

1. Options for Calculations

calculation acc. to DIN 1052:2008

service class 1

coefficients of thermal expansion: timber $\alpha_t = 0.500 \cdot 10^{-5}/^{\circ}\text{K}$, steel $\alpha_t = 1.200 \cdot 10^{-5}/^{\circ}\text{K}$

2. Structural system



reinforcement left side

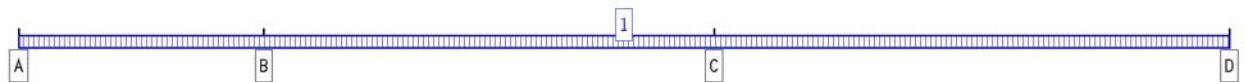


main beam

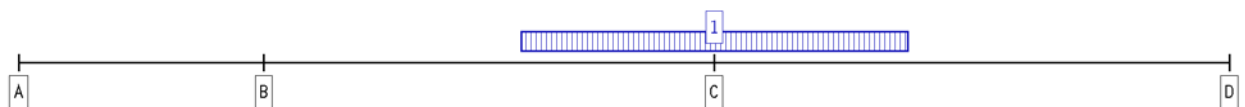


reinforcement right side

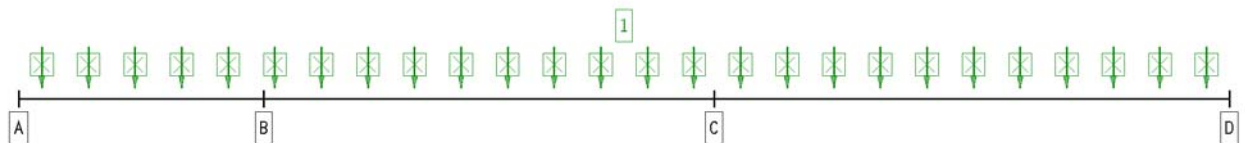
3. Loading



action effect 1: permanent loads (permanent, 1 load cases)



D



D



D



action effect 2: live loads (transient, 3 load cases)



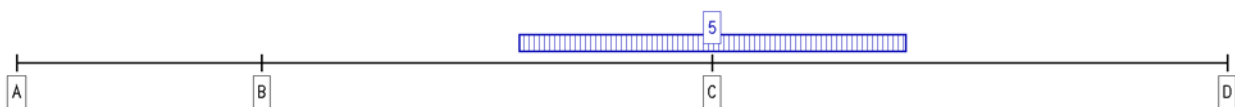
D



D



D



action effect 3: snow (transient, 1 load cases)



D

4. material parameters

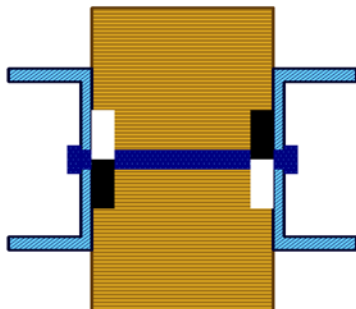
timber grade main beam	solid coniferous timber, C24 (S10)
service class	1
beam width	$b = 120 \text{ mm}$
coeff. therm.expan. timber:	$0.500 \cdot 10^{-5} / ^\circ\text{K}$
coeff. thermal expan. steel:	$1.200 \cdot 10^{-5} / ^\circ\text{K}$
char. bend. strength $f_{m,k}$	24.0 N/mm^2
char. shear strength $f_{v,k}$	2.0 N/mm^2
modulus of elast. $E_{0,mean}$	11000 N/mm^2

definition of internal forces and moments:

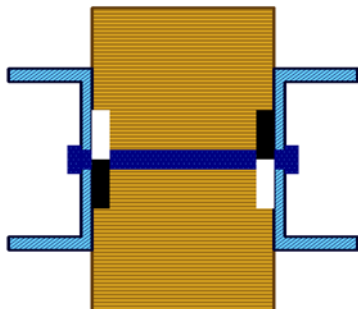


5. Beam sections

section beam section 1, scale 1: 5



section beam section 2, scale 1: 5



main beam sections

section	x_A m	x_E m	l m	l_{ef} m	k_m -	l_v m	cantil.	$h_{main\ beam}$ mm
1	0.00	1.90	1.90	2.00	1.0000	1.90	x	200
2	1.90	5.40	3.50	3.50	1.0000	3.50	-	200
3	5.40	9.40	4.00	4.00	1.0000	4.00	-	200

sections with reinforcements

section	reinforcement left side	reinforcement right side
1	steel plate S235 (St37) U120	steel plate S235 (St37) U120
2	steel plate S235 (St37) U120	steel plate S235 (St37) U120
3	-	-

6. Fastener data

section 1 from $x_A = 0.00$ m to $x_E = 1.90$

shear plate connector B1 $d_c = 65$ mm, FK 4.6

bolt M 12, FK 4.6

washer $d = 36$ mm

1 - row

$K_{ser} = 27300$ N/mm, $\gamma_M = 1.30$, $R_k = 13437.1$ N, all values per shear plane

coordinates of connectors section 1

Nr.	x_{Abs} m	x_D m	Nr.	x_{Abs} m	x_D m
1	0.200	0.200	4	1.400	1.400
2	0.600	0.600	5	1.800	1.800
3	1.000	1.000			

section 2 from $x_A = 1.90$ m to $x_E = 5.40$

shear plate connector B1 $d_c = 65$ mm, FK 4.6

bolt M 12, FK 4.6

1 - row

$K_{ser} = 27300$ N/mm, $\gamma_M = 1.30$, $R_k = 13437.1$ N, all values per shear plane

coordinates of connectors section 2

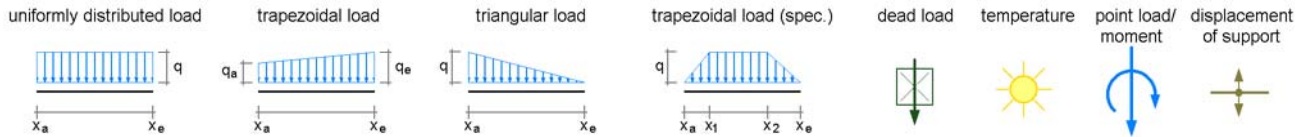
Nr.	x_{Abs} m	x_D m	Nr.	x_{Abs} m	x_D m
1	0.200	2.100	4	2.500	4.400
2	0.600	2.500	5	2.900	4.800
3	1.000	2.900	6	3.300	5.200

7. Supports

coordinates of supports

supp.name	x m	C_F kN/m	C_M kNm/-	left reinf.		main beam		right reinf.	
				(F)	(M)	(F)	(M)	(F)	(M)
B	1.90	fix	----	-	-	X	-	-	-
C	5.40	fix	----	-	-	X	-	-	-
D	9.40	fix	----	-	-	X	-	-	-

8. Action effects



Permanent action effect: permanent loads

1. additive load case: dead load (1)

- unif.distr.load (main beam): $q = 1.00 \text{ kN/m}$ from $x_a = 0.00 \text{ m}$ to $x_e = 9.40 \text{ m}$
- point load (main beam): $F = 3.00 \text{ kN}$ at $x = 0.10 \text{ m}$
- unif.distr.load (main beam): $q = 1.50 \text{ kN/m}$ from $x_a = 3.90 \text{ m}$ to $x_e = 6.90 \text{ m}$
- dead load (main beam): $\gamma = 6.00 \text{ kN/m}^3$ from $x_a = 0.00 \text{ m}$ to $x_e = 9.40 \text{ m}$

2. Transient action effect: live loads

2. additive load case: span 1

- unif.distr.load (main beam): $q = 1.20 \text{ kN/m}$ from $x_a = 0.00 \text{ m}$ to $x_e = 1.90 \text{ m}$
- point load (main beam): $F = 2.00 \text{ kN}$ at $x = 0.10 \text{ m}$

3. additive load case: span 2

- unif.distr.load (main beam): $q = 1.20 \text{ kN/m}$ from $x_a = 1.90 \text{ m}$ to $x_e = 5.40 \text{ m}$

4. additive load case: span 3

- unif.distr.load (main beam): $q = 1.20 \text{ kN/m}$ from $x_a = 5.40 \text{ m}$ to $x_e = 9.40 \text{ m}$

3. Transient action effect: snow

5. additive load case: snow

- unif.distr.load (main beam): $q = 1.00 \text{ kN/m}$ from $x_a = 3.90 \text{ m}$ to $x_e = 6.90 \text{ m}$
- point load (main beam): $F = 1.50 \text{ kN}$ at $x = 0.10 \text{ m}$

9. verifications

1: DIN 1052:2008 load-carrying capacity

safety against overturning will be executed

Extreme rule 1

2: DIN 1052:2008 deformations (rarely)

Extreme rule 1

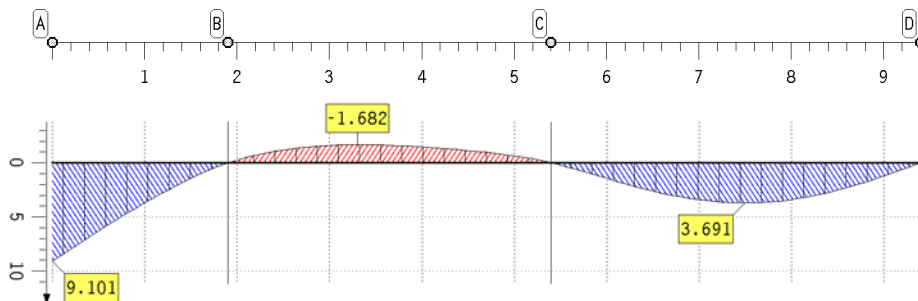
3: DIN 1052:2008 deformations (quasicontinuous)

Extreme rule 1

10. Results of load cases

10.1. Action effect 1: load case 1: dead load (1)

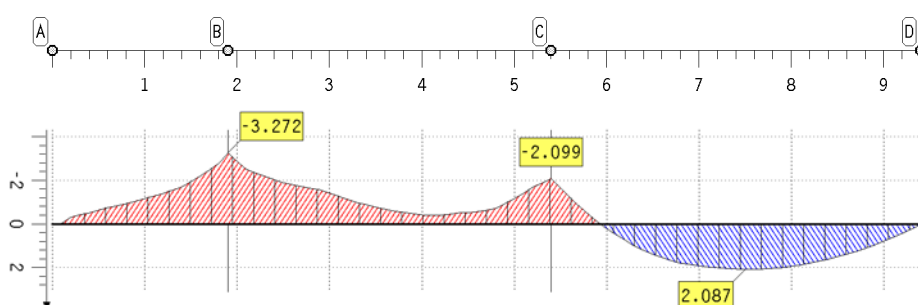
deflections of main beam (characteristic)



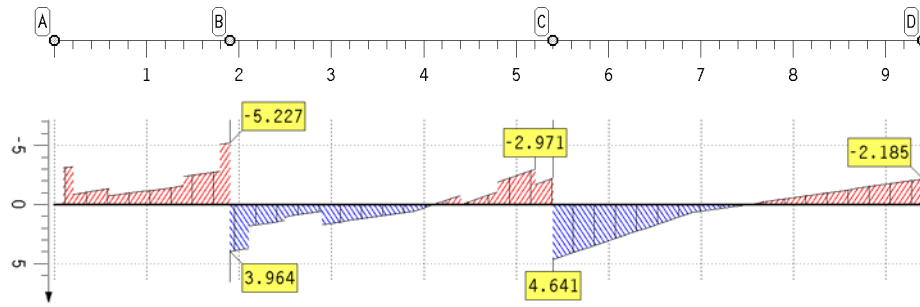
deflections of main beam (characteristic)

point	x	w	point	x	w	point	x	w	point	x	w
-	m	mm	-	m	mm	-	m	mm	-	m	mm
A	0.000	9.10		3.300	-1.68		6.700	3.01	minimum		-1.68
B	1.900	0.00		4.500	-1.12		7.500	3.69	maximum		9.10
B	1.900	0.00	C	5.400	-0.00		8.300	2.90			
	2.500	-1.23	C	5.400	0.00	D	9.400	-0.00			

internal forces and moments



internal forces and moments



shear force
main beam
V in kN
Min: -5.23
Max: 4.64

internal forces and moments

point	x m	main beam		reinf. left		reinf. right	
		M kNm	V kN	M _l kNm	V _l kN	M _r kNm	V _r kN
A	0.000	-0.00	0.00	0.00	-0.00	0.00	-0.00
	0.100	-0.01	-0.11	-0.00	-0.00	-0.00	-0.00
	0.100	-0.01	-3.11	-0.00	-0.00	-0.00	0.00
	0.200	-0.32	-3.23	-0.00	-0.00	0.00	0.00
	0.200	-0.32	-0.89	-0.00	-1.17	-0.00	-1.17
	0.600	-0.77	-1.34	-0.47	-1.17	-0.47	-1.17
	0.600	-0.77	-0.75	-0.47	-1.47	-0.47	-1.47
	1.000	-1.16	-1.15	-1.06	-1.50	-1.06	-1.50
	1.400	-1.71	-1.60	-1.66	-1.50	-1.66	-1.50
	1.400	-1.71	-2.38	-1.66	-1.11	-1.66	-1.11
B	1.800	-2.75	-2.84	-2.10	-1.11	-2.10	-1.11
	1.800	-2.75	-5.11	-2.10	0.03	-2.10	0.03
	1.900	-3.27	-5.23	-2.10	0.03	-2.10	0.03
	1.900	-3.27	3.96	-2.10	0.03	-2.10	0.03
	2.100	-2.50	3.73	-2.09	0.03	-2.09	0.03
	2.100	-2.50	1.80	-2.09	1.00	-2.09	1.00
	2.500	-1.87	1.34	-1.69	1.00	-1.69	1.00
	2.500	-1.87	1.02	-1.69	1.16	-1.69	1.16
	2.900	-1.56	0.56	-1.23	1.16	-1.23	1.16
	2.900	-1.56	1.68	-1.23	0.60	-1.23	0.60
C	4.100	-0.39	0.01	-0.52	0.60	-0.52	0.60
	4.400	-0.51	-0.78	-0.34	0.60	-0.34	0.60
	4.400	-0.51	-0.02	-0.34	0.21	-0.34	0.21
	4.800	-0.73	-1.07	-0.25	0.21	-0.25	0.21
	4.800	-0.73	-1.91	-0.25	0.63	-0.25	0.63
	5.200	-1.70	-2.97	-0.00	0.63	-0.00	0.63
	5.200	-1.70	-1.71	0.00	-0.00	-0.00	0.00
	5.400	-2.10	-2.24	-0.00	-0.00	0.00	0.00
	5.400	-2.10	4.64	-----	-----	-----	-----
	6.400	1.22	2.00	-----	-----	-----	-----
D	7.500	2.09	-0.01	-----	-----	-----	-----
	8.500	1.50	-1.16	-----	-----	-----	-----
	9.400	0.00	-2.19	-----	-----	-----	-----
	minimum	-3.27	-5.23	-2.10	-1.50	-2.10	-1.50
	maximum	2.09	4.64	0.00	1.16	0.00	1.16

support forces

point	x m	AP kN	AP _l kN	AP _r kN	ΣAP kN
B	1.900	-9.19	-0.00	0.00	-9.19
C	5.400	-6.88	-0.00	0.00	-6.88
D	9.400	-2.19	-----	-----	-2.19

connector reactions

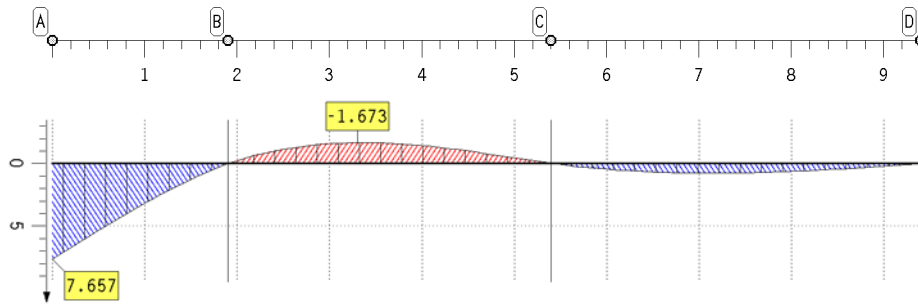
x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm	x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm
0.200	1.17	0.00	1.17	0.00	2.100	-0.97	0.00	-0.97	0.00
0.600	0.30	0.00	0.30	0.00	2.500	-0.16	0.00	-0.16	0.00
1.000	0.03	0.00	0.03	0.00	2.900	0.56	0.00	0.56	0.00
1.400	-0.39	0.00	-0.39	0.00	4.400	0.38	0.00	0.38	0.00
1.800	-1.14	0.00	-1.14	0.00	4.800	-0.42	0.00	-0.42	0.00

connector reactions

x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm
5.200	0.63	0.00	0.63	0.00

10.2. Action effect 2: load case 2: span 1

deflections of main beam (characteristic)

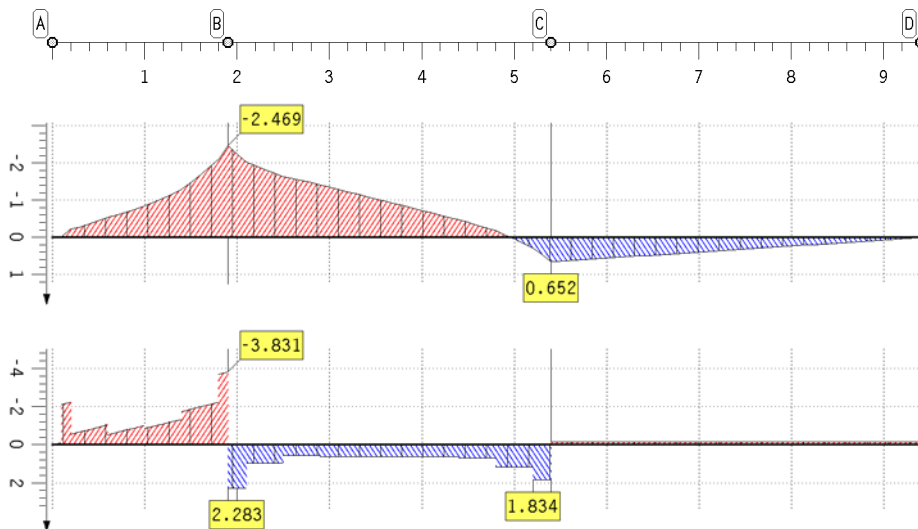


deflection
main beam
characteristic
w in mm
Min: -1.67
Max: 7.66

deflections of main beam (characteristic)

point	x m	w mm	point	x m	w mm	point	x m	w mm	point	x m	w mm
A	0.000	7.66		3.300	-1.67		6.200	0.57			
B	1.900	0.00		4.100	-1.35		7.100	0.76			
B	1.900	0.00	C	5.400	-0.00		8.100	0.57			
	2.600	-1.28	C	5.400	0.00	D	9.400	0.00			
									minimum		-1.67
									maximum		7.66

internal forces and moments



flexural moment
main beam
M in kNm
Min: -2.47
Max: 0.65

shear force
main beam
V in kN
Min: -3.83
Max: 2.28

internal forces and moments

point	x m	main beam		reinf. left		reinf. right	
		M kNm	V kN	M _l kNm	V _l kN	M _r kNm	V _r kN
A	0.000	0.00	-0.00	0.00	-0.00	0.00	-0.00
	0.100	-0.01	-0.12	-0.00	-0.00	-0.00	-0.00
	0.100	-0.01	-2.12	-0.00	0.00	0.00	-0.00
	0.200	-0.22	-2.24	0.00	0.00	-0.00	-0.00
	0.200	-0.22	-0.56	-0.00	-0.84	-0.00	-0.84
	0.600	-0.55	-1.04	-0.34	-0.84	-0.34	-0.84
	0.600	-0.55	-0.53	-0.34	-1.09	-0.34	-1.09
	1.000	-0.86	-0.86	-0.77	-1.17	-0.77	-1.17
	1.800	-2.09	-2.23	-1.63	-0.96	-1.63	-0.96
	1.800	-2.09	-3.71	-1.63	-0.22	-1.63	-0.22
B	1.900	-2.47	-3.83	-1.65	-0.22	-1.65	-0.22
B	1.900	-2.47	2.28	-1.65	-0.22	-1.65	-0.22
	2.100	-2.01	2.28	-1.69	-0.22	-1.69	-0.22
	2.100	-2.01	0.95	-1.69	0.44	-1.69	0.44

internal forces and moments

point	x m	main beam		reinf. left		reinf. right	
		M kNm	V kN	M _l kNm	V _l kN	M _r kNm	V _r kN
	2.500	-1.63	0.95	-1.52	0.44	-1.52	0.44
	2.500	-1.63	0.57	-1.52	0.63	-1.52	0.63
	4.800	-0.18	0.71	-0.13	0.56	-0.13	0.56
	4.800	-0.18	1.16	-0.13	0.34	-0.13	0.34
	5.200	0.29	1.16	-0.00	0.34	-0.00	0.34
	5.200	0.29	1.83	-0.00	0.00	0.00	-0.00
C	5.400	0.65	1.83	0.00	0.00	0.00	-0.00
C	5.400	0.65	-0.16	-----	-----	-----	-----
D	9.400	-0.00	-0.16	-----	-----	-----	-----
minimum		-2.47	-3.83	-1.69	-1.17	-1.69	-1.17
maximum		0.65	2.28	0.00	0.63	0.00	0.63

support forces

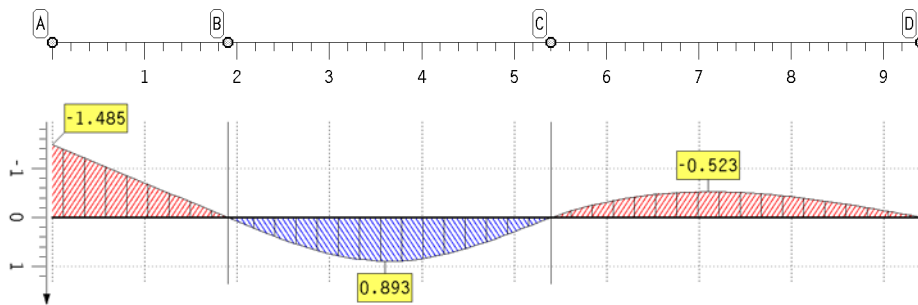
point	x m	AP kN	AP _l kN	AP _r kN	ΣAP kN
B	1.900	-6.11	0.00	0.00	-6.11
C	5.400	2.00	0.00	-0.00	2.00
D	9.400	-0.16	-----	-----	-0.16

connector reactions

x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm	x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm
0.200	0.84	0.00	0.84	0.00	2.500	-0.19	0.00	-0.19	0.00
0.600	0.26	0.00	0.26	0.00	2.900	0.03	0.00	0.03	0.00
1.000	0.08	0.00	0.08	0.00	4.400	0.04	0.00	0.04	0.00
1.400	-0.21	0.00	-0.21	0.00	4.800	0.23	0.00	0.23	0.00
1.800	-0.74	0.00	-0.74	0.00	5.200	0.34	0.00	0.34	0.00
2.100	-0.66	0.00	-0.66	0.00					

10.3. Action effect 2: load case 3: span 2

deflections of main beam (characteristic)

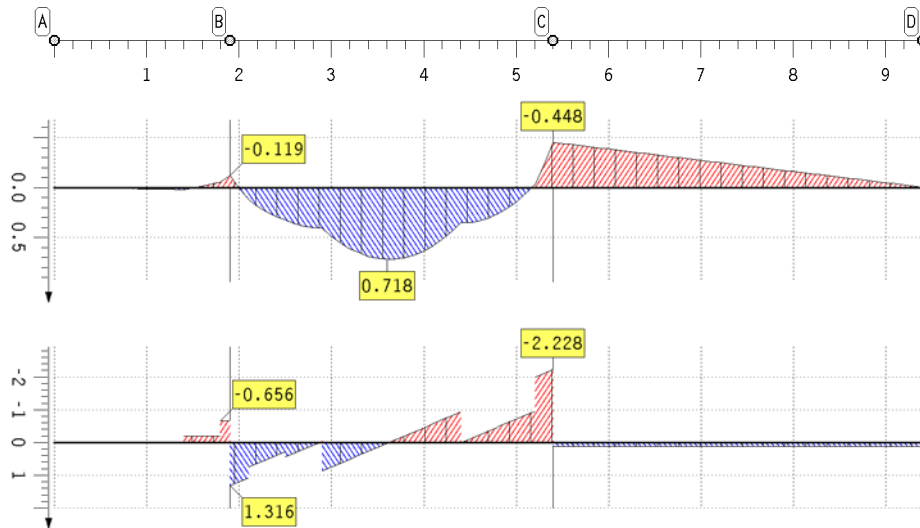


deflection
main beam
characteristic
w in mm
Min: -1.49
Max: 0.89

deflections of main beam (characteristic)

point	x m	w mm	point	x m	w mm	point	x m	w mm	point	x m	w mm
A	0.000	-1.49		3.600	0.89		6.200	-0.39	minimum		-1.49
B	1.900	-0.00		4.300	0.72		7.100	-0.52	maximum		0.89
B	1.900	0.00	C	5.400	0.00		8.100	-0.40			
	2.900	0.69	C	5.400	0.00	D	9.400	0.00			

internal forces and moments



internal forces and moments

point	x	main beam		reinf. left		reinf. right		
		M	V	M _l	V _l	M _r	V _r	
-	m	kNm	kN	kNm	kN	kNm	kN	
A	0.000	0.00	-0.00	0.00	-0.00	0.00	-0.00	
	0.600	0.00	0.03	-0.00	-0.01	-0.00	-0.01	
	1.400	0.02	0.02	-0.01	-0.01	-0.01	-0.01	
	1.400	0.02	-0.19	-0.01	0.09	-0.01	0.09	
	1.800	-0.05	-0.19	0.03	0.09	0.03	0.09	
	1.800	-0.05	-0.66	0.03	0.33	0.03	0.33	
B	1.900	-0.12	-0.66	0.06	0.33	0.06	0.33	
B	1.900	-0.12	1.32	0.06	0.33	0.06	0.33	
	2.100	0.12	1.08	0.12	0.33	0.12	0.33	
	2.100	0.12	0.76	0.12	0.49	0.12	0.49	
	2.900	0.41	-0.04	0.48	0.41	0.48	0.41	
	2.900	0.41	0.86	0.48	-0.05	0.48	-0.05	
	3.600	0.72	0.02	0.45	-0.05	0.45	-0.05	
	4.400	0.35	-0.94	0.41	-0.05	0.41	-0.05	
	4.400	0.35	0.01	0.41	-0.52	0.41	-0.52	
	5.200	-0.03	-0.96	0.00	-0.51	0.00	-0.51	
	5.200	-0.03	-1.99	-0.00	0.00	-0.00	-0.00	
	C	5.400	-0.45	-2.23	-0.00	0.00	-0.00	-0.00
	C	5.400	-0.45	0.11	-----	-----	-----	-----
D	9.400	-0.00	0.11	-----	-----	-----	-----	
minimum		-0.45	-2.23	-0.01	-0.52	-0.01	-0.52	
maximum		0.72	1.32	0.48	0.49	0.48	0.49	

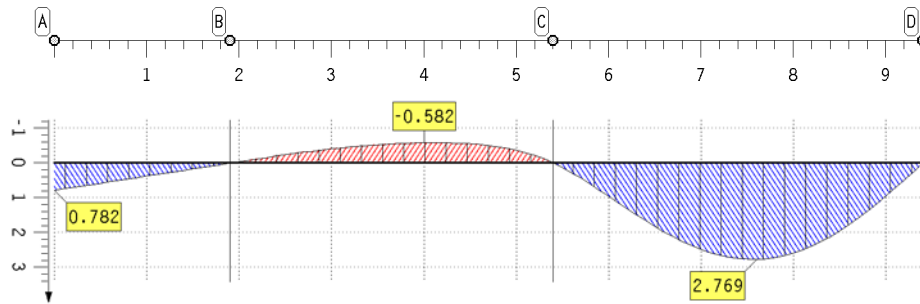
support forces

point	x m	AP kN	AP _l kN	AP _r kN	ΣAP kN
B	1.900	-1.97	0.00	0.00	-1.97
C	5.400	-2.34	0.00	-0.00	-2.34
D	9.400	0.11	-----	-----	0.11

connector reactions

x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm	x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm
0.200	0.00	0.00	0.00	0.00	2.500	0.08	0.00	0.08	0.00
0.600	0.01	0.00	0.01	0.00	2.900	0.45	0.00	0.45	0.00
1.000	-0.01	0.00	-0.01	0.00	4.400	0.47	0.00	0.47	0.00
1.400	-0.10	0.00	-0.10	0.00	4.800	-0.01	0.00	-0.01	0.00
1.800	-0.24	0.00	-0.24	0.00	5.200	-0.51	0.00	-0.51	0.00
2.100	-0.16	0.00	-0.16	0.00					

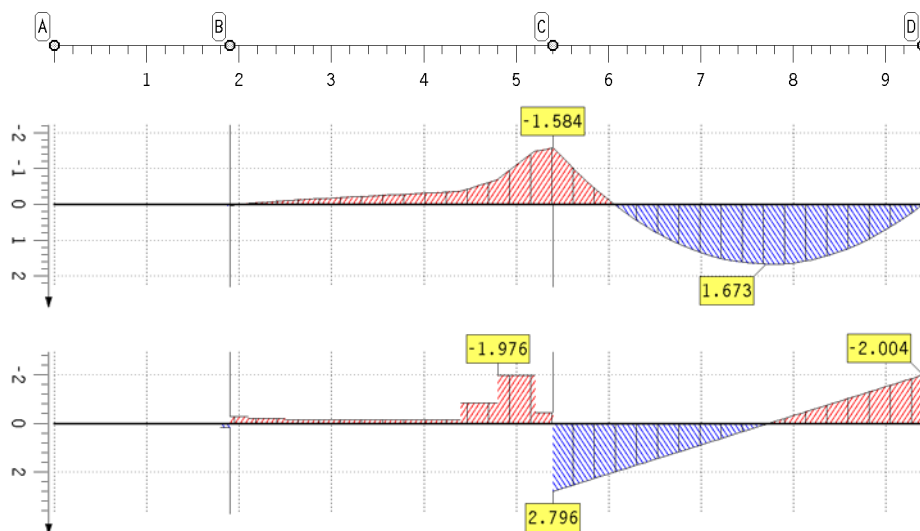
10.4. Action effect 2: load case 4: span3 deflections of main beam (characteristic)



deflections of main beam (characteristic)

point	x	w	point	x	w	point	x	w	point	x	w
-	m	mm	-	m	mm	-	m	mm	-	m	mm
A	0.000	0.78		4.000	-0.58	C	5.400	0.00	D	9.400	-0.00
B	1.900	0.00		4.800	-0.46		6.800	2.26	minimum		-0.58
B	1.900	0.00		5.100	-0.29		7.600	2.77	maximum		2.77
	3.100	-0.44	C	5.400	-0.00		8.400	2.11			

internal forces and moments



internal forces and moments

point	x	main beam		reinf. left		reinf. right	
		M	V	M _l	V _l	M _r	V _r
-	m	kNm	kN	kNm	kN	kNm	kN
A	0.000	-0.00	0.00	0.00	-0.00	-0.00	0.00
	0.600	-0.00	-0.01	0.00	0.00	0.00	0.00
	1.400	-0.01	-0.01	0.00	0.00	0.00	0.00
	1.400	-0.01	0.04	0.00	-0.02	0.00	-0.02
	1.800	0.01	0.04	-0.01	-0.02	-0.01	-0.02
	1.800	0.01	0.16	-0.01	-0.08	-0.01	-0.08
B	1.900	0.03	0.16	-0.01	-0.08	-0.01	-0.08
B	1.900	0.03	-0.29	-0.01	-0.08	-0.01	-0.08
	2.900	-0.17	-0.13	-0.14	-0.16	-0.14	-0.16
	4.400	-0.37	-0.13	-0.38	-0.16	-0.38	-0.16
	4.400	-0.37	-0.83	-0.38	0.19	-0.38	0.19
	4.800	-0.70	-0.83	-0.30	0.19	-0.30	0.19
	4.800	-0.70	-1.98	-0.30	0.76	-0.30	0.76
	5.200	-1.49	-1.98	-0.00	0.76	-0.00	0.76
	5.200	-1.49	-0.45	0.00	-0.00	-0.00	0.00
C	5.400	-1.58	-0.45	-0.00	-0.00	0.00	0.00
C	5.400	-1.58	2.80	-----	-----	-----	-----
	6.600	0.91	1.36	-----	-----	-----	-----
	7.700	1.67	0.04	-----	-----	-----	-----
	8.600	1.22	-1.04	-----	-----	-----	-----
D	9.400	0.00	-2.00	-----	-----	-----	-----

internal forces and moments

point	x m	main beam		reinf. left		reinf. right	
		M kNm	V kN	M _l kNm	V _l kN	M _r kNm	V _r kN
minimum		-1.58	-2.00	-0.38	-0.16	-0.38	-0.16
maximum		1.67	2.80	0.00	0.76	0.00	0.76

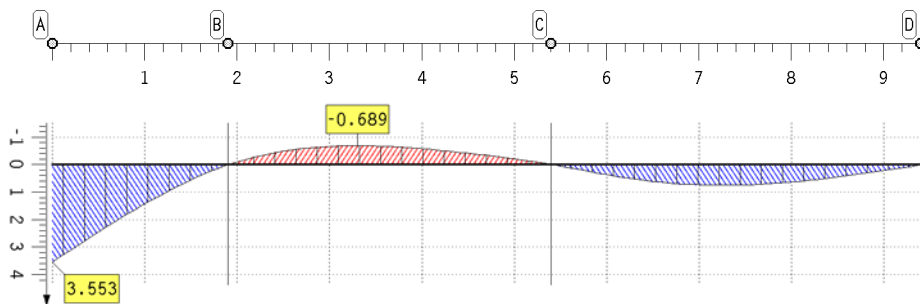
support forces

point	x m	AP kN	AP _l kN	AP _r kN	ΣAP kN
B	1.900	0.45	0.00	-0.00	0.45
C	5.400	-3.25	-0.00	0.00	-3.25
D	9.400	-2.00	-----	-----	-2.00

connector reactions

x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm	x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm
0.200	-0.00	0.00	-0.00	0.00	2.500	0.02	0.00	0.02	0.00
0.600	-0.00	0.00	-0.00	0.00	2.900	0.01	0.00	0.01	0.00
1.000	0.00	0.00	0.00	0.00	4.400	-0.35	0.00	-0.35	0.00
1.400	0.02	0.00	0.02	0.00	4.800	-0.57	0.00	-0.57	0.00
1.800	0.06	0.00	0.06	0.00	5.200	0.76	0.00	0.76	0.00
2.100	0.05	0.00	0.05	0.00					

10.5. Action effect 3: load case 5: snow deflections of main beam (characteristic)

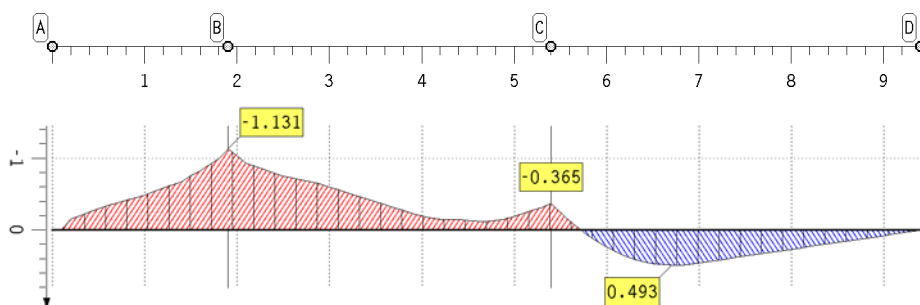


deflection
main beam
characteristic
w in mm
Min: -0.69
Max: 3.55

deflections of main beam (characteristic)

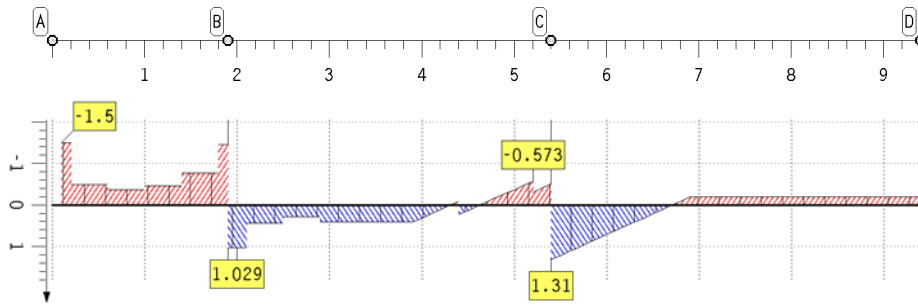
point	x m	w mm	point	x m	w mm	point	x m	w mm	point	x m	w mm
A	0.000	3.55		3.300	-0.69		6.400	0.58	minimum		-0.69
B	1.900	0.00		4.200	-0.51		7.200	0.75	maximum		3.55
B	1.900	0.00	C	5.400	-0.00		8.100	0.59			
	2.600	-0.55	C	5.400	0.00	D	9.400	-0.00			

internal forces and moments



flexural moment
main beam
M in kNm
Min: -1.13
Max: 0.49

internal forces and moments



shear force
main beam
V in kN
Min: -1.50
Max: 1.31

internal forces and moments

point	x m	main beam		reinf. left		reinf. right	
		M kNm	V kN	M _l kNm	V _l kN	M _r kNm	V _r kN
A	0.000	0.00	-0.00	-0.00	0.00	0.00	-0.00
	0.100	-0.00	-0.00	0.00	0.00	-0.00	-0.00
	0.100	0.00	-1.50	-0.00	-0.00	-0.00	0.00
	0.200	-0.15	-1.50	-0.00	-0.00	0.00	0.00
	0.200	-0.15	-0.49	-0.00	-0.51	-0.00	-0.51
	0.600	-0.34	-0.49	-0.20	-0.51	-0.20	-0.51
	0.600	-0.34	-0.36	-0.20	-0.57	-0.20	-0.57
	1.400	-0.68	-0.47	-0.64	-0.52	-0.64	-0.52
	1.400	-0.68	-0.78	-0.64	-0.36	-0.64	-0.36
	1.800	-0.99	-0.78	-0.78	-0.36	-0.78	-0.36
	1.800	-0.99	-1.46	-0.78	-0.02	-0.78	-0.02
	1.900	-1.13	-1.46	-0.78	-0.02	-0.78	-0.02
B	1.900	-1.13	1.03	-0.78	-0.02	-0.78	-0.02
	2.100	-0.93	1.03	-0.79	-0.02	-0.79	-0.02
	2.100	-0.93	0.45	-0.79	0.27	-0.79	0.27
	2.500	-0.75	0.45	-0.68	0.27	-0.68	0.27
	2.500	-0.75	0.28	-0.68	0.36	-0.68	0.36
	2.900	-0.64	0.28	-0.54	0.36	-0.54	0.36
	2.900	-0.64	0.41	-0.54	0.29	-0.54	0.29
	3.900	-0.22	0.41	-0.25	0.29	-0.25	0.29
	4.400	-0.14	-0.09	-0.10	0.29	-0.10	0.29
	4.400	-0.14	0.23	-0.10	0.13	-0.10	0.13
	4.600	-0.12	0.03	-0.08	0.13	-0.08	0.13
	5.200	-0.28	-0.57	-0.00	0.13	-0.00	0.13
C	5.200	-0.28	-0.31	0.00	-0.00	0.00	-0.00
	5.400	-0.37	-0.51	-0.00	-0.00	0.00	-0.00
C	5.400	-0.37	1.31	-----	-----	-----	-----
	6.100	0.31	0.61	-----	-----	-----	-----
	6.700	0.49	0.01	-----	-----	-----	-----
	6.900	0.47	-0.19	-----	-----	-----	-----
D	9.400	0.00	-0.19	-----	-----	-----	-----
minimum		-1.13	-1.50	-0.79	-0.57	-0.79	-0.57
maximum		0.49	1.31	0.00	0.36	0.00	0.36

support forces

point	x m	AP kN	AP _l kN	AP _r kN	ΣAP kN
B	1.900	-2.49	-0.00	-0.00	-2.49
C	5.400	-1.82	-0.00	-0.00	-1.82
D	9.400	-0.19	-----	-----	-0.19

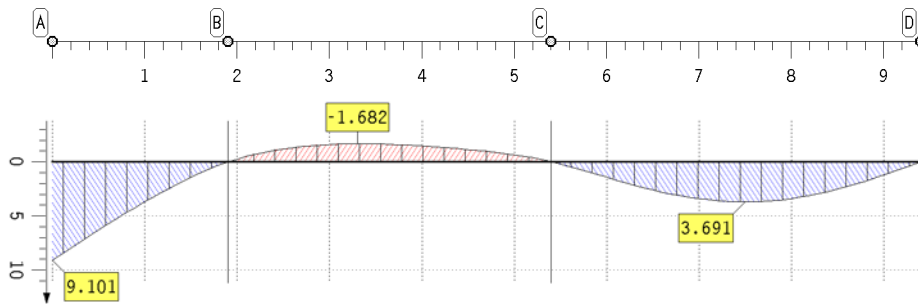
connector reactions

x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm	x m	CP _l kN	CM _l kNm	CP _r kN	CM _r kNm
0.200	0.51	0.00	0.51	0.00	2.500	-0.08	0.00	-0.08	0.00
0.600	0.06	0.00	0.06	0.00	2.900	0.07	0.00	0.07	0.00
1.000	-0.05	0.00	-0.05	0.00	4.400	0.16	0.00	0.16	0.00
1.400	-0.15	0.00	-0.15	0.00	4.800	0.00	0.00	0.00	0.00
1.800	-0.34	0.00	-0.34	0.00	5.200	0.13	0.00	0.13	0.00
2.100	-0.29	0.00	-0.29	0.00					

11. Results of action effects

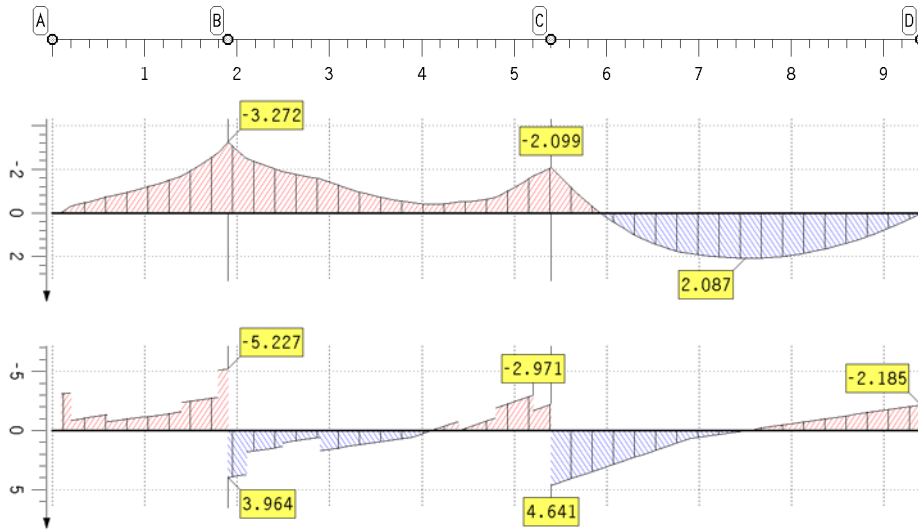
11.1. Action effect 1: permanent loads

extremal deflections of main beam (characteristic)



deflection
main beam
characteristic
w in mm
Min: -1.68
Max: 9.10

extremal internal forces

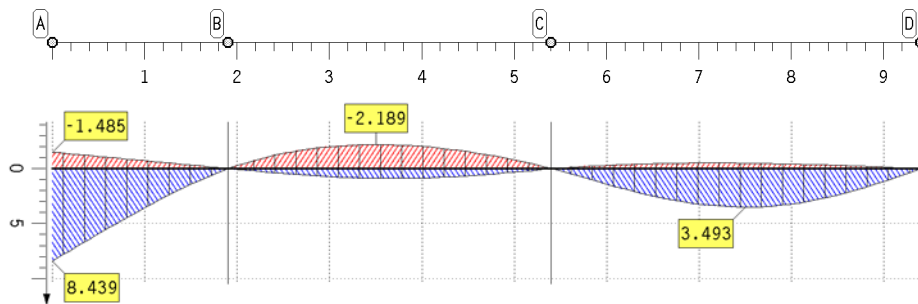


flexural moment
main beam
M in kNm
Min: -3.27
Max: 2.09

shear force
main beam
V in kN
Min: -5.23
Max: 4.64

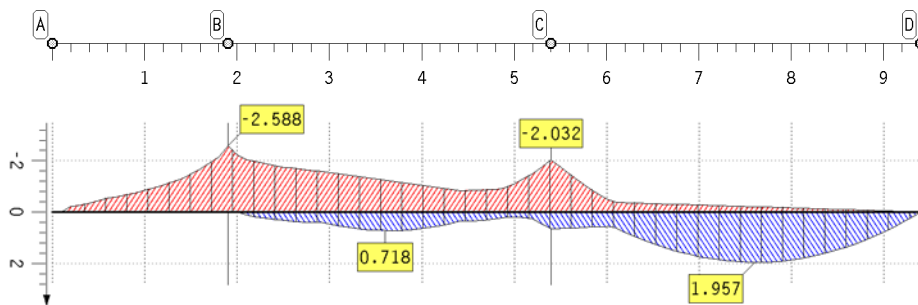
11.2. Action effect 2: live loads

extremal deflections of main beam (characteristic)



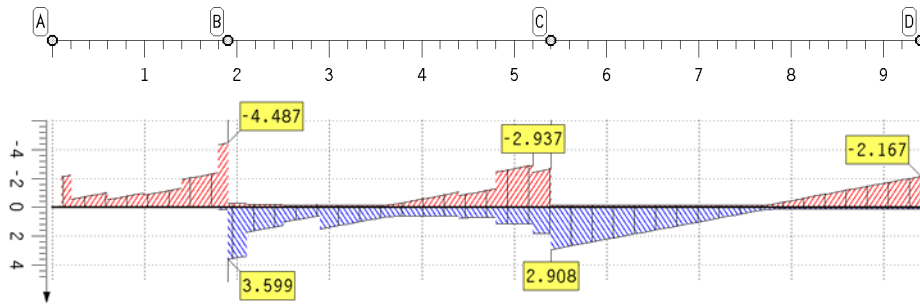
deflection
main beam
characteristic
w in mm
Min: -2.19
Max: 8.44

extremal internal forces



flexural moment
main beam
M in kNm
Min: -2.59
Max: 1.96

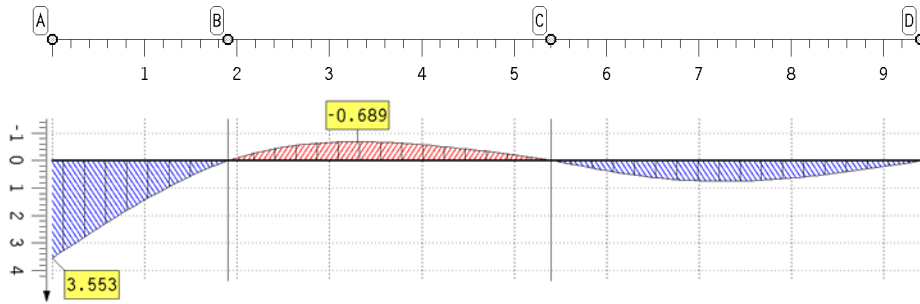
extremal internal forces



shear force
main beam
V in kN
Min: -4.49
Max: 3.60

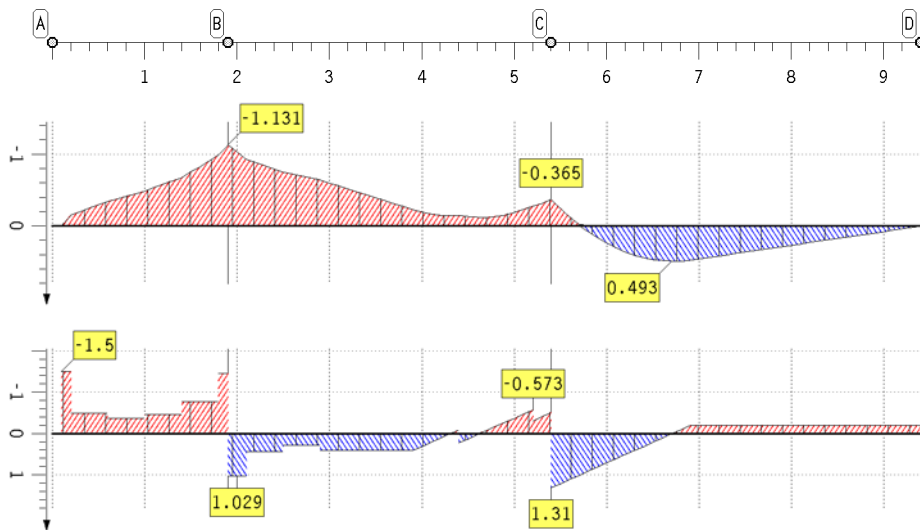
11.3. Action effect 3: snow

extremal deflections of main beam (characteristic)



deflection
main beam
characteristic
w in mm
Min: -0.69
Max: 3.55

extremal internal forces



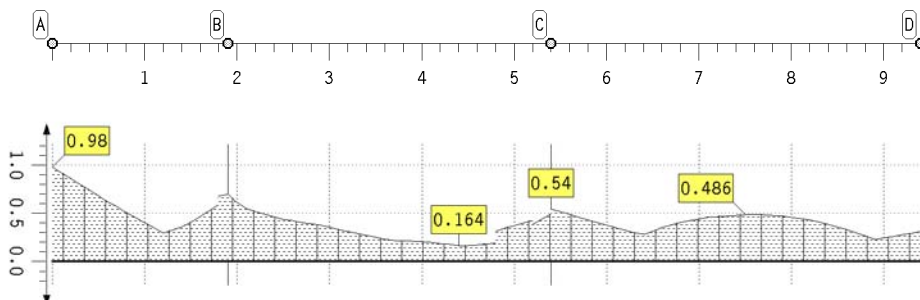
flexural moment
main beam
M in kNm
Min: -1.13
Max: 0.49

shear force
main beam
V in kN
Min: -1.50
Max: 1.31

12. Summary

12.1. Summary of all verifications

maximal utilization



utilization
Max: 0.98

maximal utilization

point	x	U	point	x	U	point	x	U	point	x	U
-	m	-	-	m	-	-	m	-	-	m	-
A	0.000	0.980		2.500	0.435	C	5.400	0.540		8.900	0.230
	1.200	0.298		4.400	0.164		6.400	0.279	D	9.400	0.315
B	1.900	0.702		4.800	0.195		6.900	0.427	minimum		0.164
B	1.900	0.702		4.800	0.318		7.600	0.486	maximum		0.980
	2.100	0.545	C	5.400	0.498		8.200	0.426			

maximal connector utilization

x	U	x	U	x	U
m	-	m	-	m	-
0.200	0.35	1.800	0.36	4.400	0.16
0.600	0.10	2.100	0.31	4.800	0.17
1.000	0.02	2.500	0.06	5.200	0.30
1.400	0.12	2.900	0.18		

13. Utilizations of all verifications

all verifications successful!