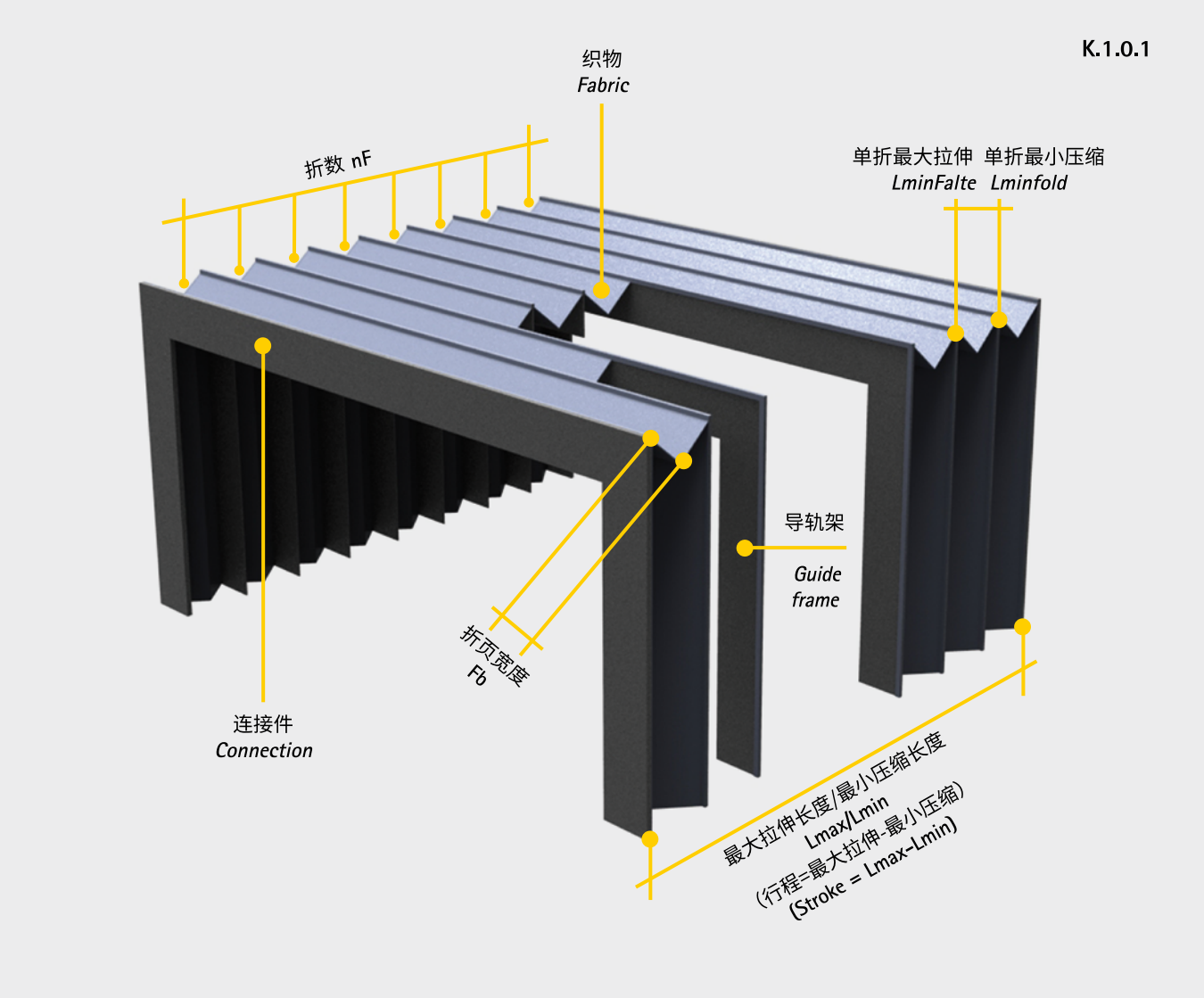
波纹防护罩
Bellows

CLASSIC

阿诺德经典款波纹防护罩已经成功应用了百万次，在多个应用领域找到了用武之地。产品可以抵御各类冷却润滑剂、污垢、灰尘、油和脂肪的侵袭，建立可靠的保护屏障。
针对这类产品，我们提供流体密封或自动灭火功能的设计。主要应用领域包括：加工中心、机床、电火花机、磨床、直线导轨、激光加工、航空、家具行业、护理行业、木工、水射流切割、测量机、医疗技术、输送技术、电气行业、测量和控制技术、汽车工程、玻璃加工机、工艺技术、太阳能技术、冶金、能源工程、建筑工程、雕刻机、印刷机、纺织机、分拣设施、铆接机、飞机工业、专用机械、塑料工程。

Arnold classic bellows have proved themselves millions of times over, in various uses. They offer reliable protection against many cooling lubricants, dirt, dust, oils and fats. Furthermore, they can be designed to be fluid-tight or self-extinguishing. Main application areas are: machining centers, machine tools, eroding machines, grinding machines, linear slides, laser processing, aviation, furniture industry, care industry, woodworking, water jet cutting, measuring machines, medical technology, conveyor technology, electrical industry, measurement and control technology, automotive engineering, glass processing machines, process technology, solar technology, metallurgy, energy technology, building technology, engraving machines, printing machines, textile machines, sorting plants, riveting machines, aircraft industry, special-purpose machines, plastics technology.

命名法
Nomenclature



阿诺德产品目录中的缩略语 / *Abbreviations in the Arnold catalogue*

Fb = 折页宽度 / *fold width*

Lmax = 最大拉伸长度 / *maximum length*

Lmin = 最小压缩长度 / *minimum length*

行程=最大拉伸-最小压缩 / *stroke = Lmax-Lmin*

LmaxFalte = 单折最大拉伸长度 / *maximum length per fold*

LminFalte = 单折最小压缩长度 / *minimum length per fold*

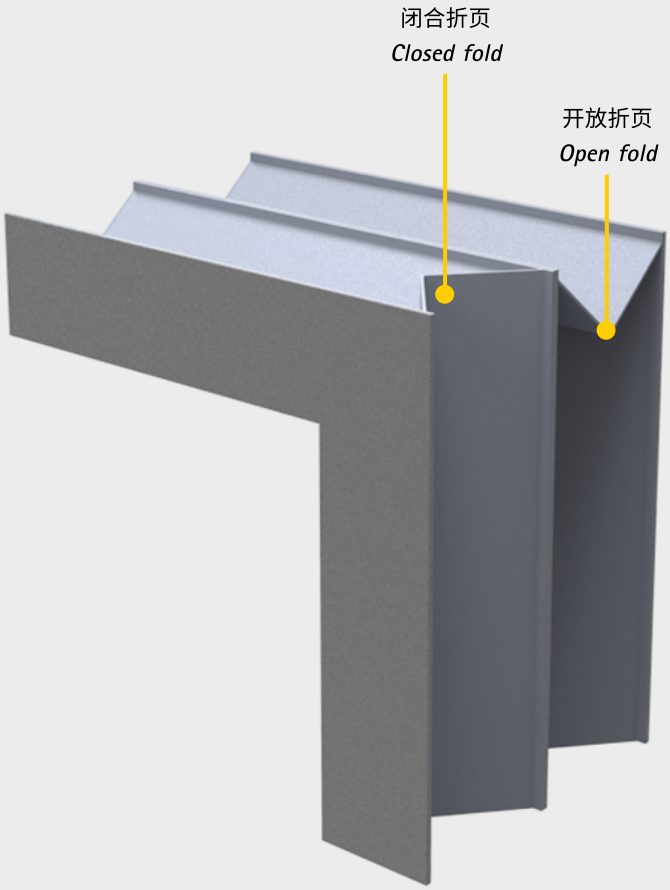
nF = 折数 / *number of folds*

顶部图片中解释的术语适用于本产品目录中的所有阿诺德防护罩。

The terms explained in the picture at the top can be used for all Arnold protective covers in this catalogue.

折叠
Folding

K.1.0.2



阿诺德防护罩可以：
针对所有应用单独定制。
例如，冷却液流量可以通过折页的配置来控制。单个折页可以由垂直和水平来布置。

Arnold protective covers can be individually tailored to all applications. For example, the coolant flow can be controlled by the configuration of the folding. The individual folding can relate to folds arranged vertically and horizontally.

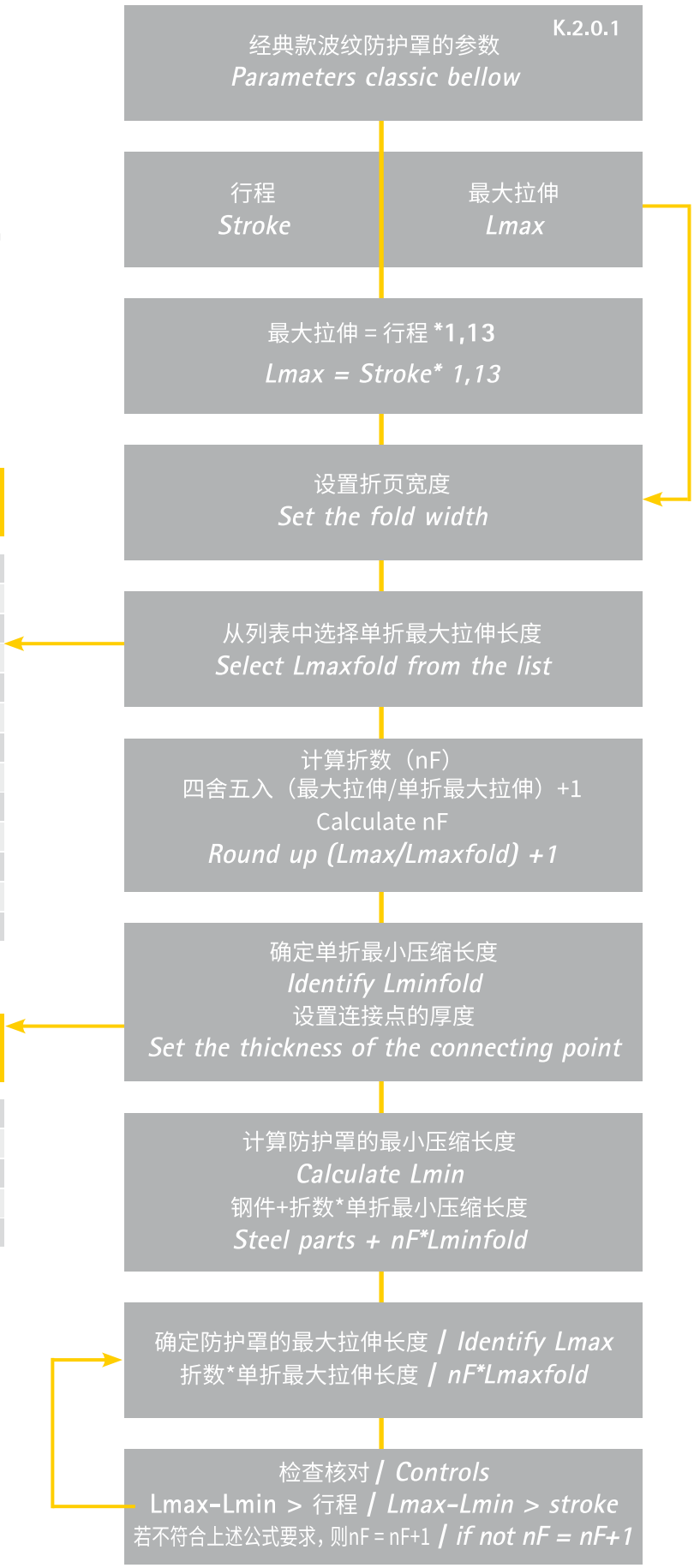
参数
Parameters

您可以使用所示流程图来确定所需的安装空间大小。“织物厚度”包含了三种不同材料等级的近似值。快速一览中介绍了三种材料等级各自的最大拉伸长度（Lmax）、折页宽度（Fb）和最小压缩（Lmin）组合。

The scale of the required construction space can be determined using the shown flow diagram. The “fabric thickness” contains approximate values for 3 different material classes. In the quick summary, a rough overview of the combination of Lmax, Fb and Lmin can be found for each of these 3 material classes.

折页宽度 (Fb) *Fold width*	单折最大拉伸长度 *Lmaxfold*
15	22
20	31
25	40
30	49
35	58
40	67
45	76
50	85
60	103
70	121
80	139
90	157
100	175

材料厚度 *Thickness of material*	单折最小压缩长度 *Lminfold*
0,2 mm	3 mm
0,3 mm	3,6 mm
0,5 mm	5,5 mm



快速一览
Quick summary

当：织物厚度为0.2mm/单折最小压缩长度（Lminfold）=3mm，防护罩最小压缩长度Lmin的相应数值为： *Lmin if fabric thickness 0,2 mm / Lminfold = 3 mm* K.2.0.2

Lmax \ Fb	15	20	25	30	35	40	45	50	60	70	80	90	100
100	22	19	16	16	13	13	13	13	10	10	10	10	10
200	37	28	25	2	19	19	16	16	13	13	13	13	13
300	49	37	31	28	25	22	19	19	16	16	16	13	13
400	64	49	40	34	28	28	25	22	19	19	16	16	16
500	79	58	46	40	34	31	28	25	22	22	19	19	16
600	91	67	55	46	40	37	31	31	25	22	22	19	19
700	106	76	61	52	46	40	37	34	28	25	25	22	22
800	121	88	70	58	49	46	40	37	31	28	25	25	22
900	133	97	76	64	55	49	43	40	34	31	28	25	25
1000	148	106	85	70	61	55	49	43	37	34	31	28	25
1500	217	157	121	100	88	76	67	61	52	46	40	37	34
2000	286	205	160	133	112	100	88	79	67	58	52	46	43
2500	355	253	199	163	139	121	109	97	82	70	64	55	52
3000	424	304	235	193	166	145	127	115	97	82	73	67	61
3500	496	352	274	226	190	166	148	133	112	97	85	76	70
4000	565	400	313	256	217	190	166	151	124	109	94	85	76
4500	634	451	349	286	244	211	187	169	139	121	106	94	85
5000	703	499	388	316	268	235	208	187	154	133	118	103	94

当：织物厚度为0.3mm/单折最小压缩长度（Lminfold）=3.6mm，防护罩最小压缩长度Lmin的相应数值为： *Lmin if fabric thickness 0,3 mm / Lminfold = 3,6 mm* K.2.0.3

Lmax \ Fb	15	20	25	30	35	40	45	50	60	70	80	90	100
100	26	22	18	18	15	15	15	15	11	11	11	11	11
200	44	33	29	26	22	22	18	18	15	15	15	15	15
300	58	44	36	33	29	26	22	22	18	18	18	15	15
400	76	58	47	40	33	33	29	26	22	22	18	18	18
500	94	69	54	47	40	36	33	29	26	26	22	22	18
600	108	80	65	54	47	44	36	36	29	26	26	22	22
700	126	90	72	62	54	47	44	40	33	29	29	26	26
800	144	105	83	69	58	54	47	44	36	33	29	29	26
900	159	116	90	76	65	58	51	47	40	36	33	29	29
1000	177	126	101	83	72	65	58	51	44	40	36	33	29
1500	260	188	144	119	105	90	80	72	62	54	47	44	40
2000	342	245	191	159	134	119	105	94	80	69	62	54	51
2500	425	303	238	195	166	144	130	116	98	83	76	65	62
3000	508	364	281	231	198	173	152	137	116	98	87	80	72
3500	594	422	328	270	227	198	177	159	134	116	101	90	83
4000	677	479	375	306	260	227	198	180	148	130	112	101	90
4500	760	540	418	342	292	252	224	202	166	144	126	112	101
5000	843	598	465	378	321	281	249	224	184	159	141	123	112

当：织物厚度为0.5mm/单折最小压缩长度（Lminfold）=5.5mm，防护罩最小压缩长度Lmin的相应数值为： *Lmin if fabric thickness 0,5 mm / Lminfold = 5,5 mm* K.2.0.4

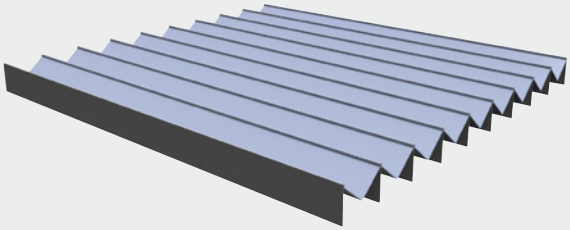
Lmax \ Fb	15	20	25	30	35	40	45	50	60	70	80	90	100
100	37	32	26	26	21	21	21	21	15	15	15	15	15
200	65	48	43	37	32	32	26	26	21	21	21	21	21
300	87	65	54	48	43	37	32	32	26	26	26	21	21
400	114	87	70	59	48	48	43	37	32	32	26	26	26
500	142	103	81	70	59	54	48	43	37	37	32	32	26
600	164	120	98	81	70	65	54	54	43	37	37	32	32
700	191	136	109	92	81	70	65	59	48	43	43	37	37
800	219	158	125	103	87	81	70	65	54	48	43	43	37
900	241	175	136	114	98	87	76	70	59	54	48	43	43
1000	268	191	153	125	109	98	87	76	65	59	54	48	43
1500	395	285	219	180	158	136	120	109	92	81	70	65	59
2000	521	373	290	241	202	180	158	142	120	103	92	81	76
2500	648	461	362	296	252	219	197	175	147	125	114	98	92
3000	774	554	428	351	301	263	230	208	175	147	131	120	109
3500	906	642	199	411	345	301	268	241	202	175	153	136	125
4000	1033	730	571	466	395	345	301	274	224	197	169	153	136
4500	1159	824	637	521	444	384	340	307	252	219	191	169	153
5000	1286	912	708	576	488	428	378	340	279	241	213	186	169

基本形状
Basic shapes

这里列举了最常见的基本形状。此外，我们还可以提供多种异形防护罩。客户也可以定制特定的几何形状。

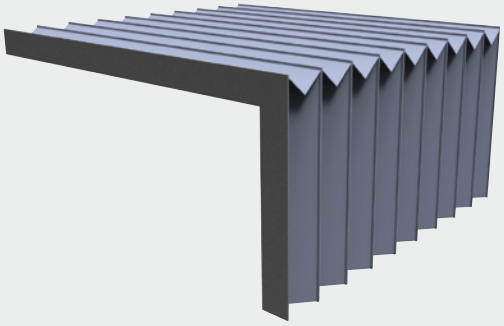
The most popular basic shapes are listed here. In addition, there are many special shapes. Customer specific geometries are also possible.

K.1.1.1



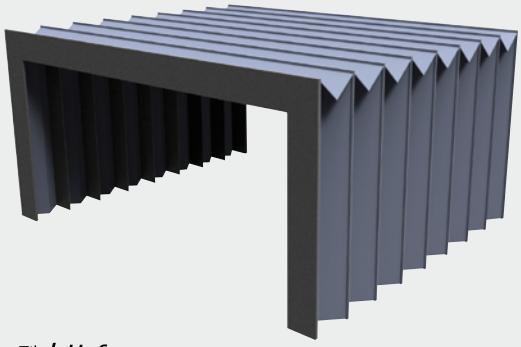
I 型 / *I-form*

K.1.2.1



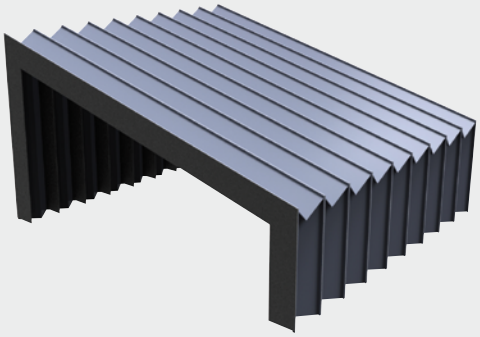
L 型 / *L-form*

K.1.3.1



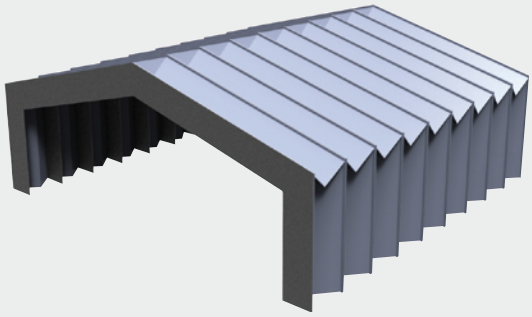
U 型 / *U-form*

K.1.4.1



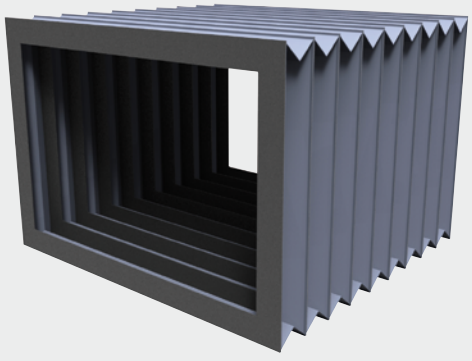
斜面桌型 / *Desk-form*

K.1.5.1



屋顶型 / *Roof-form*

K.1.6.1



箱型 / *Box-form*

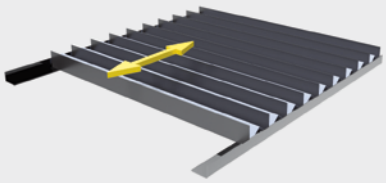
导轨类型
Guide variations

防护罩工作空间的位置
Location of the work area for the protective cover

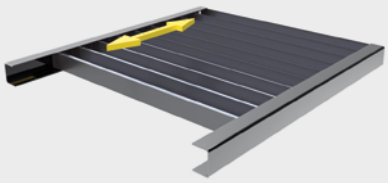
下图显示了各种安装位置的基本形状和相应导向装置的几何形状。
黄色箭头表示行进方向。

The following pictures show the basic shapes in various positions of mounting and the associated guide geometries. The process direction is indicated by the yellow arrow.

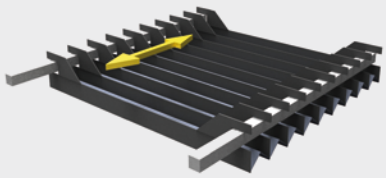
K.3.1.1



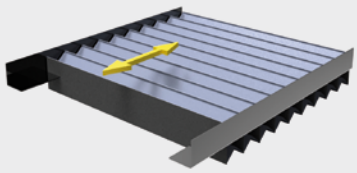
K.3.1.2



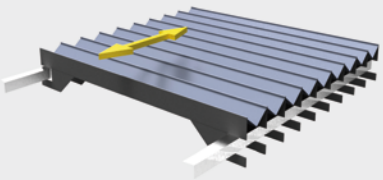
K.3.1.3



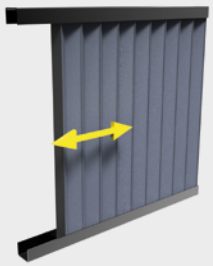
K.3.1.4



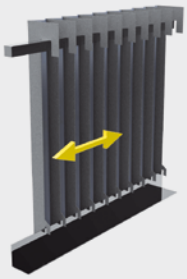
K.3.1.5



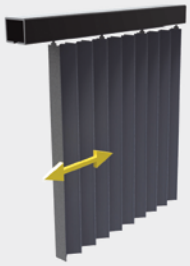
K.3.1.6



K.3.1.7

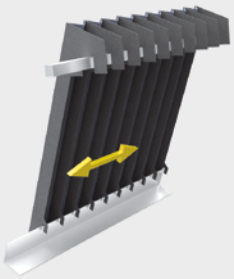


K.3.1.8

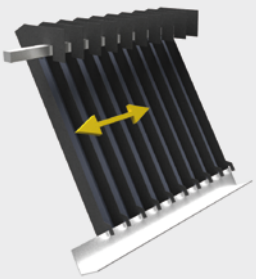


K.3.1.9

K.3.1.10

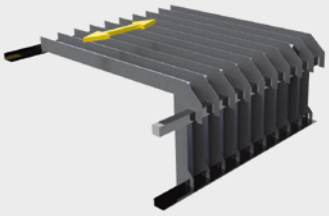


K.3.1.11

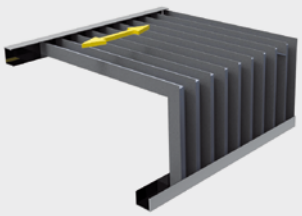


导轨类型
Guide variations

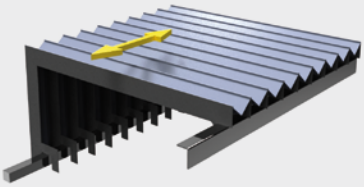
K.3.2.1



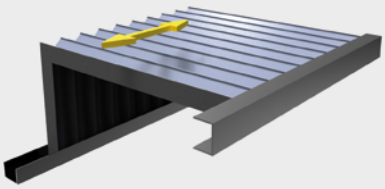
K.3.2.2



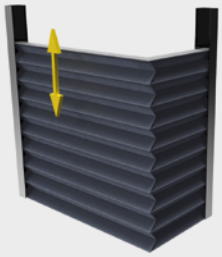
K.3.2.3



K.3.2.4

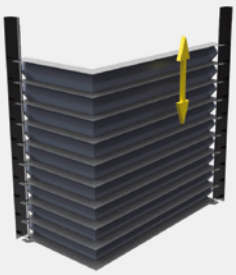


K.3.2.5



K.3.2.6

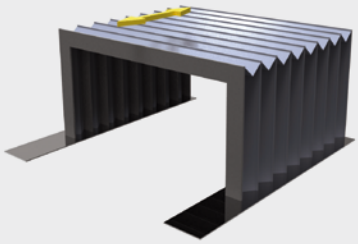
K.3.2.7



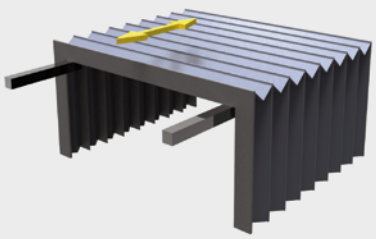
ARNOLD
阿诺德

导轨类型
Guide variations

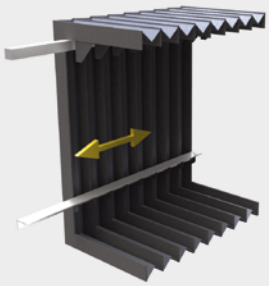
K.3.3.1



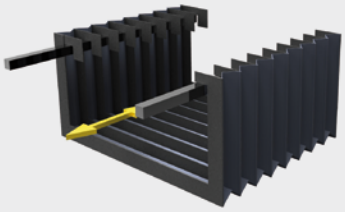
K.3.3.2



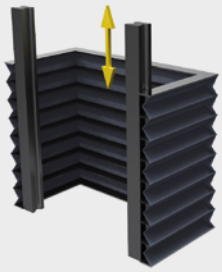
K.3.3.3



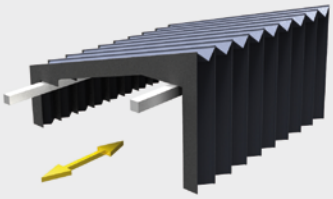
K.3.3.4



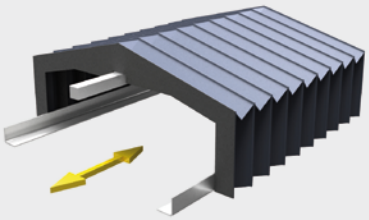
K.3.3.5



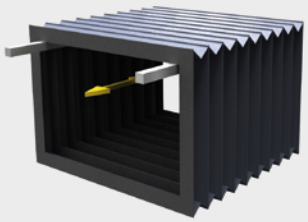
K.3.4.1



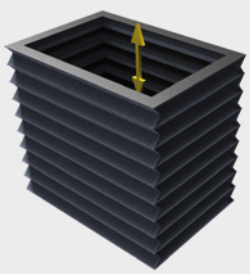
K.3.5.1



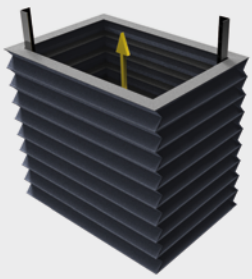
K.3.6.1



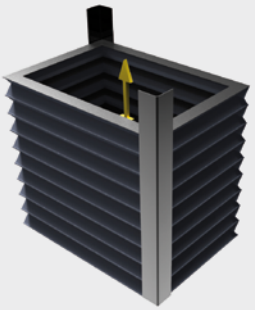
K.3.6.2



K.3.6.3



K.3.6.4

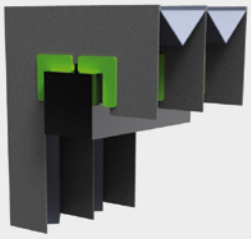


选项
Options

额外选项为您提供量体裁衣的防护罩产品。您可以选择组合方案或定制特殊的解决方案。
我们将竭诚为您提供咨询服务，塑造符合您需求的防护罩产品。

Select additional options to make the protective cover specific to your requirements. Combinations and individual special solutions are possible.
We will be happy to advise you on which options are suitable for the protective cover you desire.

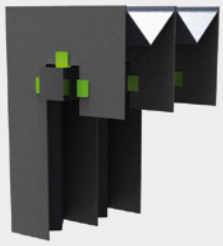
K.4.0.1



转角滑块：
用夹代粘：
优化的运行性能，转角稳定，低噪音，可更换。

Angle slide:
Clipping rather than sticking: Optimised running properties, corner stabilisation, low-noise, replaceable.

K.4.0.2



夹式滑块：
用夹代粘：
优化的运行性能，转角稳定，低噪音，可更换。

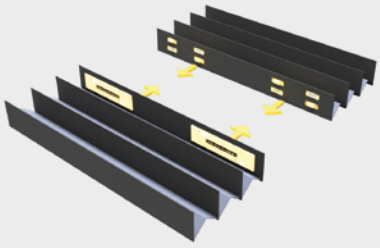
Clip slider:
Clipping rather than sticking: Optimised running properties, corner stabilisation, low-noise, replaceable.

K.4.0.3

滚动滑块：
改善大重量情况下的运行性能，可更换。

Roller slider:
Improved running properties with high weight, replaceable.

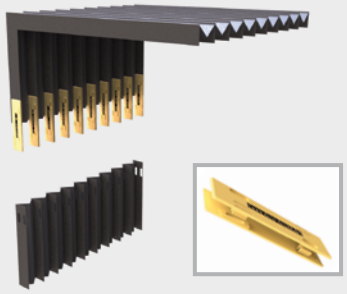
K.4.0.4



可在行进方向上联锁扩展，无需工具即可组装。

***Interlocking extension** in the process direction, which can be assembled without the need for tools.*

K.4.0.5

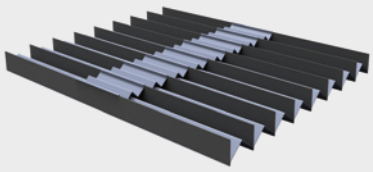


可选联锁连接防护顶盖，无需工具即可组装。

***Interlocking attachment** of an optional **roof cover**, can be assembled without the need for tools.*

选项
Options

K.4.0.6

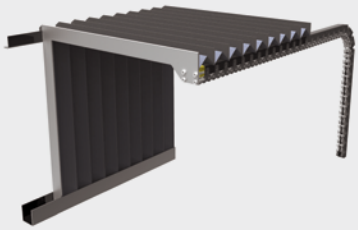


QuickStep

带阻模块：防止拉出的折页出现过度拉伸，适用于横移长路径的高动态应用场景。在快速应用下也具备可替换性。

Band stops: *Prevent over-stretching of the pulled-out folds, suitable in case of high dynamics of large traverse paths. Quick step allows replaceability.*

K.4.0.7

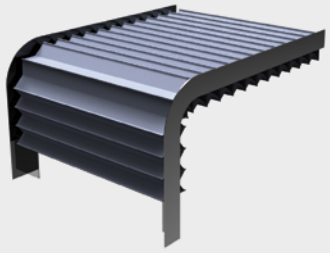


CATENA

柔性集成导轨；在无法使用连续导轨时具有优势。允许自由进入工作区，例如：可用于起重机装载。

Integrated, flexible guide; *helpful if a continuous guide is not possible. Guarantees free access to the work area, e.g. for crane loading.*

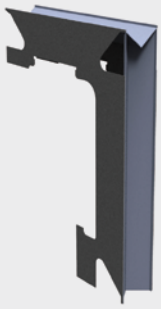
K.4.0.8



圆弧形导向装置允许重新配置工作区后方的模块尺寸。

Bowing *allows relocation of the block size behind the work area.*

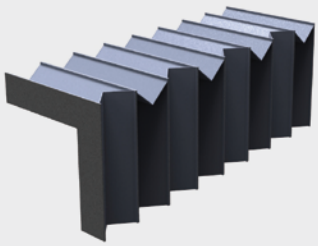
K.4.0.9



转角区域的导向架留空，以优化防护罩的最小压缩长度（Lmin）。

Lmin optimisation *by blanks in the guide frame in the corner area.*

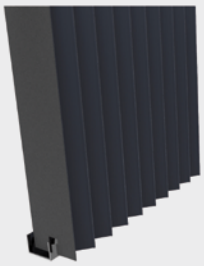
K.4.0.10



交替使用开放和闭合折页，以优化防护罩的最小压缩长度（Lmin）。

Lmin optimisation *by alternating between open and closed folding.*

K.4.0.11

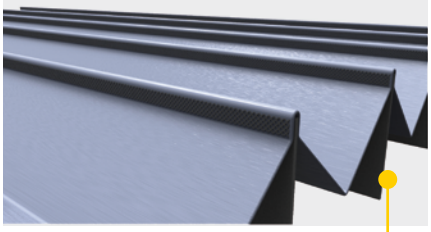


迷宫密封原理确保了液密滑块设计。

Labyrinth principle *allows a fluid-tight guide.*

选项
Options

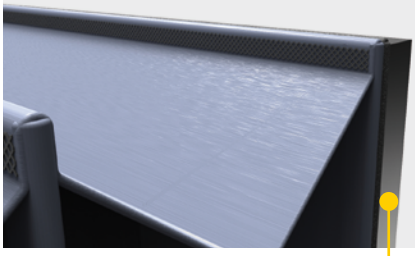
K.4.0.12



焊接设计提高了液体密封性。

***Welded design** increases seal against fluids.*

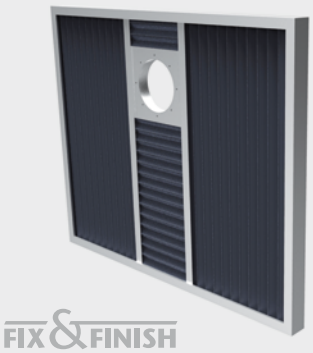
K.4.0.13



无铆钉孔的液密连接件。

***Fluid-tight connection** without rivet holes.*

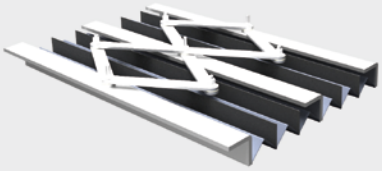
K.4.0.14



有1轴、2轴或3轴的预组装和可立即安装的完整解决方案。

***Pre-assembled and ready-to-install complete solution over** 1, 2 or 3 axes.*

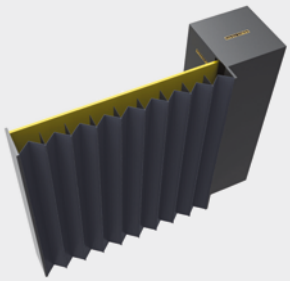
K.4.0.15



剪切系统确保各段的同步性。
注意：重量增加将影响最小压缩长度和动态性。

***Shear systems** guarantee the synchronisation of individual segments. Note: weight increase can restrict minimum length and dynamics.*

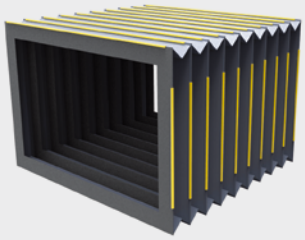
K.4.0.16



约束系统：
提高能量吸收。

Restraint system:
Increases energy absorption.

K.4.0.17

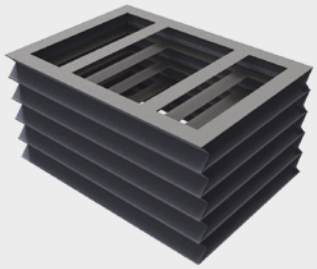


信号传递效应：彩色信号元件确保了移动危险点的可视性。
该选项适用所有形状，推荐用于升降台。

***Signal effect:** A coloured signal element makes moving danger points visible. The option is possible for all shapes and recommended for lifting tables.*

选项
Options

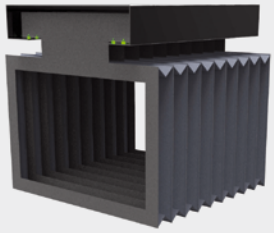
K.4.6.1



箱型，带横拉条：
在较高内压情况下，起到稳定作用。

Box shape with cross pieces:
For stabilisation in case of high internal pressure.

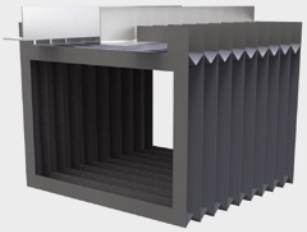
K.4.6.2



激光束波纹防护罩，密闭设计，带C型材导轨。

Laser beam bellow,
airtight design with guide in the C-profile.

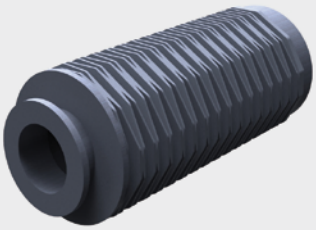
K.4.6.3



激光束波纹防护罩，密闭设计，不可拆卸的导轨系统。

Laser beam bellow,
airtight design, undetachable guiding.

K.4.8.1

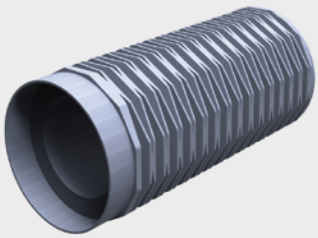


RONDET

带连接法兰的多边形波纹防护罩。

Polygonal bellow with connecting flange.

K.4.8.2

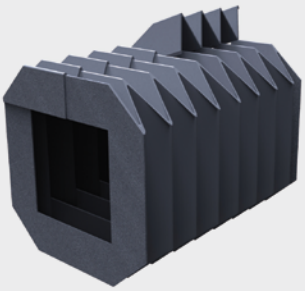


RONDET

带轴环连接的多边形波纹防护罩。

Polygonal bellow with collar for connection.

K.4.8.3



用于后续组装的箱型波纹防护罩/多边形波纹防护罩，供货产品为开放式；安装在机器上后闭合。

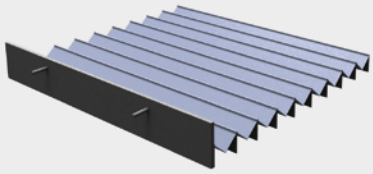
Box bellow/polygonal bellow for subsequent assembly, supplied in open form; closing takes place after installation in the machine.

连接件
Connections

根据实际情况选择机器上的固定方式。这里展示了最常见的固定类型。此外，公司还可以提供个性化的特殊解决方案。

Fixing into the machine is dependent on the respective conditions. Here, we show the most popular fixing types. Furthermore, we also develop individual, special solutions.

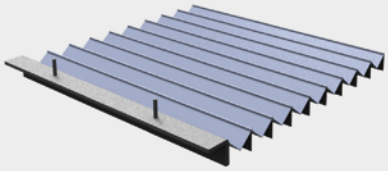
K.5.0.1



在行进方向上，使用带螺纹螺栓的金属部件固定。

Metal part with threaded bolt in the process direction.

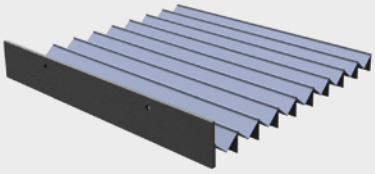
K.5.0.2



垂直于行进方向上，用带螺纹螺栓的金属部件固定。

Metal part with threaded bolt perpendicular to the process direction.

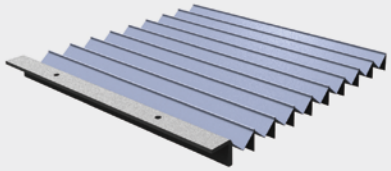
K.5.0.3



使用带螺纹孔的金属部件。

Metal part with threaded holes.

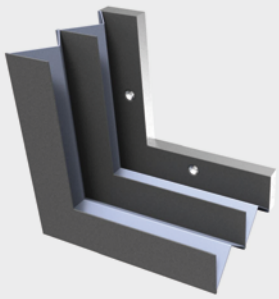
K.5.0.4



使用弯曲处有螺纹孔的金属部件。

Metal part with threaded holes in a bend.

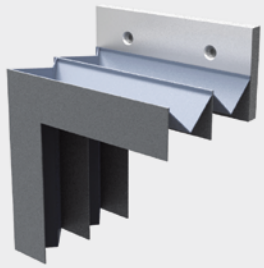
K.5.0.5



波纹防护罩轮廓内带螺纹孔的金属部件。

Metal part with threaded holes inside the shape of the bellow.

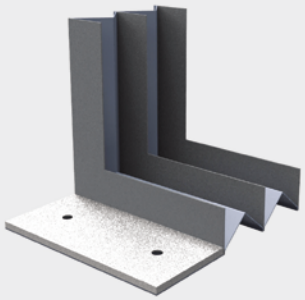
K.5.0.6



带通孔的突出金属部件。

Overhanging metal part with through holes.

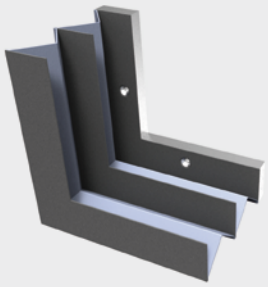
K.5.0.7



带通孔、弯曲有角度的金属部件。

Angled metal part with through holes.

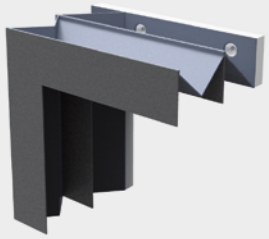
K.5.0.8



波纹防护罩轮廓内带有通孔。

Through holes inside the shape of the bellow.

K.5.0.9

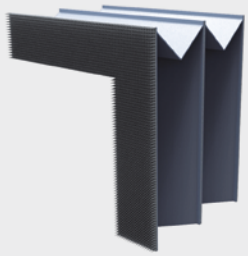


1/2折页，有通孔，可从正面用螺丝拧紧。

1/2 fold, through hole, screw joint possible from the front.

连接件
Connections

K.5.0.10



通过魔术贴胶带连接

Connection via Velcro tape

K.5.0.11

魔术贴胶带配对部分粘在机器上。

The Velcro tape counterpart is stuck on the machine.

K.5.0.12

魔术贴胶带配对部分联锁固定在一个塑料框架上。
框架用螺丝固定在机器上。

The Velcro tape counterpart is fixed interlocking on a plastic frame. The frame is screwed to the machine.

K.5.0.13

钥匙孔固定，钩住保护罩。

Keyhole fixing to hook in the protective cover.

K.5.0.14

用开槽螺母钩住保护罩。

Slot nut to hook in the protective cover.

K.5.0.15

在机器侧预装的弹簧挂钩借助摩擦力固定相关的对应物。

Pre-assembled spring hanger on the machine side holds the relevant counterpart by friction.