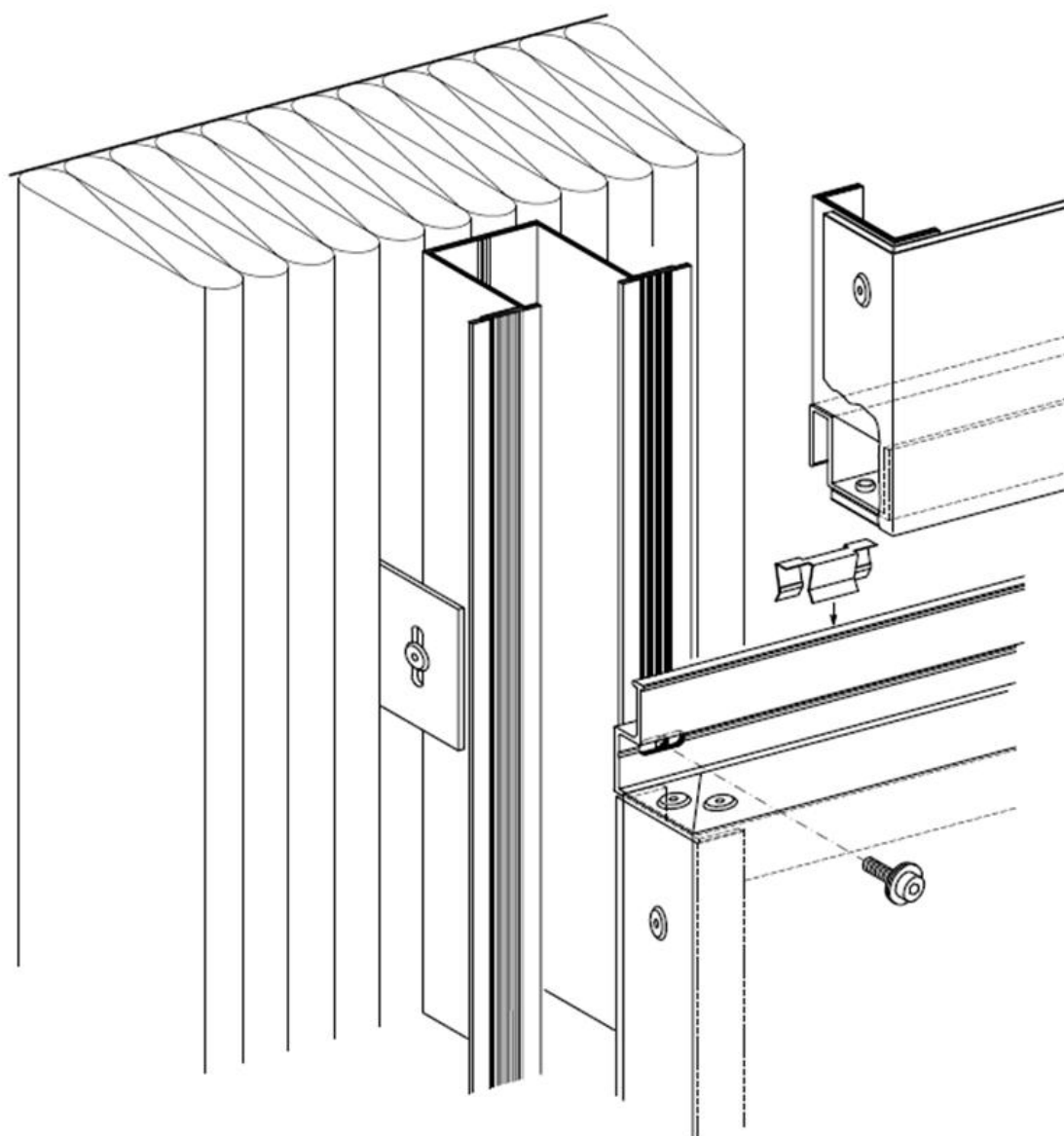


Horizontal layout of tray-panel, System SZ 20

Wind load tables for 3 and 4 mm ALUCOBOND®



System SZ 20, horizontal layout of tray-panel

General remarks

- The system SZ-20 can be used for elements with a maximum height of 1430 mm in a horizontal layout. All four sides of the ALUCOBOND® element have a standard return folding of 34 mm. The panels are reinforced using a S- and Z-section in the horizontal return foldings and – optional -different sections in the vertical return folding . The Z-section is fixed to an aluminium substructure by screws.

There are two variations using the system SZ-20:

- **Elements without intermediate bearing** (picture 1) – only vertical supporting profiles on the right and left side to fix the element.
In this case max. L is equal to max. L_t. (static system: single-span girder)
- **Elements with intermediate bearing** (picture 2) – vertical supporting profiles on the right and left side and also vertical supporting profiles in between to fix the element.
In this case the size of the elements is limited by the strength of the ALUCOBOND. This size can be exceeded if stiffeners are glued to the rear side of the ALUCOBOND reducing the area between the stiffeners according to the load table to a value less than max. L. Such stiffeners have to be fixed to S- and Z-section.
max. L: permissible length of the element assuming that, the element has intermediate bearings but no without stiffeners.
max. L_t: indicates the permissible spacing between the intermediate bearings. Also valid for longer elements reinforced by stiffeners glued to the rear-side.
(static system : continuous beam)
- The horizontal return folding of ALUCOBOND® is fixed to the S- and Z-section using rivets, e.g. GESIPA-blind-rivet, rivet body: AlMg3; mandrel: stainless steel; Ø 5 mm; depth of return folding: 34 mm; spacing of rivets in accordance with the table „permissible spacing of rivets“.
- The thermal expansion of the tray panel has to be considered. Therefore it is necessary to mill slot holes into the Z-section before fixing the tray panel to the support rails.
The linear thermal expansion rate of aluminium and ALUCOBOND® is 2,4 mm/(m·100 K)
- To glue stiffeners to the ALUCOBOND® please follow also the information published by the manufacturer of the adhesive.

Pull out force F_{max} for elements with and without intermediate bearings

F_{max} indicates the pull out force at the decisive bearing (supporting-structure).

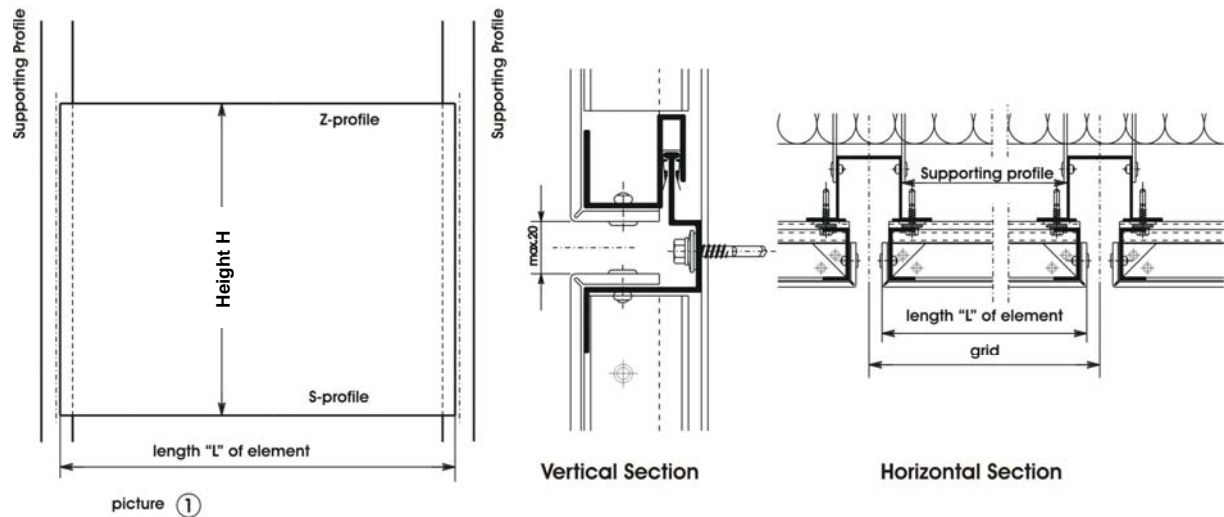
elements without intermediate bearings : F_{max,1} fixing at the vertical edges of the element

For elements with intermediate bearings : F_{max,2} fixing at the intermediate bearing;
at the vertical edges of the elements generally one screw for the fixing is sufficient

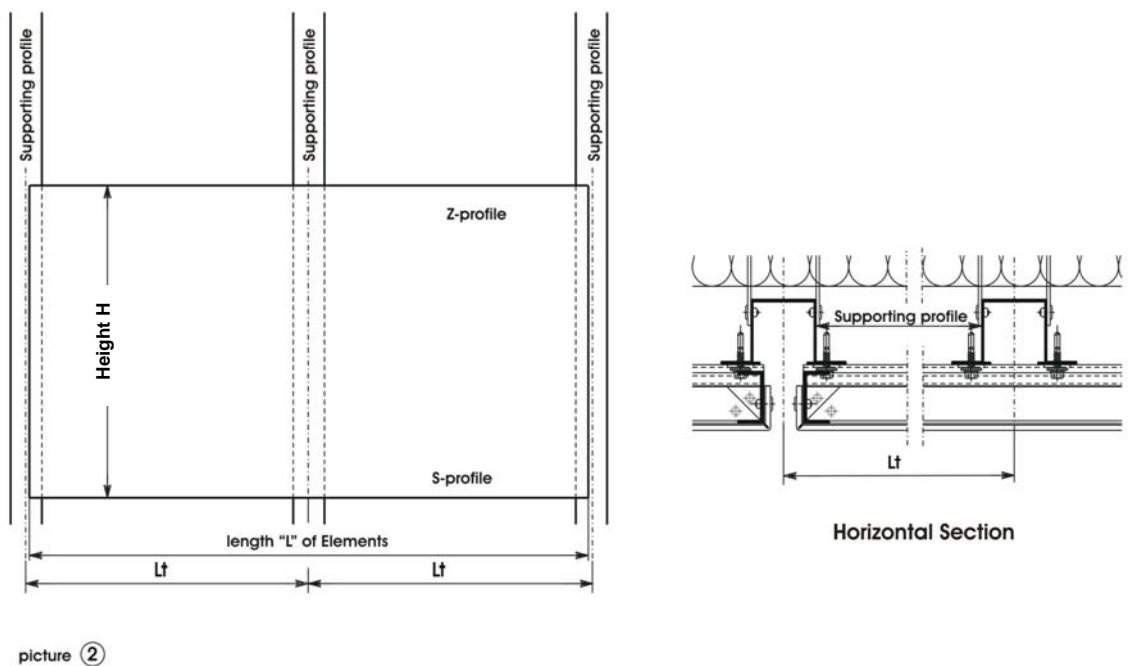
To connect the tray panel to the supports facade screws, e.g. EJOT self-drilling screw JZ3-6,3xL E16 should be used. The permissible tensile force of this fixing depends on the type of screw and the flange thickness of the support rail. If the existing tensile force at the fixing is exceeded either reduce the span between the bearings or increase the flange thickness of the support rail.

Horizontal layout of tray-panel, System SZ 20

Elements without intermediate bearing, picture ①



Elements with intermediate bearing, picture ②



System SZ 20, horizontal layout of tray-panel

Table 1

Wind load q [kN/m ²]	height H [mm]	maximum length „L“ for various heights „H“							
		elements with intermediate bearing, picture ②				Elements without intermediate bearing, picture ①			
		max L [mm]		max L _t [mm]	F _{max,2} [kN]	max L = max L _t [mm]		F _{max,1} [kN]	
		3 mm	4 mm		3 / 4 mm	3 mm	4 mm	3 mm	4 mm
± 0.50	555	8000	8000	3260	1.13	2440	2440	0.34	0.34
	680	8000	8000	3050	1.30	2280	2280	0.39	0.39
	930	8000	8000	2750	1.60	2250	2250	0.48	0.48
	1180	6490	8000	2470	1.82	1900	1900	0.56	0.56
	1430	3960	6130	2250	2.02	1780	1780	0.64	0.64
± 0.60	555	8000	8000	3070	1.28	2290	2290	0.38	0.38
	680	8000	8000	2870	1.46	2140	2140	0.44	0.44
	930	7425	8000	2540	1.78	1930	1930	0.54	0.54
	1180	4555	5660	2260	2.00	1780	1780	0.63	0.63
	1430	2750	4145	2060	2.20	1670	1670	0.72	0.72
± 0.70	555	8000	8000	2920	1.42	2180	2180	0.42	0.42
	680	8000	8000	2730	1.62	2040	2040	0.49	0.49
	930	5730	8000	2360	1.92	1830	1830	0.60	0.60
	1180	3300	5660	2100	2.16	1690	1690	0.70	0.70
	1430	2215	3275	1910	2.38	1590	1590	0.80	0.80
± 0.80	555	8000	8000	2790	1.54	2080	2080	0.46	0.46
	680	8000	8000	2570	1.74	1950	1950	0.53	0.53
	930	5265	8000	2210	2.06	1750	1750	0.65	0.65
	1180	2780	4830	1970	2.32	1620	1620	0.76	0.76
	1430	1865	2665	1790	2.56	1520	1520	0.87	0.87
± 0.90	555	8000	8000	2680	1.68	2000	2000	0.50	0.50
	680	8000	8000	2430	1.86	1870	1870	0.57	0.57
	930	4475	5335	2090	2.18	1690	1690	0.71	0.71
	1180	2220	3150	1860	2.46	1560	1560	0.83	0.83
	1430	1625	2180	1690	2.72	1460	1460	0.94	0.94
± 1.00	555	8000	8000	2550	1.76	1930	1930	0.54	0.54
	680	8000	8000	2310	1.96	1810	1810	0.62	0.62
	930	4000	4870	1980	2.30	1630	1630	0.76	0.76
	1180	1875	2680	1770	2.62	1500	1500	0.89	0.89
	1430	1435	1925	1610	2.88	1410	1410	1.01	1.01
± 1.10	555	8000	8000	2430	1.86	1870	1870	0.57	0.57
	680	6150	8000	2200	2.06	1750	1750	0.65	0.65
	930	2540	4580	1890	2.42	1580	1580	0.81	0.81
	1180	1635	2350	1690	2.74	1460	1460	0.95	0.95
	1430	1300	1700	1540	3.02	1300	1370	1.02	1.08
± 1.20	555	8000	8000	2330	1.94	1820	1820	0.61	0.61
	680	5845	8000	2110	2.16	1700	1700	0.69	0.69
	930	2165	4400	1810	2.52	1530	1530	0.85	0.85
	1180	1460	2120	1620	2.18	1420	1420	1.01	1.01
	1430	1180	1560	1480		1180	1330	1.01	1.14

F_{max,1/2}: the total occurring tensile force at the decisive bearing

Example 1: System “Element without intermediate bearing” a wind load of 0.8 kN/m² and a height of 1430 mm. For this system the permissible distance between the supports is L = L_t = 1520 mm. To fix the element to the substructure the permissible tensile force per screw is 1.2 kN (e.g. EJOT JZ3-6.3xL; wall thickness of 3 mm; safety factor γ= 3.0). The following number of screws: n = 0.87 kN/1.20 ≈ 1 is needed.

System SZ 20, horizontal layout of tray-panel

(Table 1 continued)

Wind load q [kN/m ²]	height H [mm]	maximum length „L“ for various heights „H“							
		elements with intermediate bearing, picture ②				Elements without intermediate bearing, picture ①			
		max L [mm]		max L _t [mm]	F _{max,2} [kN]	max L = max L _t [mm]		F _{max,1} [kN]	
		3 mm	4 mm		3 / 4 mm	3 mm	4 mm	3 mm	4 mm
± 1.30	555	8000	8000	2240	2.02	1770	1770	0.64	0.64
	680	5725	8000	2030	2.24	1660	1660	0.73	0.73
	930	1960	4070	1750	2.64	1490	1490	0.90	0.90
	1180	1350	1890	1560	3.00	1350	1380	1.04	1.06
	1430	1090	1430	1420	3.30	1090	1290	1.01	1.20
± 1.40	555	8000	8000	2160	2.10	1730	1730	0.71	0.71
	680	5600	8000	1960	2.34	1620	1620	0.77	0.77
	930	1760	3735	1680	2.74	1460	1460	0.95	0.95
	1180	1250	1660	1500	3.10	1250	1340	1.03	1.11
	1430	1000	1300	1370	3.42	1000	1260	1.00	1.26
± 1.50	555	8000	8000	2090	2.18	1690	1690	0.70	0.70
	680	5515	6835	1890	2.40	1580	1580	0.81	0.81
	930	1615	2560	1630	2.84	1420	1420	0.99	0.99
	1180	1145	1525	1460	3.24	1145	1310	1.01	1.16
	1430	945	1215	1330	3.56	945	1215	1.01	1.30
± 1.60	555	8000	8000	2030	2.26	1650	1650	0.73	0.73
	680	5425	5670	1840	2.50	1550	1550	0.84	0.84
	930	1465	1965	1580	2.94	1390	1390	1.03	1.03
	1180	1040	1390	1410	3.32	1040	1290	0.98	1.22
	1430	885	1130	1290	3.68	885	1130	1.01	1.29
± 1.80	555	8000	8000	1910	2.38	1590	1590	0.79	0.79
	680	1910	5470	1740	2.66	1490	1490	0.91	0.91
	930	1200	1640	1490	3.18	1200	1340	1.00	1.12
	1180	905	1185	1340	3.56	905	1185	0.96	1.26
	1430	800	1000	1220	3.92	800	1000	1.03	1.29
± 2.00	555	5315	8000	1820	2.52	1540	1540	0.85	0.85
	680	1650	5360	1650	2.80	1430	1430	0.97	0.97
	930	1040	1445	1420	3.30	1040	1290	0.97	1.20
	1180	820	1045	1270	3.74	820	1045	0.97	1.23
	1430	720	885	1170	4.18	720	885	1.03	1.27
± 2.20	555	5240	2765	1740	2.66	1490	1490	0.91	0.91
	680	1470	2115	1580	2.96	1390	1390	1.04	1.04
	930	935	1265	1360	3.48	935	1250	0.96	1.28
	1180	750	930	1220	3.96	750	930	0.97	1.21
	1430	680	800	1120	4.40	680	800	1.07	1.26
± 2.40	555	5140	2180	1670	2.78	1440	1440	0.96	0.96
	680	1290	1680	1510	3.08	1290	1350	1.05	1.10
	930	825	1100	1310	3.66	825	1100	0.92	1.23
	1180	680	850	1170	4.14	680	850	0.96	1.20
	1430	630	750	1070	4.60	630	750	1.08	1.29

F_{max,1/2}: the total occurring tensile force at the decisive bearing (for a continuous beam)

Example 2: Tray panel system “Elements with intermediate bearing”, a wind load of 1.6 kN/m² and a height of 680 mm. From the load table above for the both parameters (width and load) a total length of L = 5670 mm and a distance of L_t = 1840 mm between the intermediate bearings can be determined. That means at a distance L_t = 1840 mm sections have to be added as support. Using screws with a permissible pull out force of 1.80 kN per screw (e.g. EJOT JZ3-6.3xL fixed into an aluminium section with a wall thickness of 4 mm; γ = 3.0) n = 2.50 kN/1.80 ~ 2 screws are required. For the panel length of L = 5670 mm it is necessary to add 2 support sections in a distance of less than L_t = 1840 mm.

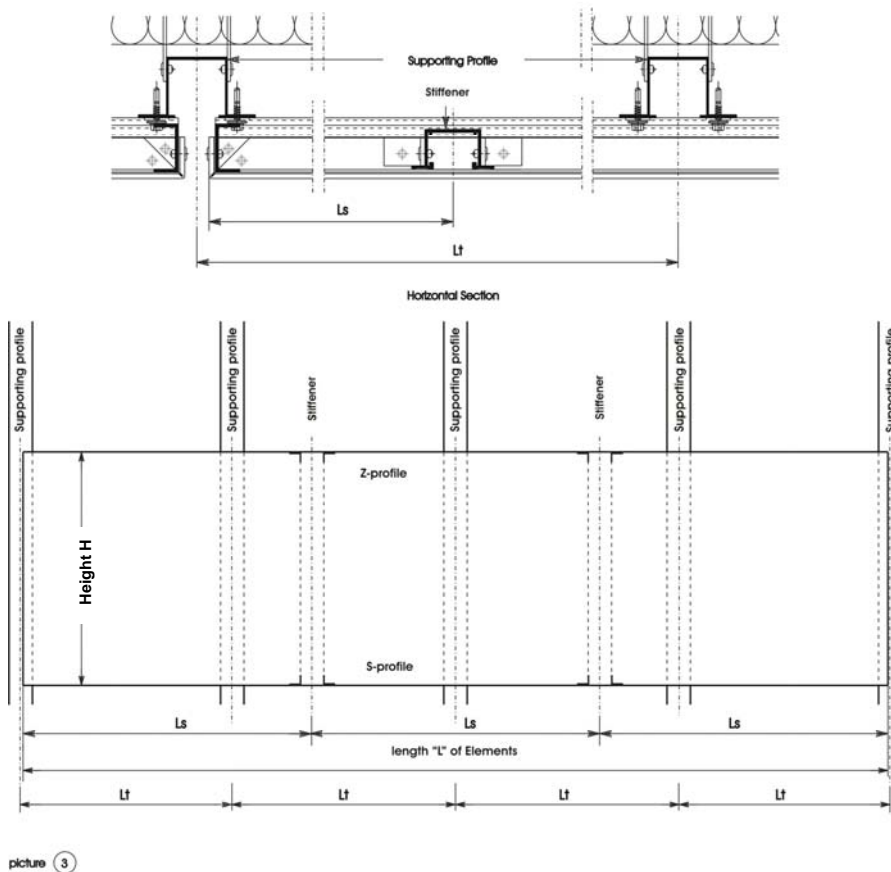
Example 3: Tray panel system “Elements with intermediate bearing” a wind load of 2.2 kN/m^2 and a height of 680 mm. From the load table the maximum length is $L = 2115 \text{ mm}$ and the distance between the supports of less than $L_t = 1580 \text{ mm}$ can be determined.

Using screws with a permissible pull out force of 1.80 kN per screw (e.g. EJOT JZ3-6.3xL fixed into an aluminium section with a wall thickness of 4 mm ; $\gamma = 3.0$) for the fixing $n = 2.96 \text{ kN}/1.80 \sim 2$ screws are necessary. For the panel length of 2115 mm a further support has to be added at $L_t = 2115/2 = 1057 \text{ mm}$. That also means that the force on the screws is reduced. It can be calculated separate to adjust type and number of screws as well as the wall thickness of the aluminium section. This calculation is carried out according to the static for a continuous beam.

Example 4: An element similar to the one in example 3 should have a length of $L = 5500 \text{ mm}$ instead of 2115 mm . Such an element can be realised if on the rear side of the ALUCOBOND two stiffeners are glued in according to our recommendations and fixed to the horizontal sections. The maximum distance for these stiffener should be max. $L_s = 2115 \text{ mm}$, the value for max L in the load table.

Independent from these stiffeners a support is necessary at $L_t = 1580 \text{ mm}$ ($5500 / 1580 = 3.5$) which means 4 fields with $L_t = 1375 \text{ mm}$. The number of screws can be worked out as in example no. 3 (see picture 3).

Elements with intermediate bearing, picture ③



System SZ 20, horizontal layout of tray-panel

Admissible spacing for the rivets in the horizontal return

Wind load [kN/m ²]	admissible spacing for rivets [mm] for different panel heights				
	555	680	930	1180	1430
± 0.5	500	500	500	500	500
± 0.6	500	500	500	500	500
± 0.7	500	500	500	500	490
± 0.8	500	500	500	500	459
± 0.9	500	500	500	476	432
± 1.0	500	500	500	452	410
± 1.1	500	500	485	430	391
± 1.2	500	500	464	412	374
± 1.3	500	500	446	396	360
± 1.4	500	500	430	382	347
± 1.6	500	470	402	357	324
± 1.8	491	443	379	337	306
± 2.0	465	420	356	319	290
± 2.2	444	401	343	305	276
± 2.4	425	384	328	292	265

- The aluminium stiffeners in the vertical folded edges should be fixed with an even number of rivets. For the spacing of these rivets please use the values as mentioned above.

System SZ 20, horizontal layout of tray-panel

Reinforcement of the vertical folded edges using aluminium sections

Windload q [kN/m ²]	Height H [mm]	reinforcement of the vertical folded edge				
		required values		section	provided values	
		W _{req.} [cm ³]	I _{req.} [cm ⁴]		W _{prov.} [cm ³]	I _{prov.} [cm ⁴]
± 0.50	555	0.08	0.06	-	0.29	0.70
	680	0.15	0.13	-	0.29	0.70
	930	0.22	0.43	I-30x2	0.30	0.45
	1180	0.45	1.10	U-15x30x15x2	0.98	1.47
	1430	0.81	2.38	U-20x30x20x3	1.70	2.54
± 0.60	555	0.10	0.06	-	0.29	0.70
	680	0.19	0.15	-	0.29	0.70
	930	0.26	0.51	I-30x3	0.45	0.68
	1180	0.54	1.32	U-15x30x15x2	0.98	1.47
	1430	0.96	2.85	U-30x30x30x3	2.43	3.64
± 0.70	555	0.11	0.07	-	0.29	0.70
	680	0.22	0.17	-	0.29	0.70
	930	0.31	0.59	I-30x3	0.45	0.68
	1180	0.63	1.54	U-20x30x20x2	1.24	1.86
	1430	1.12	3.32	U-30x30x30x3	2.43	3.64
± 0.80	555	0.13	0.09	-	0.29	0.70
	680	0.25	0.20	-	0.29	0.70
	930	0.36	0.68	I-30x3	0.45	0.68
	1180	0.73	1.76	U-20x30x20x2	1.24	1.86
	1430	1.29	3.80	U-40x30x40x3	3.16	4.74
± 0.90	555	0.15	0.10	-	0.29	0.70
	680	0.28	0.22	-	0.29	0.70
	930	0.81	0.76	I-35x3	0.61	1.07
	1180	1.44	1.98	U-15x30x15x3	1.33	1.99
	1430		4.27	U-35x35x35x2	2.46	4.31
± 1.00	555	0.17	0.11	-	0.29	0.70
	680	0.18	0.25	I-30x2	0.30	0.45
	930	0.45	0.85	I-35x3	0.61	1.07
	1180	0.91	2.20	U-20x30x20x3	1.70	2.55
	1430	1.60	4.74	U-40x30x40x3	3.16	4.74
± 1.10	555	0.19	0.12	-	0.29	0.70
	680	0.19	0.27	I-30x3	0.45	0.68
	930	0.49	0.94	I-35x3	0.61	1.07
	1180	1.00	2.42	U-20x30x20x3	1.70	2.54
	1430	1.76	5.22	U-50x30x50x3	3.43	5.84
± 1.20	555	0.20	0.13	-	0.29	0.70
	680	0.21	0.29	I-30x2	0.30	0.45
	930	0.53	1.02	I-35x3	0.61	1.07
	1180	1.08	2.64	U-30x30x30x2	1.77	2.65
	1430	1.92	5.69	U-50x30x50x3	3.89	5.84

Note: the standard depth of the folded edge provides the following statically values: h = 34mm, W_{prov.} = 0.284cm³, I_{prov.} = 0.696cm⁴

white area : permissible stress $\sigma_{adm.} \leq 5.3 \text{ kN/cm}^2$ (ALUCOBOND)

grey area : permissible stress $\sigma_{adm.} \leq 9.5 \text{ kN/cm}^2$ (aluminium-profile: EN AW-6063 (AlMgSi0,5), temper T6)



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System SZ 20, horizontal layout of tray-panel (continued)

Reinforcement of the vertical folded edges using aluminium stiffeners

Windload q [kN/m ²]	Height H [mm]	reinforcement of element				
		required values		section	provided values	
		W _{req.} [cm ³]	I _{req.} [cm ⁴]		W _{prov.} [cm ³]	I _{prov.} [cm ⁴]
± 1.30	555	0.22	0.14	-	0.29	0.70
	680	0.22	0.32	I-30x2	0.30	0.45
	930	0.57	1.10	U-15x30x15x2	0.98	1.47
	1180	1.17	2.86	U-30x30x30x3	2.43	3.64
	1430	2.08	6.17	U-30x40x30x3	3.58	7.16
± 1.40	555	0.24	0.15	-	0.29	0.70
	680	0.24	0.34	I-30x2	0.30	0.45
	930	0.62	1.19	U-15x30x15x2	0.98	1.47
	1180	1.26	3.08	U-30x30x30x3	2.43	3.64
	1430	2.04	6.04	U-30x40x30x3	3.58	7.16
± 1.50	555	0.25	0.16	-	0.29	0.70
	680	0.26	0.36	I-30x2	0.30	0.45
	930	0.66	1.27	U-15x30x15x2	0.98	1.47
	1180	1.35	3.30	U-30x30x30x3	2.43	3.64
	1430	2.04	6.05	U-30x40x30x3	3.58	7.16
± 1.60	555	0.27	0.18	-	0.29	0.70
	680	0.28	0.39	I-30x2	0.30	0.45
	930	0.71	1.36	U-15x30x15x2	0.98	1.47
	1180	1.45	3.52	U-30x30x30x3	2.43	3.64
	1430	2.03	6.00	U-35x35x35x3	3.43	6.00
± 1.80	555	0.17	0.19	I-30x2	0.30	0.45
	680	0.31	0.44	I-30x3	0.45	0.68
	930	0.79	1.53	U-20x30x20x2	1.24	1.86
	1180	1.62	3.96	U-35x35x35x2	2.46	4.31
	1430	2.03	5.97	U-35x35x35x3	3.43	6.00
± 2.00	555	0.19	0.22	I-30x2	0.30	0.45
	680	0.34	0.49	I-30x3	0.45	0.68
	930	0.88	1.70	U-20x30x20x2	1.24	1.86
	1180	1.60	3.90	U-35x35x35x2	2.46	4.31
	1430	2.08	6.15	U-30x40x30x3	3.58	7.16
± 2.20	555	0.21	0.24	I-30x2	0.30	0.45
	680	0.38	0.54	I-30x3	0.45	0.68
	930	0.97	1.87	U-15x30x15x3	1.33	1.99
	1180	1.56	3.81	U-35x35x35x2	2.46	4.31
	1430	2.12	6.30	U-30x40x30x3	3.58	7.16
± 2.40	555	0.22	0.26	I-30x2	0.30	0.45
	680	0.41	0.58	I-30x3	0.45	0.68
	930	1.06	2.04	U-20x30x20x3	1.69	2.54
	1180	1.56	3.80	U-35x35x35x2	2.46	4.31
	1430	2.20	6.55	U-30x40x30x3	3.58	7.16

Note: the standard depth of the folded edge provides the following statically values: h = 34mm, W_{prov.} = 0.284 cm³, I_{prov.} = 0.696 cm⁴

white area : permissible stress $\sigma_{adm.} \leq 5.3 \text{ kN/cm}^2$ (ALUCOBOND)

grey area : permissible stress $\sigma_{adm.} \leq 9.5 \text{ kN/cm}^2$ (aluminium-profile: EN AW-6063 (AlMgSi0,5), temper T6)