Technical Data

Stainless Steel Parts MQ and MQK

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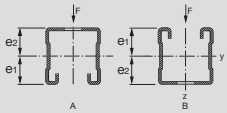
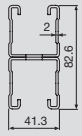
February 2015

Technical data for channel profile MQ (stainless steel)

Definition of axes								
			MQ-21-RA2	**MQ-21-R**	**MQ-41-RA2**	**MQ-41-R**	**MQ-21 D-R**	**MQ-41 D-R**
Channel wall thickness	t	[mm]	2.0	2.0	2.0	2.0	2.0	2.0
Cross-sectional area	A	[mm²]	165.3	165.3	245.1	245.1	330.6	490.3
Channel weight		[kg/m]	1.45	1.47	2.09	2.12	2.96	4.27
Delivered length		[m]	3/6	3/6	3/6	3/6	3/6	3/6
Material								
Permissible stress	δ_{perm}	[N/mm²]	149.4	155.8	149.4	155.8	155.8	155.8
E-module		[N/mm²]	200000	200000	200000	200000	200000	200000
Surface								
Stainless steel A2 (1.4301)			•		•			
Stainless steel A4 (1.4571/1.4404)				•		•	•	•
Cross-section values y-axis								
Axis of gravity A[1)]	e_1	[mm]	10.84	10.84	21.13	21.13	20.60	41.30
Axis of gravity B	e_2	[mm]	9.76	9.76	20.17	20.17	20.60	41.30
Moment of inertia	I_y	[cm⁴]	0.92	0.92	5.37	5.37	4.98	30.69
Reaction modulus A	W_{y1}	[cm³]	0.85	0.85	2.54	2.54	2.42	7.43
Reaction modulus B	W_{y2}	[cm³]	0.94	0.94	2.66	2.66	2.42	7.43
Radius of gyration	i_y	[cm]	0.74	0.74	1.48	1.48	1.23	2.50
Permissible moment[2)]	M_y	[Nm]	121	132	363	396	377	1158
Z-axis								
Moment of inertia	I_z	[cm⁴]	4.39	4.39	7.33	7.33	8.78	14.67
Reaction modulus	W_z	[cm³]	2.13	2.13	3.55	3.55	4.25	7.10
Radius of gyration	i_z	[cm]	1.63	1.63	1.73	1.73	1.63	1.73

• The permissible stress $\sigma_D / \gamma_{G/Q}$ where y = 1.4. σ_D results from the higher yield strength (point) resulting from cold forming as per EN 1993-1-3: 2010-12: $\sigma_D = f_{yk} / \gamma_M$ where $\gamma_M = 1.1$.

1) For the arithmetical bending dimensioning is the smaller value (W_{y1}, W_{y2}) decisive to ($W_{y1} = I_{y/e1}$ bzw. $W_{y2} = I_{y/e2}$).

2) My = δ_{zul} x min. (W_{y1}, W_{y2})

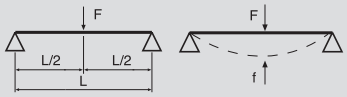
Channel selection:

• The given data is based on a single span (simply-supported beam) bearing a single load, F(N), at mid span, L/2.

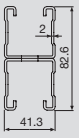
• The permissible stress in the steel and the max. deflection, L/200, are not exceeded with the given max. span widths, L (mm).

• The channel's own weight has been considered.

Technical data for channel profile MQ (max. span width/deflection at single load)





	Max. span width L [cm] / deflection f [mm], max. L/200 at single load							
	MQ-21-RA2 MQ-21-R		**MQ-41-RA2 MQ-41-R**		**MQ-21 D-R**		**MQ-41 D-R**	
load F [kN]	**L**	**f**	**L**	**f**	**L**	**f**	**L**	**f**
0.25	130	6	299	15	282	14	600	30
0.50	93	5	221	11	211	11	485	24
0.75	67	3	183	9	175	9	414	21
1.00	50	1	150	7	142	6	367	18
1.25	40	<1	120	4	114	4	332	17
1.50	34	<1	101	3	95	3	296	14
1.75	29	<1	86	2	82	2	257	11
2.00	25	<1	76	2	72	2	226	8
2.25	22	<1	67	1	64	1	202	7
2.50	20	<1	61	1	58	1	182	5
2.75	18	<1	55	<1	52	<1	166	5
3.00	17	<1	50	<1	48	<1	153	4
3.50	14	<1	43	<1	41	<1	131	3
4.00	12	<1	38	<1	36	<1	115	2
4.50	11	<1	34	<1	32	<1	102	2
5.00	10	<1	30	<1	29	<1	92	1
6.00	8	<1	25	<1	24	<1	77	<1
7.00	7	<1	21	<1	20	<1	66	<1
8.00	6	<1	19	<1	18	<1	58	<1

Selection example:

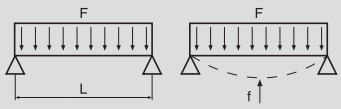
• 1.0 kN (≈ 100 kg) should be carried by a channel with a channel span width L = 100 cm (single span simply supported).

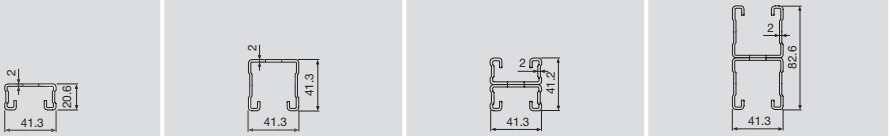
Solution:

• Select the line with the load, F = 1.0 kN.

• The channels MQ-41-RA2 to MQ-41 D-R can be used because the permissible span width (table value) is larger or equal to the required span width of L = 100 cm.

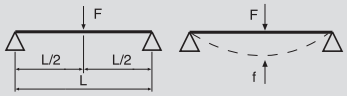
Technical data for channel profile MQ (max. span width/deflection at uniform distributed load)

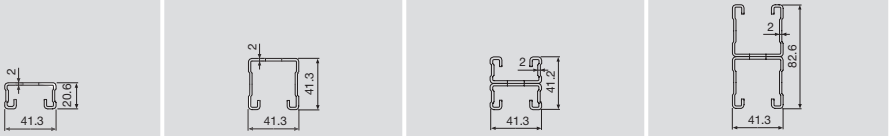




	Max. span width L [cm] / deflection f [mm], max. L/200 at uniform distributed load							
	MQ-21-RA2 MQ-21-R		MQ-41-RA2 MQ-41-R		MQ-21 D-R		MQ-41 D-R	
load F [kN]	L	f	L	f	L	f	L	f
0.25	161	8	357	18	332	17	600	23
0.50	117	6	272	14	258	13	566	28
0.75	96	5	227	11	217	11	496	25
1.00	84	4	199	10	190	10	446	22
1.25	75	4	179	9	172	9	407	20
1.50	67	3	164	8	157	8	377	19
1.75	57	2	152	8	146	7	352	18
2.00	50	2	143	7	137	7	332	17
2.25	44	1	133	7	126	6	315	16
2.50	40	1	120	5	114	5	300	15
2.75	36	<1	109	4	104	4	287	14
3.00	33	<1	100	4	95	3	275	14
3.50	28	<1	86	3	82	3	256	13
4.00	25	<1	75	2	72	2	226	10
4.50	22	<1	67	2	64	2	202	8
5.00	19	<1	60	1	57	1	182	7
6.00	16	<1	50	<1	48	<1	153	5
7.00	13	<1	43	<1	41	<1	131	3
8.00	11	<1	37	<1	36	<1	115	3

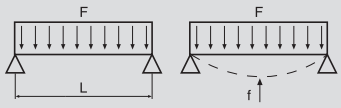
Technical data for channel profile MQ (max. load/deflection at single load)

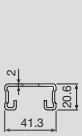


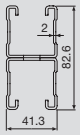


	Max. load F [kN] / deflection f [mm], max. L/200 bei single load							
	MQ-21-RA2 MQ-21-R		MQ-41-RA2 MQ-41-R		MQ-21 D-R		MQ-41 D-R	
Span width L [cm]	F	f	F	f	F	f	F	f
25	2.01	0.4	6.03	0.2	5.73	0.2	18.36	<0.1
50	1.01	1.4	3.03	0.7	2.88	0.8	9.23	0.4
75	0.67	3.2	2.02	1.7	1.91	1.7	6.15	0.9
100	0.43	5.0	1.51	2.9	1.43	3.0	4.61	1.6
125	0.27	6.3	1.20	4.6	1.14	4.7	3.68	2.5
150	0.18	7.5	1.00	6.7	0.94	6.8	3.06	3.5
175	0.13	8.8	0.82	8.8	0.75	8.8	2.61	4.8
200	0.09	10.0	0.62	10.0	0.56	10.0	2.27	6.3
225	0.07	11.3	0.48	11.3	0.43	11.3	2.01	8.0
250	0.05	12.5	0.38	12.5	0.34	12.5	1.80	9.9
275	0.03	13.8	0.31	13.8	0.27	13.8	1.63	12.0
300	0.02	15.0	0.25	15.0	0.21	15.0	1.48	14.3
325	-	-	0.20	16.3	0.17	16.3	1.31	16.3
350	-	-	0.17	17.5	0.13	17.5	1.11	17.5
375	-	-	0.13	18.8	0.10	18.8	0.95	18.8
400	-	-	0.11	20.0	0.08	20.0	0.82	20.0
425	-	-	0.09	21.3	0.06	21.3	0.70	21.3
450	-	-	0.07	22.5	0.04	22.5	0.61	22.5
475	-	-	0.05	23.8	0.02	23.8	0.53	23.8
500	-	-	0.04	25.0	-	-	0.46	25.0
525	-	-	0.03	26.3	-	-	0.40	26.3
550	-	-	0.01	27.5	-	-	0.34	27.5
575	-	-	-	-	-	-	0.30	28.8
600	-	-	-	-	-	-	0.25	30.0

Technical data for channel profile MQ (max. load/deflection at uniform distributed load)



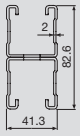




	Max. load F [kN] / deflection f [mm], max. L/200 at uniform distributed load							
	MQ-21-RA2 MQ-21-R		MQ-41-RA2 MQ-41-R		MQ-21 D-R		MQ-41 D-R	
span width L [cm]	**F**	**f**	**F**	**f**	**F**	**f**	**F**	**f**
25	4.04	0.4	12.15	0.2	11.55	0.2	37.04	0.1
50	2.02	1.8	6.07	0.9	5.76	0.9	18.51	0.5
75	1.24	3.8	4.04	2.1	3.83	2.1	12.32	1.1
100	0.69	5.0	3.02	3.7	2.86	3.8	9.22	2.0
125	0.43	6.3	2.41	5.8	2.28	5.9	7.36	3.1
150	0.29	7.5	1.80	7.5	1.66	7.5	6.11	4.4
175	0.20	8.8	1.31	8.8	1.20	8.8	5.22	6.0
200	0.15	10.0	0.99	10.0	0.90	10.0	4.55	7.9
225	0.11	11.3	0.77	11.3	0.69	11.3	4.02	9.9
250	0.08	12.5	0.61	12.5	0.54	12.5	3.60	12.3
275	0.05	13.8	0.49	13.8	0.43	13.8	3.00	13.8
300	0.04	15.0	0.40	15.0	0.34	15.0	2.49	15.0
325	-	-	0.32	16.3	0.27	16.3	2.10	16.3
350	-	-	0.26	17.5	0.21	17.5	1.78	17.5
375	-	-	0.22	18.8	0.16	18.8	1.52	18.8
400	-	-	0.17	20.0	0.12	20.0	1.31	20.0
425	-	-	0.14	21.3	0.09	21.3	1.13	21.3
450	-	-	0.11	22.5	0.06	22.5	0.98	22.5
475	-	-	0.08	23.8	0.03	23.8	0.85	23.8
500	-	-	0.06	25.0	-	-	0.73	25.0
525	-	-	0.04	26.3	-	-	0.64	26.3
550	-	-	0.02	27.5	-	-	0.55	27.5
575	-	-	-	-	-	-	0.47	28.8
600	-	-	-	-	-	-	0.40	30.0

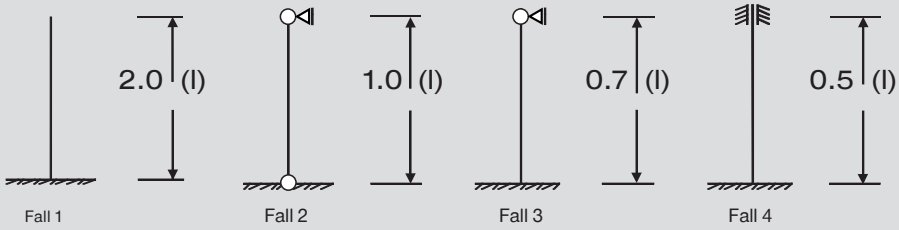
Permissible buckling load for channel profile MQ

• Flexural buckling certificate according to DIN 18800 and DASt-Rili 016 for C-Profiles (fully supporting cross-section)



Effective length Sk [cm]	MQ-21-RA2 MQ-21-R [KN]	MQ-41-RA2 MQ-41-R [KN]	MQ-21 D-R [KN]	MQ-41 D-R [KN]
25	23.05	36.37	48.72	75.92
50	18.81	34.18	44.66	72.67
75	13.22	31.38	39.58	67.86
100	8.78	27.89	33.14	62.09
125	6.05	23.77	26.34	55.15
150	4.37	19.60	20.56	47.46
175	3.30	15.95	16.16	39.94
200	-	13.02	12.92	33.35
225	-	10.73	10.51	27.91
250	-	8.96	8.70	23.54
275	-	7.58	7.31	20.03
300	-	6.48	6.23	17.22
325	-	5.60	-	14.94
350	-	4.89	-	13.07
375	-	-	-	11.52
400	-	-	-	10.23

Flexural buckling:
Rod length l (cm) / euler factor β/Sk (cm) effective length = l • β



• $\gamma_{G/Q}$ = 1.4 → F_D* = permissible buckling load 1.4 *(design value)

• Bend table is only valid for centric buckling loads. The values in this table aren't allowed for offset torque/oblique position/lateral-torsional buckling and must be engineered.

Technical data for bracket MQK (stainless steel)

		Type of load 1 Uniform	Type of load 2 Single	Type of load 3	Type of load 4	Type of load 5
		$F_1 = q \cdot i$	F_1 ½ ½	F_1	F_2 F_2 ⅓ ⅓ ⅓	F_3 F_3 F_3 ¼ ¼ ¼ ¼
Bracket	**L (mm)**	**F1 [N]**	**F1 [N]**	**F1 [N]**	**F2 [N]**	**F3 [N]**
Stainless steel A4 without angle brace		**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***
MQK-21/300 R	300	570	570	280	280	190
MQK-21/450 R	450	380	380	150	190	120
MQK-41/300 R	300	1700	1700	850	850	560
MQK-41/450 R	450	1130	1130	560	560	370
MQK-41/600 R	600	840	840	420	420	280
MQK-21 D/450 R	450	1050	1050	520	520	350
MQK-41 D/750 R	750	1600	1600	800	800	530

* The bearing capacity of the bracket with attachment **HST-R M12** alternative **HUS-HR 10x105** with h_{ef} min 67 mm.
- Load values are for grade ≥ C20/25 concrete.
- The bracket's own weight has been considered.
- The load's apply only if the bracket is fastened away from a building component edge (fastenings made at component edges must be designed separately).
- Separate verification must be provided that forces are transferred to the respective base material, i.e. steel and concrete.
- The application guidelines in anchor approvals must be observed. Loading values according to approval status October 2013.
- The deflection (deformation) of L/150 was observed in all cases, this being measured at the point of load application.

Technical data for bracket MQK with angle brace (stainless steel)

		Type of load 1 Uniform	Type of load 2 Single	Type of load 3	Type of load 4	Type of load 5
		$F_1 = q \cdot i$	F_1 ½ ½	F_1	F_2 F_2 ⅓ ⅓ ⅓	F_3 F_3 F_3 ¼ ¼ ¼ ¼
Bracket	**L (mm)**	**F1 [N]**	**F1 [N]**	**F1 [N]**	**F2 [N]**	**F3 [N]**
Stainless steel A4 with angle brace		**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***	**HST-R M12 HUS-HR 10x105/15/35/45***
MQK-21/450 R k	450	4520	1170	420	2020	1790
MQK-41/450 R k	450	6390	3520	2440	3190	2130
MQK-41/600 R l	600	5650	2630	2740	2570	1890
MQK-21 D/450 R k	450	6380	3350	2320	3190	2120
MQK-41 D/750 R l	750	4530	4530	2260	2260	1510

k = MQK-SK-R l = MQK-SL-R

* The bearing capacity of the bracket with attachment **HST-R M12** alternative **HUS-HR 10x105** with h_{ef} min 67 mm.
- Load values are for grade ≥ C20/25 concrete.
- The bracket's own weight has been considered.
- The load's apply only if the bracket is fastened away from a building component edge (fastenings made at component edges must be designed separately).
- Separate verification must be provided that forces are transferred to the respective base material, i.e. steel and concrete.
- The application guidelines in anchor approvals must be observed. Loading values according to approval status October 2013.
- The deflection (deformation) of L/150 was observed in all cases, this being measured at the point of load application.