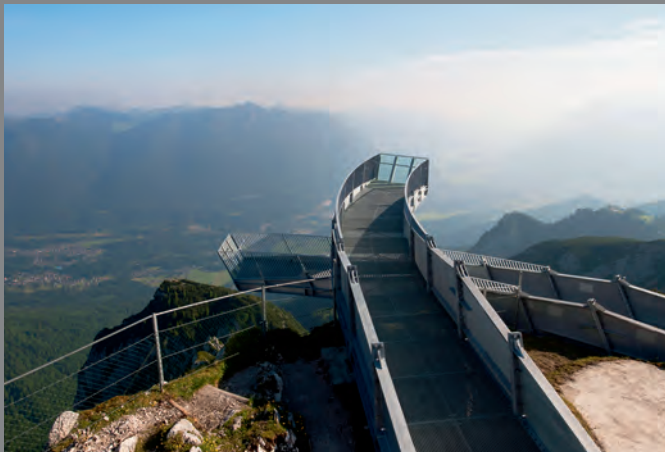
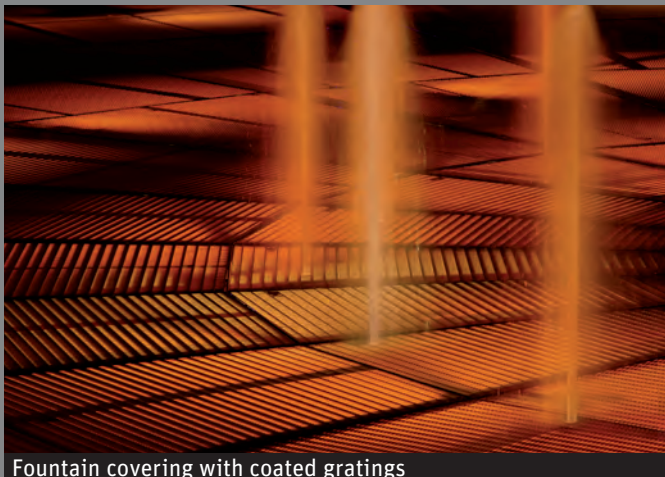




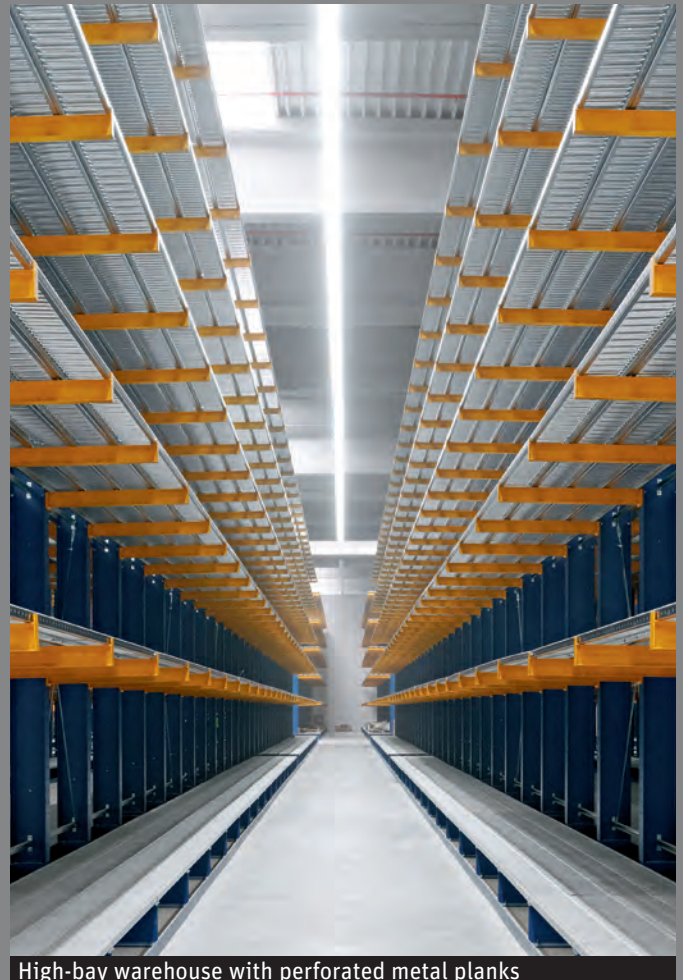
Fire-retarding covering Standard covering type BN-OF



Viewing platform with pressure-locked gratings



Fountain covering with coated gratings

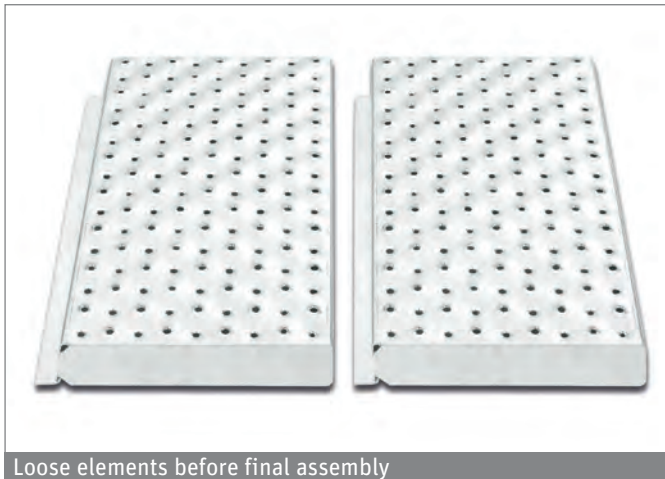


High-bay warehouse with perforated metal planks

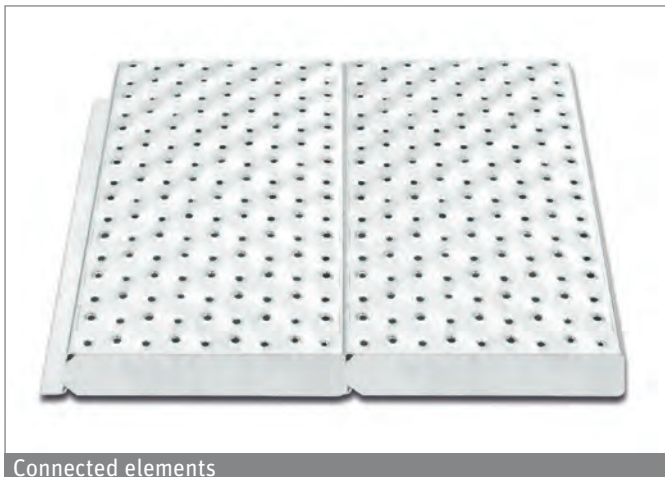
Lichtgitter – Everything from one source A bright outlook since 1929

Lichtgitter was established in 1929 in order to carry out the specialized manufacturing of gratings. By the continuous monitoring of our performance, and quality systems, together with innovation in manufacturing techniques, we have ensured Lichtgitter's place in the forefront of manufacturers of industrial floor coverings. Besides the production of pressure-locked gratings, forge-welded gratings and perforated metal planks, a various offer of GRP products are part of the production range.

Our current product range also includes profiled chequer plates, spiral staircases, straight staircases and ladder rungs. Together with our steel slitting service centre and hot dip galvanizing plants we provide a complete fabrication facility to our customers. Lichtgitter is certified according to DIN EN 9001:2008, and complies with all European and International Standards.



Loose elements before final assembly



Connected elements



Transformer

Lichtgitter Transformer coverings Environment protection – Up to date and safe

Energy suppliers are using oil for the cooling of aggregates in transformer units. Normally pans which have to collect the oil are installed beneath the aggregates. The pan should avoid that in case of an accident oil could reach the ground and could pollute the groundwater. There is always a danger that a fire could arise due to the relatively low flashpoint of the oil and the high operating temperature. Bearing this background on mind it is more and more common to make use of fire retarding coverings to limit the chance of a fire in the oil collecting pan. In the past a layer of broken stones of about 20 cm thickness was used as a covering of the transformer.



Fire retarding covering type BN-OF

The economic alternative against conventional coverings

The fire-retarding covering BN-OF was developed as an alternative to the conventional coverings. The basis is the well-known perforated metal plank type BN-O, which Lichtgitter is producing and distributing for quite some years. The advanced type BN-OF is especially suitable as a covering for the oil collecting pans beneath the transformer units. In case of fire the flames are restrained by the limited air permeability, but not stifled. The capability of the fire-retarding covering BN-OF was proven by various tests. The results of these tests are documented in a special test report.

It is unproblematic to rebuild existing transformer units with flame-retarding BN-OF elements. Many energy supplying companies have already recognized the advantages of this fire-retarding covering and have used the BN-OF elements.

Lower assembly and disassembly time

The fire retarding covering BN-OF offers the advantage that assembly and/or disassembly work can be done quite easily. The elements can be erected without any difficulties with the help of a lifting hook with the effect of shorter switch-off periods of the transformer.

Safe surface profile

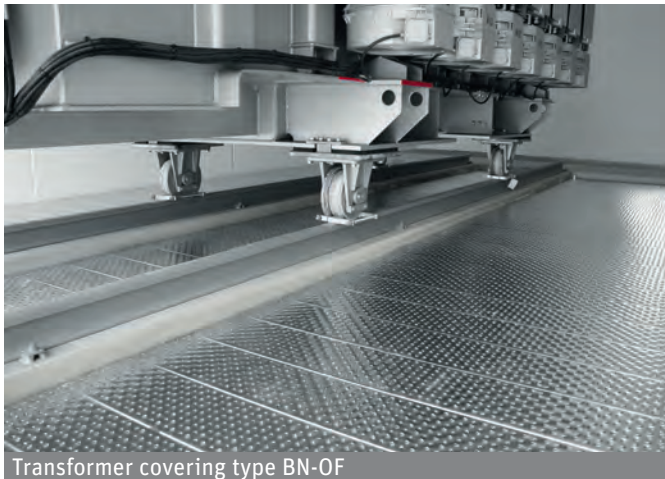
The special surface profile of the BN-OF elements gives a safe feeling while walking on the covering. There are approximately 480 openings with a diameter of approximately 7,5 mm per sqm as well as 480 openings with a diameter of approximately 8 mm. Therefore a free cross section of only 4,5% is reached.

Additional works possible

On request the fire-retarding covering can be delivered with clips for electrical grounding and an opening with cap. The dimension of the opening depends on the demand of the client.

Balance of tolerance

One underside of each element – besides the last element – is edged outwards. This offers an additional seal plus a balance of the tolerance.



Transformer covering type BN-OF



Inspection opening

Use at transformers with drainage

Further tests have shown that the BN-OF elements can even be used in transformers with drainage under the pre-condition that the distance between the aggregate and the drainage of the pit will be at least 1,5 m. If the distance is smaller than 1,5 m it is necessary to install a safety device according to DIN EN 12874 to avoid that the flames can break through.

Protection against corrosion

The BN-OF elements are galvanized according to DIN EN ISO 1461 and offer therefore a sufficient protection against corrosion. The galvanizing process takes place in our own galvanizing plants.

Advantages

Better and quicker control of the collecting pan

Shorter switch-off period of the transformer

Optimum flow time speed of oil, tempering and rain water

Quick possibility to remove the liquid out of the collection pan

In case of fire in the collecting pan this system can contain and delay the fire

Serial production – short delivery times

High safety level during maintenance operations

Existing installations can be rebuilt without problems

The covering is especially suited for locations where in case of an accident the rescue service can be immediately at site

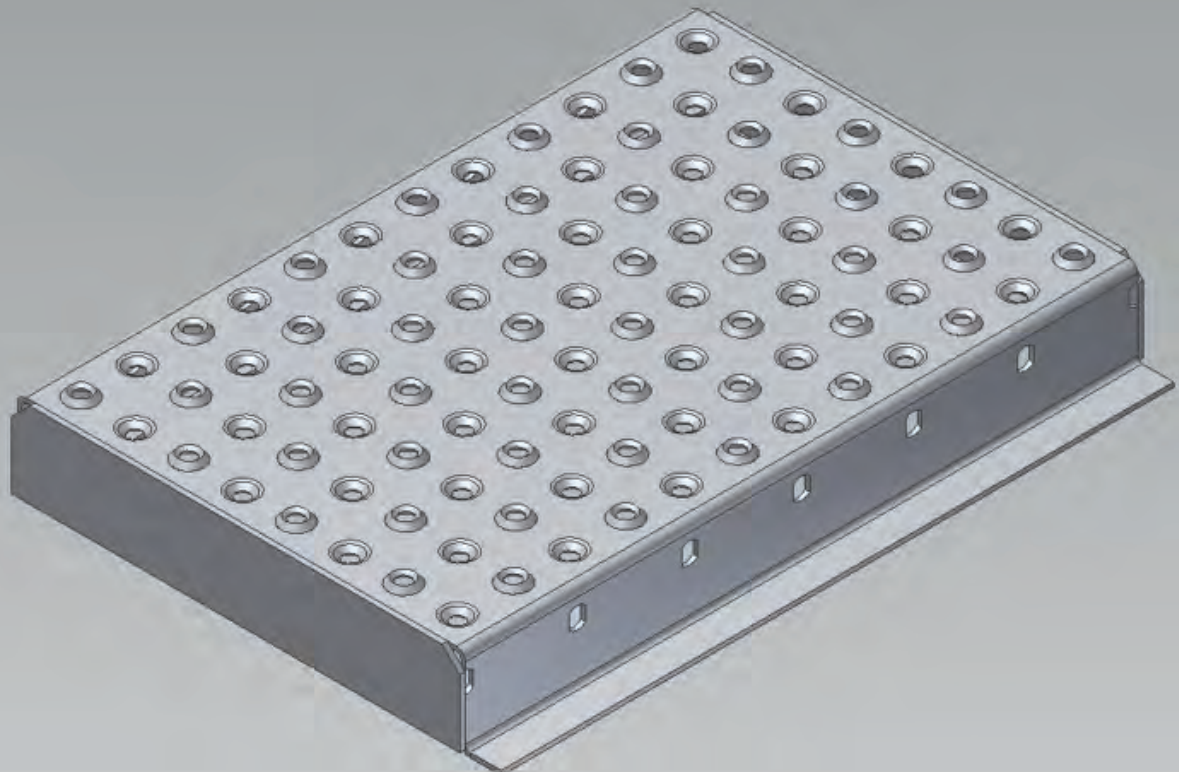
Perforated metal planks type BN-OF

Material	S 235JR
Surface	galvanized according to DIN EN ISO 1461
Sheet thickness	2,5 mm
Structural module R	125 mm
Production lengths L	if possible n x R
Widths B	150, 200, 250, 300 mm
Heights H	40, 50, 75, 100 mm
Benting t_{u1}	approx. 10 mm
Benting t_{u2}	approx. 20 mm

The elements are edged at one underside outwards so that a support area of approx. 20 mm is reached. Both front sides are closed.

Production possibilities on the demands of the clients

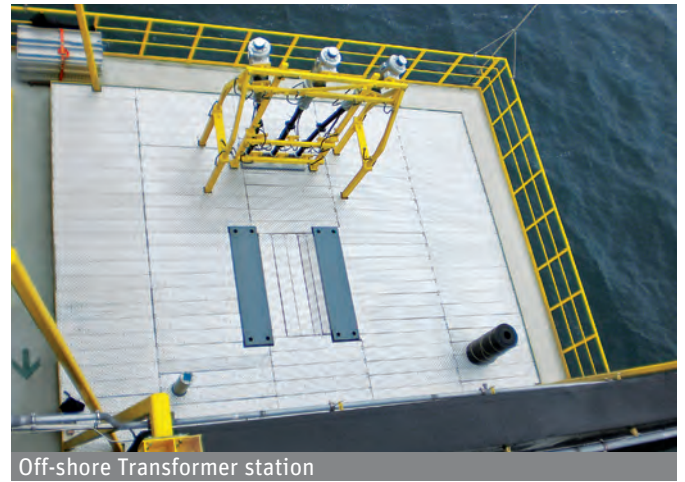
Fire-retarding covering type BN-OF



3D sketch – Fire-retarding covering type BN-OF



Transformer covering BN-OF



Off-shore Transformer station

Lichtgitter fire-retarding coverings have proven effectually for many years their availability for the use for transformer stations even in the offshore sector. Besides the usual Lichtgitter quality, the lower assembly and disassembly times as well as the advantages of our own galvanizing plants, we are especially focusing on the demands of our clients. Custom-made production and other special requirements like cutouts are certainly possible.



Transformer unit

Loadtable BN-OF

Key to symbols

Fv = Load value at uniformly distributed load in kN/m²

f = Deflection in cm at load Fv

Fp = Single load in kN on an area of 200 x 200 mm

f1 = Deflection in cm at load Fp

The mentioned values are characteristically.

Type BN-OF	Galvanized weight in kg/m ²	Load/ Deflection	Span in mm									
			500	600	700	800	900	1.000	1.100	1.200	1.300	1.400
150/40/2,5	33,90	Fv	101,45	70,45	51,76	39,63	31,31	25,36	20,96	17,61	15,01	12,94
		f	0,08	0,12	0,16	0,21	0,27	0,33	0,40	0,47	0,56	0,65
		Fp	6,34	5,07	4,23	3,62	3,17	2,82	2,54	2,31	2,11	1,95
		f1	0,10	0,14	0,19	0,25	0,31	0,38	0,46	0,54	0,64	0,73
200/40/2,5	30,73	Fv	73,22	50,84	37,35	28,60	22,60	18,30	15,13	12,71	10,83	9,34
		f	0,09	0,13	0,17	0,22	0,28	0,35	0,42	0,50	0,59	0,68
		Fp	4,58	3,66	3,05	2,61	2,29	2,03	1,83	1,66	1,53	1,41
		f1	0,08	0,11	0,15	0,20	0,25	0,30	0,36	0,43	0,50	0,58
250/40/2,5	28,80	Fv	58,57	40,68	29,88	22,88	18,08	14,64	12,10	10,17	8,66	7,47
		f	0,09	0,13	0,17	0,22	0,28	0,35	0,42	0,50	0,59	0,68
		Fp	4,58	3,66	3,05	2,61	2,29	2,03	1,83	1,66	1,53	1,41
		f1	0,08	0,11	0,15	0,20	0,25	0,30	0,36	0,43	0,50	0,58
300/40/2,5	27,55	Fv	50,73	35,23	25,88	19,81	15,66	12,68	10,48	8,81	7,50	6,47
		f	0,08	0,12	0,16	0,21	0,27	0,33	0,40	0,47	0,56	0,65
		Fp	4,76	3,80	3,17	2,72	2,38	2,11	1,90	1,73	1,59	1,46
		f1	0,08	0,11	0,14	0,19	0,23	0,29	0,35	0,41	0,48	0,55
150/50/2,5	36,74	Fv	144,29	100,20	73,61	56,36	44,53	36,07	29,81	25,05	21,34	18,40
		f	0,07	0,10	0,13	0,17	0,22	0,27	0,32	0,39	0,45	0,53
		Fp	9,02	7,21	6,01	5,15	4,51	4,01	3,61	3,28	3,01	2,77
		f1	0,08	0,12	0,16	0,20	0,25	0,31	0,37	0,44	0,52	0,60
200/50/2,5	32,85	Fv	104,01	72,23	53,07	40,63	32,10	26,00	21,49	18,06	15,39	13,27
		f	0,07	0,10	0,14	0,18	0,23	0,28	0,34	0,41	0,48	0,55
		Fp	6,50	5,20	4,33	3,71	3,25	2,89	2,60	2,36	2,17	2,00
		f1	0,07	0,09	0,12	0,16	0,20	0,25	0,30	0,35	0,41	0,47
250/50/2,5	30,52	Fv	83,21	57,79	42,45	32,50	25,68	20,80	17,19	14,45	12,31	10,61
		f	0,07	0,10	0,14	0,18	0,23	0,28	0,34	0,41	0,48	0,55
		Fp	6,50	5,20	4,33	3,71	3,25	2,89	2,60	2,36	2,17	2,00
		f1	0,07	0,09	0,12	0,16	0,20	0,25	0,30	0,35	0,41	0,47
300/50/2,5	28,97	Fv	72,14	50,10	36,81	28,18	22,27	18,04	14,91	12,52	10,67	9,20
		f	0,07	0,10	0,13	0,17	0,22	0,27	0,32	0,39	0,45	0,53
		Fp	6,76	5,41	4,51	3,86	3,38	3,01	2,71	2,46	2,25	2,08
		f1	0,06	0,09	0,12	0,15	0,19	0,23	0,28	0,33	0,39	0,45
150/75/2,5	43,80	Fv	277,26	192,54	141,46	108,30	85,57	69,31	57,29	48,14	41,01	35,36
		f	0,05	0,07	0,09	0,12	0,15	0,18	0,22	0,27	0,31	0,36
		Fp	17,33	13,86	11,55	9,90	8,66	7,70	6,93	6,30	5,78	5,33
		f1	0,06	0,08	0,11	0,14	0,18	0,21	0,26	0,31	0,36	0,41
200/75/2,5	38,15	Fv	199,91	138,83	101,99	78,09	61,70	49,98	41,30	34,71	29,57	25,50
		f	0,05	0,07	0,09	0,12	0,16	0,19	0,23	0,28	0,32	0,38
		Fp	12,49	10,00	8,33	7,14	6,25	5,55	5,00	4,54	4,16	3,84
		f1	0,04	0,06	0,08	0,11	0,14	0,17	0,20	0,24	0,28	0,32
250/75/2,5	34,76	Fv	159,93	111,06	81,06	62,47	49,36	39,98	33,04	27,77	23,66	20,40
		f	0,05	0,07	0,09	0,12	0,16	0,19	0,23	0,28	0,32	0,38
		Fp	12,49	10,00	8,33	7,14	6,25	5,55	5,00	4,54	4,16	3,84
		f1	0,04	0,06	0,08	0,11	0,14	0,17	0,20	0,24	0,28	0,32
300/75/2,5	32,50	Fv	138,63	96,27	70,73	54,15	42,79	34,66	28,64	24,07	20,51	17,68
		f	0,05	0,07	0,09	0,12	0,15	0,18	0,22	0,27	0,31	0,36
		Fp	13,00	10,40	8,66	7,43	6,50	5,78	5,20	4,73	4,33	4,00
		f1	0,04	0,06	0,08	0,10	0,13	0,16	0,19	0,23	0,27	0,31
150/100/2,5	50,90	Fv	446,29	309,92	227,70	174,33	137,74	111,57	92,21	77,48	66,02	56,92
		f	0,04	0,05	0,07	0,09	0,11	0,14	0,17	0,20	0,24	0,28
		Fp	27,89	22,31	18,60	15,94	13,95	12,40	11,16	10,14	9,30	8,58
		f1	0,04	0,06	0,08	0,11	0,13	0,16	0,20	0,23	0,27	0,32
200/100/2,5	43,45	Fv	322,39	223,88	164,49	125,93	99,50	80,60	66,61	55,97	47,69	41,12
		f	0,04	0,05	0,07	0,09	0,12	0,15	0,18	0,21	0,25	0,29
		Fp	20,15	16,12	13,43	11,51	10,07	8,96	8,06	7,33	6,72	6,20
		f1	0,03	0,05	0,06	0,08	0,10	0,13	0,15	0,18	0,21	0,24
250/100/2,5	39,00	Fv	257,91	179,11	131,59	100,75	79,60	64,48	53,29	44,78	38,15	32,90
		f	0,04	0,05	0,07	0,09	0,12	0,15	0,18	0,21	0,25	0,29
		Fp	20,15	16,12	13,43	11,51	10,07	8,96	8,06	7,33	6,72	6,20
		f1	0,03	0,05	0,06	0,08	0,10	0,13	0,15	0,18	0,21	0,24

Load limit: According to German instruction
 Elastic deflection (in loaded state) not >1/200 of the span
 but max. 4 mm at a moving single load of 1,5 kN on an area
 of 200 x 200 mm.
 Under the precondition of a distributed payload of 5 kN/m²
 the max. deflection at this load limit is 4 mm.

Span in mm															
1.500	1.600	1.700	1.800	1.900	2000	2100	2.200	2.300	2.400	2.500	2.600	2.700	2.800	2.900	3.000
11,27	9,91	8,78	7,83	7,03	6,34	5,75	5,24	4,79	4,40	4,06	3,75	3,48	3,24	3,02	2,82
0,74	0,84	0,95	1,07	1,19	1,32	1,45	1,59	1,74	1,90	2,06	2,23	2,4	2,58	2,77	2,97
1,81	1,69	1,59	1,49	1,41	1,33	1,27	1,21	1,15	1,10	1,06	1,01	0,98	0,94	0,91	0,87
0,84	0,95	1,07	1,20	1,33	1,47	1,62	1,77	1,94	2,11	2,28	2,46	2,65	2,85	3,05	3,27
8,14	7,15	6,33	5,65	5,07	4,58	4,15	3,78	3,46	3,18	2,93	2,71	2,51	2,33	2,18	2,03
0,78	0,89	1,00	1,13	1,25	1,39	1,53	1,68	1,84	2,00	2,17	2,35	2,53	2,72	2,92	3,13
1,31	1,22	1,14	1,08	1,02	0,96	0,92	0,87	0,83	0,80	0,76	0,73	0,70	0,68	0,65	0,63
0,66	0,75	0,85	0,95	1,05	1,16	1,28	1,40	1,53	1,66	1,80	1,95	2,1	2,25	2,41	2,58
6,51	5,72	5,07	4,52	4,06	3,66	3,32	3,03	2,77	2,54	2,34	2,17	2,01	1,87	1,74	1,63
0,78	0,89	1,00	1,13	1,25	1,39	1,53	1,68	1,84	2,00	2,17	2,35	2,53	2,72	2,92	3,13
1,31	1,22	1,14	1,08	1,02	0,96	0,92	0,87	0,83	0,80	0,76	0,73	0,70	0,68	0,65	0,63
0,66	0,75	0,85	0,95	1,05	1,16	1,28	1,40	1,53	1,66	1,80	1,95	2,1	2,25	2,41	2,58
5,64	4,95	4,39	3,91	3,51	3,17	2,88	2,62	2,40	2,20	2,03	1,88	1,74	1,62	1,51	1,41
0,74	0,84	0,95	1,07	1,19	1,32	1,45	1,59	1,74	1,90	2,06	2,23	2,40	2,58	2,77	2,97
1,36	1,27	1,19	1,12	1,06	1,00	0,95	0,91	0,86	0,83	0,79	0,76	0,73	0,70	0,68	0,66
0,63	0,71	0,80	0,90	1,00	1,10	1,22	1,33	1,45	1,58	1,71	1,85	1,99	2,14	2,29	2,45
16,03	14,09	12,48	11,13	9,99	9,02	8,18	7,45	6,82	6,26	5,77	5,34	4,95	4,60	4,29	4,01
0,60	0,69	0,78	0,87	0,97	1,07	1,18	1,30	1,42	1,55	1,68	1,81	1,96	2,10	2,26	2,42
2,58	2,40	2,25	2,12	2,00	1,90	1,80	1,72	1,64	1,57	1,50	1,44	1,39	1,34	1,29	1,24
0,68	0,78	0,87	0,98	1,08	1,20	1,32	1,45	1,58	1,71	1,86	2,01	2,16	2,32	2,49	2,66
11,56	10,16	9,00	8,03	7,20	6,50	5,90	5,37	4,92	4,51	4,16	3,85	3,57	3,32	3,09	2,89
0,63	0,72	0,81	0,91	1,02	1,13	1,24	1,36	1,49	1,62	1,76	1,90	2,05	2,21	2,37	2,53
1,86	1,73	1,63	1,53	1,44	1,37	1,30	1,24	1,18	1,13	1,08	1,04	1,00	0,96	0,93	0,90
0,54	0,61	0,69	0,77	0,85	0,94	1,04	1,14	1,24	1,35	1,46	1,58	1,7	1,83	1,96	2,09
9,25	8,13	7,20	6,42	5,76	5,20	4,72	4,30	3,93	3,61	3,33	3,08	2,85	2,65	2,47	2,31
0,63	0,72	0,81	0,91	1,02	1,13	1,24	1,36	1,49	1,62	1,76	1,90	2,05	2,21	2,37	2,53
1,86	1,73	1,63	1,53	1,44	1,37	1,30	1,24	1,18	1,13	1,08	1,04	1,00	0,96	0,93	0,90
0,54	0,61	0,69	0,77	0,85	0,94	1,04	1,14	1,24	1,35	1,46	1,58	1,7	1,83	1,96	2,09
8,02	7,05	6,24	5,57	5,00	4,51	4,09	3,73	3,41	3,13	2,89	2,67	2,47	2,30	2,14	2,00
0,60	0,69	0,78	0,87	0,97	1,07	1,18	1,30	1,42	1,55	1,68	1,81	1,96	2,10	2,26	2,42
1,93	1,80	1,69	1,59	1,50	1,42	1,35	1,29	1,23	1,18	1,13	1,08	1,04	1,00	0,70	0,93
0,51	0,58	0,65	0,73	0,81	0,90	0,99	1,08	1,18	1,29	1,39	1,50	1,62	1,74	1,87	1,99
30,81	27,08	23,98	21,39	19,20	17,33	15,72	14,32	13,10	12,03	11,09	10,25	9,51	8,84	8,24	7,70
0,42	0,47	0,53	0,60	0,67	0,74	0,81	0,89	0,98	1,06	1,15	1,25	1,35	1,45	1,55	1,66
4,95	4,62	4,33	4,08	3,85	3,65	3,47	3,30	3,15	3,01	2,89	2,77	2,67	2,57	2,48	2,39
0,47	0,53	0,60	0,67	0,75	0,83	0,91	0,99	1,09	1,18	1,28	1,38	1,49	1,6	1,71	1,83
22,21	19,52	17,29	15,43	13,84	12,49	11,33	10,33	9,45	8,68	8,00	7,39	6,86	6,37	5,94	5,55
0,43	0,49	0,56	0,62	0,69	0,77	0,85	0,93	1,02	1,11	1,20	1,30	1,40	1,51	1,62	1,73
3,57	3,33	3,12	2,94	2,78	2,63	2,50	2,38	2,27	2,17	2,08	2,00	1,92	1,85	1,78	1,72
0,37	0,42	0,47	0,52	0,58	0,64	0,71	0,78	0,85	0,92	1,00	1,08	1,16	1,25	1,34	1,43
17,77	15,62	13,83	12,34	11,08	10,00	9,07	8,26	7,56	6,94	6,40	5,91	5,48	5,10	4,75	4,44
0,43	0,49	0,56	0,62	0,69	0,77	0,85	0,93	1,02	1,11	1,20	1,30	1,40	1,51	1,62	1,73
3,57	3,33	3,12	2,94	2,78	2,63	2,50	2,38	2,27	2,17	2,08	2,00	1,92	1,85	1,78	1,72
0,37	0,42	0,47	0,52	0,58	0,64	0,71	0,78	0,85	0,92	1,00	1,08	1,16	1,25	1,34	1,43
15,40	13,54	11,99	10,70	9,60	8,66	7,86	7,16	6,55	6,02	5,55	5,13	4,75	4,42	4,12	3,85
0,42	0,47	0,53	0,60	0,67	0,74	0,81	0,89	0,98	1,06	1,15	1,25	1,35	1,45	1,55	1,66
3,71	3,47	3,25	3,06	2,89	2,74	2,60	2,48	2,36	2,26	2,17	2,08	2,00	1,93	1,86	1,79
0,35	0,40	0,45	0,50	0,56	0,62	0,68	0,75	0,81	0,89	0,96	1,04	1,12	1,20	1,28	1,37
49,59	43,58	38,61	34,44	30,91	27,89	25,30	23,05	21,09	19,37	17,85	16,50	15,30	14,23	13,27	12,40
0,32	0,36	0,41	0,46	0,51	0,57	0,62	0,68	0,75	0,81	0,88	0,96	1,03	1,11	1,19	1,27
7,97	7,44	6,97	6,56	6,20	5,87	5,58	5,31	5,07	4,85	4,65	4,46	4,29	4,13	3,98	3,85
0,36	0,41	0,46	0,51	0,57	0,63	0,70	0,76	0,83	0,90	0,98	1,06	1,14	1,22	1,31	1,4
35,82	31,48	27,89	24,88	22,33	20,15	18,28	16,65	15,24	13,99	12,90	11,92	11,06	10,28	9,58	8,96
0,33	0,37	0,42	0,47	0,53	0,58	0,64	0,71	0,77	0,84	0,91	0,99	1,07	1,15	1,23	1,32
5,76	5,37	5,04	4,74	4,48	4,24	4,03	3,84	3,66	3,50	3,36	3,22	3,10	2,99	2,88	2,78
0,28	0,32	0,36	0,40	0,44	0,49	0,54	0,59	0,64	0,70	0,76	0,82	0,88	0,95	1,02	1,09
28,66	25,19	22,31	19,90	17,86	16,12	14,62	13,32	12,19	11,19	10,32	9,54	8,84	8,22	7,67	7,16
0,33	0,37	0,42	0,47	0,53	0,58	0,64	0,71	0,77	0,84	0,91	0,99	1,07	1,15	1,23	1,32
5,76	5,37	5,04	4,74	4,48	4,24	4,03	3,84	3,66	3,50	3,36	3,22	3,10	2,99	2,88	2,78
0,28	0,32	0,36	0,40	0,44	0,49	0,54	0,59	0,64	0,70	0,76	0,82	0,88	0,95	1,02	1,09

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are the main arguments why choosing Lichtgitter. To guarantee this quality we are manufacturing our products under permanent attention of valid standards and instructions.

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