

**Characteristic**

Graepel-Spikes has an upwardly formed surface. The surface is closed. The perforation owes its name to the upwardly embossed stepped cones (diameter of 10 mm at the base). They are arranged in staggered rows, extend approx. 4 mm upwards, and therefore offer a higher displacement than Graepel-Perl. The maximum embossed field is 580 mm.

**Application**

They are for example used for coverings capable of being walked on, where nothing should drop through, or as cover with optically attractive surface.

**Options**

- This perforation is program controllable. Each stepped cone can be left out and thus an individual embossing can be created.
- The standard edge perforation may be omitted.

Dimensions		Graepel-Spikes
Material thickness	DD 11 raw	2.0   2.5   3.0 mm
	DD 11 hot-dip galvanized   DX 51 D pre-galvanized	2.0   2.5   3.0 mm
	Stainless steel	2.0   2.5 mm
	EN AW-5754	2.0   2.5   3.0 mm
Dimensions	Lengths (l) up to length divider	6,000 mm 30 mm
	Standard grating widths (B) DD 11   DX 51 D   Stainless steel   EN AW-5754 Width divider	120 to 300 mm in steps of 15 mm 15 mm
	Heights (H)	40   50   75 mm

<sup>1</sup>Other dimensions on request.

Anti-slip values		
Material	Evaluation of anti-slip	Displacement
DD 11 hot-dip galvanized	R 10	V 10
Stainless steel	R 11	V 10



Further details on the perforation on our website

Grating width [mm]	Weight per meter for Graepel-Spikes for material thickness D [in kg/m]																	
	2.0						2.5						3.0					
	DD 11**/ Stainless steel Height [mm]			EN AW-5754 Height [mm]			DD 11** Height [mm]			EN AW-5754 Height [mm]			DD 11** Height [mm]			EN AW-5754 Height [mm]		
100	3.7	4.0	4.8	1.3	1.4	1.6	4.5	4.9	5.9	1.6	1.7	2.0	5.3	5.8	7.0	1.8	2.0	2.4
150	4.2	4.5	5.3	1.4	1.5	1.8	5.1	5.5	6.5	1.8	1.9	2.2	6.0	6.5	7.7	2.1	2.2	2.7
180	4.6	5.0	5.8	1.6	1.7	2.0	5.7	6.1	7.1	2.0	2.1	2.4	6.8	7.2	8.4	2.3	2.5	2.9
210	5.1	5.4	6.2	1.8	1.9	2.1	6.3	6.7	7.7	2.2	2.3	2.7	7.5	8.0	9.2	2.6	2.7	3.1
240	5.6	5.9	6.7	1.9	2.0	2.3	6.9	7.3	8.3	2.4	2.5	2.9	8.2	8.7	9.9	2.8	3.0	3.4
270	6.1	6.4	7.2	2.1	2.2	2.5	7.5	7.9	8.9	2.6	2.7	3.1	8.9	9.4	10.6	3.1	3.2	3.6
300	6.6	6.9	7.7	2.3	2.4	2.6	8.1	8.5	9.5	2.8	2.9	3.3	9.6	10.1	11.3	3.3	3.5	3.9

H [mm]	D [mm]	Uniformly distributed load												Replacement load F <sub>q</sub> [in kN] for uniformly distributed load (numerical values apply for single grating)												Concentrated load												Load F <sub>q</sub> [in kN] for concentrated load (numerical values apply for single grating)																																																																																																																																																																				
		Support length l [mm]												Support length l [mm]												Support length l [mm]												Support length l [mm]																																																																																																																																																																				
		500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000																																																																																																																																																													
D 11, DX 51 D	40	2.0	9.304	6.203	4.652	3.722	3.001	2.205	1.688	1.334	1.080	0.893	0.750	5.815	3.578	2.584	2.023	1.661	1.387	1.060	0.837	0.677	0.560	0.470	11.796	7.864	5.898	4.718	3.932	2.911	2.229	1.761	1.426	1.179	0.991	7.372	4.537	3.277	2.564	2.106	1.787	1.400	1.105	0.894	0.739	0.620	13.949	9.299	6.975	5.580	4.650	3.627	2.777	2.194	1.777	1.469	1.234	8.718	5.365	3.875	3.032	2.491	2.114	1.744	1.377	1.114	0.920	0.773	12.569	8.379	6.285	5.028	4.190	3.591	2.848	2.250	1.822	1.506	1.266	7.856	4.834	3.491	2.732	2.244	1.904	1.654	1.412	1.143	0.944	0.793	16.014	10.676	8.007	6.406	5.338	4.576	3.765	2.975	2.410	1.991	1.673	10.009	6.159	4.448	3.481	2.860	2.426	2.107	1.862	1.511	1.248	1.048	19.075	12.717	9.537	7.630	6.358	5.450	4.708	3.720	3.013	2.490	2.092	11.922	7.336	5.299	4.147	3.406	2.890	2.510	2.218	1.889	1.560	1.311	22.056	14.704	11.028	8.822	7.352	6.302	5.514	4.901	4.411	3.956	3.324	13.785	8.483	6.127	4.795	3.938	3.342	2.902	2.565	2.297	2.081	1.901	28.254	18.836	14.127	11.302	9.418	8.073	7.064	6.279	5.651	5.137	4.390	17.659	10.867	7.848	6.142	5.045	4.281	3.718	3.285	2.943	2.666	2.436	33.997	22.665	16.999	13.599	11.332	9.713	8.499	7.555	6.799	6.181	5.502	21.248	13.076	9.444	7.391	6.071	5.151	4.473	3.953	3.541	3.207	2.931		
	EN AW-5754	40	2.0	7.070	3.705	2.084	1.334	0.926	0.681	0.521	0.412	0.333	0.276	0.232	4.419	2.395	1.328	0.844	0.584	0.428	0.327	0.258	0.209	0.173	0.145	8.977	4.903	2.758	1.765	1.226	0.901	0.689	0.545	0.441	0.365	0.306	5.611	3.169	1.757	1.117	0.773	0.566	0.433	0.342	0.277	0.229	0.192	10.622	6.117	3.441	2.202	1.529	1.123	0.860	0.680	0.550	0.455	0.382	6.638	3.954	2.192	1.393	0.964	0.707	0.540	0.426	0.345	0.285	0.239	9.575	6.265	3.524	2.255	1.566	1.151	0.881	0.696	0.564	0.466	0.392	5.984	3.683	2.245	1.427	0.987	0.724	0.553	0.437	0.354	0.292	0.245	12.217	8.144	4.669	2.988	2.075	1.525	1.167	0.922	0.747	0.617	0.519	7.635	4.699	2.975	1.891	1.308	0.959	0.733	0.579	0.468	0.387	0.325	14.560	9.707	5.846	3.741	2.598	1.909	1.461	1.155	0.935	0.773	0.650	9.100	5.600	3.724	2.367	1.638	1.201	0.918	0.724	0.586	0.484	0.407	16.877	11.251	8.439	5.951	4.132	3.036	2.324	1.837	1.488	1.229	1.033	10.548	6.491	4.688	3.669	2.605	1.910	1.460	1.152	0.933	0.770	0.647	21.647	14.431	10.823	7.871	5.466	4.016	3.074	2.429	1.968	1.626	1.366	13.529	8.326	6.013	4.706	3.446	2.526	1.931	1.524	1.234	1.019	0.856	26.063	17.375	13.032	9.876	6.859	5.039	3.858	3.048	2.469	2.041	1.715	16.289	10.024	7.240	5.666	4.324	3.169	2.423	1.913	1.548	1.279	1.074	
		Stainless steel	40	2.0	10.190	6.793	5.095	4.076	3.001	2.205	1.688	1.334	1.080	0.893	0.750	6.369	3.919	2.831	2.215	1.820	1.387	1.060	0.837	0.677	0.560	0.470	12.919	8.613	6.460	5.168	3.962	2.911	2.229	1.761	1.426	1.179	0.991	8.075	4.969	3.589	2.809	2.307	1.831	1.400	1.105	0.894	0.739	0.620	15.278	10.185	7.639	6.111	4.936	3.627	2.777	2.194	1.777	1.469	1.234	9.549	5.876	4.244	3.321	2.728	2.281	1.744	1.377	1.114	0.920	0.773	13.766	9.177	6.883	5.506	4.589	3.719	2.848	2.250	1.822	1.506	1.266	8.604	5.295	3.824	2.993	2.458	2.086	1.788	1.412	1.143	0.944	0.793	17.539	11.693	8.770	7.016	5.846	4.918	3.765	2.975	2.410	1.991	1.673	10.962	6.746	4.872	3.813	3.132	2.657	2.308	1.867	1.511	1.248	1.048	20.891	13.928	10.446	8.357	6.964	5.969	4.708	3.720	3.013	2.490	2.092	13.057	8.035	5.803	4.542	3.731	3.165	2.749	2.334	1.889	1.560	1.311	24.156	16.104	12.078	9.662	8.052	6.902	6.039	5.368	4.787	3.956	3.324	15.098	9.291	6.710	5.251	4.314	3.660	3.178	2.809	2.516	2.279	2.082	30.945	20.630	15.473	12.378	10.315	8.842	7.736	6.877	6.189	5.224	4.390	19.341	11.902	8.596	6.727	5.526	4.689	4.072	3.598	3.223	2.919	2.668	37.235	24.823	18.617	14.894	12.412	10.639	9.309	8.274	7.447	6.548	5.502	23.272	14.321	10.343	8.095	6.649	5.642	4.899	4.330	3.879	3.513	3.210

Grating width B [mm]	Maximum possible lump load F [in kN] (numerical values apply for DD n)		
	Load area 200 x 200 mm		
	Material thickness [mm]		
	2.0	2.5	3.0
120***	2.86	4.47	6.44
150***	1.96	3.05	4.40
180***	1.45	2.26	3.25
210	1.13	1.76	2.54
240	0.94	1.46	2.11
270	0.81	1.27	1.83
300	0.73	1.13	1.63

**Note concerning lump load**  
The values are calculated for gratings which are supported over their whole length. For a given span width, the values stated in this lump load table must not exceed those given in the concentrated load table.

For EN AW-5754, the values in the table must be multiplied by a factor of 0.74.

**Conversion of the replacement load F<sub>q</sub> from the table into a distributed load Q**

with:  
 Q - Distributed load for a grating [kN/m<sup>2</sup>]  
 F<sub>q</sub> - Replacement load from table with reference to the support width [kN]  
 B - Grating width [mm]  
 L - Support length [mm]

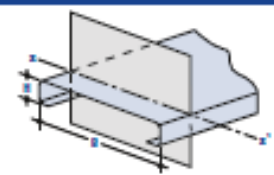
$$Q = \frac{10^6 \times F_q}{B \times L}$$

**Order information**  
The gratings are available up to a length of 6,000 mm.

Upon request, the gratings are cut to length. Please specify the required length when ordering. Please take account of the length divider of 30 mm.

Hot-dip galvanized gratings are hot-dip galvanized after being cut to ensure optimum corrosion protection.

**Moments of inertia and section modulus**  
Grating cross-sections (axis X-X)



Note: Only the unperforated area of the two sides is taken into account for the static cross section values for the longitudinal direction of the grating (shaded area).

Bend height H [mm]	Material thickness D [mm]	Moment of inertia I <sub>x</sub> [mm <sup>4</sup> ]	Minimum section modulus W <sub>x</sub> [mm <sup>3</sup> ]
40	2.0	83738.15	4139.69
	2.5	110555.85	5248.44
	3.0	137733.97	6206.58
50	2.0	141251.66	5592.51
	2.5	186763.37	7125.41
	3.0	233509.75	8487.17
75	2.0	371031.28	9813.41
	2.5	489947.64	12571.54
	3.0	614101.80	15126.67