sub>z,k,min</sub><br>F <sub>z,k,max</sub><br>[kN] | F <sub>y,k,min</sub><br>F <sub>y,k,max</sub><br>[kN] |
|------------|-------|-------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| Einw. Gk   | A     | 0.00                                                  | 0.00                                                 | 0.00                                                 |
|            | B     | 0.00                                                  | 0.07                                                 | 0.00                                                 |
| Einw. Qk.N | A     | 0.00                                                  | -0.41                                                | 0.00                                                 |
|            |       | 0.00                                                  | 0.50                                                 | 0.00                                                 |

PROJEKT **19259-1a AVA Diele 40**

PROJ.-NR.

**19259\_1a**POSITION **AL2-5-200 Alu Bpr Kragarm (VL, 5.0 kN/m<sup>2</sup>)**

DATUM

**10.07.2019**

|                            |   |      |      |      |
|----------------------------|---|------|------|------|
| Einw. <i>Q<sub>k</sub></i> | B | 0.00 | 0.50 | 0.00 |
|                            |   | 0.00 | 1.81 | 0.00 |
|                            | A | 0.00 | 0.01 | 0.00 |
|                            |   | 0.00 | 0.01 | 0.00 |
|                            | B | 0.00 | 0.23 | 0.00 |
|                            |   | 0.00 | 0.23 | 0.00 |

Zusammenfassung

Zusammenfassung der Nachweise

Nachweise (GZT)

Nachweise im Grenzzustand der Tragfähigkeit

Nachweis

 $\eta_b$   
[ - ]

Nachweis E-E

OK 0.30

Nachweise (GZG)

Nachweise im Grenzzust. der Gebrauchstauglichkeit

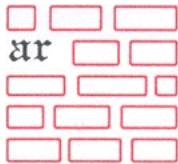
Nachweis

 $\eta_b$   
[ - ]

Verformung

OK 0.99

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



## Pos. AL1-5-2-Feld Alu Bpr (Verkehrslastansatz, 5.0 kN/m²)

Die Verkehrslast 5,0 kN/m² wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:120



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1-2  | 2.20     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-2  | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

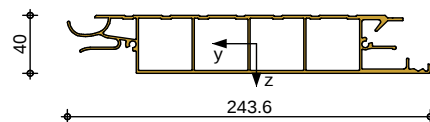
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub><br>bzw. | Gabel l. Wölbb. | beh. |
|-------|----------|----------------------------|--------------------------|-------------------------------|--------------------------|-----------------|------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei                     | fest            | frei |
| B     | 2.20     | fest                       | frei                     | fest                          | frei                     | fest            | frei |
| C     | 4.40     | fest                       | frei                     | fest                          | frei                     | fest            | frei |

| Lager   | b<br>[cm] |
|---------|-----------|
| A, B, C | 8.0       |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

Belastungen auf das System

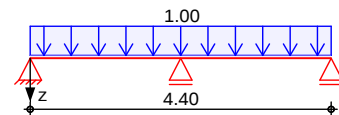
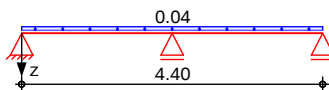
Grafik

Belastungsgrafiken (einwirkungsbezogen)

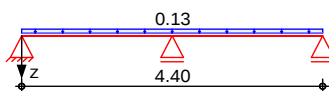
Einwirkungen

G<sub>k</sub>

Q<sub>k,N</sub>

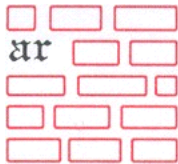


Q<sub>k,S</sub>



Streckenlasten  
in z-Richtung

| Gleichlasten |          | a    | s    | q <sub>li</sub> | q <sub>re</sub> | e    |
|--------------|----------|------|------|-----------------|-----------------|------|
| Feld         | Komm.    | [m]  | [m]  | [kN/m]          | [kN/m]          | [cm] |
| 1            | Eigengew | 0.00 | 2.20 |                 | 0.04            | -0.4 |
| 2            | Eigengew | 0.00 | 2.20 |                 | 0.04            | -0.4 |
| 1            | p+s      | 0.00 | 4.40 |                 | 1.00            | 0.0  |



Einw.  $Q_{k.S}$

1 p+s 0.00 4.40 0.13 0.0

Char. Schnittgrößen charakteristische Schnittgrößen und Verformungen

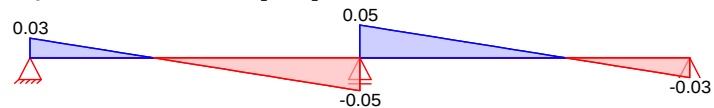
Grafik Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

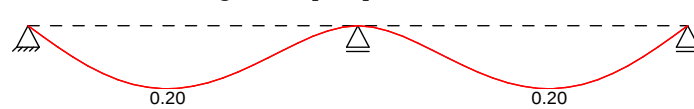
Moment  $M_{y,k}$  [kNm]



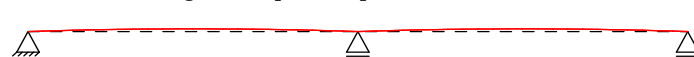
Querkraft  $V_{z,k}$  [kN]



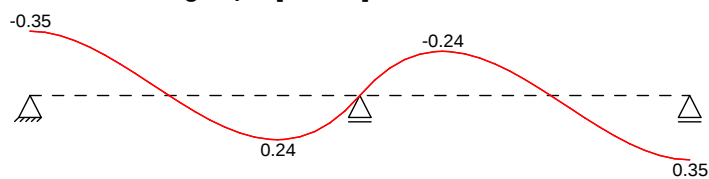
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\chi_{,k}$  [mrad]

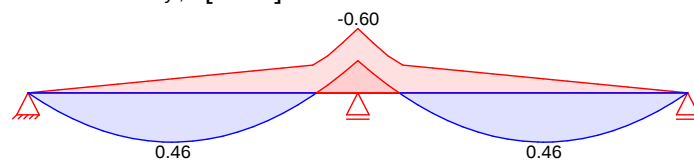


Verdrehung  $\gamma_{,k}$  [mrad]

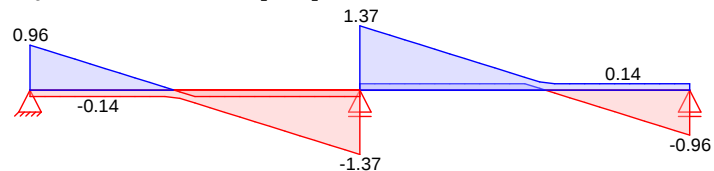


Einw.  $Q_{k.N}$

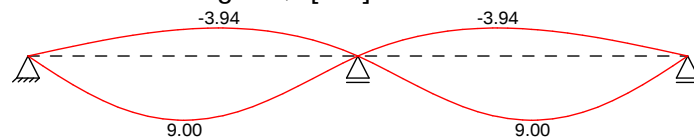
Moment  $M_{y,k}$  [kNm]

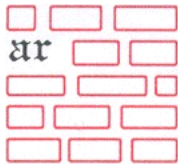


Querkraft  $V_{z,k}$  [kN]

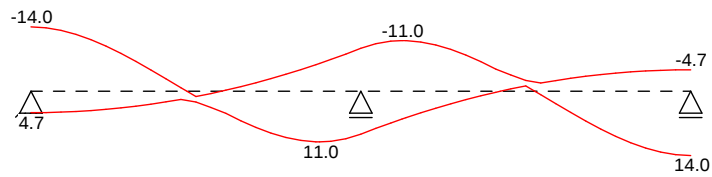


Verschiebung  $w_{z,k}$  [mm]



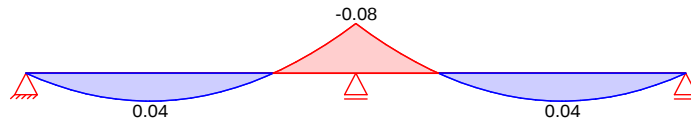


Verdrehung  $\varphi_y, k [mrad]$

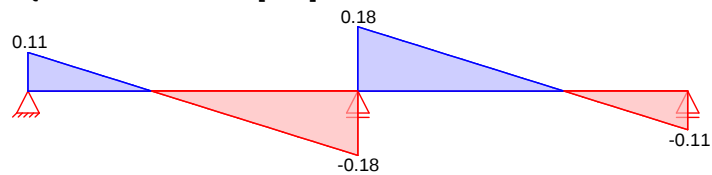


Einw.  $Qk.S$

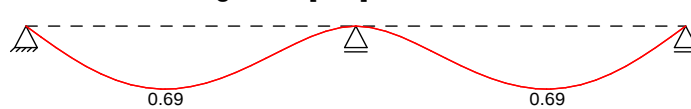
Moment  $M_y, k [kNm]$



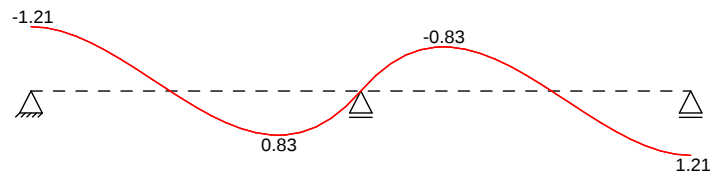
Querkraft  $V_z, k [kN]$



Verschiebung  $w_z, k [mm]$



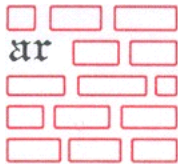
Verdrehung  $\varphi_y, k [mrad]$



Tabelle

Schnittgrößen (je Einwirkung)

|              | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|--------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $Gk$   | 1    | 0.00     | 0.00                   | 0.00                   | 0.03                  | 0.03                  |
|              |      | 0.83     | 0.01                   | 0.01*                  | 0.00                  | 0.00                  |
|              |      | 2.20     | -0.02*                 | -0.02                  | -0.05*                | -0.05                 |
| Einw. $Qk.N$ | 2    | 0.00     | -0.02                  | -0.02                  | 0.05                  | 0.05*                 |
|              |      | 2.20     | 0.00                   | 0.00                   | -0.03                 | -0.03                 |
|              |      | 2.20     | 0.00                   | 0.00                   | -0.03                 | -0.03                 |
| Einw. $Qk.S$ | 1    | 0.00     | 0.00                   | 0.00                   | -0.14                 | 0.96                  |
|              |      | 0.96     | -0.13                  | 0.46*                  | -0.16                 | 0.00                  |
|              |      | 2.20     | -0.60*                 | -0.30                  | -1.37*                | -0.14                 |
| Einw. $Qk.S$ | 2    | 0.00     | -0.60                  | -0.30                  | 0.14                  | 1.37*                 |
|              |      | 2.20     | 0.00                   | 0.00                   | -0.96                 | 0.14                  |
|              |      | 2.20     | 0.00                   | 0.00                   | -0.96                 | 0.14                  |
| Einw. $Qk.S$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.11                  | 0.11                  |
|              |      | 0.83     | 0.04                   | 0.04*                  | 0.00                  | 0.00                  |
|              |      | 2.20     | -0.08*                 | -0.08                  | -0.18*                | -0.18                 |
| Einw. $Qk.S$ | 2    | 0.00     | -0.08                  | -0.08                  | 0.18                  | 0.18*                 |
|              |      | 2.20     | 0.00                   | 0.00                   | -0.11                 | -0.11                 |
|              |      | 2.20     | 0.00                   | 0.00                   | -0.11                 | -0.11                 |



## Verformungen (je Einwirkung)

|            | Feld | X<br>[m] | Wz,k,min         | y,k,min           | x,k,min           |
|------------|------|----------|------------------|-------------------|-------------------|
|            |      |          | Wz,k,max<br>[mm] | y,k,max<br>[mrad] | x,k,max<br>[mrad] |
| Einw. Gk   | 1    | 0.00     | 0.00             | -0.35*            | 0.00              |
|            |      |          | 0.00             | -0.35             | 0.00              |
|            |      | 0.93     | 0.20             | 0.00              | 0.00              |
|            |      |          | 0.20*            | 0.00              | 0.00              |
|            |      | 1.10     | 0.19             | 0.09              | 0.00              |
|            |      |          | 0.19             | 0.09              | 0.00              |
|            | 2    | 2.20     | 0.00             | 0.00              | 0.00              |
|            |      |          | 0.00             | 0.00              | 0.00              |
|            |      | 0.00     | 0.00             | 0.00              | 0.00              |
|            |      |          | 0.00             | 0.00              | 0.00              |
|            |      | 2.20     | 0.00             | 0.35              | 0.00              |
| Einw. Qk.N | 1    | 0.00     | 0.00             | -13.97*           | 0.00              |
|            |      |          | 0.00             | 4.66              | 0.00              |
|            |      | 1.04     | -3.75            | 0.00              | 0.00              |
|            |      |          | 9.00*            | 1.99              | 0.00              |
|            |      | 1.27     | -3.94*           | -0.01             | 0.00              |
|            | 2    |          | 8.48             | 4.42              | 0.00              |
|            |      | 2.20     | 0.00             | -9.31             | 0.00              |
|            |      |          | 0.00             | 9.31              | 0.00              |
|            |      | 0.00     | 0.00             | -9.31             | 0.00              |
|            |      |          | 0.00             | 9.31              | 0.00              |
| Einw. Qk.S | 1    | 0.00     | 0.00             | -1.21*            | 0.00              |
|            |      |          | 0.00             | -1.21             | 0.00              |
|            |      | 0.93     | 0.69             | 0.00              | 0.00              |
|            |      |          | 0.69*            | 0.00              | 0.00              |
|            |      | 2.20     | 0.00             | 0.00              | 0.00              |
|            | 2    |          | 0.00             | 0.00              | 0.00              |
|            |      | 0.00     | 0.00             | 0.00              | 0.00              |
|            |      |          | 0.00             | 0.00              | 0.00              |
|            |      | 2.20     | 0.00             | 1.21              | 0.00              |
|            |      |          | 0.00             | 1.21*             | 0.00              |

## Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |                       |
|-------------------|----|------|------------|-----------------------|
| ständig/vorüberg. | 38 | 1    | 1.35*Gk    | +1.50*Qk.N +1.50*Qk.S |
| quasi-ständig     | 15 |      | 1.00*Gk    | (1,2)<br>+0.80*Qk.N   |
|                   | 16 |      | 1.00*Gk    | (1)<br>+0.80*Qk.N     |
|                   |    |      |            | (2)                   |

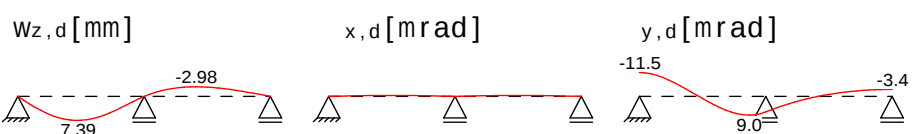
## Bem.-verformungen

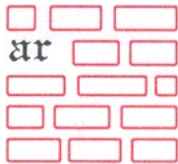
Bemessungsverformungen

## Grafik

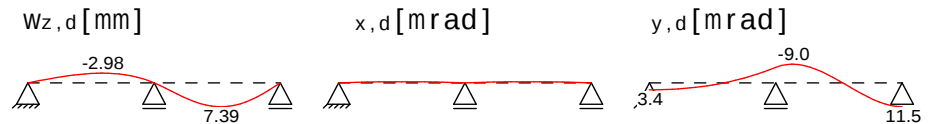
Verformungen (je Kombination)

Komb. 15





Komb. 16



Tabelle

Verformungen (je Kombination)

Komb. 15

| Feld | x<br>[m] | Wz,d<br>[mm] | y,d<br>[mrad] | x,d<br>[mrad] |
|------|----------|--------------|---------------|---------------|
| 1    | 0.00     | 0.00         | -11.52*       | 0.00          |
|      | 1.04     | 7.39*        | 0.05          | 0.00          |
|      | 1.10     | 7.36         | 1.02          | 0.00          |
|      | 1.90     | 2.55         | 8.97*         | 0.00          |
|      | 2.20     | 0.00         | 7.45          | 0.00          |
| 2    | 0.00     | 0.00         | 7.45          | 0.00          |
|      | 0.90     | -2.98*       | 0.00          | 0.00          |
|      | 2.20     | 0.00         | -3.37         | 0.00          |
| 1    | 0.00     | 0.00         | 3.37          | 0.00          |
|      | 1.10     | -2.88        | 1.02          | 0.00          |
|      | 1.30     | -2.98*       | 0.00          | 0.00          |
|      | 2.20     | 0.00         | -7.45         | 0.00          |
|      | 2.20     | 0.00         | -7.45         | 0.00          |
| 2    | 0.00     | 0.00         | -7.45         | 0.00          |
|      | 0.30     | 2.55         | -8.97*        | 0.00          |
|      | 1.16     | 7.39*        | -0.05         | 0.00          |
|      | 2.20     | 0.00         | 11.52*        | 0.00          |

Komb. 16

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

| Material            | t <sub>Max</sub><br>[mm] | f <sub>0</sub><br>[N/mm²] | E<br>[N/mm²] | BC |
|---------------------|--------------------------|---------------------------|--------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                       | 70000        | A  |
|                     | 25 <sup>b</sup>          | 180                       | 70000        | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

| QS | Profil        | A<br>[cm²] | S <sub>y</sub><br>S <sub>z</sub><br>[cm³] | I <sub>y</sub><br>I <sub>z</sub><br>[cm⁴] | W <sub>y</sub><br>W <sub>z</sub><br>[cm³] |
|----|---------------|------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| 1  | AVADIELE40 40 | 13.9       | 10.2<br>41.6                              | 35.2<br>647.4                             | 17.2<br>51.0                              |

Hauptachsen

| QS | Profil        | ε<br>[°] | I <sub>yz</sub><br>[cm⁴] | I <sub>ib</sub><br>[cm⁴] | I <sub>ib</sub><br>[cm⁴] |
|----|---------------|----------|--------------------------|--------------------------|--------------------------|
| 1  | AVADIELE40 40 | 87.42    | -27.6                    | 648.7                    | 34.0                     |

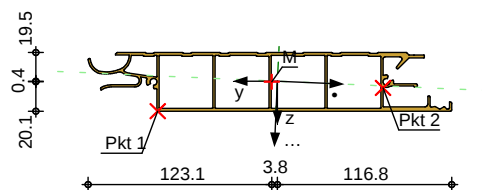
Torsion

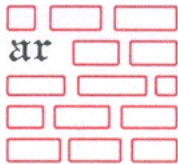
| QS | Profil        | I <sub>t</sub><br>[cm⁴] | I <sub>n</sub><br>[cm⁶] |
|----|---------------|-------------------------|-------------------------|
| 1  | AVADIELE40 40 | 73.1                    | 0.0                     |

Grafik

Querschnittsgrafik [mm]

M 1:5





## Auflagerkräfte

## Charakteristische Auflagerkräfte (global)

### Char. Auflagerkr.

|                 | Aufl. | $M_{x,k,min}$          | $F_{z,k,min}$         | $F_{y,k,min}$         |
|-----------------|-------|------------------------|-----------------------|-----------------------|
|                 |       | $M_{x,k,max}$<br>[kNm] | $F_{z,k,max}$<br>[kN] | $F_{y,k,max}$<br>[kN] |
| Einw. $G_k$     | A     | 0.00                   | 0.03                  | 0.00                  |
|                 |       | 0.00                   | 0.03                  | 0.00                  |
|                 | B     | 0.00                   | 0.10                  | 0.00                  |
|                 |       | 0.00                   | 0.10                  | 0.00                  |
|                 | C     | 0.00                   | 0.03                  | 0.00                  |
| Einw. $Q_{k,N}$ | A     | 0.00                   | -0.14                 | 0.00                  |
|                 |       | 0.00                   | 0.96                  | 0.00                  |
|                 | B     | 0.00                   | 1.37                  | 0.00                  |
|                 |       | 0.00                   | 2.75                  | 0.00                  |
|                 | C     | 0.00                   | -0.14                 | 0.00                  |
| Einw. $Q_{k,S}$ | A     | 0.00                   | 0.11                  | 0.00                  |
|                 |       | 0.00                   | 0.11                  | 0.00                  |
|                 | B     | 0.00                   | 0.36                  | 0.00                  |
|                 |       | 0.00                   | 0.36                  | 0.00                  |
|                 | C     | 0.00                   | 0.11                  | 0.00                  |
|                 |       | 0.00                   | 0.11                  | 0.00                  |

## Zusammenfassung

## Zusammenfassung der Nachweise

### Nachweise (GZT)

### Nachweise im Grenzzustand der Tragfähigkeit

#### Nachweis

#### Nachweis E-E

OK 0.45

### Nachweise (GZG)

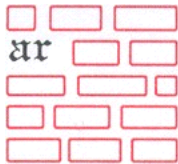
### Nachweise im Grenzzust. der Gebrauchstauglichkeit

#### Nachweis

#### Verformung

OK 1.01

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



## Pos. AL1-5-2-Feld-200 Bpr (Verkehrslastansatz, 5.0 kN/m<sup>2</sup>)

Die Verkehrslast 5,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:135



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1-2  | 2.50     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-2  | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

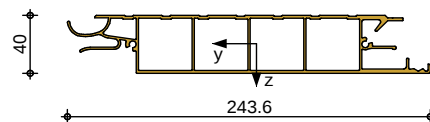
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub><br>bzw. | Gabel l. Wölbb. | beh. |
|-------|----------|----------------------------|--------------------------|-------------------------------|--------------------------|-----------------|------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei                     | fest            | frei |
| B     | 2.50     | fest                       | frei                     | fest                          | frei                     | fest            | frei |
| C     | 5.00     | fest                       | frei                     | fest                          | frei                     | fest            | frei |

| Lager   | b<br>[cm] |
|---------|-----------|
| A, B, C | 8.0       |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

Belastungen auf das System

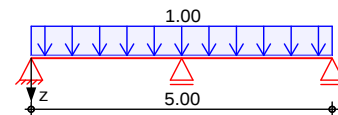
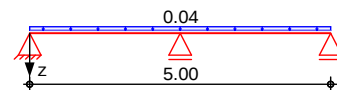
Grafik

Belastungsgrafiken (einwirkungsbezogen)

Einwirkungen

G<sub>k</sub>

Q<sub>k,N</sub>



Q<sub>k,S</sub>



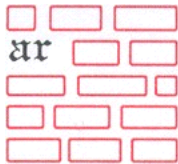
Streckenlasten  
in z-Richtung

Gleichlasten  
Feld Komm.

Einw. G<sub>k</sub>

Einw. Q<sub>k,N</sub>

|   |          | a<br>[m] | s<br>[m] | q <sub>li</sub><br>[kN/m] | q <sub>re</sub><br>[kN/m] | e<br>[cm] |
|---|----------|----------|----------|---------------------------|---------------------------|-----------|
| 1 | Eigengew | 0.00     | 2.50     |                           | 0.04                      | -0.4      |
| 2 | Eigengew | 0.00     | 2.50     |                           | 0.04                      | -0.4      |
| 1 | p+s      | 0.00     | 5.00     |                           | 1.00                      | 0.0       |



Einw.  $Qk.S$

Char. Schnittgrößen

Grafik

Einw.  $Gk$

1 p+s 0.00 5.00 0.13 0.0

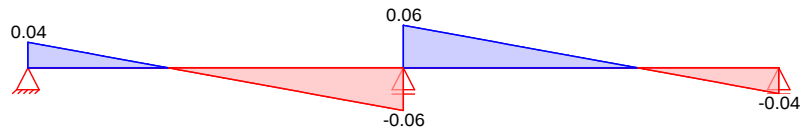
charakteristische Schnittgrößen und Verformungen

Schnittgrößen und Verformungen (je Einwirkung)

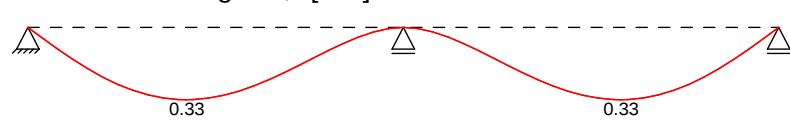
Moment  $M_{y,k}$  [kNm]



Querkraft  $V_{z,k}$  [kN]



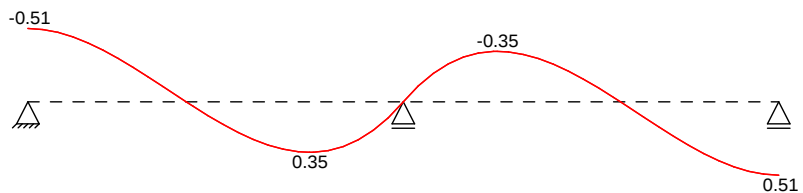
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_x,k$  [mrad]

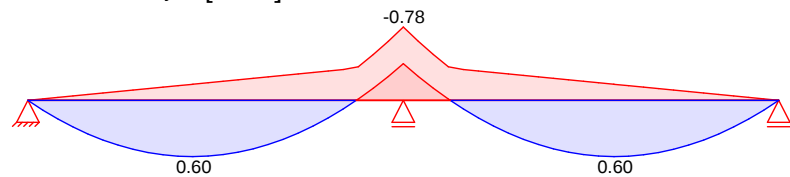


Verdrehung  $\varphi_y,k$  [mrad]

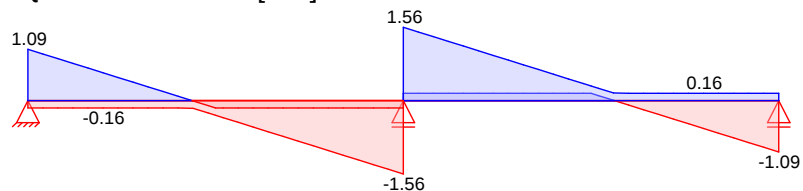


Einw.  $Qk.N$

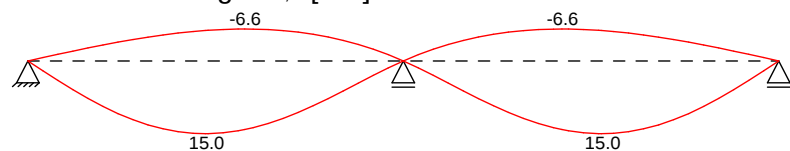
Moment  $M_{y,k}$  [kNm]

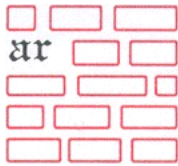


Querkraft  $V_{z,k}$  [kN]

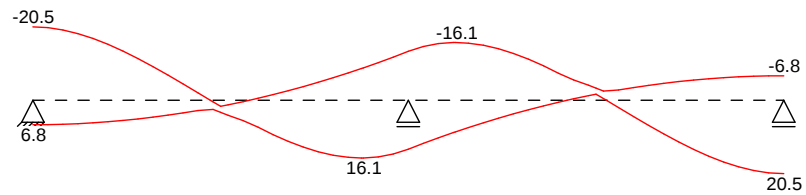


Verschiebung  $w_{z,k}$  [mm]



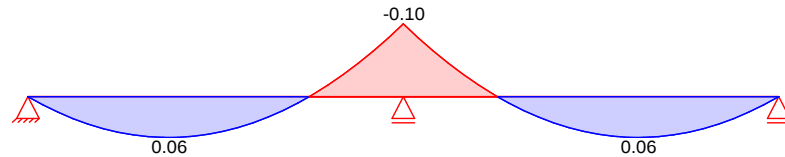


Verdrehung  $\varphi_{y,k}$  [mrad]

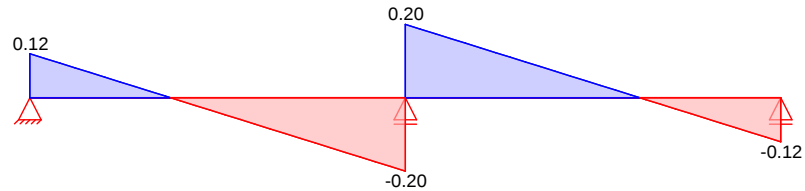


Einw.  $Q_{k.S}$

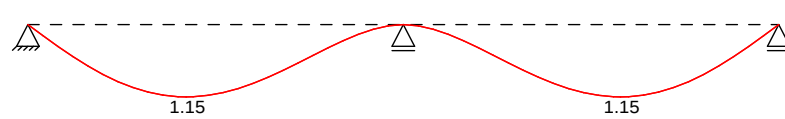
Moment  $M_{y,k}$  [kNm]



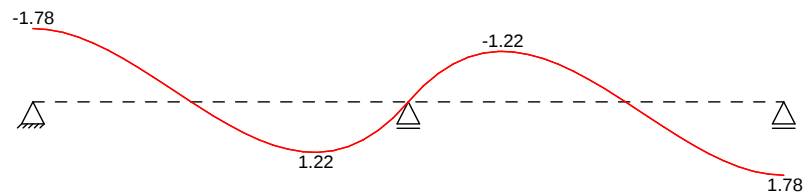
Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]



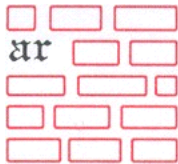
Verdrehung  $\varphi_{y,k}$  [mrad]



Tabelle

Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.04                  | 0.04                  |
|                 |      | 0.94     | 0.02                   | 0.02 *                 | 0.00                  | 0.00                  |
|                 |      | 2.50     | -0.03 *                | -0.03                  | -0.06 *               | -0.06                 |
|                 | 2    | 0.00     | -0.03                  | -0.03                  | 0.06                  | 0.06 *                |
|                 |      | 2.50     | 0.00                   | 0.00                   | -0.04                 | -0.04                 |
| Einw. $Q_{k.N}$ | 1    | 0.00     | 0.00                   | 0.00                   | -0.16                 | 1.09                  |
|                 |      | 1.09     | -0.17                  | 0.60 *                 | -0.16                 | 0.00                  |
|                 |      | 2.50     | -0.78 *                | -0.39                  | -1.56 *               | -0.16                 |
|                 | 2    | 0.00     | -0.78                  | -0.39                  | 0.16                  | 1.56 *                |
|                 |      | 2.50     | 0.00                   | 0.00                   | -1.09                 | 0.16                  |
| Einw. $Q_{k.S}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.12                  | 0.12                  |
|                 |      | 0.94     | 0.06                   | 0.06 *                 | 0.00                  | 0.00                  |
|                 |      | 2.50     | -0.10 *                | -0.10                  | -0.20 *               | -0.20                 |
|                 | 2    | 0.00     | -0.10                  | -0.10                  | 0.20                  | 0.20 *                |
|                 |      | 2.50     | 0.00                   | 0.00                   | -0.12                 | -0.12                 |



## Verformungen (je Einwirkung)

|            | Feld | X<br>[m] | Wz, k, min         | y, k, min           | x, k, min           |
|------------|------|----------|--------------------|---------------------|---------------------|
|            |      |          | Wz, k, max<br>[mm] | y, k, max<br>[mrad] | x, k, max<br>[mrad] |
| Einw. Gk   | 1    | 0.00     | 0.00               | -0.51*              | 0.00                |
|            |      |          | 0.00               | -0.51               | 0.00                |
|            |      | 1.05     | 0.33               | 0.00                | -0.01               |
|            |      |          | 0.33*              | 0.00                | -0.01               |
|            |      | 1.25     | 0.32               | 0.13                | -0.01*              |
|            |      |          | 0.32               | 0.13                | -0.01               |
|            | 2    | 2.50     | 0.00               | 0.00                | 0.00                |
|            |      |          | 0.00               | 0.00                | 0.00                |
|            |      | 0.00     | 0.00               | 0.00                | 0.00                |
|            |      |          | 0.00               | 0.00                | 0.00                |
|            |      | 2.50     | 0.00               | 0.51                | 0.00                |
| Einw. Qk.N | 1    | 0.00     | 0.00               | -20.49*             | 0.00                |
|            |      |          | 0.00               | 6.83                | 0.00                |
|            |      | 1.18     | -6.26              | 0.00                | 0.00                |
|            |      |          | 15.00*             | 2.63                | 0.00                |
|            |      | 1.44     | -6.57*             | -0.01               | 0.00                |
|            |      |          | 14.14              | 6.50                | 0.00                |
|            | 2    | 2.50     | 0.00               | -13.66              | 0.00                |
|            |      |          | 0.00               | 13.66               | 0.00                |
|            |      | 0.00     | 0.00               | -13.66              | 0.00                |
|            |      |          | 0.00               | 13.66               | 0.00                |
|            |      | 2.50     | 0.00               | -6.83               | 0.00                |
| Einw. Qk.S | 1    | 0.00     | 0.00               | 20.49*              | 0.00                |
|            |      |          | 0.00               | -1.78*              | 0.00                |
|            |      | 1.05     | 0.00               | -1.78               | 0.00                |
|            |      |          | 1.15               | 0.00                | 0.00                |
|            |      | 2.50     | 1.15*              | 0.00                | 0.00                |
|            | 2    |          | 0.00               | 0.00                | 0.00                |
|            |      | 0.00     | 0.00               | 0.00                | 0.00                |
|            |      |          | 0.00               | 0.00                | 0.00                |
|            |      | 2.50     | 0.00               | 1.78                | 0.00                |
|            |      |          | 0.00               | 1.78*               | 0.00                |

## Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |                       |
|-------------------|----|------|------------|-----------------------|
| ständig/vorüberg. | 38 | 1    | 1.35*Gk    | +1.50*Qk.N +1.50*Qk.S |
| quasi-ständig     | 15 |      | 1.00*Gk    | (1,2)<br>+0.80*Qk.N   |
|                   | 16 |      | 1.00*Gk    | (1)<br>+0.80*Qk.N     |
|                   |    |      |            | (2)                   |

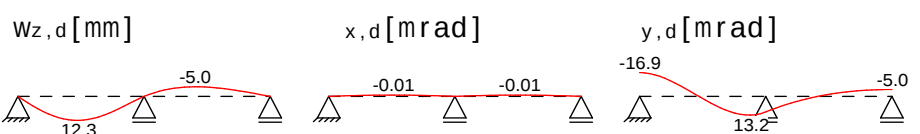
## Bem.-verformungen

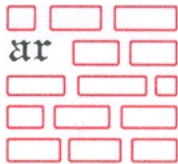
Bemessungsverformungen

## Grafik

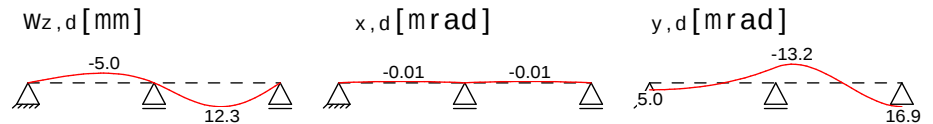
Verformungen (je Kombination)

Komb. 15





Komb. 16



Tabelle

Verformungen (je Kombination)

Komb. 15

| Feld | x<br>[m] | Wz,d<br>[mm] | y,d<br>[mrad] | x,d<br>[mrad] |
|------|----------|--------------|---------------|---------------|
| 1    | 0.00     | 0.00         | -16.91*       | 0.00          |
|      | 1.18     | 12.33*       | 0.08          | -0.01         |
|      | 1.25     | 12.25        | 1.49          | -0.01*        |
|      | 2.19     | 3.88         | 13.17*        | 0.00          |
|      | 2.50     | 0.00         | 10.93         | 0.00          |
| 2    | 0.00     | 0.00         | 10.93         | 0.00          |
|      | 1.00     | -4.98*       | 0.17          | -0.01         |
|      | 2.50     | 0.00         | -4.95         | 0.00          |

Komb. 16

|   |      |        |         |        |
|---|------|--------|---------|--------|
| 1 | 0.00 | 0.00   | 4.95    | 0.00   |
|   | 1.25 | -4.79  | 1.49    | -0.01* |
|   | 1.50 | -4.98* | -0.17   | -0.01  |
|   | 2.50 | 0.00   | -10.93  | 0.00   |
| 2 | 0.00 | 0.00   | -10.93  | 0.00   |
|   | 0.31 | 3.88   | -13.17* | 0.00   |
|   | 1.32 | 12.33* | -0.08   | -0.01  |
|   | 2.50 | 0.00   | 16.91*  | 0.00   |

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

| Material            | t <sub>Max</sub><br>[mm] | f <sub>0</sub><br>[N/mm <sup>2</sup> ] | E<br>[N/mm <sup>2</sup> ] | BC |
|---------------------|--------------------------|----------------------------------------|---------------------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                                    | 70000                     | A  |
|                     | 25 <sup>b</sup>          | 180                                    | 70000                     | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

| QS | Profil        | A<br>[cm <sup>2</sup> ] | S <sub>y</sub><br>S <sub>z</sub><br>[cm <sup>3</sup> ] | I <sub>y</sub><br>I <sub>z</sub><br>[cm <sup>4</sup> ] | W <sub>y</sub><br>W <sub>z</sub><br>[cm <sup>3</sup> ] |
|----|---------------|-------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| 1  | AVADIELE40 40 | 13.9                    | 10.2<br>41.6                                           | 35.2<br>647.4                                          | 17.2<br>51.0                                           |

Hauptachsen

| QS | Profil        | ε<br>[°] | I <sub>yz</sub><br>[cm <sup>4</sup> ] | I <sub>ib</sub><br>[cm <sup>4</sup> ] | I <sub>ib</sub><br>[cm <sup>4</sup> ] |
|----|---------------|----------|---------------------------------------|---------------------------------------|---------------------------------------|
| 1  | AVADIELE40 40 | 87.42    | -27.6                                 | 648.7                                 | 34.0                                  |

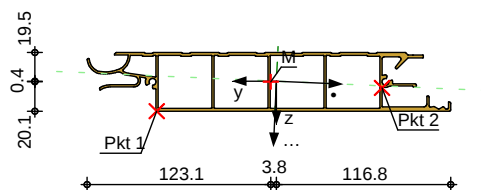
Torsion

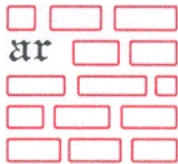
| QS | Profil        | I <sub>t</sub><br>[cm <sup>4</sup> ] | I <sub>n</sub><br>[cm <sup>6</sup> ] |
|----|---------------|--------------------------------------|--------------------------------------|
| 1  | AVADIELE40 40 | 73.1                                 | 0.0                                  |

Grafik

Querschnittsgrafik [mm]

M 1:5





## Auflagerkräfte

## Charakteristische Auflagerkräfte (global)

### Char. Auflagerkr.

|                 | Aufl. | $M_{x,k,min}$          | $F_{z,k,min}$         | $F_{y,k,min}$         |
|-----------------|-------|------------------------|-----------------------|-----------------------|
|                 |       | $M_{x,k,max}$<br>[kNm] | $F_{z,k,max}$<br>[kN] | $F_{y,k,max}$<br>[kN] |
| Einw. $G_k$     | A     | 0.00                   | 0.04                  | 0.00                  |
|                 |       | 0.00                   | 0.04                  | 0.00                  |
|                 | B     | 0.00                   | 0.12                  | 0.00                  |
|                 |       | 0.00                   | 0.12                  | 0.00                  |
|                 | C     | 0.00                   | 0.04                  | 0.00                  |
| Einw. $Q_{k,N}$ | A     | 0.00                   | -0.16                 | 0.00                  |
|                 |       | 0.00                   | 1.09                  | 0.00                  |
|                 | B     | 0.00                   | 1.56                  | 0.00                  |
|                 |       | 0.00                   | 3.12                  | 0.00                  |
|                 | C     | 0.00                   | -0.16                 | 0.00                  |
| Einw. $Q_{k,S}$ | A     | 0.00                   | 1.09                  | 0.00                  |
|                 |       | 0.00                   | 0.12                  | 0.00                  |
|                 | B     | 0.00                   | 0.41                  | 0.00                  |
|                 |       | 0.00                   | 0.41                  | 0.00                  |
|                 | C     | 0.00                   | 0.12                  | 0.00                  |
|                 |       | 0.00                   | 0.12                  | 0.00                  |

## Zusammenfassung

## Zusammenfassung der Nachweise

### Nachweise (GZT)

### Nachweise im Grenzzustand der Tragfähigkeit

#### Nachweis

#### Nachweis E-E

OK 0.58

### Nachweise (GZG)

### Nachweise im Grenzzust. der Gebrauchstauglichkeit

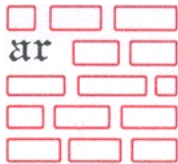
#### Nachweis

#### Verformung

OK 0.99

Die Auflagerspannweite ist als Grenzspannweite festgelegt.

Kürzere Spannweiten sind möglich!

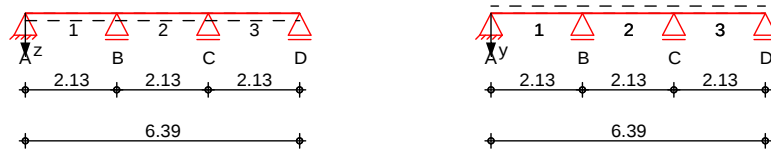


## Pos. AL1-5-3-Feld Alu Bpr (Verkehrslastansatz, 5.0 kN/m<sup>2</sup>)

Die Verkehrslast 5,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:175



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1-3  | 2.13     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-3  | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

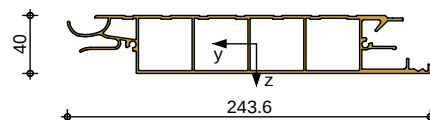
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub><br>bzw. | Gabel l. Wölbeh. |
|-------|----------|----------------------------|--------------------------|-------------------------------|--------------------------|------------------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei                     | fest             |
| B     | 2.13     | fest                       | frei                     | fest                          | frei                     | fest             |
| C     | 4.26     | fest                       | frei                     | fest                          | frei                     | fest             |
| D     | 6.39     | fest                       | frei                     | fest                          | frei                     | fest             |

| Lager      | b<br>[cm] |
|------------|-----------|
| A, B, C, D | 8.0       |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

Belastungen auf das System

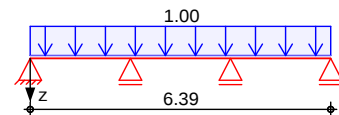
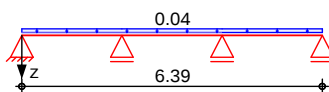
Grafik

Belastungsgrafiken (einwirkungsbezogen)

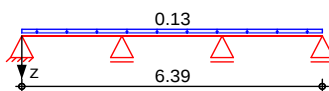
Einwirkungen

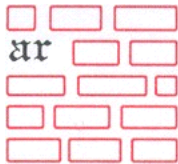
G<sub>k</sub>

Q<sub>k,N</sub>



Q<sub>k,S</sub>



Streckenlasten  
in z-RichtungEinw.  $G_k$ Einw.  $Q_{k,N}$ Einw.  $Q_{k,S}$ Gleichlasten  
Feld Komm.

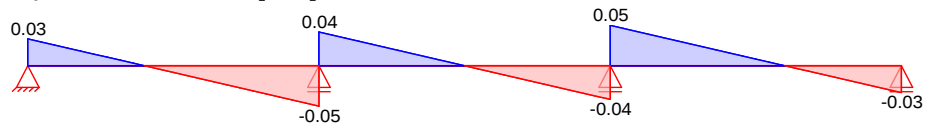
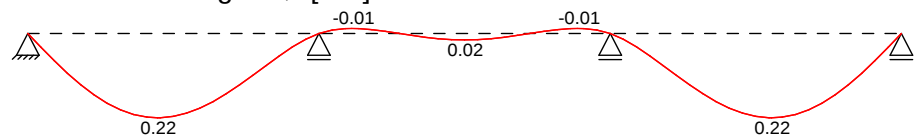
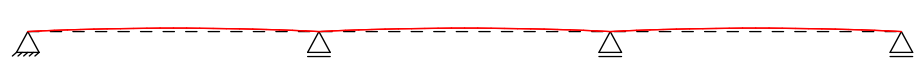
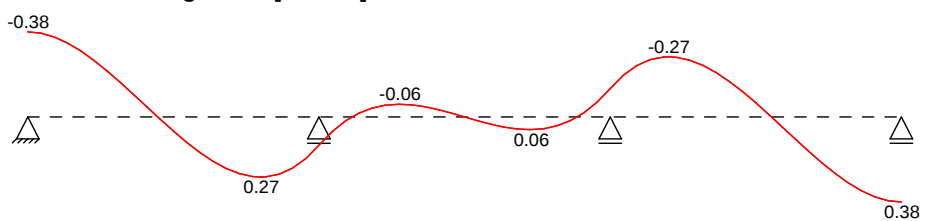
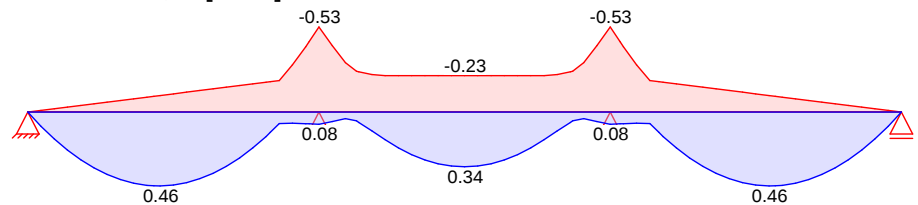
|   |          | a    | s    | $q_{li}$ | $q_{re}$ | e    |
|---|----------|------|------|----------|----------|------|
|   |          | [m]  | [m]  | [kN/m]   | [kN/m]   | [cm] |
| 1 | Eigengew | 0.00 | 2.13 |          | 0.04     | -0.4 |
| 2 | Eigengew | 0.00 | 2.13 |          | 0.04     | -0.4 |
| 3 | Eigengew | 0.00 | 2.13 |          | 0.04     | -0.4 |
| 1 | p+s      | 0.00 | 6.39 |          | 1.00     | 0.0  |
| 1 | p+s      | 0.00 | 6.39 |          | 0.13     | 0.0  |

Char. Schnittgrößen

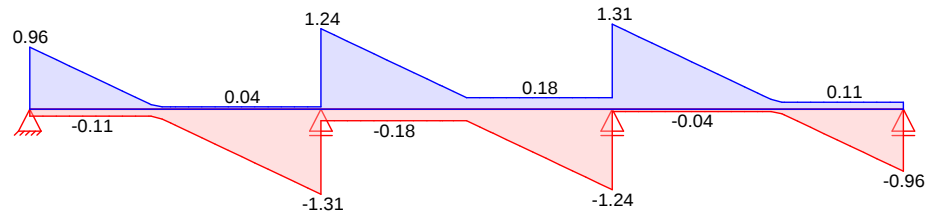
charakteristische Schnittgrößen und Verformungen

Grafik

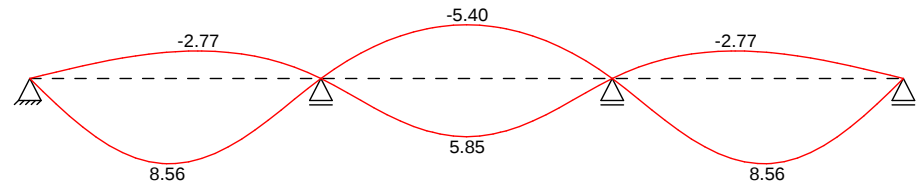
Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$ Moment  $M_{y,k}$  [kNm]Querkraft  $V_{z,k}$  [kN]Verschiebung  $w_{z,k}$  [mm]Verdrehung  $\varphi_x$  [mrad]Verdrehung  $\varphi_y$  [mrad]Einw.  $Q_{k,N}$ Moment  $M_{y,k}$  [kNm]

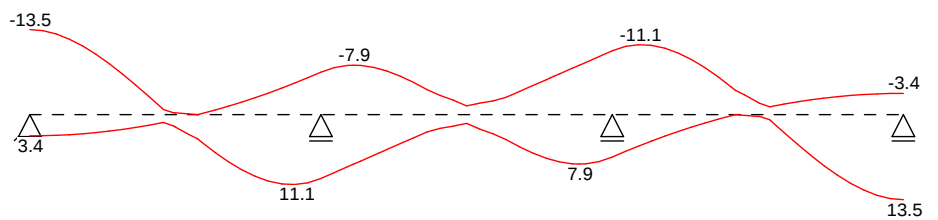
### Querkraft $V_{z,k}$ [kN]



### Verschiebung $w_{z,k}$ [mm]

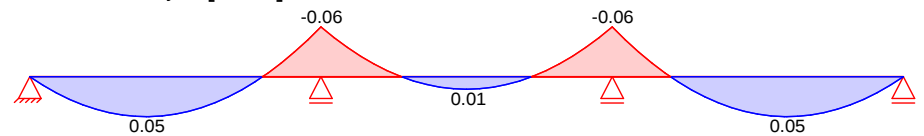


### Verdrehung $\varphi_y$ [mrad]

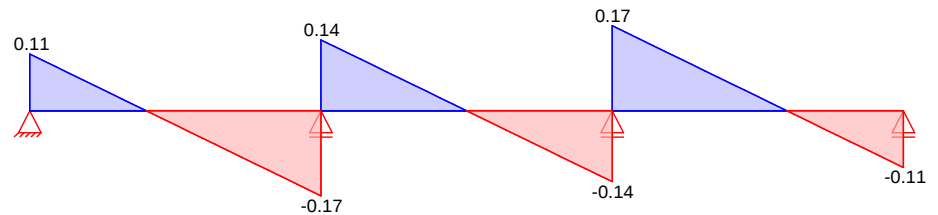


Einw.  $Q_{k,S}$

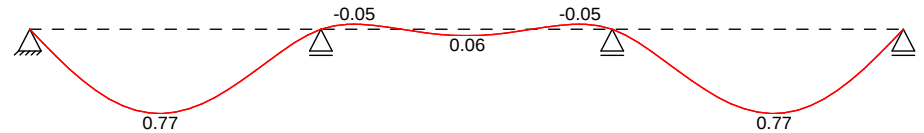
### Moment $M_{y,k}$ [kNm]



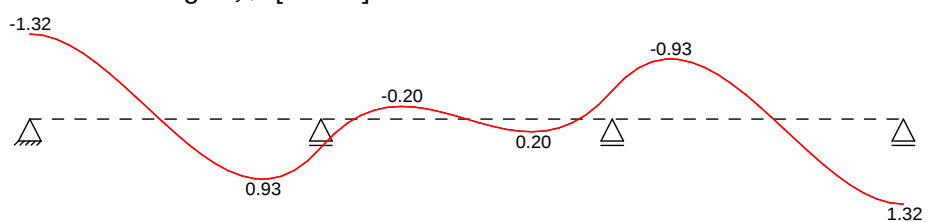
### Querkraft $V_{z,k}$ [kN]

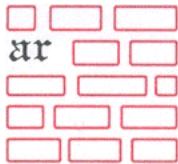


### Verschiebung $w_{z,k}$ [mm]



### Verdrehung $\varphi_y$ [mrad]





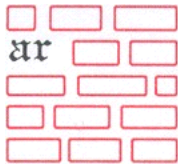
## Tabelle

## Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.03                  | 0.03                  |
|                 |      | 0.85     | 0.01                   | 0.01*                  | 0.00                  | 0.00                  |
|                 |      | 2.13     | -0.02*                 | -0.02                  | -0.05*                | -0.05                 |
|                 | 2    | 0.00     | -0.02                  | -0.02                  | 0.04                  | 0.04                  |
|                 |      | 2.13     | -0.02                  | -0.02                  | -0.04                 | -0.04                 |
|                 | 3    | 0.00     | -0.02                  | -0.02                  | 0.05                  | 0.05*                 |
| Einw. $Q_{k,N}$ | 1    | 2.13     | 0.00                   | 0.00                   | -0.03                 | -0.03                 |
|                 |      | 0.00     | 0.00                   | 0.00                   | -0.11                 | 0.96                  |
|                 |      | 0.97     | -0.10                  | 0.46*                  | -0.15                 | 0.04                  |
|                 | 2    | 2.13     | -0.53*                 | 0.08                   | -1.31*                | 0.04                  |
|                 |      | 0.00     | -0.53                  | 0.08                   | -0.18                 | 1.24                  |
|                 | 3    | 2.13     | -0.53                  | 0.08                   | -1.24                 | 0.18                  |
| Einw. $Q_{k,S}$ | 1    | 0.00     | -0.53                  | 0.08                   | -0.04                 | 1.31*                 |
|                 |      | 2.13     | 0.00                   | 0.00                   | -0.96                 | 0.11                  |
|                 |      | 0.00     | 0.00                   | 0.00                   | 0.11                  | 0.11                  |
|                 | 2    | 0.85     | 0.05                   | 0.05*                  | 0.00                  | 0.00                  |
|                 |      | 2.13     | -0.06*                 | -0.06                  | -0.17*                | -0.17                 |
|                 | 3    | 0.00     | -0.06                  | -0.06                  | 0.14                  | 0.14                  |
|                 | 2    | 2.13     | -0.06                  | -0.06                  | -0.14                 | -0.14                 |
|                 |      | 0.00     | -0.06                  | -0.06                  | 0.17                  | 0.17*                 |
|                 | 3    | 2.13     | 0.00                   | 0.00                   | -0.11                 | -0.11                 |
|                 |      | 0.00     | 0.00                   | 0.00                   | 0.17                  | 0.17*                 |
|                 |      | 2.13     | 0.00                   | 0.00                   | -0.11                 | -0.11                 |
|                 |      | 0.00     | 0.00                   | 0.00                   | 0.17                  | 0.17*                 |

## Verformungen (je Einwirkung)

|                 | Feld | x<br>[m] | $W_{z,k,min}$<br>[mm] | $y_{k,min}$<br>[mm] | $x_{k,min}$<br>[mm] |
|-----------------|------|----------|-----------------------|---------------------|---------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                  | -0.38*              | 0.00                |
|                 |      | 0.95     | 0.00                  | -0.38               | 0.00                |
|                 |      | 2.13     | 0.22                  | 0.00                | 0.00                |
|                 |      | 0.00     | 0.22*                 | 0.00                | 0.00                |
|                 |      | 2.13     | 0.00                  | 0.13                | 0.00                |
|                 |      | 0.00     | 0.00                  | 0.13                | 0.00                |
|                 | 2    | 0.00     | 0.00                  | 0.13                | 0.00                |
|                 |      | 0.24     | 0.00                  | 0.13                | 0.00                |
|                 |      | 1.07     | -0.01*                | 0.00                | 0.00                |
|                 |      | 2.13     | -0.01                 | 0.00                | 0.00                |
|                 |      | 0.00     | 0.02                  | 0.00                | 0.00                |
|                 |      | 2.13     | 0.02                  | 0.00                | 0.00                |
| Einw. $Q_{k,N}$ | 3    | 2.13     | 0.00                  | -0.13               | 0.00                |
|                 |      | 0.00     | 0.00                  | -0.13               | 0.00                |
|                 |      | 2.13     | 0.00                  | -0.13               | 0.00                |
|                 |      | 0.00     | 0.00                  | -0.13               | 0.00                |
|                 |      | 2.13     | 0.00                  | 0.38                | 0.00                |
|                 |      | 0.00     | 0.00                  | 0.38*               | 0.00                |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                  | -13.52*             | 0.00                |
|                 |      | 2.13     | 0.00                  | 3.38                | 0.00                |
|                 |      | 0.00     | 0.00                  | -6.76               | 0.00                |
|                 |      | 2.13     | 0.00                  | 10.14               | 0.00                |
|                 |      | 0.00     | 0.00                  | -6.76               | 0.00                |
|                 |      | 2.13     | 0.00                  | 10.14               | 0.00                |
|                 | 2    | 1.07     | -5.40*                | -1.41               | 0.00                |
|                 |      | 2.13     | 5.85                  | 1.41                | 0.00                |
|                 |      | 0.00     | 0.00                  | -10.14              | 0.00                |
|                 |      | 2.13     | 0.00                  | 6.76                | 0.00                |
|                 |      | 0.00     | 0.00                  | -10.14              | 0.00                |
|                 |      | 2.13     | 0.00                  | 6.76                | 0.00                |
| 3               |      | 0.00     | 0.00                  | -10.14              | 0.00                |
|                 |      | 1.13     | 0.00                  | 6.76                | 0.00                |
|                 |      | 2.13     | -2.63                 | -1.42               | 0.00                |
|                 |      | 0.00     | 8.56*                 | 0.66                | 0.00                |
|                 |      | 2.13     | 0.00                  | 0.66                | 0.00                |
|                 |      | 0.00     | 0.00                  | 0.66                | 0.00                |



|                 |   |      |        |        |      |
|-----------------|---|------|--------|--------|------|
| Einw. $Q_{k,S}$ | 1 | 2.13 | 0.00   | -3.38  | 0.00 |
|                 |   |      | 0.00   | 13.52* | 0.00 |
|                 |   | 0.00 | 0.00   | -1.32* | 0.00 |
|                 | 2 |      | 0.00   | -1.32  | 0.00 |
|                 |   | 0.95 | 0.77   | 0.00   | 0.00 |
|                 |   |      | 0.77*  | 0.00   | 0.00 |
|                 | 3 | 2.13 | 0.00   | 0.44   | 0.00 |
|                 |   |      | 0.00   | 0.44   | 0.00 |
|                 |   | 0.00 | 0.00   | 0.44   | 0.00 |
|                 |   |      | 0.00   | 0.44   | 0.00 |
|                 |   | 0.24 | -0.05* | 0.01   | 0.00 |
|                 |   |      | -0.05  | 0.01   | 0.00 |

## Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |            |            |
|-------------------|----|------|------------|------------|------------|
| ständig/vorüberg. | 47 | 4    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
|                   |    |      |            | (1,2)      |            |
|                   | 48 | 5    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
|                   |    |      |            | (1,2)      |            |
| quasi-ständig     | 53 | 6    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
|                   |    |      |            | (2,3)      |            |
|                   | 55 | 8    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
|                   |    |      |            | (2)        |            |
|                   | 22 |      | 1.00*Gk    | +0.80*Qk.N |            |
|                   |    |      |            | (1,3)      |            |
|                   | 23 |      | 1.00*Gk    | +0.80*Qk.N |            |
|                   |    |      |            | (2)        |            |

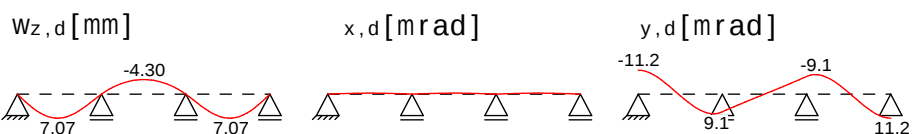
## Bem.-verformungen

Bemessungsverformungen

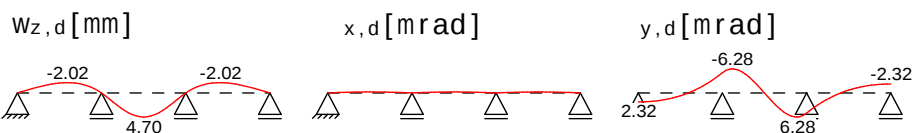
## Grafik

Verformungen (je Kombination)

### Komb. 22



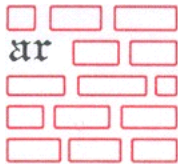
### Komb. 23



## Tabelle

Verformungen (je Kombination)

|          | Feld | x    | Wz,d   | y,d     | x,d    |
|----------|------|------|--------|---------|--------|
|          |      | [m]  | [mm]   | [mrad]  | [mrad] |
| Komb. 22 | 1    | 0.00 | 0.00   | -11.20* | 0.00   |
|          |      | 2.13 | 0.00   | 8.24    | 0.00   |
|          | 2    | 0.00 | 0.00   | 8.24    | 0.00   |
|          |      | 1.07 | -4.30* | 0.00    | 0.00   |
|          |      | 2.13 | 0.00   | -8.24   | 0.00   |
|          | 3    | 0.00 | 0.00   | -8.24   | 0.00   |
|          |      | 1.13 | 7.07*  | 0.28    | 0.00   |



Komb. 23

|   |      |        |        |      |
|---|------|--------|--------|------|
| 1 | 2.13 | 0.00   | 11.20* | 0.00 |
|   | 0.00 | 0.00   | 2.32   | 0.00 |
| 2 | 1.26 | -2.02* | 0.03   | 0.00 |
|   | 2.13 | 0.00   | -5.28  | 0.00 |
|   | 0.00 | 0.00   | -5.28  | 0.00 |
|   | 0.24 | 1.43   | -6.28* | 0.00 |
|   | 1.07 | 4.70*  | 0.00   | 0.00 |
| 3 | 1.89 | 1.43   | 6.28*  | 0.00 |
|   | 2.13 | 0.00   | 5.28   | 0.00 |
|   | 0.00 | 0.00   | 5.28   | 0.00 |
|   | 2.13 | 0.00   | -2.32  | 0.00 |

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

Material

|                     | $t_{\text{Max}}$<br>[mm] | $f_o$<br>[N/mm <sup>2</sup> ] | E<br>[N/mm <sup>2</sup> ] | BC |
|---------------------|--------------------------|-------------------------------|---------------------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                           | 70000                     | A  |
|                     | 25 <sup>b</sup>          | 180                           | 70000                     | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

| QS | Profil        | A<br>[cm <sup>2</sup> ] | $S_y$<br>$S_z$<br>[cm <sup>3</sup> ] | $I_y$<br>$I_z$<br>[cm <sup>4</sup> ] | $W_y$<br>$W_z$<br>[cm <sup>3</sup> ] |
|----|---------------|-------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 1  | AVADIELE40 40 | 13.9                    | 10.2<br>41.6                         | 35.2<br>647.4                        | 17.2<br>51.0                         |

Hauptachsen

| QS | Profil        | $\epsilon$<br>[°] | $I_{yz}$<br>[cm <sup>4</sup> ] | $I_b$<br>[cm <sup>4</sup> ] | $I_b$<br>[cm <sup>4</sup> ] |
|----|---------------|-------------------|--------------------------------|-----------------------------|-----------------------------|
| 1  | AVADIELE40 40 | 87.42             | -27.6                          | 648.7                       | 34.0                        |

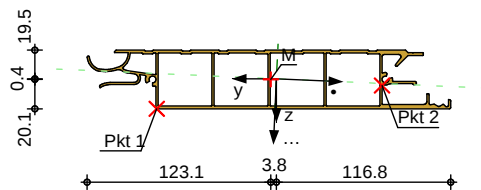
Torsion

| QS | Profil        | $I_t$<br>[cm <sup>4</sup> ] | $I_n$<br>[cm <sup>6</sup> ] |
|----|---------------|-----------------------------|-----------------------------|
| 1  | AVADIELE40 40 | 73.1                        | 0.0                         |

Grafik

Querschnittsgrafik [mm]

M 1:5

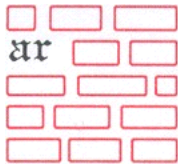


Auflagerkräfte

Charakteristische Auflagerkräfte (global)

Char. Auflagerkr.

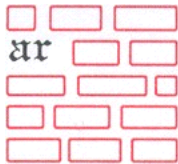
| Einw.      | Aufl. | $M_{x,k,min}$<br>$M_{x,k,max}$<br>[kNm] | $F_{z,k,min}$<br>$F_{z,k,max}$<br>[kN] | $F_{y,k,min}$<br>$F_{y,k,max}$<br>[kN] |
|------------|-------|-----------------------------------------|----------------------------------------|----------------------------------------|
|            |       |                                         |                                        |                                        |
| Einw. Gk   | A     | 0.00                                    | 0.03                                   | 0.00                                   |
|            |       | 0.00                                    | 0.03                                   | 0.00                                   |
|            | B     | 0.00                                    | 0.09                                   | 0.00                                   |
|            |       | 0.00                                    | 0.09                                   | 0.00                                   |
|            | C     | 0.00                                    | 0.09                                   | 0.00                                   |
|            |       | 0.00                                    | 0.09                                   | 0.00                                   |
| Einw. Qk.N | D     | 0.00                                    | 0.03                                   | 0.00                                   |
|            |       | 0.00                                    | 0.03                                   | 0.00                                   |
|            | A     | 0.00                                    | -0.11                                  | 0.00                                   |
|            |       | 0.00                                    | 0.96                                   | 0.00                                   |
|            | B     | 0.00                                    | -0.21                                  | 0.00                                   |



|            |   |      |       |      |
|------------|---|------|-------|------|
|            |   | 0.00 | 2.56  | 0.00 |
|            | C | 0.00 | -0.21 | 0.00 |
|            |   | 0.00 | 2.56  | 0.00 |
|            | D | 0.00 | -0.11 | 0.00 |
|            |   | 0.00 | 0.96  | 0.00 |
| Einw. Qk.S | A | 0.00 | 0.11  | 0.00 |
|            |   | 0.00 | 0.11  | 0.00 |
|            | B | 0.00 | 0.30  | 0.00 |
|            |   | 0.00 | 0.30  | 0.00 |
|            | C | 0.00 | 0.30  | 0.00 |
|            |   | 0.00 | 0.30  | 0.00 |
|            | D | 0.00 | 0.11  | 0.00 |
|            |   | 0.00 | 0.11  | 0.00 |

|                 |                                                   |    |             |
|-----------------|---------------------------------------------------|----|-------------|
| Zusammenfassung | Zusammenfassung der Nachweise                     |    |             |
| Nachweise (GZT) | Nachweise im Grenzzustand der Tragfähigkeit       |    |             |
|                 | Nachweis                                          |    | Hb<br>[ - ] |
|                 | Nachweis E-E                                      | OK | 0.39        |
| Nachweise (GZG) | Nachweise im Grenzzust. der Gebrauchstauglichkeit |    |             |
|                 | Nachweis                                          |    | Hb<br>[ - ] |
|                 | Verformung                                        | OK | 1.00        |

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



## Pos. AL1-5-3-Feld-200 Bpr (Verkehrslastansatz, 5.0 kN/m<sup>2</sup>)

Die Verkehrslast 5,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:200



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1-3  | 2.45     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-3  | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

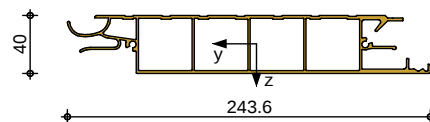
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub><br>bzw. | Gabel l. Wölbeh. |
|-------|----------|----------------------------|--------------------------|-------------------------------|--------------------------|------------------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei                     | fest             |
| B     | 2.45     | fest                       | frei                     | fest                          | frei                     | fest             |
| C     | 4.90     | fest                       | frei                     | fest                          | frei                     | fest             |
| D     | 7.35     | fest                       | frei                     | fest                          | frei                     | fest             |

| Lager      | b<br>[cm] |
|------------|-----------|
| A, B, C, D | 8.0       |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

Belastungen auf das System

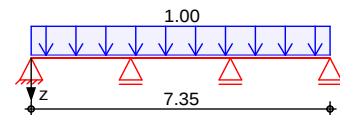
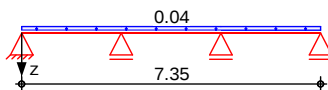
Grafik

Belastungsgrafiken (einwirkungsbezogen)

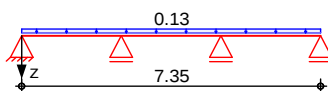
Einwirkungen

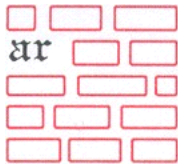
G<sub>k</sub>

Q<sub>k,N</sub>



Q<sub>k,S</sub>





Streckenlasten  
in z-Richtung

Einw.  $G_k$

Einw.  $Q_{k,N}$

Einw.  $Q_{k,S}$

Gleichlasten  
Feld Komm.

|   |          | a<br>[m] | s<br>[m] | $q_{li}$<br>[kN/m] | $q_{re}$<br>[kN/m] | e<br>[cm] |
|---|----------|----------|----------|--------------------|--------------------|-----------|
| 1 | Eigengew | 0.00     | 2.45     |                    | 0.04               | -0.4      |
| 2 | Eigengew | 0.00     | 2.45     |                    | 0.04               | -0.4      |
| 3 | Eigengew | 0.00     | 2.45     |                    | 0.04               | -0.4      |
| 1 | p+s      | 0.00     | 7.35     |                    | 1.00               | 0.0       |
| 1 | p+s      | 0.00     | 7.35     |                    | 0.13               | 0.0       |

Char. Schnittgrößen

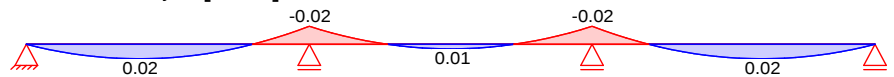
charakteristische Schnittgrößen und Verformungen

Grafik

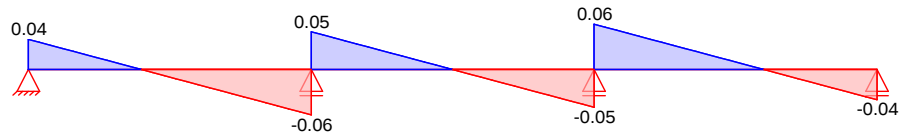
Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$

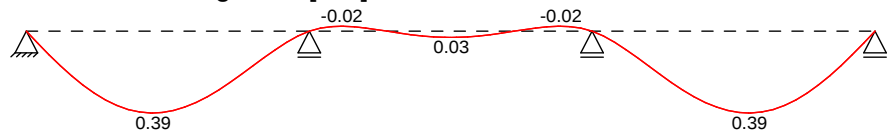
Moment  $M_{y,k}$  [kNm]



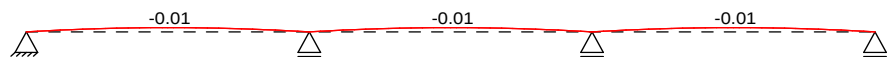
Querkraft  $V_{z,k}$  [kN]



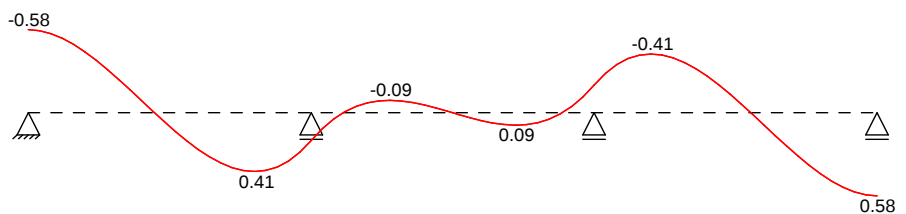
Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\alpha_x$  [mrad]

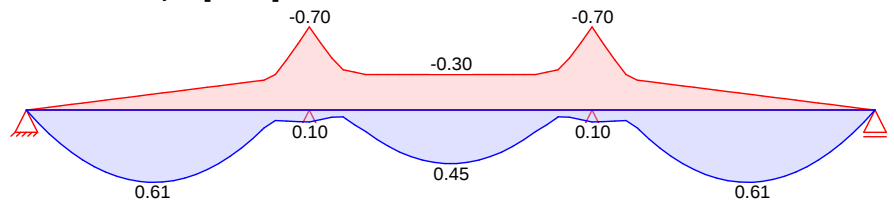


Verdrehung  $\alpha_y$  [mrad]

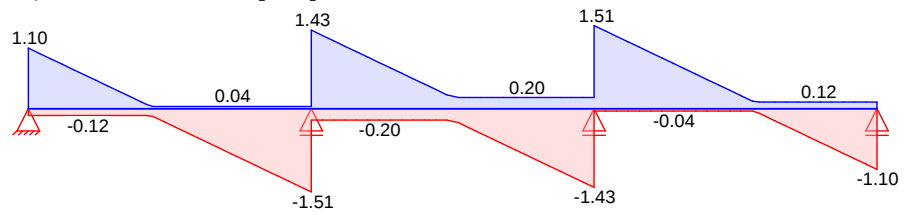


Einw.  $Q_{k,N}$

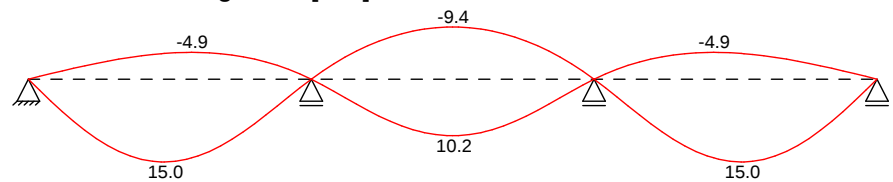
Moment  $M_{y,k}$  [kNm]



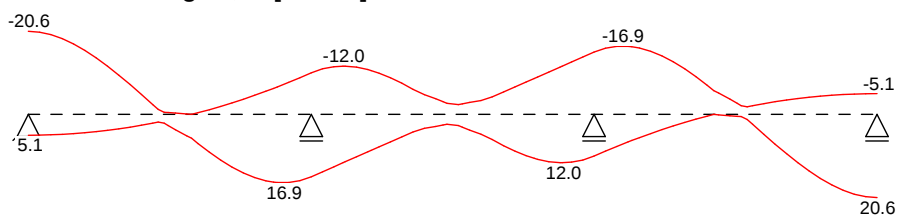
### Querkraft $V_{z,k}$ [kN]



### Verschiebung $w_{z,k}$ [mm]

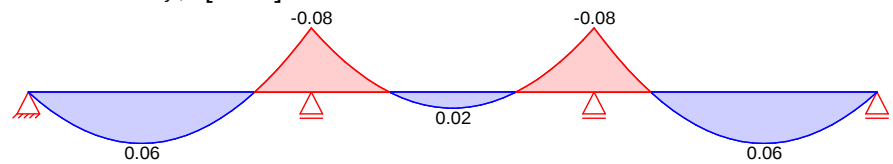


### Verdrehung $\varphi_y$ [mrad]

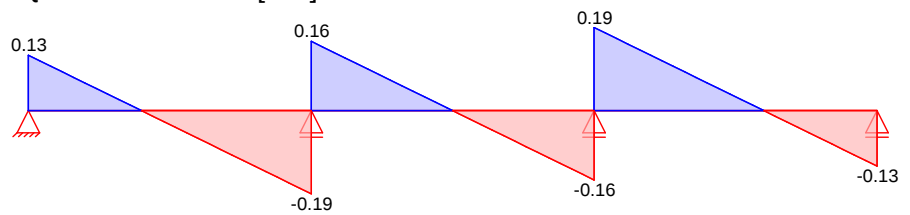


Einw.  $Q_{k,S}$

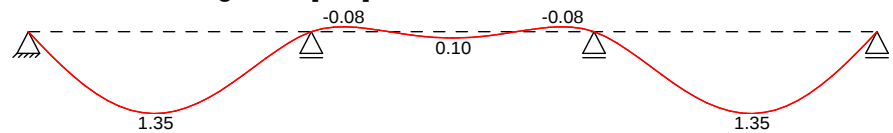
### Moment $M_{y,k}$ [kNm]



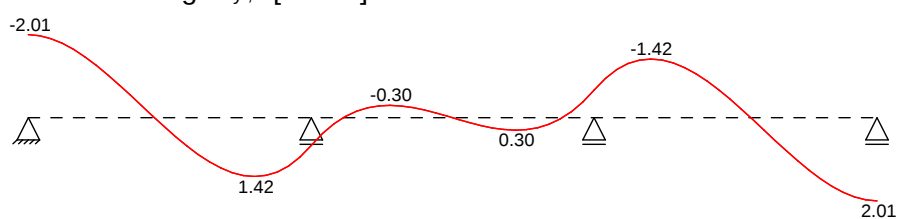
### Querkraft $V_{z,k}$ [kN]

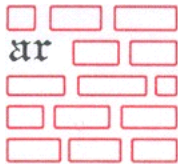


### Verschiebung $w_{z,k}$ [mm]



### Verdrehung $\varphi_y$ [mrad]





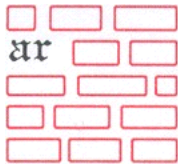
## Tabelle

## Schnittgrößen (je Einwirkung)

|                 | Feld | x<br>[m] | $M_{y,k,min}$<br>[kNm] | $M_{y,k,max}$<br>[kNm] | $V_{z,k,min}$<br>[kN] | $V_{z,k,max}$<br>[kN] |
|-----------------|------|----------|------------------------|------------------------|-----------------------|-----------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                   | 0.00                   | 0.04                  | 0.04                  |
|                 |      | 0.98     | 0.02                   | 0.02*                  | 0.00                  | 0.00                  |
|                 |      | 2.45     | -0.02*                 | -0.02                  | -0.06*                | -0.06                 |
|                 | 2    | 0.00     | -0.02                  | -0.02                  | 0.05                  | 0.05                  |
|                 |      | 2.45     | -0.02                  | -0.02                  | -0.05                 | -0.05                 |
|                 | 3    | 0.00     | -0.02                  | -0.02                  | 0.06                  | 0.06*                 |
|                 |      | 2.45     | 0.00                   | 0.00                   | -0.04                 | -0.04                 |
| Einw. $Q_{k,N}$ | 1    | 0.00     | 0.00                   | 0.00                   | -0.12                 | 1.10                  |
|                 |      | 1.08     | -0.13                  | 0.61*                  | -0.14                 | 0.04                  |
|                 |      | 2.45     | -0.70*                 | 0.10                   | -1.51*                | 0.04                  |
|                 | 2    | 0.00     | -0.70                  | 0.10                   | -0.20                 | 1.43                  |
|                 |      | 2.45     | -0.70                  | 0.10                   | -1.43                 | 0.20                  |
|                 | 3    | 0.00     | -0.70                  | 0.10                   | -0.04                 | 1.51*                 |
|                 |      | 2.45     | 0.00                   | 0.00                   | -1.10                 | 0.12                  |
| Einw. $Q_{k,S}$ | 1    | 0.00     | 0.00                   | 0.00                   | 0.13                  | 0.13                  |
|                 |      | 0.98     | 0.06                   | 0.06*                  | 0.00                  | 0.00                  |
|                 |      | 2.45     | -0.08*                 | -0.08                  | -0.19*                | -0.19                 |
|                 | 2    | 0.00     | -0.08                  | -0.08                  | 0.16                  | 0.16                  |
|                 |      | 2.45     | -0.08                  | -0.08                  | -0.16                 | -0.16                 |
|                 | 3    | 0.00     | -0.08                  | -0.08                  | 0.19                  | 0.19*                 |
|                 |      | 2.45     | 0.00                   | 0.00                   | -0.13                 | -0.13                 |

## Verformungen (je Einwirkung)

|                 | Feld | x<br>[m] | $W_z,k,min$<br>[mm] | $y,k,min$<br>[mm] | $x,k,min$<br>[mm] |
|-----------------|------|----------|---------------------|-------------------|-------------------|
| Einw. $G_k$     | 1    | 0.00     | 0.00                | -0.58*            | 0.00              |
|                 |      |          | 0.00                | -0.58             | 0.00              |
|                 |      | 1.09     | 0.39                | 0.00              | -0.01             |
|                 |      |          | 0.39*               | 0.00              | -0.01             |
|                 |      | 2.45     | 0.00                | 0.19              | 0.00              |
|                 |      |          | 0.00                | 0.19              | 0.00              |
|                 | 2    | 0.00     | 0.00                | 0.19              | 0.00              |
|                 |      |          | 0.00                | 0.19              | 0.00              |
|                 |      | 0.28     | -0.02*              | 0.00              | 0.00              |
|                 |      |          | -0.02               | 0.00              | 0.00              |
|                 |      | 1.23     | 0.03                | 0.00              | -0.01*            |
|                 |      |          | 0.03                | 0.00              | -0.01             |
|                 | 3    | 2.45     | 0.00                | -0.19             | 0.00              |
|                 |      |          | 0.00                | -0.19             | 0.00              |
|                 |      | 0.00     | 0.00                | -0.19             | 0.00              |
| Einw. $Q_{k,N}$ | 1    | 2.45     | 0.00                | 0.58              | 0.00              |
|                 |      |          | 0.00                | 0.58*             | 0.00              |
|                 |      | 0.00     | 0.00                | -20.58*           | 0.00              |
|                 |      |          | 0.00                | 5.14              | 0.00              |
|                 |      | 1.18     | -4.66               | -0.53             | 0.00              |
|                 |      |          | 15.00*              | 2.16              | 0.00              |
|                 | 2    | 2.45     | 0.00                | -10.29            | 0.00              |
|                 |      |          | 0.00                | 15.43             | 0.00              |
|                 |      | 0.00     | 0.00                | -10.29            | 0.00              |
|                 |      |          | 0.00                | 15.43             | 0.00              |
|                 |      | 1.27     | -9.44*              | -2.44             | 0.00              |
|                 |      |          | 10.22               | 2.75              | 0.00              |
|                 | 3    | 2.45     | 0.00                | -15.43            | 0.00              |
|                 |      |          | 0.00                | 10.29             | 0.00              |
|                 |      | 0.00     | 0.00                | -15.43            | 0.00              |
|                 |      |          | 0.00                | 10.29             | 0.00              |



|                 |   |      |        |        |      |
|-----------------|---|------|--------|--------|------|
| Einw. $Q_{k.S}$ | 1 | 2.45 | 0.00   | -5.14  | 0.00 |
|                 |   |      | 0.00   | 20.58* | 0.00 |
|                 |   | 0.00 | 0.00   | -2.01* | 0.00 |
|                 | 2 |      | 0.00   | -2.01  | 0.00 |
|                 |   | 1.09 | 1.35   | 0.00   | 0.00 |
|                 |   |      | 1.35*  | 0.00   | 0.00 |
|                 | 3 | 2.45 | 0.00   | 0.67   | 0.00 |
|                 |   |      | 0.00   | 0.67   | 0.00 |
|                 |   | 0.00 | 0.00   | 0.67   | 0.00 |
|                 |   |      | 0.00   | 0.67   | 0.00 |
|                 |   | 0.28 | -0.08* | 0.00   | 0.00 |
|                 |   |      | -0.08  | 0.00   | 0.00 |
|                 |   | 2.45 | 0.00   | -0.67  | 0.00 |
|                 |   |      | 0.00   | -0.67  | 0.00 |
|                 |   | 0.00 | 0.00   | -0.67  | 0.00 |
|                 |   |      | 0.00   | -0.67  | 0.00 |
|                 |   | 2.45 | 0.00   | 2.01   | 0.00 |
|                 |   |      | 0.00   | 2.01*  | 0.00 |

## Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u     | (I*K*EW)               |
|-------------------|----|------|-------|------------------------|
| ständig/vorüberg. | 47 | 4    | 1.35* | Gk                     |
|                   |    |      |       | +1.50*Q <sub>k.N</sub> |
|                   |    |      |       | (1,2)                  |
|                   |    |      |       | +1.50*Q <sub>k.S</sub> |
| quasi-ständig     | 48 | 5    | 1.35* | Gk                     |
|                   |    |      |       | +1.50*Q <sub>k.N</sub> |
|                   |    |      |       | (1,2)                  |
|                   |    |      |       | +1.50*Q <sub>k.S</sub> |
|                   | 53 | 6    | 1.35* | Gk                     |
|                   |    |      |       | +1.50*Q <sub>k.N</sub> |
|                   |    |      |       | (2,3)                  |
|                   |    |      |       | +1.50*Q <sub>k.S</sub> |
|                   | 55 | 8    | 1.35* | Gk                     |
|                   |    |      |       | +1.50*Q <sub>k.N</sub> |
|                   |    |      |       | (2)                    |
|                   |    |      |       | +0.80*Q <sub>k.N</sub> |
|                   | 22 |      | 1.00* | Gk                     |
|                   |    |      |       | (1,3)                  |
|                   | 23 |      | 1.00* | Gk                     |
|                   |    |      |       | (2)                    |

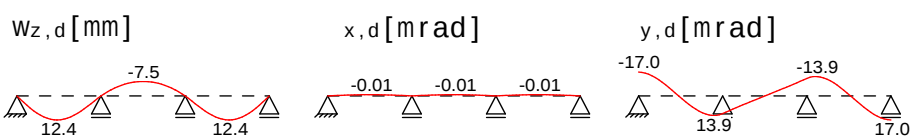
## Bem.-verformungen

Bemessungsverformungen

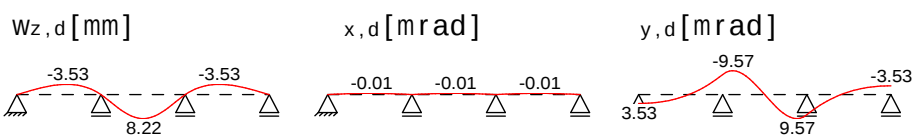
## Grafik

Verformungen (je Kombination)

### Komb. 22



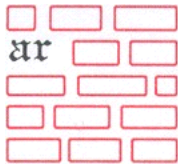
### Komb. 23



## Tabelle

Verformungen (je Kombination)

|          | Feld | x    | Wz,d   | y,d     | x,d    |
|----------|------|------|--------|---------|--------|
|          |      | [m]  | [mm]   | [mrad]  | [mrad] |
| Komb. 22 | 1    | 0.00 | 0.00   | -17.04* | 0.00   |
|          |      | 1.18 | 12.39* | 0.10    | -0.01  |
|          |      | 2.45 | 0.00   | 12.54   | 0.00   |
|          | 2    | 0.00 | 0.00   | 12.54   | 0.00   |
|          |      | 1.23 | -7.52  | 0.00    | -0.01* |
|          |      | 1.27 | -7.52* | -0.48   | -0.01  |
|          |      | 2.45 | 0.00   | -12.54  | 0.00   |



PROJEKT 19259-1a AVA Diele 40

PROJ.-NR.

19259\_1a

POSITION AL1-5-3-Feld-200 Alu Bpr (Verkehrslastansatz, 5.0 kN/m²)

10.07.2019

Komb. 23

|   |      |        |        |        |
|---|------|--------|--------|--------|
| 3 | 0.00 | 0.00   | -12.54 | 0.00   |
|   | 2.45 | 0.00   | 17.04* | 0.00   |
| 1 | 0.00 | 0.00   | 3.53   | 0.00   |
|   | 1.47 | -3.53* | -0.07  | -0.01  |
|   | 2.45 | 0.00   | -8.04  | 0.00   |
| 2 | 0.00 | 0.00   | -8.04  | 0.00   |
|   | 0.29 | 2.67   | -9.57* | 0.00   |
|   | 1.23 | 8.22*  | 0.00   | -0.01* |
|   | 2.16 | 2.67   | 9.57*  | 0.00   |
|   | 2.45 | 0.00   | 8.04   | 0.00   |
| 3 | 0.00 | 0.00   | 8.04   | 0.00   |
|   | 2.45 | 0.00   | -3.53  | 0.00   |

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

Material

|                     | $t_{\text{Max}}$<br>[mm] | $f_o$<br>[N/mm²] | E<br>[N/mm²] | BC |
|---------------------|--------------------------|------------------|--------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200              | 70000        | A  |
|                     | 25 <sup>b</sup>          | 180              | 70000        | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

| QS | Profil        | A     | $S_y$<br>$S_z$ | $I_y$<br>$I_z$ | $W_y$<br>$W_z$ |
|----|---------------|-------|----------------|----------------|----------------|
|    |               | [cm²] | [cm³]          | [cm⁴]          | [cm³]          |
| 1  | AVADIELE40 40 | 13.9  | 10.2<br>41.6   | 35.2<br>647.4  | 17.2<br>51.0   |

Hauptachsen

| QS | Profil        | $\epsilon$ | $I_{yz}$ | $I_b$ | $I_b$ |
|----|---------------|------------|----------|-------|-------|
|    |               | [°]        | [cm⁴]    | [cm⁴] | [cm⁴] |
| 1  | AVADIELE40 40 | 87.42      | -27.6    | 648.7 | 34.0  |

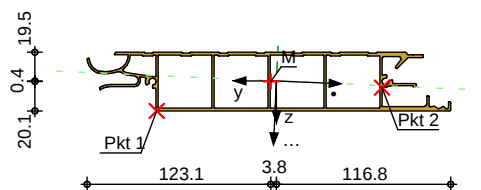
Torsion

| QS | Profil        | $I_t$ | $I_n$ |
|----|---------------|-------|-------|
|    |               | [cm⁴] | [cm⁶] |
| 1  | AVADIELE40 40 | 73.1  | 0.0   |

Grafik

Querschnittsgrafik [mm]

M 1:5

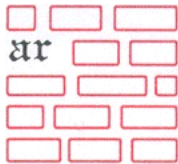


Auflagerkräfte

Charakteristische Auflagerkräfte (global)

Char. Auflagerkr.

|            | Aufl. | $M_{x,k,min}$<br>$M_{x,k,max}$<br>[kNm] | $F_{z,k,min}$<br>$F_{z,k,max}$<br>[kN] | $F_{y,k,min}$<br>$F_{y,k,max}$<br>[kN] |
|------------|-------|-----------------------------------------|----------------------------------------|----------------------------------------|
| Einw. Gk   | A     | 0.00                                    | 0.04                                   | 0.00                                   |
|            |       | 0.00                                    | 0.04                                   | 0.00                                   |
|            | B     | 0.00                                    | 0.10                                   | 0.00                                   |
|            |       | 0.00                                    | 0.10                                   | 0.00                                   |
|            | C     | 0.00                                    | 0.10                                   | 0.00                                   |
|            |       | 0.00                                    | 0.10                                   | 0.00                                   |
|            | D     | 0.00                                    | 0.04                                   | 0.00                                   |
|            |       | 0.00                                    | 0.04                                   | 0.00                                   |
| Einw. Qk.N | A     | 0.00                                    | -0.12                                  | 0.00                                   |
|            |       | 0.00                                    | 1.10                                   | 0.00                                   |



PROJEKT **19259-1a AVA Diele 40**

PROJ.-NR.

**19259\_1a**

POSITION **AL1-5-3-Feld-200 Alu Bpr (Verkehrslastansatz, 50 kN/m²)**

**10.07.2019**

|                              |   |      |       |      |
|------------------------------|---|------|-------|------|
| Einw. <i>Q<sub>k,S</sub></i> | B | 0.00 | -0.24 | 0.00 |
|                              |   | 0.00 | 2.94  | 0.00 |
|                              | C | 0.00 | -0.24 | 0.00 |
|                              |   | 0.00 | 2.94  | 0.00 |
|                              | D | 0.00 | -0.12 | 0.00 |
|                              |   | 0.00 | 1.10  | 0.00 |
|                              | A | 0.00 | 0.13  | 0.00 |
|                              |   | 0.00 | 0.13  | 0.00 |
|                              | B | 0.00 | 0.35  | 0.00 |
|                              |   | 0.00 | 0.35  | 0.00 |
|                              | C | 0.00 | 0.35  | 0.00 |
|                              |   | 0.00 | 0.35  | 0.00 |
|                              | D | 0.00 | 0.13  | 0.00 |
|                              |   | 0.00 | 0.13  | 0.00 |

Zusammenfassung

Zusammenfassung der Nachweise

Nachweise (GZT)

Nachweise im Grenzzustand der Tragfähigkeit

Nachweis

Nachweis E-E

OK

<sup>H<sub>b</sub></sup>  
[-]  
0.51

Nachweise (GZG)

Nachweise im Grenzzust. der Gebrauchstauglichkeit

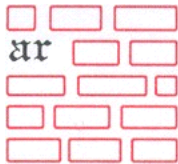
Nachweis

Verformung

OK

<sup>H<sub>b</sub></sup>  
[-]  
1.01

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



## Pos. AL1-5-4-Feld Alu Bpr (Verkehrslastansatz, 5.0 kN/m²)

Die Verkehrslast 5,0 kN/m² wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:230



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1-4  | 2.13     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-4  | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

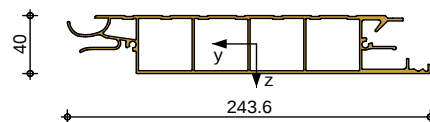
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub> | Gabel l. Wölbb. | beh. |
|-------|----------|----------------------------|--------------------------|-------------------------------|------------------|-----------------|------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei             | fest            | frei |
| B     | 2.13     | fest                       | frei                     | fest                          | frei             | fest            | frei |
| C     | 4.26     | fest                       | frei                     | fest                          | frei             | fest            | frei |
| D     | 6.39     | fest                       | frei                     | fest                          | frei             | fest            | frei |
| E     | 8.52     | fest                       | frei                     | fest                          | frei             | fest            | frei |

| Lager         | b<br>[cm] |
|---------------|-----------|
| A, B, C, D, E | 8.0       |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

Belastungen auf das System

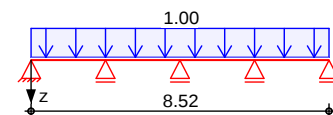
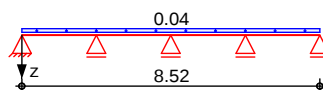
Grafik

Belastungsgrafiken (einwirkungsbezogen)

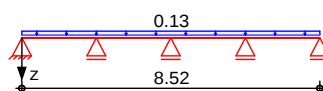
Einwirkungen

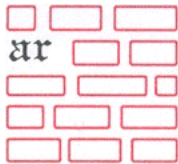
Gk

Qk.N



Qk.S



Streckenlasten  
in z-RichtungEinw.  $G_k$ Einw.  $Q_{k,N}$ Einw.  $Q_{k,S}$ Gleichlasten  
Feld Komm.

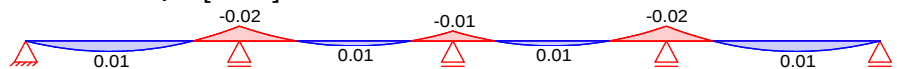
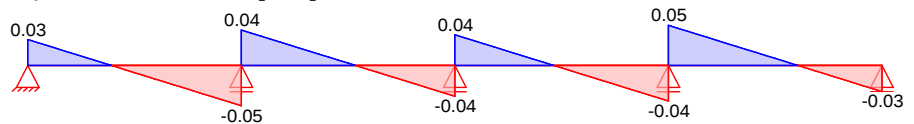
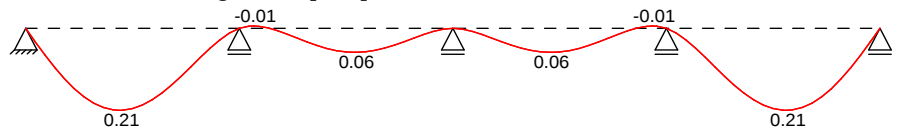
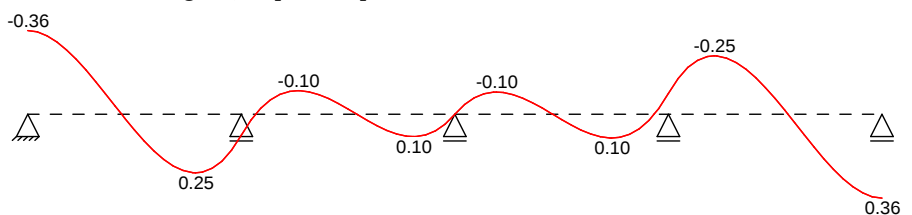
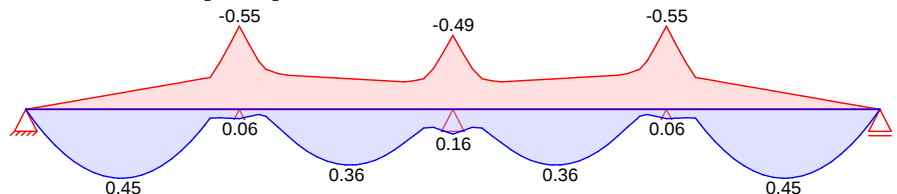
|   |          | a<br>[m] | s<br>[m] | $q_{li}$<br>[kN/m] | $q_{re}$<br>[kN/m] | e<br>[cm] |
|---|----------|----------|----------|--------------------|--------------------|-----------|
| 1 | Eigengew | 0.00     | 2.13     |                    | 0.04               | -0.4      |
| 2 | Eigengew | 0.00     | 2.13     |                    | 0.04               | -0.4      |
| 3 | Eigengew | 0.00     | 2.13     |                    | 0.04               | -0.4      |
| 4 | Eigengew | 0.00     | 2.13     |                    | 0.04               | -0.4      |
| 1 | p+s      | 0.00     | 8.52     |                    | 1.00               | 0.0       |
| 1 | p+s      | 0.00     | 8.52     |                    | 0.13               | 0.0       |

Char. Schnittgrößen

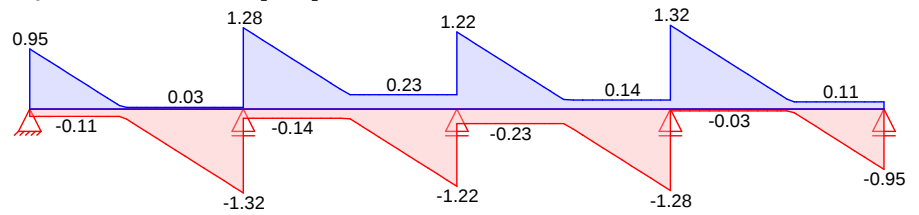
charakteristische Schnittgrößen und Verformungen

Grafik

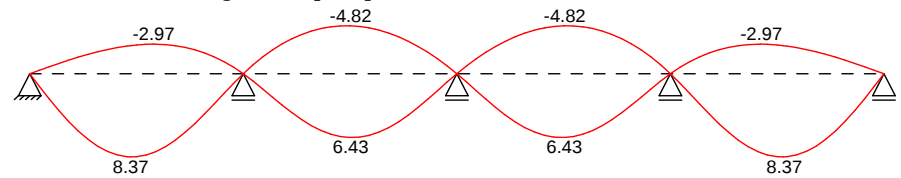
Schnittgrößen und Verformungen (je Einwirkung)

Einw.  $G_k$ Moment  $M_{y,k}$  [kNm]Querkraft  $V_{z,k}$  [kN]Verschiebung  $w_{z,k}$  [mm]Verdrehung  $\alpha_x$  [mrad]Verdrehung  $\alpha_y$  [mrad]Einw.  $Q_{k,N}$ Moment  $M_{y,k}$  [kNm]

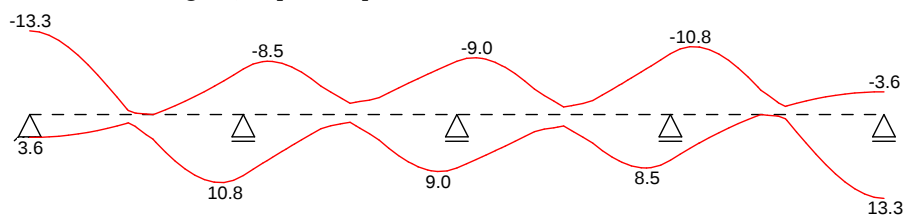
Querkraft  $V_{z,k}$  [kN]



Verschiebung  $w_{z,k}$  [mm]

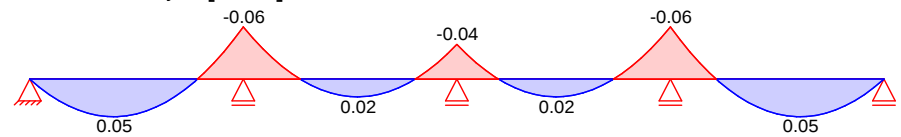


Verdrehung  $\varphi_y$  [mrad]

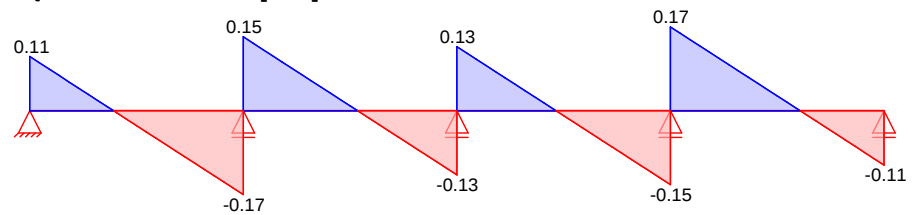


Einw.  $Q_{k,S}$

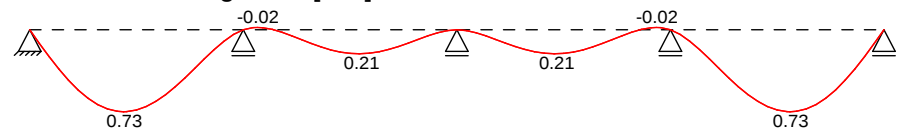
Moment  $M_{y,k}$  [kNm]



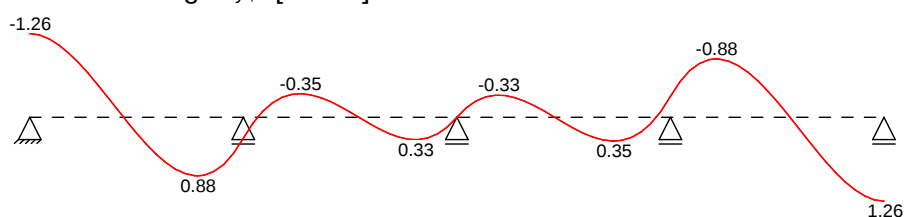
Querkraft  $V_{z,k}$  [kN]

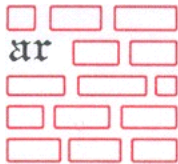


Verschiebung  $w_{z,k}$  [mm]



Verdrehung  $\varphi_y$  [mrad]





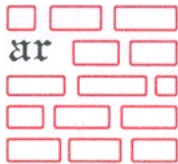
## Tabelle

## Schnittgrößen (je Einwirkung)

|            | Feld | x<br>[m] | My,k,min<br>[kNm] | My,k,max<br>[kNm] | Vz,k,min<br>[kN] | Vz,k,max<br>[kN] |
|------------|------|----------|-------------------|-------------------|------------------|------------------|
| Einw. Gk   | 1    | 0.00     | 0.00              | 0.00              | 0.03             | 0.03             |
|            |      | 0.84     | 0.01              | 0.01*             | 0.00             | 0.00             |
|            |      | 2.13     | -0.02*            | -0.02             | -0.05*           | -0.05            |
|            | 2    | 0.00     | -0.02             | -0.02             | 0.04             | 0.04             |
|            |      | 2.13     | -0.01             | -0.01             | -0.04            | -0.04            |
|            | 3    | 0.00     | -0.01             | -0.01             | 0.04             | 0.04             |
|            |      | 2.13     | -0.02             | -0.02             | -0.04            | -0.04            |
|            | 4    | 0.00     | -0.02             | -0.02             | 0.05             | 0.05*            |
|            |      | 2.13     | 0.00              | 0.00              | -0.03            | -0.03            |
| Einw. Qk.N | 1    | 0.00     | 0.00              | 0.00              | -0.11            | 0.95             |
|            |      | 0.97     | -0.11             | 0.45*             | -0.16            | 0.03             |
|            |      | 2.13     | -0.55*            | 0.06              | -1.32*           | 0.03             |
|            | 2    | 0.00     | -0.55             | 0.06              | -0.14            | 1.28             |
|            |      | 2.13     | -0.49             | 0.16              | -1.22            | 0.23             |
|            | 3    | 0.00     | -0.49             | 0.16              | -0.23            | 1.22             |
|            |      | 2.13     | -0.55             | 0.06              | -1.28            | 0.14             |
|            | 4    | 0.00     | -0.55             | 0.06              | -0.03            | 1.32*            |
|            |      | 2.13     | 0.00              | 0.00              | -0.95            | 0.11             |
| Einw. Qk.S | 1    | 0.00     | 0.00              | 0.00              | 0.11             | 0.11             |
|            |      | 0.84     | 0.05              | 0.05*             | 0.00             | 0.00             |
|            |      | 2.13     | -0.06*            | -0.06             | -0.17*           | -0.17            |
|            | 2    | 0.00     | -0.06             | -0.06             | 0.15             | 0.15             |
|            |      | 2.13     | -0.04             | -0.04             | -0.13            | -0.13            |
|            | 3    | 0.00     | -0.04             | -0.04             | 0.13             | 0.13             |
|            |      | 2.13     | -0.06             | -0.06             | -0.15            | -0.15            |
|            | 4    | 0.00     | -0.06             | -0.06             | 0.17             | 0.17*            |
|            |      | 2.13     | 0.00              | 0.00              | -0.11            | -0.11            |

## Verformungen (je Einwirkung)

|            | Feld | x<br>[m] | Wz,k,min<br>[mm] | y,k,min<br>[mm] | x,k,min<br>[mm] |
|------------|------|----------|------------------|-----------------|-----------------|
| Einw. Gk   | 1    | 0.00     | 0.00             | -0.36*          | 0.00            |
|            |      |          | 0.00             | -0.36           | 0.00            |
|            |      | 0.94     | 0.21             | 0.00            | 0.00            |
|            | 2    |          | 0.21*            | 0.00            | 0.00            |
|            |      | 2.13     | 0.00             | 0.09            | 0.00            |
|            |      |          | 0.00             | 0.09            | 0.00            |
|            | 3    | 0.00     | 0.00             | 0.09            | 0.00            |
|            |      |          | 0.00             | 0.09            | 0.00            |
|            |      | 0.14     | -0.01*           | 0.00            | 0.00            |
|            | 4    |          | -0.01            | 0.00            | 0.00            |
|            |      | 1.07     | 0.06             | -0.02           | 0.00            |
|            |      |          | 0.06             | -0.02           | 0.00            |
|            | 3    | 2.13     | 0.00             | 0.00            | 0.00            |
|            |      |          | 0.00             | 0.00            | 0.00            |
|            |      | 0.00     | 0.00             | 0.00            | 0.00            |
| Einw. Qk.N | 1    | 0.00     | 0.00             | -13.28*         | 0.00            |
|            |      |          | 0.00             | 3.62            | 0.00            |
|            |      | 2.13     | 0.00             | -7.24           | 0.00            |
|            | 2    |          | 0.00             | 9.66            | 0.00            |
|            |      |          |                  |                 |                 |
|            |      |          |                  |                 |                 |
|            | 3    |          |                  |                 |                 |
|            |      |          |                  |                 |                 |
|            |      |          |                  |                 |                 |



PROJEKT 19259-1a AVA Diele 40

PROJ.-NR.

19259\_1a

POSITION AL1-5-4-Feld Alu Bpr (Verkehrslastansatz, 50 kN/m²)

10.07.2019

|                 |   |      |        |        |      |
|-----------------|---|------|--------|--------|------|
| Einw. $Q_{k.S}$ | 2 | 0.00 | 0.00   | -7.24  | 0.00 |
|                 |   |      | 0.00   | 9.66   | 0.00 |
|                 |   | 1.07 | -4.82* | -1.81  | 0.00 |
|                 |   |      | 6.43   | 1.21   | 0.00 |
|                 |   | 2.13 | 0.00   | -8.45  | 0.00 |
|                 |   |      | 0.00   | 8.45   | 0.00 |
|                 | 3 | 0.00 | 0.00   | -8.45  | 0.00 |
|                 |   |      | 0.00   | 8.45   | 0.00 |
|                 |   | 2.13 | 0.00   | -9.66  | 0.00 |
|                 |   |      | 0.00   | 7.24   | 0.00 |
|                 | 4 | 0.00 | 0.00   | -9.66  | 0.00 |
|                 |   |      | 0.00   | 7.24   | 0.00 |
|                 |   | 1.13 | -2.82  | -1.45  | 0.00 |
|                 |   |      | 8.37*  | 0.54   | 0.00 |
|                 |   | 2.13 | 0.00   | -3.62  | 0.00 |
|                 |   |      | 0.00   | 13.28* | 0.00 |
|                 | 1 | 0.00 | 0.00   | -1.26* | 0.00 |
|                 |   |      | 0.00   | -1.26  | 0.00 |
|                 |   | 0.94 | 0.73   | 0.00   | 0.00 |
|                 |   |      | 0.73*  | 0.00   | 0.00 |
|                 |   | 2.13 | 0.00   | 0.31   | 0.00 |
|                 |   |      | 0.00   | 0.31   | 0.00 |
|                 | 2 | 0.00 | 0.00   | 0.31   | 0.00 |
|                 |   |      | 0.00   | 0.31   | 0.00 |
|                 |   | 0.14 | -0.02* | 0.01   | 0.00 |
|                 |   |      | -0.02  | 0.01   | 0.00 |
|                 |   | 2.13 | 0.00   | 0.00   | 0.00 |
|                 |   |      | 0.00   | 0.00   | 0.00 |
|                 | 3 | 0.00 | 0.00   | 0.00   | 0.00 |
|                 |   |      | 0.00   | 0.00   | 0.00 |
|                 |   | 2.13 | 0.00   | -0.31  | 0.00 |
|                 |   |      | 0.00   | -0.31  | 0.00 |
|                 | 4 | 0.00 | 0.00   | -0.31  | 0.00 |
|                 |   |      | 0.00   | -0.31  | 0.00 |
|                 |   | 2.13 | 0.00   | 1.26   | 0.00 |
|                 |   |      | 0.00   | 1.26*  | 0.00 |

Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |            |            |
|-------------------|----|------|------------|------------|------------|
| ständig/vorüberg. | 58 | 7    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
|                   |    |      |            | (1,2,4)    |            |
|                   | 59 | 8    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
|                   |    |      |            | (1,2,4)    |            |
|                   | 60 | 5    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
| quasi-ständig     | 61 | 6    | 1.35*Gk    | +1.50*Qk.N | +1.50*Qk.S |
|                   |    |      |            | (1,3,4)    |            |
|                   | 28 |      | 1.00*Gk    | +0.80*Qk.N |            |
|                   |    |      |            | (1,3)      |            |
|                   | 29 |      | 1.00*Gk    | +0.80*Qk.N |            |
|                   |    |      |            | (2,4)      |            |

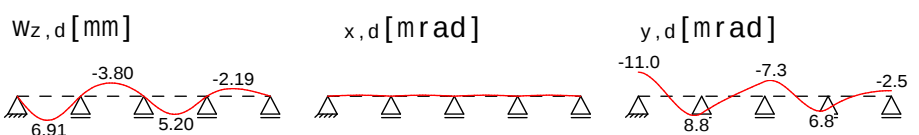
Bem. - verformungen

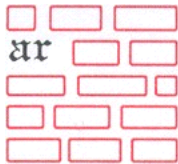
Bemessungsverformungen

Grafik

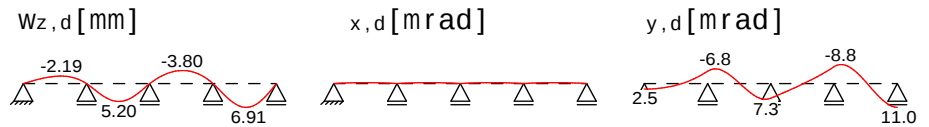
Verformungen (je Kombination)

Komb. 28





Komb. 29



Tabelle

Verformungen (je Kombination)

Komb. 28

| Feld | x<br>[m] | Wz,d<br>[mm] | y,d<br>[mrad] | x,d<br>[mrad] |
|------|----------|--------------|---------------|---------------|
| 1    | 0.00     | 0.00         | -10.99*       | 0.00          |
|      | 1.00     | 6.91*        | -0.21         | 0.00          |
|      | 1.94     | 1.63         | 8.81*         | 0.00          |
|      | 2.13     | 0.00         | 7.82          | 0.00          |
| 2    | 0.00     | 0.00         | 7.82          | 0.00          |
|      | 1.07     | -3.80*       | -0.26         | 0.00          |
|      | 2.13     | 0.00         | -6.76         | 0.00          |
| 3    | 0.00     | 0.00         | -6.76         | 0.00          |
|      | 2.13     | 0.00         | 5.70          | 0.00          |
| 4    | 0.00     | 0.00         | 5.70          | 0.00          |
|      | 2.13     | 0.00         | -2.53         | 0.00          |

Komb. 29

|   |      |        |        |      |
|---|------|--------|--------|------|
| 1 | 0.00 | 0.00   | 2.53   | 0.00 |
|   | 2.13 | 0.00   | -5.70  | 0.00 |
|   | 0.00 | 0.00   | -5.70  | 0.00 |
| 2 | 0.00 | 0.00   | -5.70  | 0.00 |
|   | 1.07 | 5.20   | -0.26  | 0.00 |
|   | 2.13 | 0.00   | 6.76   | 0.00 |
| 3 | 0.00 | 0.00   | 6.76   | 0.00 |
|   | 1.07 | -3.80* | 0.26   | 0.00 |
|   | 2.13 | 0.00   | -7.82  | 0.00 |
| 4 | 0.00 | 0.00   | -7.82  | 0.00 |
|   | 0.19 | 1.63   | -8.81* | 0.00 |
|   | 1.13 | 6.91*  | 0.21   | 0.00 |
|   | 2.13 | 0.00   | 10.99* | 0.00 |

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

| Material            | t <sub>Max</sub><br>[mm] | f <sub>0</sub><br>[N/mm <sup>2</sup> ] | E<br>[N/mm <sup>2</sup> ] | BC |
|---------------------|--------------------------|----------------------------------------|---------------------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                                    | 70000                     | A  |
|                     | 25 <sup>b</sup>          | 180                                    | 70000                     | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

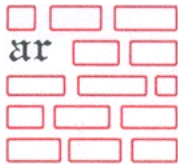
| QS | Profil        | A<br>[cm <sup>2</sup> ] | S <sub>y</sub><br>S <sub>z</sub><br>[cm <sup>3</sup> ] | I <sub>y</sub><br>I <sub>z</sub><br>[cm <sup>4</sup> ] | W <sub>y</sub><br>W <sub>z</sub><br>[cm <sup>3</sup> ] |
|----|---------------|-------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| 1  | AVADIELE40 40 | 13.9                    | 10.2<br>41.6                                           | 35.2<br>647.4                                          | 17.2<br>51.0                                           |

Hauptachsen

| QS | Profil        | ε<br>[°] | I <sub>yz</sub><br>[cm <sup>4</sup> ] | I <sub>bb</sub><br>[cm <sup>4</sup> ] | I <sub>bb</sub><br>[cm <sup>4</sup> ] |
|----|---------------|----------|---------------------------------------|---------------------------------------|---------------------------------------|
| 1  | AVADIELE40 40 | 87.42    | -27.6                                 | 648.7                                 | 34.0                                  |

Torsion

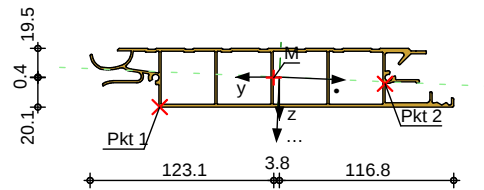
| QS | Profil        | I <sub>t</sub><br>[cm <sup>4</sup> ] | I <sub>tt</sub><br>[cm <sup>6</sup> ] |
|----|---------------|--------------------------------------|---------------------------------------|
| 1  | AVADIELE40 40 | 73.1                                 | 0.0                                   |



Grafik

Querschnittsgrafik [mm]

M 1:5



Auflagerkräfte

Charakteristische Auflagerkräfte (global)

Char. Auflagerkr.

|                 | Aufl. | $M_{x,k,min}$          | $F_{z,k,min}$         | $F_{y,k,min}$         |
|-----------------|-------|------------------------|-----------------------|-----------------------|
|                 |       | $M_{x,k,max}$<br>[kNm] | $F_{z,k,max}$<br>[kN] | $F_{y,k,max}$<br>[kN] |
| Einw. $G_k$     | A     | 0.00                   | 0.03                  | 0.00                  |
|                 |       | 0.00                   | 0.03                  | 0.00                  |
|                 | B     | 0.00                   | 0.09                  | 0.00                  |
|                 |       | 0.00                   | 0.09                  | 0.00                  |
|                 | C     | 0.00                   | 0.07                  | 0.00                  |
|                 |       | 0.00                   | 0.07                  | 0.00                  |
|                 | D     | 0.00                   | 0.09                  | 0.00                  |
| Einw. $Q_{k,N}$ | E     | 0.00                   | 0.03                  | 0.00                  |
|                 |       | 0.00                   | 0.03                  | 0.00                  |
|                 | A     | 0.00                   | -0.11                 | 0.00                  |
|                 |       | 0.00                   | 0.95                  | 0.00                  |
|                 | B     | 0.00                   | -0.17                 | 0.00                  |
|                 |       | 0.00                   | 2.61                  | 0.00                  |
|                 | C     | 0.00                   | -0.46                 | 0.00                  |
| Einw. $Q_{k,S}$ |       | 0.00                   | 2.43                  | 0.00                  |
|                 | D     | 0.00                   | -0.17                 | 0.00                  |
|                 |       | 0.00                   | 2.61                  | 0.00                  |
|                 | E     | 0.00                   | -0.11                 | 0.00                  |
|                 |       | 0.00                   | 0.95                  | 0.00                  |
|                 | A     | 0.00                   | 0.11                  | 0.00                  |
|                 |       | 0.00                   | 0.11                  | 0.00                  |
|                 | B     | 0.00                   | 0.32                  | 0.00                  |
|                 |       | 0.00                   | 0.32                  | 0.00                  |
|                 | C     | 0.00                   | 0.26                  | 0.00                  |
|                 |       | 0.00                   | 0.26                  | 0.00                  |
|                 | D     | 0.00                   | 0.32                  | 0.00                  |
|                 |       | 0.00                   | 0.32                  | 0.00                  |
|                 | E     | 0.00                   | 0.11                  | 0.00                  |
|                 |       | 0.00                   | 0.11                  | 0.00                  |

Zusammenfassung

Zusammenfassung der Nachweise

Nachweise (GZT)

Nachweise im Grenzzustand der Tragfähigkeit

Nachweis

Nachweis E-E

OK 0.40

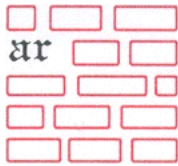
Nachweise (GZG)

Nachweise im Grenzzust. der Gebrauchstauglichkeit

Nachweis

Verformung

OK 0.97



PROJEKT **19259-1a AVA Diele 40**  
POSITION **AL1-5-4-Feld Alu Bpr (Verkehrslastansatz,  $50 \text{ kN/m}^2$ )**

SEITE

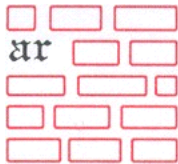
PROJ.-NR.

73

19259\_1a

10.07.2019

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



## Pos. AL1-5-4-Feld-200 Bpr (Verkehrslastansatz, 5.0 kN/m<sup>2</sup>)

Die Verkehrslast 5,0 kN/m<sup>2</sup> wird auf 5 Dielen je Meter verlegte Elemente verteilt.

System Durchlaufträger

M 1:265



Abmessungen  
Mat./Querschnitt

| Feld | l<br>[m] | Lage<br>[°] | Achsen |
|------|----------|-------------|--------|
| 1-4  | 2.45     | 0.0         | frei   |

| Feld | Material            | Profil        |
|------|---------------------|---------------|
| 1-4  | EN-AW 6063, T66, EP | AVADIELE40 40 |

Auflager

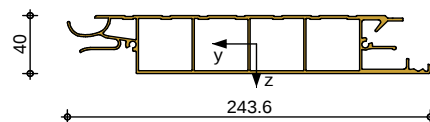
| Lager | x<br>[m] | K <sub>T,z</sub><br>[kN/m] | K <sub>R,y</sub><br>bzw. | K <sub>T,y</sub><br>[kNm/rad] | K <sub>R,z</sub><br>bzw. | Gabel l. Wölbb. |
|-------|----------|----------------------------|--------------------------|-------------------------------|--------------------------|-----------------|
| A     | 0.00     | fest                       | frei                     | fest                          | frei                     | fest            |
| B     | 2.45     | fest                       | frei                     | fest                          | frei                     | fest            |
| C     | 4.90     | fest                       | frei                     | fest                          | frei                     | fest            |
| D     | 7.35     | fest                       | frei                     | fest                          | frei                     | fest            |
| E     | 9.80     | fest                       | frei                     | fest                          | frei                     | fest            |

| Lager         | b<br>[cm] |
|---------------|-----------|
| A, B, C, D, E | 8.0       |

Grafik

Querschnittsgrafik

M 1:5



Belastungen

Belastungen auf das System

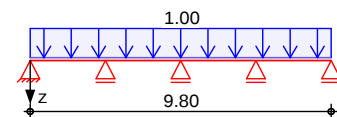
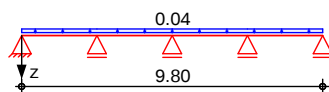
Grafik

Belastungsgrafiken (einwirkungsbezogen)

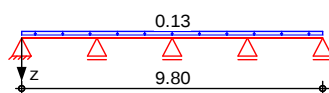
Einwirkungen

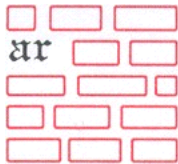
Gk

Qk.N



Qk.S



Streckenlasten  
in z-RichtungEinw.  $G_k$ Einw.  $Q_{k,N}$ Einw.  $Q_{k,S}$ 

Char. Schnittgrößen

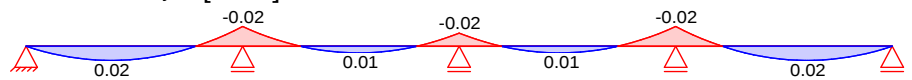
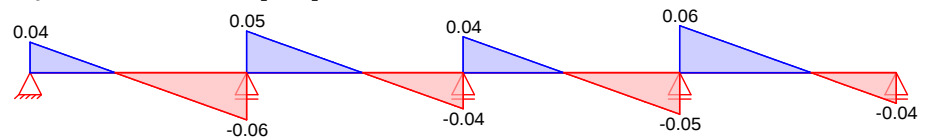
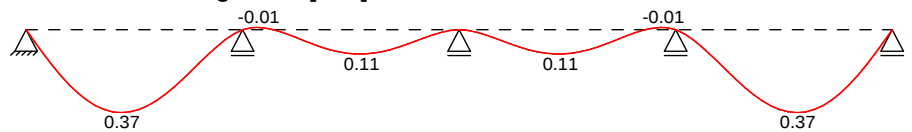
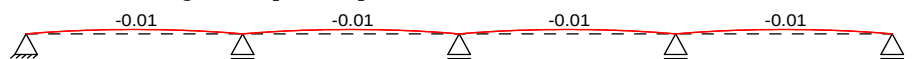
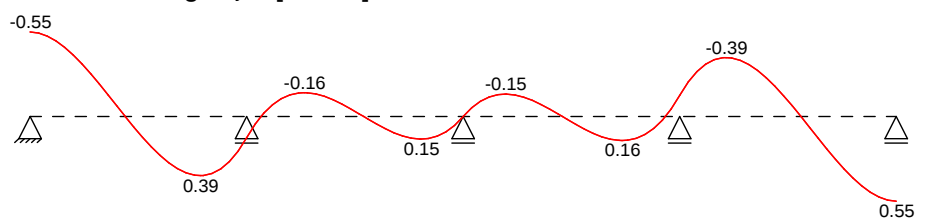
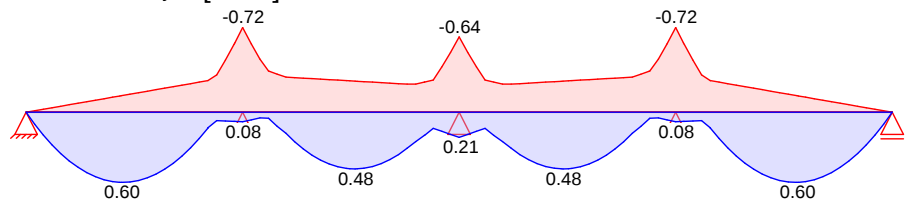
Grafik

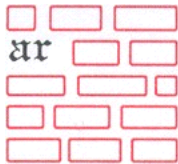
Einw.  $G_k$ Gleichlasten  
Feld Komm.

|   |          | a    | s    | $q_{li}$ | $q_{re}$ | e    |
|---|----------|------|------|----------|----------|------|
|   |          | [m]  | [m]  | [kN/m]   | [kN/m]   | [cm] |
| 1 | Eigengew | 0.00 | 2.45 |          | 0.04     | -0.4 |
| 2 | Eigengew | 0.00 | 2.45 |          | 0.04     | -0.4 |
| 3 | Eigengew | 0.00 | 2.45 |          | 0.04     | -0.4 |
| 4 | Eigengew | 0.00 | 2.45 |          | 0.04     | -0.4 |
| 1 | p+s      | 0.00 | 9.80 |          | 1.00     | 0.0  |
| 1 | p+s      | 0.00 | 9.80 |          | 0.13     | 0.0  |

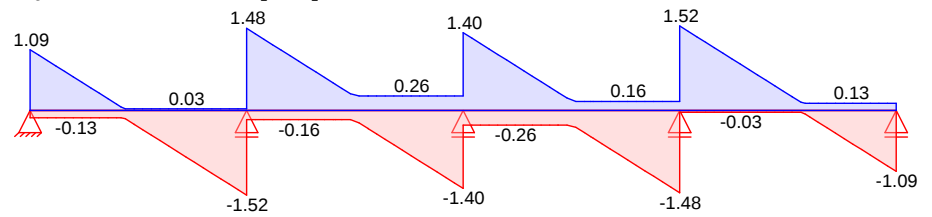
charakteristische Schnittgrößen und Verformungen

Schnittgrößen und Verformungen (je Einwirkung)

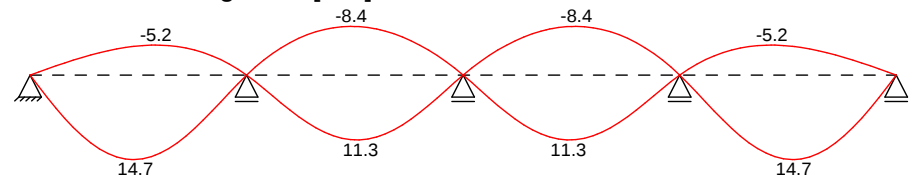
Moment  $M_{y,k}$  [kNm]Querkraft  $V_{z,k}$  [kN]Verschiebung  $w_{z,k}$  [mm]Verdrehung  $\chi_k$  [mrad]Verdrehung  $\gamma_k$  [mrad]Einw.  $Q_{k,N}$ Moment  $M_{y,k}$  [kNm]



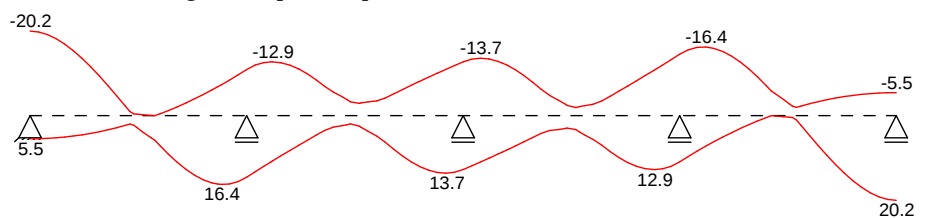
### Querkraft $V_{z,k}$ [kN]



### Verschiebung $w_{z,k}$ [mm]

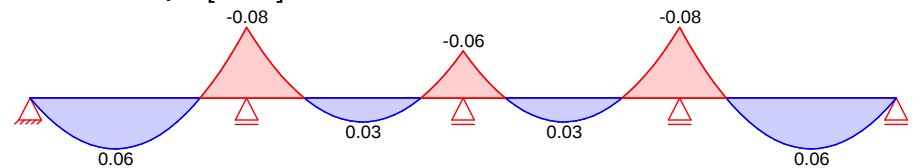


### Verdrehung $\varphi_y$ [mrad]

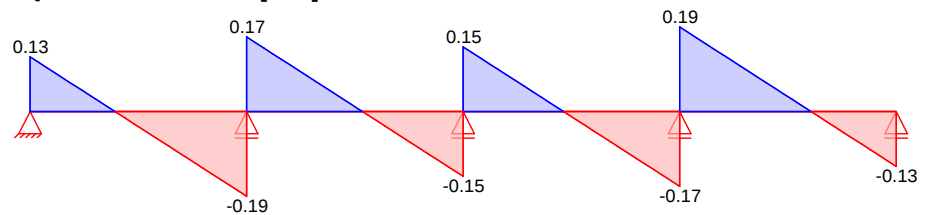


Einw.  $Q_{k,S}$

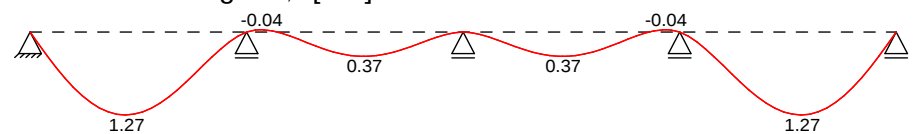
### Moment $M_{y,k}$ [kNm]



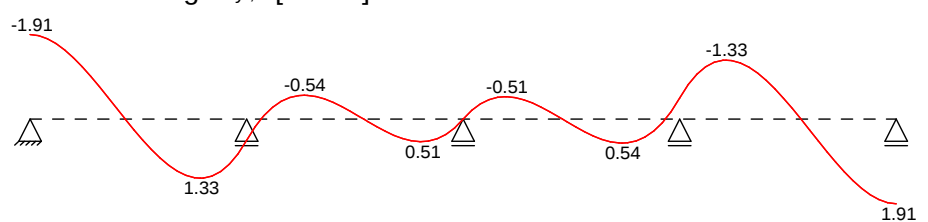
### Querkraft $V_{z,k}$ [kN]

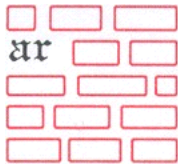


### Verschiebung $w_{z,k}$ [mm]



### Verdrehung $\varphi_y$ [mrad]





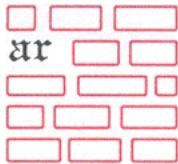
Tabelle

Schnittgrößen (je Einwirkung)

|                   | Feld | x<br>[m] | My,k,min<br>[kNm] | My,k,max<br>[kNm] | Vz,k,min<br>[kN] | Vz,k,max<br>[kN] |
|-------------------|------|----------|-------------------|-------------------|------------------|------------------|
| Einw. <i>Gk</i>   | 1    | 0.00     | 0.00              | 0.00              | 0.04             | 0.04             |
|                   |      | 0.96     | 0.02              | 0.02*             | 0.00             | 0.00             |
|                   |      | 2.45     | -0.02*            | -0.02             | -0.06*           | -0.06            |
|                   | 2    | 0.00     | -0.02             | -0.02             | 0.05             | 0.05             |
|                   |      | 2.45     | -0.02             | -0.02             | -0.04            | -0.04            |
|                   | 3    | 0.00     | -0.02             | -0.02             | 0.04             | 0.04             |
|                   |      | 2.45     | -0.02             | -0.02             | -0.05            | -0.05            |
|                   | 4    | 0.00     | -0.02             | -0.02             | 0.06             | 0.06*            |
|                   |      | 2.45     | 0.00              | 0.00              | -0.04            | -0.04            |
|                   |      |          |                   |                   |                  |                  |
|                   |      |          |                   |                   |                  |                  |
|                   |      |          |                   |                   |                  |                  |
| Einw. <i>Qk.N</i> | 1    | 0.00     | 0.00              | 0.00              | -0.13            | 1.09             |
|                   |      | 1.08     | -0.14             | 0.60*             | -0.15            | 0.03             |
|                   |      | 2.45     | -0.72*            | 0.08              | -1.52*           | 0.03             |
|                   | 2    | 0.00     | -0.72             | 0.08              | -0.16            | 1.48             |
|                   |      | 2.45     | -0.64             | 0.21              | -1.40            | 0.26             |
|                   | 3    | 0.00     | -0.64             | 0.21              | -0.26            | 1.40             |
|                   |      | 2.45     | -0.72             | 0.08              | -1.48            | 0.16             |
|                   | 4    | 0.00     | -0.72             | 0.08              | -0.03            | 1.52*            |
|                   |      | 2.45     | 0.00              | 0.00              | -1.09            | 0.13             |
|                   |      |          |                   |                   |                  |                  |
|                   |      |          |                   |                   |                  |                  |
|                   |      |          |                   |                   |                  |                  |
| Einw. <i>Qk.S</i> | 1    | 0.00     | 0.00              | 0.00              | 0.13             | 0.13             |
|                   |      | 0.96     | 0.06              | 0.06*             | 0.00             | 0.00             |
|                   |      | 2.45     | -0.08*            | -0.08             | -0.19*           | -0.19            |
|                   | 2    | 0.00     | -0.08             | -0.08             | 0.17             | 0.17             |
|                   |      | 2.45     | -0.06             | -0.06             | -0.15            | -0.15            |
|                   | 3    | 0.00     | -0.06             | -0.06             | 0.15             | 0.15             |
|                   |      | 2.45     | -0.08             | -0.08             | -0.17            | -0.17            |
|                   | 4    | 0.00     | -0.08             | -0.08             | 0.19             | 0.19*            |
|                   |      | 2.45     | 0.00              | 0.00              | -0.13            | -0.13            |
|                   |      |          |                   |                   |                  |                  |
|                   |      |          |                   |                   |                  |                  |
|                   |      |          |                   |                   |                  |                  |

Verformungen (je Einwirkung)

|                   | Feld | x<br>[m] | Wz,k,min<br>[mm] | Wz,k,max<br>[mm] | y,k,min<br>[mrad] | y,k,max<br>[mrad] | x,k,min<br>[mrad] | x,k,max<br>[mrad] |
|-------------------|------|----------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Einw. <i>Gk</i>   | 1    | 0.00     | 0.00             | 0.00             | -0.55*            | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      | 1.08     | 0.37             | 0.37*            | 0.00              | -0.01             | -0.01             | -0.01             |
|                   | 2    | 2.45     | 0.00             | 0.00             | 0.14              | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   | 3    | 0.00     | 0.00             | 0.00             | 0.14              | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   | 4    | 0.16     | -0.01*           | -0.01            | 0.00              | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      | 1.23     | 0.11             | 0.11             | -0.03             | -0.01*            | -0.01*            | -0.01*            |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      | 2.45     | 0.00             | 0.00             | 0.00              | 0.00              | 0.00              | 0.00              |
| Einw. <i>Qk.N</i> | 1    | 0.00     | 0.00             | 0.00             | 0.00              | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      | 2.45     | 0.00             | 0.00             | -0.14             | 0.00              | 0.00              | 0.00              |
|                   | 2    | 0.00     | 0.00             | 0.00             | -0.14             | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   | 3    | 0.00     | 0.00             | 0.00             | -0.14             | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   | 4    | 0.00     | 0.00             | 0.00             | -0.14             | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      | 2.45     | 0.00             | 0.00             | 0.55              | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      |          |                  |                  | 0.55*             | 0.00              | 0.00              | 0.00              |
| Einw. <i>Qk.S</i> | 1    | 0.00     | 0.00             | 0.00             | -20.21*           | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      | 1.18     | -4.99            | 14.67*           | -0.43             | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |
|                   |      |          |                  |                  | 2.29              | 0.00              | 0.00              | 0.00              |
|                   |      |          |                  |                  |                   |                   |                   |                   |



PROJEKT **19259-1a AVA Diele 40**

PROJ.-NR.

**19259\_1a**

POSITION **AL1-5-4-Feld-200 Alu Bpr (Verkehrslastansatz, 50 kN/m²)**

**10.07.2019**

|            |   |      |        |        |      |
|------------|---|------|--------|--------|------|
|            |   | 2.45 | 0.00   | -11.02 | 0.00 |
|            |   |      | 0.00   | 14.70  | 0.00 |
|            | 2 | 0.00 | 0.00   | -11.02 | 0.00 |
|            |   |      | 0.00   | 14.70  | 0.00 |
|            |   | 1.18 | -8.45* | -3.32  | 0.00 |
|            |   |      | 11.21  | 1.96   | 0.00 |
|            |   | 2.45 | 0.00   | -12.86 | 0.00 |
|            |   |      | 0.00   | 12.86  | 0.00 |
|            | 3 | 0.00 | 0.00   | -12.86 | 0.00 |
|            |   |      | 0.00   | 12.86  | 0.00 |
|            |   | 2.45 | 0.00   | -14.70 | 0.00 |
|            |   |      | 0.00   | 11.02  | 0.00 |
|            | 4 | 0.00 | 0.00   | -14.70 | 0.00 |
|            |   |      | 0.00   | 11.02  | 0.00 |
|            |   | 2.45 | 0.00   | -5.51  | 0.00 |
|            |   |      | 0.00   | 20.21* | 0.00 |
| Einw. Qk.S | 1 | 0.00 | 0.00   | -1.91* | 0.00 |
|            |   |      | 0.00   | -1.91  | 0.00 |
|            |   | 1.08 | 1.27   | 0.00   | 0.00 |
|            |   |      | 1.27*  | 0.00   | 0.00 |
|            |   | 2.45 | 0.00   | 0.48   | 0.00 |
|            |   |      | 0.00   | 0.48   | 0.00 |
|            | 2 | 0.00 | 0.00   | 0.48   | 0.00 |
|            |   |      | 0.00   | 0.48   | 0.00 |
|            |   | 0.16 | -0.04* | 0.01   | 0.00 |
|            |   |      | -0.04  | 0.01   | 0.00 |
|            |   | 2.45 | 0.00   | 0.00   | 0.00 |
|            |   |      | 0.00   | 0.00   | 0.00 |
|            | 3 | 0.00 | 0.00   | 0.00   | 0.00 |
|            |   |      | 0.00   | 0.00   | 0.00 |
|            |   | 2.45 | 0.00   | -0.48  | 0.00 |
|            |   |      | 0.00   | -0.48  | 0.00 |
|            | 4 | 0.00 | 0.00   | -0.48  | 0.00 |
|            |   |      | 0.00   | -0.48  | 0.00 |
|            |   | 2.45 | 0.00   | 1.91   | 0.00 |
|            |   |      | 0.00   | 1.91*  | 0.00 |

## Kombinationen

Kombinationsbildung nach DIN EN 1990  
Darstellung der maßgebenden Kombinationen

|                   | Ek | Imp. | u (I*K*EW) |                       |            |
|-------------------|----|------|------------|-----------------------|------------|
| ständig/vorüberg. | 58 | 7    | 1.35*Gk    | +1.50*Qk.N<br>(1,2,4) | +1.50*Qk.S |
|                   | 59 | 8    | 1.35*Gk    | +1.50*Qk.N<br>(1,2,4) | +1.50*Qk.S |
|                   | 60 | 5    | 1.35*Gk    | +1.50*Qk.N<br>(1,3,4) | +1.50*Qk.S |
|                   | 61 | 6    | 1.35*Gk    | +1.50*Qk.N<br>(1,3,4) | +1.50*Qk.S |
| quasi-ständig     | 28 |      | 1.00*Gk    | +0.80*Qk.N<br>(1,3)   |            |
|                   | 29 |      | 1.00*Gk    | +0.80*Qk.N<br>(2,4)   |            |

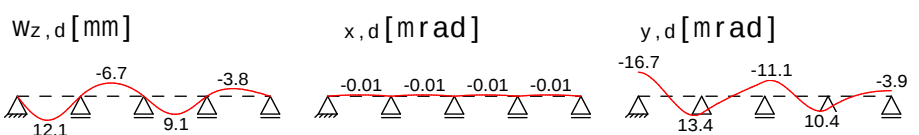
## Bem. - verformungen

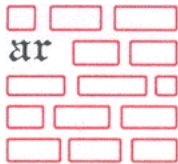
Bemessungsverformungen

## Grafik

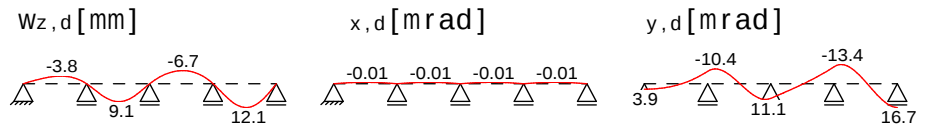
Verformungen (je Kombination)

Komb. 28





Komb. 29



Tabelle

Verformungen (je Kombination)

Komb. 28

| Feld | x<br>[m] | Wz,d<br>[mm] | y,d<br>[mrad] | x,d<br>[mrad] |
|------|----------|--------------|---------------|---------------|
| 1    | 0.00     | 0.00         | -16.72 *      | 0.00          |
|      | 1.18     | 12.10 *      | 0.20          | -0.01         |
|      | 2.16     | 3.82         | 13.45 *       | 0.00          |
|      | 2.45     | 0.00         | 11.90         | 0.00          |
| 2    | 0.00     | 0.00         | 11.90         | 0.00          |
|      | 1.18     | -6.65 *      | 0.02          | -0.01         |
|      | 1.23     | -6.64        | -0.40         | -0.01 *       |
|      | 2.45     | 0.00         | -10.29        | 0.00          |
| 3    | 0.00     | 0.00         | -10.29        | 0.00          |
|      | 2.45     | 0.00         | 8.68          | 0.00          |
| 4    | 0.00     | 0.00         | 8.68          | 0.00          |
|      | 2.45     | 0.00         | -3.86         | 0.00          |

Komb. 29

|   |      |         |          |         |
|---|------|---------|----------|---------|
| 1 | 0.00 | 0.00    | 3.86     | 0.00    |
|   | 2.45 | 0.00    | -8.68    | 0.00    |
| 2 | 0.00 | 0.00    | -8.68    | 0.00    |
|   | 1.23 | 9.10    | -0.40    | -0.01 * |
| 3 | 2.45 | 0.00    | 10.29    | 0.00    |
|   | 0.00 | 0.00    | 10.29    | 0.00    |
| 4 | 1.27 | -6.65 * | -0.02    | -0.01   |
|   | 2.45 | 0.00    | -11.90   | 0.00    |
| 4 | 0.00 | 0.00    | -11.90   | 0.00    |
|   | 0.29 | 3.82    | -13.45 * | 0.00    |
|   | 1.27 | 12.10 * | -0.20    | -0.01   |
|   | 2.45 | 0.00    | 16.72 *  | 0.00    |

Mat./Querschnitt

Material- und Querschnittswerte

Aluminium

| Material            | t <sub>Max</sub><br>[mm] | f <sub>0</sub><br>[N/mm <sup>2</sup> ] | E<br>[N/mm <sup>2</sup> ] | BC |
|---------------------|--------------------------|----------------------------------------|---------------------------|----|
| EN-AW 6063, T66, EP | 10 <sup>b</sup>          | 200                                    | 70000                     | A  |
|                     | 25 <sup>b</sup>          | 180                                    | 70000                     | A  |

b: Es werden die ungünstigeren Festigkeiten je Querschnitt angesetzt (Tab. 3.2b, Fußnote 3)

Querschnitt

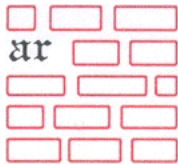
| QS | Profil        | A<br>[cm <sup>2</sup> ] | Sy<br>S <sub>z</sub><br>[cm <sup>3</sup> ] | I <sub>y</sub><br>I <sub>z</sub><br>[cm <sup>4</sup> ] | Wy<br>W <sub>z</sub><br>[cm <sup>3</sup> ] |
|----|---------------|-------------------------|--------------------------------------------|--------------------------------------------------------|--------------------------------------------|
| 1  | AVADIELE40 40 | 13.9                    | 10.2<br>41.6                               | 35.2<br>647.4                                          | 17.2<br>51.0                               |

Hauptachsen

| QS | Profil        | ε<br>[°] | I <sub>yz</sub><br>[cm <sup>4</sup> ] | I <sub>b</sub><br>[cm <sup>4</sup> ] | I <sub>b</sub><br>[cm <sup>4</sup> ] |
|----|---------------|----------|---------------------------------------|--------------------------------------|--------------------------------------|
| 1  | AVADIELE40 40 | 87.42    | -27.6                                 | 648.7                                | 34.0                                 |

Torsion

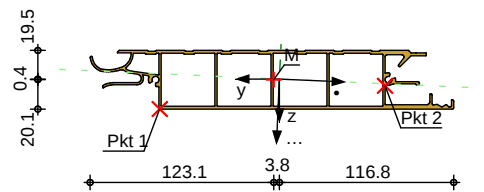
| QS | Profil        | I <sub>t</sub><br>[cm <sup>4</sup> ] | I <sub>n</sub><br>[cm <sup>6</sup> ] |
|----|---------------|--------------------------------------|--------------------------------------|
| 1  | AVADIELE40 40 | 73.1                                 | 0.0                                  |



Grafik

Querschnittsgrafik [mm]

M 1:5



Auflagerkräfte

Charakteristische Auflagerkräfte (global)

Char. Auflagerkr.

|                 | Aufl. | $M_{x,k,min}$          | $F_{z,k,min}$         | $F_{y,k,min}$         |
|-----------------|-------|------------------------|-----------------------|-----------------------|
|                 |       | $M_{x,k,max}$<br>[kNm] | $F_{z,k,max}$<br>[kN] | $F_{y,k,max}$<br>[kN] |
| Einw. $G_k$     | A     | 0.00                   | 0.04                  | 0.00                  |
|                 |       | 0.00                   | 0.04                  | 0.00                  |
|                 | B     | 0.00                   | 0.11                  | 0.00                  |
|                 |       | 0.00                   | 0.11                  | 0.00                  |
|                 | C     | 0.00                   | 0.09                  | 0.00                  |
|                 |       | 0.00                   | 0.09                  | 0.00                  |
|                 | D     | 0.00                   | 0.11                  | 0.00                  |
|                 |       | 0.00                   | 0.11                  | 0.00                  |
|                 | E     | 0.00                   | 0.04                  | 0.00                  |
|                 |       | 0.00                   | 0.04                  | 0.00                  |
| Einw. $Q_{k,N}$ | A     | 0.00                   | -0.13                 | 0.00                  |
|                 |       | 0.00                   | 1.09                  | 0.00                  |
|                 | B     | 0.00                   | -0.20                 | 0.00                  |
|                 |       | 0.00                   | 3.00                  | 0.00                  |
|                 | C     | 0.00                   | -0.52                 | 0.00                  |
|                 |       | 0.00                   | 2.80                  | 0.00                  |
|                 | D     | 0.00                   | -0.20                 | 0.00                  |
|                 |       | 0.00                   | 3.00                  | 0.00                  |
|                 | E     | 0.00                   | -0.13                 | 0.00                  |
|                 |       | 0.00                   | 1.09                  | 0.00                  |
| Einw. $Q_{k,S}$ | A     | 0.00                   | 0.13                  | 0.00                  |
|                 |       | 0.00                   | 0.13                  | 0.00                  |
|                 | B     | 0.00                   | 0.36                  | 0.00                  |
|                 |       | 0.00                   | 0.36                  | 0.00                  |
|                 | C     | 0.00                   | 0.30                  | 0.00                  |
|                 |       | 0.00                   | 0.30                  | 0.00                  |
|                 | D     | 0.00                   | 0.36                  | 0.00                  |
|                 |       | 0.00                   | 0.36                  | 0.00                  |
|                 | E     | 0.00                   | 0.13                  | 0.00                  |
|                 |       | 0.00                   | 0.13                  | 0.00                  |

Zusammenfassung

Zusammenfassung der Nachweise

Nachweise (GZT)

Nachweise im Grenzzustand der Tragfähigkeit

Nachweis

Nachweis E-E

OK 0.53

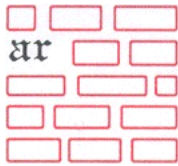
Nachweise (GZG)

Nachweise im Grenzzust. der Gebrauchstauglichkeit

Nachweis

Verformung

OK 0.99



PROJEKT **19259-1a AVA Diele 40**  
POSITION **AL1-5-4-Feld-200 Alu Bpr (Verkehrslastansatz,  $50 \text{ kN/m}^2$ )**

SEITE

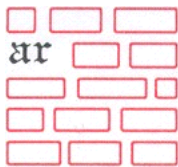
PROJ.-NR.

81

**19259\_1a**

**10.07.2019**

Die Auflagerspannweite ist als Grenzspannweite festgelegt.  
Kürzere Spannweiten sind möglich!



PROJEKT **19259-1a AVA Diele 40**  
POSITION **ALSchT\_01 Schlusstext**

SEITE **82**  
PROJ.-NR. **19259\_1a**  
DATUM **10.07.2019**

## Pos. ALSchT\_01      Schlusstext

Die in der Berechnung betrachteten Stützweiten sind Grenzstützweiten!  
Kürzere Stützweiten sind ohne weitere Nachweise möglich!  
Weitere Stützweiten sind in gesonderten Nachweisen zu überprüfen!

Zur Verankerung des Belags sind die einschlägigen Richtlinien zu beachten, insbesondere für Windsog und Winddruck!

Rheinfelden,

Juli 2019,

Aufgestellt:

