## X-Y LM SHIELD with Thermic-Welded Covers and Movable Plates

- The **X - Y LM SHIELD** composed of thermic-welded bellows with steel laminations, represents the cheapest solution for protecting the working area in horizontal spindle machining centers where there is a large production of hot shavings.
  This system consists of No. 2 horizontal bellows and No. 2 vertical bellows, protected by movable stainless steel plates guaranteeing a very functional product for Quality/Price.
- Accelerations up to 1 G
- Speeds up 120 m/min.
- The thermic-welded protection bellows are largely used on every kind of machine tool. They are frequently used in machining centers and chip-removing machines. In order to protect the bellow exposed to hot shavings, a shielding made by metal elements, called "plates" will be necessary. The steel laminations are fixed by special clamps keeping the plates adherent and loaded one on the other to prevent contaminants and shavings from entering.

THERMIC-WELDED COVERS
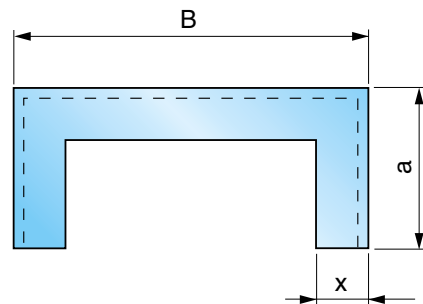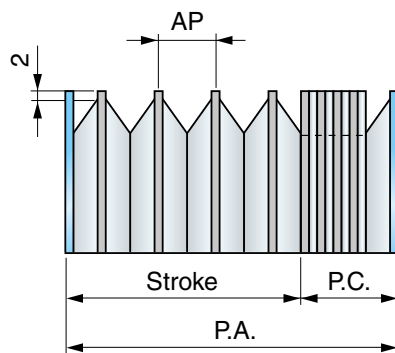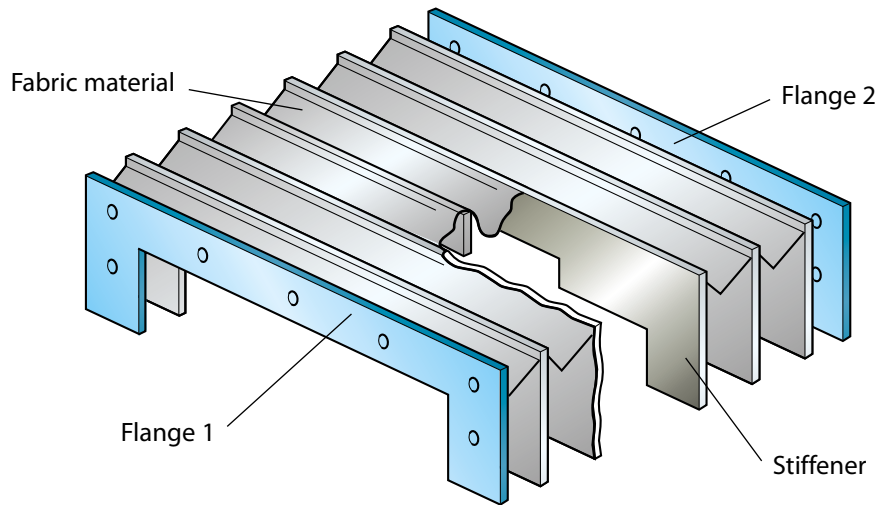
Fabric material

Flange 2

Flange 1

Stiffener

P.A.	= Open length	B	= Outside width
P.C.	= Closed length	a	= Outside height
Stroke	= Open length - closed length	x	= Fold height

Formula for calculating the CLOSED LENGTH

AP = Opening of 1 fold = $x \cdot 2 - 8$

SM = Fabric thickness *

SS = Stiffener thickness *

SF = Flange thickness *

NP = Number of folds = $\dfrac{P.A.}{AP} + 2$

P. C.= $(SM \cdot 8 + SS) \cdot NP + (SF \cdot 2)$

* See materials list on page 31.

This data sheet shows only one type of Thermic-Welded Cover that we manufacture.
Contact our engineering department for other types.

Example:

Given that: Fold height = 15 mm

                     Open length = 1000 mm

Opening of 1 fold = 15 x 2 - 8 = 22

Number of folds = $\dfrac{1000}{22} + 2$ = 48

Closed length   = (0,25* x 8 + 1**) x 48 + (2 *** x 2)

Closed length   = 3 x 48 + 4   = 148
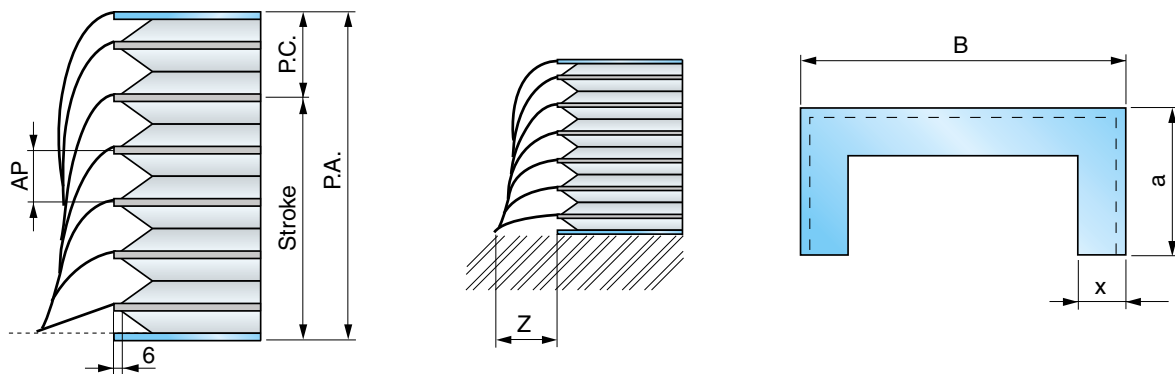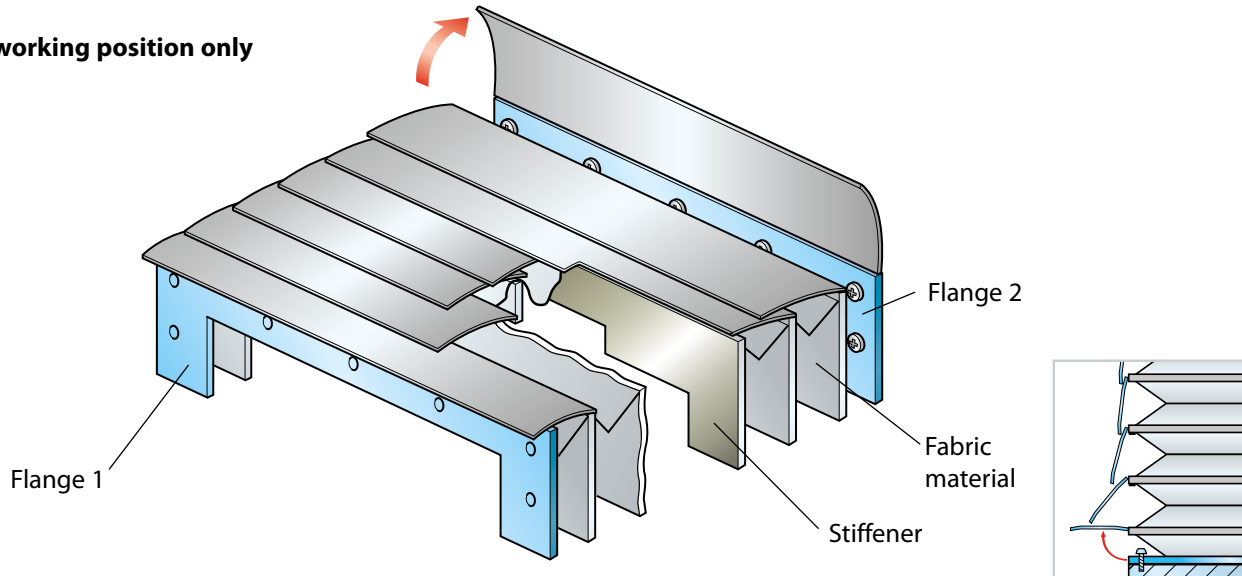
Closed length = 148 mm

*   We hypothesize the fabric material with code "TEMAT015" (see materials list on page 32)

** We hypothesize that the stiffener is 1 mm thick

*** We hypothesize that the flange is 2 mm thick (see materials list on page 31)

THERMIC-WELDED COVER WITH FLEXIBLE LAMINATIONS

Vertical working position only

Flange 2

Flange 1

Fabric material

Stiffener

P.A.	= Open length	**B**	= Outside width
P.C.	= Closed length	**a**	= Outside height
Stroke	= Open length - closed length	**x**	= Fold height

x(mm)	15	20	25	30	35	40	45
Z(mm)	40	50	60	70	80	90	100

Formula for calculating the CLOSED LENGTH

Opening of 1 fold = $(x \cdot 2) - 16$

SM = Fabric thickness *

SS = Stiffener thickness *

SF = Flange thickness *

NP = Number of folds = $\dfrac{P.A.}{AP} + 2$

P. C. = $(SM \cdot 8 + SS) \cdot NP + (SF \cdot 2)$

* See materials list on page 31

This data sheet shows only one type of Thermic-Welded Cover that we manufacture.
Contact our engineering department for other types.

Example

Given that: Fold height = 30 mm
Open length = 1000 mm

Opening of 1 fold = (30 x 2) - 16 = 44

Number of folds = $\dfrac{1000}{44} + 2 = 25$

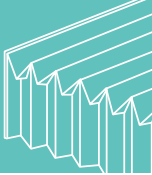Closed length = (0,25* x 8 + 1**) x 25 + (2*** x 2)
Closed length = 3 x 25 + 4 = 79
Closed length = 79 mm

*   We hypothesize the fabric material with code "TEMAT015" (see materials list on page 32)

**   We hypothesize that the stiffener is 1 mm thick

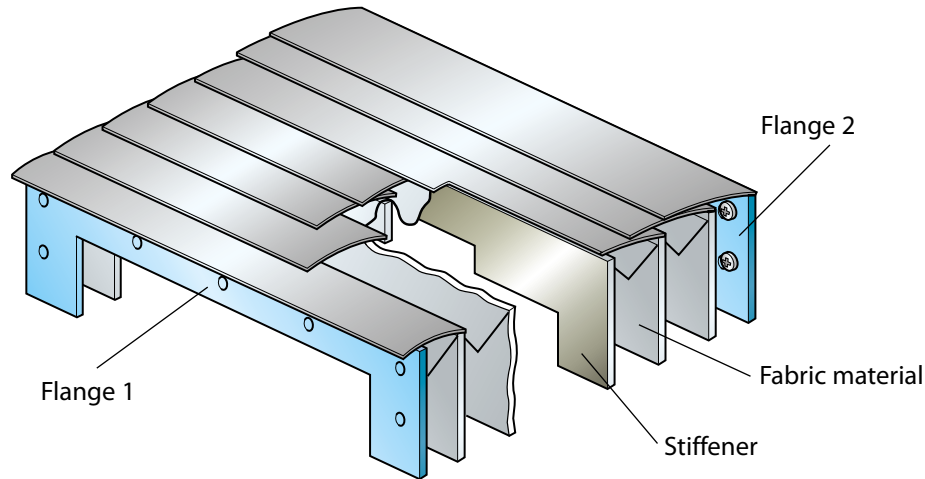*** We hypothesize that the flange is 2 mm thick

(see materials list on page 31)

THERMIC-WELDED COVER WITH FIXED LAMINATIONS
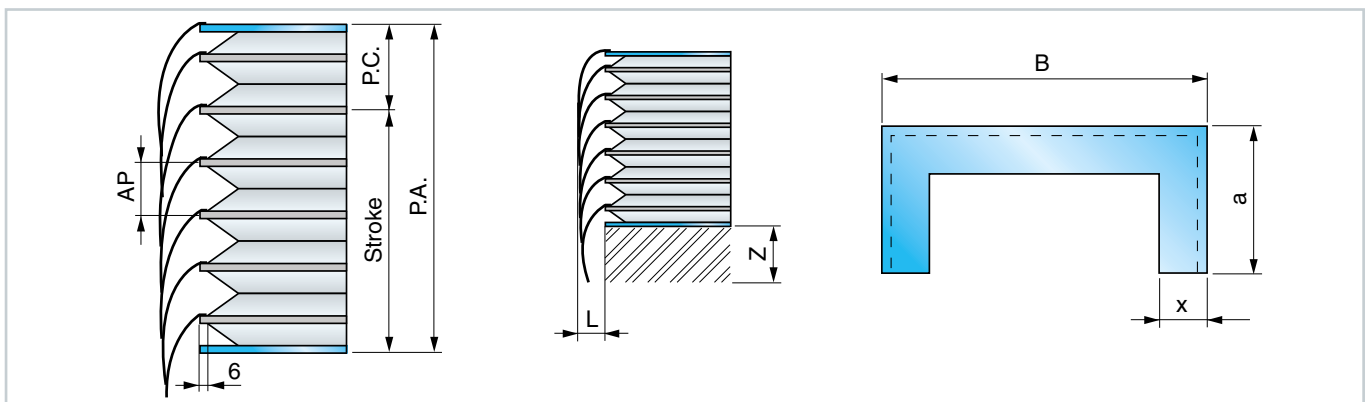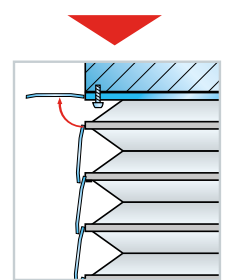
Working position:
Horizontal
Vertical
Frontal

Flange 2

Possible special fixing to facilitate the mounting of the first steel lamination

Flange 1

Fabric material

Stiffener

P.A.	= Open length	**B**	= Outside width
P.C.	= Closed length	**a**	= Outside height
Stroke	= Open length - closed length	**x**	= Fold height

x(mm)	15	20	25	30	35	40	45
L(mm)	16	21	26	33	43	48	56
Z(mm)	45	55	65	75	85	95	105

Formula for calculating the CLOSED LENGTH

AP	=	Opening of 1 fold = $x \cdot 2 - 16$
SM	=	Fabric thickness *
SS	=	Stiffener thickness *
SF	=	Flange thickness *
NP	=	Number of folds= $\dfrac{P.A.}{AP} + 2$
P. C.	=	$(SM \cdot 8 + SS) \cdot NP + (SF \cdot 2)$

* See materials list on page 31

This data sheet shows only one type of Thermic-Welded Cover that we manufacture.
Contact our engineering department for other types.
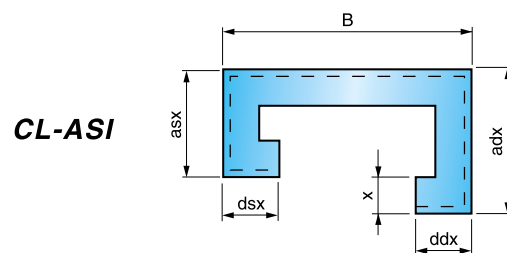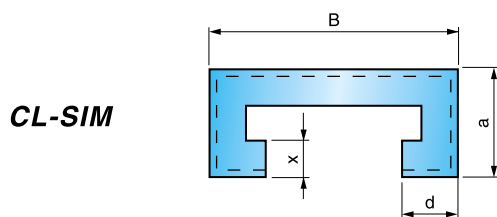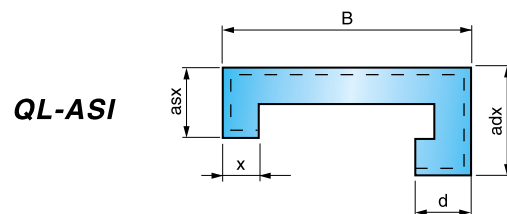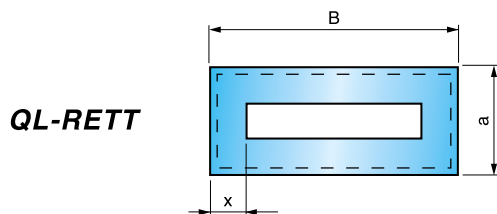
Example

Given that: Fold height = 45 mm
             Open length = 1800 mm
Opening of 1 fold = 45 x 2 - 16 = 74
Number of folds = $\dfrac{1800}{74}$ + 2 = 27
Closed length   = (0,35* x 8 + 1**) x 27 + (3*** x 2)
Closed length   = 3,8 x 27 + 6   = 109
Closed length = 109 mm

* We hypothesize the fabric material with code "TEMAT151" (see materials list on page 32)
** We hypothesize that the stiffener is 1 mm thick
*** We hypothesize that the flange is 3 mm thick (see materials list on page 31)

Standard Shapes

UL-OS

UL-2ST

UL-1S

UL-3S

DL-DXC

TL-SIM

TL-DXC

TL-DXI

QL-QUAD

QL-CAP

QL-RETT

QL-ASI

CL-SIM

CL-ASI
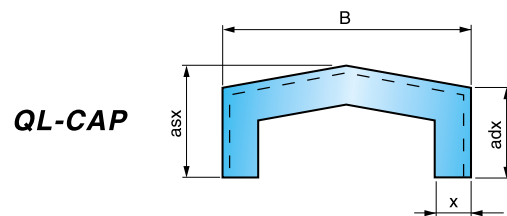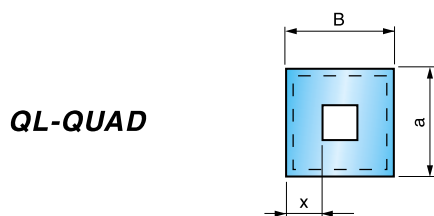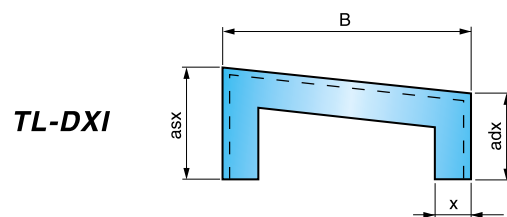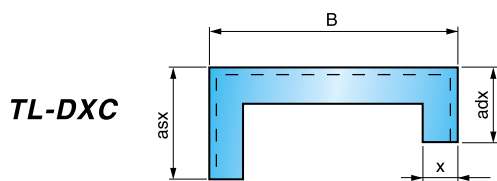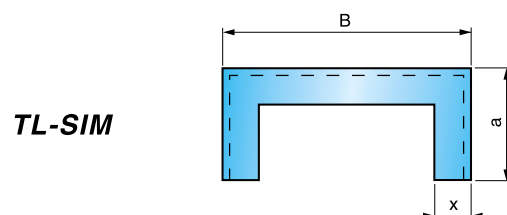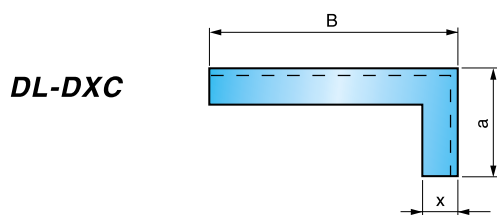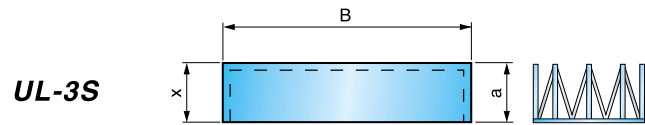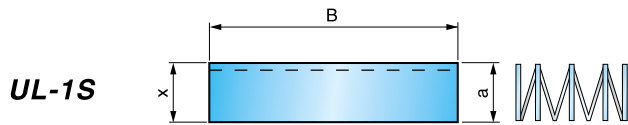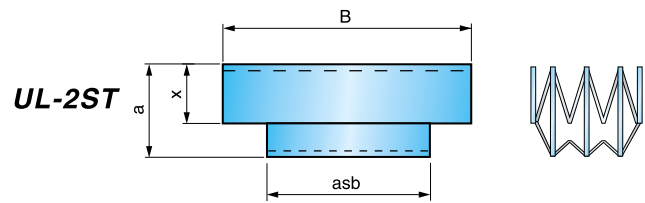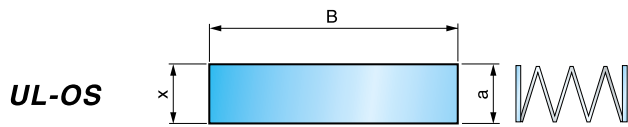
NOTE: The above are only the standard shapes of Thermic-Welded Covers.
Other shapes available upon request.

Thermic-Welded Cover materials

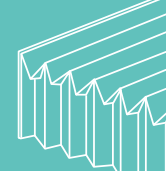| Fabric material code	Description			Thickness (mm)	Heat resistance			Primary resistance characteristics
	Visible side	Fabric insert	Internal side		Momentary contact °C	Continuous		
						min. °C	max. °C	
TEMAT 091	PVC	Fiberglass	PVC	0,44	+300	-30	+ 80	Fabric suitable for minor welding splatter. Also appropriate around acids. **Self-extinguishing**.
TEMAT 106	Ptfe	Polyester	Polyurethane	0,30	+200	-30	+120	Excellent resistance to oils and chemical products. No adhesive surface. Low friction coefficient. Excellent chemical inertia. Excellent resistance to abrasion and bending strength. **Mainly used in grinding machines.**
TEMAT 015	Polyurethane	Polyester	Polyurethane	0,25	+200	-30	+ 90	Excellent resistance to petroleum products, oils and heavy abrasion. Excellent bending strength.
TEMAT 151	Polyurethane	Polyester	Polyurethane	0,35	+200	-30	+ 90	
TEMAT 164	Polyurethane	Kevlar*	Polyurethane	0,35	+350	-30	+180	Excellent resistance to petroleum products, oils and heavy abrasion. Excellent bending strength. Excellent mechanical strength. Kevlar also has excellent shear strength. Normally used when there is heavy mechanical stress, a large amount of sharp shavings, and at high temperatures.
TEMAT 165	Polyurethane	Nomex*	Polyurethane	0,36	+300	-30	+130	Excellent resistance to petroleum products, oils and heavy abrasion. Excellent bending strength. Excellent mechanical strength. Good resistance to minor welding splatter or hot material. Widely used in laser cutting machines. **Self-extinguishing**.
TEMAT 169	Polyurethane	Panox*/Kevlar	Polyurethane	0,33	+300	-30	+130	Excellent resistance to petroleum products, oils and heavy abrasion . Excellent bending strength. Excellent mechanical strength. Good resistance to minor welding splatter or hot material. **It may be considered as the best fabric on the market for use in laser cutting machines. Self-extinguishing.**
TEMAT 017	PVC	Polyester	PVC	0,36	+100	-30	+ 70	Mainly used around heavy ambient dust, minor splatters of coolant and oil. Also suitable for use around acids.
TEMAT 020	PVC	Polyester	PVC	0,25	+100	-30	+ 70	

Stiffener materials

Stiffener material code	Description	Thickness (mm)	Notes
PVC 05	PVC	0,50 **	Outside width (B) up to 300 mm
PVC 10	PVC	1,00	Outside width (B) from 301 up to 700 mm
PVC 15	PVC	1,50	Outside width (B) from 701 up to 1500 mm

Flange materials

Flange material code	Description	Thickness (mm)
AL	Aluminum	2,0 - 3,0
AC	Steel	2,0 - 3,0 - 4,0
PVC	PVC	2,0 - 3,0

Lamination materials

| Lamination material code	Description	Primary applications
AL	Aluminum (Baked Enamel Finish)	For use around welding splatter, small and medium-sized hot shavings. Especially suitable for use around continuous sparks. Appropriate where lightweight materials are necessary.
INOX		In work environments with large shavings. Especially suitable for use around acids.

* Kevlar and Nomex are registered Dupont trademarks   ** NOT recommended for Thermic-Welded Covers with laminations.

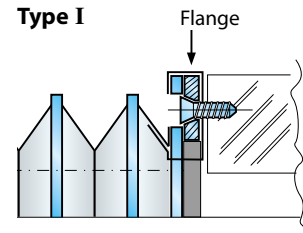Contact our engineering department for other materials and applications.

Flange Fastening Systems

Type A

Type I Flange

- Solution with sheet steel, aluminum or PVC flange
- Shape and holes per customer drawings
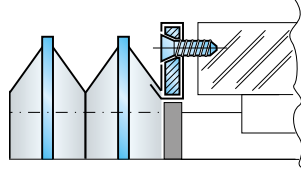
Type B1

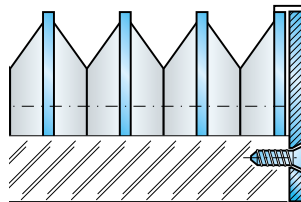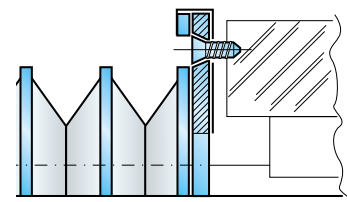**Type B2**

- Solution with sheet steel, aluminum or PVC flange
- Shape and holes per customer drawings
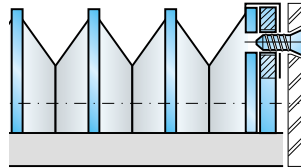- Solution with connector flange protruding from the cover profile, made of sheet steel, aluminum or PVC

Type C

- Solution with sheet steel flange
- Shape and holes per customer drawings
- Threaded flange holes

Type E PVC cover stiffener / Strip of Velcro applied to the machine

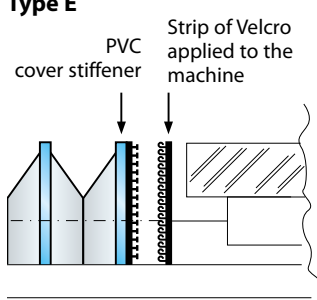**Type H** Flange / PVC stiffener / Strip of Velcro applied to the machine

Solution with rapid VELCRO connection.
A PVC support acts as a flange, with VELCRO strips applied to the stiffener and directly to the machine.
This solution offers:
- Rapid application and removal of the cover
- Low cost
Recommended for dry work environments

Type F PVC stiffener / Flange

Type G Entire fold in PVC / PVC Stiffener / Flange / Counterflange
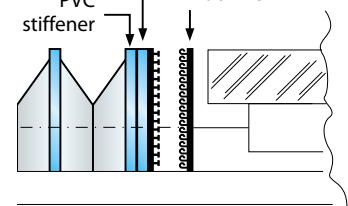
Solution with STRONG HOLD rapid connection.
A PVC support and flange act as a flange, to which the STRONG HOLD rapid connection is applied. The flange is made of sheet steel, aluminum or PVC, shape and holes per customer drawings. This solution offers:
- Rapid application and removal of the cover
- Foam gasket strip provides a tight seal around the connection
Recommended for wet work environments
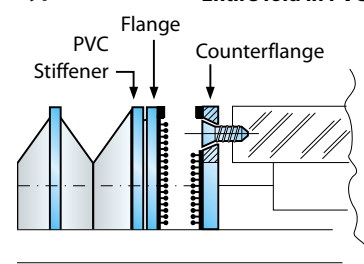
THERMIC-WELDED COVER: EVER-CLEAN

- The **construction of the corner** is the main feature of this thermic-welded bellow.
- The bellow is guaranteed to be **free from chips and sludge**, there are no creases in the fabric which obstruct the chip conveyor.
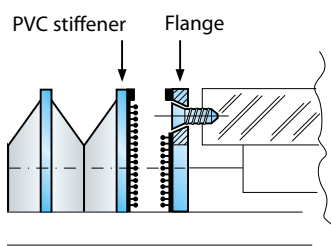- The **closed length** of the bellow is **smaller** than traditional thermic-welded bellows due to the absence of folds of fabric in the corners.
- The **range of geometry** possible for manufacture **has increased**.
- **Structural rigidity** has increased in applications where only one bellow must cover the crossbar and roof of the machinery.
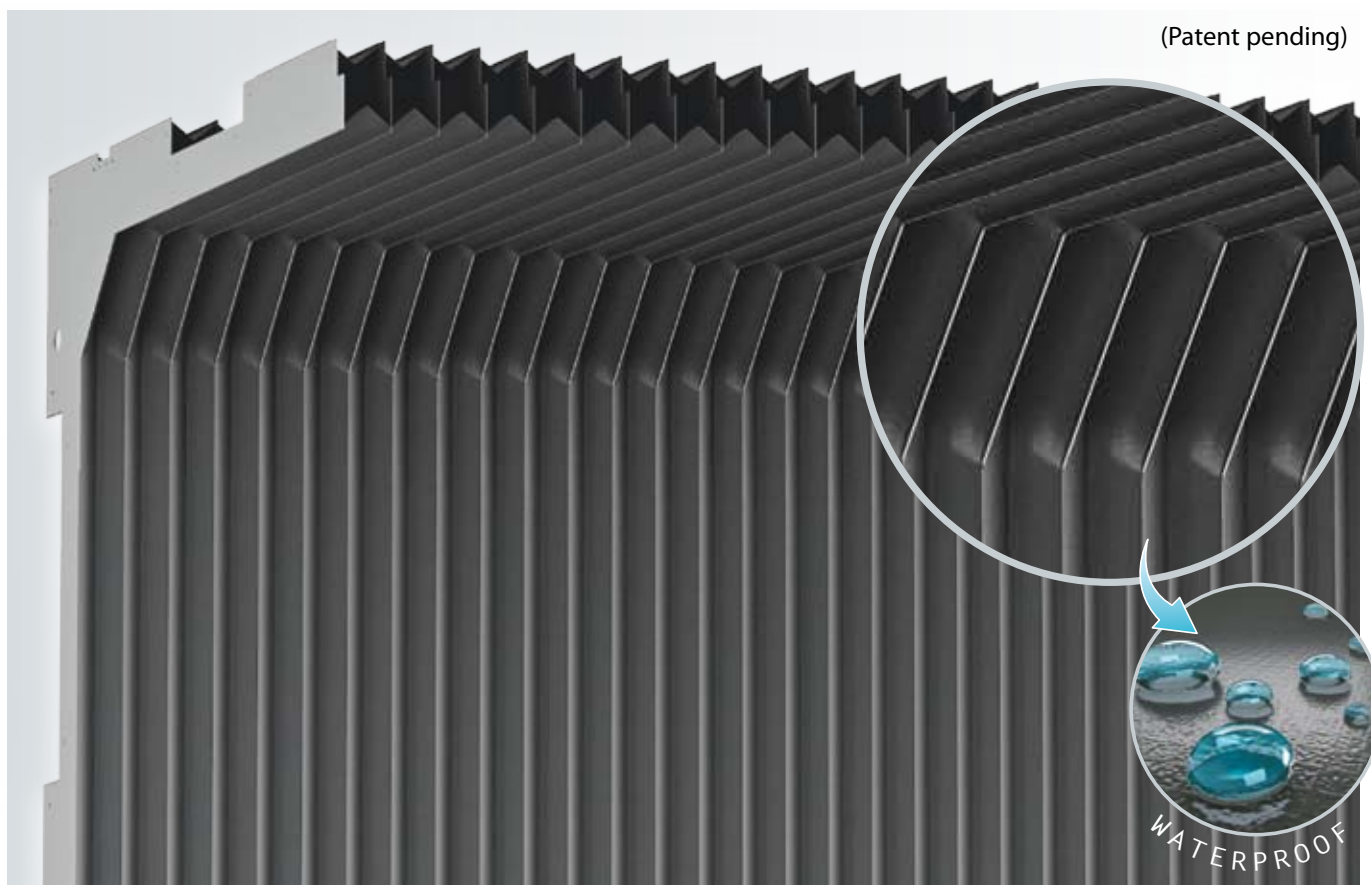
(Patent pending)

WATERPROOF

Formula for calculating the CLOSED LENGTH

Closed Length = Fabric thickness x 4,5

Formula for calculating X1

$X1 = X \times 2$

For this type of bellow consult our technical office.
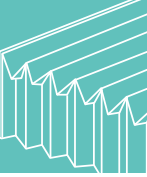
THERMIC-WELDED COVER WITH LAMINATIONS: MULTI-STEEL

- Thermic-welded bellows with laminations on many sides are the ideal solution for **complete protection of the roof and crossbar** in multi-shaft working centres.
- The corners are closed and steel inox laminations applied with a **perfect 90° fold** in merit of the elastic deformation of the material and a special geometry.
- **More than two sides** can be covered and **with different angles**.

(Patent pending)

For this type of bellow consult our technical office.

Thermic-Welded Covers for Linear Slides

Example of bellows mounted on linear slides
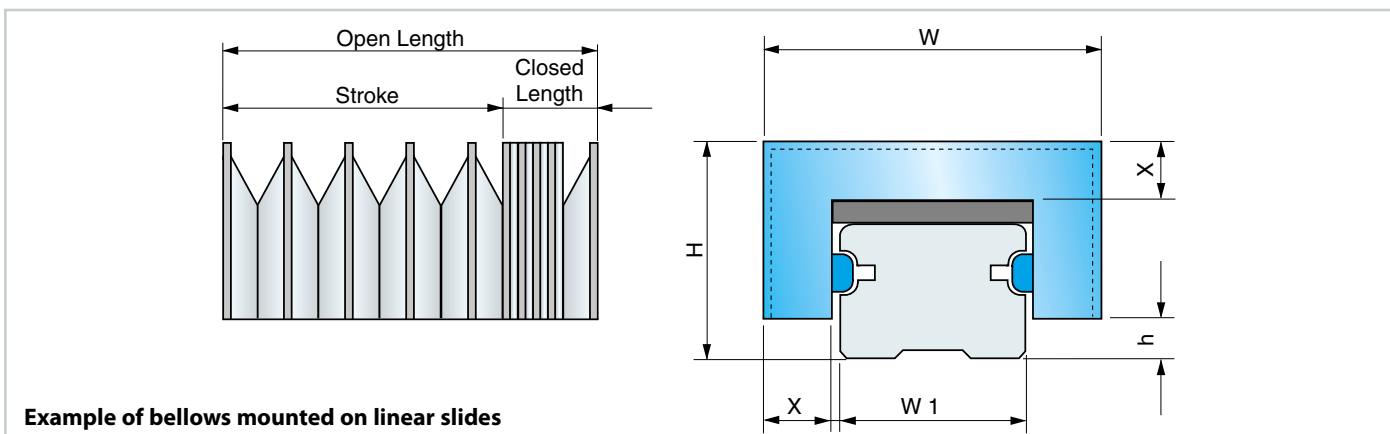
List of Standard Material

Type of material	Stiffener	Fabric material	Closed length for 1000 mm of open length
S1	PVC 0,50	PVC + Polyester + PVC 0,25 (TEMAT020)	90
P1	PVC 0,50	Polyurethane + Polyester + Polyurethane 0,25 (TEMAT015)	90
LX	PVC 1,00	Polyurethane Panox/Kevlar + Polyurethane 0,33 (TEMAT169)	150

Standard Thermic-Welded Covers Size

Slide nominal value	Ply height	Bellow width	Total height	Slide deviation
W1	**X**	**W**	**H**	**h**
15	19	56	36	5
20	19	61	40,5	5
25	19	67	43	7,5
30	19	72	51	8
35	19	76,5	51	9
45	19	87,5	61	10
55	25	108	73	15
65	32	132	90	15

NOTE: For the W1 slide over size 65, please contact our Technical Dept.

Example of the identification code of a Thermic-Welded Cover for Linear Slides complete with flange

Slide manufacturer	THK
Slide model	HSR
Slide nominal value (W1)	35
Open length (stroke + closed length)	1500
Type of material	P1
Flange fixing system	A-A (see page 37)

Questionnaire for Thermic-Welded Covers for Linear Slides

❗ **Slide Manufacturer** ....

❗ **Slide Model** ....

❗ **Slide Nominal Value (W1)**   ❑ 15   ❑ 20   ❑ 25   ❑ 30
❑ 35   ❑ 45   ❑ 55   ❑ 65

❗ **Open length (Stroke + Closed length)** ....**mm**

❗ **Fabric type**   ❑ S1   ❑ P1   ❑ LX

❗ **Fastening system on guide top**   ❑ Solution A with clamps
❑ Solution B1 with flange in PVC

❗ **Fastening system to table**   ❑ Solution A with clamps
❑ Solution B2 with flange in PVC

❗ **Company name** ....

Phone:...

E-mail:. ....

Quantity:..

Annual demand: ....

....

Date:...

Notes:...

....

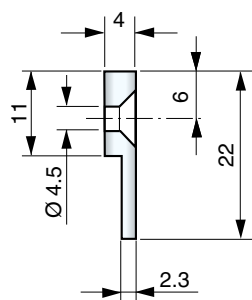...
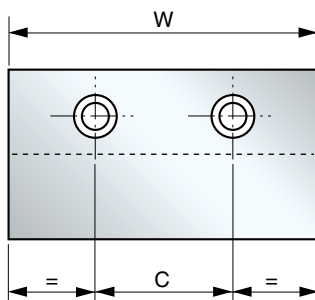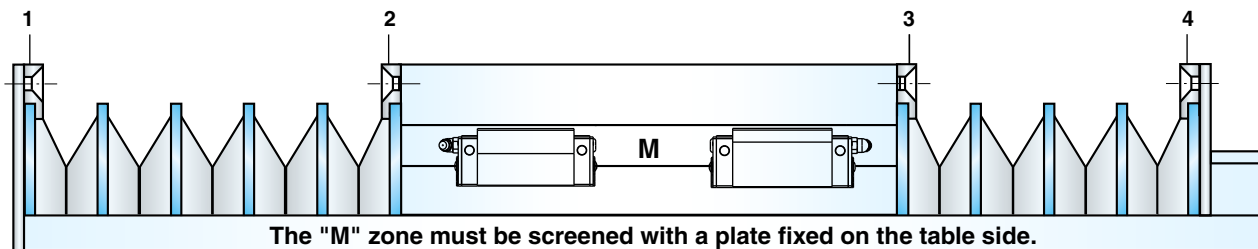
NOTE: The data fields and/or tables marked by ❗ are the least ones to be filled in order to give you a quotation. Please send an e-mail to info@pei.eu or a fax to +39 051 6464840.

Thermic-Welded Covers Standard Systems for Linear Slides

Solution A: Fastening holdfast

The "M" zone must be screened with a plate fixed on the table side.

SLIDE	W	C	N. HOLES
15	52	26	2
20	57	29	2
25	63	32	2
30	68	34	2
35	72	36	2
45	83	28	3
55	104	35	3
65	128	32	4

Suitable for bellows fastening in positions 1 - 2 - 3 - 4, with angular or plate supports provided by customers

### Solution B: Velcro flange fastening (B1 and B2)

The "M" zone must be screened with a plate fixed on the table side.

Standard flange Type B1 in PVC

Standard flange Type B2 in PVC
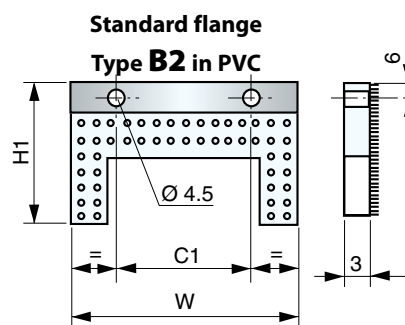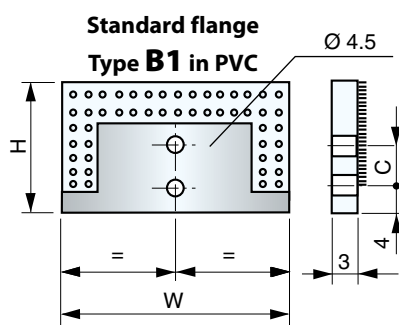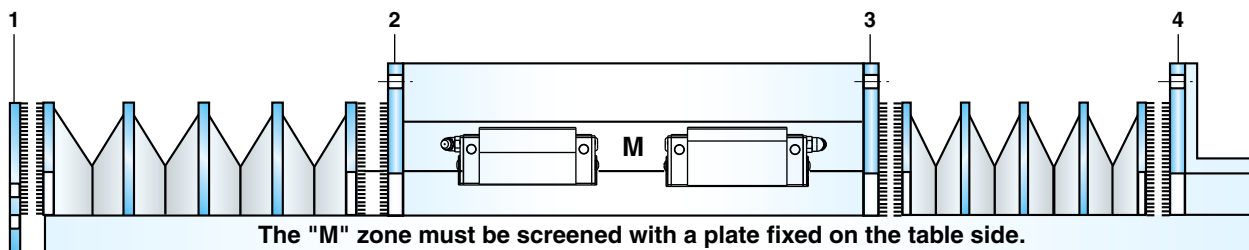
SLIDE	W	H	C	H1	C1	N. HOLES
15	56	36	0	42	26	2
20	61	40,5	8	46,5	29	2
25	67	43	8	46,5	32	2
30	72	51	8	54	34	2
35	76,5	51	18	53	36	2
45	87,5	61	18	62	28	3
55	108	73	18	69	35	3
65	132	90	18	86	32	4

Pos.1   a) Fix the type 1 standard flange at the head of the slide.
             b) Fix the bellows to the type 1 standard flange by pressing strongly.
Pos.2-3 a) Fix the table or the mounting plate to the type 2 standard flange by means of screws.
             b) Fix the bellows to the type 2 standard flange by pressing strongly.
Pos.4   a) Fix the type 2 standard flange to the angular support provided by the customer by means of screws.
             b) Fix the bellows to the type 2 standard flange by pressing strongly.

N.B.   Fastening options showed in Pos. 1-4 are interchangeable

This technical card represents the standard systems used for the fastening of bellows for linear slides we can provide. For different sizes, please contact our technical department.
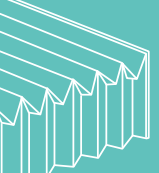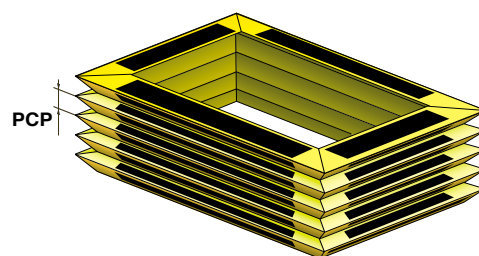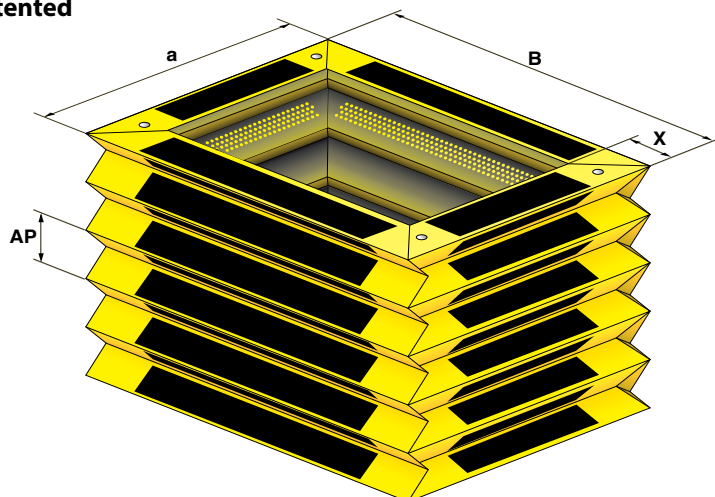
BELLOWS FOR HOISTING PLATFORM

- Prevention of impediment of the hoist pantograph
- Protection from dust, dirt or foreign particles

Bellows Duratite™

Patented

Formula for calculating the CLOSED LENGTH

$$\textbf{P.C.} = NP \cdot PCP + 10 \text{ mm}$$

$$\textbf{NP} = \text{Number of folds} = \frac{\text{P.A.}}{\text{AP}}$$

X	AP	PCP	Material	Color	Reference code
38	55	10	PVC/PU	Yellow/Black	DM-PU-G
			PVC/PU	Black	DM-PU-N
67	100	10	PVC	Yellow/Black	DM-PU-G
			PVC	Black	DM-PU-N
89	125	10	PVC	Yellow/Black	DM-PU-G
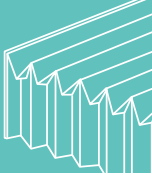
BELLOWS FOR HOISTING PLATFORM

Thermic-welded Bellows
Type QL-RETT
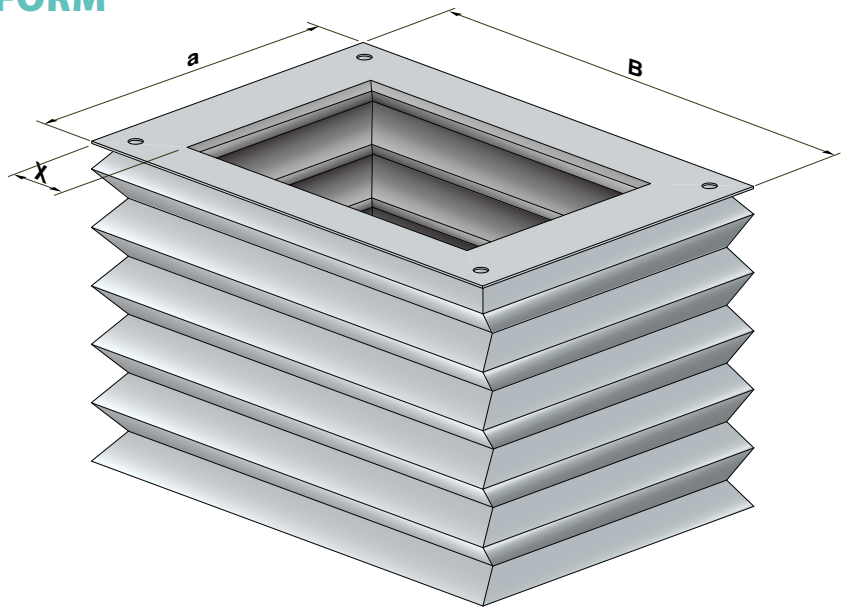
- All calculation formulas are shown on page 27.

Systems for fastening Bellows for Lift Tables

I	**B**	**E**	**CI**	**CE**
Solution with sheet steel, aluminum or PVC flange. Shape and holes per customer drawings.	Solution with sheet steel, aluminum or PVC flange. Shape and holes per customer drawings.	Solution with rapid VELCRO connection. This solution offers: • Rapid application and removal of the cover • Low cost	Bellows inner collar. Suitable for screw fastening.	Bellows outer collar. Suitable for screw fastening.

EXAMPLES OF APPLICATION:

- **Closing of upright doors**
- **Closing of storehouse rooms and interspaces**
- **Protection of level changing in assembly lines of the manufacturing industry**
- **Base protection of medical equipment**
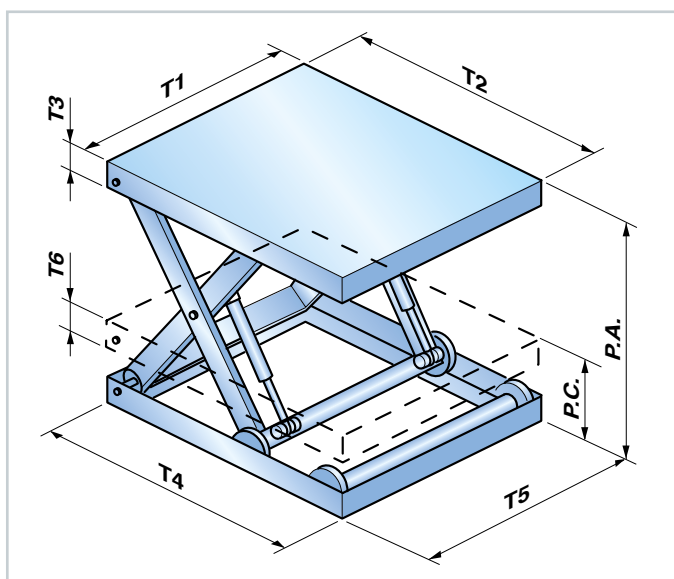
Questionnaire for hoisting platforms BELLOWS:

a = ... mm
B = ... mm
X = ... mm

Questionnaire for HOISTING PLATFORMS:

T1 = ... mm
T2 = ... mm
T3 = ... mm
T4 = ... mm
T5 = ... mm
T6 = ... mm
P.A. = ... mm
P.C. = ... mm
NP = ... mm

Upper side fastening	❏ I	❏ B	❏ E	❏ C I	❏ CE
Lower side fastening	❏ I	❏ B	❏ E	❏ C I	❏ CE

NOTE: The data fields and/or tables marked by ❗ are the least ones to be filled in order to give you a quotation. Please send an e-mail to info@pei.eu or a fax to +39 051 6464840.

FLAT COVERS GLUED AND SEWN

Type CL-SIM

Glued style "A"

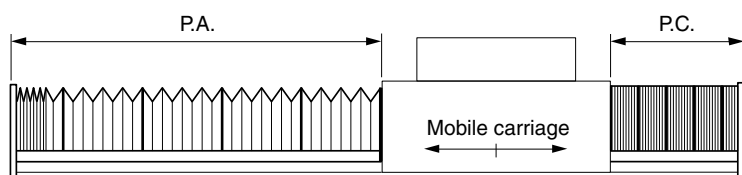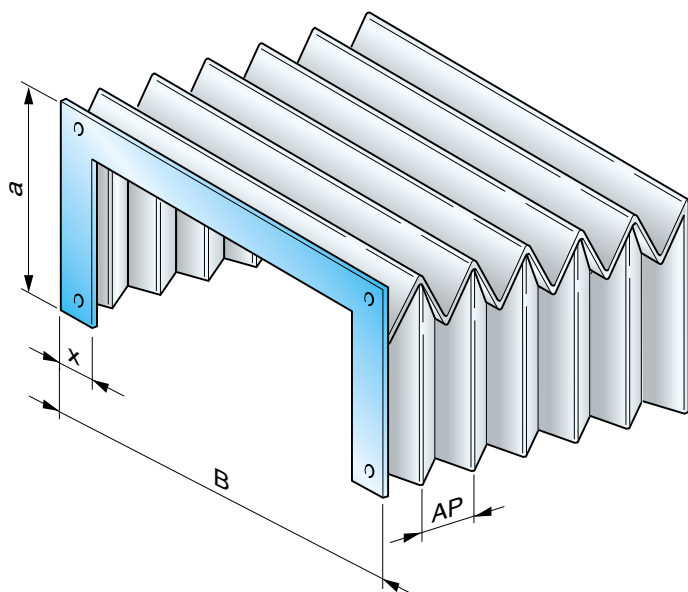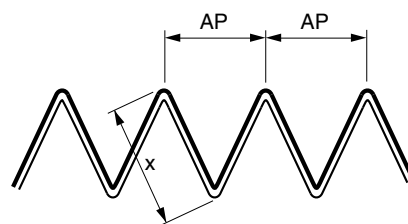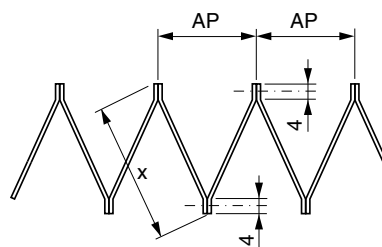### Formula for calculating the CLOSED LENGTH

$$P.\,C. = NP \cdot 4 + \text{flange thickness}$$

$$NP = \text{Number of folds} = \frac{P.A.}{AP} + 2$$

$$AP = \text{Opening of 1 fold} = x \cdot 1{,}41$$

Type TL-SIM

Sewn style "C"

Formula for calculating the CLOSED LENGTH

$$P.\,C. = NP \cdot 2{,}5 + \text{flange thickness}$$

$$NP = \text{Number of folds} = \frac{P.A.}{AP} + 2$$

$$AP = \text{Opening of 1 fold} = (x-8) \cdot 1{,}41$$

Mobile carriage
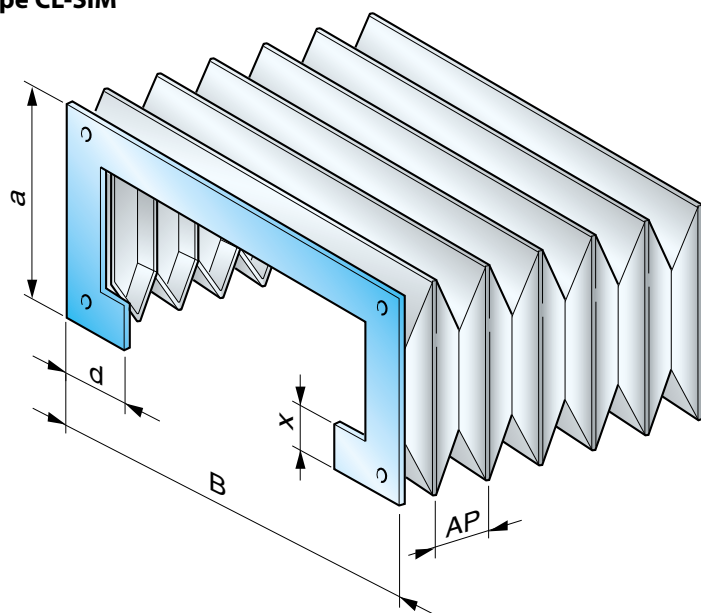
Contact our engineering department for this type of cover.

Ref.	Description	Dim.	Type	Style
❗ P.A.	Open length			
❗ P.C.	Closed length			
❗ Stroke	(P.A. - P.C.)			
❗ a	Outside height			
❗ B	Outside width			
❗ x	Fold height			
❗ d	Return dimension			
❗ AP	Fold opening			
❗ NP	Number of folds			

NOTE: The data fields and/or tables marked by ❗ are the least ones to be filled in order to give you a quotation. Please send an e-mail to info@pei.eu or a fax to +39 051 6464840.
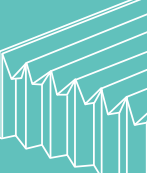
BELLOWS FOR LASER AND PLASMA MACHINES
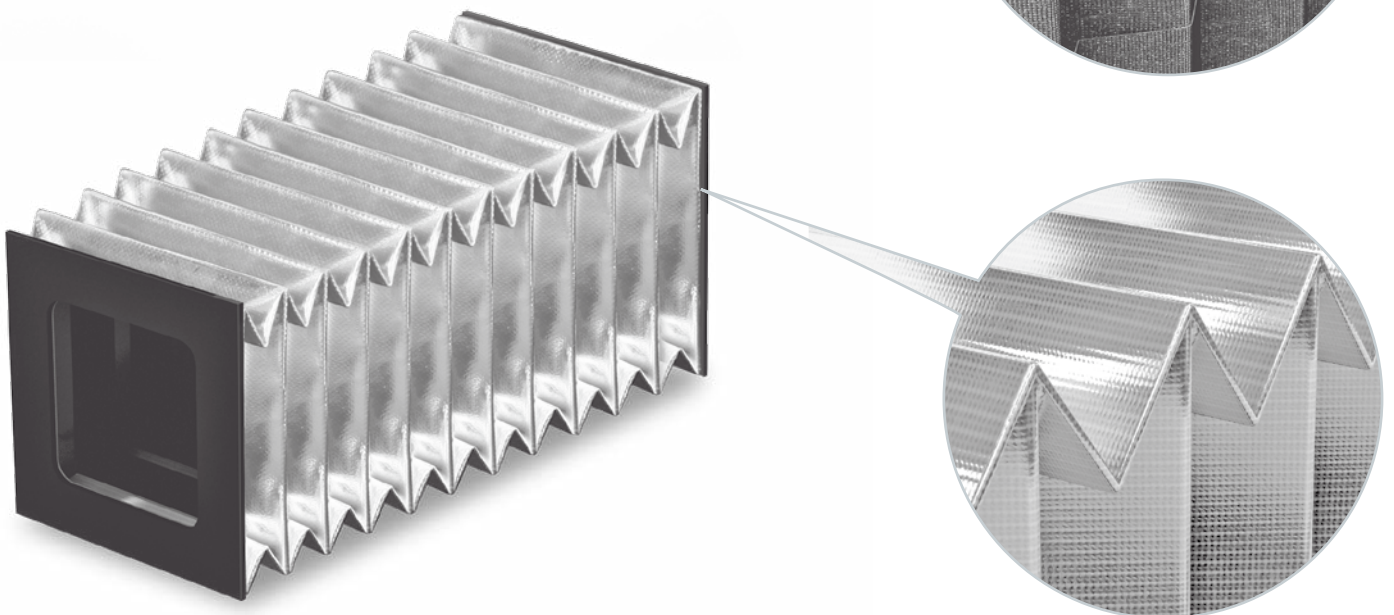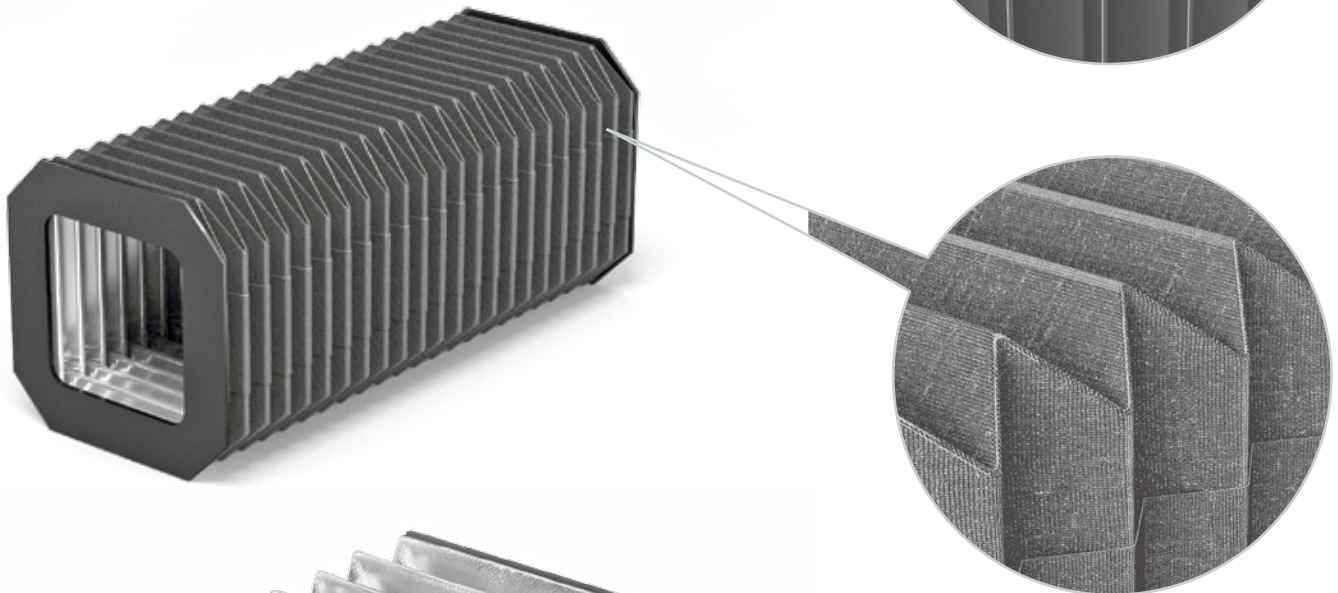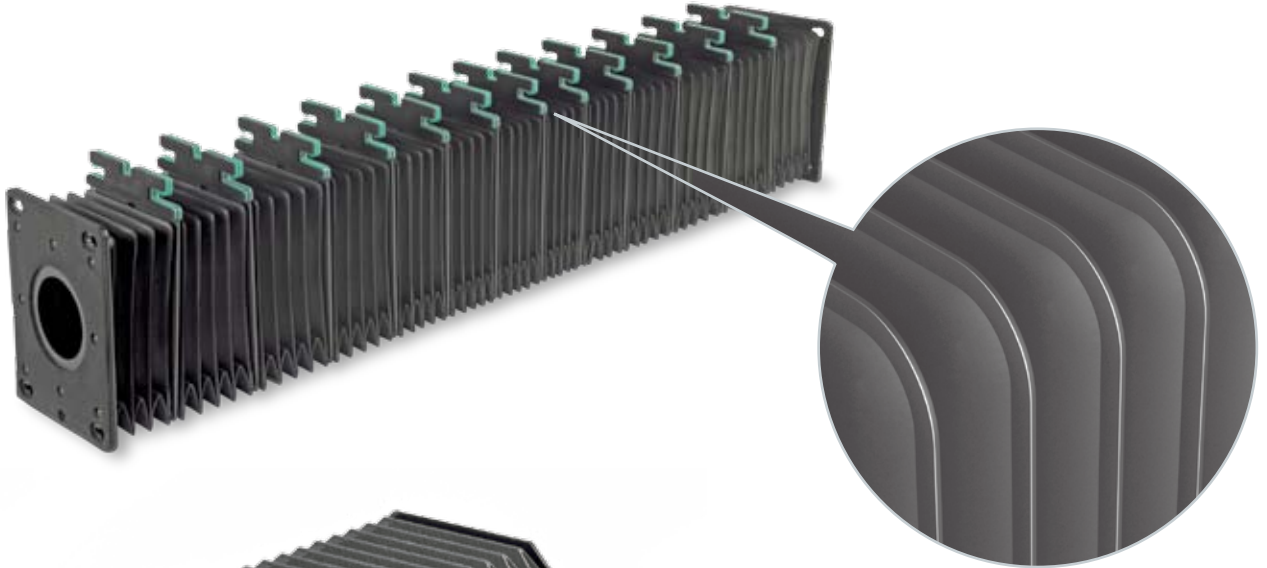
BELLOWS FOR OVERHEAD PROTECTION FOR PORTAL MILLING MACHINES: WAVE SKY

- **WAVE SKY** is a bellow that limits the escape of fumes, dust and chips from the workstation area.
  WAVE SKY bellow reduces the suction force created during working: carbon fibres, composite materials and vaporised cooling lubricant.
  The special translucent fabric guarantees ample light in the work area.
  The motorised version makes for a quick opening and closing of the overhead apparatus.
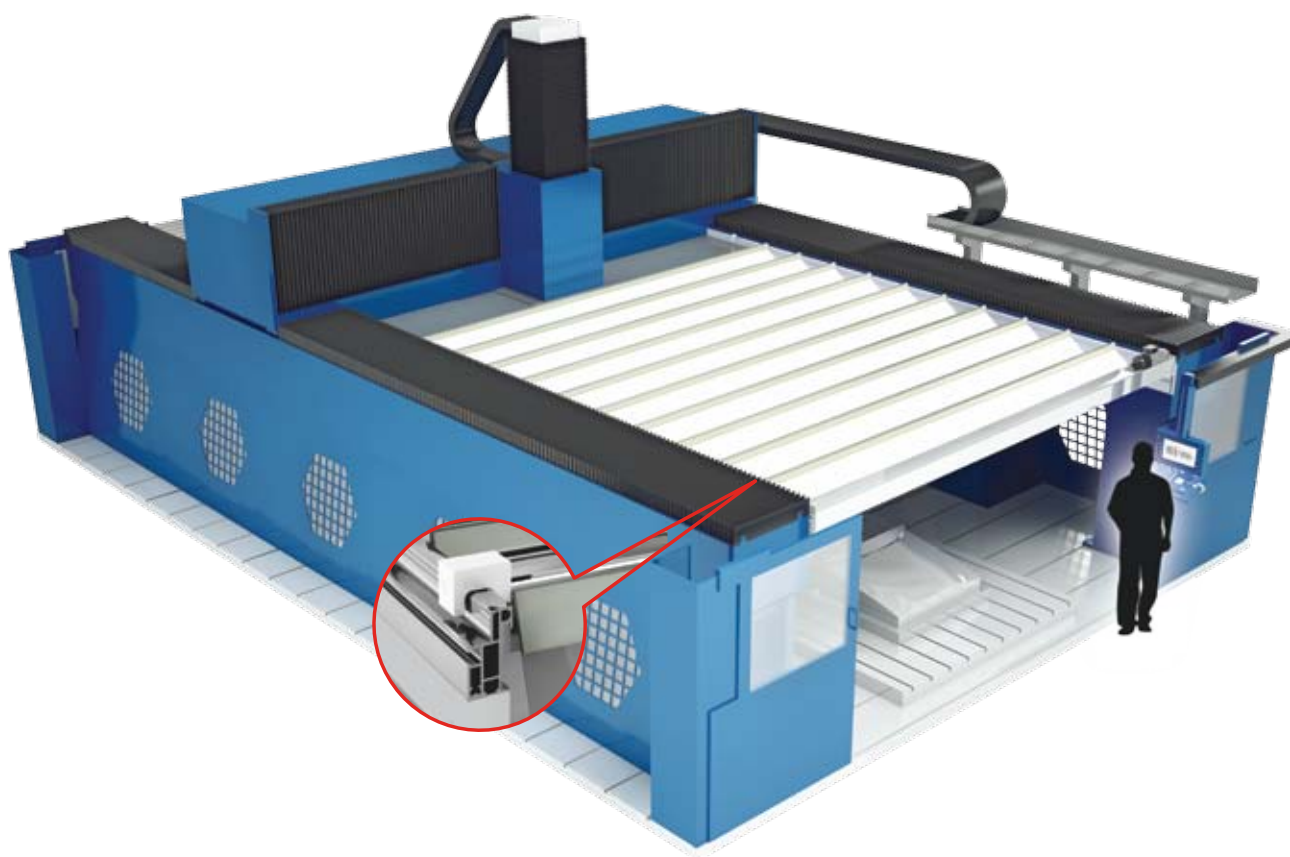
TECHNICAL SPECIFICATIONS

✔ **MAX SPEED:** 90 mt/min.

✔ **MAX ACCELERATION:** 1g

✔ **MAX WIDTH BETWEEN GUIDES:** 8.000 mm

✔ **MAXIMUM STROKE:** 25.000 mm

✔ **STANDARD FOLD HEIGHT:** 200 / 250 / 300 mm
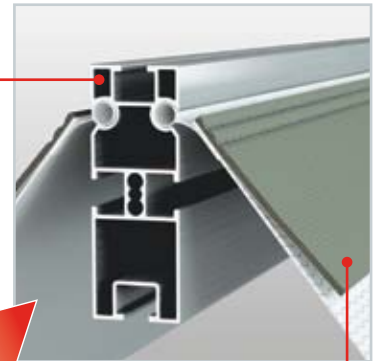
EXAMPLE OF APPLICATION

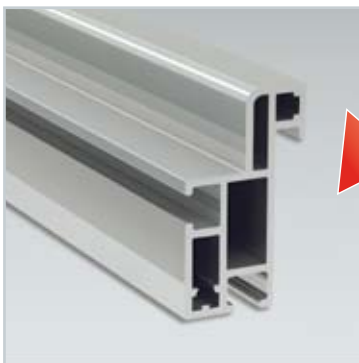# BELLOWS FOR OVERHEAD PROTECTION FOR PORTAL MILLING MACHINES: WAVE SKY

Sliding along the aluminium guides is ensured by **rollers**

Structural **aluminium frames**
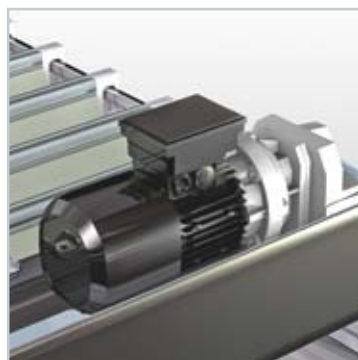
Soundproof fabric for damping at full stroke
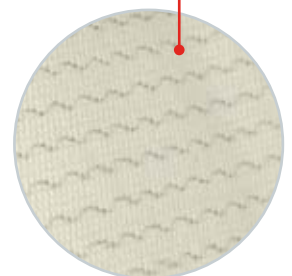
Lateral guides **modular** and **adjustable**

Bellow cover in **translucent** and **double weave fabric TEMAT 154**

Guide cover casing

Automatic motorisation opening/closing available on request

Code	Description of materials			Thickness	Heat resistance		Primary resistance characteristics
	Visible side	Fabric insert	Hidden side		Momentary contact °C	Continuous °C	
TEMAT154	Polyurethane	Polyester	Polyurethane	0,9	+130	-30 +90	Excellent resistance to petrol based products, oils and strong abrasion. The textile insert is made of a special fabric with high rigidity in the diagonal weave plus an aesthetically pleasing appearance. It is normally used in environments where there are large quantities of chips. **TRANSLUCENT and ANTI-STATIC.**
TEMAT180	CPT**	Polyester	-	1,6	+1200	-25 +300	**CERAMIX** has an excellent abrasion resistance and excellent shear strength. **CERAMIX** shows excellent resistance to mineral oils and hot temperatures. The two-ply fabric insert gives an high transverse rigidity and a very attractive appearance. In **WAVE-SKY** only **CERAMIX** is used in the bellow folds close to the working area, when large quantities of **ALUMINUM** hot and shearing shavings are produced, in cases of high speed chip-removing dry work environments. **ANTISTATIC-PROOF and SELF-EXTINGUISHING.**

** Ceramic Polymer Technology