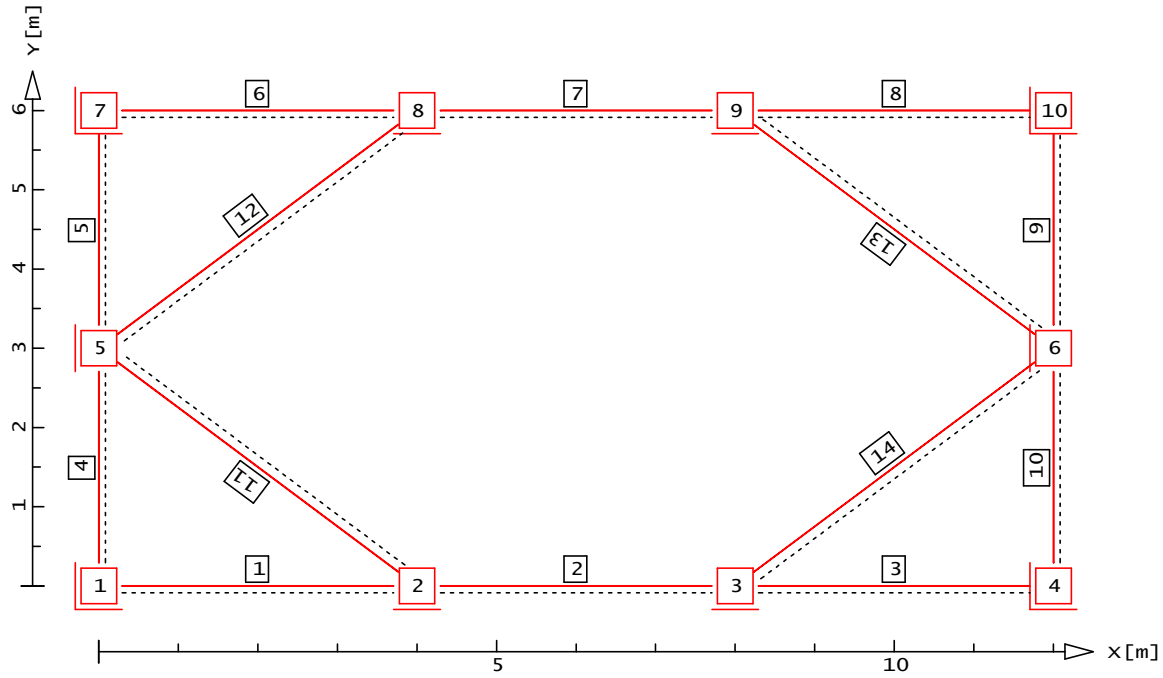
Pos. 02 **Gurtung oben**

System
M 1:95



Knotenbeschreibung

Knoten	X [m]	Y [m]	Knoten	X [m]	Y [m]
1 XY	0.00	0.00	2 Y	4.00	0.00
3 Y	8.00	0.00	4 XY	12.00	0.00
5 X	0.00	3.00	6 X	12.00	3.00
7 XY	0.00	6.00	8 Y	4.00	6.00
9 Y	8.00	6.00	10 XY	12.00	6.00

Festhaltung: X=horizontal Y=vertikal R=Drehung

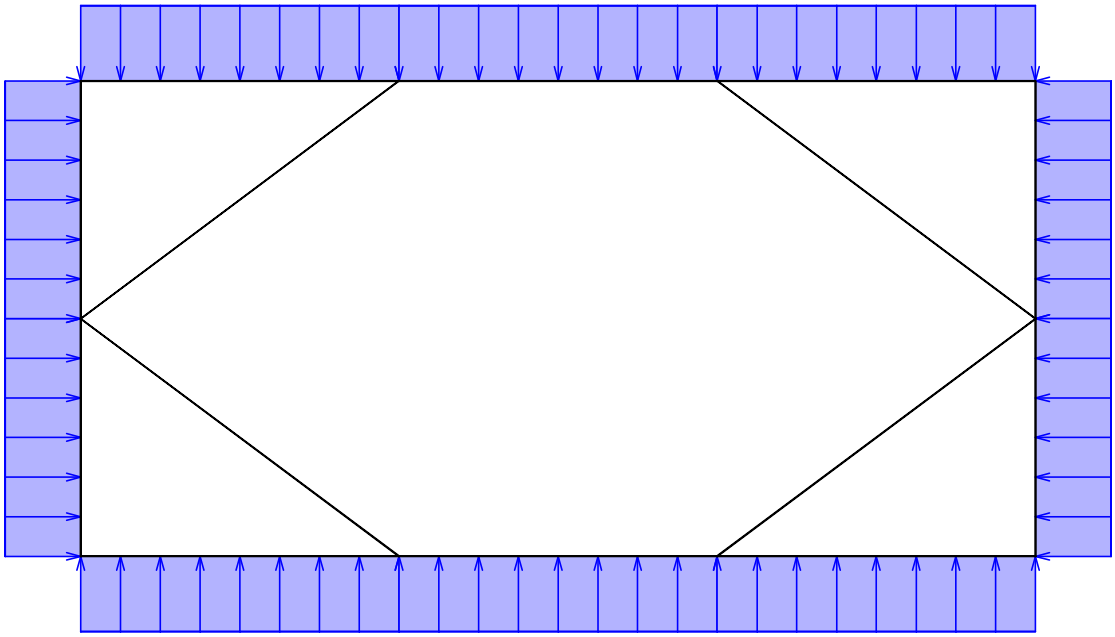
Stabbeschreibung

St	von Knoten	bis Knoten	I [cm4]	A [cm²]	h [mm]	Mnr
1	1	2	31310	220	290	1
2	2	3	31310	220	290	1
3	3	4	31310	220	290	1
4	1	5	31310	220	290	1
5	5	7	31310	220	290	1
6	7	8	31310	220	290	1
7	8	9	31310	220	290	1
8	9	10	31310	220	290	1
9	6	10	31310	220	290	1
10	4	6	31310	220	290	1
11	2	5	31310	220	290	1
12	5	8	31310	220	290	1
13	6	9	31310	220	290	1
14	3	6	31310	220	290	1

Materialwerte	Elastizitätsmodul	E =	210000 MN/m²
	Temperaturdehnzahl	aT =	1.2e-005 1/K

Belastung

Bild 1 Lastfall 1
M 1:95



Lf	Lastart	St	K	R	sl/a [m]	sr/s [m]	q li/Q [kN/m,kN]	q re/M [kN/m,kNm]
1	Gleichlast	1		Y			-206.00	-206.00
		2		Y			-206.00	-206.00
		3		Y			-206.00	-206.00
		4		X			206.00	206.00
		5		X			206.00	206.00
		6		Y			206.00	206.00
		7		Y			206.00	206.00
		8		Y			206.00	206.00
		9		X			-206.00	-206.00
		10		X			-206.00	-206.00

Kombinationen

Lk	Art	Bemerkung
1	Min/Max	

Lastkombinationsfaktoren

Lk	*LF 1	LF 2	LF 3	LF 4	LF 5	LF 6
1	1.35					
2	1.00					

* = Lastfall ständig vorhanden

Schnittgrößen Extremwerte aller Lastkombinationen

Stab	x	Maximalwerte N	Q	M	Minimalwerte N	Q	M
	[m]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kNm]
1	0.00	-0.65	-534.80	305.81	-0.65	-534.80	305.81
	1.92	-0.65	0.00	-208.42			
	1.92				-0.65	0.00	-208.42
	4.00	-0.65	577.60	391.41	-0.65	577.60	391.41
2	0.00	1.30	-556.20	378.73	1.30	-556.20	378.73
	2.00				1.30	0.00	-177.47
	2.00	1.30	0.00	-177.47			
	4.00	1.30	556.20	378.73	1.30	556.20	378.73
3	0.00	-0.65	-577.60	391.41	-0.65	-577.60	391.41
	2.08	-0.65	0.00	-208.42			
	2.08				-0.65	0.00	-208.42
	4.00	-0.65	534.80	305.81	-0.65	534.80	305.81
4	0.00	0.00	465.77	-305.81	0.00	465.77	-305.81
	1.67				0.00	0.00	84.23
	1.67	0.00	0.00	84.23			
	3.00	0.00	-368.53	-159.96	0.00	-368.53	-159.96
5	0.00	0.00	368.53	-159.96	0.00	368.53	-159.96
	1.33	0.00	0.00	84.23			
	1.33				0.00	0.00	84.23
	3.00	0.00	-465.77	-305.81	0.00	-465.77	-305.81
6	0.00	-0.65	534.80	-305.81	-0.65	534.80	-305.81
	1.92	-0.65	0.00	208.42			
	1.92				-0.65	0.00	208.42
	4.00	-0.65	-577.60	-391.41	-0.65	-577.60	-391.41
7	0.00	1.30	556.20	-378.73	1.30	556.20	-378.73
	2.00				1.30	0.00	177.47
	2.00	1.30	0.00	177.47			
	4.00	1.30	-556.20	-378.73	1.30	-556.20	-378.73
8	0.00	-0.65	577.60	-391.41	-0.65	577.60	-391.41
	2.08	-0.65	0.00	208.42			
	2.08				-0.65	0.00	208.42
	4.00	-0.65	-534.80	-305.81	-0.65	-534.80	-305.81
9	0.00	0.00	-368.53	159.96	0.00	-368.53	159.96
	1.33	0.00	0.00	-84.23			
	1.33				0.00	0.00	-84.23

Stab	x	Maximalwerte N	Q	M	Minimalwerte N	Q	M
	[m]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kNm]
	3.00	0.00	465.77	305.81	0.00	465.77	305.81
10	0.00	0.00	-465.77	305.81	0.00	-465.77	305.81
	1.67				0.00	0.00	-84.23
	1.67	0.00	0.00	-84.23			
	3.00	0.00	368.53	159.96	0.00	368.53	159.96
11	0.00	-0.42	-3.80	12.68	-0.42	-3.80	12.68
	5.00	-0.42	-3.80	-6.34	-0.42	-3.80	-6.34
12	0.00	-0.42	3.80	-6.34	-0.42	3.80	-6.34
	5.00	-0.42	3.80	12.68	-0.42	3.80	12.68
13	0.00	-0.42	-3.80	6.34	-0.42	-3.80	6.34
	5.00	-0.42	-3.80	-12.68	-0.42	-3.80	-12.68
14	0.00	-0.42	3.80	-12.68	-0.42	3.80	-12.68
	5.00	-0.42	3.80	6.34	-0.42	3.80	6.34

Extremwerte (fett gedruckt) mit zugehörigen Größen

Verformungen Extremwerte aller Lastkombinationen

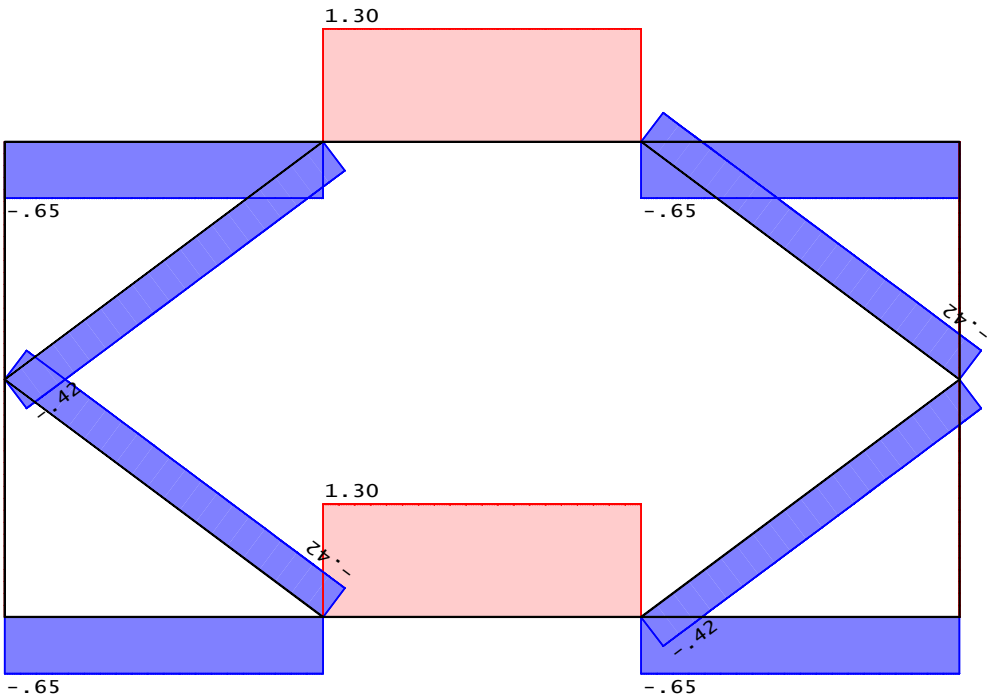
K	Maximalwerte x [cm]	y [cm]	r [rad]	Minimalwerte x [cm]	y [cm]	r [rad]
1	0.000	0.000	0.00111	0.000	0.000	0.00111
2	-0.000	0.000	-0.00024	-0.000	0.000	-0.00024
3	0.000	0.000	0.00024	0.000	0.000	0.00024
4	0.000	0.000	-0.00111	0.000	0.000	-0.00111
5	0.000	0.000	0.00000	0.000	0.000	0.00000
6	0.000	0.000	0.00000	0.000	0.000	0.00000
7	0.000	0.000	-0.00111	0.000	0.000	-0.00111
8	-0.000	0.000	0.00024	-0.000	0.000	0.00024
9	0.000	0.000	-0.00024	0.000	0.000	-0.00024
10	0.000	0.000	0.00111	0.000	0.000	0.00111

vorgegebene Verschiebungen sind enthalten

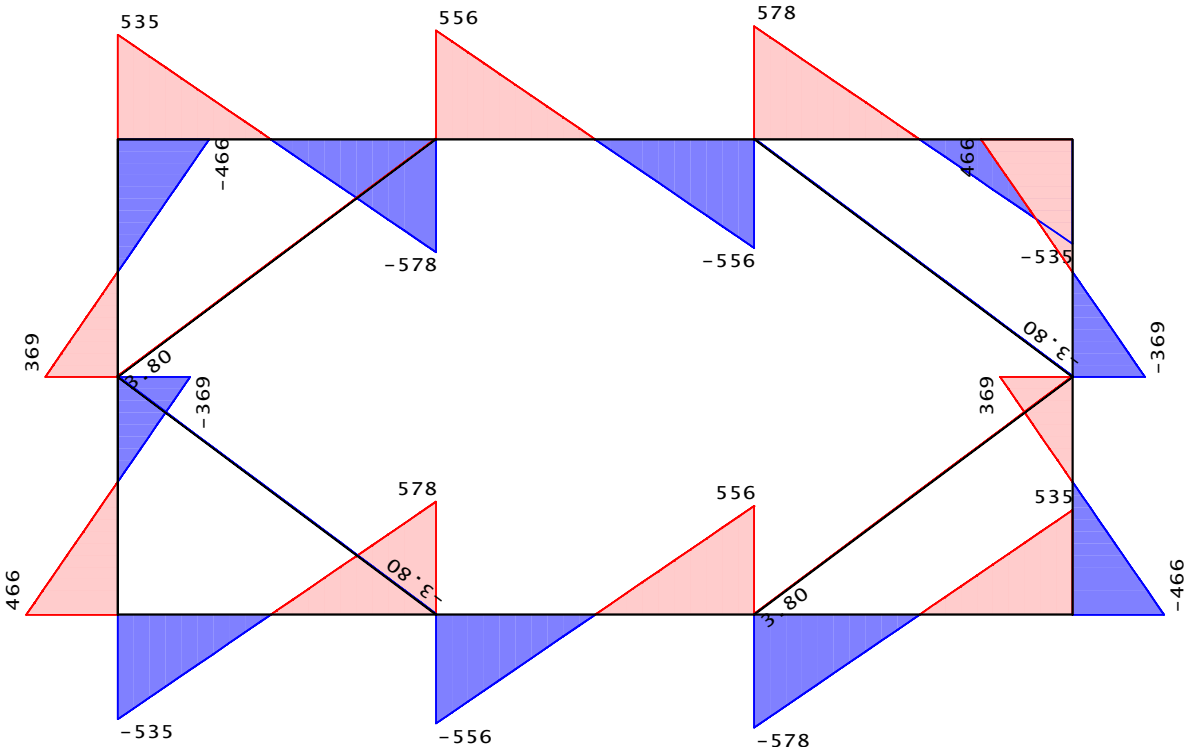
Auflagerkräfte Extremwerte aller Lastkombinationen

K	Maximalwerte X [kN]	Y [kN]	M [kNm]	Minimalwerte X [kN]	Y [kN]	M [kNm]
1	-465.12	-534.80	0.00	-465.12	-534.80	0.00
2	0.00	-1130.51	0.00	0.00	-1130.51	0.00
3	0.00	-1130.51	0.00	0.00	-1130.51	0.00
4	465.12	-534.80	0.00	465.12	-534.80	0.00
5	-740.97	0.00	0.00	-740.97	0.00	0.00
6	740.97	0.00	0.00	740.97	0.00	0.00
7	-465.12	534.80	0.00	-465.12	534.80	0.00
8	0.00	1130.51	0.00	0.00	1130.51	0.00
9	0.00	1130.51	0.00	0.00	1130.51	0.00
10	465.12	534.80	0.00	465.12	534.80	0.00

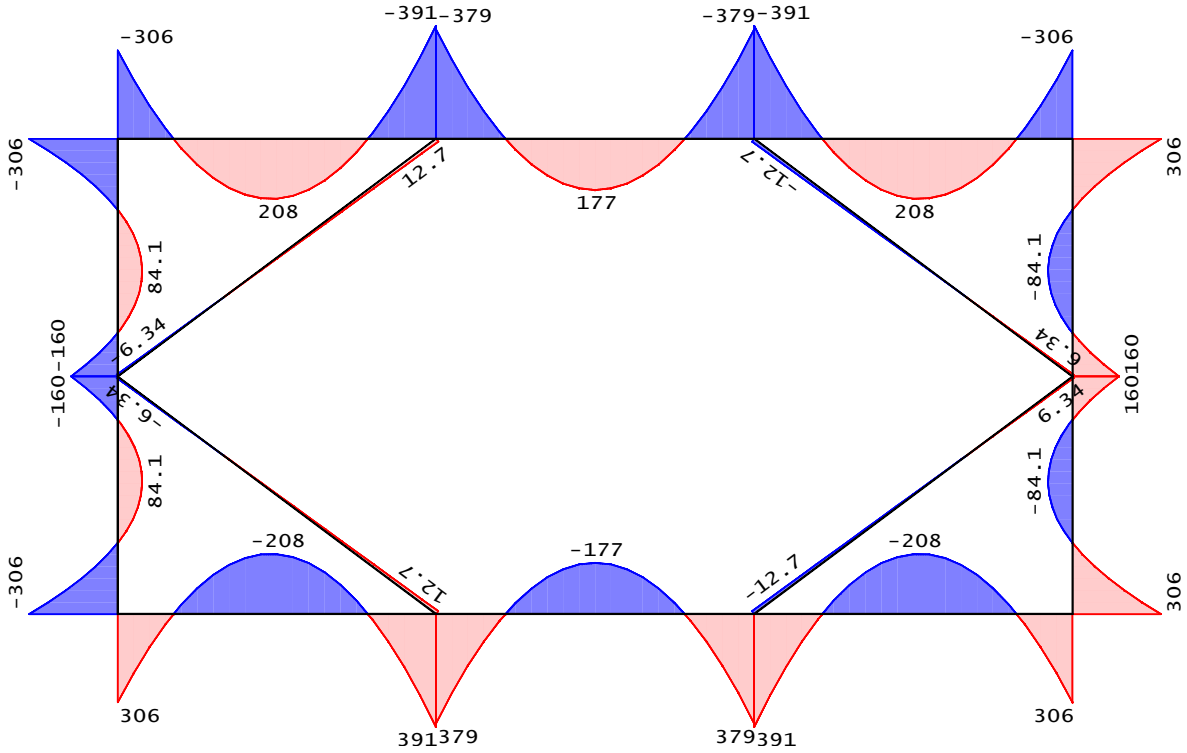
Normalkraft (kN) Extremwerte aller Lastkombinationen
M 1:95



Querkraft (kN) Extremwerte aller Lastkombinationen
M 1:95



Biegemoment (kNm) Extremwerte aller Lastkombinationen
M 1:95



Nachweise Tragsicherheitsnachweis nach DIN 18800, T1
(Verfahren Elast.-Elast.)

Der Nachweis der Tragsicherheit wird gemäß DIN 18800 Teil 1 (Nov.1990) Abschnitt 7.5.2, nach dem Verfahren Elastisch-Elastisch geführt.

Charakteristische und Bemessungswerte:

Streckgrenze	f yk =	240.00	N/mm²
Teilsicherheitsbeiwert	gamma m =	1.00	-
Grenznormalspannung	sigma Rd =	240.00	N/mm²
Grenzschubspannung	tau Rd =	138.56	N/mm²

St	Profil	h mm	b mm	t mm	r mm	s mm	A cm²	Iy cm4	Sy cm³
1	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
2	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
3	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
4	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
5	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
6	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
7	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
8	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
9	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
10	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
11	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
12	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
13	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262
14	HEM 260	290	268	32.5	24.0	18.0	220	31310	1262

Der Spannungsnachweis wird nach den Elementen 747 und 748 geführt.

Der Nachweis der Schlankheit des Steges erfolgt für den Größtwert der Druckspannungen nach Element 745 und Tab. 12. bzw. 14.
Flansche werden mit einem Randspannungsverhältnis psi = 1 nach Element 745 und Tab. 13 nachgewiesen.

Spannungsnachweis — Extremwerte aller Lastkombinationen
Maximalwerte

Stab	x [m]	max sigma [N/mm²]	max tau [N/mm²]	sigma v [N/mm²]	zugehörig sigma [N/mm²]	zugehörig tau [N/mm²]
1	0.00	141.61	119.76	214.08	86.47	113.07
	1.92	96.52	0.00	96.52	96.52	0.00
	4.00	181.24	129.34	238.71	110.66	122.12
2	0.00	175.40	124.55	230.12	107.11	117.59
	2.00	82.22	0.00	82.22	82.22	0.00
	4.00	175.40	124.55	230.12	107.11	117.59
3	0.00	181.24	129.34	238.71	110.66	122.12
	2.08	96.52	0.00	96.52	96.52	0.00
	4.00	141.61	119.76	214.08	86.47	113.07
4	0.00	141.58	104.30	191.21	86.44	98.47
	1.67	39.00	0.00	39.00	39.00	0.00
	3.00	74.06	82.52	142.94	0.00	82.52
5	0.00	74.06	82.52	142.94	0.00	82.52
	1.33	39.00	0.00	39.00	39.00	0.00
	3.00	141.58	104.30	191.21	86.44	98.47
6	0.00	141.61	119.76	214.08	86.47	113.07
	1.92	96.52	0.00	96.52	96.52	0.00
	4.00	181.24	129.34	238.71	110.66	122.12
7	0.00	175.40	124.55	230.12	107.11	117.59
	2.00	82.22	0.00	82.22	82.22	0.00
	4.00	175.40	124.55	230.12	107.11	117.59
8	0.00	181.24	129.34	238.71	110.66	122.12
	2.08	96.52	0.00	96.52	96.52	0.00
	4.00	141.61	119.76	214.08	86.47	113.07
9	0.00	74.06	82.52	142.94	0.00	82.52
	1.33	39.00	0.00	39.00	39.00	0.00
	3.00	141.58	104.30	191.21	86.44	98.47
10	0.00	141.58	104.30	191.21	86.44	98.47
	1.67	39.00	0.00	39.00	39.00	0.00
	3.00	74.06	82.52	142.94	0.00	82.52
11	0.00	5.89	0.85	5.90	5.89	0.21
	5.00	2.95	0.85	2.97	2.95	0.21
12	0.00	2.95	0.85	2.97	2.95	0.21
	5.00	5.89	0.85	5.90	5.89	0.21
13	0.00	2.95	0.85	2.97	2.95	0.21
	5.00	5.89	0.85	5.90	5.89	0.21
14	0.00	5.89	0.85	5.90	5.89	0.21
	5.00	2.95	0.85	2.97	2.95	0.21

Schlankheitsnachweis Extremwerte aller Lastkombinationen
Maximalwerte

Stab	x	sigma 1	psi	Steg grenz(b/t)	vorh(b/t)	Flansch grenz(b/t)	vorh(b/t)
	[m]	[N/mm²]	[-]	[-]	[-]	[-]	[-]
1	0.00	-86.47	-1.00	220.55	9.83	16.84	3.11
	1.92	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-110.66	-1.00	194.97	9.83	14.89	3.11
2	0.00	-106.99	-1.00	198.23	9.83	15.14	3.11
	2.00	-50.10	-1.00	289.47	9.83	22.12	3.11
	4.00	-106.99	-1.00	198.23	9.83	15.14	3.11
3	0.00	-110.66	-1.00	194.97	9.83	14.89	3.11
	2.08	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-86.47	-1.00	220.55	9.83	16.84	3.11
4	0.00	-86.44	-1.00	220.67	9.83	16.85	3.11
	1.67	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-45.21	-1.00	305.11	9.83	23.29	3.11
5	0.00	-45.21	-1.00	305.11	9.83	23.29	3.11
	1.33	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-86.44	-1.00	220.67	9.83	16.85	3.11
6	0.00	-86.47	-1.00	220.55	9.83	16.84	3.11
	1.92	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-110.66	-1.00	194.97	9.83	14.89	3.11
7	0.00	-106.99	-1.00	198.23	9.83	15.14	3.11
	2.00	-50.10	-1.00	289.47	9.83	22.12	3.11
	4.00	-106.99	-1.00	198.23	9.83	15.14	3.11
8	0.00	-110.66	-1.00	194.97	9.83	14.89	3.11
	2.08	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-86.47	-1.00	220.55	9.83	16.84	3.11
9	0.00	-45.21	-1.00	305.11	9.83	23.29	3.11
	1.33	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-86.44	-1.00	220.67	9.83	16.85	3.11
10	0.00	-86.44	-1.00	220.67	9.83	16.85	3.11
	1.67	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-45.21	-1.00	305.11	9.83	23.29	3.11
11	0.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
	5.00	-1.81	-0.98	1507.74	9.83	116.65	3.11
12	0.00	-1.81	-0.98	1507.74	9.83	116.65	3.11
	5.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
13	0.00	-1.81	-0.98	1507.74	9.83	116.65	3.11
	5.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
14	0.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
	5.00	-1.81	-0.98	1507.74	9.83	116.65	3.11

Spannungsnachweis Extremwerte aller Lastkombinationen
Minimalwerte

Stab	x	max sigma	max tau	sigma v	zugehörig sigma	tau
	[m]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]
1	0.00	141.61	119.76	214.08	86.47	113.07
	1.92	96.52	0.00	96.52	96.52	0.00
	4.00	181.24	129.34	238.71	110.66	122.12
2	0.00	175.40	124.55	230.12	107.11	117.59
	2.00	82.22	0.00	82.22	82.22	0.00
	4.00	175.40	124.55	230.12	107.11	117.59
3	0.00	181.24	129.34	238.71	110.66	122.12

Stab	x [m]	max sigma [N/mm²]	max tau [N/mm²]	sigma v [N/mm²]	zugehörig sigma [N/mm²]	zugehörig tau [N/mm²]
	2.08	96.52	0.00	96.52	96.52	0.00
	4.00	141.61	119.76	214.08	86.47	113.07
4	0.00	141.58	104.30	191.21	86.44	98.47
	1.67	39.00	0.00	39.00	39.00	0.00
	3.00	74.06	82.52	142.94	0.00	82.52
5	0.00	74.06	82.52	142.94	0.00	82.52
	1.33	39.00	0.00	39.00	39.00	0.00
	3.00	141.58	104.30	191.21	86.44	98.47
6	0.00	141.61	119.76	214.08	86.47	113.07
	1.92	96.52	0.00	96.52	96.52	0.00
	4.00	181.24	129.34	238.71	110.66	122.12
7	0.00	175.40	124.55	230.12	107.11	117.59
	2.00	82.22	0.00	82.22	82.22	0.00
	4.00	175.40	124.55	230.12	107.11	117.59
8	0.00	181.24	129.34	238.71	110.66	122.12
	2.08	96.52	0.00	96.52	96.52	0.00
	4.00	141.61	119.76	214.08	86.47	113.07
9	0.00	74.06	82.52	142.94	0.00	82.52
	1.33	39.00	0.00	39.00	39.00	0.00
	3.00	141.58	104.30	191.21	86.44	98.47
10	0.00	141.58	104.30	191.21	86.44	98.47
	1.67	39.00	0.00	39.00	39.00	0.00
	3.00	74.06	82.52	142.94	0.00	82.52
11	0.00	5.89	0.85	5.90	5.89	0.21
	5.00	2.95	0.85	2.97	2.95	0.21
12	0.00	2.95	0.85	2.97	2.95	0.21
	5.00	5.89	0.85	5.90	5.89	0.21
13	0.00	2.95	0.85	2.97	2.95	0.21
	5.00	5.89	0.85	5.90	5.89	0.21
14	0.00	5.89	0.85	5.90	5.89	0.21
	5.00	2.95	0.85	2.97	2.95	0.21

Schlankheitsnachweis — Extremwerte aller Lastkombinationen
Minimalwerte

Stab	x [m]	sigma 1 [N/mm²]	Steg psi [-]	Steg grenz(b/t) [-]	Steg vorh(b/t) [-]	Flansch grenz(b/t) [-]	Flansch vorh(b/t) [-]
1	0.00	-86.47	-1.00	220.55	9.83	16.84	3.11
	1.92	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-110.66	-1.00	194.97	9.83	14.89	3.11
2	0.00	-106.99	-1.00	198.23	9.83	15.14	3.11
	2.00	-50.10	-1.00	289.47	9.83	22.12	3.11
	4.00	-106.99	-1.00	198.23	9.83	15.14	3.11
3	0.00	-110.66	-1.00	194.97	9.83	14.89	3.11
	2.08	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-86.47	-1.00	220.55	9.83	16.84	3.11
4	0.00	-86.44	-1.00	220.67	9.83	16.85	3.11
	1.67	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-45.21	-1.00	305.11	9.83	23.29	3.11
5	0.00	-45.21	-1.00	305.11	9.83	23.29	3.11
	1.33	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-86.44	-1.00	220.67	9.83	16.85	3.11
6	0.00	-86.47	-1.00	220.55	9.83	16.84	3.11
	1.92	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-110.66	-1.00	194.97	9.83	14.89	3.11
7	0.00	-106.99	-1.00	198.23	9.83	15.14	3.11

Stab	x [m]	sigma 1 [N/mm²]	psi [-]	Steg grenz(b/t) [-]	Steg vorh(b/t) [-]	Flansch grenz(b/t) [-]	Flansch vorh(b/t) [-]
	2.00	-50.10	-1.00	289.47	9.83	22.12	3.11
	4.00	-106.99	-1.00	198.23	9.83	15.14	3.11
8	0.00	-110.66	-1.00	194.97	9.83	14.89	3.11
	2.08	-58.94	-1.00	267.09	9.83	20.40	3.11
	4.00	-86.47	-1.00	220.55	9.83	16.84	3.11
9	0.00	-45.21	-1.00	305.11	9.83	23.29	3.11
	1.33	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-86.44	-1.00	220.67	9.83	16.85	3.11
10	0.00	-86.44	-1.00	220.67	9.83	16.85	3.11
	1.67	-23.81	-1.00	420.47	9.83	32.10	3.11
	3.00	-45.21	-1.00	305.11	9.83	23.29	3.11
11	0.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
	5.00	-1.81	-0.98	1507.74	9.83	116.65	3.11
12	0.00	-1.81	-0.98	1507.74	9.83	116.65	3.11
	5.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
13	0.00	-1.81	-0.98	1507.74	9.83	116.65	3.11
	5.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
14	0.00	-3.60	-0.99	1074.76	9.83	82.60	3.11
	5.00	-1.81	-0.98	1507.74	9.83	116.65	3.11